District Five - Active Arterial Management Strategies and Initiatives

FSITE Winter Workshop
February 28, 2020

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FMS/AMS Engineer

Agenda

1. Background
2. Current and Future Retiming Process
3. Current and Future Tools
4. Active Arterial Management/Integrated Corridor Management

Background

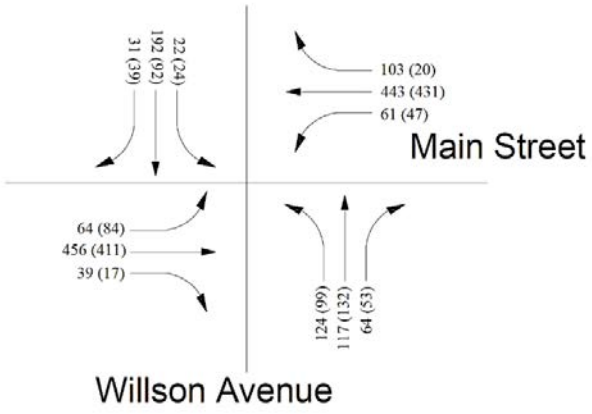
- Approximately 1600 signalized intersections on state roadways
- Retiming studies are data-driven, as well as request-driven
- Annual retiming funding of $800k
- Multiple corridors are running adaptive signal control systems
  - US 92, US 17-92
  - Future locations: SR 44, SR 421, SR 40

Background Cont.

- Majority of corridors operate by time-of-day coordination
- Coordinated signal systems require routine operation and maintenance
- Coordinate with local agencies on operation and maintenance

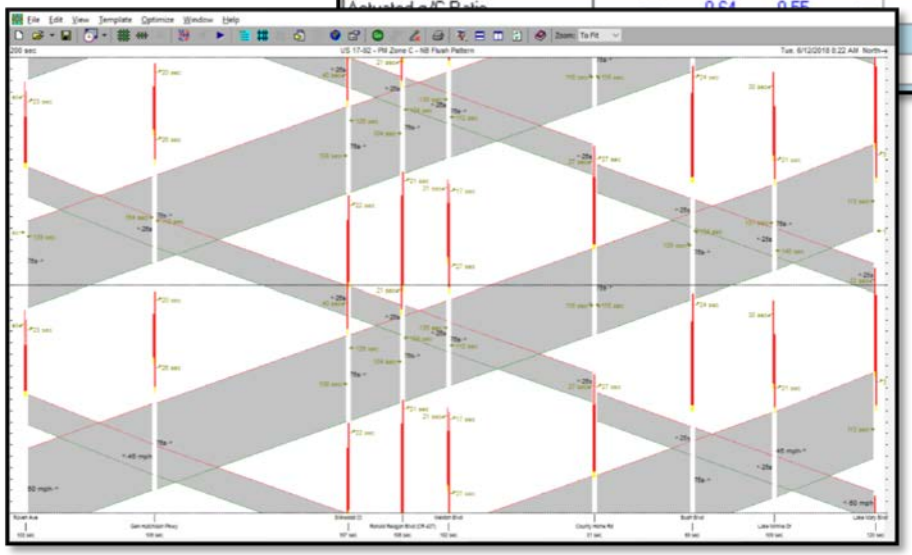
D5 Retiming Process

- District 5 currently follows a traditional retiming program
  - 3 years for coordinated systems
  - 5 years for isolated intersections
- Follow current industry practice



TIMING SETTINGS	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR
Leading Detector (ft)	—	35	156	—	—	35	156	—
Trailing Detector (ft)	—	-5	150	—	—	-5	150	—
Minimum Initial (s)	6.0	6.0	15.0	—	6.0	6.0	15.0	—
Minimum Split (s)	16.0	16.0	27.0	—	16.0	16.0	27.0	—
Total Split (s)	38.0	38.0	104.0	—	19.0	19.0	85.0	—
Yellow Time (s)	4.4	4.4	4.4	—	4.4	4.4	4.4	—
All-Red Time (s)	2.1	2.1	2.0	—	2.2	2.2	2.0	—
Lost Time Adjust (s)	—	0.0	0.0	0.0	—	0.0	0.0	—
Lagging Phase?	☐	☐	☑	—	☐	☐	☑	—
Allow Lead/Lag Optimize?	☐	☐	☐	—	☐	☐	☐	—
Recall Mode	None	None	Max	—	None	None	C-Max	—
Speed limit (mph)	—	—	40	—	—	—	40	—
Actuated Effct. Green (s)	—	120.7	104.7	—	—	96.0	86.7	—
					—	0.51	0.46	—
					—	0.54	1.05	—
					—	34.5	84.4	—

Synchro



Tru-Traffic

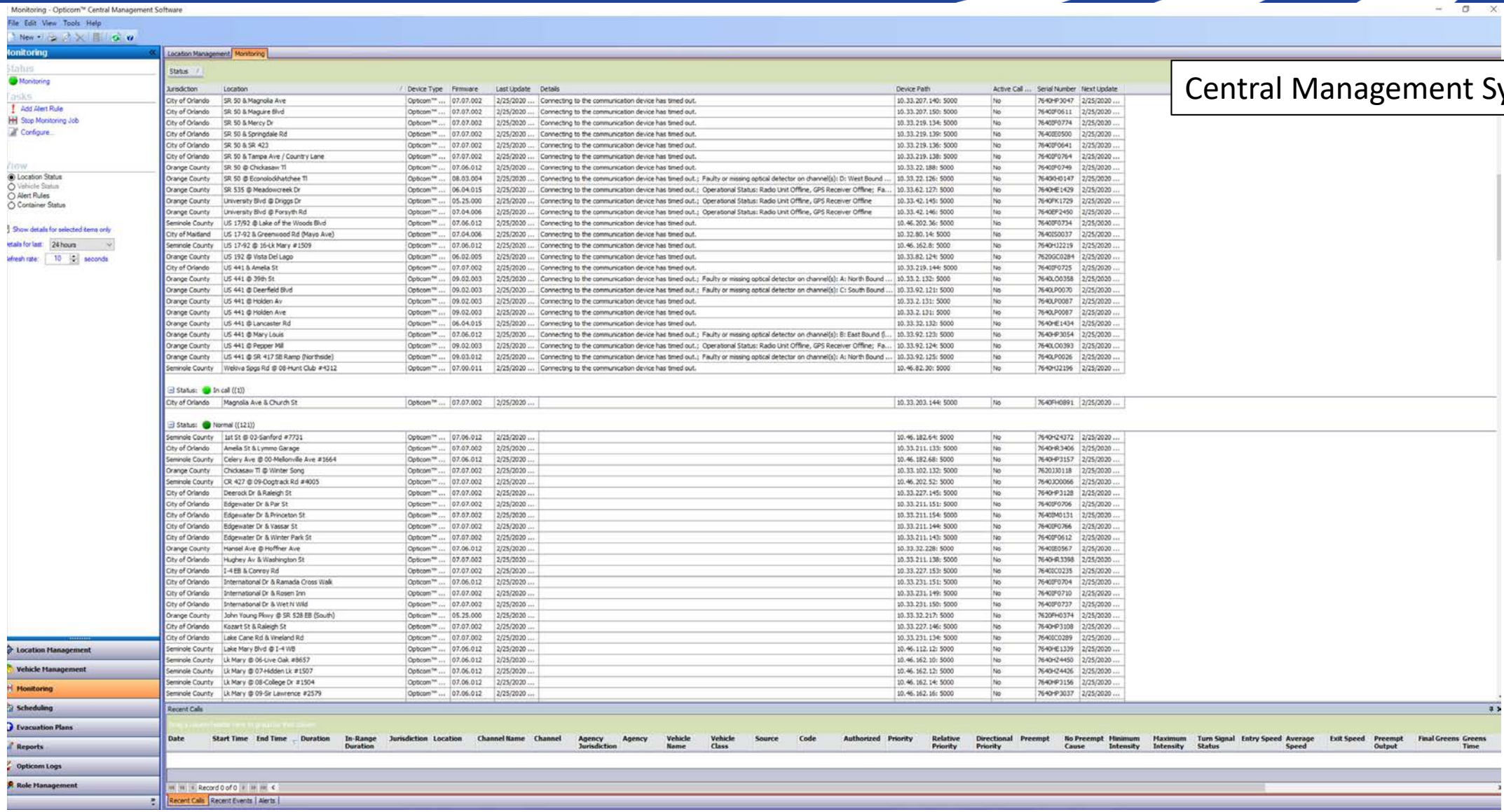
D5 Retiming Process Cont.

- Identify Existing Conditions (Includes Kickoff Meeting)
- Collect Existing Data
- Field Reviews
- Obtain Local Timings and Signal Groupings
- Prepare a Preliminary Report
- Implement New Signal Timings
- Field Evaluation & Fine Tuning
- Final Report
- 30-Day Adjustment Period

Transit Signal Priority (TSP)

- Currently deploying TSP throughout the District
- Component to review during retiming studies
- TSP ensures on-time transit service
- Uses Opticom GPS
- Arterial Corridor Manager monitors requests and keeps records of transit calls
  - Central Management Software (CMS)

Transit Signal Priority (TSP) Cont.



Central Management System

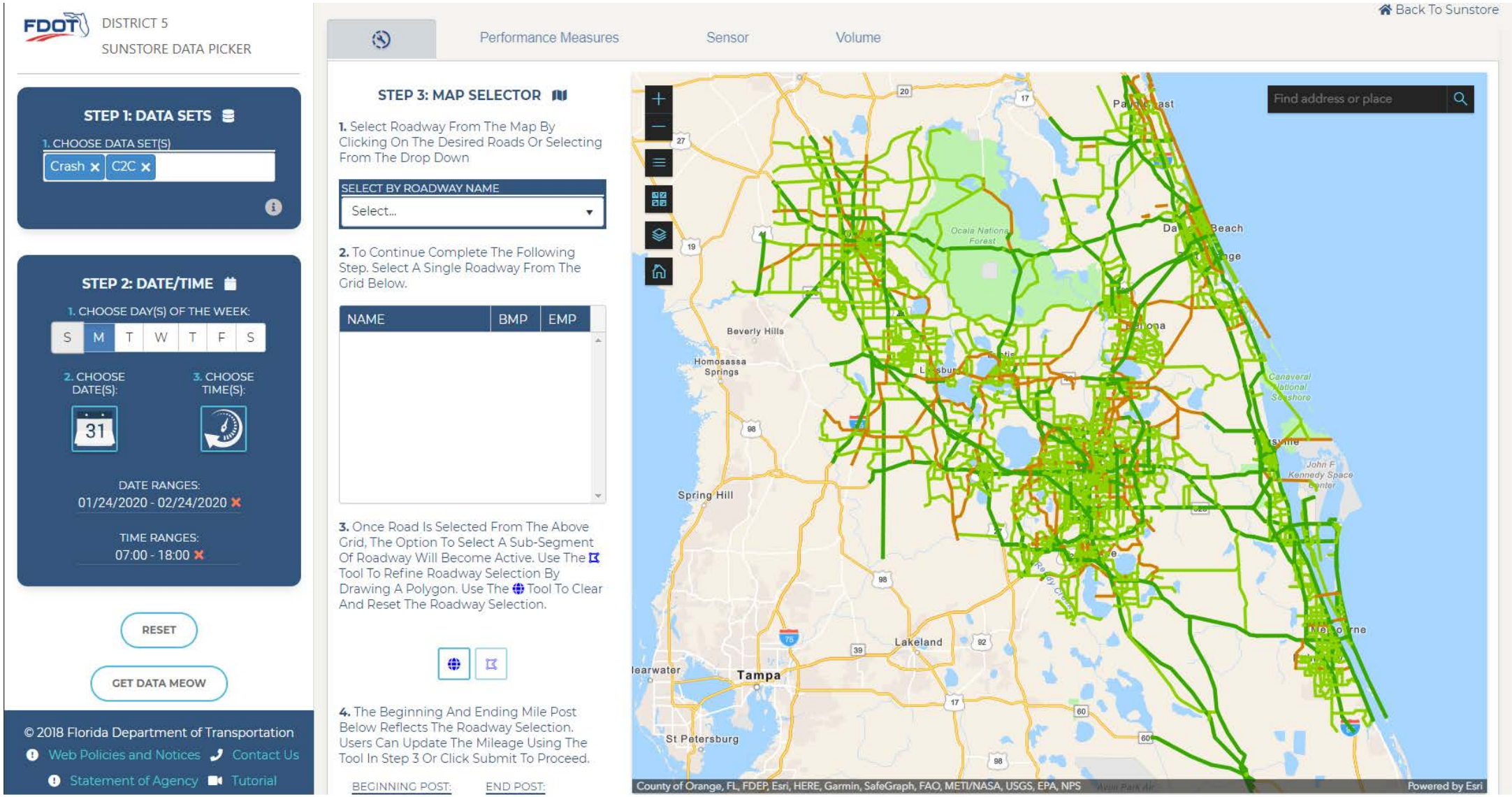
Technology Enhancements

- Evaluating current traditional retiming methodology
- Transitioning from reactive to proactive analysis
- Ongoing arterial retiming practices study
- Technology enhancements provide data sets in real-time
- New software systems/databases will be available to provide performance measures and additional information
  - SunStore Data Picker Phase II (RTMC Map)
  - Cloud ATSPM
  - Signal Optimization Tool (SOT)
  - Signalized Intersection Inventory Application (SIIA)

