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TRANSPORTATION RESEARCH BOARD

TRB Webinar: Visualizing Transportation System Performance

May 17, 2021

1:00- 3:00 PM Eastern

@NASEMTRB
#TRBwebinar

PDH Certification Information:

- 2 Professional Development Hours (PDH) – see follow-up email for instructions
- You must attend the entire webinar to be eligible to receive PDH credits
- Questions? Contact Reggie Gillum at RGillum@nas.edu

#TRBwebinar

The Transportation Research Board has met the standards and requirements of the Registered Continuing Education Providers Program. Credit earned on completion of this program will be reported to RCEP. A certificate of completion will be issued to participants that have registered and attended the entire session. As such, it does not include content that may be deemed or construed to be an approval or endorsement by RCEP.

RCEP

REGISTERED CONTINUING EDUCATION PROGRAM

Learning Objectives

- Describe how visualization approaches can report transportation system performance to a broad audience
- Identify benefits of visualization techniques

#TRBwebinar

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VISUALIZING TRANSPORTATION SYSTEM PERFORMANCE

MAP-21 Reliability Measure Target Setting Approach for Interstates in Virginia

Traffic Engineering Division, VDOT
Simona Babiceanu || Sanhita Lahiri, P.E., PTOE

May 17, 2021

Please Note!

Disclaimer:

The visualizations, and the interpretations shared in this presentation are from our ongoing research on MAP-21 Reliability Measure Target Setting methodology for Interstates in Virginia. While these interim findings will inform the methodology, as the research progresses and new findings surface, we will keep refining the direction towards the final methodology.

MAP-21 Reliability Performance Measures

Interstate Travel Time Reliability Measure:

- **Percent of person-miles traveled that are reliable per year**

  Condition of Segment Unreliability –
  - Level of Travel Time Reliability (LOTTR) ≥ 1.5
  - Even if one NHPP time period is unreliable

- $$\mathbf{LOTTR} = \frac{\mathbf{80th\ percentile\ Travel\ Time}}{\mathbf{50th\ percentile\ Travel\ Time}}$$

  Calculated –
  - For each NHPP time period
  - For the entire year

National Highway Performance Program (NHPP)

Time Periods:

Weekdays:
- 6a - 10a (AMP)
- 10a - 4p (MIDD)
- 4p - 8p (PMP)

Weekends
- 6a - 8p (WE)

MAP-21 Interstate Reliability Measure

$$\text{IS\_TT\_Reliability} = \frac{\sum_{r=1}^{RI} (SL)_r \times [DIR\_AADT]_r \times (\text{number of days in the data year}) \times [OCC\_FAC]_r}{\sum_{r=1}^{IS} (SL)_r \times [DIR\_AADT]_r \times (\text{number of days in the data year}) \times [OCC\_FAC]_r} \times 100$$

Percent of person-miles traveled that are reliable for a year (%PMTR) for the Interstate System in VA

Must be calculated by that year's

- **NPMRDS data set**
- **TMC network (2021 submittal will be by 2020 TMC network)**

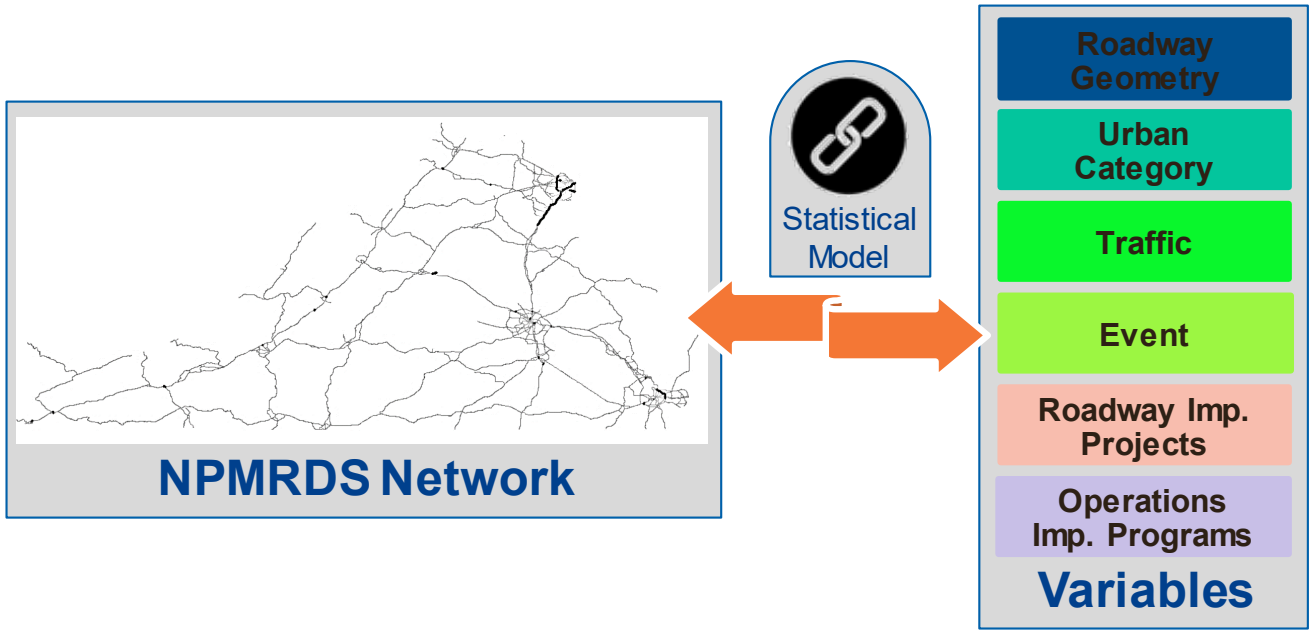
TT Reliability: *https://www.fhwa.dot.gov/tpm/guidance/hif18024.pdf*
HPMS Guidance: *https://www.fhwa.dot.gov/tpm/guidance/pm3_hpms.pdf*

- **Variables that can change based on *Change in TMC Network*:**
  - IS – Total number of reporting segments on the Interstate NHS System
  - SL – Segment Length i.e. the length of a TMC (same TMC ID)
  - AADT**

Develop Model for Target Setting

1. **Establish Model**
   - Relationship between multiple independent variables and LOTTR*
2. **Determine Statistical Significance of independent variables**
3. **Validate model**
   - Compare predicted vs actual LOTTR

*LOTTR or a dependent variable that can be used to calculate LOTTR



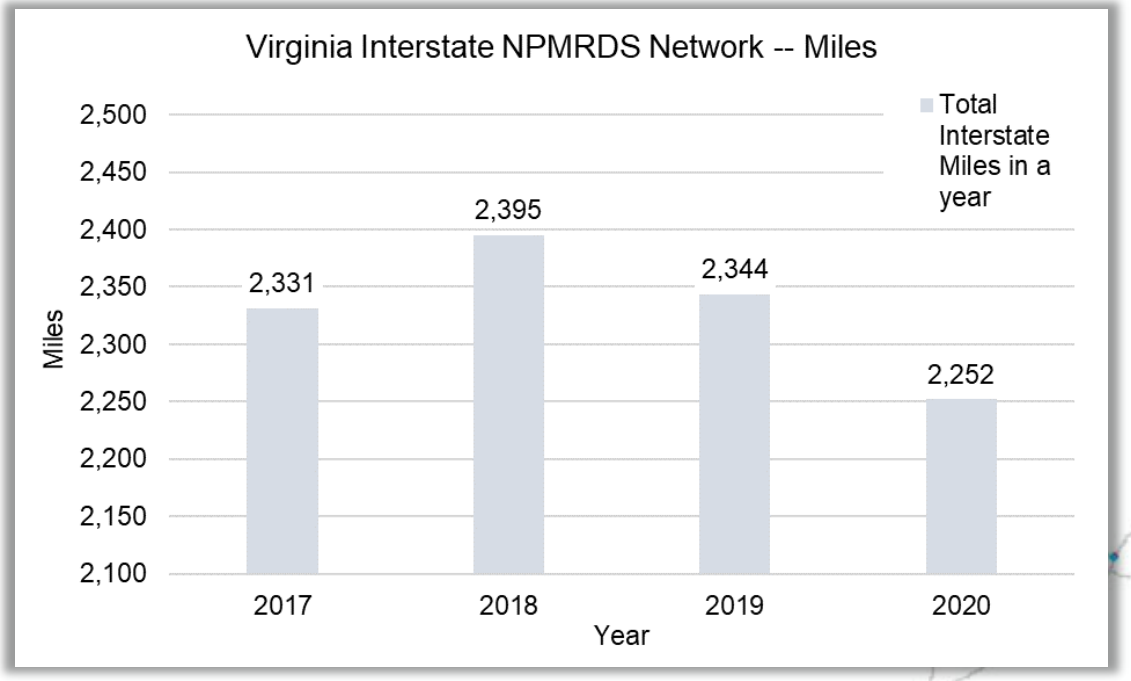
Predict Reliability

1. Project future variables (Volume, number of lanes, etc)
2. Estimate future LOTTR for future Variables
   - Each Segment
   - Each Time Period
3. Estimate %PMTR for future year

Set Target for Percent of Person Miles traveled Reliable

- ✓ Estimated %PMTR
- ✓ Strategic Considerations

TMC Network Segments – Inconsistent Inclusion



Data Source for Independent Variables

Roadway Geometry

- VDOT Internal Database
- Google Earth
- Network – NPMRDS Data Set

Urban Category

- US Census Designations

Traffic

- VDOT Internal Database
  - Hourly Volume Profile
  - Heavy Vehicle %
- RITIS NPMRDS
  - AADT, Travel Time

Event

- VDOT Internal Database

Roadway Improvement Projects

- VDOT Internal Database*

Operations Improvement Programs

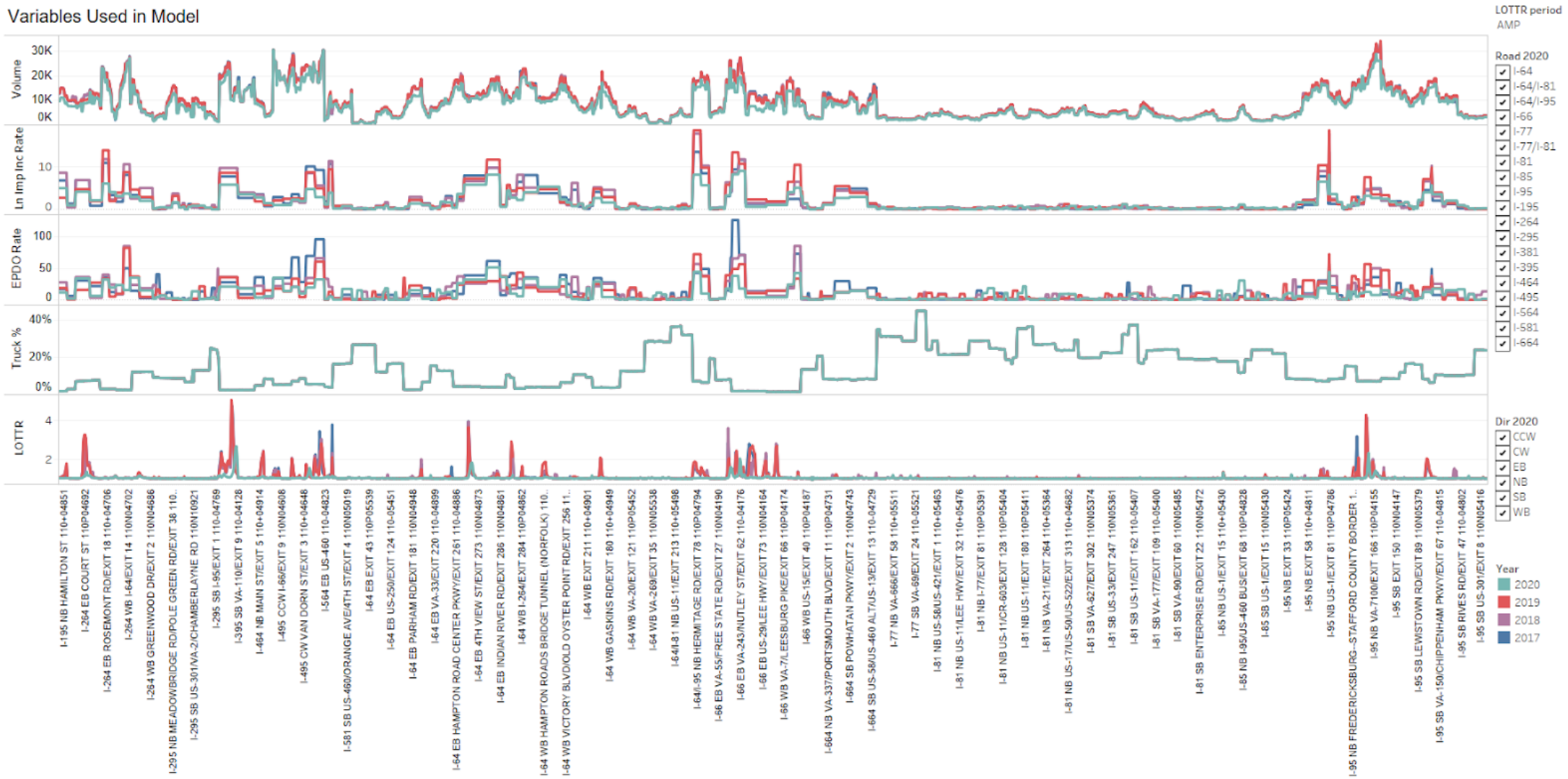
- VDOT Internal Database*

** Not yet Applied in Model*

Data Exploration

Concurrent Visualization

Tableau



Concurrent Visualization – By Corridor

Tableau

Example:

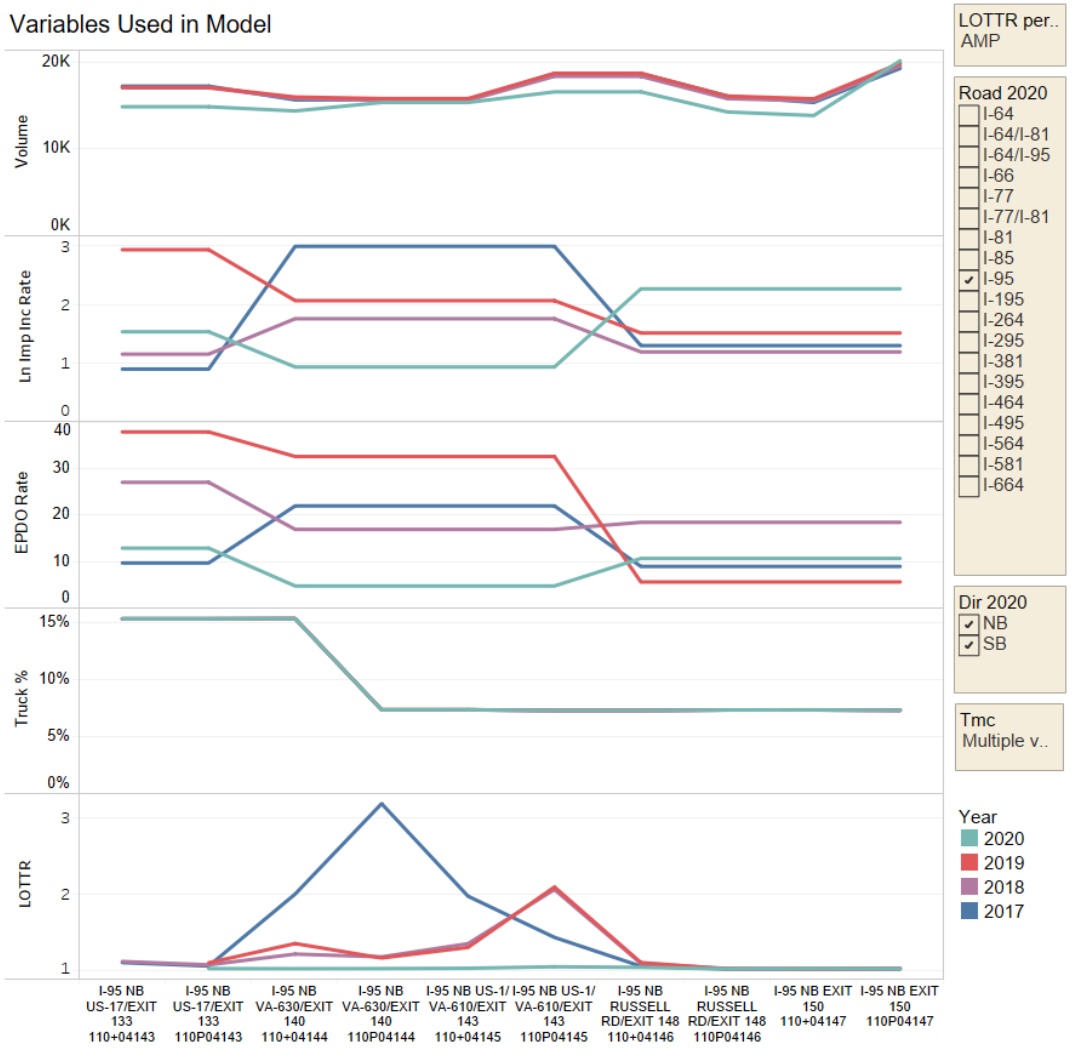
I-95 NB, Stafford County, AM Peak

- **Unreliable in 3 years**
- **High Truck % upstream of Unreliable section**
- **Crashes vary from year to year**
- **High Volume**

Strategic Considerations for Corridor Section with multiple needs (economic, multimodality, etc. not shown):

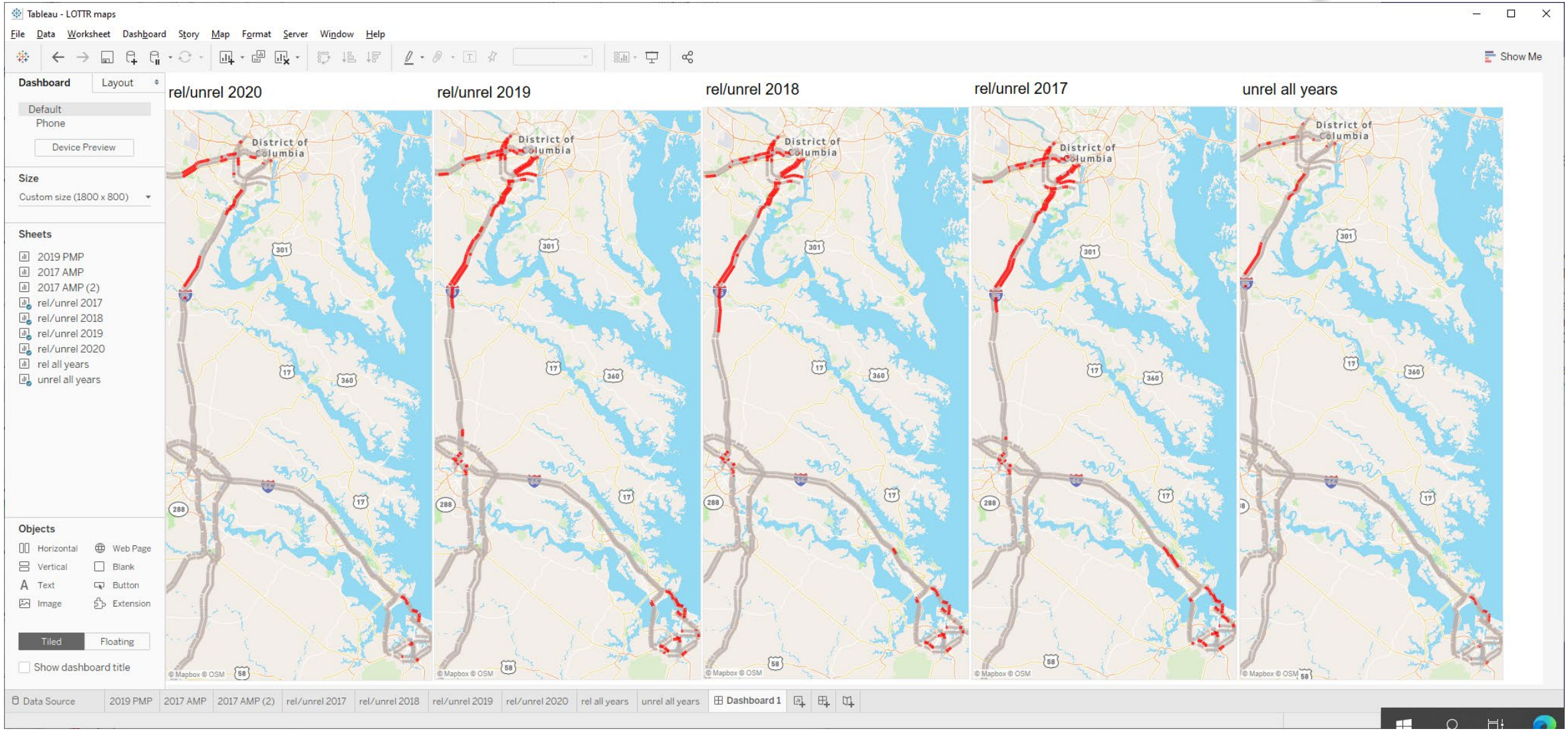
- Will the planned Projects/Programs improve reliability to push LOTTR below 1.5?

