



Taking it

to the streets

FISCAL YEAR 2016-2017

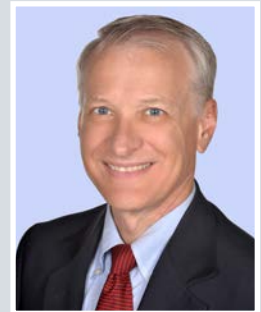
FLORIDA DEPARTMENT  
OF TRANSPORTATION  
DISTRICT SIX  
Transportation Systems  
Management and  
Operations

# Annual Report



# A MESSAGE FROM the District Secretary

## **The District Six Transportation Systems Management and Operations (TSM&O) program continued to make progress and expanded its services over the previous year.**



The SunGuide® Transportation Management Center (STMC) continues to embrace the TSM&O concept of a complete synergistic integration of transportation modes and resources for the efficient and optimized movement of motorists and goods. The District Six TSM&O Core Group is a multi-discipline team that coordinates new projects in the spirit of the TSM&O concept providing a higher level of operational integration among the freeway, arterial and transit systems.

One of the major accomplishments this past year is the start of arterial operations for a new traffic signal system along SW 8 Street in Miami. The adaptive signal control technology (ASCT) system is an advanced strategy for controlling traffic signals. This two-year pilot project will be monitored and operated by our STMC and is expected to show a benefit for motorists.

The TSM&O program also began operations of the 95 Express expansion into Broward County. This 14-mile expansion added two express lane segments. The current 95 Express encompasses over 20 miles and three tolling segments. Our TSM&O staff coordinated with District Six, District Four, and the Florida's Turnpike for a smooth transition from construction to full operation. Coordination continues with District Four and the Turnpike for the next Phase 3 expansion into Palm Beach County as well as various improvements in the Golden Glades Interchange that are scheduled for construction in 2021.

The core of the express lanes operation is the software which sets the dynamic tolling providing congestion management throughout the system. District Six developed the express lanes software for Phase 1 of 95 Express and is being used in the Phase 2 expansion. I am especially proud that the express lanes software was adopted as the statewide software for all express lanes projects.

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The Statewide Express Lanes Software (SELS) is now being implemented for near-term projects in District Four, District Two, and the Florida's Turnpike.

I am pleased to report that the safety measures that the Department introduced in the summer of 2016 are having a positive impact. District Six installed new express lane markers (ELM) from SR 112 to the I-95 flyover. The space between each marker was reduced from ten feet to five feet and the ELMs were replaced with more durable markers. This effort was done to discourage illegal lane changing and to improve safety. The new ELMs have made a significant improvement by reducing crashes due to illegal lane changing and improving the resiliency of the ELMs. As of the end of June 2017, ELM replacement is down 92%; illegal lane changing is down 88%; crashes within 95 Express are down 31%; and express lane volume has increased 1.4%. The next phase of the safety initiative is underway as five median emergency stopping sites are currently under construction and expect to be completed in the spring of 2018.

I am also encouraged by the level of cooperation from local partnering agencies such as the Miami-Dade Expressway Authority (MDX), Miami-Dade County Traffic Signal and Signs Division (TSS), Miami-Dade Transit (MDT), and the City of Miami Beach. In the near future, both the City of Miami Beach and the MDC TSS will be co-located at the STMC. Housing these agencies along with our existing partners MDX and Florida Highway Patrol (FHP) will lead to an unprecedented level of coordination throughout the region.

In the past year, our TSM&O program was successful in improving operations. During Fiscal Year (FY)

2016-2017, the 95 Express serviced over 62 million vehicle trips. Traffic operations have also improved within the I-95 general purpose lanes due to the efficiency of our ramp signaling program. Roadway incident clearance times averaged 25 minutes, which represents a 50% reduction from the 2005 FDOT District Six baseline of 50 minutes. Road Rangers provided over 39,000 assists and continue to play an important role in safety management for motorists involved in roadway incidents.

In the coming year, we are expecting to begin the operation of new express lane projects along SR 826 and I-75. We will also be providing support to our partners at District Four, the Florida's Turnpike, and District Two as they start express lane operations along I-75, the Veterans Expressway, and I-295 respectively.

The success of these programs requires dedication and vision of our staff throughout each aspect of our TSM&O program. I thank our TSM&O leadership team, consultants, and contractors for the sustained progress of our program. These incredibly dedicated people work constantly to make the District Six TSM&O program a continued success.

I am proud of our accomplishments this past year. I look forward to the future and making our multimodal transportation system the best in the nation of which the STMC and the TSM&O program are key components of achieving that goal.

**James Wolfe, P.E.**

District Six Secretary of the  
Florida Department of Transportation





# Introduction



SW 8 STREET AND SW 107 AVENUE NEAR FLORIDA INTERNATIONAL UNIVERSITY

## **The theme for this year's annual report is "taking it to the streets"**

because in addition to the traditional services provided by the SunGuide Transportation Management Center (STMC) over the past eleven years, the Transportation Systems Management and Operations (TSM&O) program expanded to include traffic signals along a busy arterial street in Miami. The TSM&O concept embraces all of the resources available throughout the entire project lifecycle process including planning, design, construction, operations, and maintenance. Last year, the Florida Department of Transportation (FDOT) District Six Intelligent Transportation Systems (ITS) program was renamed the TSM&O program. The TSM&O program provides a higher level of operational integration among the freeway, arterial, and transit systems aligned with performance measures to improve the efficiency of our multimodal transportation network in real time. The TSM&O Program was initially envisioned in 2008 and was formally endorsed as a program in 2010.

In the 1980s through the mid-1990s, a significant effort was made to upgrade traffic signal systems to improve connectivity between signalized intersections and allow engineers to proactively adjust traffic signal timing to improve traffic flow and manage demand along arterial streets. The 1990s saw the expansion in deployments of Intelligent Transportation Systems (ITS) along freeways. This effort continued well into the 2010s. Recently there has been a renewed interest in collaborative strategies for freeway and arterial systems, creating a truly smart corridor system. This is where TSM&O comes in.

Our new operations initiative along SW 8 Street in Miami is the latest service that embraces the TSM&O concept. Additional information about this project is provided later in this annual report. SW 8 Street is a busy east-west arterial spanning 18 miles from downtown Miami to the western edge of the urban area. The new operation covers 8 miles of SW 8 Street with 29 signalized intersections including interchanges for the Florida's Turnpike and SR 826. The adaptive signal control technology (ASCT) system optimizes the available signal timing and makes adjustments based on current traffic demand.

The TSM&O program offers our travelers mobility in a variety of ways. The program was developed to offer travelers a diverse range of services to make customized choices based on individual needs in terms of alternative routes, modes, and schedules. These services support traveler information, incident

management, work zone management, and active traffic management programs. FDOT District Six is committed to enhancing system capacity and improving regional mobility through the use of ITS, allowing travelers information and choices in the manner that best addresses their individual needs.

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**This FDOT District Six TSM&O Annual Report** covers the fiscal year from July 1, 2016 to June 30, 2017 (FY 2016-2017). This report aligns with the program's five primary functional areas:

**ITS Deployments**, providing planning, design and procurement of ITS equipment, including CCTV cameras, Dynamic Message Signs (DMS), vehicle detectors, arterial systems, and communications supporting ITS operations.

**TMC Operations**, providing a central location for data collection and dissemination. The STMC is the command center for managing traffic incidents and providing proactive operations through express lanes, ramp signaling, arterial operations, and other active traffic management strategies.

**Incident Management**, providing and dispatching Road Rangers and other incident management resources to safely and quickly clear lane-blocking events as well as provide motorist assists. An important part of the program is coordinating with first responders to identify, develop, and implement solutions to improve incident management.

**IT/ITS Maintenance**, managing the maintenance of ITS field and STMC equipment to ensure system availability and stability, as well as provide software support.

**Traveler Information**, providing real-time traveler information services through various media, such as the telephone, internet, smartphone applications, and social media.

This marks the twelfth edition of District Six's TSM&O Annual Report. We hope you find the report informative and welcome you to join District Six as we continue to improve the reliability of the multimodal transportation systems within South Florida.



FLORIDA DEPARTMENT OF TRANSPORTATION

**TSM&O MISSION:**

To identify, prioritize, develop, implement, operate, maintain, and update TSM&O strategies and measure their effectiveness for improved safety and mobility.

**TSM&O VISION:**

To increase the delivery rate of fatality-free and congestion-free transportation systems supporting the FDOT vision and Florida Transportation Plan goals.