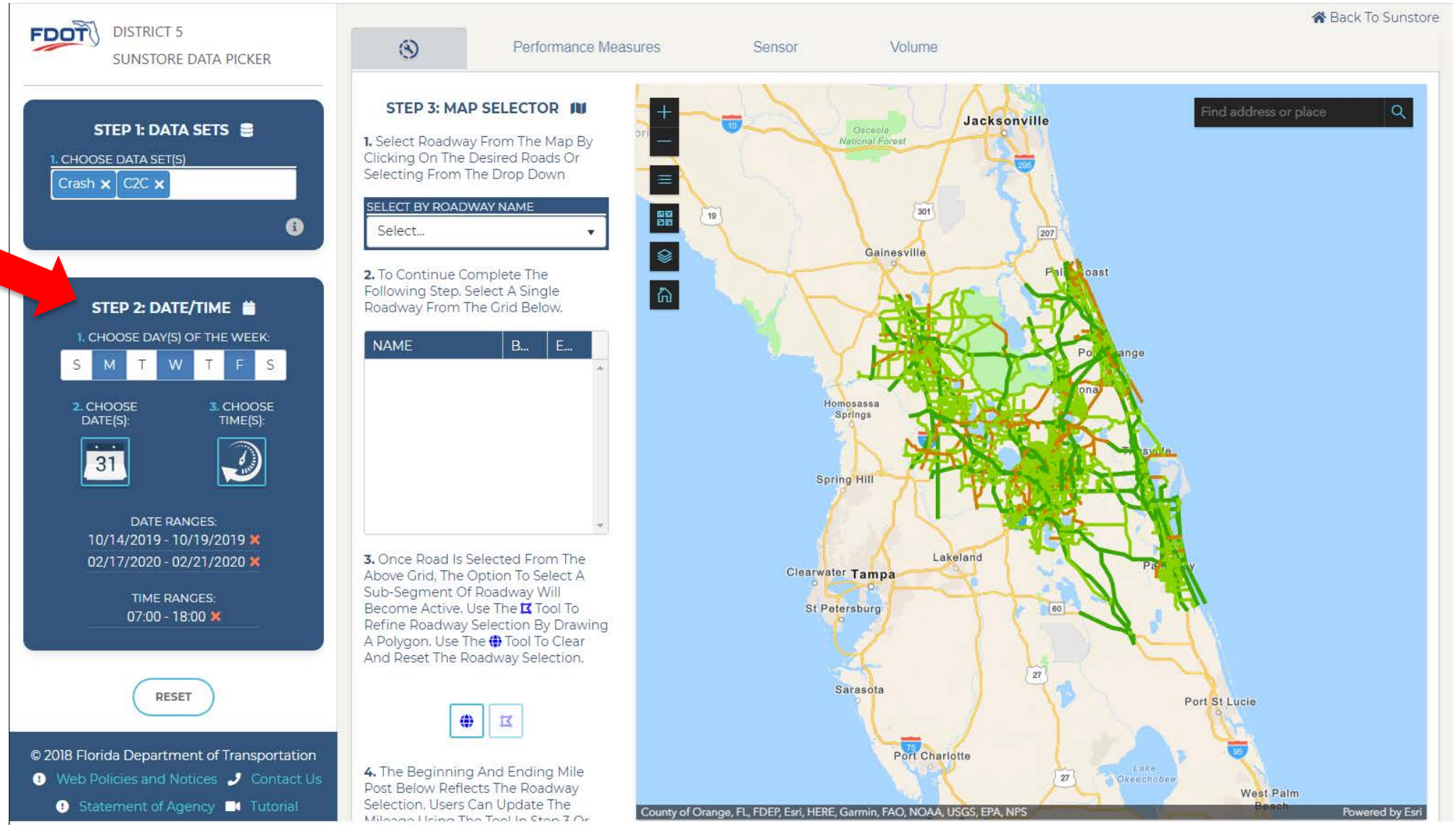
SunStore Data Picker Phase II

- Phase II adds the capability of identifying performance measures
- Uses HERE data
- Phase II will provide speeds, travel times, travel time index and planning time index
- Users will have ability to perform before and after reviews
- https://sunstore.cflsmartroads.com/datapicker/

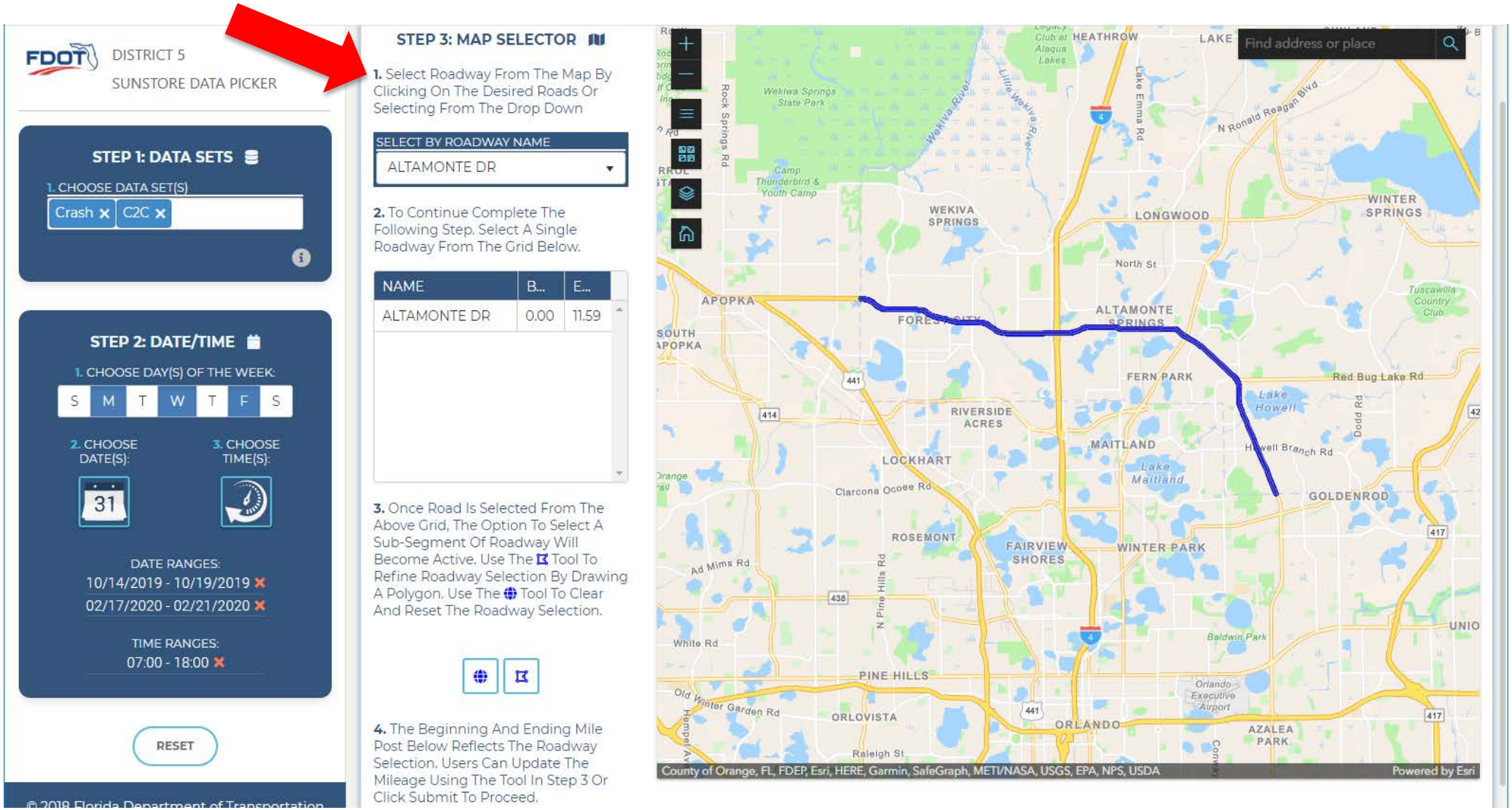
SunStore Data Picker Phase II Cont.



SunStore Data Picker Phase II Cont.



SunStore Data Picker Phase II Cont.



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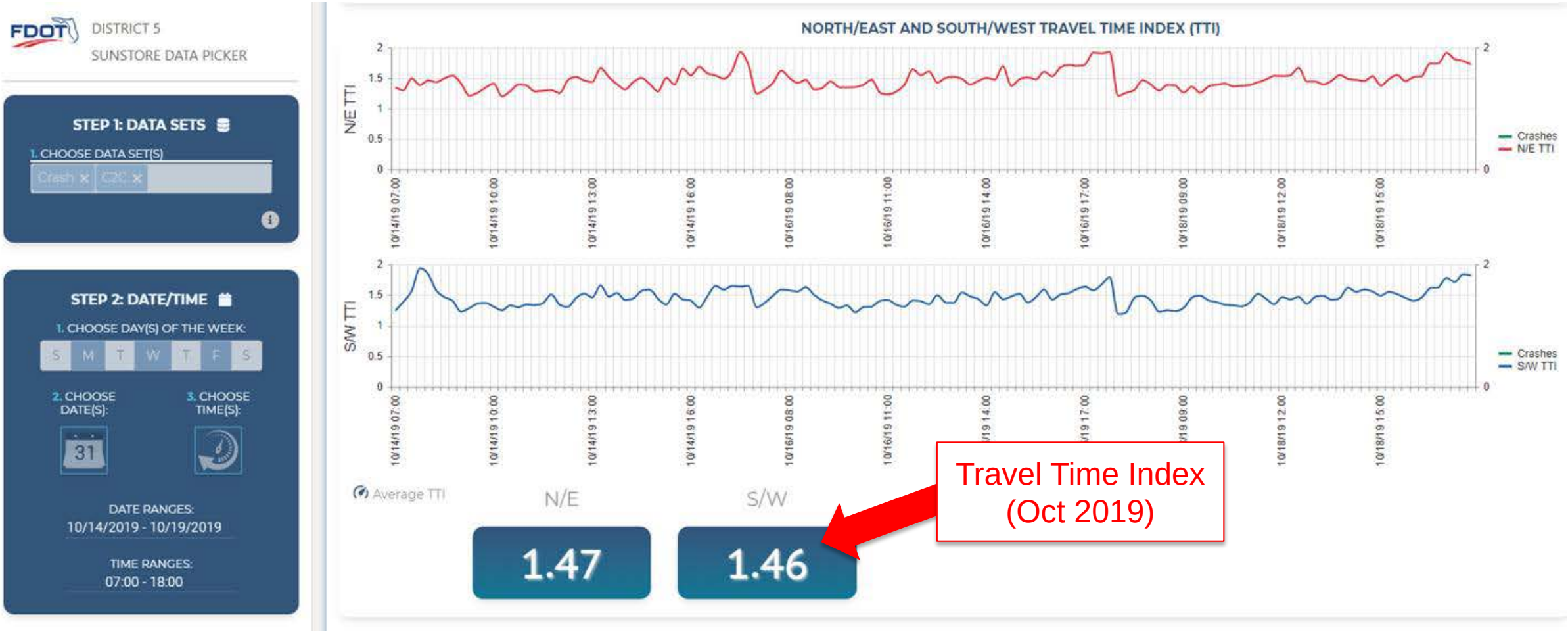