If NOT – No contribution towards State's Reliability Target



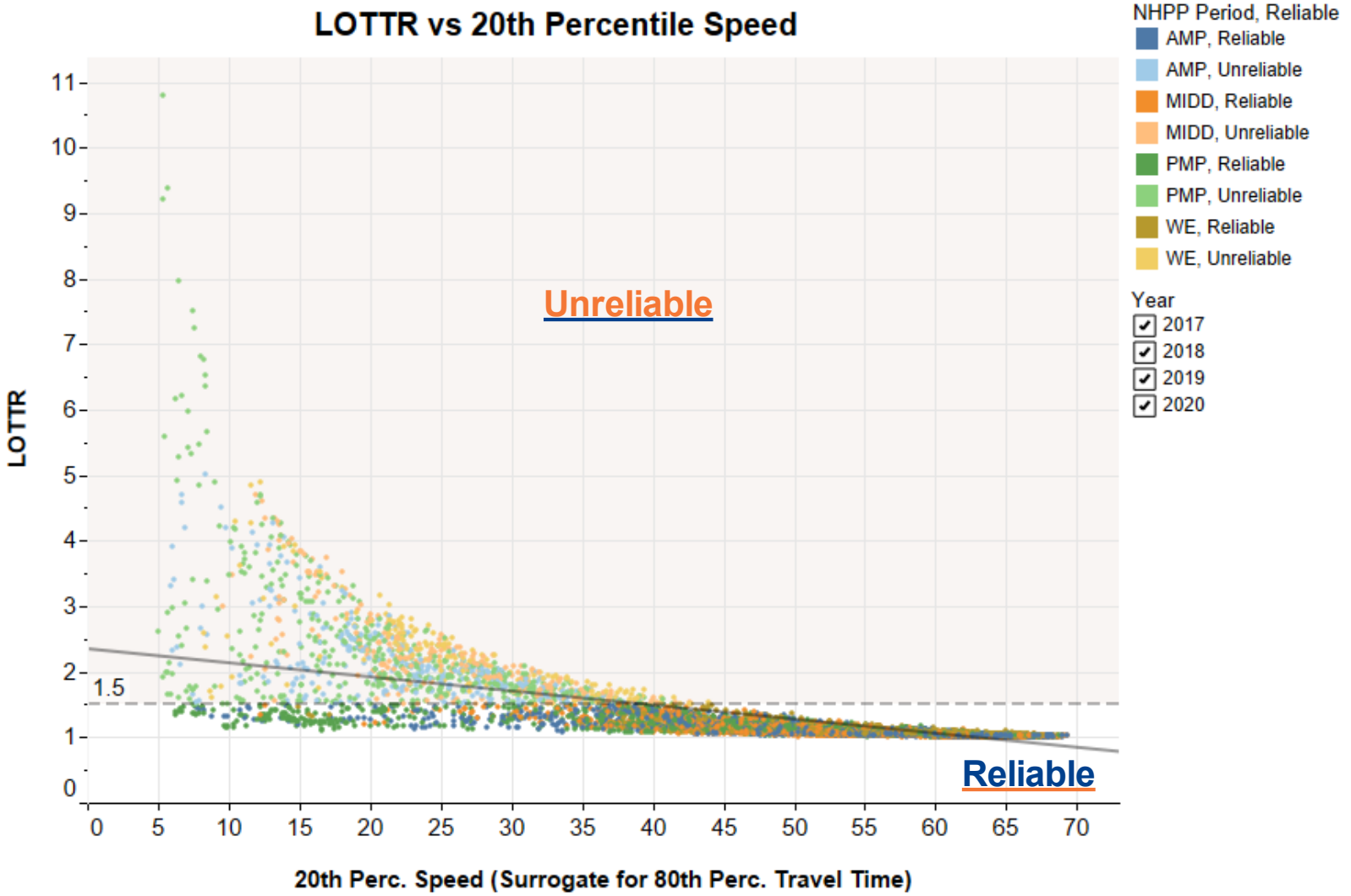
Data Exploration

Concurrent Visualization



Reliability Relationship on Virginia Interstate

Tableau



NHPP Period, Reliable
- AMP, Reliable
- AMP, Unreliable
- MIDD, Reliable
- MIDD, Unreliable
- PMP, Reliable
- PMP, Unreliable
- WE, Reliable
- WE, Unreliable

Year
- ☑ 2017
- ☑ 2018
- ☑ 2019
- ☑ 2020

Describe Trend Model

Trend Lines Model

A linear trend model is computed for sum of Lottr given sum of spd 20PCT. The model may be significant at p <= 0.05.

Model formula:	(spd 20PCT + intercept)
Number of modeled observations:	27271
Number of filtered observations:	0
Model degrees of freedom:	2
Residual degrees of freedom (DF):	27269
SSE (sum squared error):	1372.58
MSE (mean squared error):	0.0503348
R-Squared:	0.506735
Standard error:	0.224354
p-value (significance):	< 0.0001

Individual trend lines:

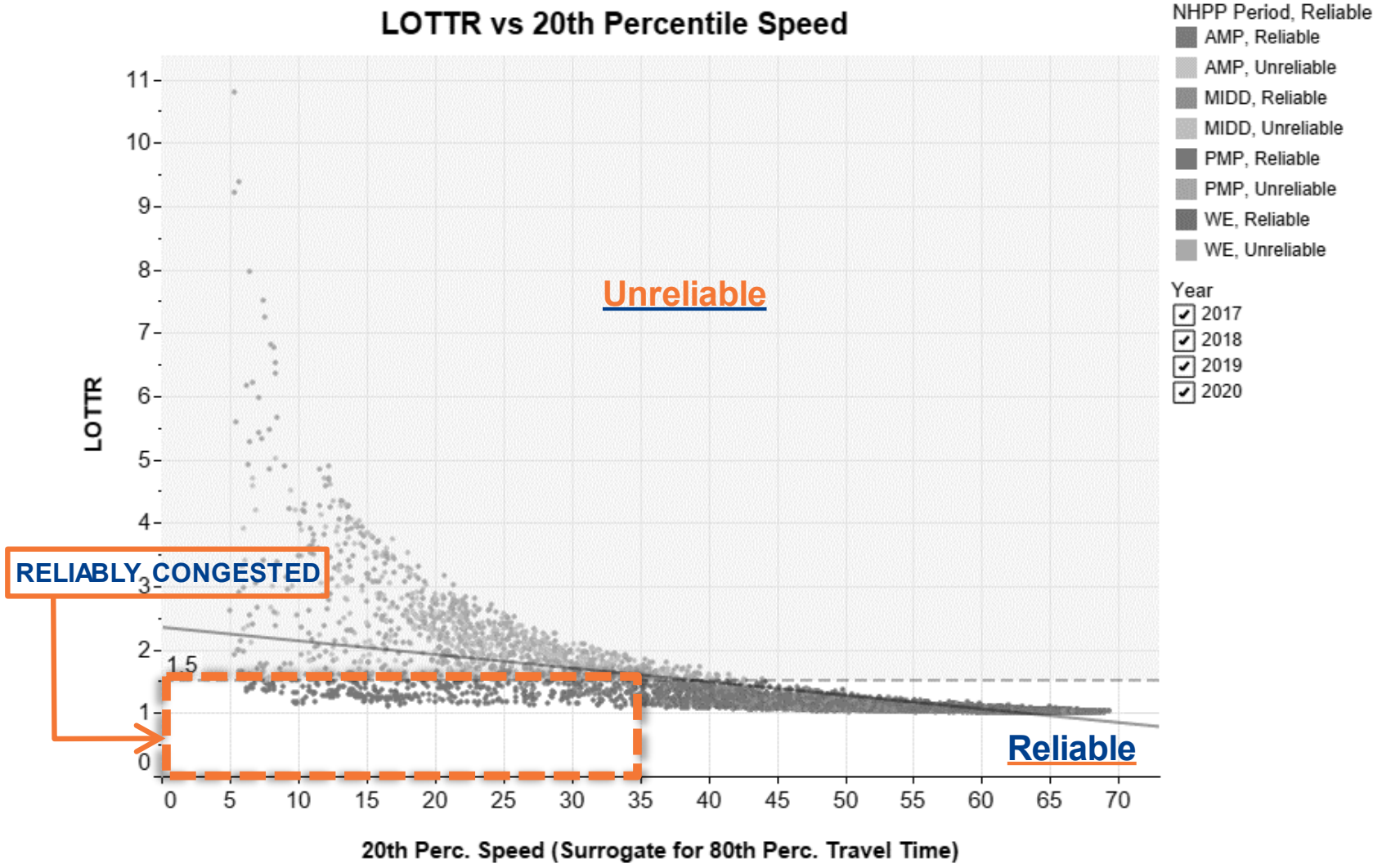
Panes		Line		Coefficients				
Row	Column	p-value	DF	Term	Value	StdErr	t-value	p-value
Lottr	spd 20PCT	< 0.0001	27269	spd 20PCT	-0.021488	0.0001284	-167.373	< 0.0001
				intercept	2.34959	0.0075514	311.145	< 0.0001

Copy | Close

Data Exploration

Reliability Relationship on Virginia Interstate

Tableau



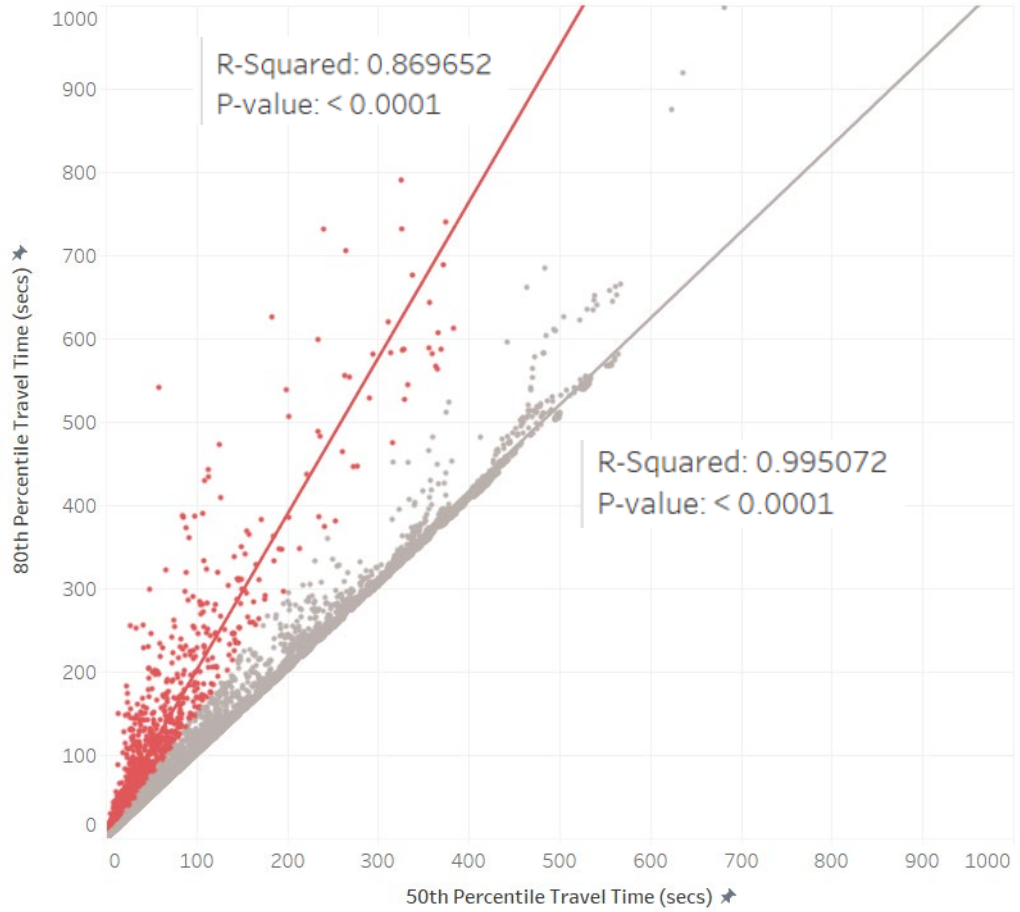
Strategic Considerations for TMCs that are Reliably Congested:

- Will the planned Projects/Programs push LOTTR above 1.5?

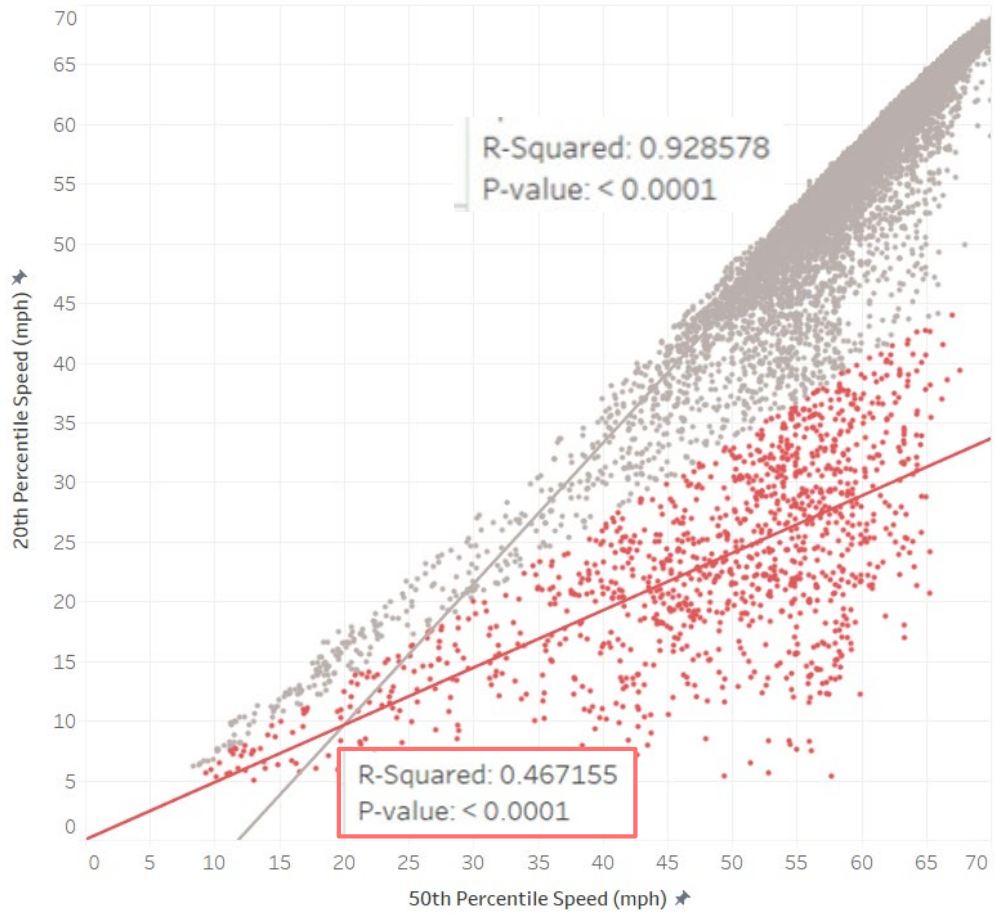
If YES – It is a detriment to State's reliability Target

Travel Time and Speed

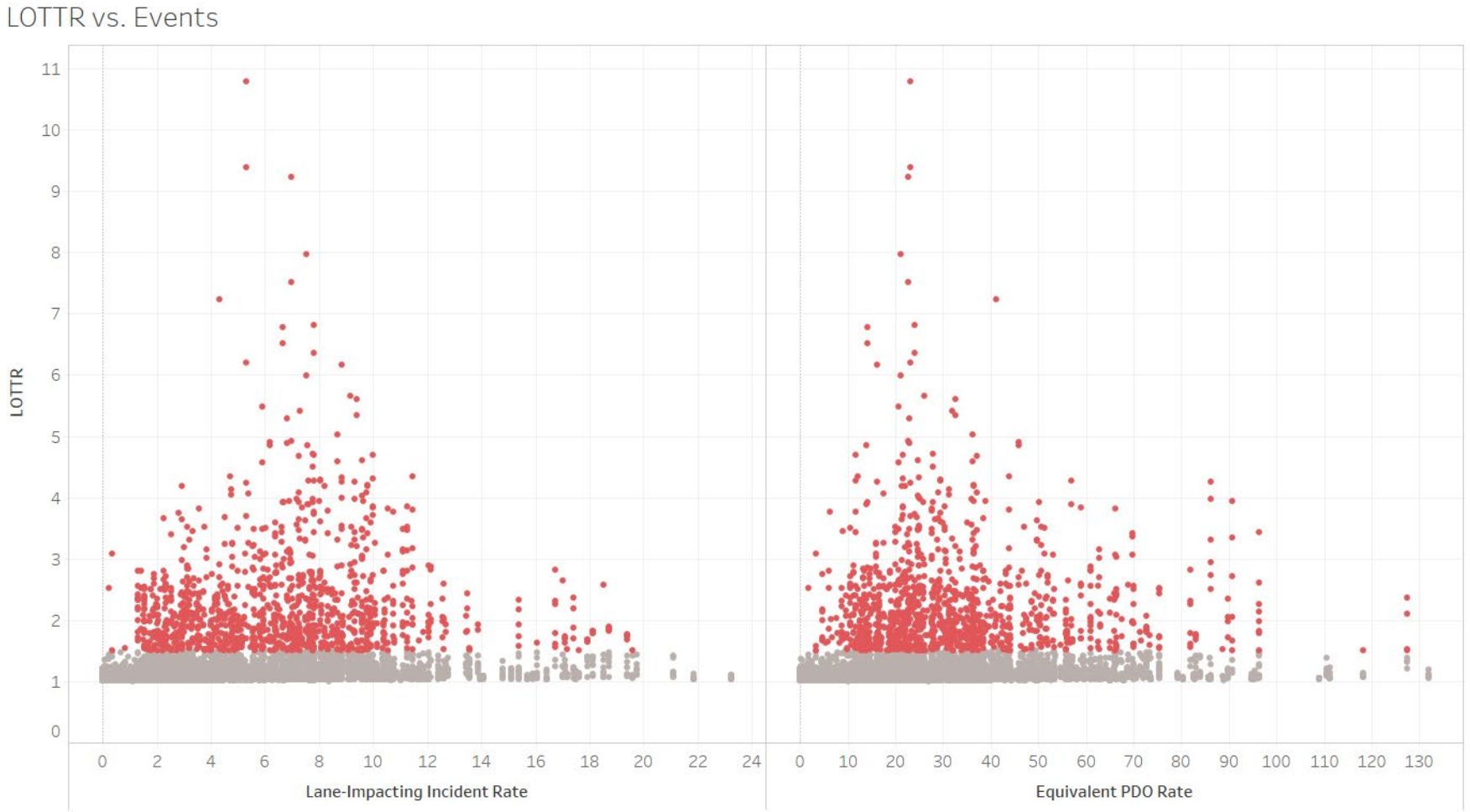
Travel Time Scatter Plot



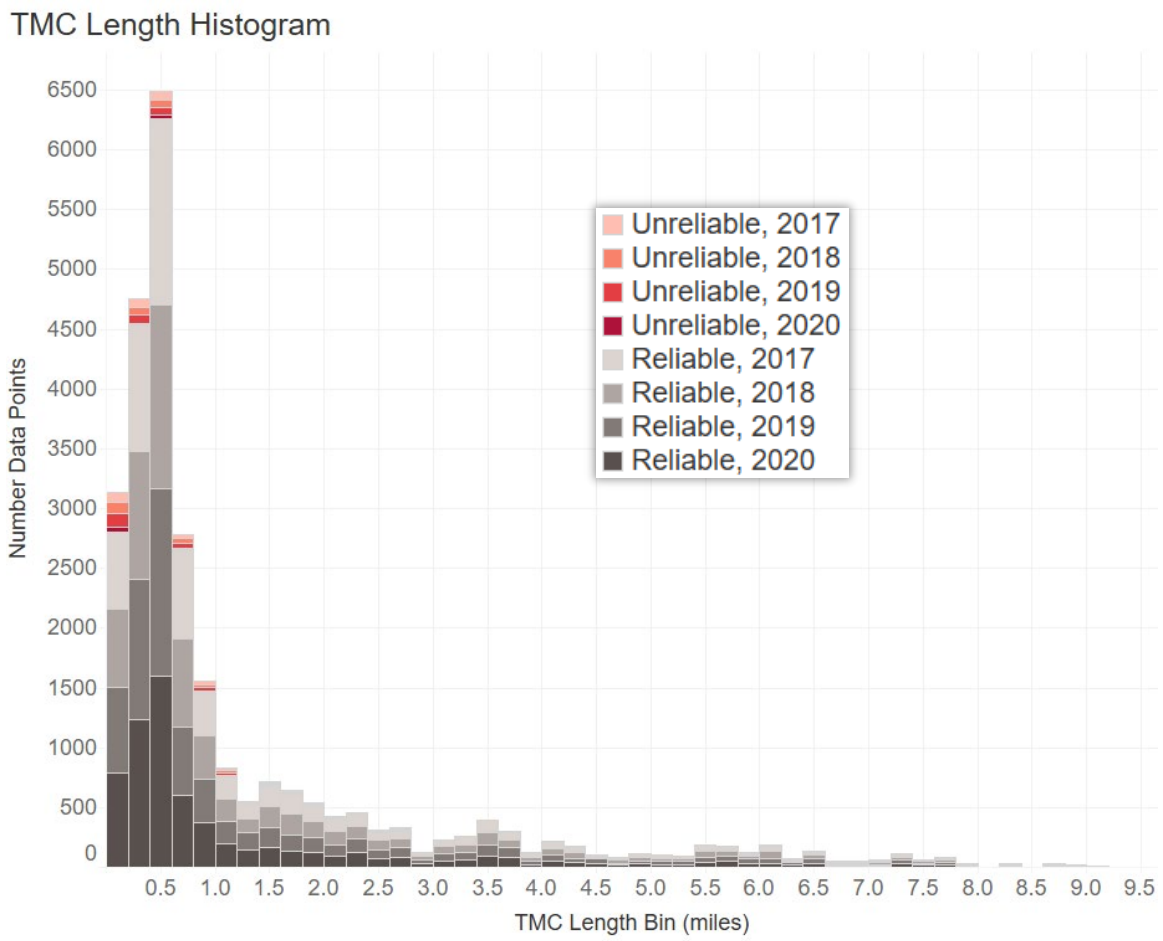
Speed Scatter Plot

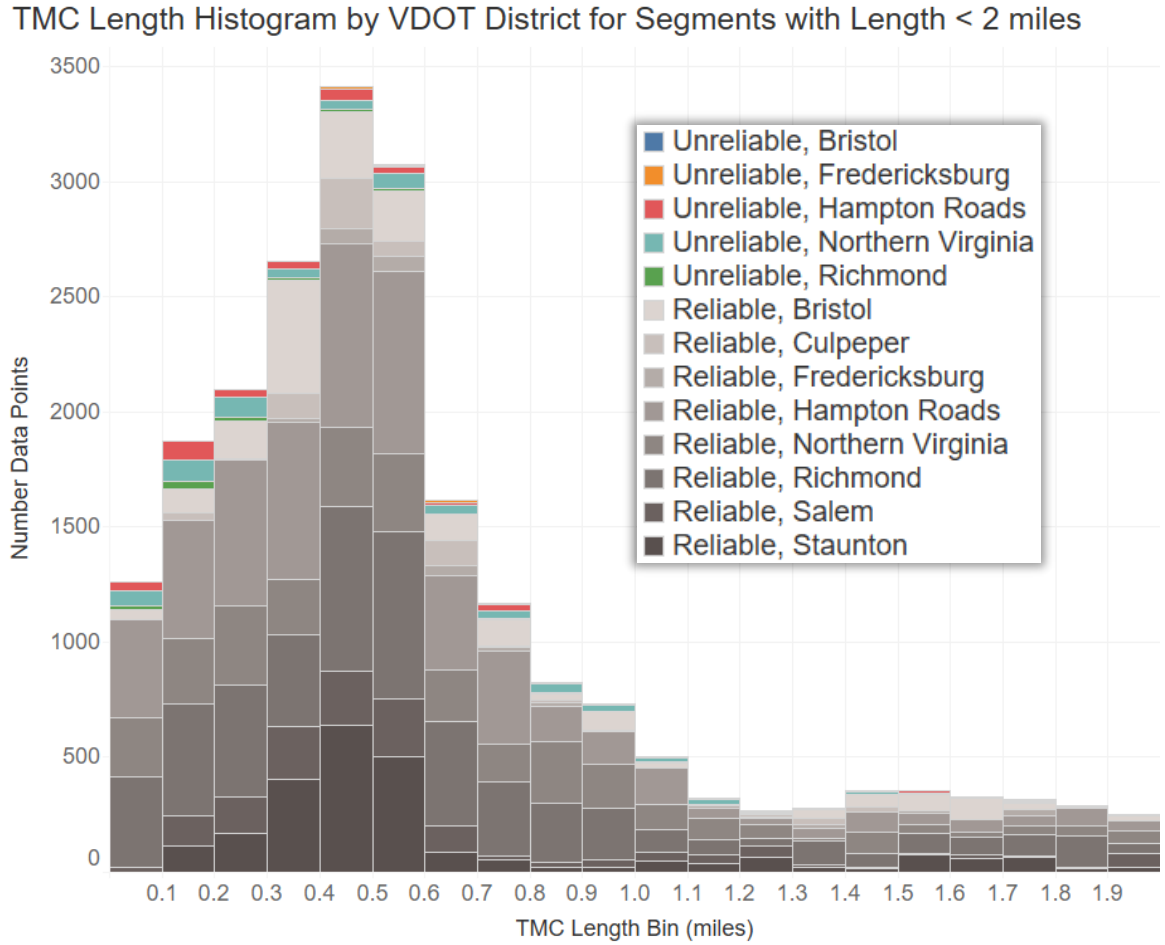


LOTTR and Road Events



LOTTR and TMC Lengths





Model

Linear Regression Models

- **Assumption = Dependent variable is a linear combinations of these factors**

$$Y = \beta_0 + \beta_1 * \mathbf{X_1} + \beta_2 * \mathbf{X_2} + \beta_3 * \mathbf{X_3} + \cdots + \beta_n * \mathbf{X_n}$$