# ITS Deployments

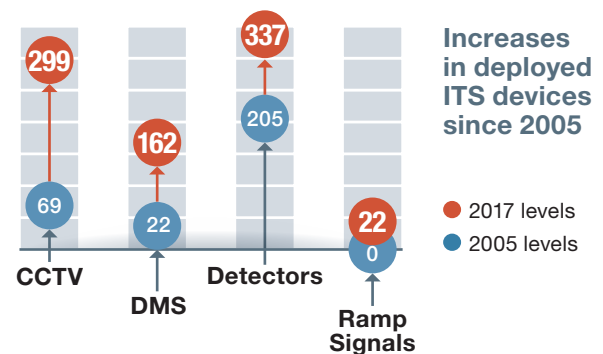


VIDEO IMAGE DETECTOR ALONG SW 8 STREET

## TSM&O is able to take it to the streets

by installing ITS devices that provide information to the STMC and allow the STMC to send information to motorists. The deployment of closed circuit television (CCTV) cameras and vehicle detectors are the eyes and ears of operations. The dynamic message signs (DMS), ramp signals, and other traveler information strategies are the mouthpiece for delivering information to motorists. FDOT District Six continued improving the ITS infrastructure to achieve its transportation goals of improving traffic safety, incident management, mobility, and reliability. These improvements include expansion of the ITS infrastructure to fill the gaps in terms of providing additional CCTV cameras, DMS, and vehicle detectors, as well as accommodating new projects such as the I-75/Palmetto Express Lanes, I-95 Pavement Rehabilitation, and ASCT system along SW 8 Street.

A summary of active FDOT District Six TSM&O projects being built during FY 2016-2017 are presented here.



## SR 826 and I-75 Express Lanes Miami-Dade

**Deployments.** These express lane projects began construction during 2014. ITS devices such as CCTV cameras, DMS, vehicle detectors, ramp signaling, and other infrastructure equipment will be installed to support the express lanes. Express lanes will be added along both directions of SR 826 from Coral Way to NW 154 Street. I-75 will have express lanes installed from SR 826 to NW 170 Street. In total, the project spans 10 miles along the SR 826 corridor and 3 miles along the I-75 corridor. The northern end of the 826 Express project will tie into a future express lanes expansion project along the east-west portion of SR 826. The northern end of the I-75 Express project will tie into the ongoing project in Broward County. This





SR 826 AND I-75 EXPRESS LANES

will bring express lanes from SR 836 to I-595. These projects are scheduled for completion in early 2018.

**Palmetto Expressway (SR 826)/Dolphin Expressway (SR 836) Interchange Reconstruction Section 5.** This major multilevel interchange reconstruction project includes additional ITS elements such as new CCTV cameras, DMSs along SR 826, arterial DMSs along the SR 826 corridor, microwave vehicle detectors, and fiber optic cables. The addition of these devices will provide District Six with full coverage of the SR 826/SR 836 Interchange and completes the final fiber optic cable link for SR 826 from West Kendall Drive to US-1. Construction has been ongoing since 2009. The road and bridge improvements were completed in late 2016 and the ITS is expected to be completed in November 2017.

**95 Express Phase 2.** This project, which began construction in November 2011, extends 95 Express from the Golden Glades Interchange in Miami-Dade County to Broward Boulevard in Broward County. ITS devices such as CCTV cameras, DMSs, vehicle detectors, and other infrastructure support equipment have been installed. Phase 2 added two express lane

segments for a total of three segments in each direction of I-95. District Six assumed operations of this system in October 2016.

**SR 826 Detector Deployment.**

The District Six TSM&O program completed the deployment of microwave vehicle detector system (MVDS) devices from US-1 to SR 836. This project completed full vehicle detector coverage of the entire SR 826 corridor.

**I-95 Pavement Replacement From NW 29 Street to NW 131 Street.**

This project began in February 2017 and is replacing the concrete pavement in both directions of I-95 from NW 29 Street to NW 79 Street. Within the first year of the project, new emergency stopping sites (ESSs) are being constructed in the median of I-95 to allow enforcement and motorist refuge areas along the express lanes. There will be three northbound and two southbound ESSs between NW 62 Street and NW 131 Street. The ESSs are expected to be completed in April 2018 and the pavement work completed in May 2020.

**I-95 Express DMS and Toll Sign Panel Replacement Project.**

This project began in FY 2015-2016 and is retrofitting existing toll signs, DMS, and confirmation cameras along I-95. The project will upgrade the equipment to high definition (HD) cameras and full matrix color DMS. This will enhance the existing express lanes and allow for the continued expansion of 95 Express. This project will also install a series of gates as a pilot project to automatically close several entrances to 95 Express. These automatic swing gates would be used to close the northbound entrances at SR 112 and NW 10 Avenue as well as the southbound entrance from the Golden Glades Park-and-Ride lot.

# TMC Operations



STMC ARTERIAL OPERATOR

## Managing traffic on the streets

happens in the operations control room at the FDOT District Six SunGuide TMC. The STMC serves as the command and control center for traffic management (including express lanes and ramp signaling) as well as its core functions of incident, work zone, emergency, and special event management. The STMC operates 24 hours a day, seven days a week. Operators at the STMC coordinate with emergency responders, Road Rangers, and other incident management resources to clear incidents as quickly and safely as possible from South Florida's roadways. This coordination is enhanced by the co-location of the Miami-Dade Expressway Authority (MDX) TMC operations staff and the Florida Highway Patrol (FHP) Troop E dispatch within the STMC. Looking ahead, the STMC is preparing for additional teams to be housed at the STMC including Miami-Dade County and the City of Miami Beach. This will add a new level of synergy between municipal agencies and cross over to the arterial street system.



## Arterial Operations

The STMC took a step into traffic this fiscal year (of course looking both ways before crossing the street) and began a new service. District Six recently completed construction of a pilot project along SW 8 Street from SW 142 Avenue to SW 67 Avenue. The 29 signalized intersections in this corridor now operate under a new adaptive signal control technology (ASCT) system. The ASCT system optimizes individual signalized intersections based on real-time data while improving the traffic flow throughout the corridor. The new arterial operations staff began operating the system in April 2017. The pilot program will run for at least two years. District Six has partnered with Florida International University to develop performance measures for the system and ultimately studying the system's overall effectiveness. STMC arterial operators monitor the ASCT system, record motorist comments, track equipment availability, and coordinate signal timing with Miami-Dade County

## TMC Control Room Operations

The fiscal year began with a new STMC support services contract. The new contract continues all





EXPANDED STMC CONTROL ROOM COMPLETED IN 2016

existing services including incident management, freeway, and 95 Express operations. New services include traffic signal arterial operations, 826 Express and I-75 Express operations. Therefore, the central operations control room where FDOT and MDX STMC operators work continues to grow. Last year's control room retrofit project provided additional capacity for this growth. The MDX TMC expanded from one to three workstations. The TSM&O operations expanded to fill the workstations for arterial operations. We expect to fill workspace for the 826/75 Express operations by the spring of 2018.

## 95 Express Operations

The District Six TSM&O program took over operations of the Phase 2 portion of 95 Express in October 2016. This new portion of 95 Express adds four tolling segments and 14 miles to the original 95 Express. During FY 2016-2017, the 95 Express reached 368 million vehicle trips since inception and serviced over 43 million vehicle trips during the past year. The project has completed its eighth full fiscal year in operation and has seen a continued increase in usage since inception. 95 Express is considered one



NEW ELMs ALONG 95 EXPRESS



95 EXPRESS BUS

of the most successful and highly used express lanes facilities in the United States and has served as the springboard for other express lanes projects in the region and the state.

Toll-exempt trips using the 95 Express (i.e., carpools of three or more occupants, transit, and hybrid cars) experienced an increase from 740,000 to 880,000 trips (19% increase) in Segment 1 (SR 836 to the Golden Glades Interchange). The total toll-exempt trips for the expanded 95 Express was 1,527,414 trips. Of all toll-exempt trips, 5.5% are composed of HOV3+. Express Lanes Bus Rapid Transit service also experienced increased usage during FY 2016-2017, rising from 3,580 to 3,670 boardings per day.