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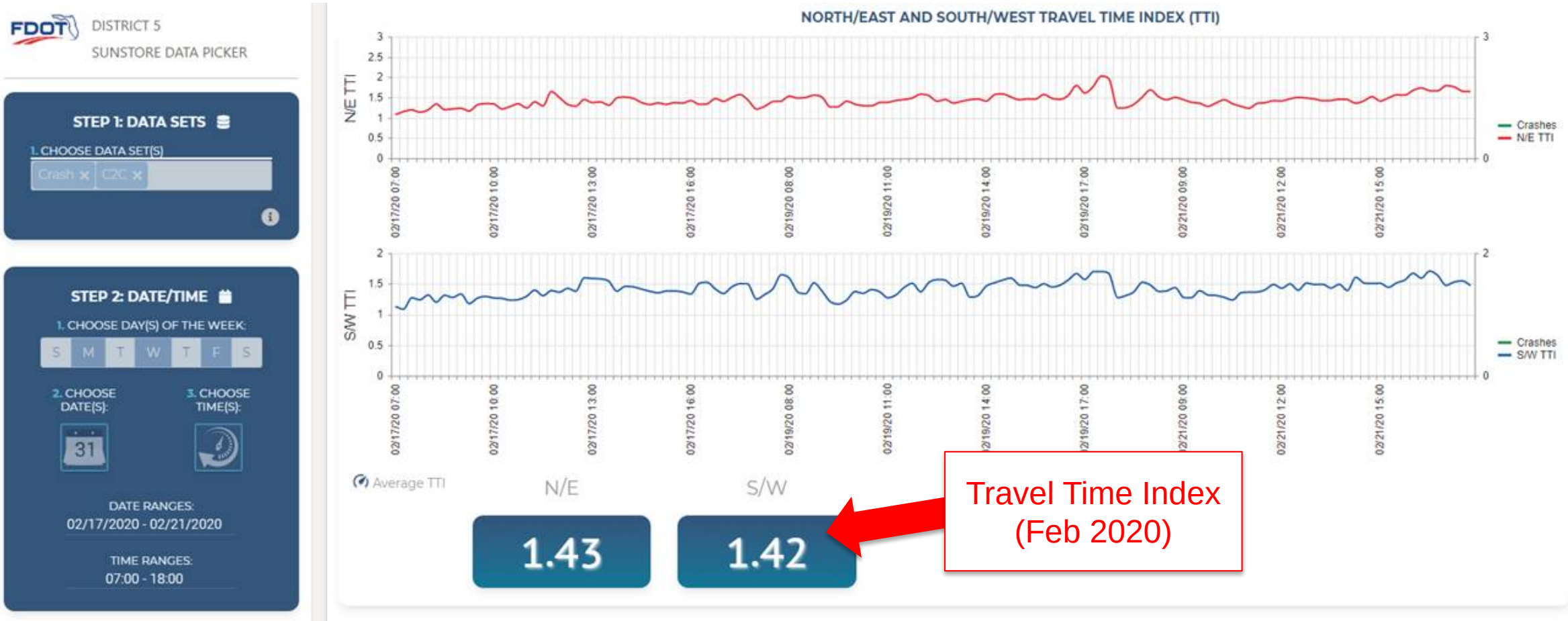

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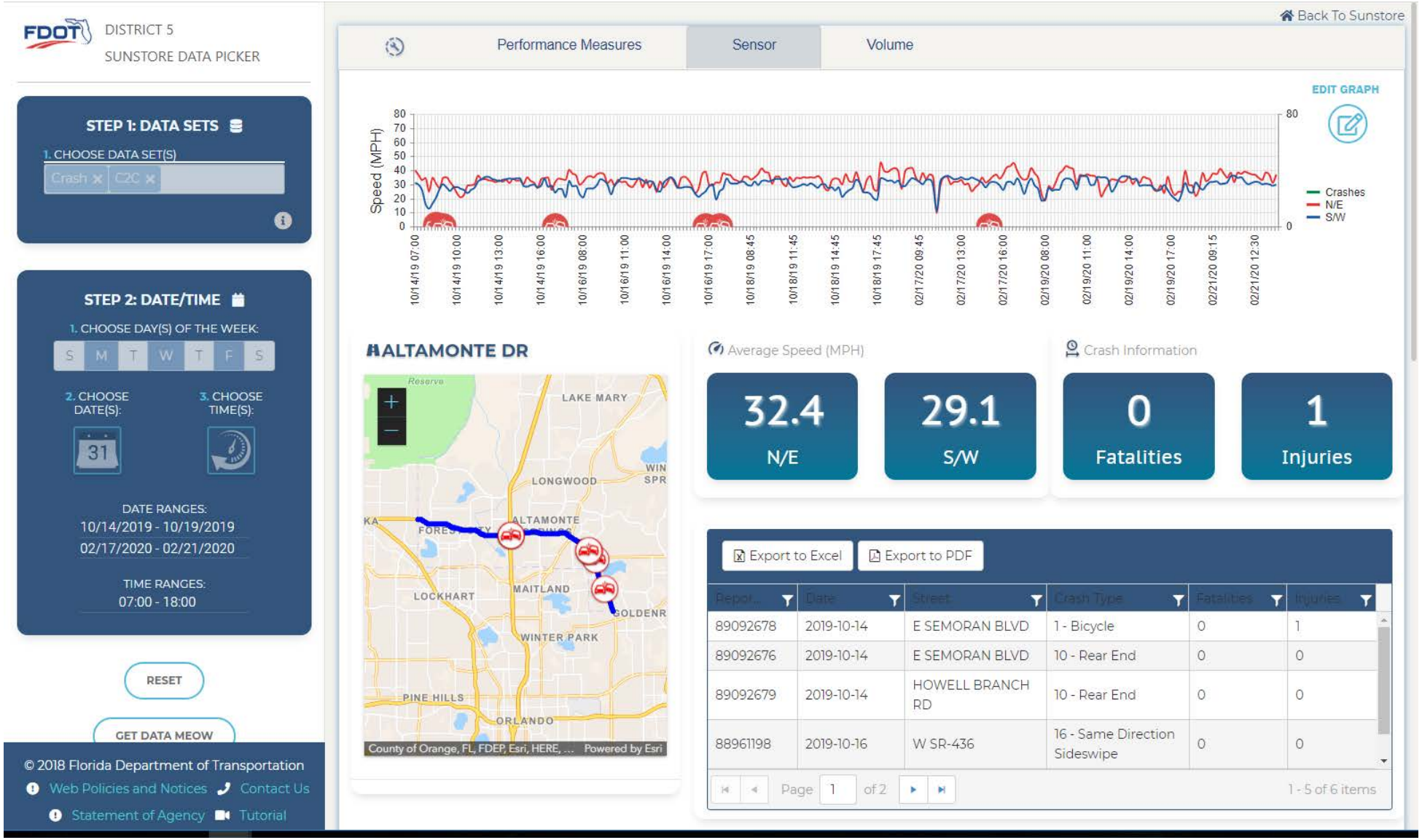
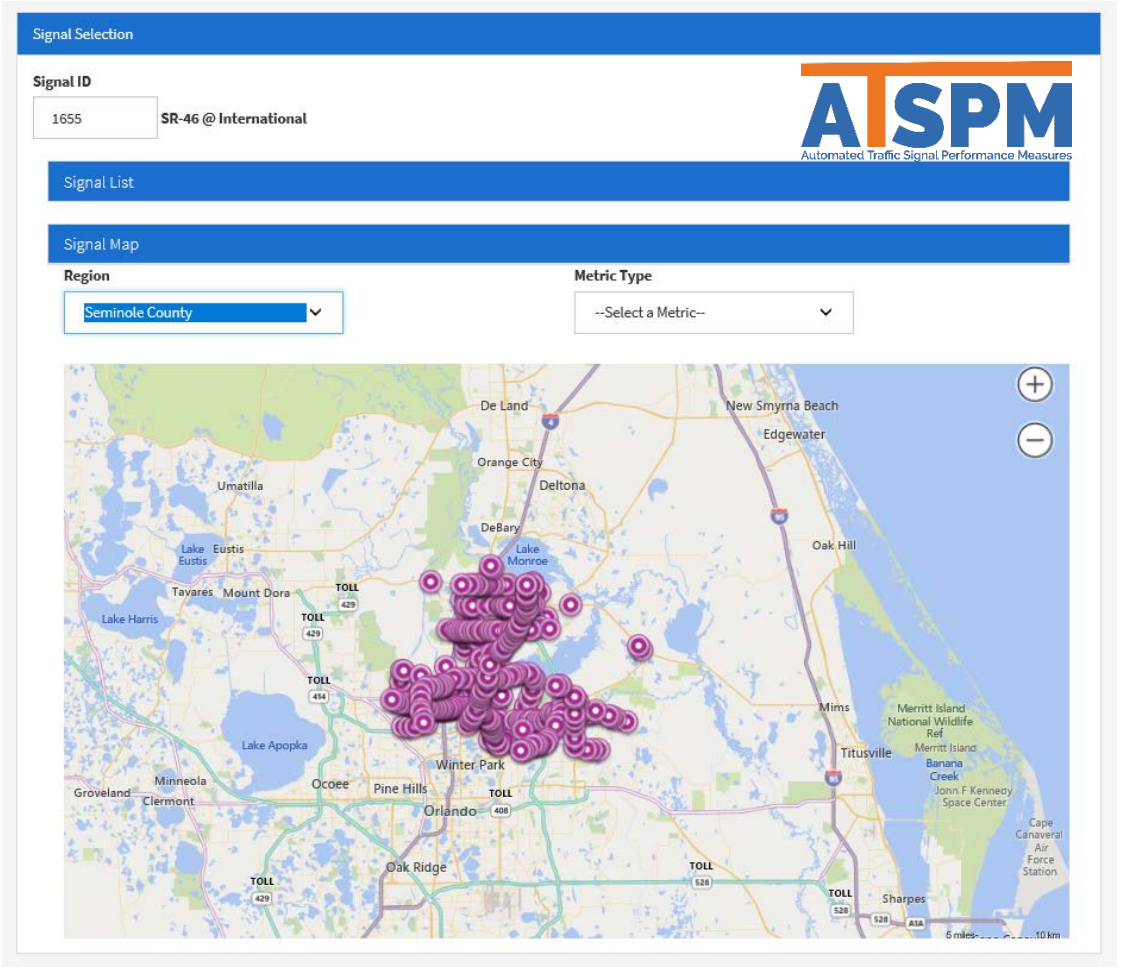


Automated Traffic Signal Performance Measures (ATSPM)

- Cloud ATSPM is in development
- Web-based application using high-resolution data logging
- Shows real-time and historical functionality at signalized intersections
- Provides continuous data
  - Manually collected data will not be necessary
  - Can transition D5 from traditional retiming practice
  - Will provide automated evaluation of signals to address the worst locations first

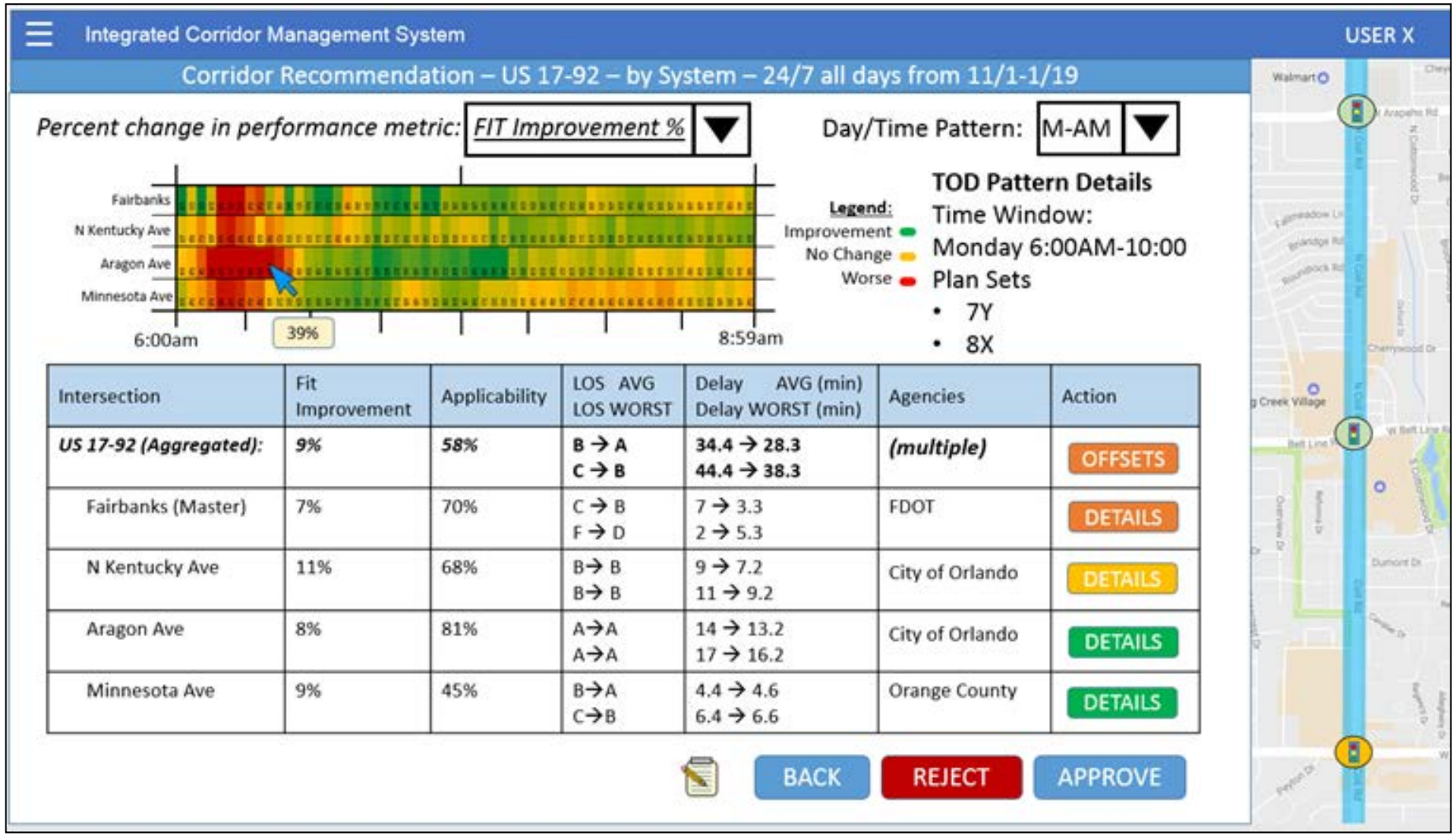


Traffops

Signal Optimization Tool (SOT)