- **Estimate coefficients $\beta_1, \beta_2, \beta_3, \ldots, \beta_n$ and the free term β_0 from observed data**
- **Advantage = simplicity**

Data Types

Independent Variables with Potential for Influencing Reliability

Roadway Geometry

- Number of Lanes
- Segment Length
- Terrain
- On/Off Ramp location*

Urban Category

- Urbanized
- Urban Cluster
- Rural

Traffic

- Volumes
- Heavy Vehicle %

** Not yet Applied in Model*

Event

- Lane Impacting Incident Rate
- Equivalent Property Damage Only Rate
- WorkZone Miles*
- Adverse Weather*

Roadway Improvement Projects

- Capacity Improvement*
- Add/Modify Acceleration/ Deceleration Lanes*

Operations Improvement Programs

- Safety service Patrol*

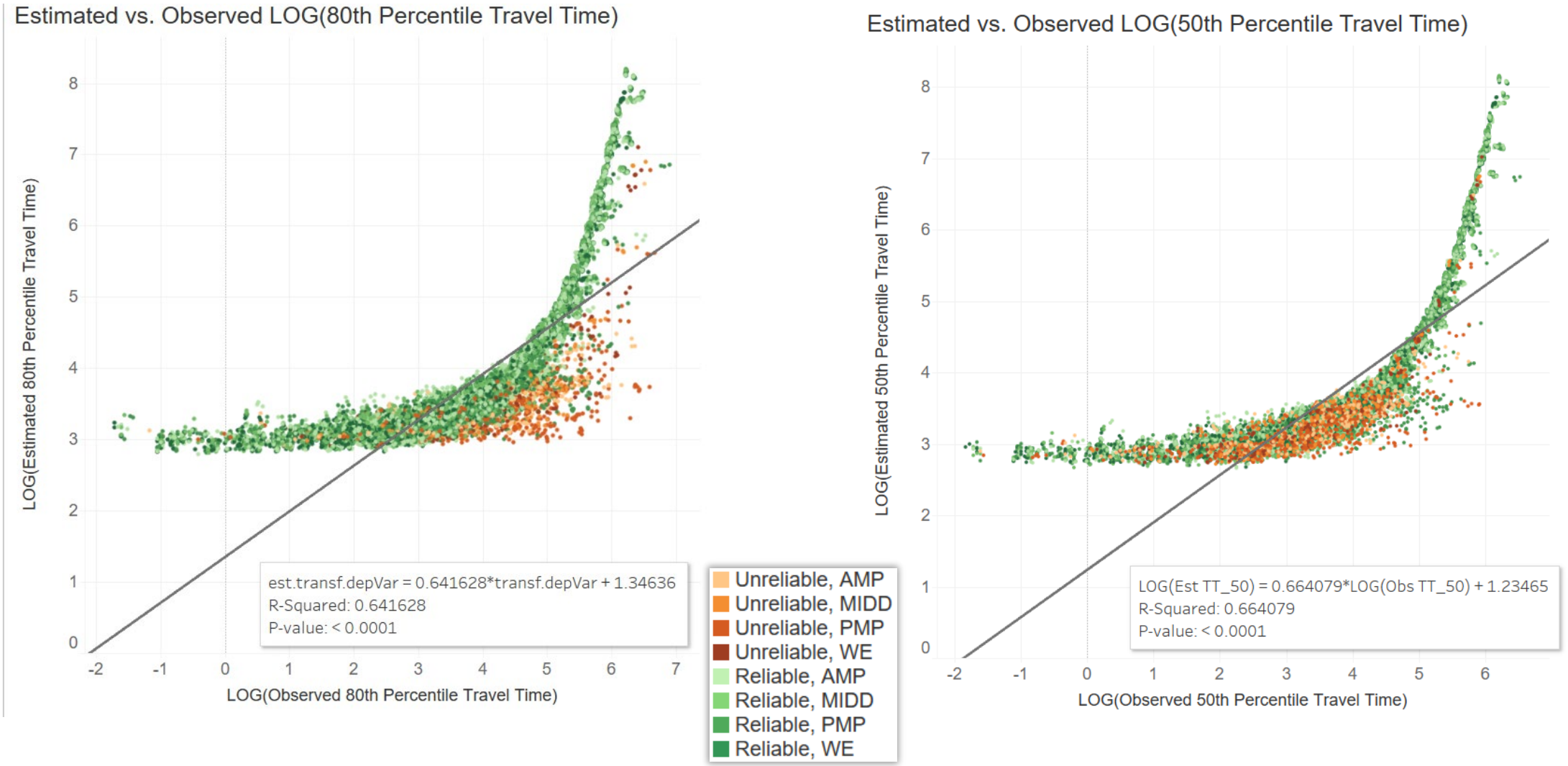
Dependent Variables Considered

Variable	Formula
LOTTR	N/A
LOG (LOTTR)	N/A
80th Percentile Travel Time	$\mathbf{LOTTR = \frac{80th\ percentile\ Travel\ Time}{50th\ percentile\ Travel\ Time}}$
50th Percentile Travel Time	
50th Percentile Speed	$\mathbf{Surrogate\ LOTTR = \frac{50th\ percentile\ Speed}{20th\ percentile\ Speed}}$
20th Percentile Speed	
LOG(80th Percentile Travel Time)	$\mathbf{LOTTR = \frac{EXP(80th\ percentile\ Travel\ Time)}{EXP(50th\ percentile\ Travel\ Time)}}$
LOG(50th Percentile Travel Time)	
LOG(50th Percentile Speed)	$\mathbf{Surrogate\ LOTTR = \frac{EXP(50th\ percentile\ Speed)}{EXP(20th\ percentile\ Speed)}}$
LOG(20th Percentile Speed)	

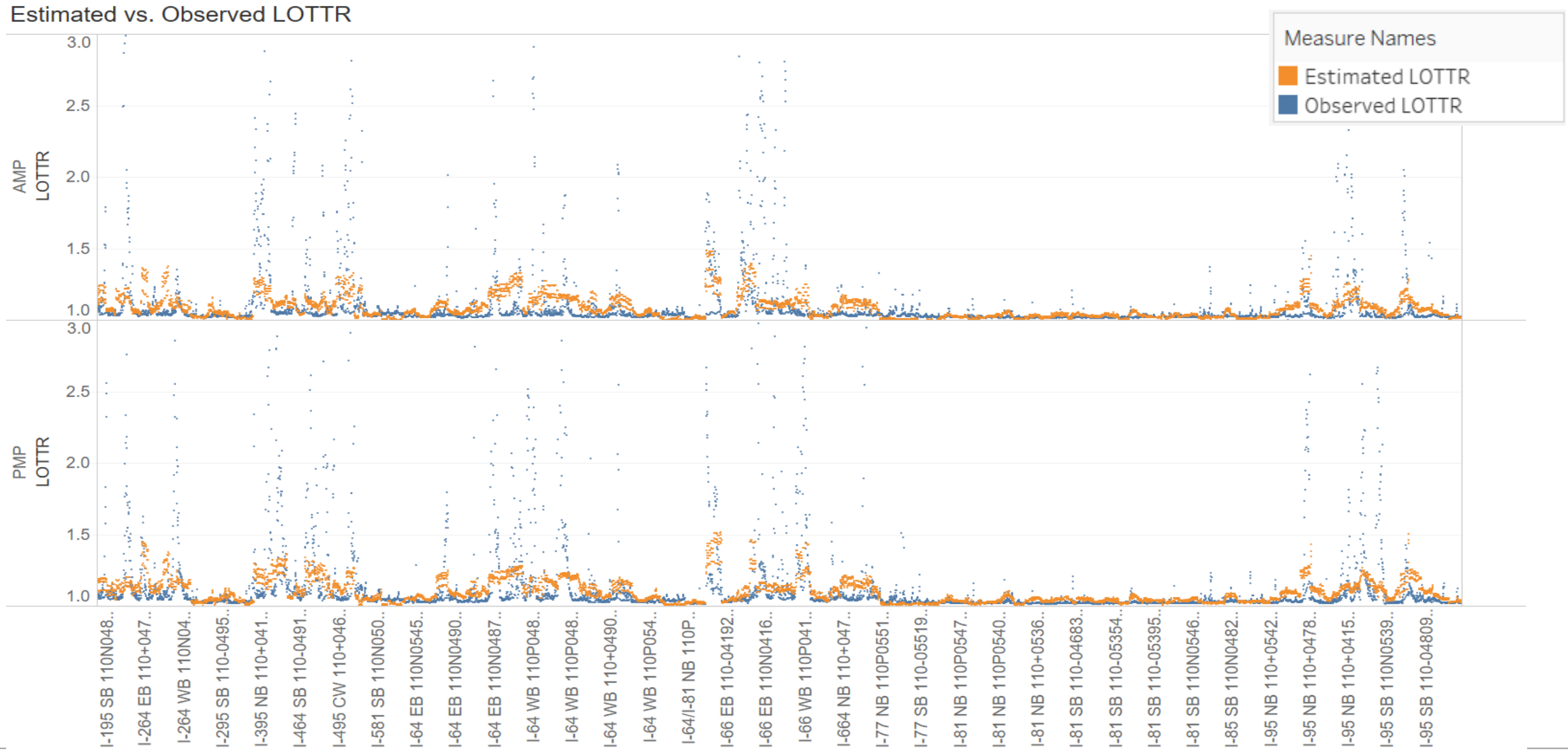
Model Run Results (PRELIMINARY EXAMPLE)

term	MODEL - ALL DATA				MODEL - RELIABLE DATA				MODEL - UNRELIABLE DATA			
	LOG(50th Percentile Travel Time)		LOG(80th Percentile Travel Time)		LOG(50th Percentile Travel Time)		LOG(80th Percentile Travel Time)		LOG(50th Percentile Travel Time)		LOG(80th Percentile Travel Time)	
	β_i	significant	β_i	significant	β_i	significant	β_i	significant	β_i	significant	β_i	significant
(Intercept)	2.75879	Y	2.84165	Y	2.79447	Y	2.84915	Y	1.56843	Y	2.29988	Y
Equivalent Property Damage Only Rate	0.00199	Y	0.00229	Y	0.00186	Y	0.00201	Y	0.00275	N	0.00258	N
Lane Impacting Incident Rate	-0.02400	Y	-0.00862	Y	-0.02630	Y	-0.02100	Y	-0.00280	N	0.00054	N
Volume	0.00765	Y	0.00933	Y	0.00741	Y	0.00813	Y	0.00694	Y	-0.00113	N
Number of Lanes	0.03406	Y	0.01019	N	0.02936	Y	0.02063	Y	0.03510	N	0.10773	Y
Heavy Vehicle %	0.00123	N	-0.00027	N	0.00087	N	0.00010	N	-0.00218	N	-0.00151	N
Terrain	0.09938	Y	0.10363	Y	0.09444	Y	0.09338	Y	0.49379	Y	0.38013	Y
Urban Cluster	-0.02521	N	-0.00891	N	-0.03324	N	-0.02259	N	--	--	--	--
Urbanized	-0.14381	Y	-0.13829	Y	-0.14584	Y	-0.14411	Y	0.71230	Y	0.82918	Y
Segment Length	0.56121	Y	0.56003	Y	0.55633	Y	0.55554	Y	0.99957	Y	0.98362	Y
R-squared	0.66408		0.64163		0.67383		0.66842		0.51292		0.45680	
Adjusted R-squared	0.66397		0.64151		0.67372		0.66831		0.50960		0.45310	
Sample Size	27271		27271									

Estimated vs Observed LOG(%-tileTravel Time) (PRELIMINARY EXAMPLE)



Estimated vs Observed LOTTR (PRELIMINARY EXAMPLE)



% PMTR

Year	Estimated PMTR	Observed PMTR
2017	100.00%	84.46%
2018	98.87%	83.45%
2019	98.15%	84.44%
2020	100.00%	93.63%

Questions?

Contact:

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Acknowledgment:

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- Jonathan Robbins, VDOT/OIPI
- Brian King, VDOT

Visualizing Transportation System Performance

ORGANIZED BY:

TRB STANDING COMMITTEE ON VISUALIZATION IN TRANSPORTATION (AED80)

May 17, 2021 – 1:00 PM ET

TRB Standing Committee on Visualization in Transportation (AED80)

Our goal: to use visualization to identify and address critical transportation issues of today, and to develop innovative visualization approaches to meet society's transportation needs of the future.

Subcommittees:

- Subcommittee on Building Information Modeling (BIM)
- Subcommittee on Performance Visualization
- Subcommittee Interactive Simulation

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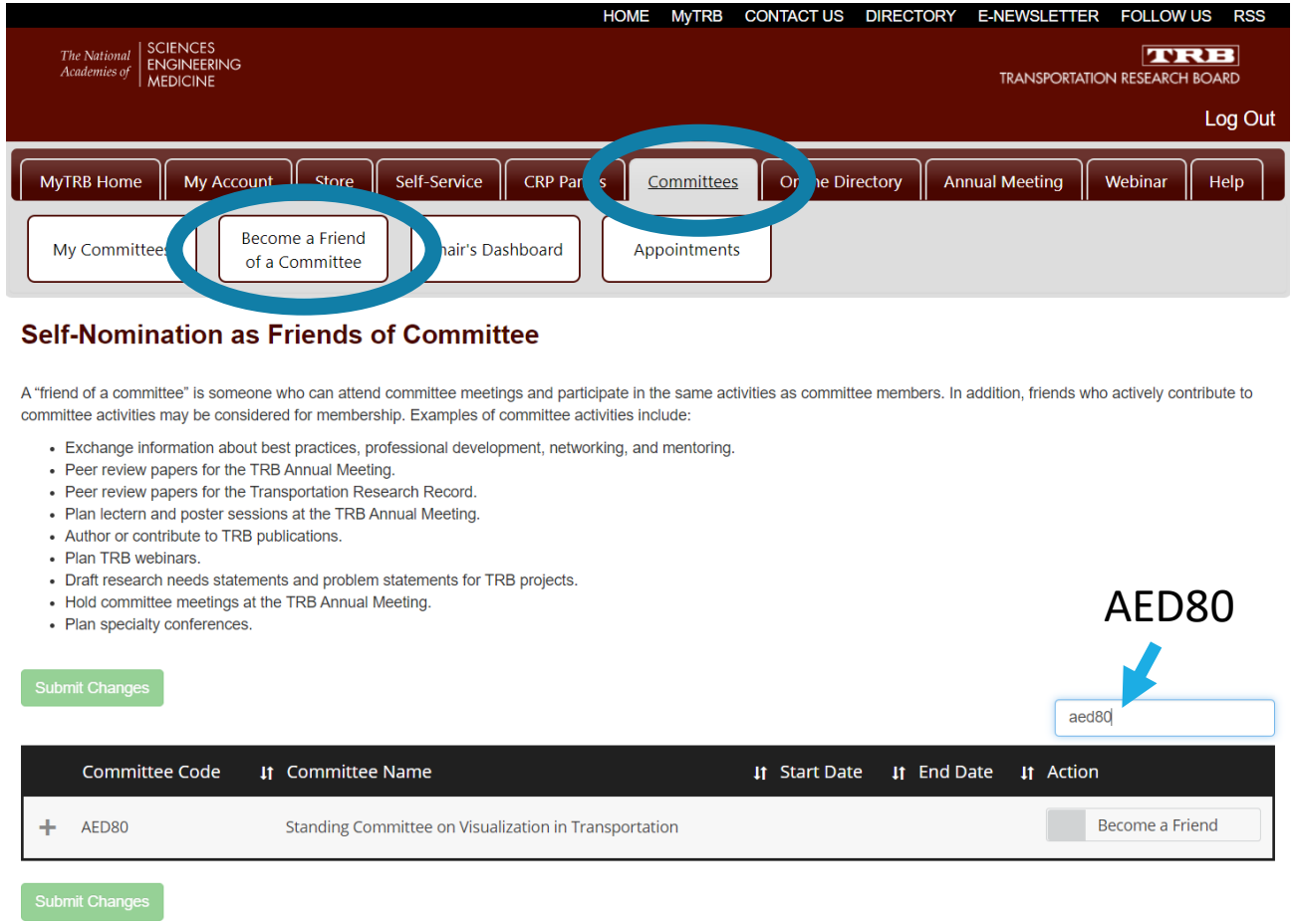
Create an account at mytrb.org and search for AED80



Today's Webinar

Visualization of VDOT MAP-21 Target Setting

Sanhita Lahiri and Simona Babiceanu,
Virginia Department of Transportation

Visualizing the FDOT Source Book

Jessica VanDenBogaert,
Florida Department of Transportation

Visualizing Automated Traffic Signal Performance Measures (ATSPM)

Alan Davis, Georgia Department of Transportation

Questions & Answers

Moderated by Charles Lattimer, University of Maryland

Questions?

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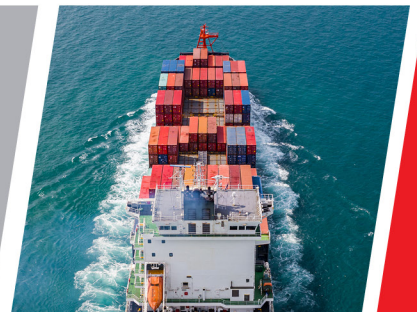
Florida Department of Transportation