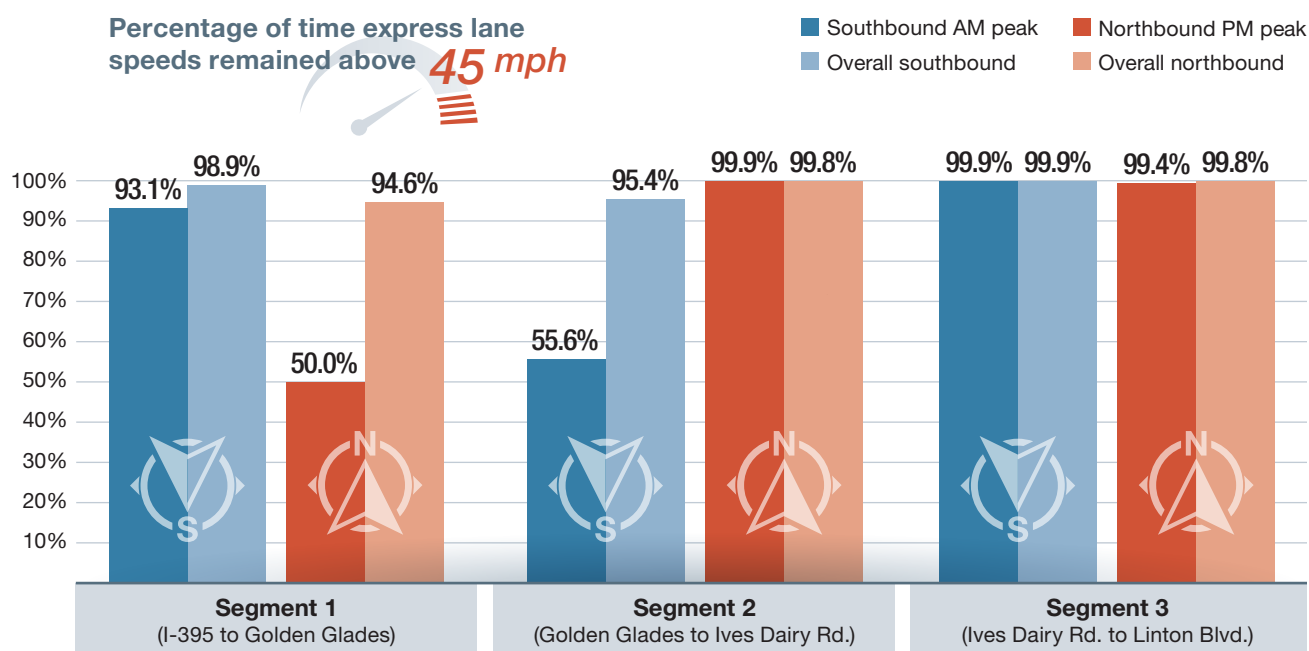
The graph presented below highlights the reliability of the 95 Express. Reliability is a key performance measure for the Express Lanes and is defined as the percentage of time when speeds remain above 45 miles per hour. The federal goal for this performance measure is 90%. The northbound afternoon peak period in Segment 1 (I-395 to Golden Glades) has several factors affecting reliability including: more concentrated traffic volumes for homebound commuters, conflict point at the Golden Glades Interchange, and freeway geometry issues north of the I-195 interchange. Likewise, the southbound morning peak period in Segment 2 (Ives Dairy Road to the

Golden Glades) has concentrated traffic volumes for commuters going to Miami.

District Six continued its “hard closure” procedure as a result of the decrease in reliability in the northbound direction during the afternoon peak because any traffic event within the express lanes expected to last longer than 30 minutes results in physically shutting down the entrances to the express lanes. This was implemented to control access to the facility, manage motorists ignoring a posted “closed” message under a “soft closure,” prevent motorists from weaving between the express lane markers, and improve safety for responders and drivers alike.

**SR 826/I-75 Express Operations.** District Six continued preparing for the operation of the next section of express lanes in South Florida’s regional network—SR 826/I-75 Express. The project limits are SR 826 from SW 24 Street to NW 154 Street continuing along I-75 from SR 826 to I-595 in Broward County. The overall project length is approximately 28 miles and spans FDOT Districts Four and Six.

STMC staff is preparing to operate this new express lane corridor by training staff, developing new standard operating guidelines, and coordinating deployment efforts with regional team members. In addition to the physical geometric improvements, the



SR 826/I-75 Express Lanes will also include system components such as: DMS, vehicle detection, CCTV cameras, ramp signals (SR 826 only), FDOT toll setting software, electronic toll collection, reversible lane control, and incident management. Operation of the SR 826/I-75 Express Lanes will be a joint effort between the TMCs in District Six, District Four, and the Florida's Turnpike. Coordination for incident management has begun between the three districts. Florida Highway Patrol (FHP) and local police and fire rescue agencies will provide emergency response. The FHP will also be responsible for enforcement. Districts Six and Four TMCs will use the statewide SunGuide software to monitor and control the ITS field devices. The toll operations functionality will be controlled through the statewide express lanes software (SELS) which interfaces with the SunGuide software and the Florida's Turnpike back office software.

### Ramp Signaling Operations

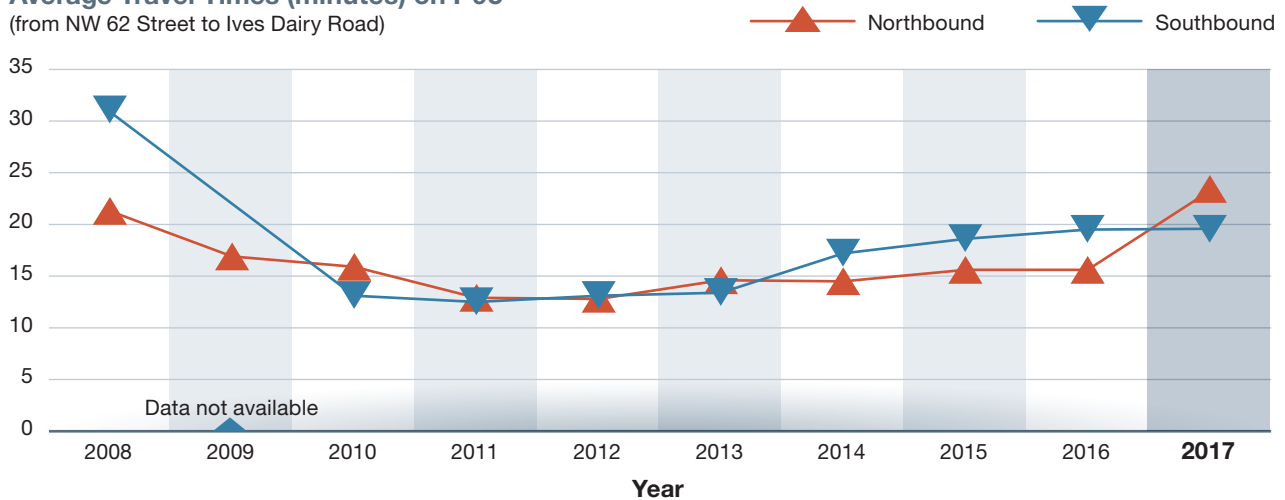
Ramp signals along I-95 entered its seventh full year of operation and continued to be an important tool for managing traffic along this busy corridor. There are 22 total ramp signals along both directions of I-95 from NW 62 Street to Ives Dairy Road. The system improves operations along I-95 by regulating the flow of vehicles entering the roadway during peak periods

of travel. STMC operators can also activate the ramp signaling system in the case of congestion during non-peak periods or to assist during an incident or special event. As demand along the freeway increases in the future, ramp signaling will continue to be one of the tools helping District Six continue to be proactive in managing congestion. The graph below indicates the decrease in average travel times along I-95 from before the ramp signaling system's implementation (2008) to after its implementation (northbound in 2009 and southbound in 2010). The graph does indicate a trend of increasing travel times over the last few years due mainly to increased traffic volumes along the I-95 corridor. Operations will be expanded to include the ramp signals being installed for 826 Express.

### Construction and Special Event Coordination

An increasing challenge for TMC operations is coordinating with multiple agencies to ensure all planned and unplanned lane blockage events are dealt with in the most efficient manner possible. During FY 2016-2017, coordination between the STMC operations staff and these various agencies increased as several construction projects continued to affect District Six roadways.

**Average Travel Times (minutes) on I-95**  
(from NW 62 Street to Ives Dairy Road)





**Construction Coordination.** One of the most significant challenges is the impact of ongoing roadway construction. STMC operations staff coordinated with the project leads of several construction projects to create pre-event information plans that would advise the motoring public of upcoming construction-related closures. The STMC operations staff developed these plans for the following projects: SR 826/836 Section 5; I-95 Pavement Rehabilitation; I-75 and SR 826 Express Lanes; 95 Express Phase 2; All Aboard Florida rail crossings; and Miami Gardens Drive I-95 ramp improvements.

**Special Event Coordination.** Several special events occur in South Florida that can cause unusual traffic congestion along District Six roadways. STMC operations staff coordinates with representatives of these events to help ensure traffic can move as safely and efficiently as possible. Events such as the annual holiday Toys in the Sun Run in Broward County, professional basketball and baseball games in downtown Miami, a major tennis tournament in Key Biscayne, all college and professional football-related events including college bowl games at the stadium in North Miami, and downtown Miami entertainment events (e.g., weekend-long music festivals) are just a few examples of events handled by STMC operations staff.

