

The Need for Real-Time Transportation Operations Through Cloud-Based Analytics and Predictive Management

2024 ITS Washington Annual Conference

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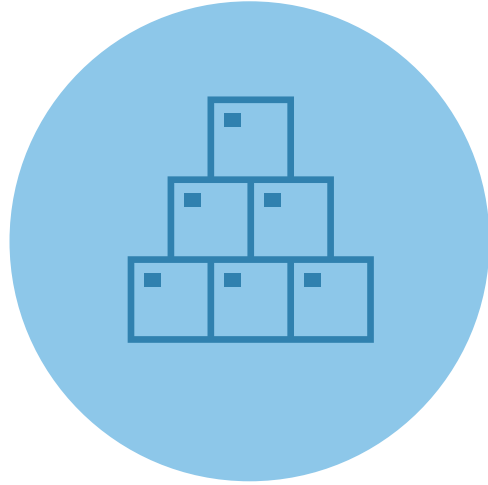


intelligent transportation society of washington



Saving Lives Through Improved Mobility

Agenda



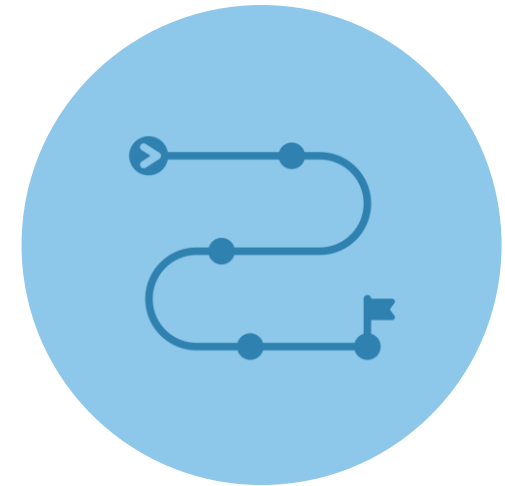
The Cloud

- ✓ Benefits of Cloud Based Solutions



The Opportunity

- ✓ Predictive Operations
- ✓ Digital Twin



Examples

- ✓ Concepts in Action

Operations and Data Solutions

- Real Time Traffic Operations

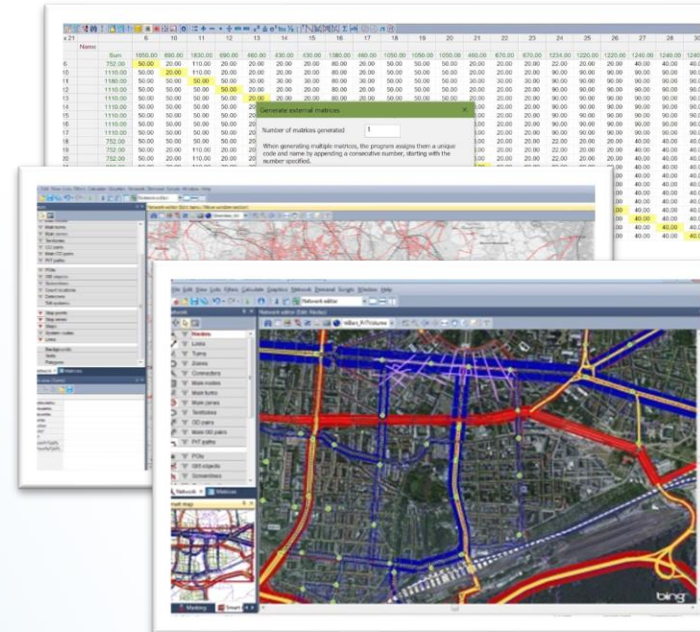
- Traffic Operations Solutions

- ITS Devices
 - ATMS
 - SPM
 - Traffic Responsive
 - Adaptive

- Predictive Planning

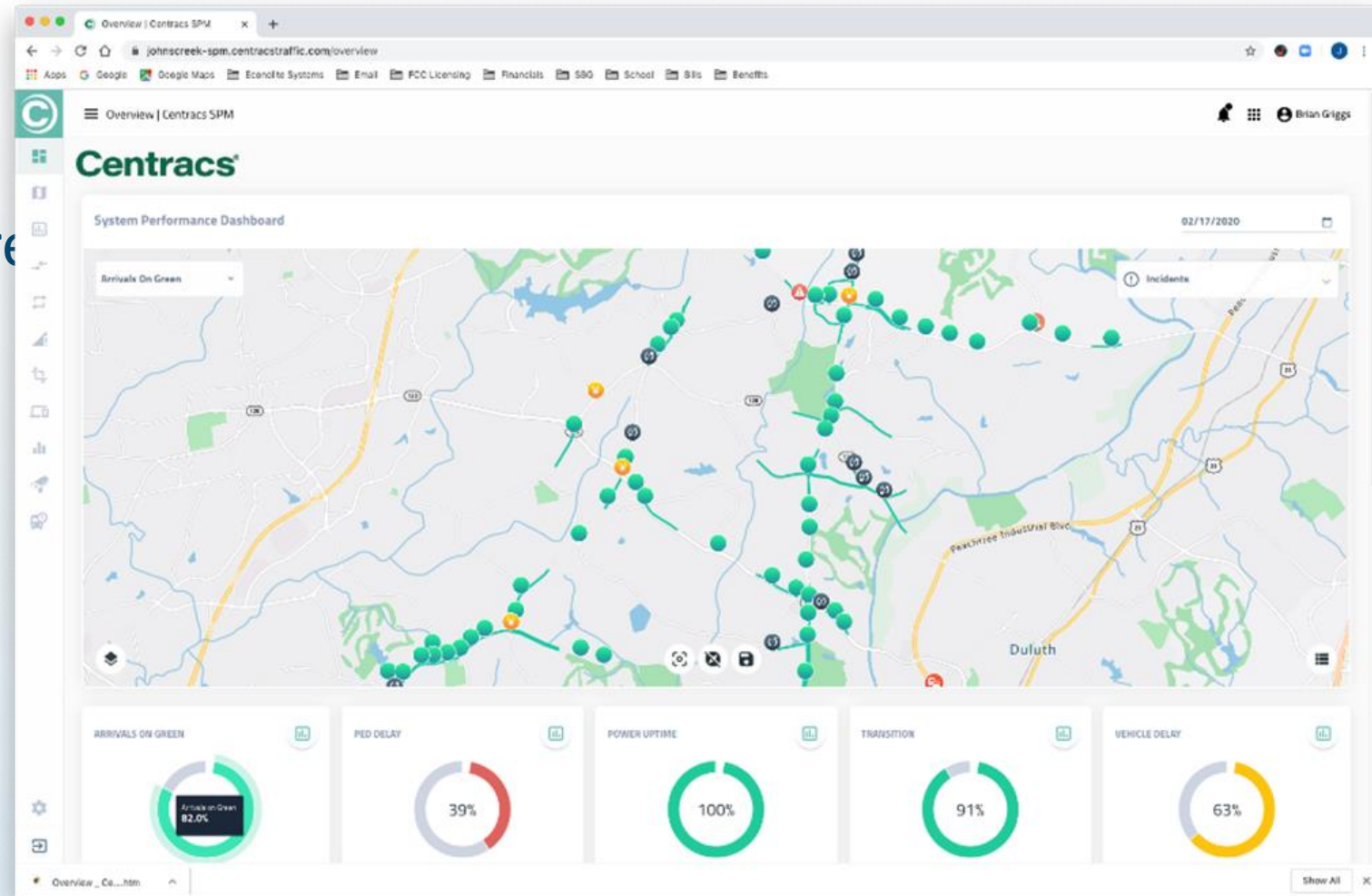
- Traffic Modeling and Simulation

- Small and Large Scale Planning
 - Real Time and Forecasted Insights
 - Transit Planning
 - Decision Support