Visualizing System Performance at FDOT

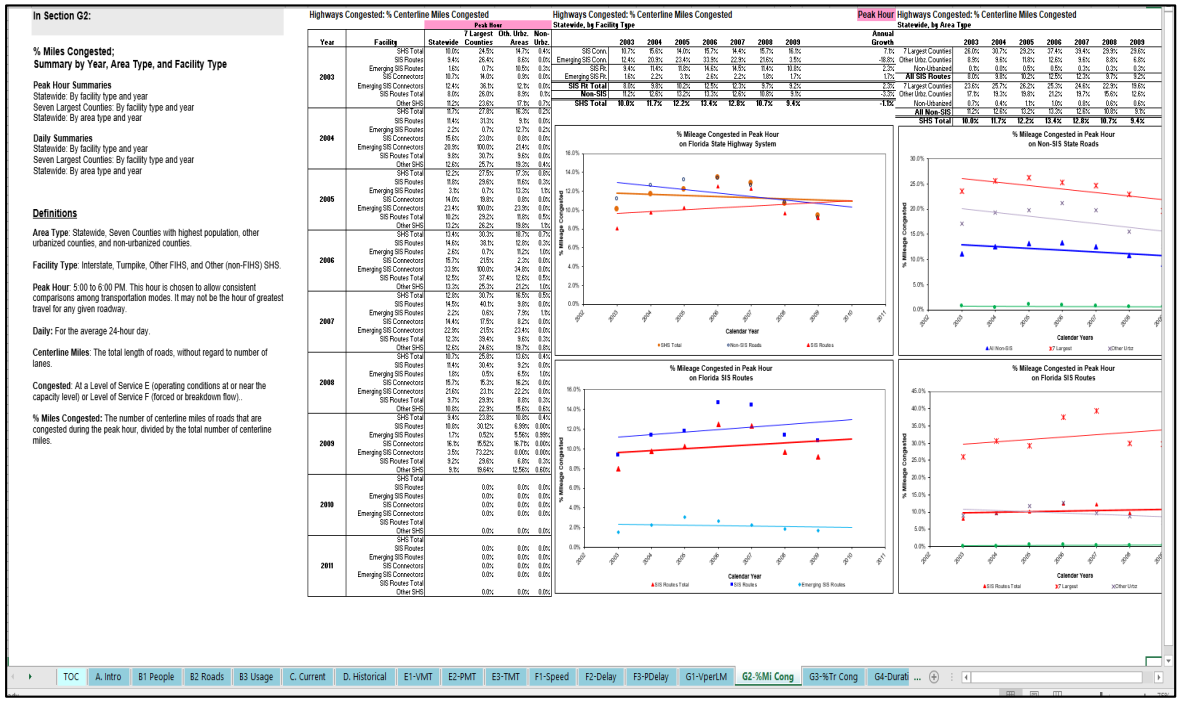
5/17/2021



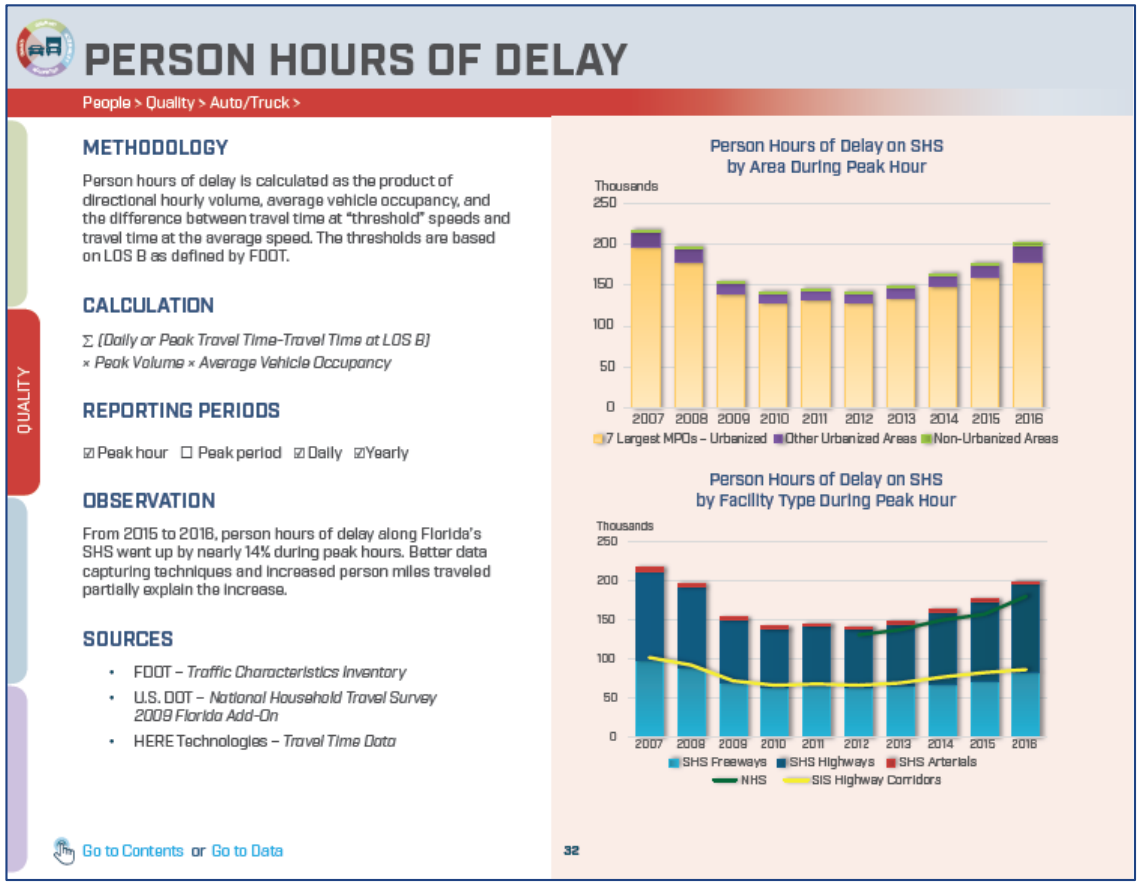
Strategic development

The FDOT Source Book

2006

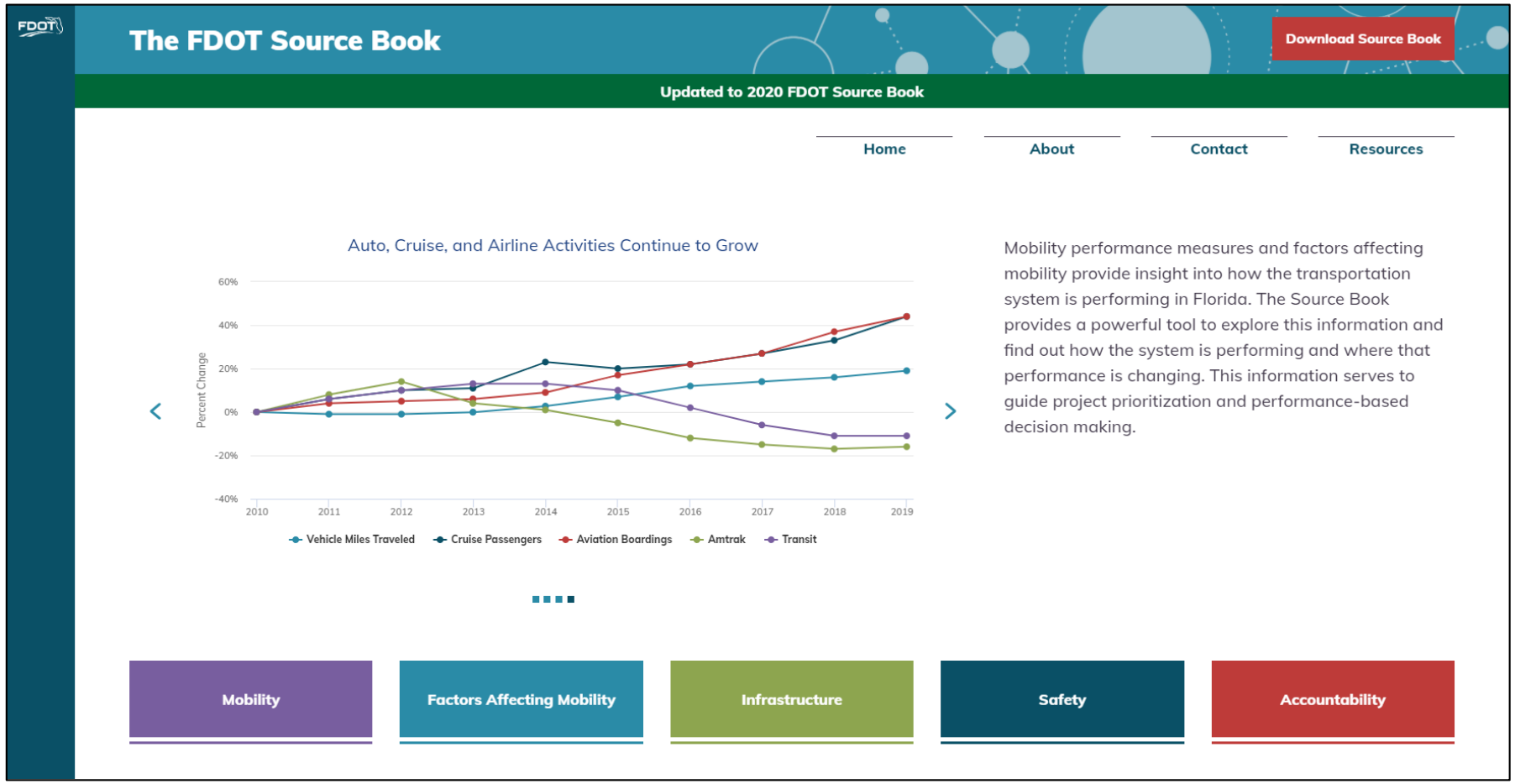


2017



2019: Let's Get Visual

FDOTSourceBook.com



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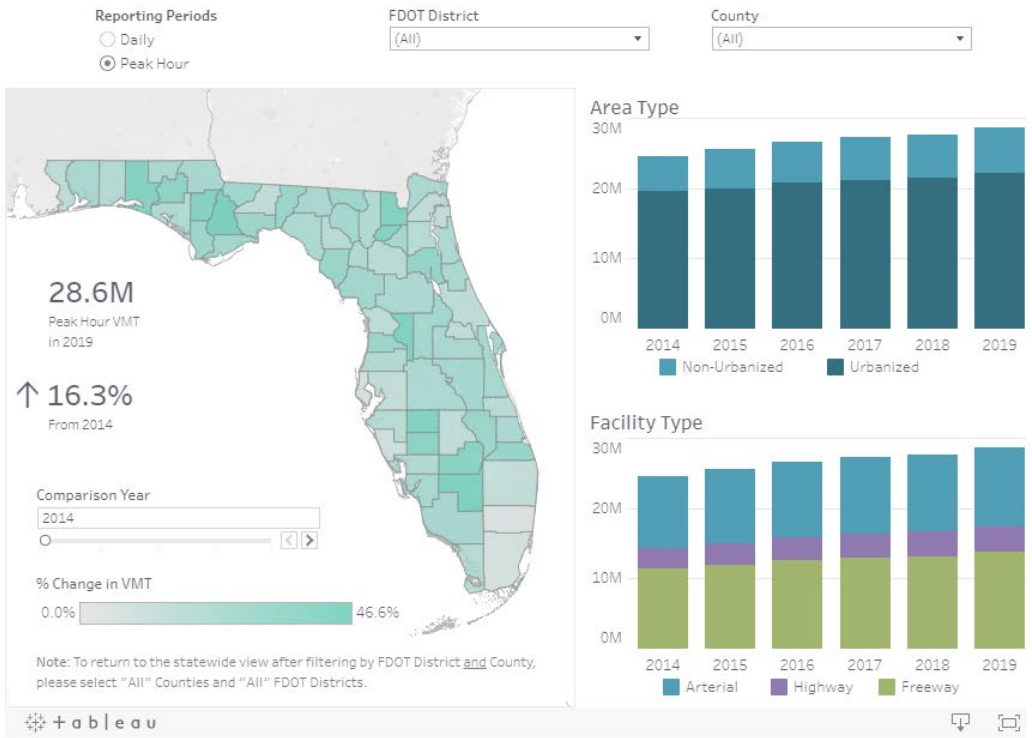
Vehicle Miles Traveled

Vehicle miles traveled (VMT) measures the amount of travel for all vehicles in a geographic region over a given period of time. VMT is calculated by adding up all the miles driven by all the cars and trucks on all the roadways in a region. This metric plays an integral role in the transportation planning, policy-making, and revenue estimation processes due to its ability to indicate travel demand and behavior.

Travel on Florida's State Highway System (SHS) has been steadily increasing since 2014. Between 2014 and 2018, vehicle miles traveled on Florida's SHS during the peak hour increased by 16.3%.

Methodology | Segment-Level Visualization



Sources

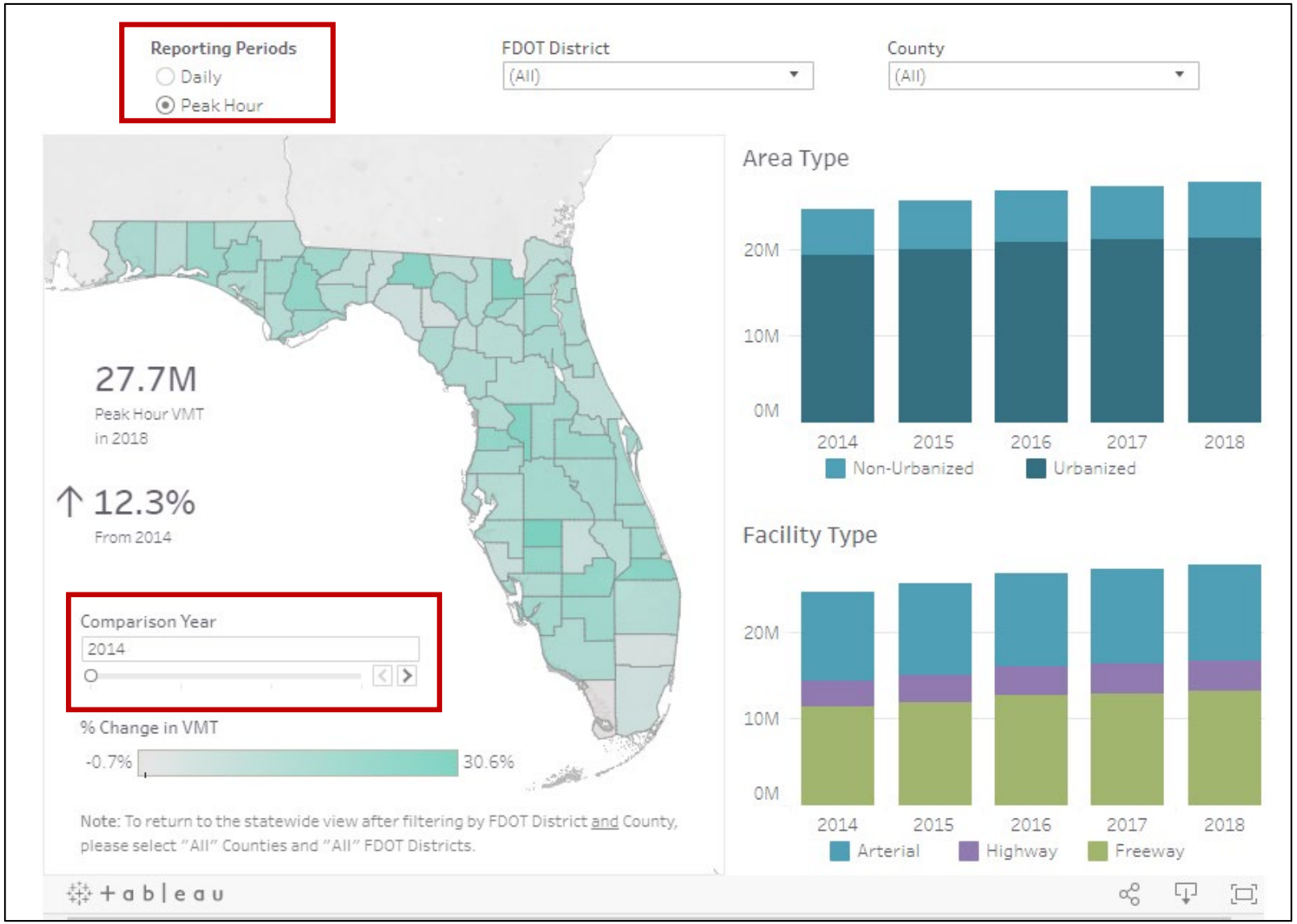
FDOT - ***Traffic Characteristics Inventory***
FDOT - ***Roadway Characteristics Inventory***

Customizations

Choose time period

- Daily
- Peak Hour
- Peak Period

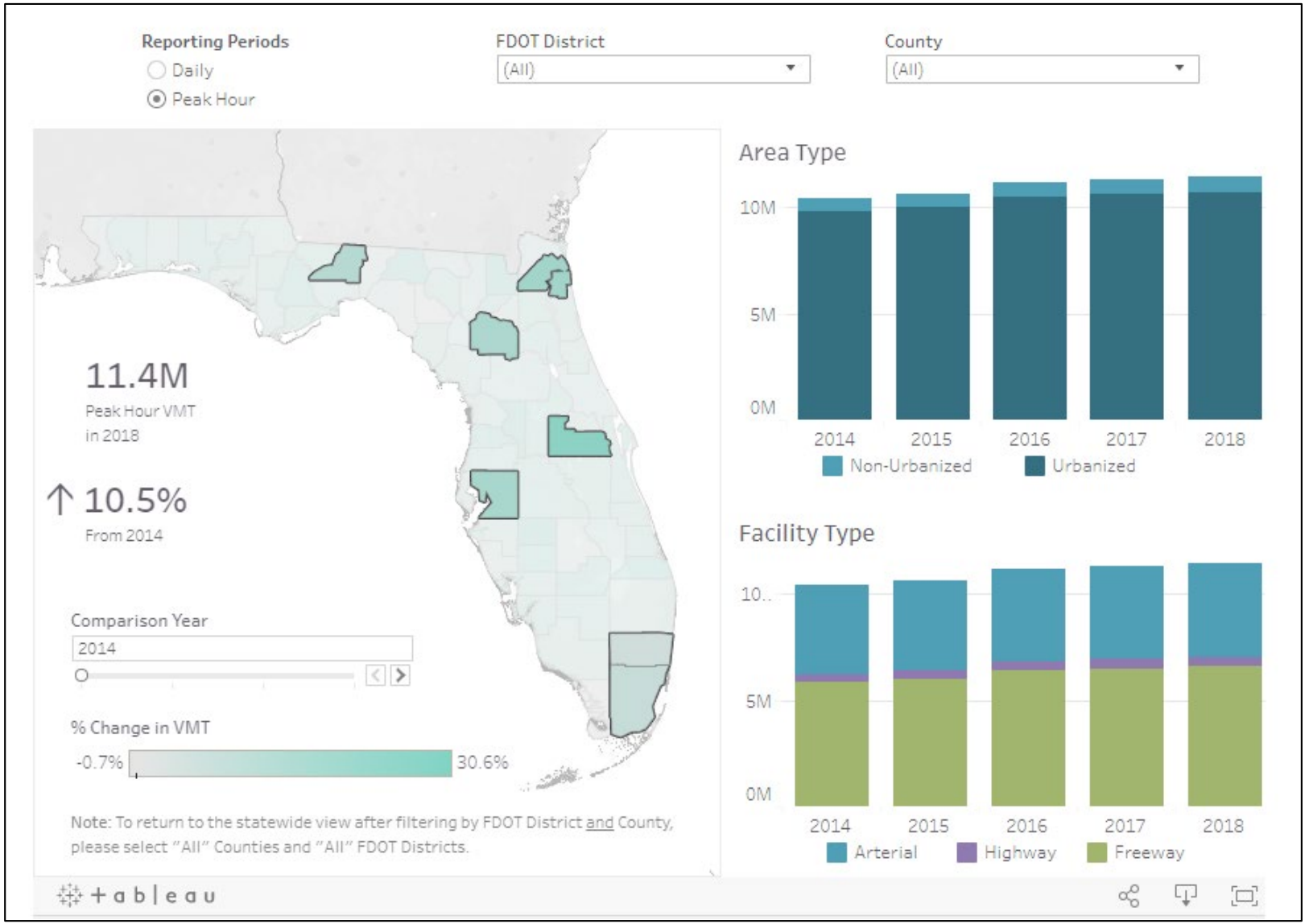
Choose comparison year



Customizations

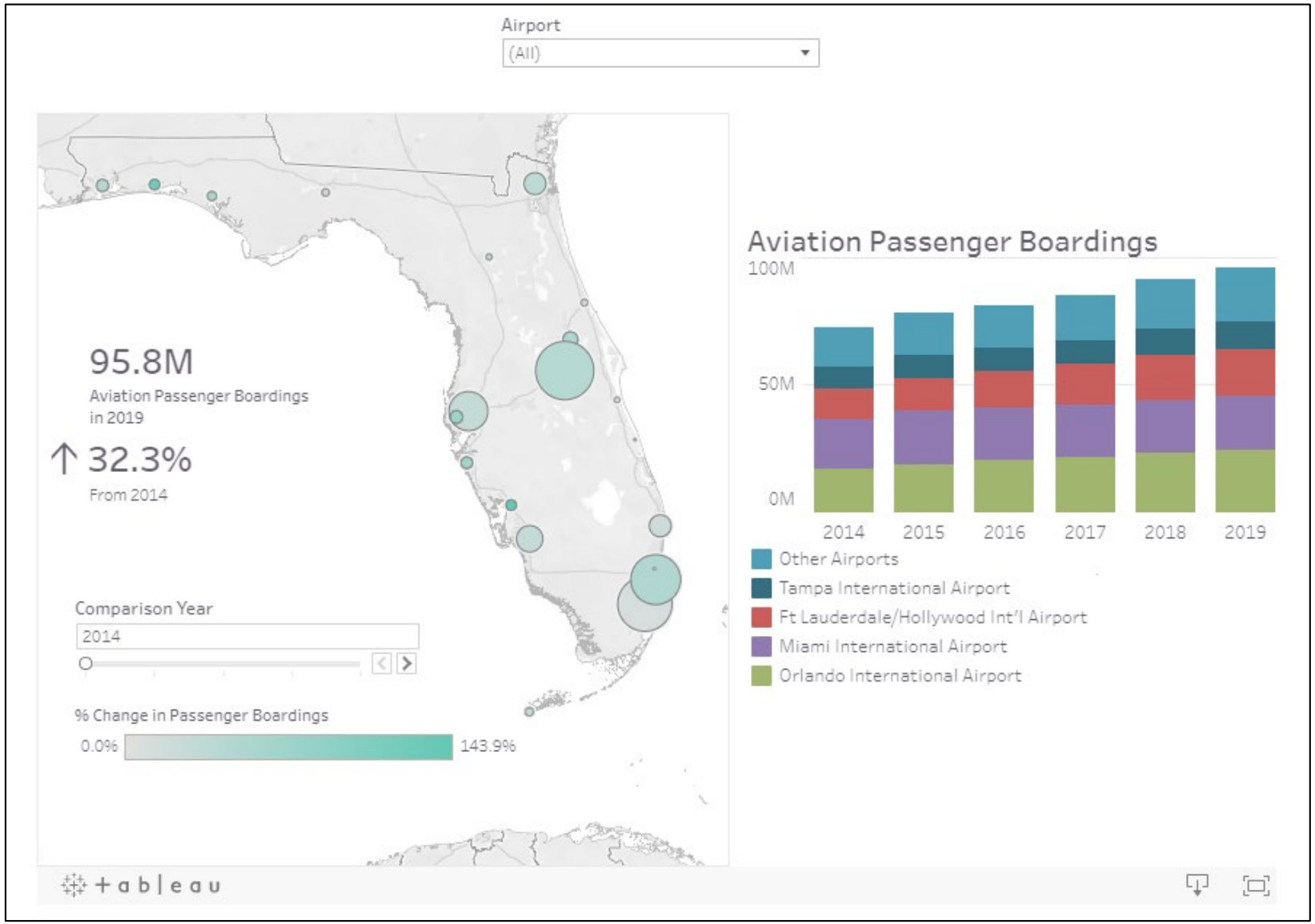
Choose geographies

- FDOT District
- County
- Multiples in any combination



Aviation Passenger Boardings

Choose an individual airport or group of airports.



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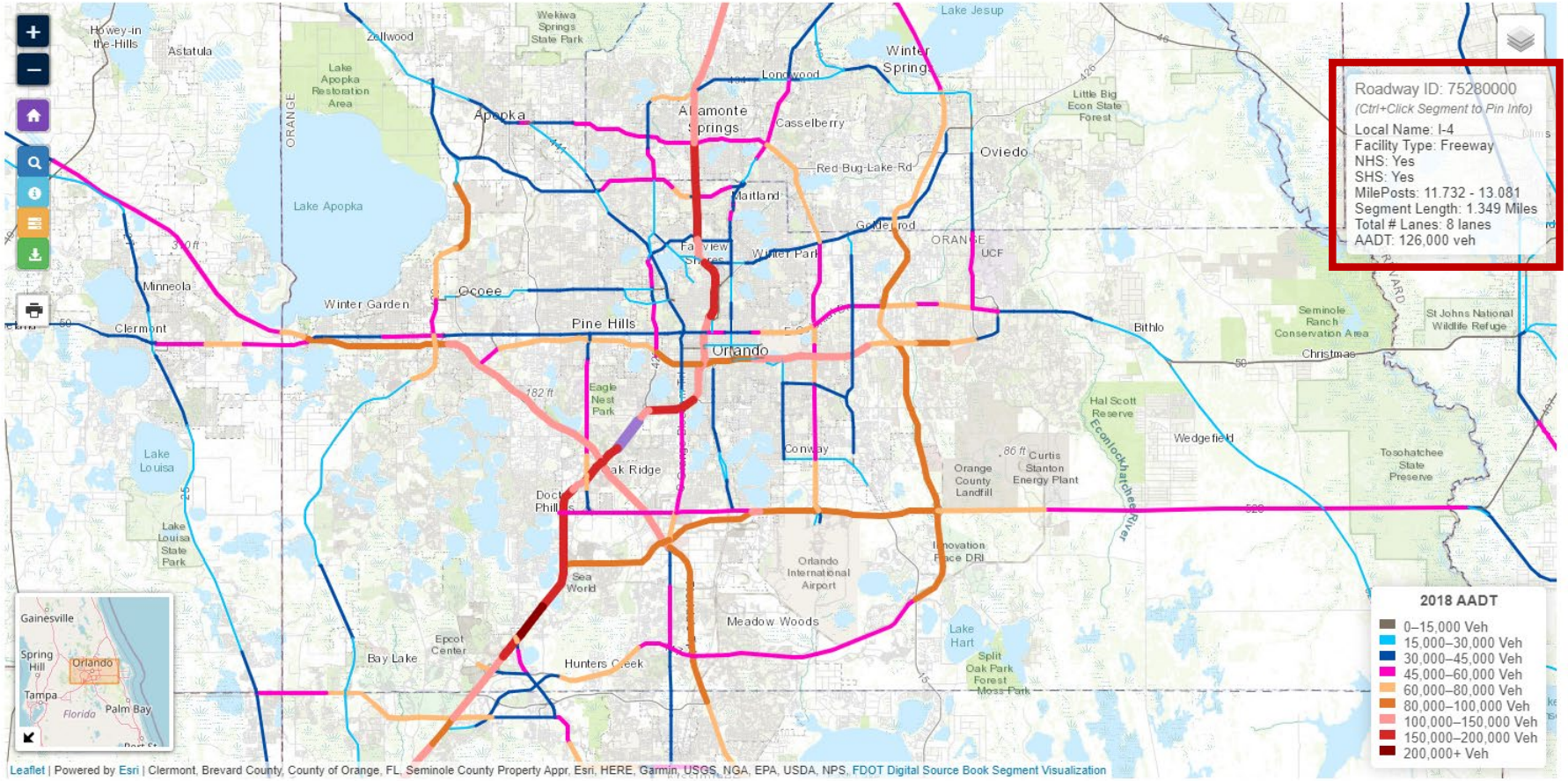

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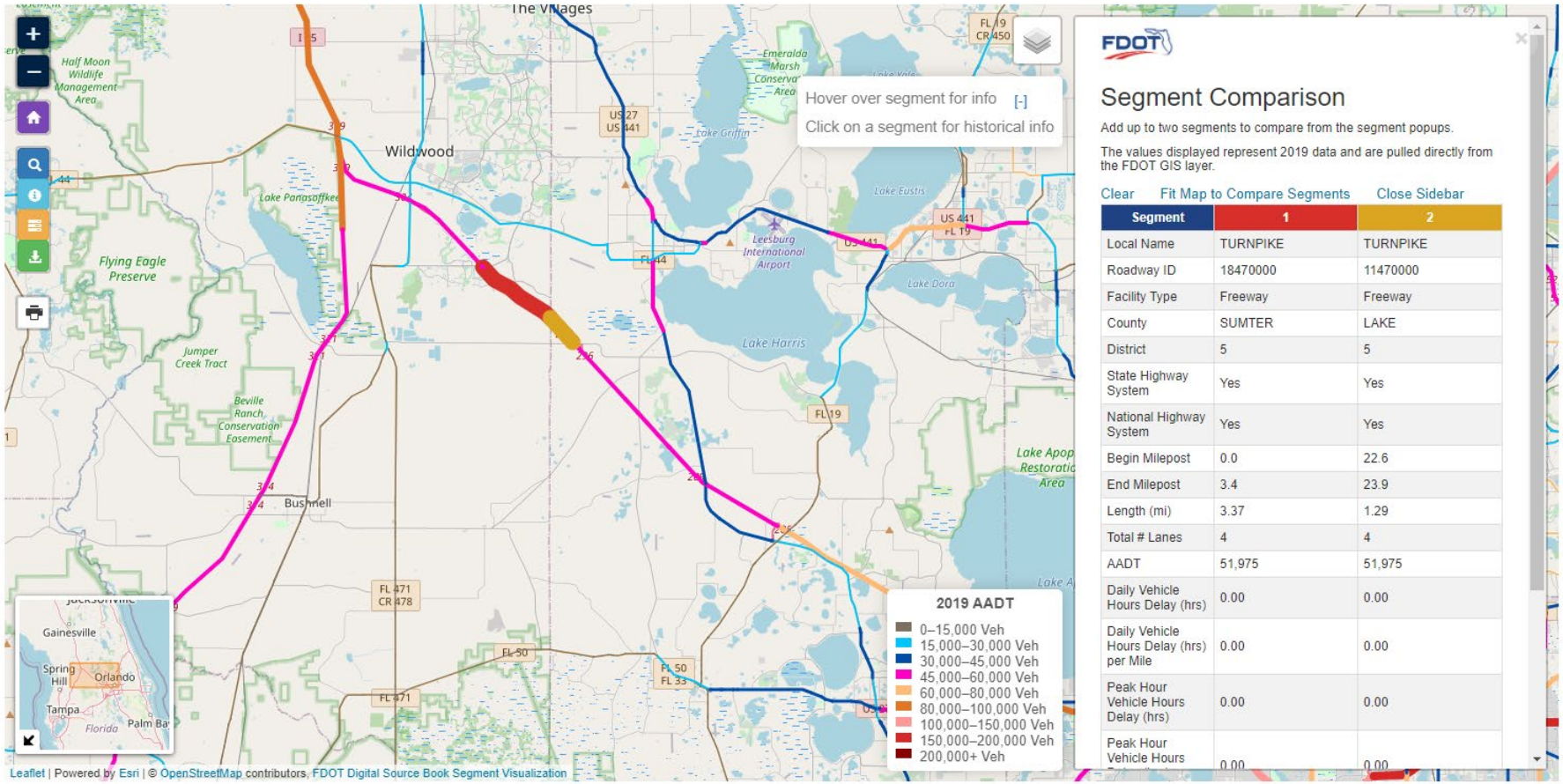

Segment Comparison

Add up to two segments to compare from the segment popups.