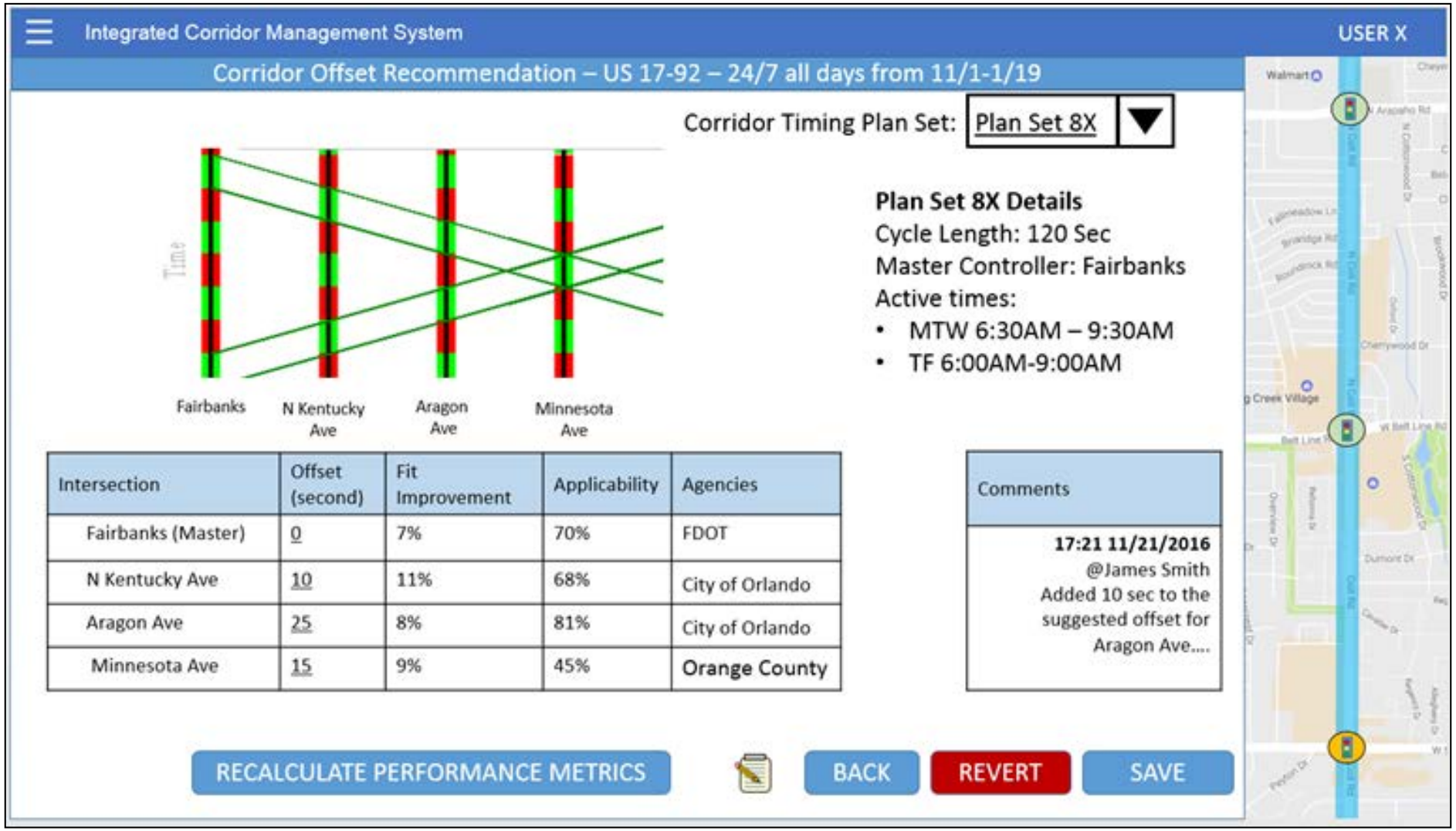
- Signal Optimization Tool (SOT)
  - Part of Integrated Corridor Management (ICM)
  - Queries across stored movement counts for corridors
  - Develops representative TMC
  - Optimizes corridor with HCS software
  - Allows results to be sorted by linear distance
  - Data is exportable to Synchro
  - Provides benefit to partner agencies to use software
- Expected completion in Fall 2020

Signal Optimization Tool (SOT) Cont.



Intersection	Fit Improvement	Applicability	LOS AVG LOS WORST	Delay AVG (min) Delay WORST (min)	Agencies	Action
US 17-92 (Aggregated):	***9%***	***58%***	**B → A** **C → B**	**34.4 → 28.3** **44.4 → 38.3**	***(multiple)***	OFFSETS
Fairbanks (Master)	7%	70%	C → B F → D	7 → 3.3 2 → 5.3	FDOT	DETAILS
N Kentucky Ave	11%	68%	B→ B B→ B	9 → 7.2 11 → 9.2	City of Orlando	DETAILS
Aragon Ave	8%	81%	A→A A→A	14 → 13.2 17 → 16.2	City of Orlando	DETAILS
Minnesota Ave	9%	45%	B→A C→B	4.4 → 4.6 6.4 → 6.6	Orange County	DETAILS

Signal Optimization Tool (SOT) Cont.



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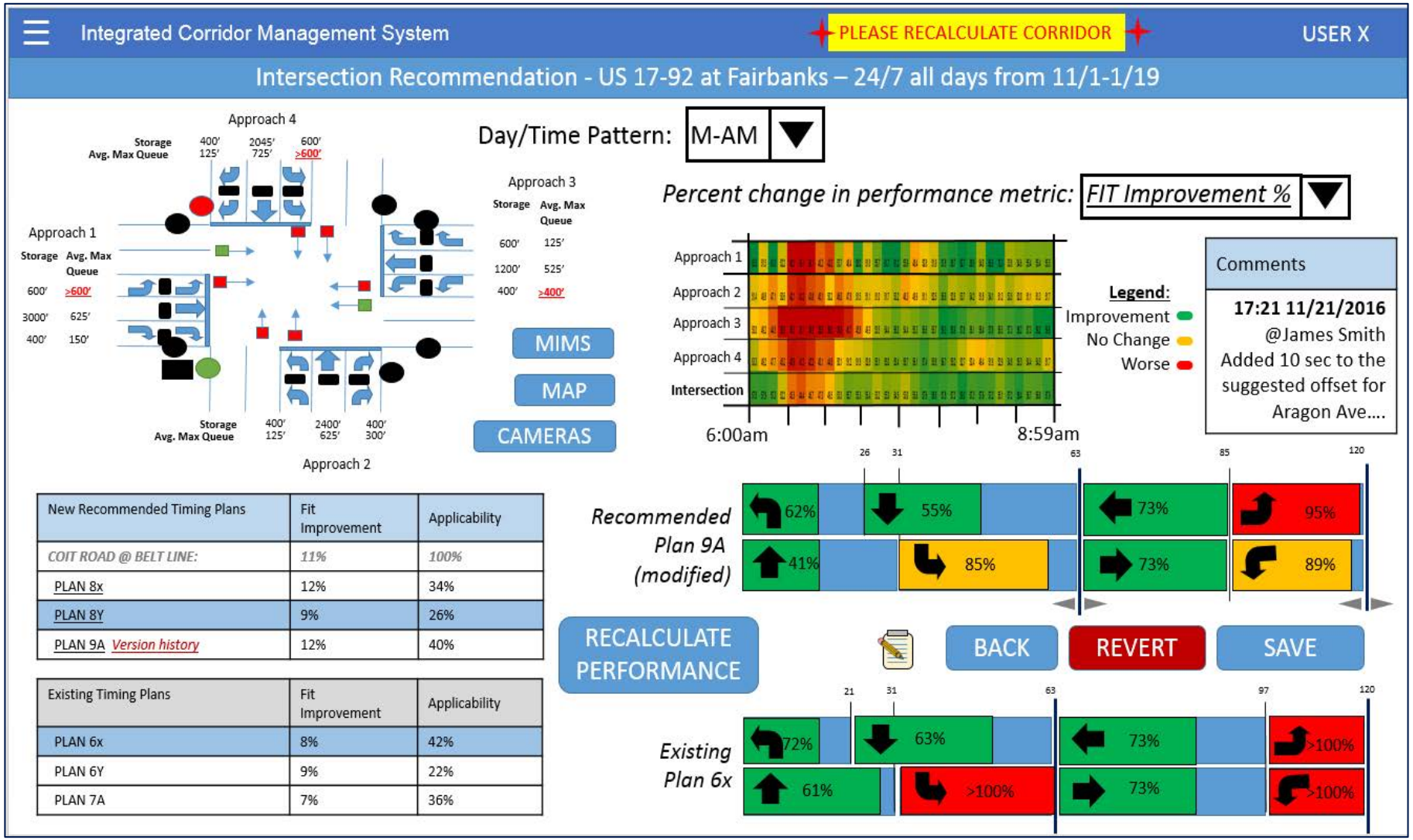
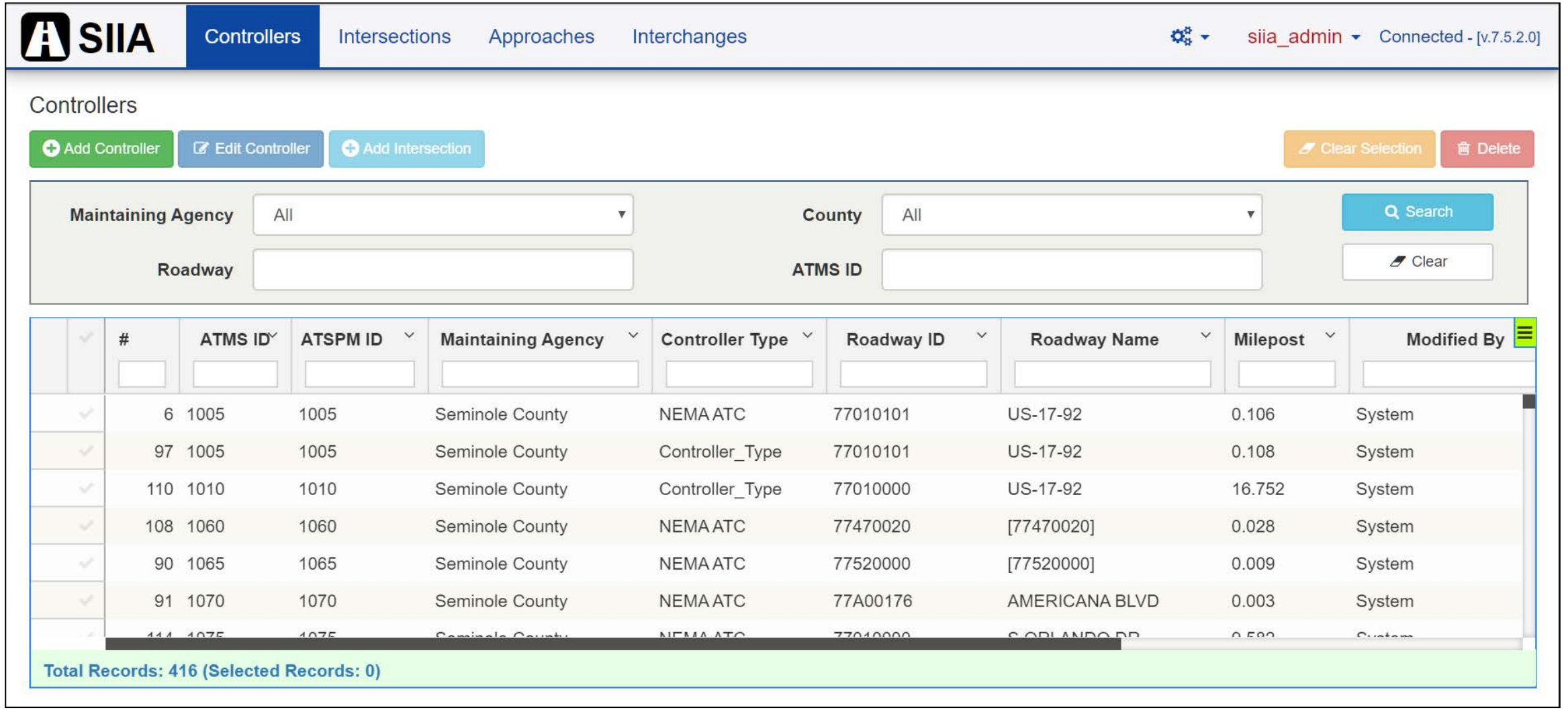