## Software Enhancements

During FY 2016-2017, STMC operations software development focused on enhancements to the express lanes software. The express lanes software was originally developed to provide the dynamic toll system for Segment 1 of 95 Express. Since then, 95 Express has expanded and other express lanes projects in the state are nearing completion. The express lanes software will be used statewide for managing and operating express lane systems.

**Operations Task Manager (OTM).** OTM is a single piece of software that incorporates several separate modules that serve as extensions of the statewide SunGuide software.



INCIDENT MANAGEMENT ALONG I-395

OTM includes twelve modules handling functions such as express lanes, ramp signaling, ITS device maintenance tracking, rapid incident scene clearance, operator quality control, and reporting functions. During FY 2016-2017, the express lanes software in OTM was improved to accommodate the 95 Express Phase 2 project expansion and allow flexibility for other express lanes projects. The express lanes software builds upon the success of 95 Express. Eventually, OTM will be transitioned to the Florida's Turnpike for continued support.

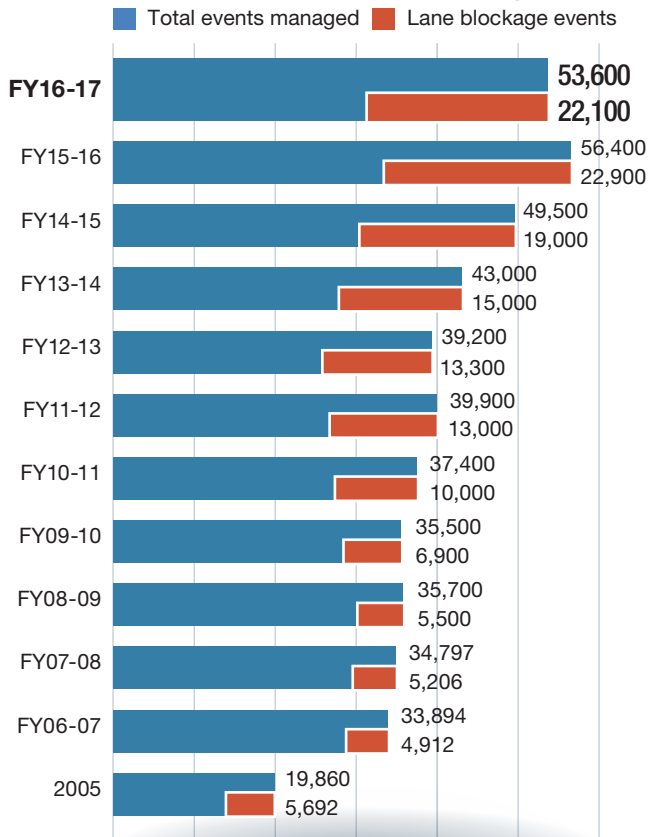
**Statewide Express Lanes Software (SELS).** District Six has committed to supporting OTM for the near future and will assist with the eventual transition of support to the Florida's Turnpike. The District Six software team has been working on enhancing SELS to accommodate other possible express lanes scenarios including express lanes along the Florida's Turnpike. FDOT established the SELS change management team (CMT). The SELS CMT comprises representatives from all Districts and Central Office. The group observes the progress of other express lanes projects, coordinates software efforts to meet project schedules, and manages by consensus any proposed changes to SELS. District Six is a key and active partner with the CMT, sharing its extensive express lanes experience with the rest of the state.

## Performance Measures

In December 2007, District Six set targets for key operational performance measures that have the greatest impact on the public. During FY 2016-2017, STMC operations staff once again exceeded those targets, thanks to quality control procedures and dedicated staff that provide continual guidance and training to operators and, with assistance from OTM, check all lane-blocking and non-lane-blocking events. The new fiscal year brought new performance measures.

The table below shows the performance measures average results and targets. These goals continue to be exceeded as operators managed 53,600 total events and 22,100 lane-blocking events during FY 2016-2017. The graph to the right shows the number of events compared to previous years.

### FDOT District Six Events Managed



## PERFORMANCE MEASURES

	Fiscal Year Averages									Target
	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	
DMS Efficiency (GPL)	100%	99.72%	99.82%	99.77%	99.87%	99.78%	99.74%	99.77%	<b>99.86%</b>	≥95%
DMS Efficiency (EL)									<b>100.0%</b>	≥100%
Operator Error Rate (GPL) (LB)	0.10	0.15	0.11	0.10	0.12	0.13	0.15	0.15	<b>0.14</b>	≤0.20
Operator Error Rate (EL) (LB)									<b>0.06</b>	≤0.10
Operator Error Rate (GPL) (NLB)	0.10	0.15	0.11	0.10	0.12	0.13	0.15	0.15	<b>0.08</b>	≤0.20
Operator Error Rate (EL) (NLB)									<b>0.06</b>	≤0.10
Dispatch Road Rangers (GPL)	0:00:47	0:01:05	0:00:56	00:00:44	00:00:44	00:00:44	00:00:45	00:00:46	<b>00:00:38</b>	≤00:02:00
Dispatch Road Rangers (EL)									<b>00:00:21</b>	≤00:00:60
Time to Confirm an Event (GPL)	0:00:26	0:00:23	0:01:31	00:01:42	00:01:40	00:01:48	00:01:11	00:00:57	<b>00:00:26</b>	≤00:02:00
Time to Confirm an Event (EL)									<b>00:00:05</b>	≤00:01:00
Time to Post DMS (GPL)	0:03:26	0:03:17	0:02:47	00:02:27	00:02:16	00:02:28	00:02:16	00:02:07	<b>00:01:47</b>	≤00:03:00
Time to Post DMS (EL)									<b>00:01:00</b>	≤00:01:30
Notify Other Agencies (GPL)	0:01:31	0:01:19	0:01:15	00:01:11	00:01:30	00:01:42	00:02:18	00:02:28	<b>00:02:11</b>	≤00:07:00
Notify Other Agencies (EL)									<b>00:01:30</b>	≤00:04:00

# Incident Management

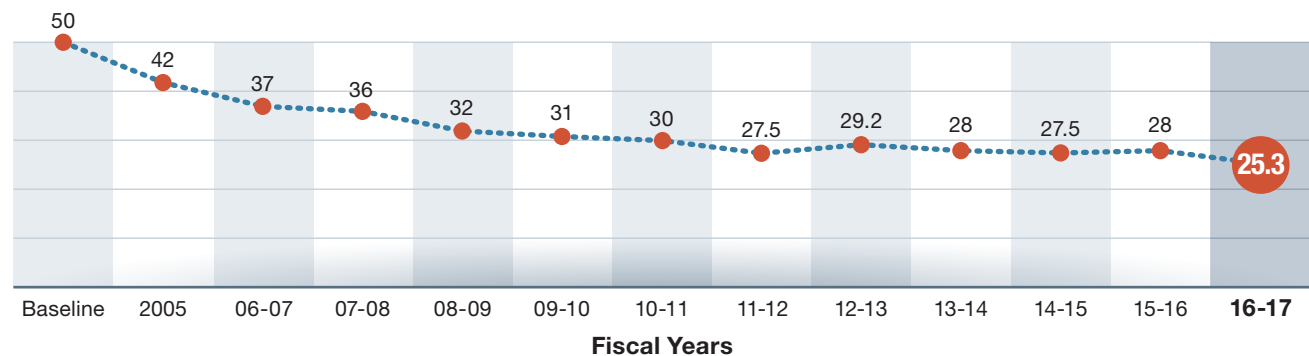


**District Six's incident management service** takes assistance to the streets to keep them clear and safe for motorists. The multi-agency Traffic Incident Management (TIM) Team plays a significant role in helping FDOT reach its goal—to reduce traffic congestion and decrease the chances of secondary events caused by prolonged exposure to traffic incidents.

District Six's average annual roadway clearance time was 25.3 minutes during FY 2016-2017. This is a significant improvement over past years and is reached with the help of all the regional TIM Team partners.

**TIM Team.** Special event coordination was an ongoing component of incident management efforts during FY 2016-2017. Interagency coordination within the TIM Team made that possible. Thanks to the relationships built within the TIM Team, the STMC's TIM representatives were able to continue coordination efforts and outreach with partnering agencies. Meetings were arranged with several agencies within the TIM Team such as FHP, Road Ranger contractors, roadway maintenance contractors, transit agencies, and fire/rescue representatives. The group discusses upcoming FDOT projects and conducts post-incident analyses of recent large-scale events to apply lessons learned. FHP Troop E and STMC operations

**Average Annual Roadway Clearance Duration (minutes)**

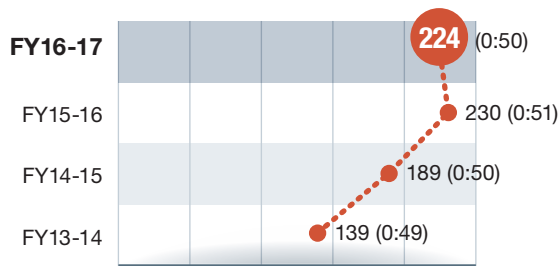




staff continue to share information and resources to help detect and manage incidents along District Six roadways more efficiently. The relationships built within the TIM Team help District Six by creating more efficient interagency coordination during future incidents along general purpose lanes as well as express lanes.