The values displayed represent 2019 data and are pulled directly from the FDOT GIS layer.

Clear | Fit Map to Compare Segments | Close Sidebar

Segment	1	2
Local Name	TURNPIKE	TURNPIKE
Roadway ID	18470000	11470000
Facility Type	Freeway	Freeway
County	SUMTER	LAKE
District	5	5
State Highway System	Yes	Yes
National Highway System	Yes	Yes
Begin Milepost	0.0	22.6
End Milepost	3.4	23.9
Length (mi)	3.37	1.29
Total # Lanes	4	4
AADT	51,975	51,975
Daily Vehicle Hours Delay (hrs)	0.00	0.00
Daily Vehicle Hours Delay (hrs) per Mile	0.00	0.00
Peak Hour Vehicle Hours Delay (hrs)	0.00	0.00
Peak Hour Vehicle Hours	0.00	0.00

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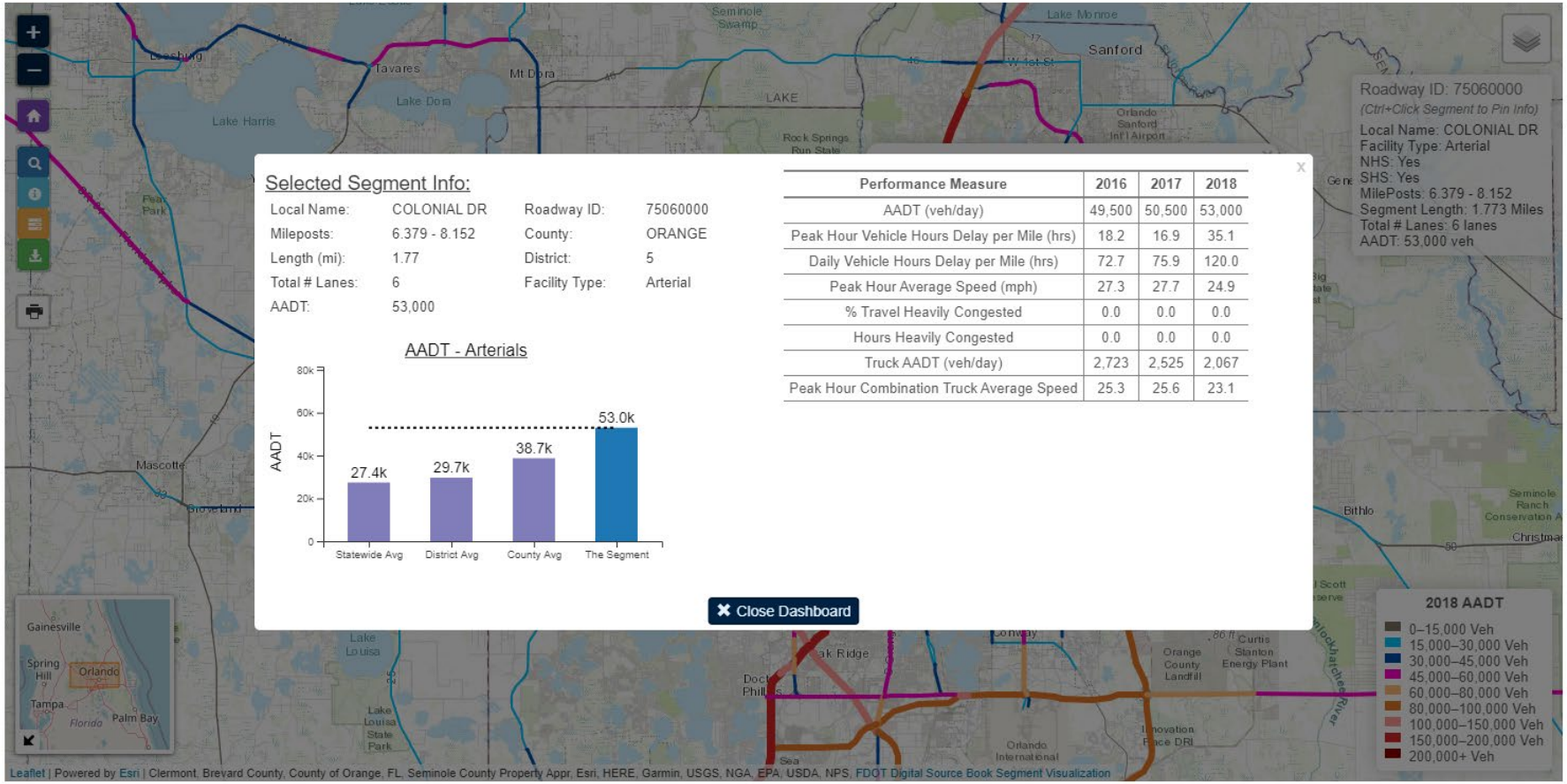
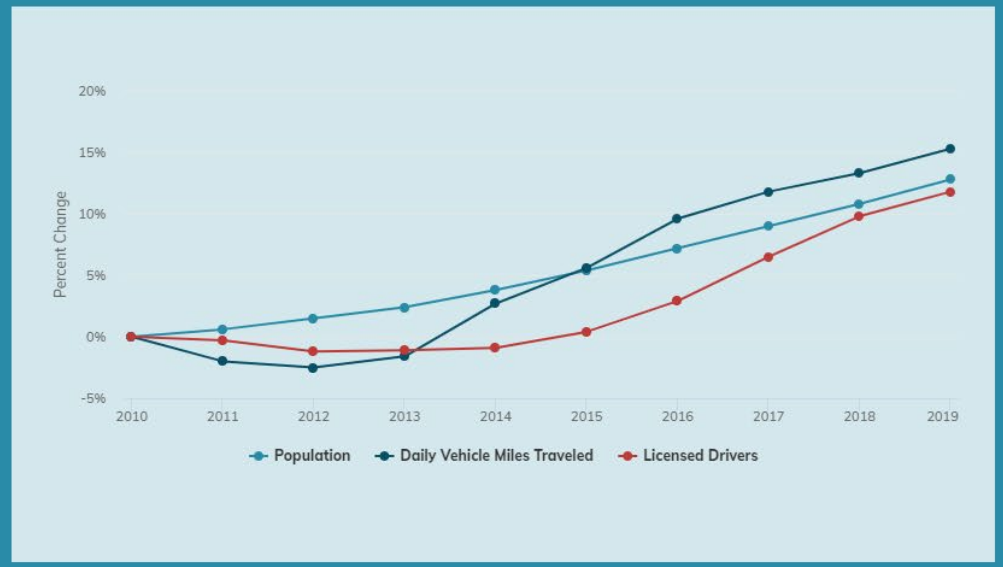


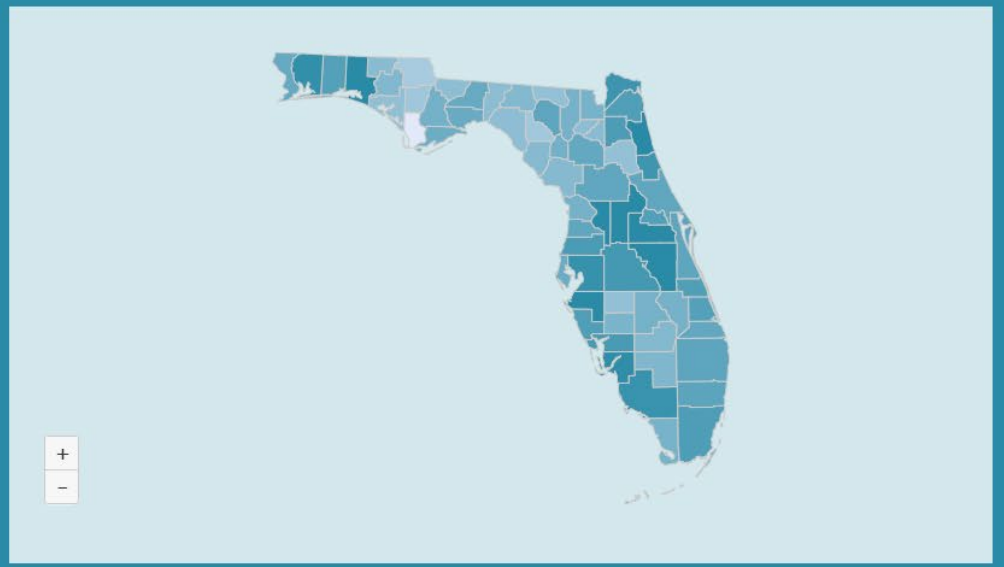
VMT Grows Faster Than Population and Drivers

Between 2010 and 2019, Florida's population grew by 12.8%, the number of licensed drivers rose by 11.8%, and vehicle miles traveled (VMT) increased by 15.3%.

Daily VMT, Population and Licensed Drivers



% Change in Population



Other System Performance Visualizations

Source Book: Special Edition 2020

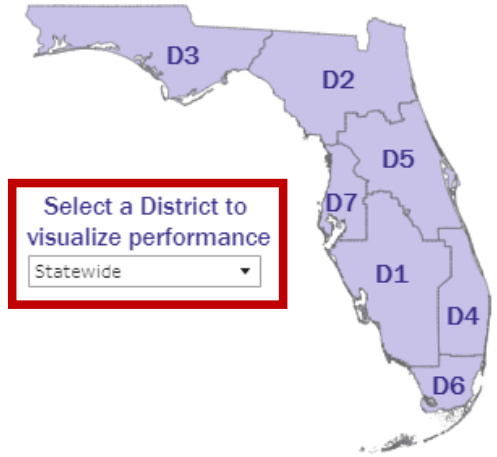
At-a-Glance | Crashes | Auto Travel Speed | **Auto Volumes** | Freight Activity | Transit Ridership | Air Travel | Seaport Tonnage | Fuel Consumption | Air Pollution | Unemployment Rate

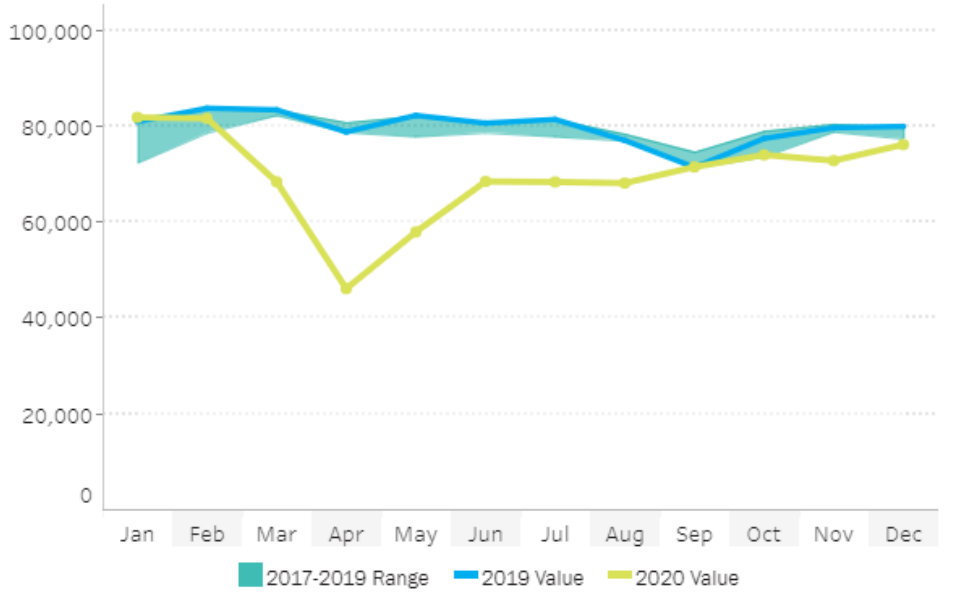
Auto Traffic Volumes (Statewide)

- Weekday
- Weekday AM Peak
- Weekday PM Peak

"With fewer vehicles on the interstate, the I-4 Ultimate project team made tremendous strides advancing construction in 12 different strategic locations across the 21-mile job. Opening the new I-4/State Road 408 interchange about three months earlier than projected was our greatest accomplishment."

- John Tyler, P.E., FDOT District Five Director of Operations



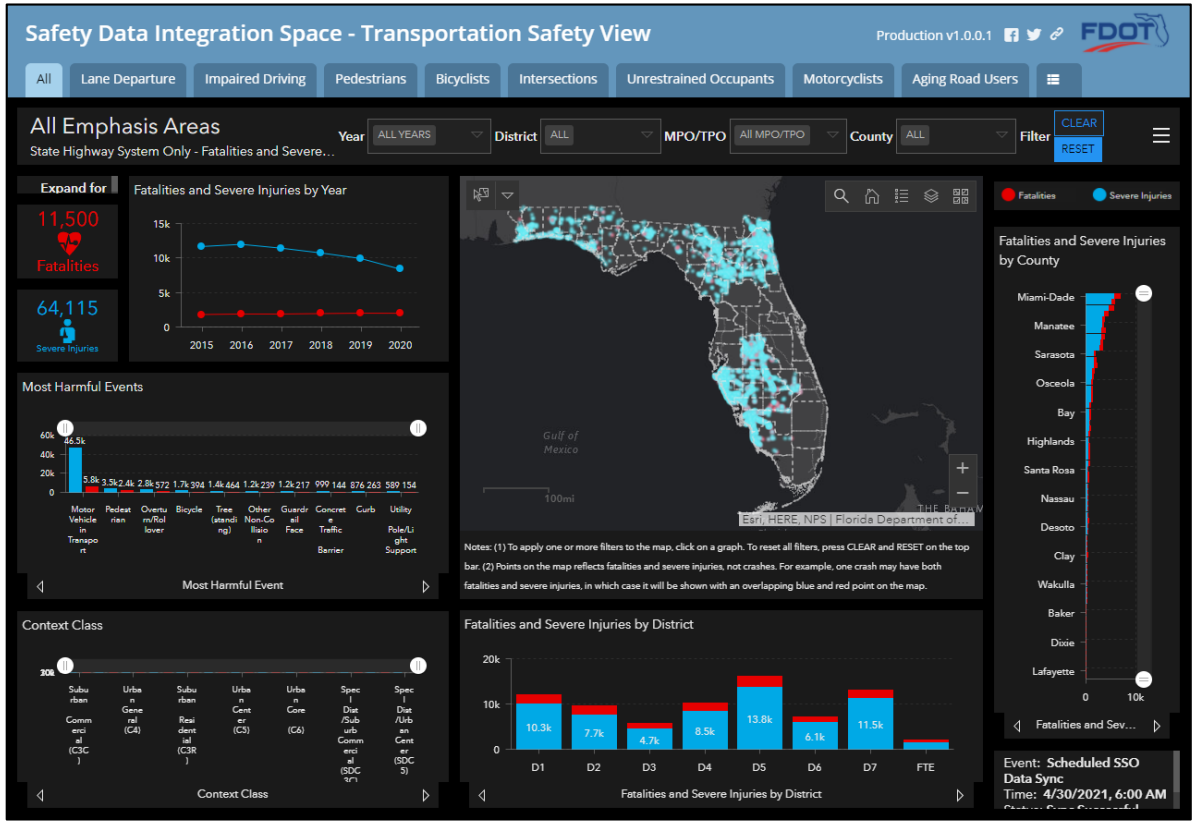


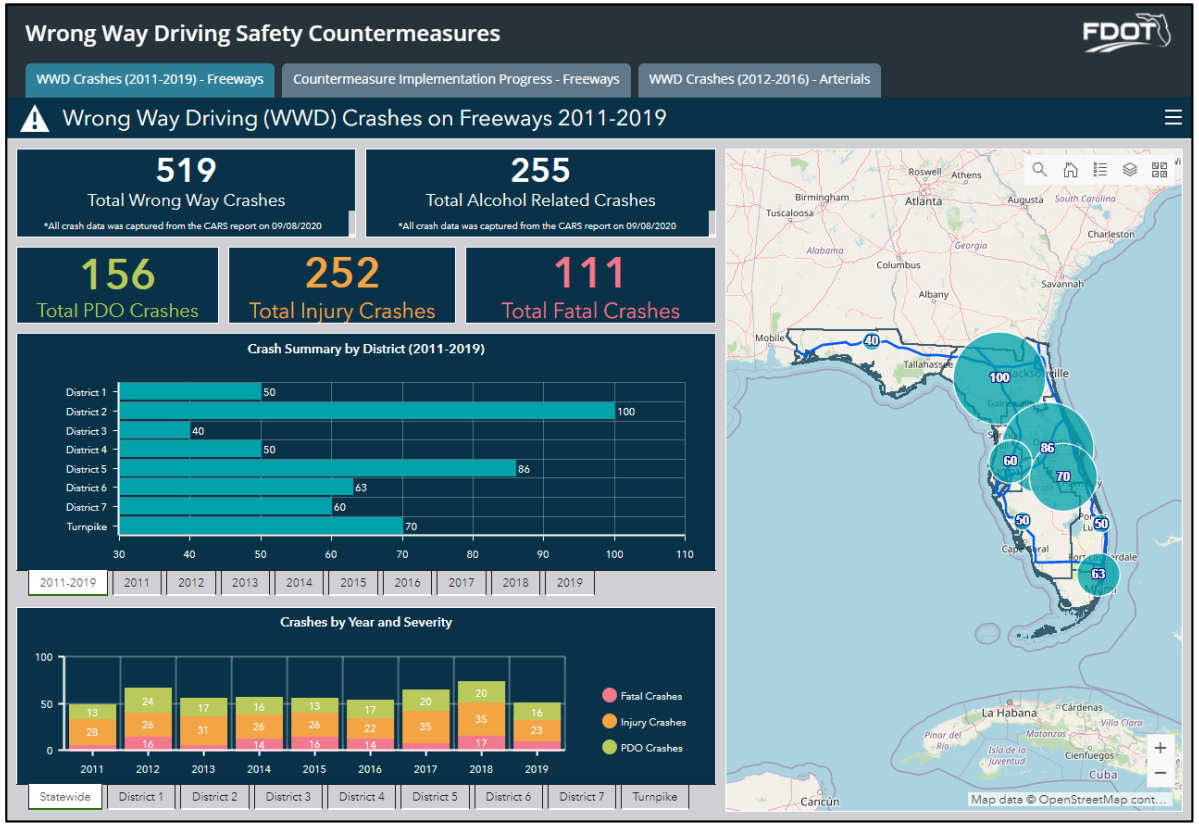
Source: FDOT Transportation Data & Analytics Office

Observation

In April 2020, statewide traffic volumes dropped 42% as compared to April 2019. By the end of 2020, statewide average daily traffic volumes returned to 95% of 2019 volumes.