Signal Intersection Inventory Application (SIIA)

- Primary purpose is to facilitate and streamline inventorying and auditing of signalized intersections
- Other attributes and devices are also included within the Application
- The Application will provide maintenance staff with a mechanism to update signalized intersections
- Data from Application will be sent to MIMS central system
- Application has been deployed and is being tested by staff

Signal Intersection Inventory Application (SIIA)



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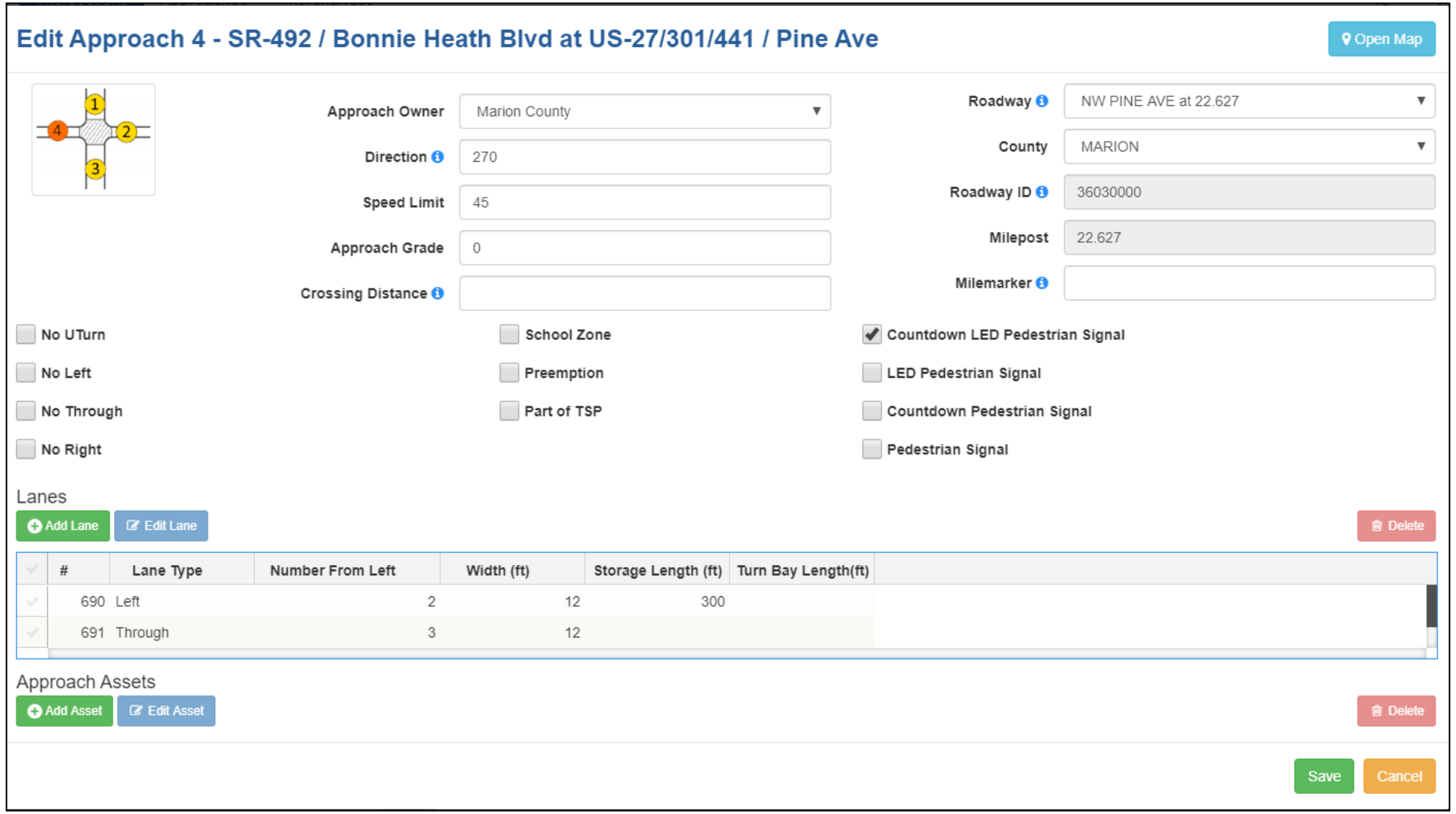

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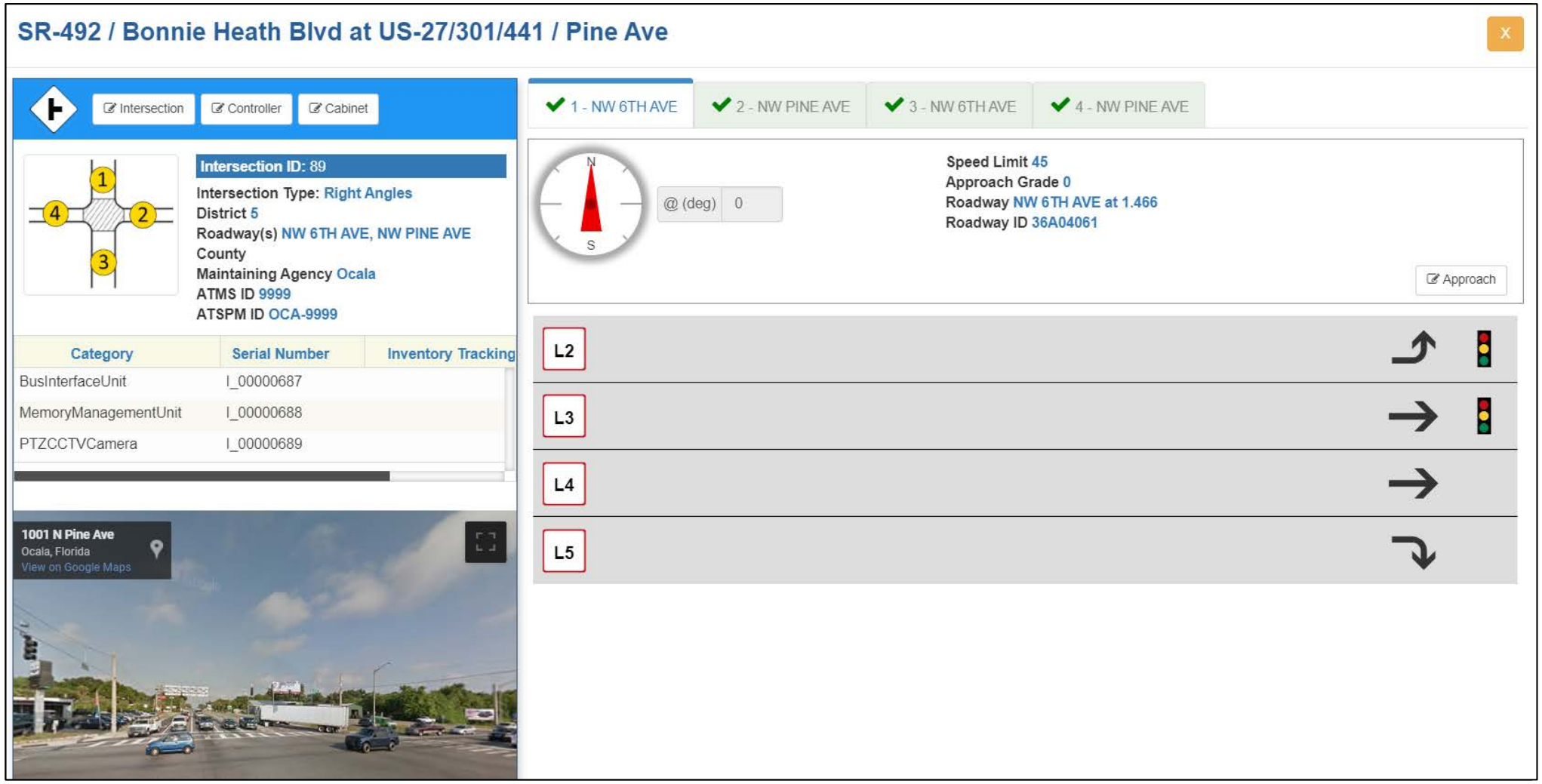
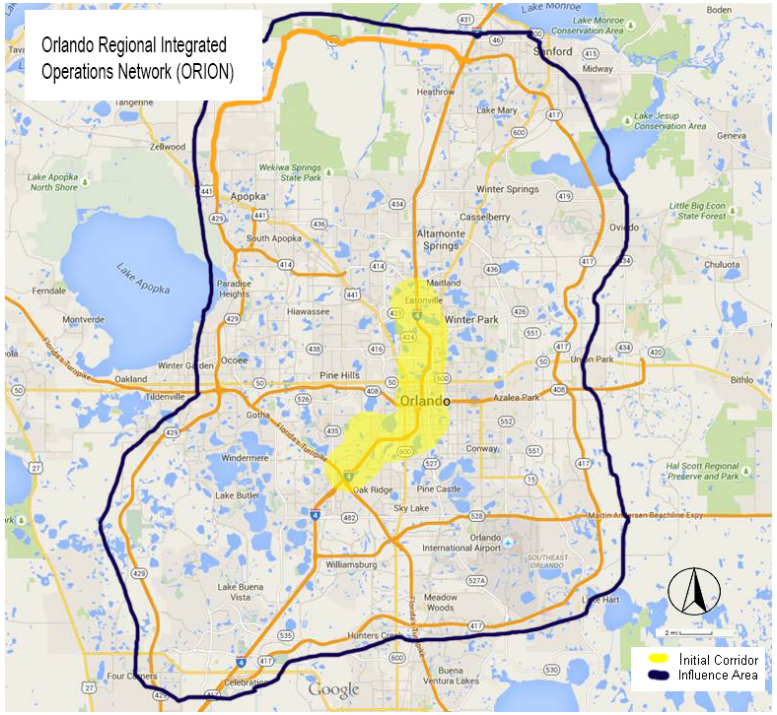


Integrated Corridor Management (ICM)

- D5 AAM has transitioned to Integrated Corridor Management
- Focuses on the **whole** transportation network
- Freeway and Arterial work together for the benefit of system mobility **as a whole**
- Purpose of ICM:
  - Improve travel time efficiency
  - Ensure travel time reliability
  - Perform incident management

ICM Region

- D5 has 2 ICM Contracts
  - I-4 Corridor
  - I-75 and I-95 Corridors
- Orlando, FL region
  - FDOT (Freeways and Active Arterial Mgmt)
  - MetroPlan (MPO)
  - 2 Toll Authorities (FTE, CFX)
  - LYNX (Bus)
  - SunRail (Commuter Rail)
  - 3 County Signal Systems (Orange, Seminole, Osceola)
  - 4 Cities (Orlando, Winter Park, Maitland, Kissimmee)



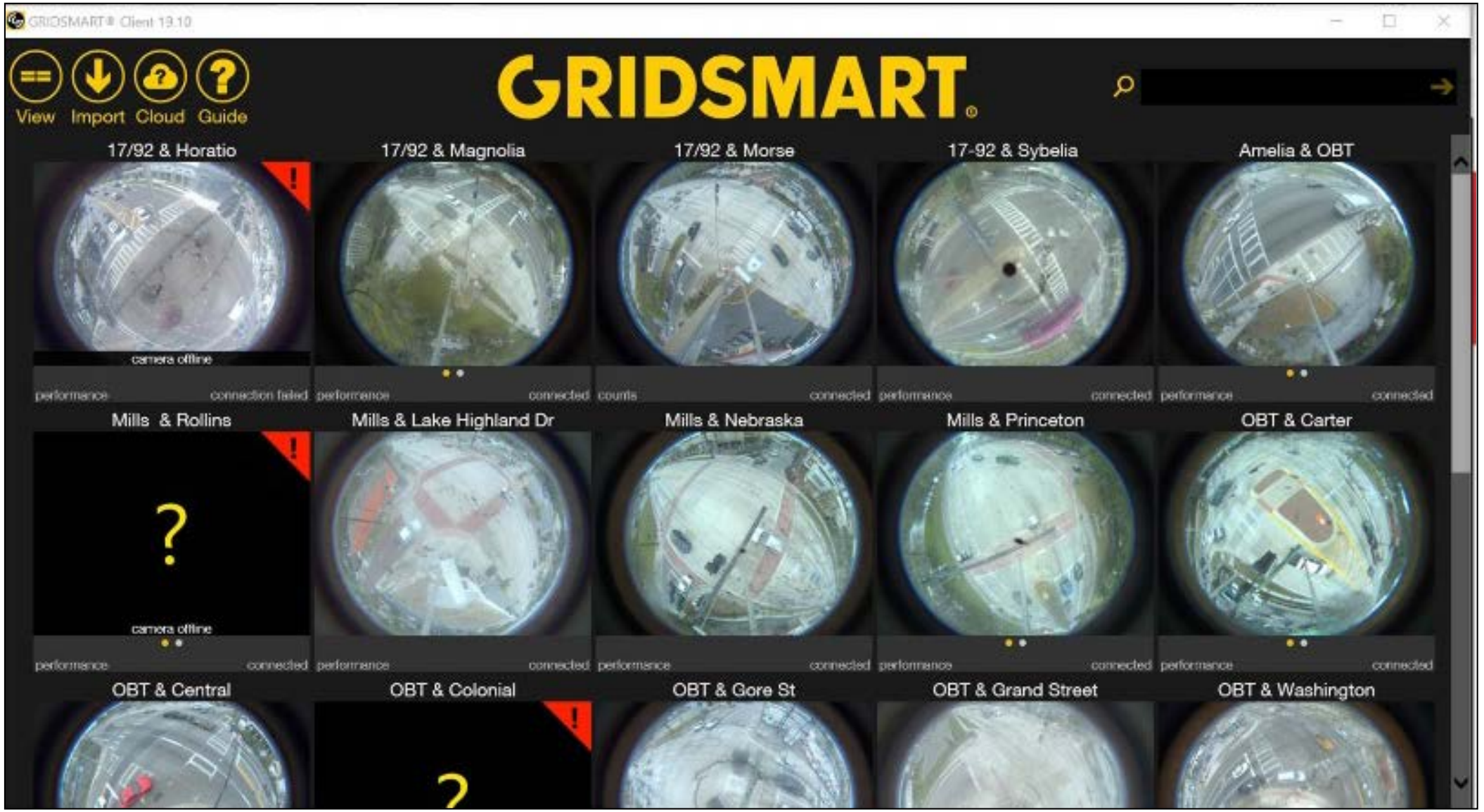
ICM Map

Active Arterial Management (AAM)