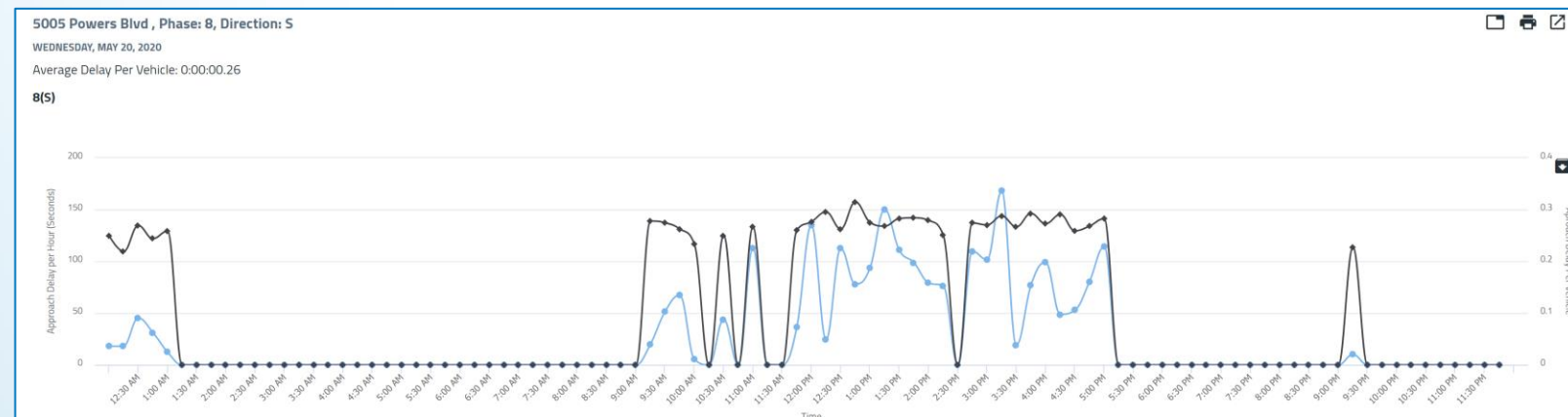
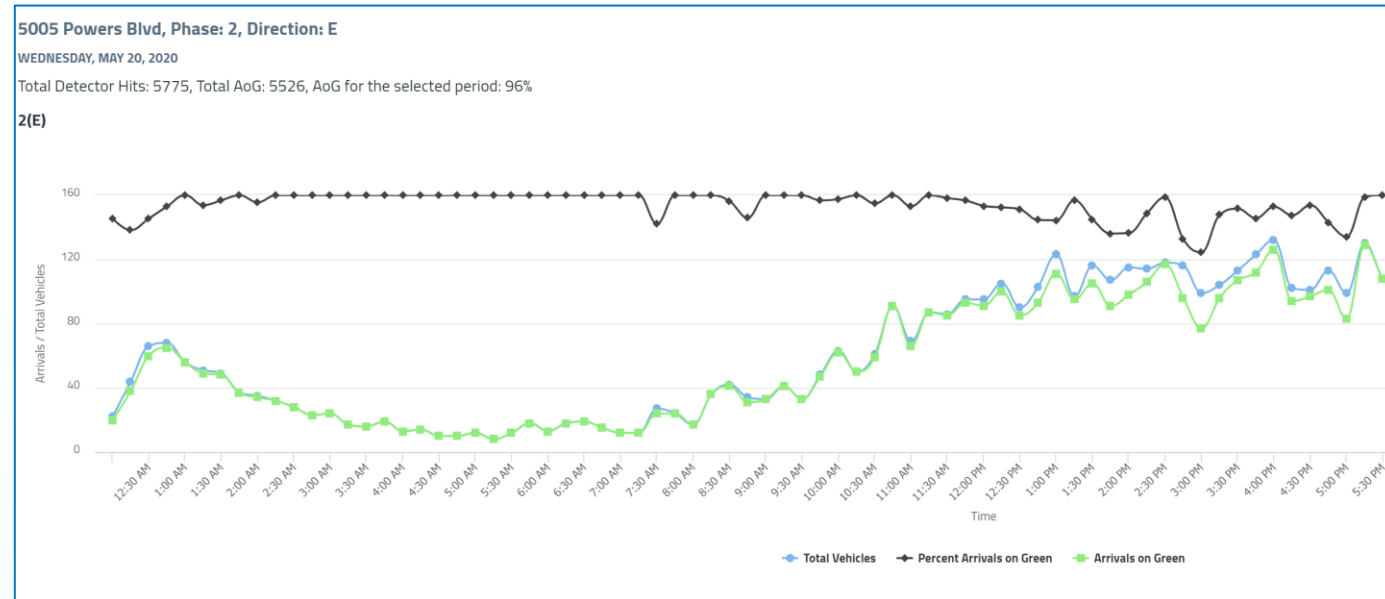
Cloud-Based Traffic Operations

- Real-Time Polling
- Manage ITS Devices Anywhere you have an Internet Connection
- Cost-Efficient Scaling
- Data Availability
- Low Maintenance
- Better Security



Access to More Operational Data

- SPM Reports
 - Vehicle delay, arrivals on green/red, split failures, Purdue Coordination Diagram, etc.
- Automated Alerts to maintain system
- Before/After Analysis
- Optimize Signal Timing
 - Regular fine-tuning