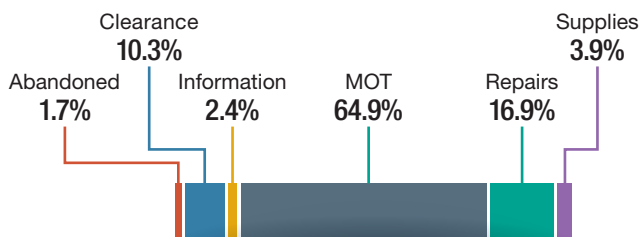
**Road Rangers.** The main STMC service that hits the streets on a daily basis is the Road Ranger program. The program began in 1999 and has evolved into an incident management force for the STMC. As the most visible component of District Six’s incident management service on the streets, Road Rangers provide incident response and motorist assistance along I-95, I-75, SR 826, I-195, I-395, and the MacArthur Causeway. The STMC serves as the control center for dispatching and coordinating field operations for the Road Rangers. The initial vehicles included tow trucks and pickup trucks. In 2009, flatbed wreckers were added and in 2013 a heavy duty wrecker was implemented. The graph below shows the impact of the heavy duty wrecker, which is used to quickly clear vehicles such as transit buses, school buses, and other heavy vehicles.

**Incidents Responded to by Heavy-Duty Wrecker**  
(with average clearance times)



The chart below shows that more than 90% of Road Ranger responses were for maintenance of traffic (MOT); repairs; or clearance services that included tows, car pushes, and motorist transports.

**Road Ranger Assists by Type**



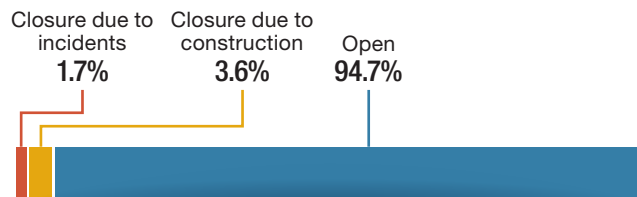
**Incident Response Vehicles (IRV).** District Six’s IRV Program expanded its operation this fiscal year to include two IRV trucks that are available during the PM peak period. IRV operators responded to 1,368 events during FY 2016-2017. IRV operators, along with the FHP, Road Rangers, and other responders were instrumental in keeping the 95 Express lanes open and available for use 94.7% of the time during the fiscal year.



IRV OPERATOR ON PATROL

The facility remained closed due to incidents 1.7% of the time, as illustrated in the chart below. The average travel lane blockage duration in the express lanes was 27.5 minutes in the northbound direction and 22 minutes southbound. Even though IRV operators focus mostly on the 95 Express lanes, they also assist motorists in the general purpose lanes along I-95 on an as-needed basis.

**Express Lanes Facility Availability**



IRV operations will be expanding during the next fiscal year as operations start for 826 Express and 75 Express. IRV will stage operators along SR 826 and I-75 in support of this new operation.

District Six continued coordination between its IRV operations staff and the District Four TMC’s Severe Incident Response Vehicle (SIRV) Team. This coordination is crucial due to the overlapping



IRV OPERATOR DEMONSTRATION

limits for the 95 Express expansion into Broward County. Coordination will continue for 95 Express and the opening of 826 Express and 75 Express next fiscal year.

**Rapid Incident Scene Clearance (RISC) Updates.**

RISC supports Florida’s Open Roads Policy by being an incentive-based program for the rapid removal of the most complex incidents that occur along District Six roadways that would normally require additional time for clearance. RISC contractors are required to respond with all necessary vehicles within 60 minutes and clear the travel lanes within 90 minutes to receive the incentive. STMC operations staff use the RISC module in Operations Task Manager to track RISC activation, resources arrival, and clearance times.

During FY 2016-2017, the average RISC response time was 50 minutes while the average RISC travel lane clearance time was 60 minutes. In total, STMC operations staff summoned RISC resources 19 times during FY 2016-2017. The RISC program has responded to 109 events since its inception in 2009. The table below summarizes these statistics for the past seven fiscal years.

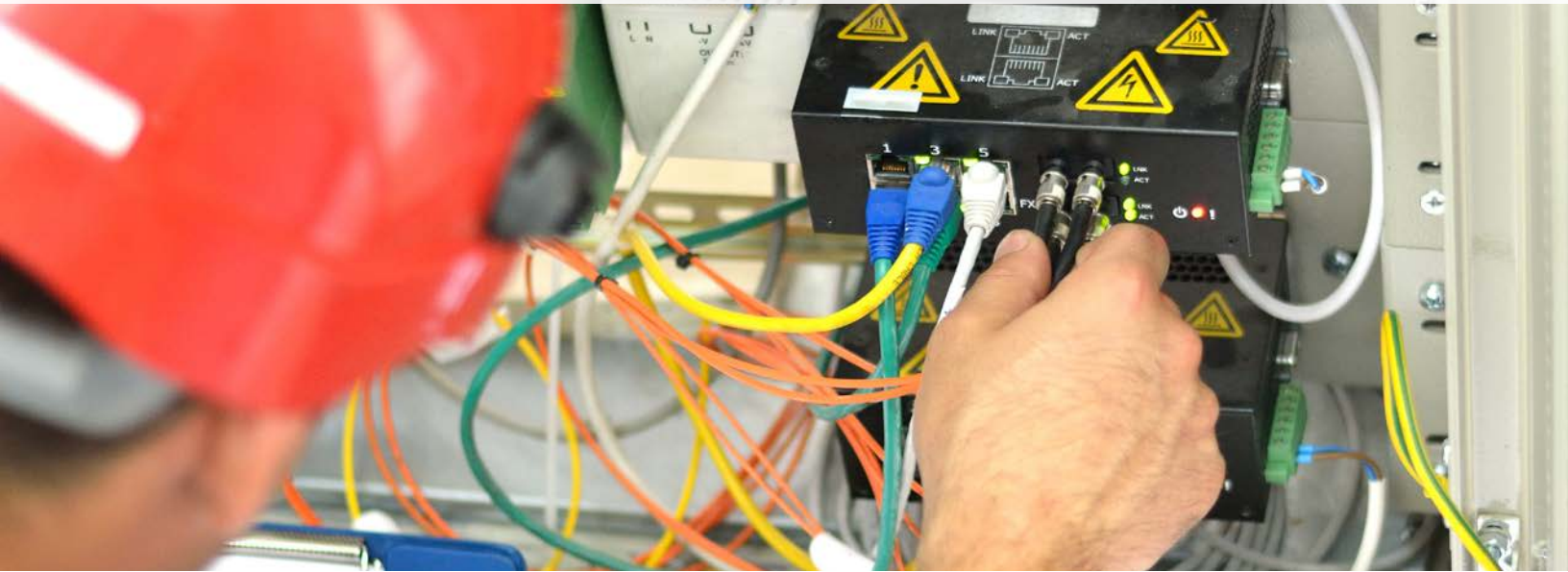
The RISC arterial pilot program was launched in 2011 to address the problem of major incidents along roadways that sustain high commercial vehicle traffic volumes. The program continued during FY 2016-2017, covering Krome Avenue (from Kendall Drive to US 27), US 27 (from SR 826 to the Miami-Dade/Broward County line), and the MacArthur Causeway.

**RISC PERFORMANCE**

	Average Times in Minutes							Target
	FY10-11	FY11-12	FY12-13	FY13-14	FY14-15	FY15-16	FY16-17	
Activation Time	21	10	28	23	28	28	<b>16</b>	—
Response Time	37	39	46	45	43	47	<b>50</b>	60
Travel Lane Clearance Time	60	88	85	68	57	63	<b>60</b>	90
Total Incident Clearance Time	128	161	225	161	141	146	<b>132</b>	—

Total RISC Events							
FY10-11	FY11-12	FY12-13	FY13-14	FY14-15	FY15-16	FY16-17	
12	9	7	19	18	15	<b>19</b>	

# IT/ITS Maintenance



**The TSM&O program** would not be able to provide services to the streets without a sophisticated network and communication infrastructure coupled with dedicated staff that support that infrastructure. The ability to process the tremendous amount of data throughout the STMC's computer network relies on high-functioning technology and computer equipment. There have been many technological changes and advancements that have required the STMC's IT/ITS maintenance staff to adapt and remain flexible. The TSM&O Program maintains a presence at the

Network Access Point (NAP) of the Americas in downtown Miami, serving as a backup system in the event of a system failure at the STMC. Also, in times of emergency, the SunGuide system and OTM software can essentially be operated from anywhere off-site with a network connection.