- District 5 currently actively manages about 20% of our arterial corridors
  - Approximately 300 traffic signals
- Bluetooth Readers and CCTV cameras are deployed
- Arterial Corridor Manager can adjust intersections as needed
- TMC staff use a variety of tools and resources

ICM Corridors
US 17/92 (Segment 1)(9 Signals) *Airport Boulevard ↔ SR 46 (1st Street) (3.0 miles)*
US 17/92 (Segment 2)(24 Signals) *Airport Boulevard ↔ Spartan Drive (10.1 miles)*
US 17/92 (Segment 3) (22 Signals) *Mayo Avenue ↔ SR 50 (Colonial Drive) (6.1 miles)*
SR 46 (12 Signals) *CR 431 (Orange Boulevard) ↔ US 17-92 (5.4 miles)*
SR 50 (Colonial Drive) (35 Signals) *SR 435 (Kirkman Road) ↔ SR 436 (Semoran Boulevard) (9.1 miles)*
SR 414 (Maitland Boulevard (9 Signals) *Bear Lake Road/Rose Avenue ↔ CR 427 (Maitland Avenue) (5.6 miles)*
SR 423/CR 423 (JYP/Lee Road) (30 Signals) *Wymore Road ↔ 36th Street (9.5 miles)*
East SR 434 (16 Signals) *US 17/92 ↔ SR 417 (6.6 miles)*
West SR 434 (Forest City Road) (26 Signals) *US 17/92 ↔ SR 414 (9.0 miles)*
SR 435 (Kirkman Road) (18 Signals) *SR 50 (Colonial Drive) ↔ Carrier Drive (6.6 miles)*
SR 436 (Segment 1) (10 Signals) *SR 434 ↔ Line Drive (2.6 miles)*
SR 436 (Segment 2) (23 Signals) *SR 434 ↔ US 17/92 (4.8 miles)*
SR 436 (Segment 3) (14 Signals) *US 17/92 ↔ Casselton Drive (4.1 miles)*
SR 436 (Segment 4) (28 Signals) *Casselton Drive ↔ TG Lee Boulevard (10.6 miles)*
US 441 (Orange Blossom Trail) (18 Signals) *Country Club Drive ↔ Americana Boulevard (5.4 miles)*
SR 482 (Sand Lake Road/McCoy Road) (8 Signals) *Turkey Lake Road ↔ CR 423 (John Young Parkway) (3.5 miles)*

Gridsmart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PulsePoint

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Agencies (4)
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ACTIVE INCIDENTS (3)
RECENT INCIDENTS (28)
MAP VIEW
Orange County Fire
Emergency Response
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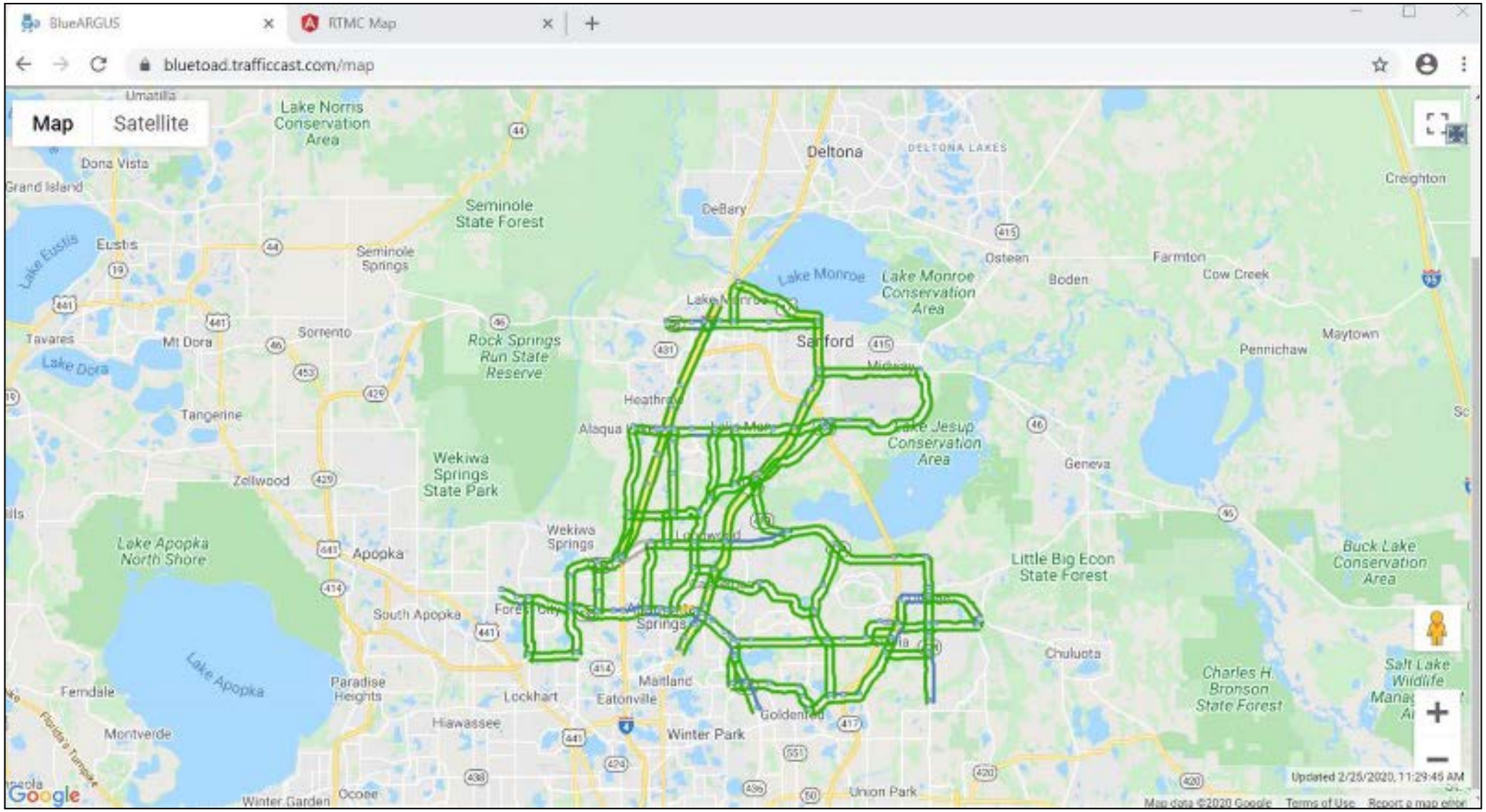
Q67
11:26 AM
Today
Orlando FD
Traffic Collision
1501 MEETING PL, ORLANDO, FL (PUBLIX 1501)
521 E006 R006 T006
11:24 AM
Today
Orange County Fire
Expanded Traffic Collision
9 E STATE ROAD 414, ORANGE COUNTY, FL
B1 CPT1 E28 Q40 R141 R28 R40 SQ3
8:36 AM
Today