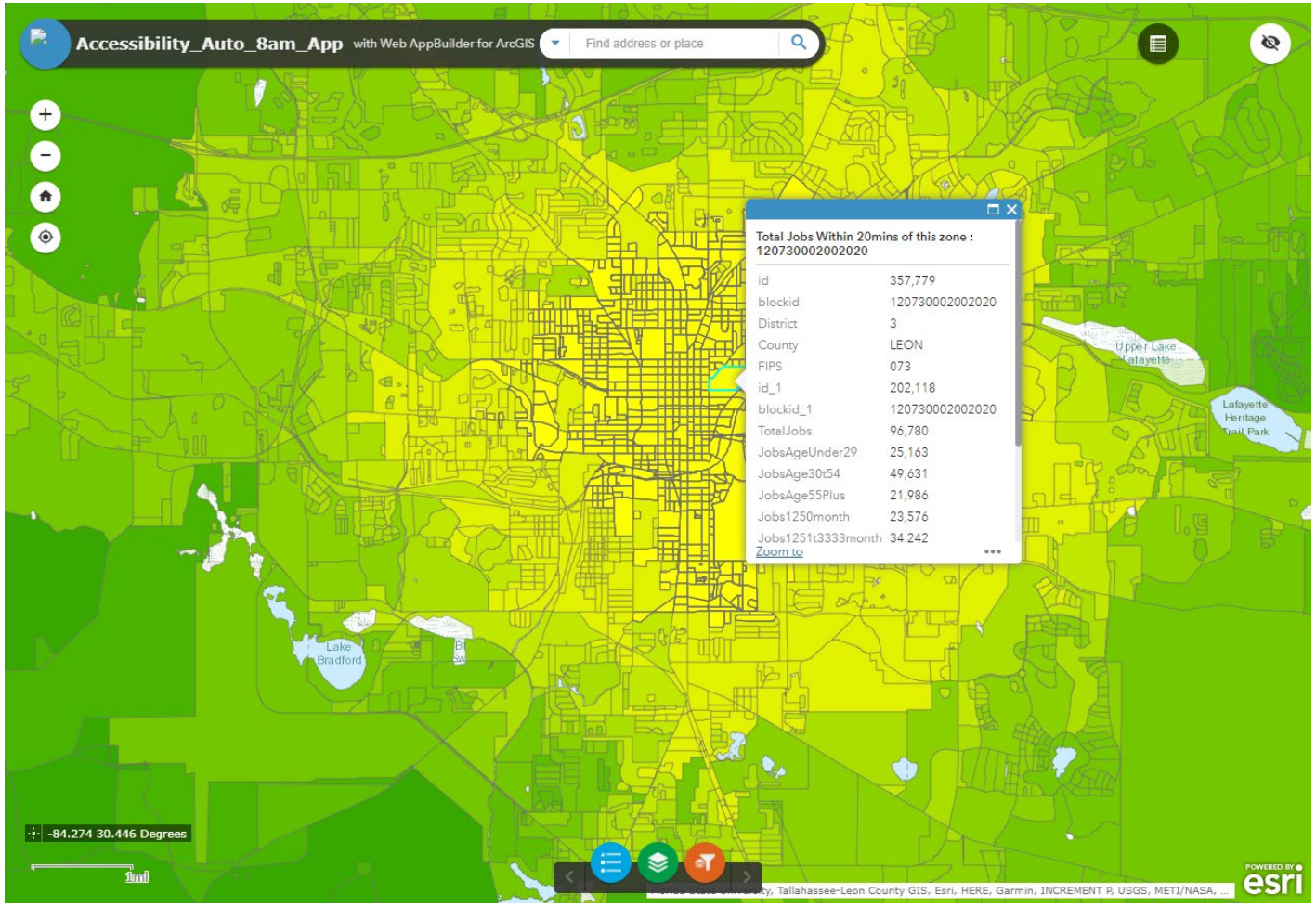
Safety Data Integration Space





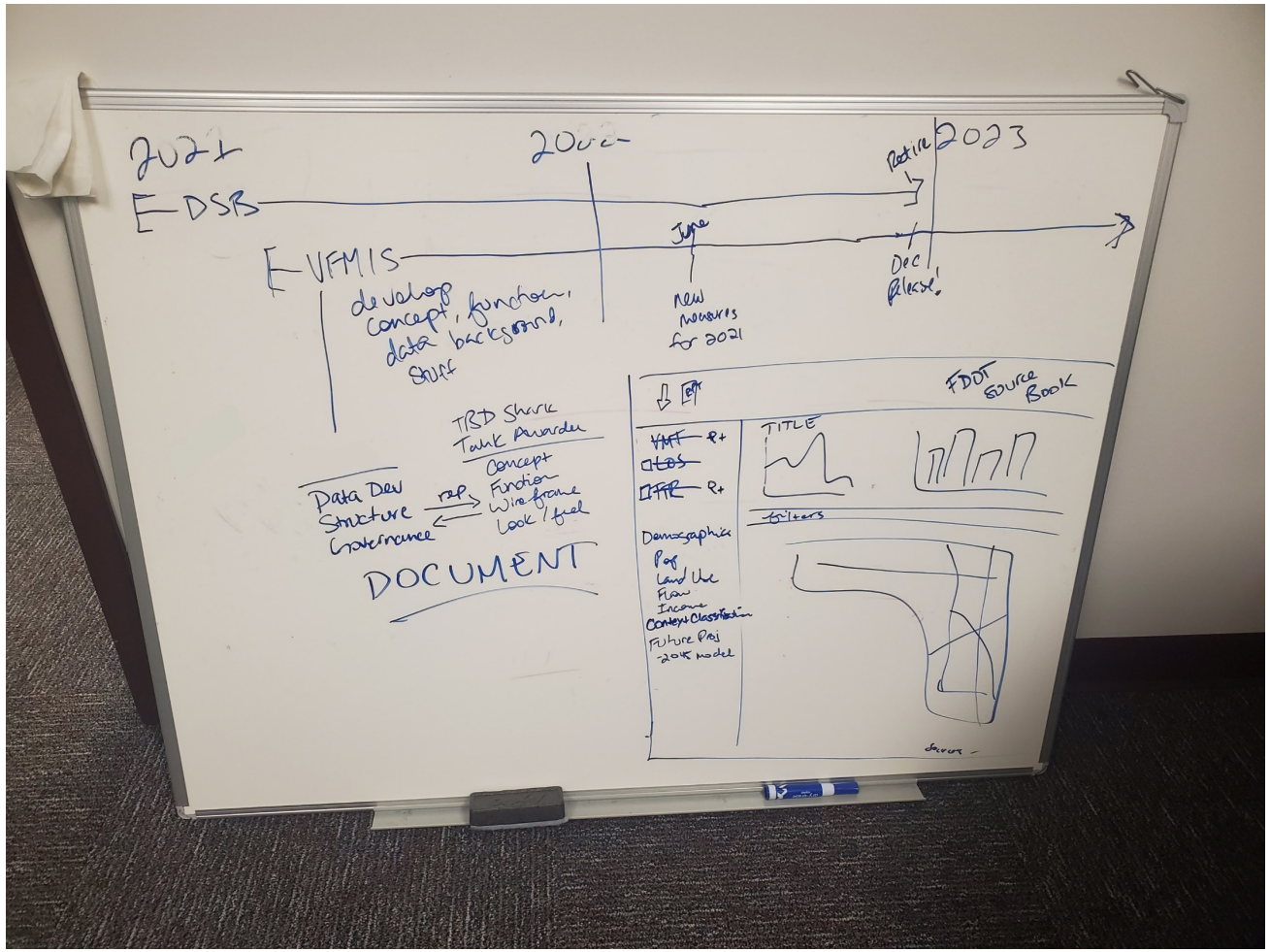
Visualizing Accessibility

- Experiment with ArcGIS
- Total jobs within 20 mins



Source Book: The Next Generation

- Streamline access and navigation
- Reduce number of clicks
- Remove barrier between area and segment visualization
- Data structure to support future growth



Florida Department of Transportation





Jessica VanDenBogaert

Forecasting and Trends Office

605 Suwannee Street

Tallahassee, FL 32399

Phone: 850-414-4631

Email: Jessica.VanDenBogaert@dot.state.fl.us

Strategic development

Visualizing Traffic Signal Performance Using ATSPM

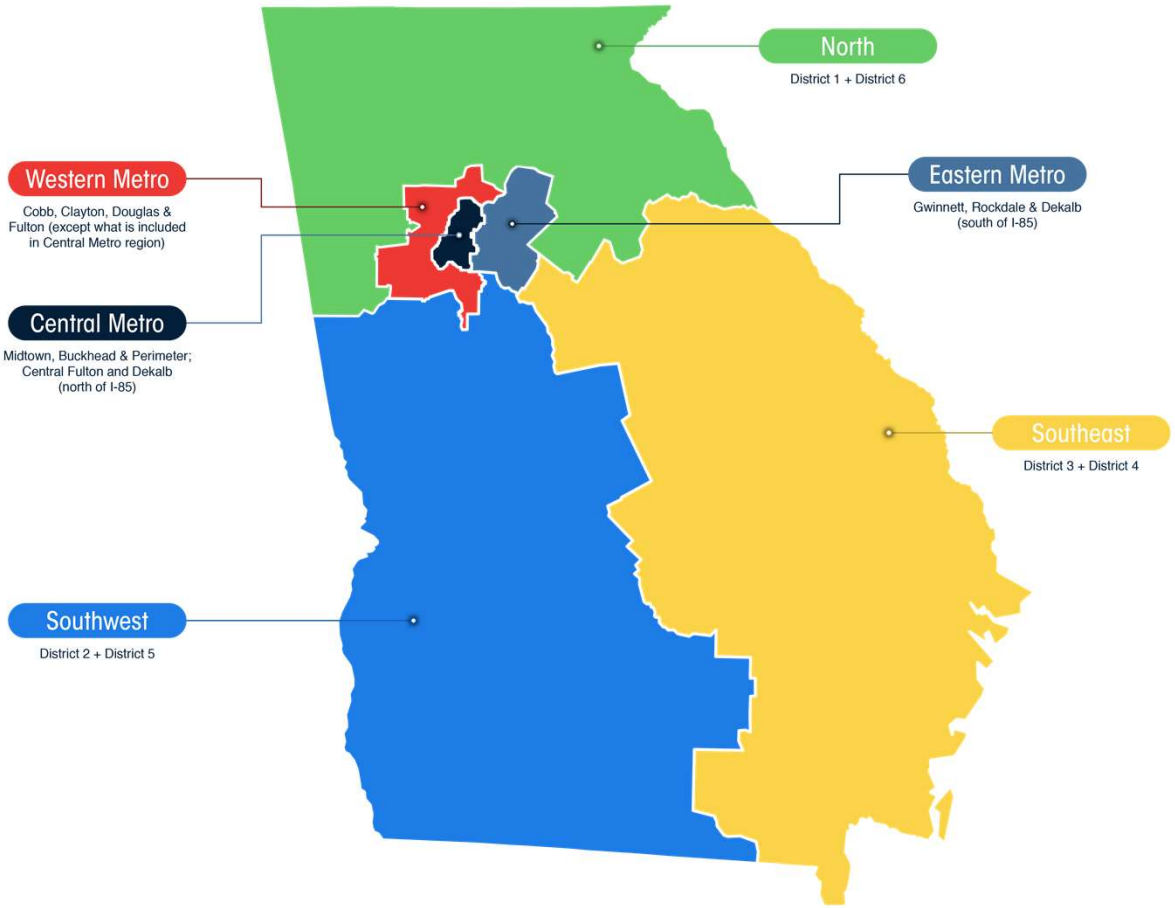
SigOps | Office of Traffic Operations

May 2021

SigOps

GDOT divides our operations and maintenance of signals into six main regions throughout the state, providing active management to the entire region:

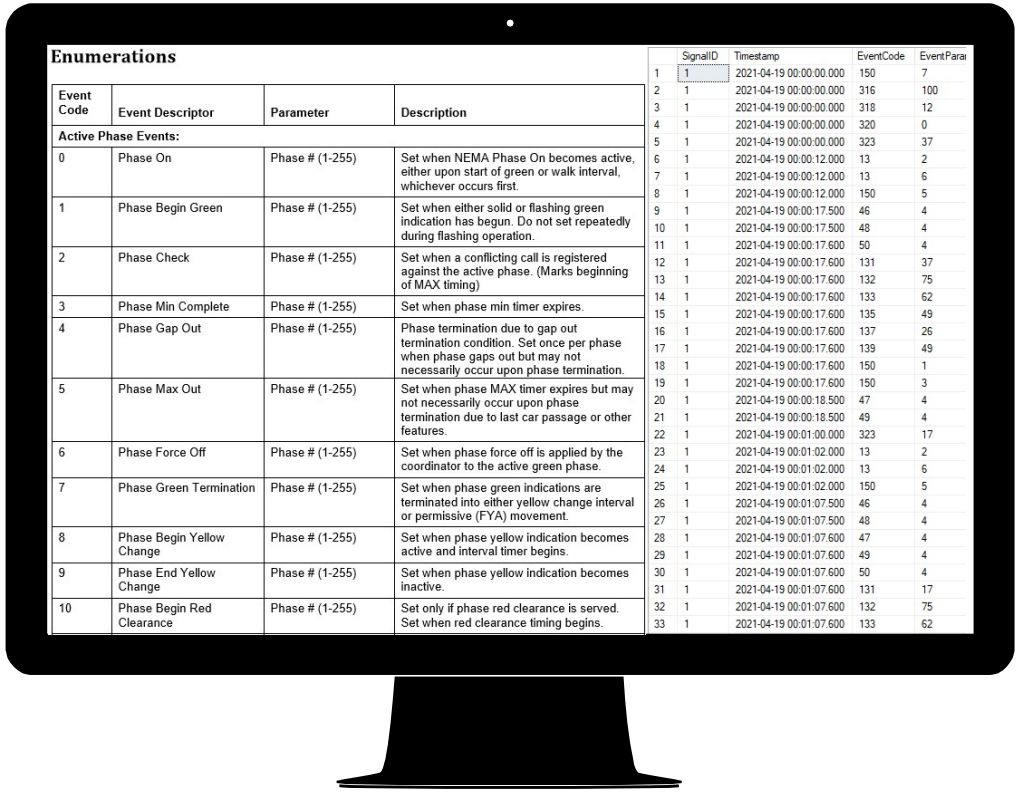
- North
- Southwest
- Southeast
- Western Metro
- Central Metro
- Eastern Metro



Automated Traffic Signal Performance Measures

Built Around High Resolution Data

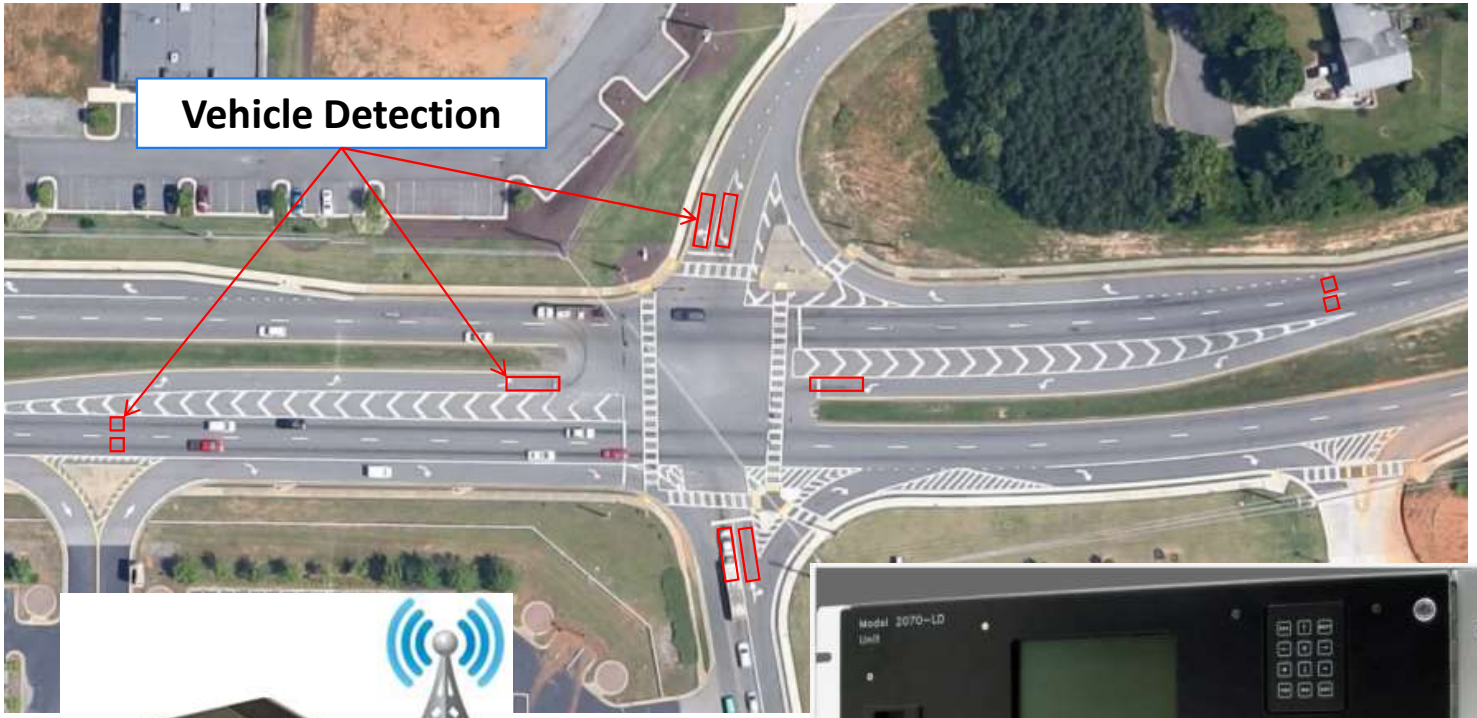
- Set of standard enumerations developed through a pooled fund study with Indiana DOT and Purdue University
- 1/10th second resolution
- Vendor input and implementation
- Intended to be agnostic of software/vendor/system
- https://docs.lib.purdue.edu/jtrpdata/4/



Enumerations

Event Code	Event Descriptor	Parameter	Description
Active Phase Events:			
0	Phase On	Phase # (1-255)	Set when NEMA Phase On becomes active, either upon start of green or walk interval, whichever occurs first.
1	Phase Begin Green	Phase # (1-255)	Set when either solid or flashing green indication has begun. Do not set repeatedly during flashing operation.
2	Phase Check	Phase # (1-255)	Set when a conflicting call is registered against the active phase. (Marks beginning of MAX timing)
3	Phase Min Complete	Phase # (1-255)	Set when phase min timer expires.
4	Phase Gap Out	Phase # (1-255)	Phase termination due to gap out termination condition. Set once per phase when phase gaps out but may not necessarily occur upon phase termination.
5	Phase Max Out	Phase # (1-255)	Set when phase MAX timer expires but may not necessarily occur upon phase termination due to last car passage or other features.
6	Phase Force Off	Phase # (1-255)	Set when phase force off is applied by the coordinator to the active green phase.
7	Phase Green Termination	Phase # (1-255)	Set when phase green indications are terminated into either yellow change interval or permissive (FYA) movement.
8	Phase Begin Yellow Change	Phase # (1-255)	Set when phase yellow indication becomes active and interval timer begins.
9	Phase End Yellow Change	Phase # (1-255)	Set when phase yellow indication becomes inactive.
10	Phase Begin Red Clearance	Phase # (1-255)	Set only if phase red clearance is served. Set when red clearance timing begins.

	SignalID	Timestamp	EventCode	EventParam
1	1	2021-04-19 00:00:00.000	150	7
2	1	2021-04-19 00:00:00.000	316	100
3	1	2021-04-19 00:00:00.000	318	12
4	1	2021-04-19 00:00:00.000	320	0
5	1	2021-04-19 00:00:00.000	323	37
6	1	2021-04-19 00:00:12.000	13	2
7	1	2021-04-19 00:00:12.000	13	6
8	1	2021-04-19 00:00:12.000	150	5
9	1	2021-04-19 00:00:17.500	46	4
10	1	2021-04-19 00:00:17.500	48	4
11	1	2021-04-19 00:00:17.600	50	4
12	1	2021-04-19 00:00:17.600	131	37
13	1	2021-04-19 00:00:17.600	132	75
14	1	2021-04-19 00:00:17.600	133	62
15	1	2021-04-19 00:00:17.600	135	49
16	1	2021-04-19 00:00:17.600	137	26
17	1	2021-04-19 00:00:17.600	139	49
18	1	2021-04-19 00:00:17.600	150	1
19	1	2021-04-19 00:00:17.600	150	3
20	1	2021-04-19 00:00:18.500	47	4
21	1	2021-04-19 00:00:18.500	49	4
22	1	2021-04-19 00:01:00.000	323	17
23	1	2021-04-19 00:01:02.000	13	2
24	1	2021-04-19 00:01:02.000	13	6
25	1	2021-04-19 00:01:02.000	150	5
26	1	2021-04-19 00:01:07.500	46	4
27	1	2021-04-19 00:01:07.500	48	4
28	1	2021-04-19 00:01:07.600	47	4
29	1	2021-04-19 00:01:07.600	49	4
30	1	2021-04-19 00:01:07.600	50	4
31	1	2021-04-19 00:01:07.600	131	17
32	1	2021-04-19 00:01:07.600	132	75
33	1	2021-04-19 00:01:07.600	133	62



Communications

High resolution controller

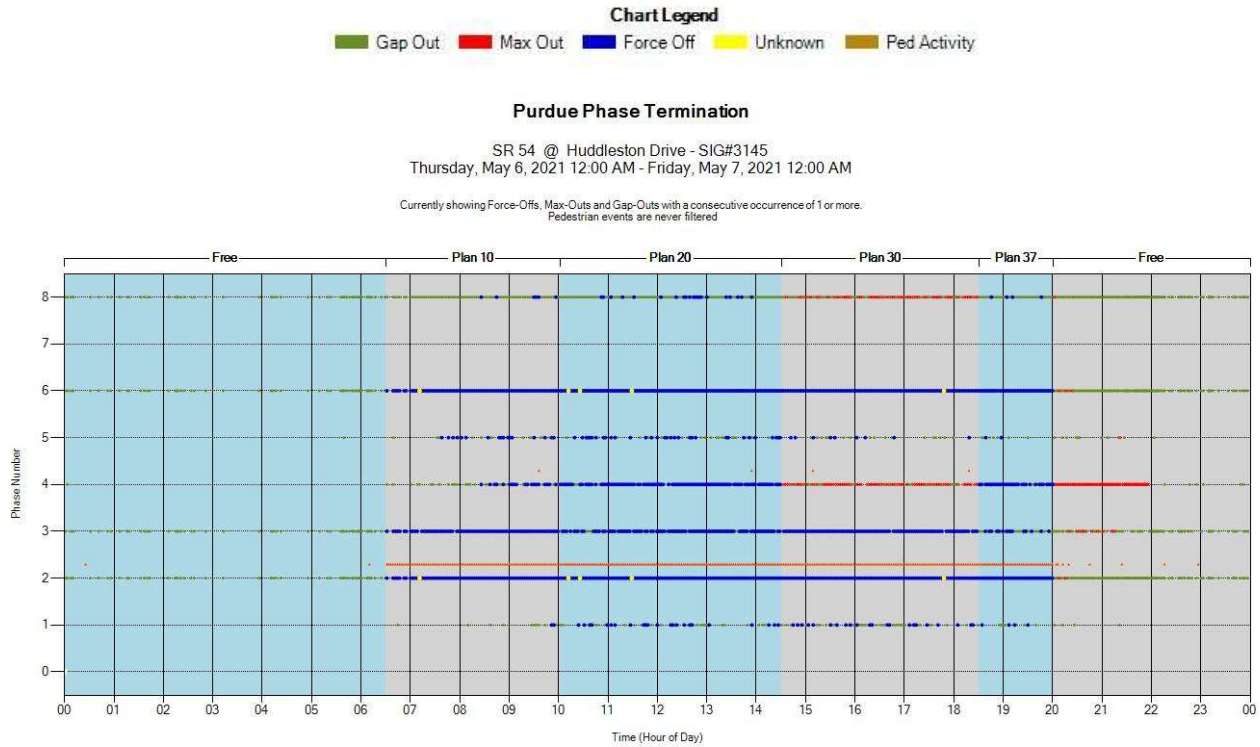
Web-based Tool for Performance Measures

- Open-sourced platform originally developed by Utah DOT
- Multiple contributors back to platform
- Over 7,000 signals in GDOT's platform
- https://traffic.dot.ga.gov/atspm

Visualization Examples

Purdue Phase Termination

- Displays phase terminations over period of time
- Effective for finding recurring maintenance or operations issues
- Often shines spotlight on issues a field visit would not identify