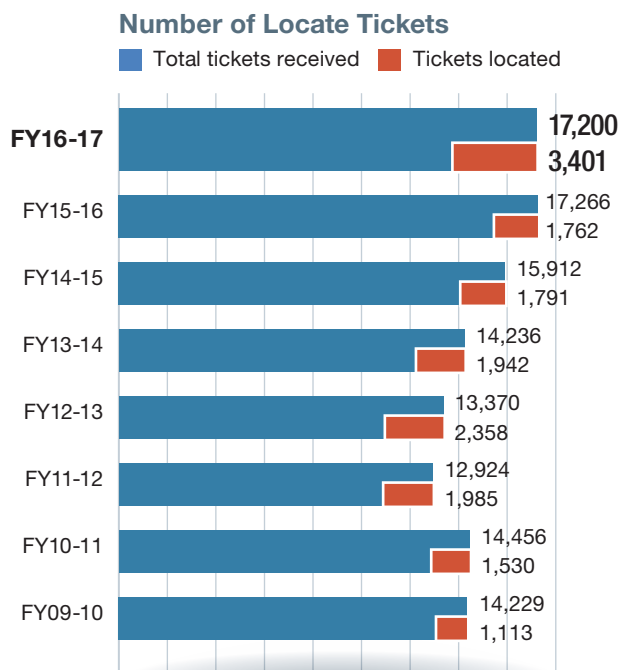
The table below shows the availability of key system components during FY 2016-2017 as compared to the previous fiscal years.

## ANNUAL AVERAGE SYSTEM AVAILABILITY

Subsystem	FY 2012-2013	FY 2013-2014	FY 2014-2015	FY 2015-2016	FY 2016-2017
CCTV	95.47%	97.56%	94.73%	92.73%	<b>92.42%</b>
DMS	93.85%	96.66%	96.15%	98.25%	<b>96.66%</b>
Vehicle Detectors	94.90%	96.13%	95.05%	87.44%	<b>87.48%</b>
Video Wall	97.49%	97.43%	98.86%	99.90%	<b>99.43%</b>
SunGuide	97.97%	99.86%	98.97%	97.98%	<b>96.93%</b>
OTM	99.85%	99.97%	99.68%	99.98%	<b>99.99%</b>



**Utility Infrastructure Locates.** One important function of the STMC is to prevent outside entities from damaging the ITS infrastructure. The TSM&O Program has installed a large number of underground fiber optic and electrical cables throughout Miami-Dade and Monroe Counties. Notifications (or locate tickets) are received from Sunshine 811 regarding activity that may interfere with underground utilities. The TSM&O Program sorts through these tickets and, when necessary, physically marks the ground showing the location of the ITS underground infrastructure. During this fiscal year, 17,200 Sunshine tickets were received and 3,400 Sunshine tickets were located. The following graph shows the amount of locates since FY 2009-2010.



Some of the accomplishments by the IT/ITS Maintenance staff during FY 2016-2017 include the following.

**IP Address Configuration.** The IT/ITS maintenance staff began changing the internet protocol (IP) addresses for all field and STMC devices connected to the network. FDOT reallocated the available IP address ranges for TMCs across the state. In order to comply with this directive, IT/ITS staff began to systematically change the IP addresses on a corridor-by-corridor basis. This systematic change will allow flexibility and growth as more devices are installed and implemented in the network.

**Server Virtualization.** IT staff embarked on a mission to take advantage of recent technology to enhance its computer network servers. IT staff introduced server virtualization which allows for a more efficient use of the computing power at the STMC and improved redundancy of critical systems while reducing dependence on additional physical equipment.



**Coordination with Miami-Dade County.** The IT/ITS maintenance staff worked with MDC as the county's efforts continued to establish a complimentary ITS service to its existing traffic signal system capabilities. Initiatives such as video sharing and support for the installation for the SunGuide software required continued communication between the two agencies.

# Traveler Information



## Providing traffic information to

motorists within South Florida allows them to make more informed decisions regarding alternative routes, modes, and schedules when confronted with congestion, traffic events, or construction. FDOT provides traveler information through the statewide Florida Advanced Traveler Information System (FLATIS), commonly referred to as 511. The service publishes real-time traffic information to the public through the internet on FL511.com and a smartphone application as well as through a phone-based Interactive Voice Recognition (IVR) system. District Six's many DMSs provide motorists with lane blockage information and travel times. District Six's TSM&O website, SunGuide.info, allows motorists to view live feeds of the TSM&O program's CCTV cameras in Miami-Dade and Monroe Counties.

FDOT continued its partnership with Waze, a crowd source traffic application for use on smartphones. This partnership started in 2014 and allows data sharing between the two partners. Waze roadway alerts pop up on STMC operators' SunGuide maps, helping to find and confirm traffic events.



## Florida's Advanced Traveler Information System (FLATIS)

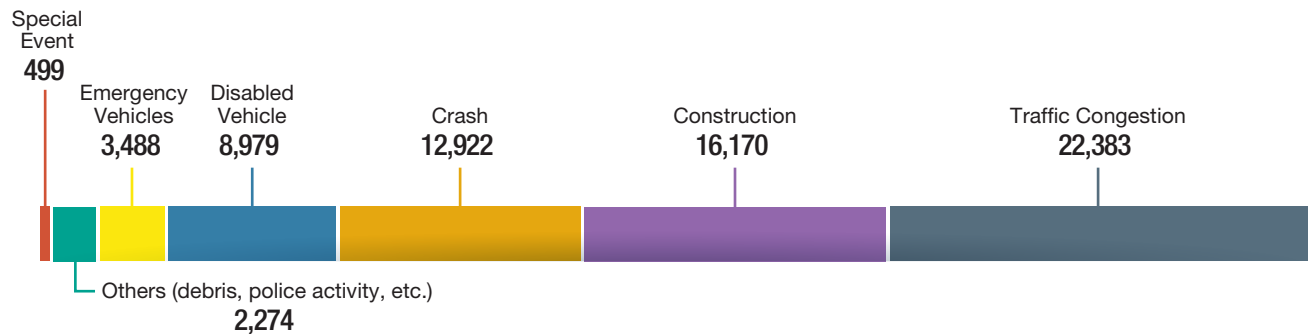
During FY 2016-2017, the 511 service continued to receive a significant amount of calls statewide with users in Miami-Dade and Broward Counties making up a considerable portion of those calls. District Six STMC operators published over 66,000 event updates from lane blockage and congestion events on roadways managed by the District Six STMC.



NSTI STUDENT GROUP



## Traffic Information Published by FLATIS (66,715 total events listed by event type )



## Motorist Awareness

The District Six TSM&O program works with its partners such as FHP, Road Ranger contractors, local fire rescue, and police departments to increase motorist awareness about laws and initiatives. These laws and initiatives help keep motorists and emergency responders safe. Media events were held this fiscal year for new safety improvements along 95 Express, promotion of the *Move Over, Florida!* campaign, and the launch of the *Arrive Alive* initiative.

The *Move Over Law* requires motorists to move over a lane in advance of emergency responders such as law enforcement vehicles, emergency vehicles, and Road Rangers, or slow to 20 miles per hour less than the speed limit if they cannot safely move over. The *Arrive Alive* initiative is devoted to safer roadways and communities, seeking to reduce fatalities and serious injury crashes.



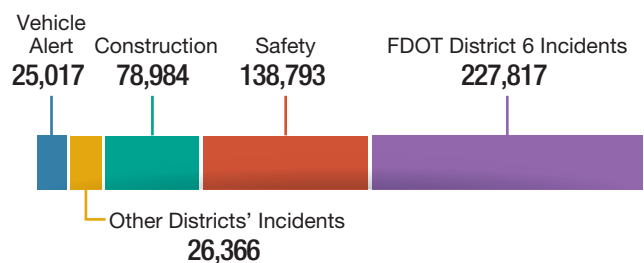
MOVE OVER, FLORIDA! CAMPAIGN MEDIA EVENT

## DMS Messaging

An important component of District Six's traveler information service is its system of DMSs, which displays lane blockage information, travel times, pre-event messages, and congestion messages, all of which help motorists plan their trips and avoid congestion in both Miami-Dade and Monroe Counties. During FY 2016-2017, more than 496,000 messages were deployed on District Six DMSs. The majority of messages alerted motorists to incidents or construction. This is an 8% increase in DMS messages compared to the previous fiscal year.

## DMS Messages Posted

(496,977 total messages listed by type)





# Public Outreach



STUDENT GROUP FROM MIAMI-DADE PUBLIC SCHOOLS TOURING THE STMC IN FY 2016-2017.