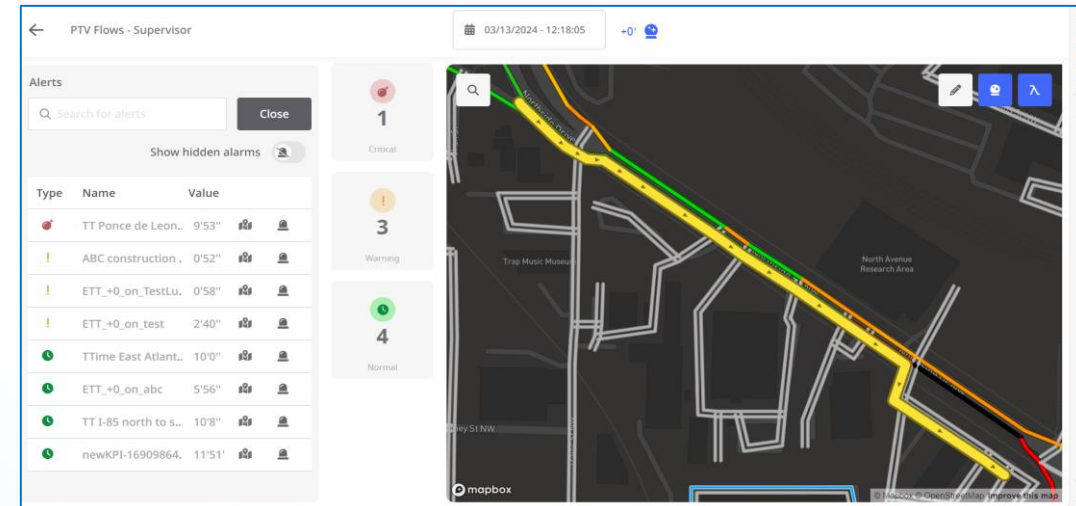
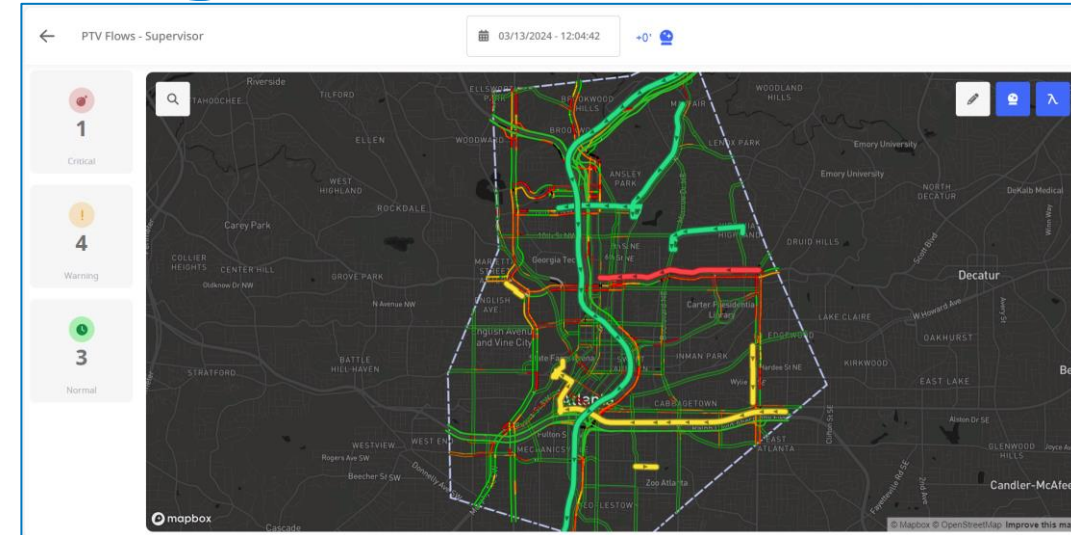
Enabling New Tools & Operational Modes

- Adaptive and Traffic Responsive are based on Real-time data
- Current Tools are in a Reactive State
- Requires regular maintenance of response plans
 - Seasonal Traffic
 - School in Session
 - Events



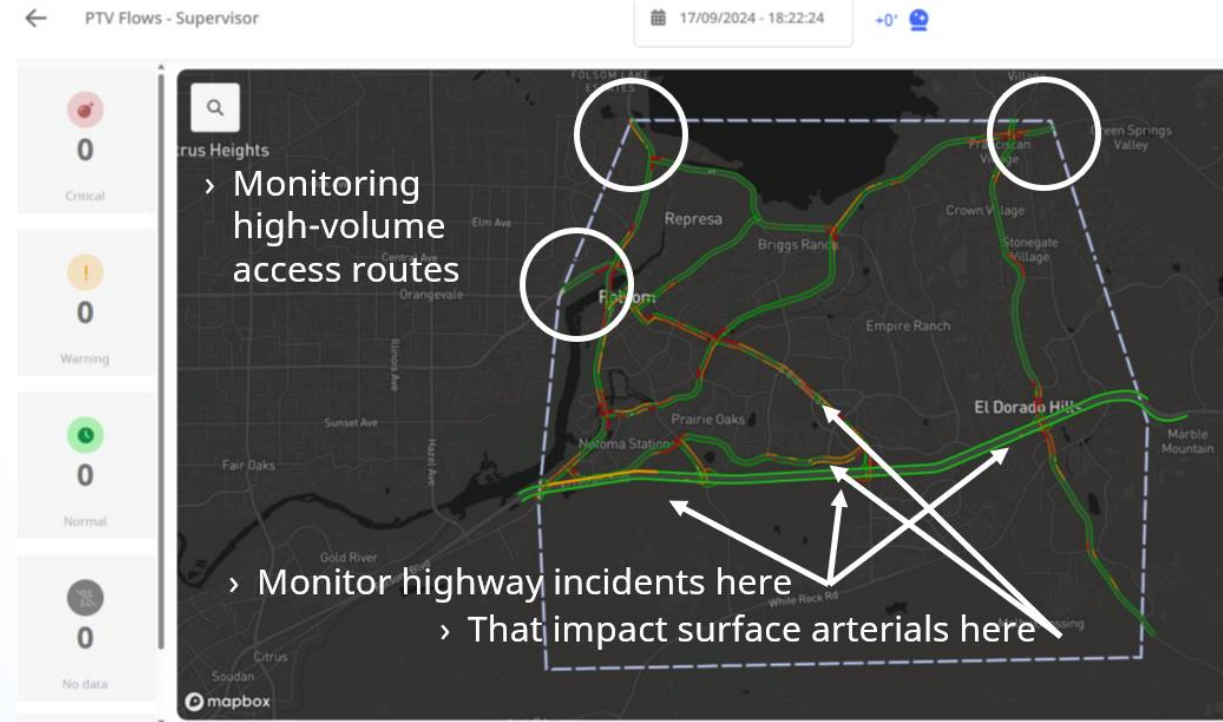
Real-Time and Predictive Insights

- Hardware-free solution for real-time traffic management
- Map is updated automatically with floating car data
- Visualizes problems in the road network and anticipates unexpected congestion
- Automatic alerts to proactively manage traffic
- Situational Awareness
 - Quickly Locate Increased Travel Time and Congestion