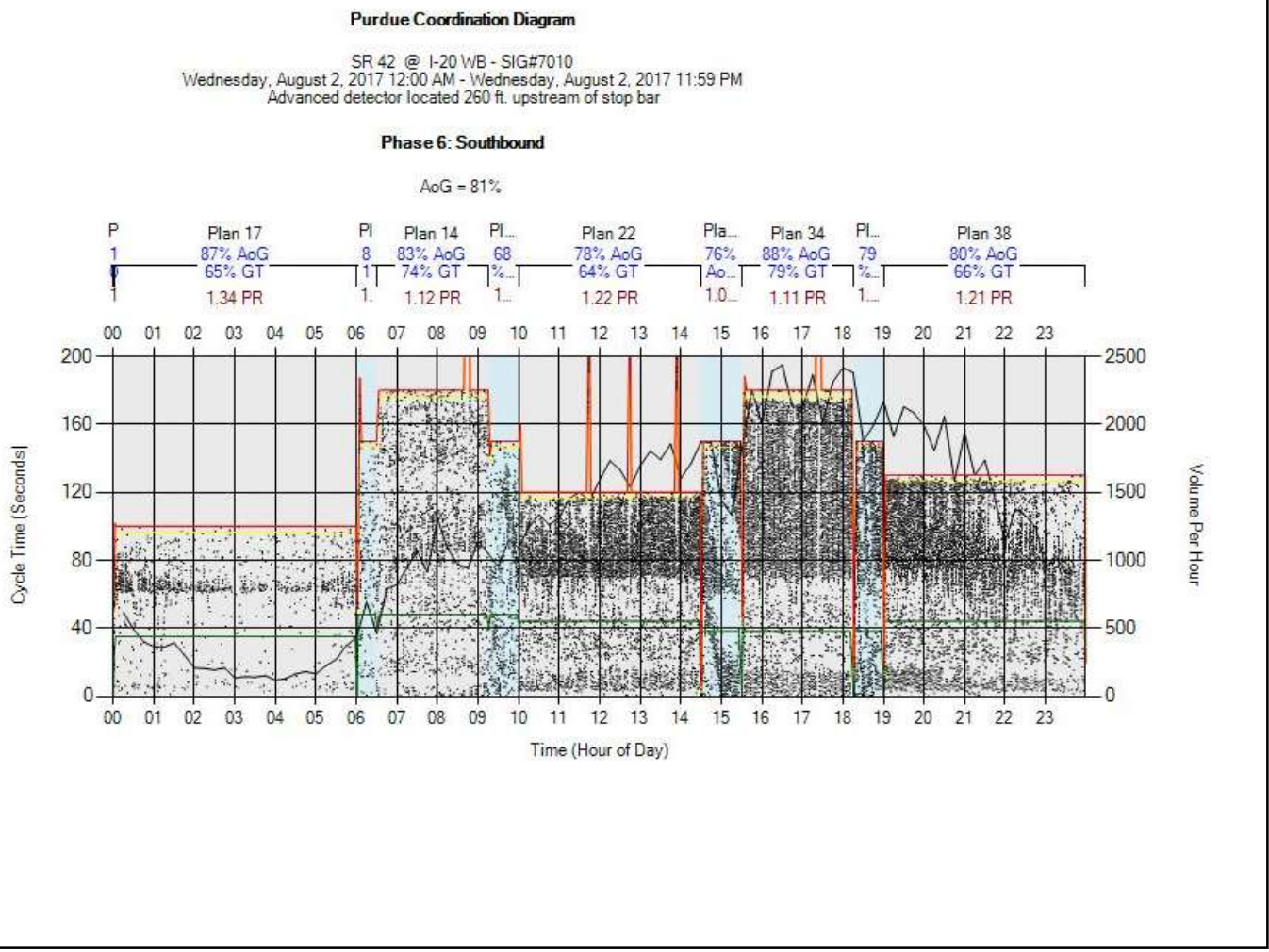


Visualization Examples

Purdue Coordination Diagram

- Red line is the start of the red phase
- Yellow line is start of the yellow phase
- Green line is start of the green phase
- Black dots represent vehicles crossing over detectors

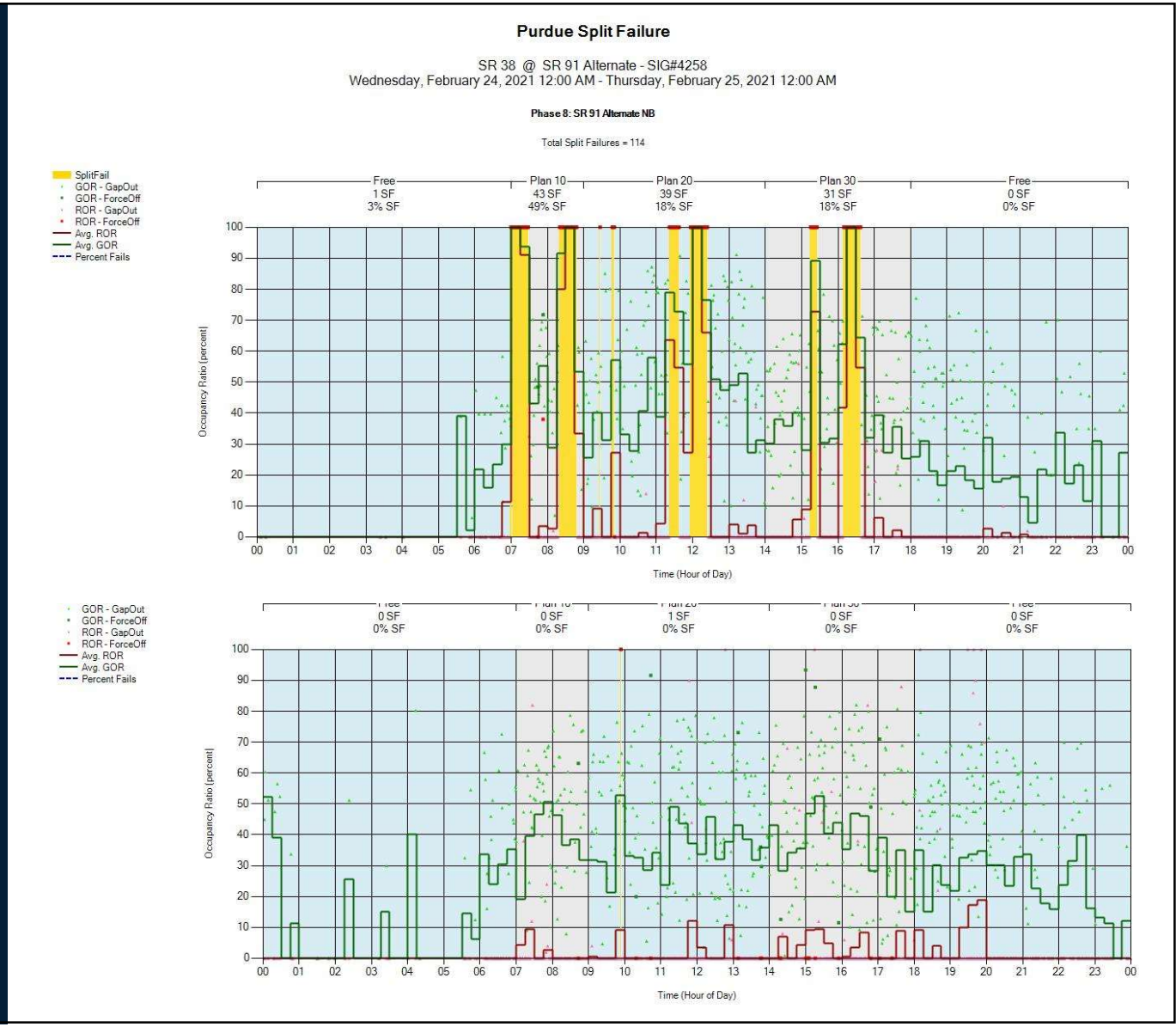
- Provides excellent view of intersection progression



Visualization Examples

Purdue Split Failure

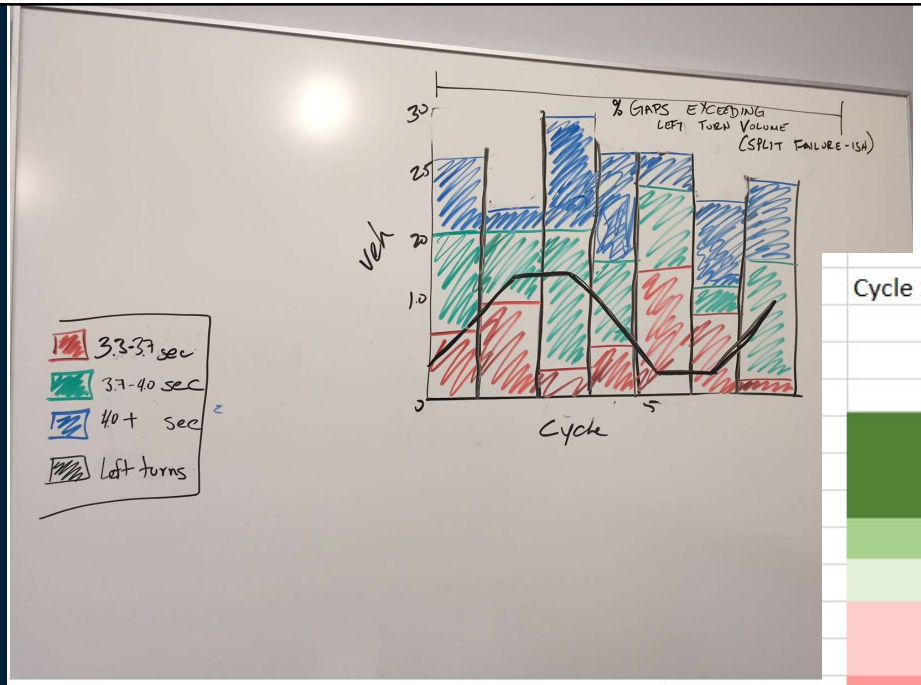
- Demand is present after the phase terminates for minor movements

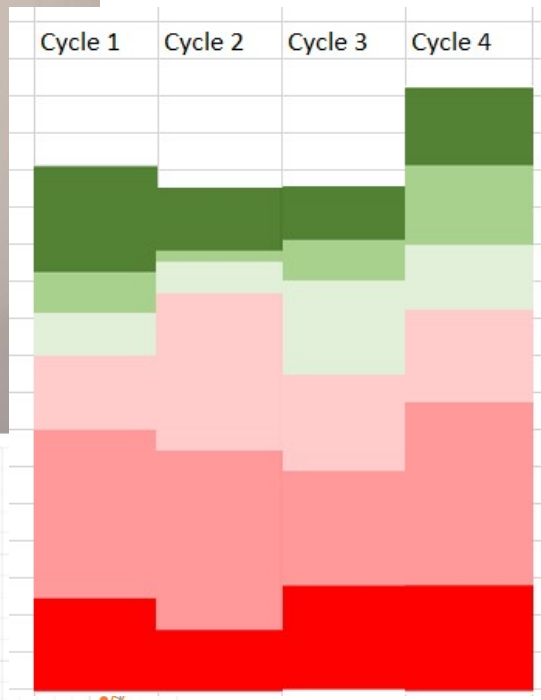


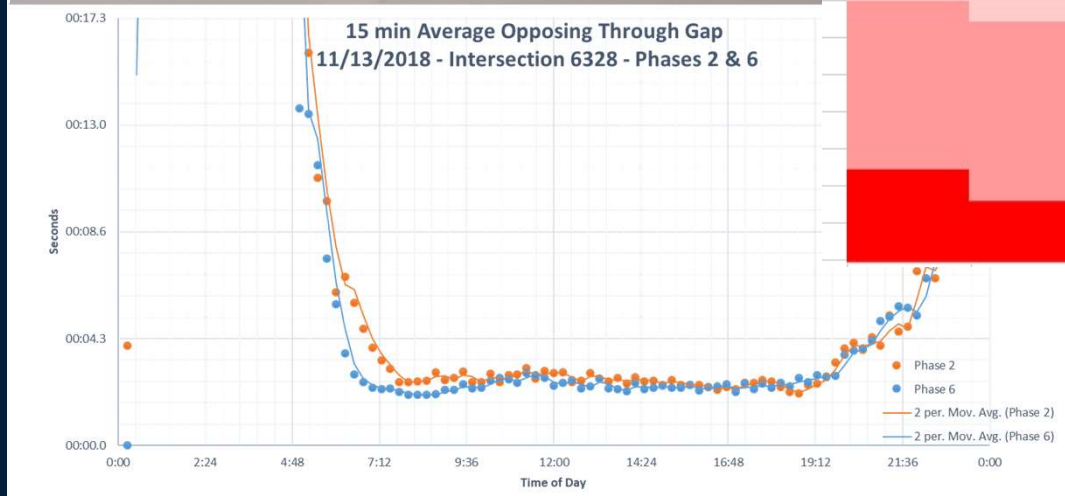
Visualization Innovation

Left turn gap analysis

- Developed by GDOT to visualize where permissive left turn movements did not have adequate gaps in opposing thru traffic.

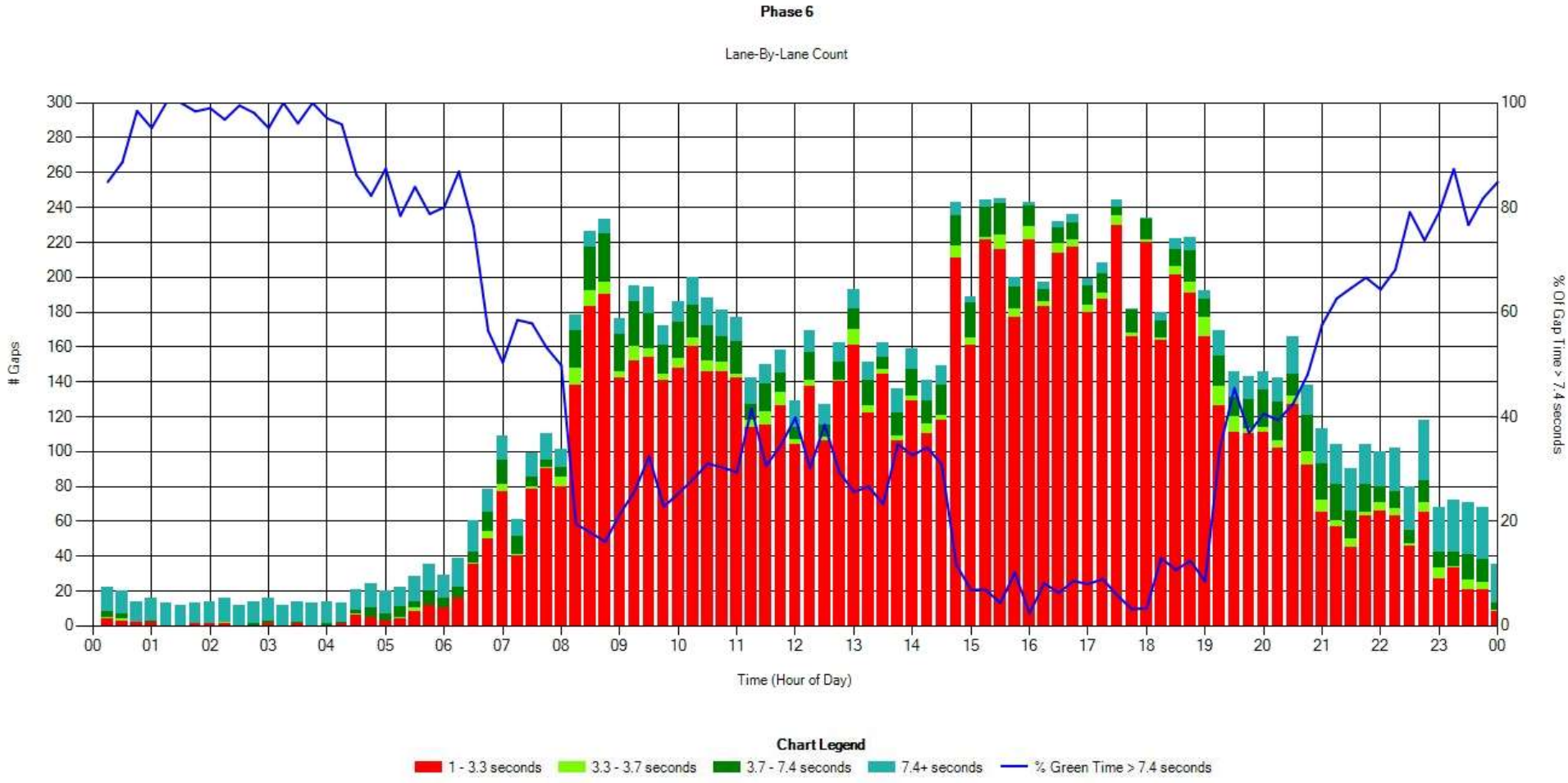






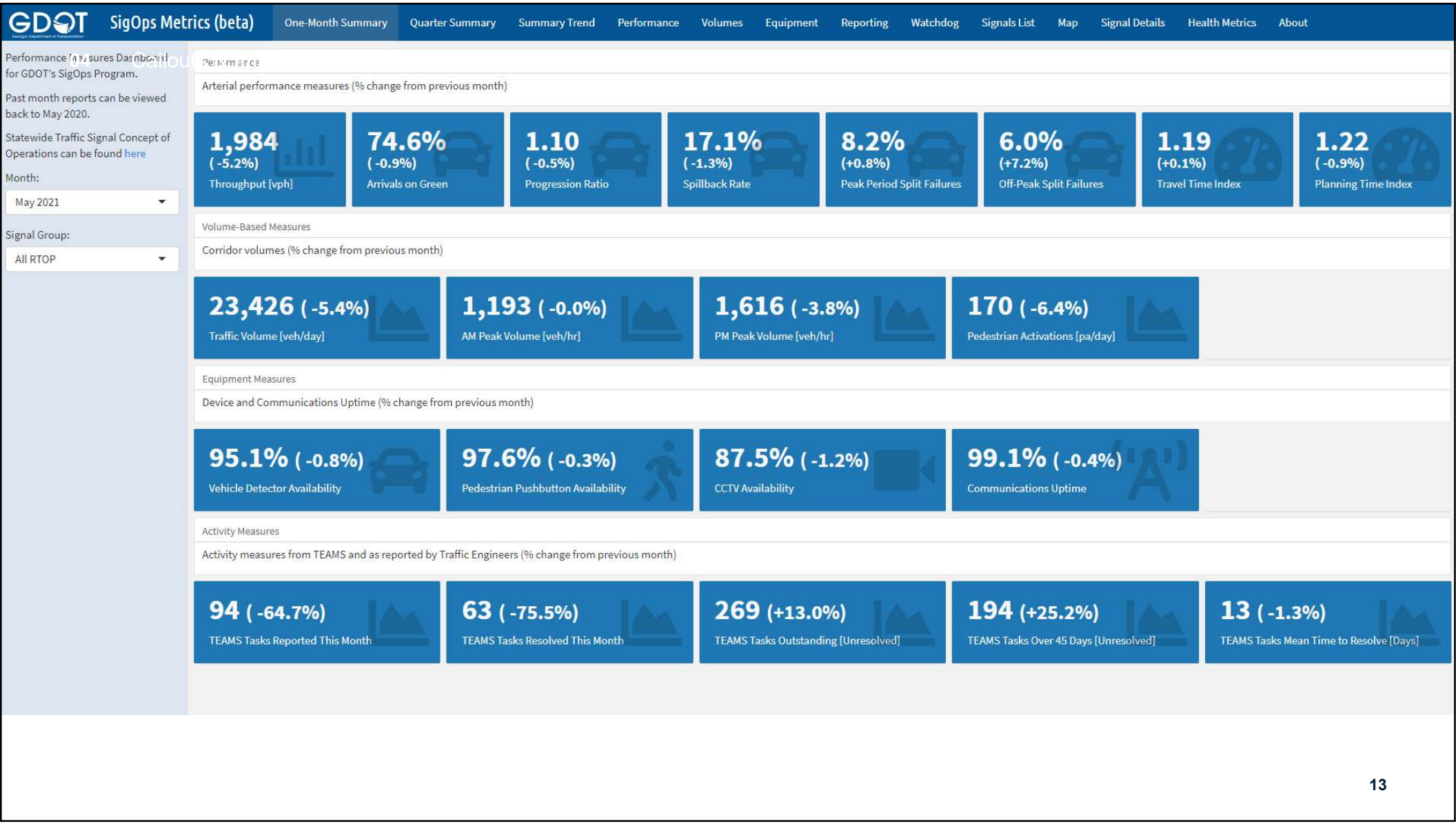
Left Turn Gap Analysis

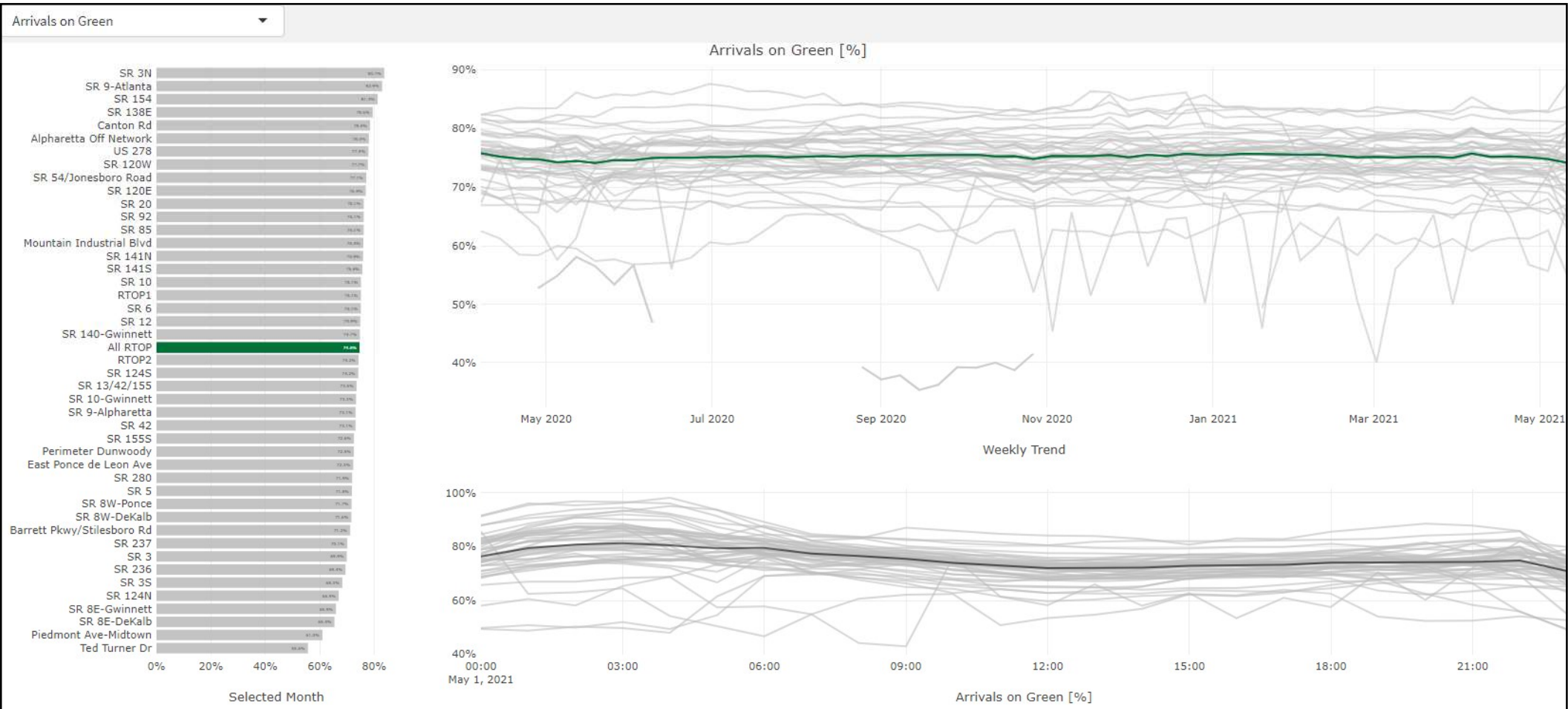
SR 92 @ Professional Way - SIG#6328
Wednesday, May 5, 2021 12:00 AM - Thursday, May 6, 2021 12:00 AM