**Public Information (PI) staff** continued to take their outreach to the streets by increasing public awareness and completing various initiatives to support the TSM&O program throughout the fiscal year. Staff partnered with the media to promote the program's public services and their benefits. The STMC hosted tours, published articles, and participated in industry conferences to enhance its profile within the local community and at the national level. The PI staff has helped provide information to motorists, the media, and other political and municipal agencies.

This fiscal year, the PI staff spearheaded an effort to consolidate customer service comments with South Florida Commuter Services and the Florida's Turnpike. When the Department launched the 95 Express lanes in 2008, the multimodal components of this highway project placed District Six in a position to receive public feedback and inquiries about the system. District Six implemented a customer service solution to streamline the responses to users' inquiries and improve the overall customer experience. Prior to implementing these changes, each customer comment took approximately 14 business days to

close out and several hours of labor from a wide range of agencies and staff. Customers also had access to several points of contact regarding 95 Express operations, which led to confusion. They were often transferred between these agencies to address their concerns. The group saw the problems both customers and operations staff were having and took steps through a series of working group sessions and internal assessments of procedures to implement a lasting and efficient customer service workflow. The improvements that were implemented included:

- Streamlining internal procedures for reviewing customer comments and inquiries
- Consolidating customer service contact points to provide customers with a single point of contact
- Creating a workflow and training materials to clarify the procedures for handling comments and determining which agency is responsible for them
- Updating the 95Express.com Contact Us page to serve as the online customer service portal



TOUR GROUP FROM THE CITY OF SANTA CRUZ, BOLIVIA

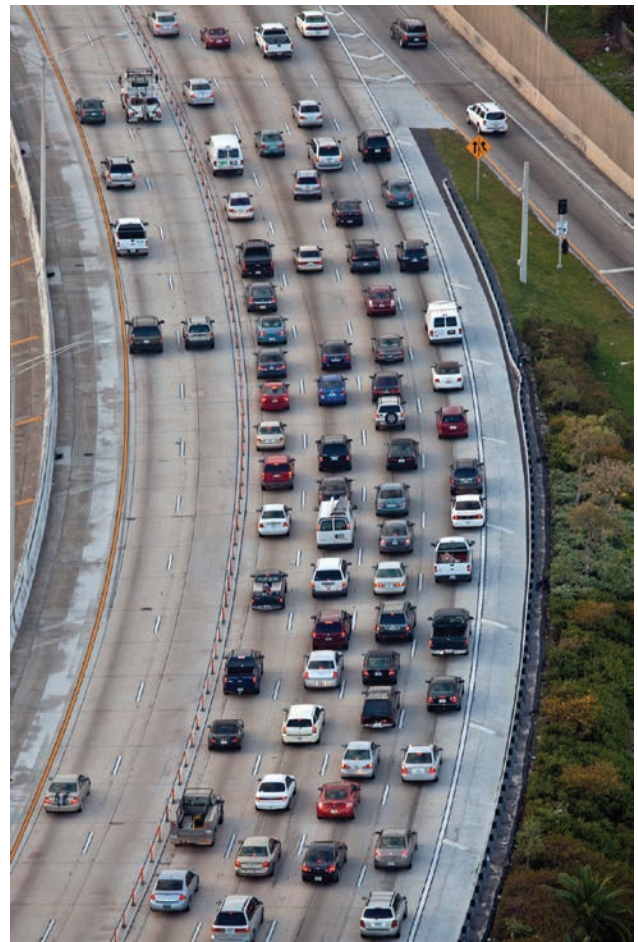
## Tours

The District Six TSM&O program conducts tours of the STMC. These tours typically include a presentation of the TSM&O program, viewing of the control room operations, and in some instances a walkthrough of the STMC. PI staff facilitated 14 tours during FY 2016-2017 including tours for:

- DMX Brand Associates
- NSTI student group
- RS&H
- FDOT District 7
- Robert Martell, new Miami-Dade TPO member
- Atkins
- FDOT interns
- FDOT new hires
- Miami Dade County Public Schools
- Cubic Transportation Systems
- Citel, Inc.
- City of Santa Cruz, Bolivia
- Miami-Dade County Commissioner, Joe Martinez

## Interviews

District Six TSM&O PI staff conducted interviews with media and other programs to help increase awareness of the TSM&O program. Some of the interviews conducted during FY 2016-2017 included CBS 4, Telemundo, and America TeVe.



SOUTHBOUND I-95 AT NW 79 STREET

## Customer Service

Customer service efforts continued to be a high priority as 95 Express experienced several changes during this fiscal year. As a result, staff processed 401 comments from a variety of topics that included tolling, transit, and data requests for academic and professional institutions.

PI staff is currently working with the Department and partner agencies on improving the customer service tracking system heading into next fiscal year.



# Benefits to the Public



**One of the most important benefits** of the TSM&O Program to South Florida motorists is the reduction in incident duration. The average travel lane blocking incident duration during this fiscal year was 25.3 minutes. This represents a 50% reduction from the 2005 FDOT District Six established baseline average duration of 50 minutes.

The FDOT District Six TSM&O Program budget for FY 2016-2017 included operating, maintenance, and capital improvement costs. The costs displayed in the table to the right are considerably less than the normal capital costs associated with expanding highways and facilities.

When the delays associated with incidents are reduced, motorists save time. This time savings can be directly translated to dollars. As shown in the benefits table, the Incident Management Program's contribution to the reduction in delay due to incidents translates into savings of \$3.7 billion. The improved incident clearance time of 25.3 minutes had a significant impact during FY 2016-2017. There were 22,100 events that blocked travel lanes during the past fiscal year. The amount of events with blocked

travel lanes coupled with lower clearance time results in significant time savings compared to the 2005 benchmark clearance time of 50 minutes.

## FISCAL YEAR 2016-2017 COSTS

ITS Operations	\$	8,431,791
ITS Maintenance*	\$	3,481,620
Road Rangers	\$	6,231,414
RISC	\$	56,500
FDOT Cost Center Operating Budget**	\$	4,628,926
Other (Consultants, FTE, FHP, FIU)	\$	8,026,236
Total Annual Operating Costs	\$	30,856,487
Total Annualized Capital Costs	\$	37,058,657
<b>Total Annual Costs</b>	<b>\$</b>	<b>67,915,144</b>

\* Includes express lanes ITS maintenance and express lane marker repair

\*\* Includes utilities for express lanes

## FISCAL YEAR 2016-2017 BENEFITS

Incident Management	\$	3,725,307,557
Express Lanes / Ramp Signals	\$	10,925,094
<b>Total Benefits</b>	<b>\$</b>	<b>3,736,232,651</b>





ARTERIAL DMS UNDER THE NW 25 STREET VIADUCT

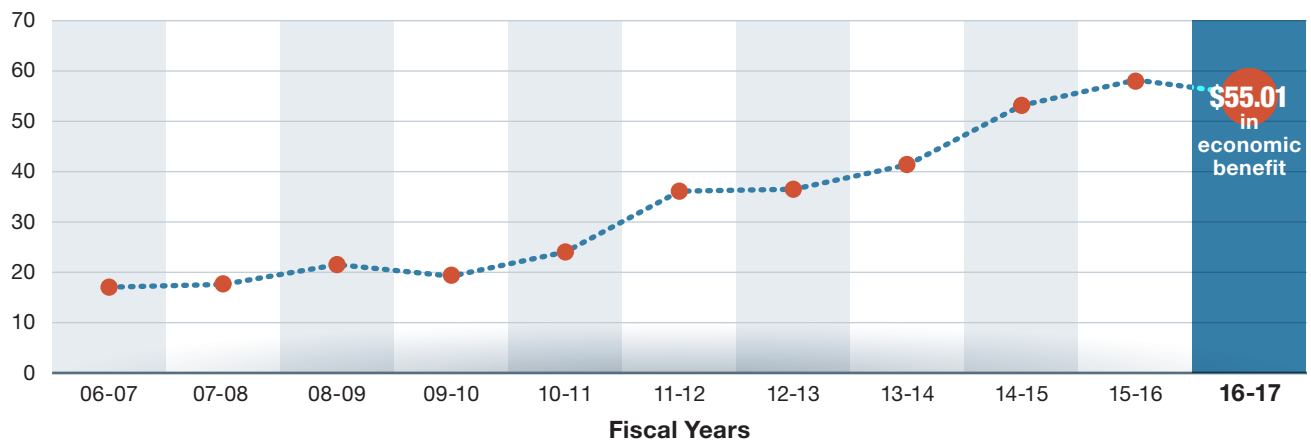
Additionally, 95 Express and the Ramp Signaling System also contributed to reduced delays during peak hours, translating into a savings of \$10.9 million. This estimate was calculated using widely accepted statistical methods for estimating the cost implications of traffic delays. The estimate only includes time saved by motorists; it does not address road user cost savings.