Real Time and Predictive Insights

- Monitor Real-Time Traffic and Forecast Traffic
 - Real-time alerts on increased travel time, speeds, etc.
 - Predictive travel times (up to 1 hour in advance)
- No need for manual monitoring
 - Runs in the background and alerts operators about current or upcoming incidents
- Applications
 - Predictive alerts, construction site monitoring, pre/post studies, event monitoring, etc.



Real Time and Predictive Insights

PTV Flows - Supervisor

03/13/2024 - 12:18:05 +0'

Alerts

Search for alerts

Close

Show hidden alarms

Type	Name	Value		
	TT Ponce de Leon..	9'53"		
	ABC construction .	0'52"		
	ETT_+0_on_TestLu.	0'58"		
	ETT_+0_on_test	2'40"		
	TTime East Atlant..	10'0"		
	ETT_+0_on_abc	5'56"		
	TT I-85 north to s..	10'8"		
	newKPI-16909864.	11'51'		

1 Critical

3 Warning

4 Normal

mapbox

+60 minutes

+0 minutes

+10 minutes

+20 minutes

Traffic Forecast
Shows the forecasted traffic on this network.

Data Source

speed

Layer Styles

speed vs free flow (ff)...

© Mapbox © OpenStreetMap Improve this map

Real Time and Predictive Insights



Advanced Machine Learning: Integrates a cutting-edge, self-learning, self-improving AI model that leverages the largest set of historical traffic data available, ensuring continual refinement and accuracy for predictions.



Detectorless Insights and Control: Use current and future travel times available in Centrac's Mobility and get instantaneous insights and signal optimization without the need for costly hardware deployment, operations, and maintenance.




Predictive Traffic Insights: Delivers real-time and predictive traffic analyses, offering up to an hour of forward-looking travel time forecasts across your road network, enhancing proactive decision-making and situational awareness.



Automated Traffic Management: Enables dynamic corridor analysis for future travel times, supporting automated adjustments in timing plans, including cycle times, offsets, and signal splits, to optimize flow and reduce congestion.



Unmatched Scalability and Data Depth: Powered by  **tomtom's** extensive historical traffic database—the largest in the industry—this feature offers unparalleled scalability. It taps into trillions of data points from years of aggregated floating car data, covering 84 countries and over 15% - 30% of all traffic movements, for deep, actionable traffic insights.