BlueToad Information



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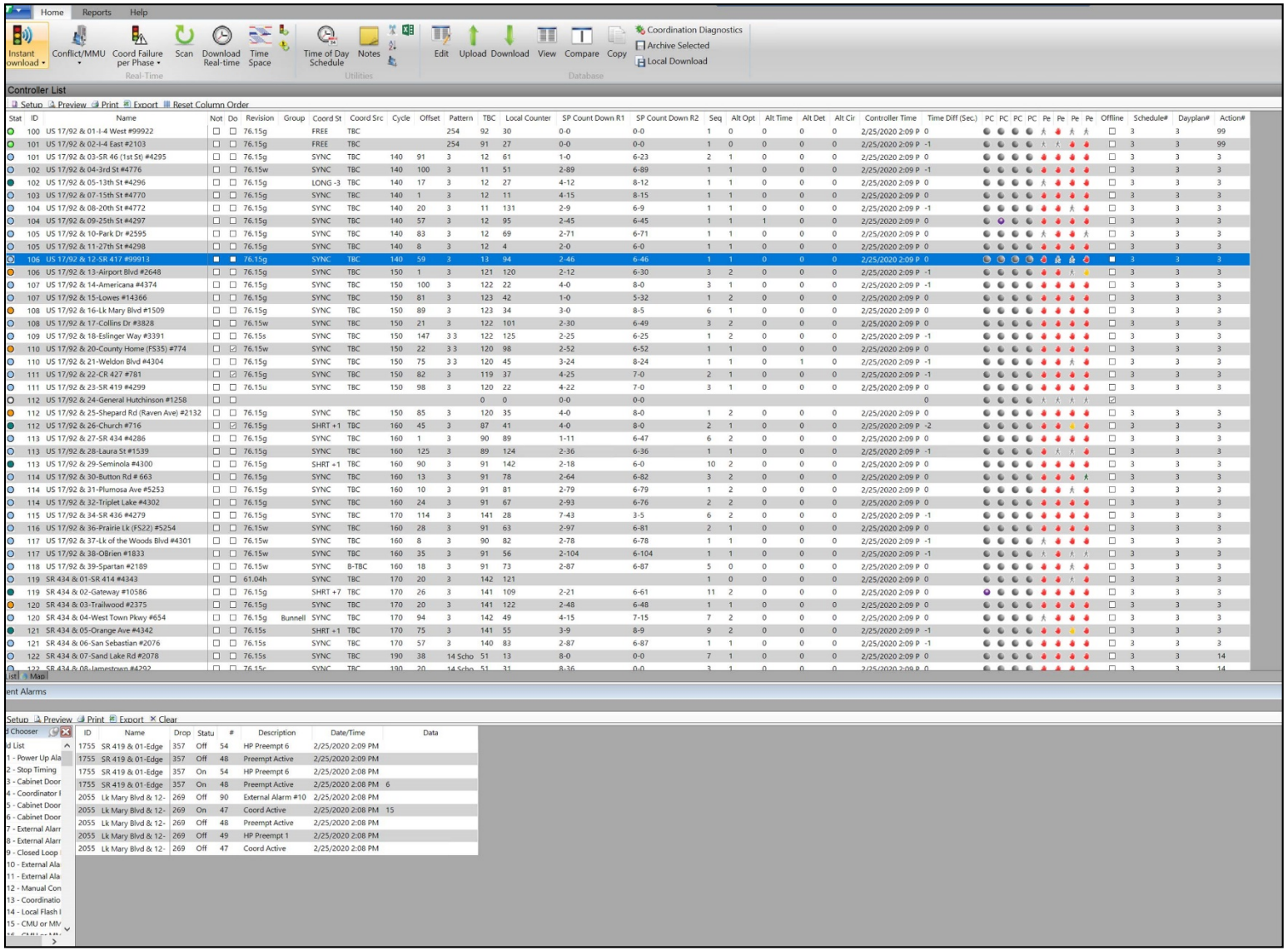
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102 US 17/92 & 04-3rd St #4776
102 US 17/92 & 05-13th St #4296
103 US 17/92 & 07-15th St #4770
104 US 17/92 & 08-20th St #4772
104 US 17/92 & 09-25th St #4297
105 US 17/92 & 10-Park Dr #2595
105 US 17/92 & 11-27th St #4298
106 US 17/92 & 12-SR 417 #99913
106 US 17/92 & 13-Airport Blvd #2648
107 US 17/92 & 14-Americana #4374
107 US 17/92 & 15-Lowes #14366
108 US 17/92 & 16-Lk Mary Blvd #1509
108 US 17/92 & 17-Collins Dr #3828
109 US 17/92 & 18-Eslinger Way #3391
110 US 17/92 & 20-County Home (FS35) #774
110 US 17/92 & 21-Weldon Blvd #4304
111 US 17/92 & 22-CR 427 #781
111 US 17/92 & 23-SR 419 #4299
112 US 17/92 & 24-General Hutchinson #1258
112 US 17/92 & 25-Shepard Rd (Raven Ave) #2132
112 US 17/92 & 26-Church #716
113 US 17/92 & 27-SR 434 #4286
113 US 17/92 & 28-Laura St #1539
113 US 17/92 & 29-Seminola #4300
114 US 17/92 & 30-Button Rd # 663
114 US 17/92 & 31-Plumosa Ave #5253
114 US 17/92 & 32-Triplet Lake #4302
115 US 17/92 & 34-SR 436 #4279
116 US 17/92 & 36-Prairie Lk (FS22) #5254
117 US 17/92 & 37-Lk of the Woods Blvd #4301
117 US 17/92 & 38-OBrien #1833
118 US 17/92 & 39-Spartan #2189
119 SR 434 & 01-SR 414 #4343
119 SR 434 & 02-Gateway #10586
120 SR 434 & 03-Trailwood #2375
120 SR 434 & 04-West Town Pkwy #654
121 SR 434 & 05-Orange Ave #4342
121 SR 434 & 06-San Sebastian #2076
122 SR 434 & 07-Sand Lake Rd #2078
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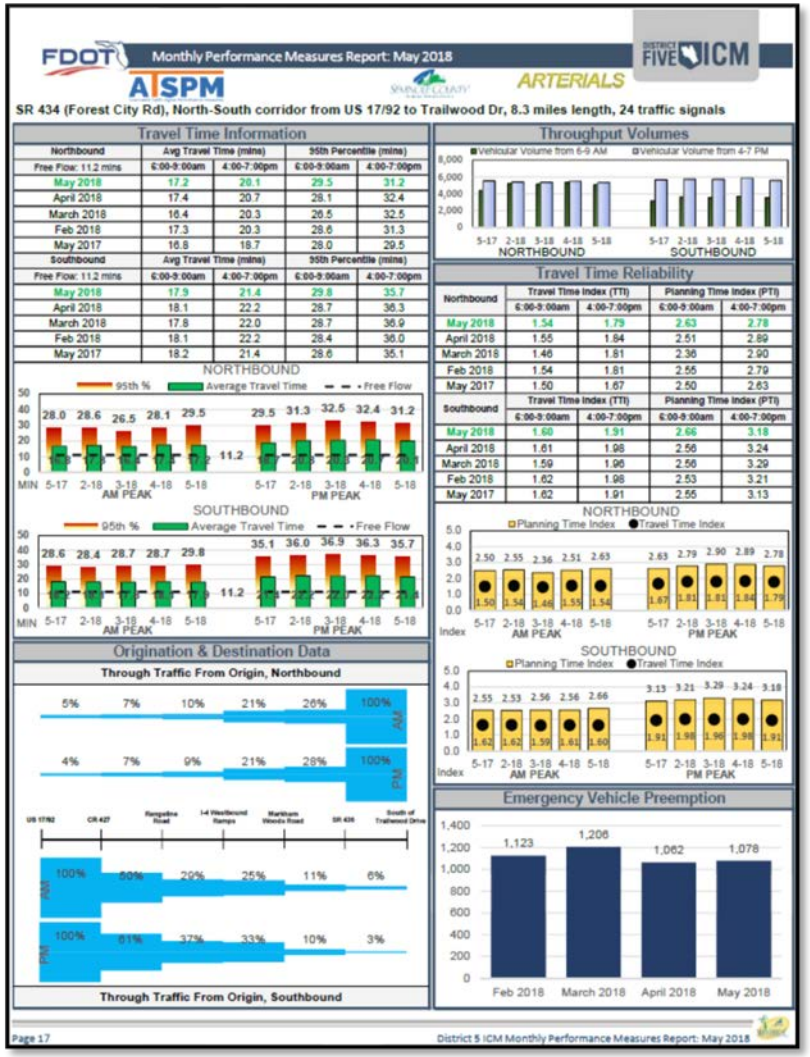
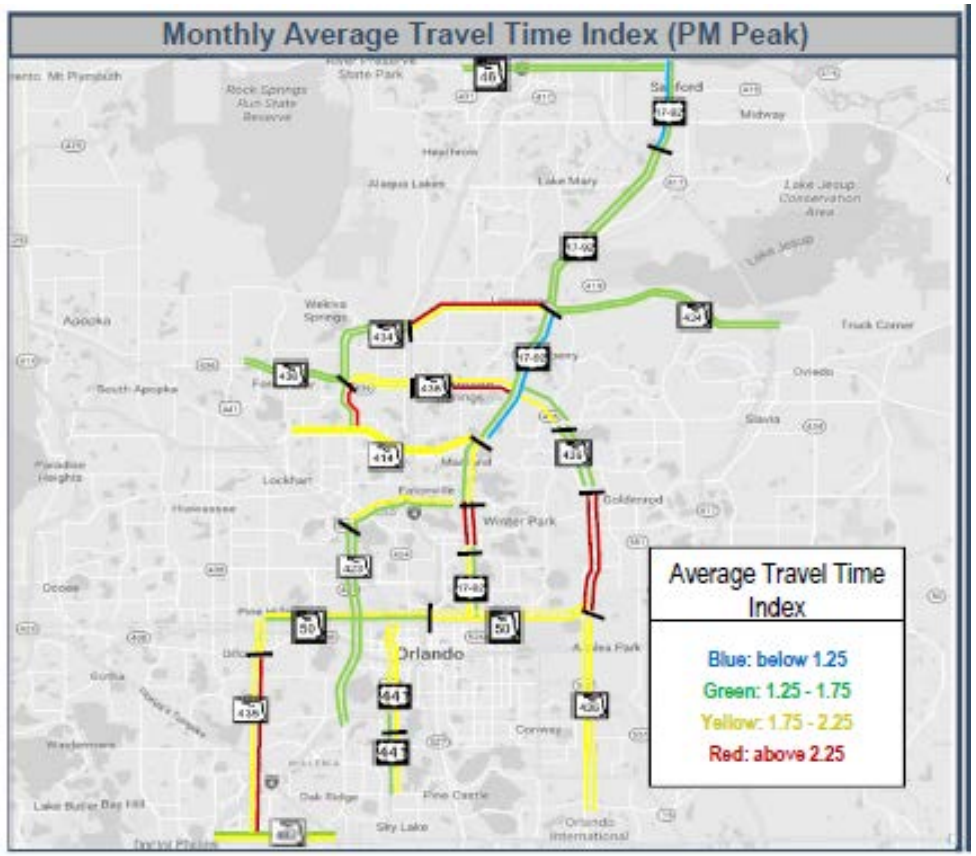
1755 SR 419 & 01-Edge 357 On 54 HP Preempt 6 2/25/2020 2:08 PM
1755 SR 419 & 01-Edge 357 On 48 Preempt Active 2/25/2020 2:08 PM 6
2055 Lk Mary Blvd & 12- 269 Off 90 External Alarm #10 2/25/2020 2:08 PM
2055 Lk Mary Blvd & 12- 269 On 47 Coord Active 2/25/2020 2:08 PM 15
2055 Lk Mary Blvd & 12- 269 Off 48 Preempt Active 2/25/2020 2:08 PM
2055 Lk Mary Blvd & 12- 269 Off 49 HP Preempt 1 2/25/2020 2:08 PM
2055 Lk Mary Blvd & 12- 269 Off 47 Coord Active 2/25/2020 2:08 PM

ICM Performance Measures

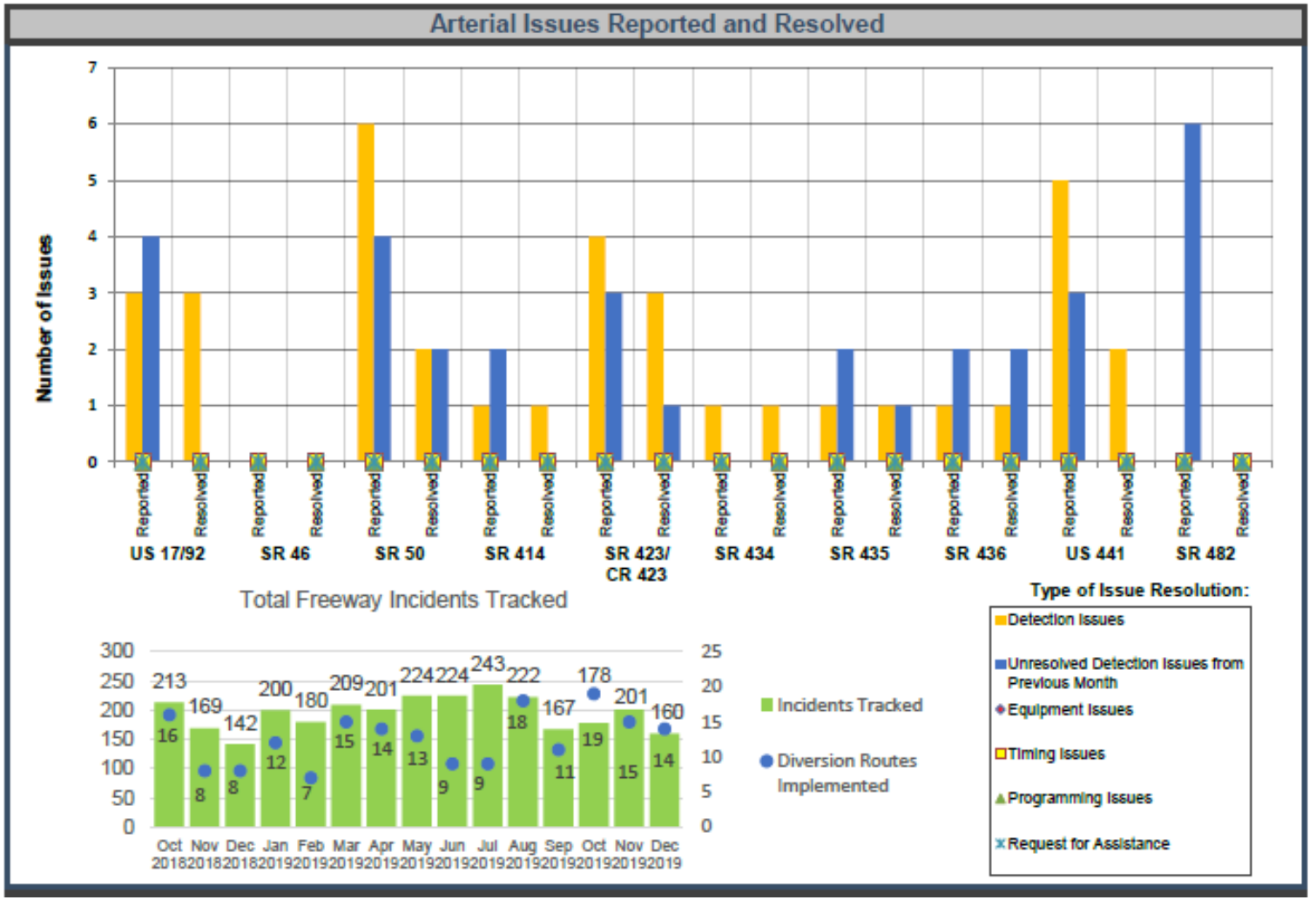
- ICM team prepares Monthly and Quarterly Performance Reports
- Arterial Reports Include:
  - Travel Time Reliability
  - Arterial Issues
  - Arterial Equipment Status
  - Preemption/TSP
  - Throughput Volume



ICM Performance Measures Cont.