When comparing the total estimated benefits of the TSM&O Program during FY 2016-2017 to the total annual operating expenses and capital investments

(annualized over ten years at seven percent), the TSM&O Program is shown to be yielding \$55.01 in economic benefit for every dollar spent (benefit-cost ratio of 55.01:1).

A comparison of the benefit-cost ratio for FY 2016-2017 to that of the previous ten years is presented in the graph below. The increased trend in benefits is a result of the continuous program improvements coupled with the increased value of travel time and lower capital expenditures now that most of the critical ITS infrastructure is in place.

### Benefit-Cost Ratio



# A Look Ahead



**Next year** the FDOT District Six TSM&O program will continue to take their experience and dedication to the streets with new projects and initiatives. The TSM&O program is preparing for the new emerging trend of connected and autonomous vehicles. Regardless of the technologies available, it is the efforts of the dedicated staff, constantly working to monitor and enhance the TSM&O program, that make the STMC a success.

**STMC Maintenance Support Services.** The STMC will begin the next fiscal year with a new maintenance support services contract. The new contract was advertised in early 2017 with commencement scheduled for July 2017. This contract includes maintenance of all field deployments such as dynamic message signs, CCTV cameras, detectors, and the fiber optic communication network. The new contract will also cover support for the adaptive signal system along SW 8 Street and other new TSM&O projects.

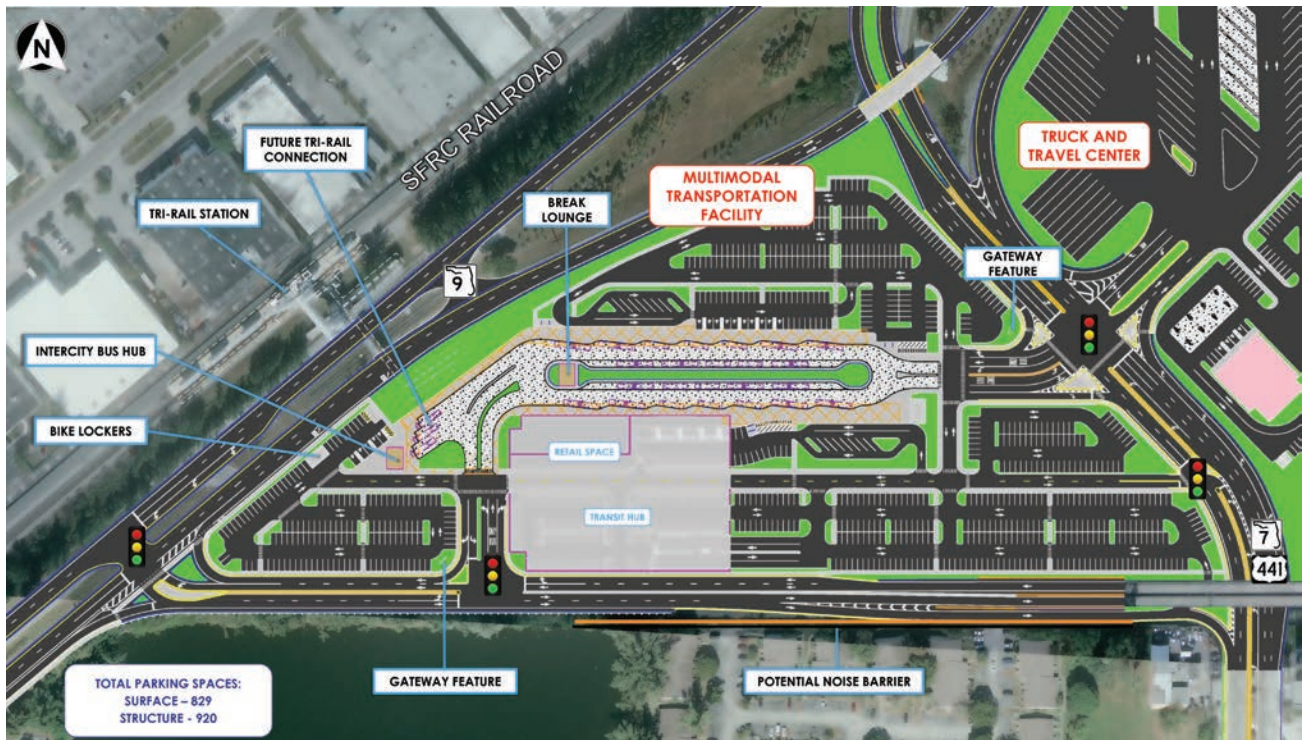
**Express Lanes Projects.** Express lanes projects will continue to be active throughout the next fiscal year. District Six is preparing for the opening of 826

Express and 75 Express in 2018. Preparation includes developing guidance documents



for operating the facility, configuration strategies for setting up SELS, hiring and training additional staff, and coordinating with District Four and the Florida's Turnpike. Phase 3 of 95 Express started last fiscal year and will extend 95 Express into Palm Beach County. Building on the success of 95 Express, FDOT is currently constructing and planning extensions of express lanes to other facilities in South Florida which will be developed as part of an overall network of express lane facilities. The design process has begun on the east-west portion of 826 Express between I-75 and I-95. The planning process is underway for the extension of 826 Express from SR 836 to US-1. A key component of the express lane expansion projects includes the Golden Glades Interchange. This interchange serves as the connecting point for major roadways including I-95, SR 826, the Florida's Turnpike, and US 441. Multiple projects are currently in design for a major system improvement with construction scheduled to start in 2021.





PLANS FOR THE NEW GOLDEN GLADES MULTIMODAL TRANSPORTATION FACILITY

**DMS Retrofit Projects.** The DMS retrofit projects will continue next fiscal year with the replacement of existing DMS, including express lane toll amount DMS and lane status DMS. The project will feature the replacement of older-technology amber DMS with full matrix color LED DMS. This will allow messages to be displayed in different colors and include graphics such as roadway signs.

**I-395 Signature Bridge.** This project will completely reconstruct the existing interstate and create a signature bridge that will span 1,025 feet over NE 2 Avenue and State Road (SR) 5/Biscayne Boulevard and potentially redefining the Miami skyline. This project fully embraces the TSM&O vision by providing additional roadway capacity and improved mobility while incorporating extensive pedestrian improvements, community access, and ITS solutions. It is planned that the signature bridge with its high vertical clearance will transform the area beneath I-395 into 55 acres of vibrant open communal spaces for the enjoyment of Overtown residents, nearby communities, and visitors. The project will add additional capacity to I-395 with a total of three through lanes in each direction and will provide separate connector ramps for traffic to and from

I-95. The project limits will extend from the SR 836 / I-95 / I-395 (Midtown) Interchange to the MacArthur Causeway, a stretch of approximately 1.4 miles in length. The project also includes work on SR 836 from NW 17 Avenue to the Midtown Interchange. The improvements on SR 836 include the construction of an elevated bridge that begins just east of the toll gantry at NW 17 Avenue and rises over the center of SR 836, allowing drivers to bypass the I-95 Interchange touching down at I-395 west of I-95.

**Golden Glades Multimodal Transportation Facility.** District Six will be starting a project at the Golden Glades Interchange to convert the existing park-and-ride lot and surrounding area into a multimodal transportation facility. This approach will take advantage of the diverse modes of transportation available in this area (e.g., Tri-Rail, Miami-Dade Transit, Broward County Transit, Greyhound, freight, connection to 95 Express) and incorporate a transit hub with retail accommodations. TSM&O's vision for this project showcases transit by combining multiple modes of transportation at a facility that is more than just a bus station. This design-build project began advertising in July 2017.





TOP LEFT: ARTERIAL OPERATIONS IN THE FLORIDA KEYS; TOP RIGHT: TOLL AMOUNT DMS RETROFIT FOR 95 EXPRESS  
 ABOVE: CONSTRUCTION OF I-75 EXPRESS LANES

**Traffic Signals in Monroe County.** The STMC will continue to expand its operations with traffic signals in the next fiscal year. The 17 signalized intersections along US-1 in Monroe County from Key Largo to Key West will be transitioned to the STMC. This will include the operations, monitoring, and maintenance of these signalized intersections.

**NW 119th Street ASCT & CV.** Another ASCT project is underway along NW 119 Street (SR 924) east of the Gratigny Parkway. This project will be constructed in phases. Phase 1 will implement a new ASCT system along the corridor. Phase 2 will introduce the Connected Vehicles Initiative. Connected Vehicles includes communication connectivity between vehicles and the surrounding infrastructure. New traffic signal controllers will be installed to transmit signal phasing and time (SPaT) information to roadside equipment and vehicle onboard systems.



**FDOT District Six**

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