Examples

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Town of Queen Creek

← PTV Flows - Supervisor

📅 10/10/2024 - 19:08:53

+0' 📍



0

Critical



1

Warning

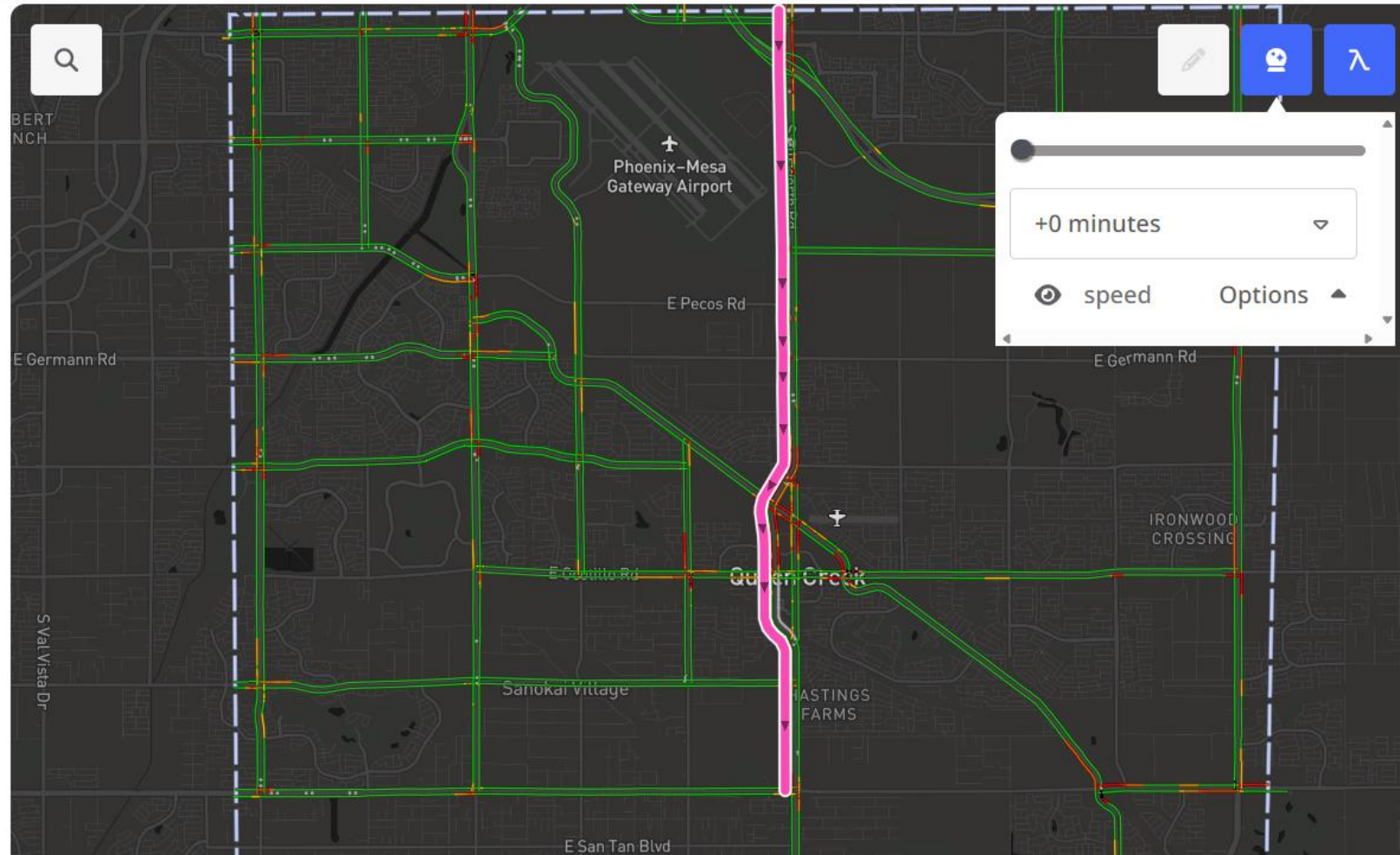


0

Normal



0



KPI details

Current Value
15 minutes
48 seconds

Free Flow Value
9 minutes
41 seconds

Location Name ⓘ

Ellsworth SB

KPI Type ✓ ⓘ

Expected travel time ▾

Trigger type ✓ ⓘ

Free flow ▾

Name ✓ ⓘ

ETT_+0_on_Ellsworth SB

Signal Status