Snapshot from Monthly Report



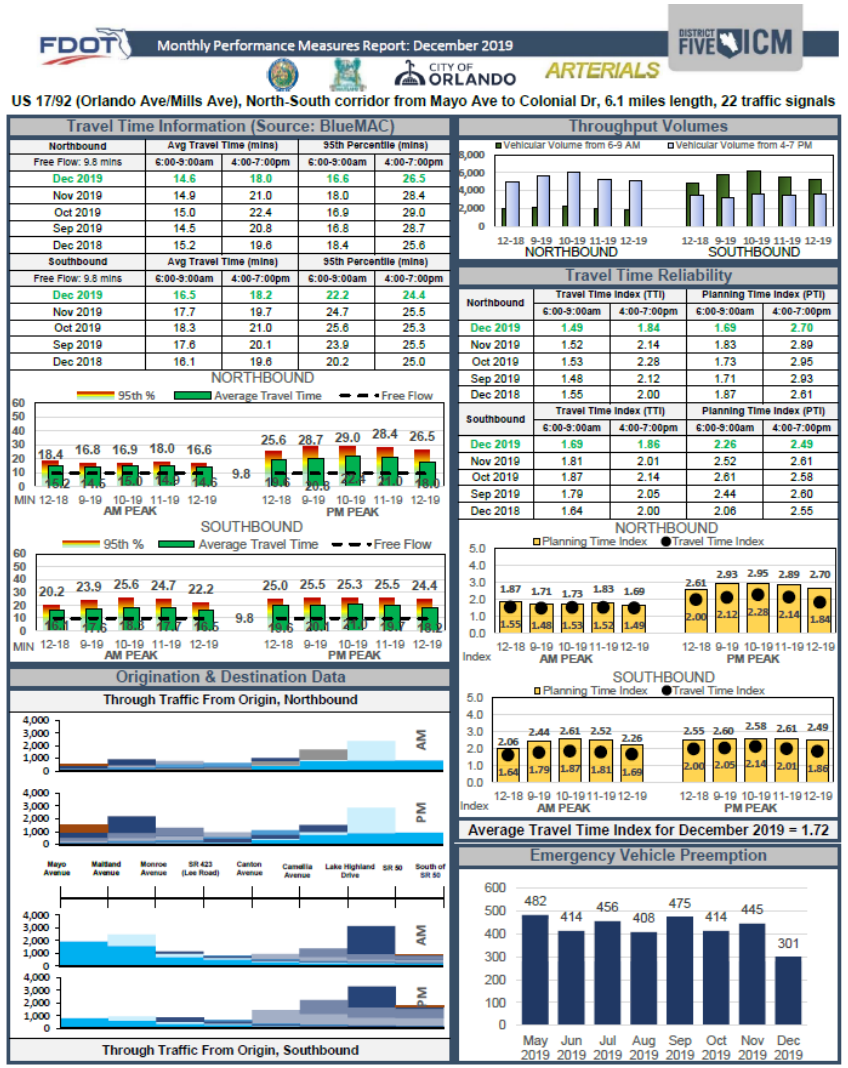
Arterial Issues

ICM/AAM Response to Reoccurring Congestion

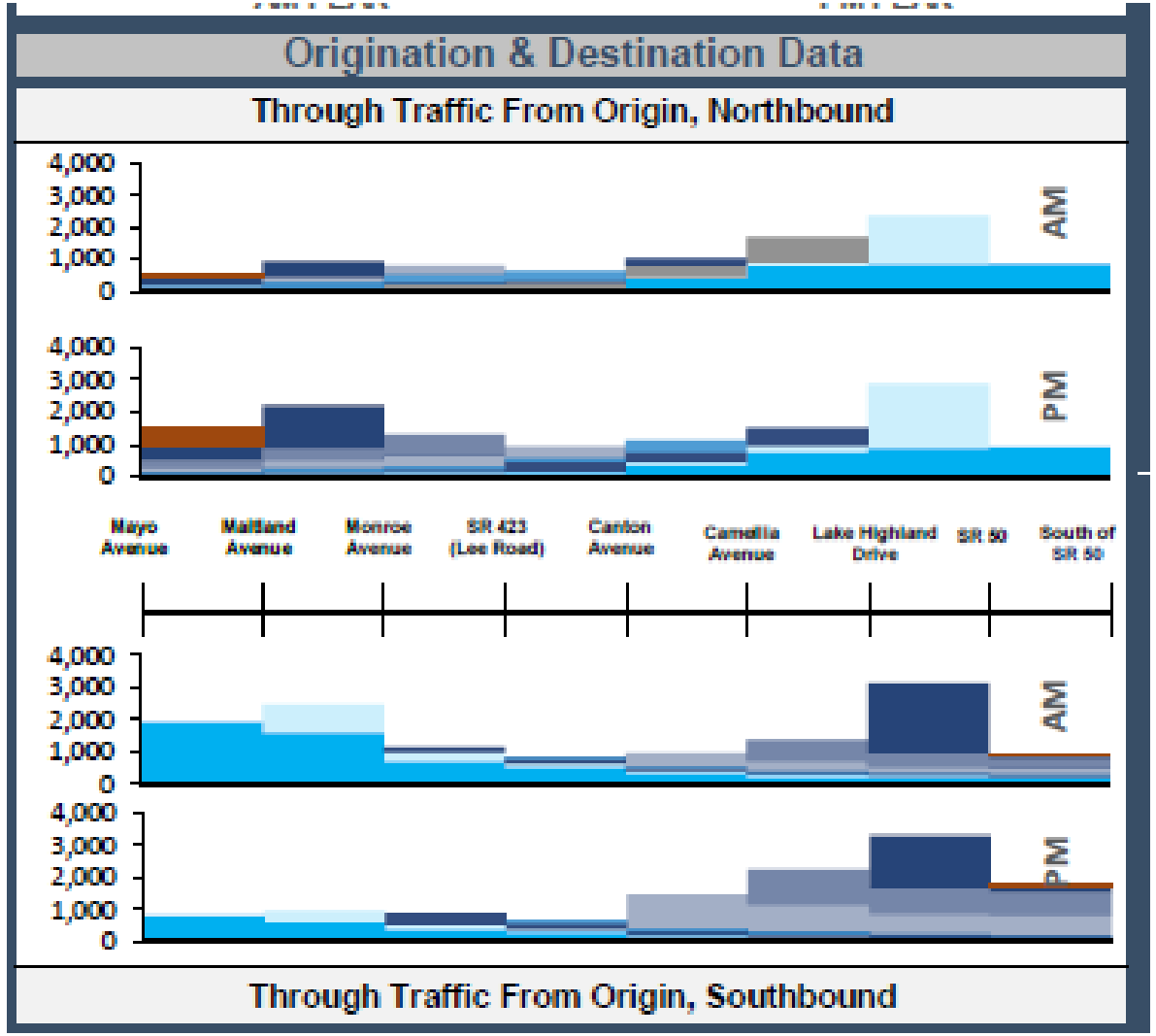
- ICM team monitors equipment issues
- ICM team alerts maintaining agency of any equipment issues
- Maintaining agency is aware of issues and can quickly respond
- ICM team reviews Monthly and Quarterly Performance Reports to identify hotspots

ICM/AAM Reoccurring Congestion Example

- US 17/92 (Mayo Ave to Colonial Dr)
  - 22 traffic signals
  - 6.1 miles length
  - 3 jurisdictions (Maitland, Winter Park, Orlando)
- Used Monthly Performance Report
- Identified intersections which needed signal timing modifications
- Able to adjust signal timings immediately



ICM/AAM Reoccurring Congestion Example Cont.



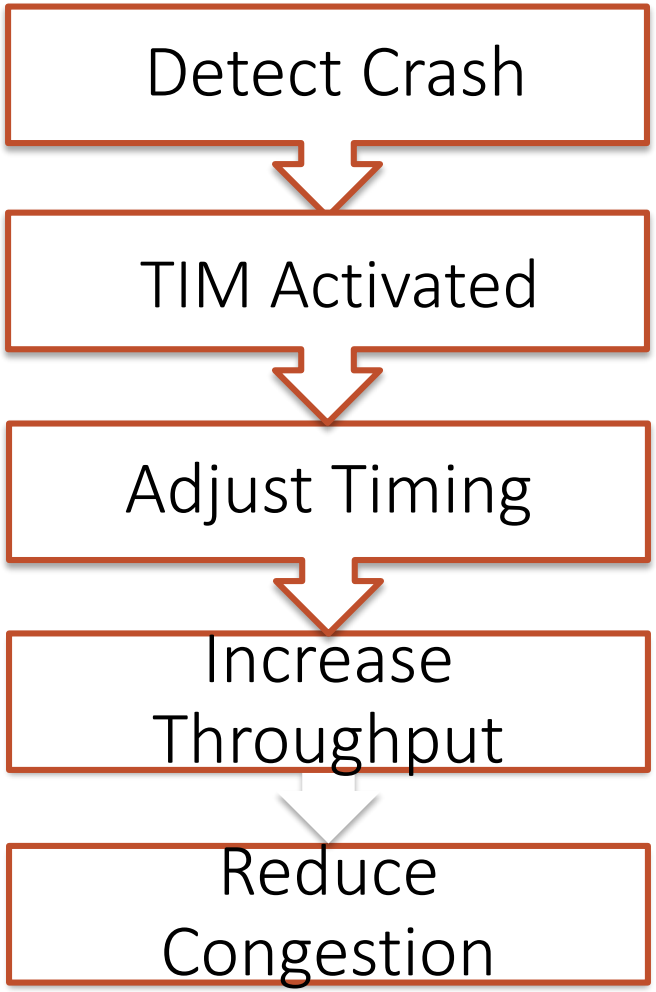
Origin-Destination

Camellia Ave to Colonial Dr, 2.2 miles length, 7 traffic signals				
Northbound	Travel Time Index (TTI)		Planning Time Index (PTI)	
	6:00-9:00am	4:00-7:00pm	6:00-9:00am	4:00-7:00pm
Dec 2019	1.44	1.70	1.72	2.18
Nov 2019	1.49	1.78	1.75	2.49
Oct 2019	1.52	1.81	1.82	2.29
Sep 2019	1.49	1.74	1.72	2.04
Dec 2018	1.42	1.94	1.79	2.72
Southbound	Travel Time Index (TTI)		Planning Time Index (PTI)	
	6:00-9:00am	4:00-7:00pm	6:00-9:00am	4:00-7:00pm
Dec 2019	1.48	1.79	1.79	2.46
Nov 2019	1.51	1.84	1.88	2.71
Oct 2019	1.54	1.91	1.90	2.55
Sep 2019	1.53	1.89	1.84	2.47
Dec 2018	1.34	1.90	1.51	2.75

Travel Time Index and Planning Time Index

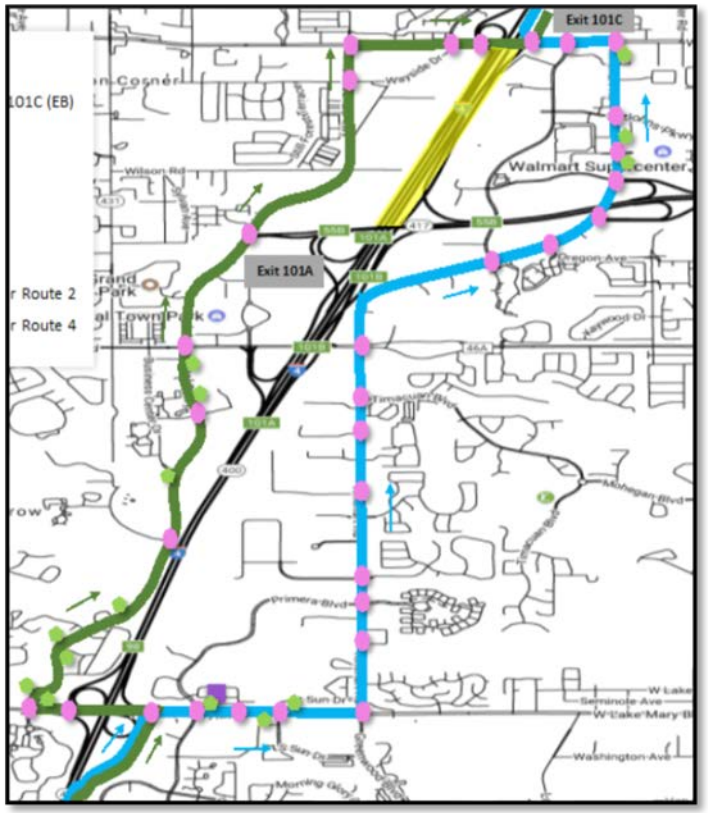
ICM Non-Reoccurring Strategies

- Allows ICM team to get the most out of each corridor's available capacity
- ICM Components
  - Alternate arterial routes (diversion routes)
  - Alternate modes of transportation
  - Data Management
  - Traveler Information
  - Intelligent infrastructure



ICM Diversion Routes and Response to Incidents

- Diversion Routes
  - Signal timing plans have been created for various incident locations
  - Diversion Route Process
    - » Start from Interstate
    - » Inventory existing plans and characterize them
    - » Investigate Plan Utilization
    - » Inventory Infrastructure and Identify Constraints



Response Plan
w/ Diversion Route

ICM Diversion Routes and Response to Incidents Cont.

- Implementing Diversion Routes
  - Utilized when there is a Level 3 incident on the Interstate
    - » Level 3: impact is expected to be more than 2 hours or the roadway is fully closed in a single direction
  - Decision to implement a diversion route timing plan is based on comparison of advantages and disadvantages

Conclusions/Lessons Learned

- Traditional retiming process is evolving
- New tools and applications will enhance arterial management
- Since implementing ICM, D5 has:
  - Built stronger relationships between freeway and arterial agencies
  - Created safer roadways
  - Improved traveling efficiency
- Coordination with local partners is key to success

Questions?

For additional information, please contact:

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or visit

www.CFLSmartRoads.com