More Than the Intersection

Corridor-based Visualization

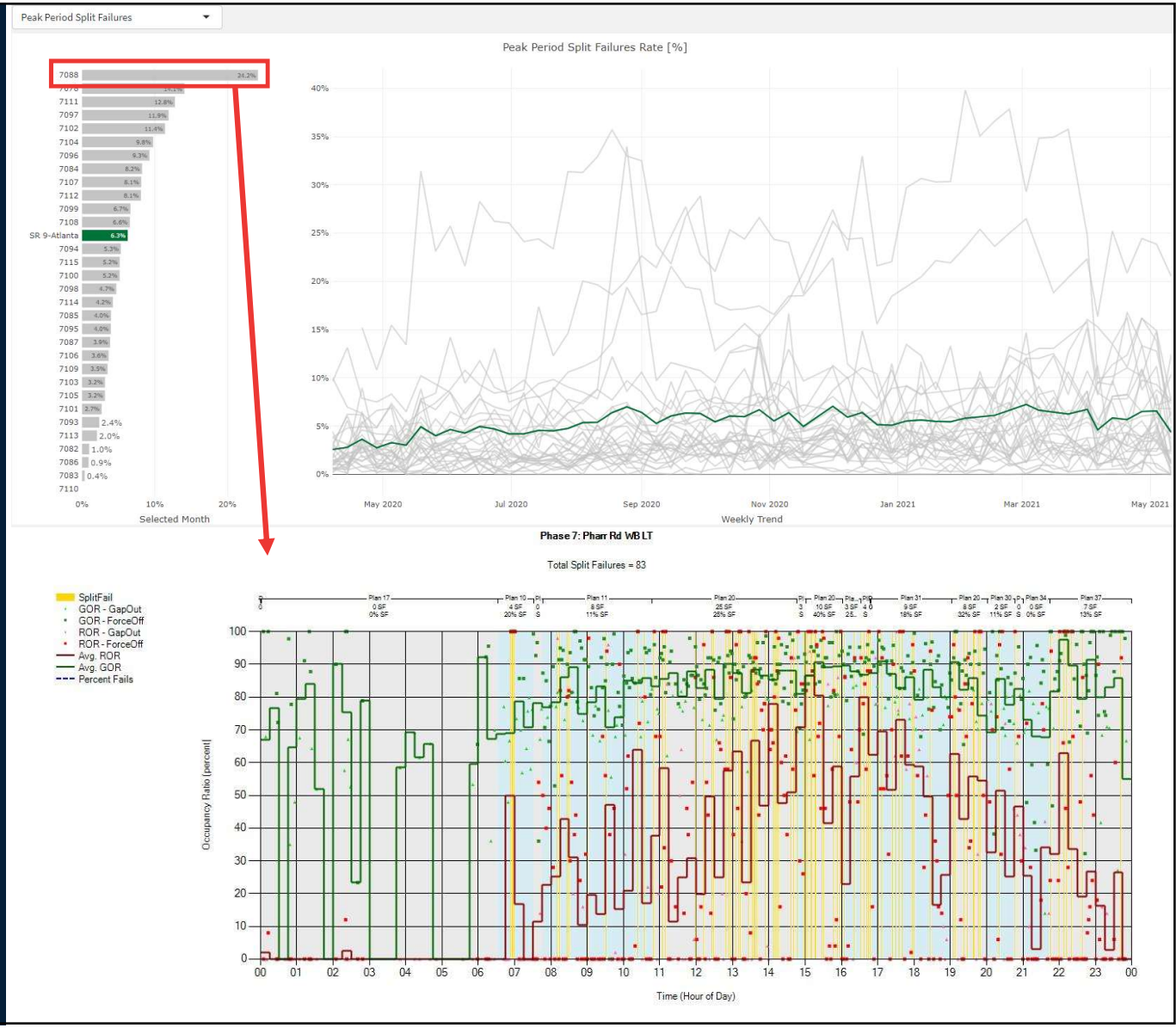

GDOT
SigOps Metrics (beta)
One-Month Summary
Quarter Summary
Summary Trend
Performance
Volumes
Equipment
Reporting
Watchdog
Signals List
Map
Signal Details
Health Metrics
About
Performance Measures Dashboard for GDOT's SigOps Program.
Past month reports can be viewed back to May 2020.
Statewide Traffic Signal Concept of Operations can be found here
Month:
May 2021
Signal Group:
All RTOP
Performance
Arterial performance measures (% change from previous month)
1,984 (-5.2%) Throughput [vph]
74.6% (-0.9%) Arrivals on Green
1.10 (-0.5%) Progression Ratio
17.1% (-1.3%) Spillback Rate
8.2% (+0.8%) Peak Period Split Failures
6.0% (+7.2%) Off-Peak Split Failures
1.19 (+0.1%) Travel Time Index
1.22 (-0.9%) Planning Time Index
Volume-Based Measures
Corridor volumes (% change from previous month)
23,426 (-5.4%) Traffic Volume [veh/day]
1,193 (-0.0%) AM Peak Volume [veh/hr]
1,616 (-3.8%) PM Peak Volume [veh/hr]
170 (-6.4%) Pedestrian Activations [pa/day]
Equipment Measures
Device and Communications Uptime (% change from previous month)
95.1% (-0.8%) Vehicle Detector Availability
97.6% (-0.3%) Pedestrian Pushbutton Availability
87.5% (-1.2%) CCTV Availability
99.1% (-0.4%) Communications Uptime
Activity Measures
Activity measures from TEAMS and as reported by Traffic Engineers (% change from previous month)
94 (-64.7%) TEAMS Tasks Reported This Month
63 (-75.5%) TEAMS Tasks Resolved This Month
269 (+13.0%) TEAMS Tasks Outstanding [Unresolved]
194 (+25.2%) TEAMS Tasks Over 45 Days [Unresolved]
13 (-1.3%) TEAMS Tasks Mean Time to Resolve [Days]



Focusing the traffic engineer on issues;
expanding the reach of a single engineer.

Corridor to Intersection

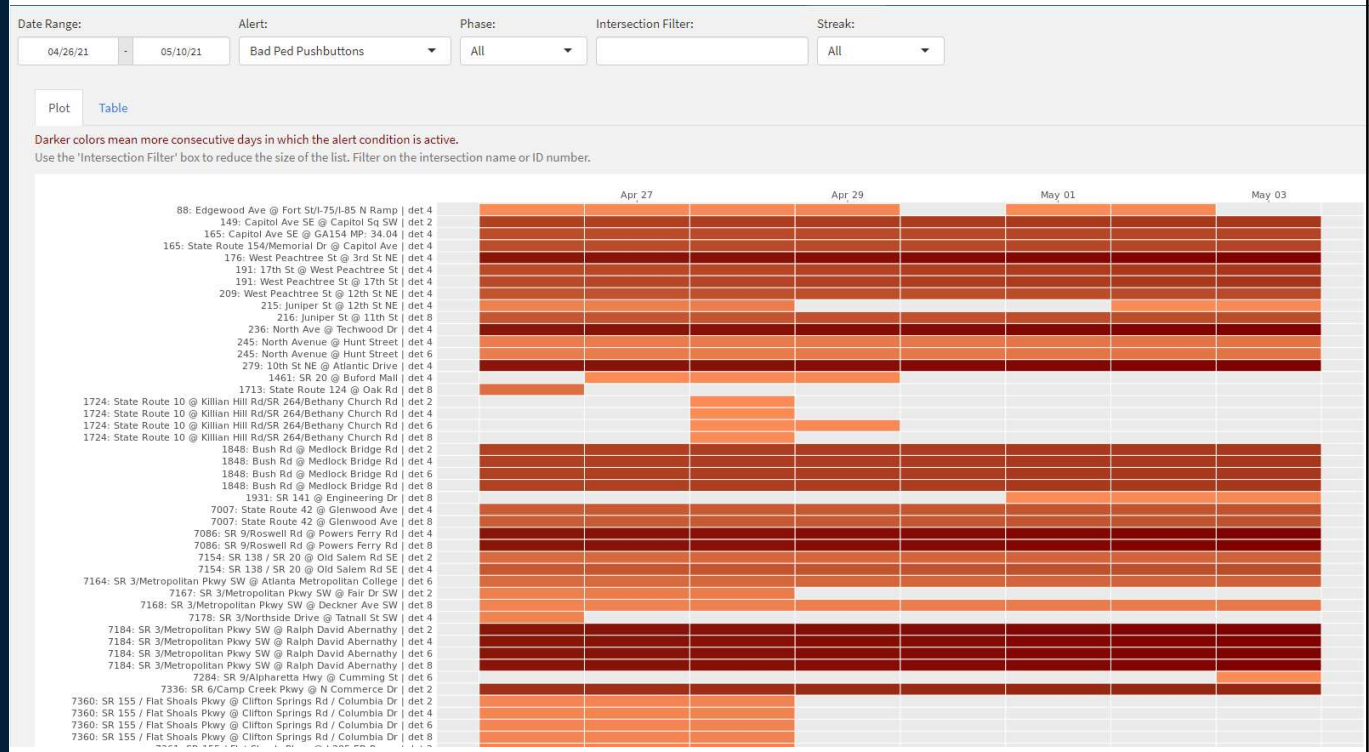
Identifying outliers and issues enable an engineer to focus on problematic intersections that need the most attention.

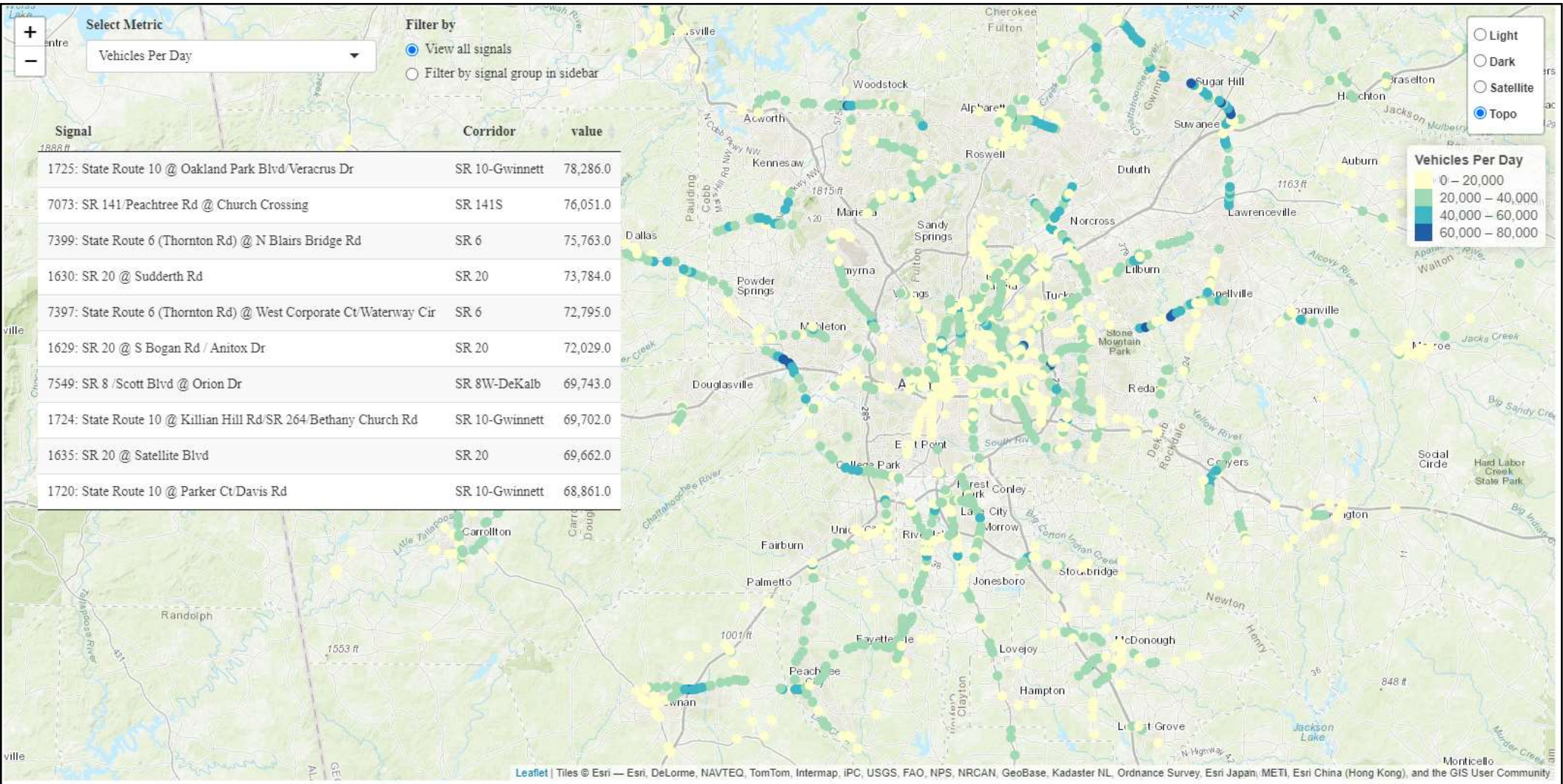


Watchdog Report Aggregation

Daily watchdog report looks for trends that indicate equipment failures.

Trends over time can identify common failures or performance issues.





Map-based visualization

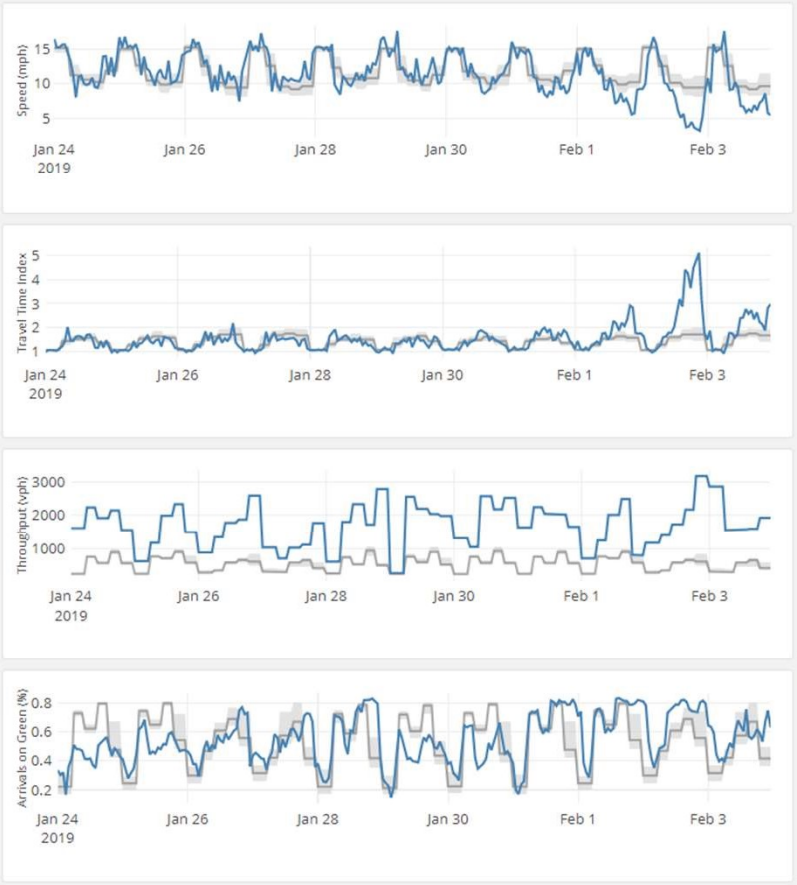
Special Events Area Performance Measures

The below traffic metrics are the most recent traffic data in the event area compared to historic data along the same routes.

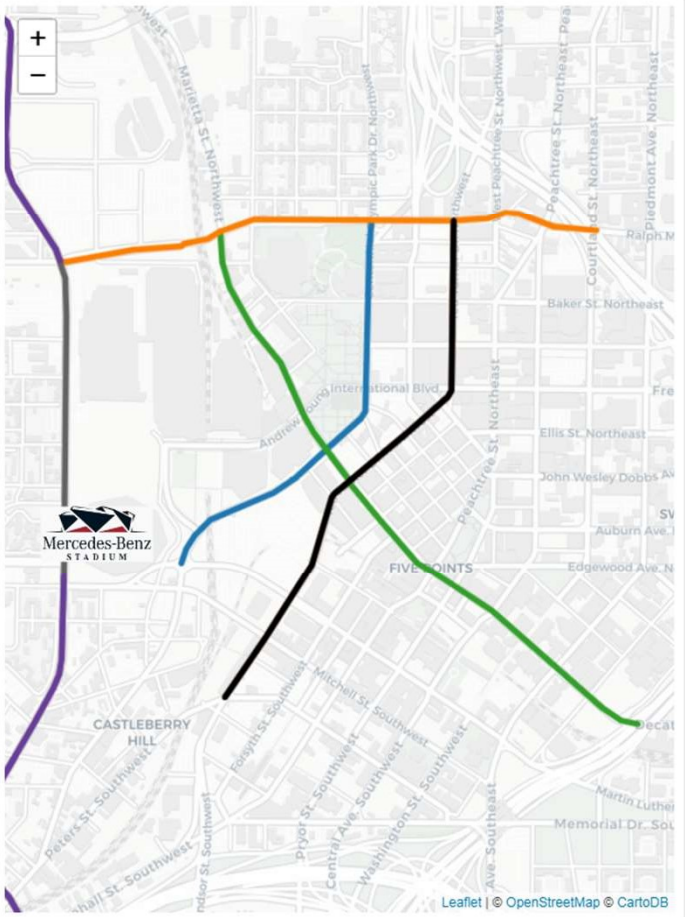
Feb 3

Ted Turner Drive

Special Event Week vs. Historical Averages



	AM Peak	PM Peak	Daily
Speed [mph]	12.2 (12.6/ -3.1%)	9.7 (9.2/ +5.4%)	9.8 (12.2/ -19.3%)
Travel Time Index	1.36 (1.28/ +6.4%)	1.80 (1.75/ +2.9%)	1.88 (1.39/ +34.8%)
Throughput [vph]	1,908 (283/ +574.4%)	2,049 (641/ +219.5%)	2,133 (416/ +412.3%)
Arrivals on Green	61.4% (42.2%/ +45.7%)	67.3% (67.1%/ +0.3%)	57.4% (43.8%/ +31.3%)



Real-time Visualization

SigOps Metro2 Quarterly Report — ARTERIAL PERFORMANCE — FY 2021 Q3 | Page 2

2021 Q3

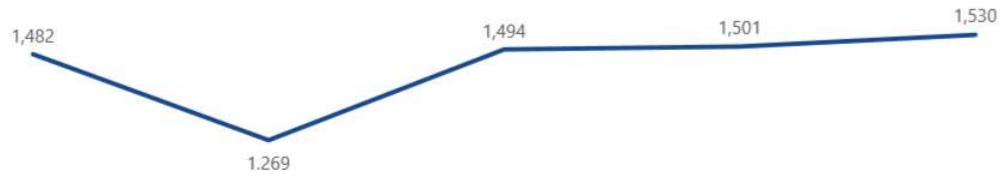
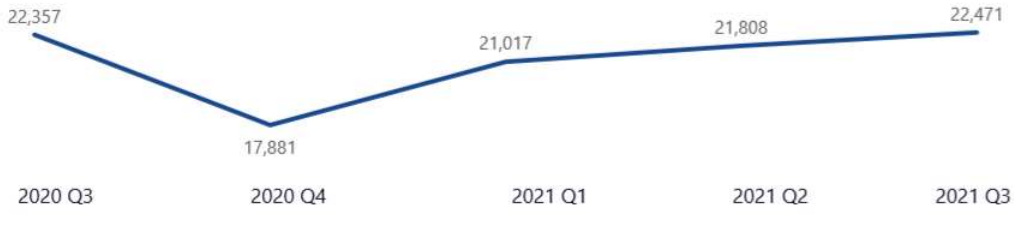
Metric	Goal	Current Quarter	% Change	Program Trends
Throughput	1,719	**1,894**	4.7%	1,795 → 1,474 → 1,655 → 1,809 → 1,894
Arrivals on Green	80%	**75.1%**	0.0%	74.1% → 74.3% → 74.9% → 75.1% → 75.1%
Spillback Rate	10%	**15.0%**	-11.2%	18.5% → 14.5% → 16.5% → 16.9% → 15.0%
Peak Period Split Failures	5%	**7.4%**	29.8%	9.1% → 5.7% → 5.2% → 5.7% → 7.4%
Off-Peak Split Failures	5%	**4.9%**	16.7%	4.8% → 4.6% → 4.3% → 4.2% → 4.9%
Travel Time Index	2.00	**1.21**	-3.2%	1.35 → 1.24 → 1.26 → 1.25 → 1.21
Planning Time Index	2.00	**1.27**	-3.8%	1.46 → 1.30 → 1.32 → 1.32 → 1.27
Progression Ratio	--	**1.10**	0.0%	1.10 → 1.07 → 1.09 → 1.10 → 1.10

2020 Q3 | 2020 Q4 | 2021 Q1 | 2021 Q2 | 2021 Q3

Executive Reports

SigOps Metro2 Quarterly Report — OTHER CORRIDOR DATA — FY 2021 Q3 | Page 3

2021 Q3

Metric	Current Quarter	% Change	Program Trends
AM Peak Volume	1,105	6.7%	
PM Peak Volume	1,530	1.9%	
Pedestrian Activity	97	-3.0%	
Traffic Volume	22,471	3.0%	

SigOps Metro2 Quarterly Report — EQUIPMENT UPTIME — FY 2021 Q3 | Page 4

2021 Q3

Metric	Goal	Current Quarter	% Change	Program Trends
CCTV Availability	95%	84.2%	0.8%	79.5%, 81.2%, 78.4%, 83.5%, 84.2%
Vehicle Detector Availability	95%	97.1%	1.6%	87.8%, 92.5%, 92.7%, 95.6%, 97.1%
Ped Pushbutton Availability	95%	96.8%	4.1%	92.9%, 92.3%, 91.1%, 93.0%, 96.8%
Communications Uptime	95%	99.1%	0.9%	96.8%, 97.1%, 97.1%, 98.2%, 99.1%

2020 Q3 | 2020 Q4 | 2021 Q1 | 2021 Q2 | 2021 Q3

Thank You!

Follow the Georgia Department of Transportation

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- Networking opportunities
- May provide a path to Standing Committee membership

Join a Standing Committee bit.ly/TRBstandingcommittee

Work with CRP https://bit.ly/TRB-crp

Update your information www.mytrb.org

Other TRB events for you

- *May 26:* **Enhancing the Capacity for Transportation System Resilience**

- *June 21-24:* **TRB Conference on Transportation Planning Applications**

- *August 10-12:* **National Conference on Transportation Asset Management**

https://www.nationalacademies.org/trb/events