The screenshot displays a traffic signal control interface. The background is a dark map with yellow and red lines representing signal paths. A white pop-up window titled "Flows TR test 2" is centered on the screen, providing detailed status information for a specific signal.

Flows TR test 2

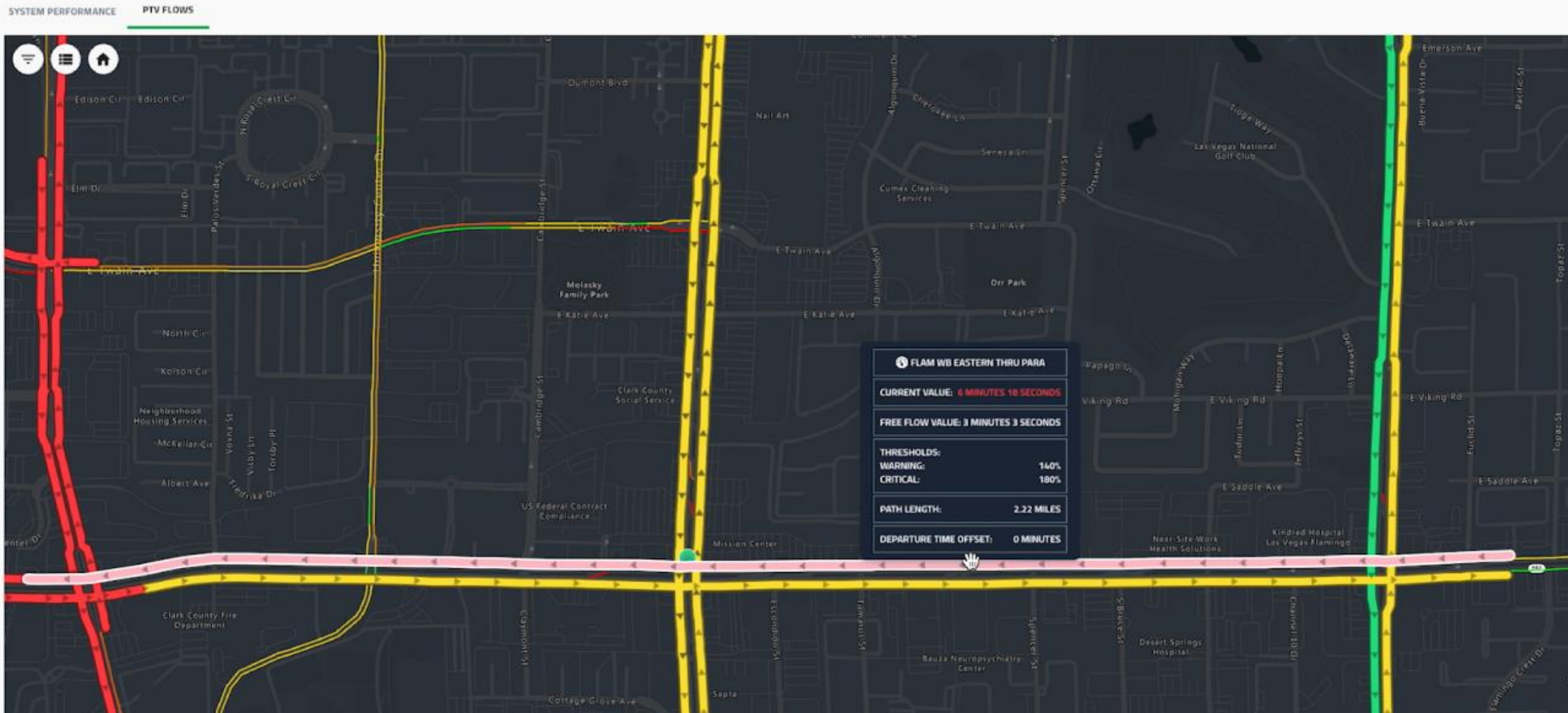
Mode/Pattern	Coordination		Time	Preempt	Alarms
Current BM / 1	In Sync	Actual Prog	LAST 13:52:55		
	CYCLE 58	80	ERROR 1 s		
	OFFSET 0	0			

PHASE	1	2	3	4	5	6	7	8
ACTUAL		3				3		
PROG	10	33	12	25	11	32	12	25
ON								
PED								
CALL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PED CALL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NEXT								

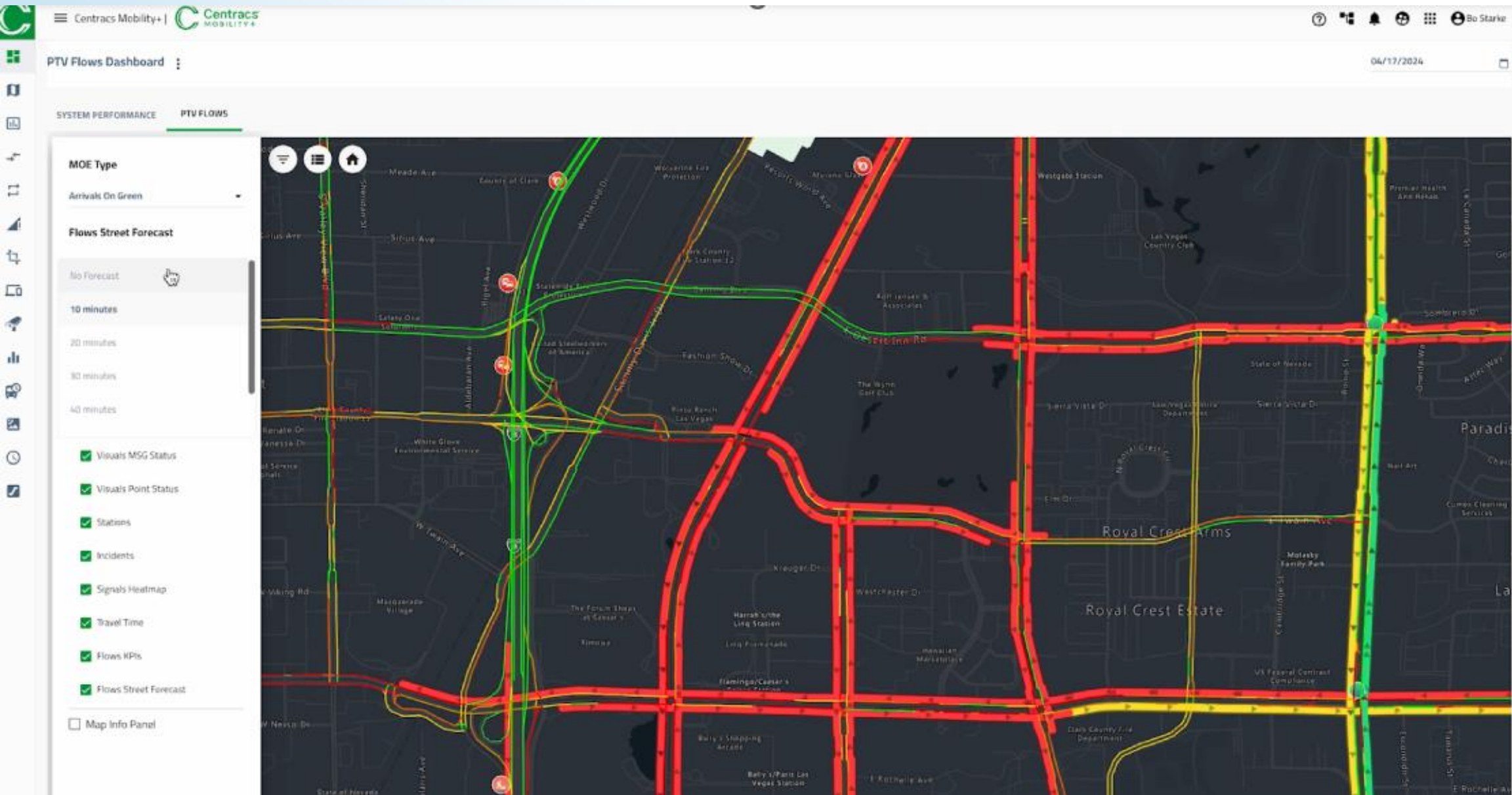
No overlaps configured

Notifications	Rings	Comms
Unit control is in backup mode	Ring 1: Green Rest Ring 2: Green Rest	100%

Travel Time Map Layer



Forecast Travel Time



Automated Monitoring and Alerting

Triggers | Centrac's MOBILITY+

SITE USER MAP HEAT MAP PERFORMANCE HOT SPOTS DETECTORS SIGNALS CORRIDORS EDAPTIVE ROUTES CENTRACS+DETECT ALERT RECI

Find Trigger...

ENABLED	NAME	CRITICALITY	EVENT	DESCRIPTION
<input checked="" type="checkbox"/>	Automation Test Flash On	Information	aut-flsh-on	
<input checked="" type="checkbox"/>	flash any off	Information	Flash: ALL OFF	Staging Test for SMS
<input checked="" type="checkbox"/>	flash any on test	Information	aut-flsh-on	Staging Test for SMS
<input type="checkbox"/>	Automation Test	Information	aut-flsh-on	
<input type="checkbox"/>	Flash off SMS test	Information	Flash: ALL OFF	
<input type="checkbox"/>	Flash On SMS test	Information	aut-flsh-on	
<input type="checkbox"/>	flows	Information	Flows KPI Warning	test
<input type="checkbox"/>	ko test alert escalation		aut-flsh-on	
<input type="checkbox"/>	ko test preempt any on	Information	Preempt - ANY ON	
<input type="checkbox"/>	ko test preempt any off	Information	Preempt - ALL OFF	
<input type="checkbox"/>	System Control Off	Critical	Unit Control: System - OFF	

Items per page: 100

Add Trigger

Name
Flows Critical Alert - Flam

Description
e.g. This trigger activates ...

Triggering Event
Flows KPI Critical

Enabled

Is Audible

Details

Type
Count

Occurrences
1

Duration (minutes)
00

flam

Select/Unselect All

- ETT_+0_on_15 SB Flam through Hacienda
- ETT_+0_on_Flam EB 15 thru Para
- ETT_+0_on_Flam EB Para thru Eastern

Traffic “Predictive”



Optimizations |



Traffic Responsive (Speed) - Flows Traffic Proactive

Computational Channels

SETTINGS

ARTERIAL

UPSTREAM

DOWNSTREAM

Speed Data Source

Flows API

Source to pull Speed data from. Travel Time API comes from Azure's last measured speeds. Flows API comes from predicted future speeds.

Flows Prediction Time Ahead

10

Number of minutes ahead to predict speed for

20

Interval (mins)

30

Frequency with which TR runs on this Section, in minutes.

Min Pattern Execution Time

0

Number of minutes that must pass before TR will send a pattern change. A value of 0 sends pattern changes as they are computed.

Threshold and Pattern Matrix

Threshold and pattern definitions to use.

Immediate Update Threshold (%)

If the change between the previous channel value and the new value (before smoothing) exceeds this threshold, TR skips threshold levels and goes directly to the one that corresponds to the new channel value. Normally, threshold levels can only be one.





































Cycle Levels (%)

20

Offset Levels (%)

20

Enabling Adaptive Operations

SUCCESS					CRITICAL	WARNING	INFORMATION
TIME	PATTERN	MODE	STATUS	ACTION			
10:00 AM	2	Analysis	 Edaptive Completed Successfully				
09:59 AM	2	Analysis	 Edaptive Completed Successfully				
09:57 AM	2	Analysis	 Edaptive Completed Successfully				
09:56 AM	2	Analysis	 Edaptive Completed Successfully				
09:54 AM	2	Analysis	 Edaptive Completed Successfully				
09:53 AM	2	Analysis	 Edaptive Completed Successfully				
09:51 AM	2	Analysis	 Edaptive Completed Successfully				
09:50 AM	2	Analysis	 Edaptive Completed Successfully				
09:49 AM	2	Analysis	 Edaptive Completed Successfully				
09:48 AM	2	Analysis	 Edaptive Completed Successfully				
09:47 AM	2	Analysis	 Edaptive Completed Successfully				
09:46 AM	2	Analysis	 Edaptive Completed Successfully				
09:45 AM	2	Analysis	 Edaptive Completed Successfully				
09:44 AM	2	Analysis	 Edaptive Completed Successfully				
09:43 AM	2	Analysis	 Edaptive Completed Successfully				
09:42 AM	2	Analysis	 Edaptive Completed Successfully				
09:41 AM	2	Analysis	 Edaptive Completed Successfully				
09:40 AM	2	Analysis	 Edaptive Completed Successfully				

Thank You!

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