



FLORIDA DEPARTMENT OF TRANSPORTATION • DISTRICT SIX

Transportation
Systems Management
and Operations

Annual Report

Fiscal Year 2015–2016



A Message from the District Secretary

James Wolfe, P.E.

District Six
Secretary of the Florida
Department of Transportation



One of the exciting parts of being District Secretary is being involved in the application of advanced technology and traffic management methods. The District Six Transportation Systems Management and Operations (TSM&O) program at the SunGuide Transportation Management Center (STMC) is certainly a leader in this fast developing field.

I am pleased to see that the expansion and retrofit of the operations control room is complete. This solidifies the STMC as one of the premier control centers in the United States. District Six has been on the forefront of many technologies and practices that serve as a model for other centers around Florida and the nation. District Six was Florida's first to deploy and operate ramp signals and express lanes.

In the near future, I expect continued positive change to our transportation system. I am encouraged by the interest of our local agencies such as Miami-Dade County and the City of Miami Beach. Both of these agencies will be co-located at the STMC in the near future. Housing these agencies along with our existing partners Miami-Dade Expressway Authority (MDX) and Florida Highway Patrol (FHP) will lead to an unprecedented level of coordination throughout the region.

We have successfully transitioned our Intelligent Transportation Systems (ITS) program to TSM&O. This will provide consistent performance along our freeway system while providing increased interface with the surrounding arterial roadway network.

In the past year, our TSM&O program was successful in improving operations. During Fiscal Year (FY) 2015-2016, the 95 Express serviced over 22 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 28 minutes which represents a 44% reduction from the 2005 FDOT District Six baseline of 50 minutes. Road Rangers provided over 41,300 assists and continue to play an important role in safety management for motorists involved in roadway incidents.

In the coming year we expect to see advancements in arterial operations as we prepare to operate a pilot project implementing adaptive signal control technology for 29 signalized intersections along SW 8 Street. We will also strive to keep 95 Express a safe corridor by installing new plastic poles and begin construction of emergency stopping sites in the median along I-95.

The success of these programs require dedication and a pioneering spirit of our staff in developing innovations as applied to each aspect of our TSM&O program. During the past year, we have made enhancements in the development of software to expand the management of the 95 Express program into Broward County and to accommodate future express lanes projects.

I thank our TSM&O Leadership team, consultants, contractors, and all the past contributors for the sustained success of our program. These incredibly dedicated people work constantly to make the District Six TSM&O program, including the 95 Express, an international success.

As District Six Secretary, I am proud of our accomplishments this past year and am fortunate to witness the evolution of the ITS and TSM&O programs during my time with FDOT. I look forward to the future and making our multimodal transportation system the best in the nation of which the SunGuide TMC is a key component of achieving that goal.

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Introduction

The SunGuide Transportation Management Center (STMC) started the 2015–2016 fiscal year with the completion of the operations control room reconfiguration. The reconfiguration project provides the needed growth as the STMC prepares to take on additional responsibilities for transportation mobility throughout the southeast Florida region.

The Florida Department of Transportation (FDOT) District Six Intelligent Transportation Systems (ITS) program was renamed the Transportation Systems Management and Operations (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 multi-modal transportation network in real-time. The TSM&O Program was initially envisioned in 2008 and formally endorsed as a program in 2010.

The TSM&O program offers our travelers mobility in a variety of ways. The TSM&O 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.

This FDOT District Six TSM&O Annual Report covers the timeframe from July 1, 2015 to June 30, 2016 (FY 2015–2016). This TSM&O Annual Report aligns with the program's five primary functional areas listed below.

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

TMC Operations provides a central location for data collection and dissemination. The STMC is the

command center for managing traffic incidents as well as providing proactive operations through express lanes, ramp signaling and other active traffic management strategies.

Incident Management provides and dispatches 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 coordination with first responders to identify, develop and implement solutions to improve incident management.

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

Traveler Information provides real-time traveler information services through various media, such as the telephone, Internet, Smartphone applications, and social media.

This marks the eleventh edition of District Six's TSM&O Annual Report. In this report, we highlight how the District Six TSM&O office focused its efforts on enhancing its operational strategies, software and coordination efforts. We hope you find the report informative and welcome you to join District Six as we continue to improve the reliability of the multi-modal transportation systems within South Florida.

FLORIDA DEPARTMENT OF TRANSPORTATION

TSM&O Mission

Optimize the safety, mobility and reliability performance outcomes of South Florida's transportation system through the timely implementation of TSM&O strategies.

TSM&O Vision

Manage and operate a nationally recognized integrated regional transportation system which optimizes transportation performance.



TMC Control Room



Hard Closure of 95 Express

ITS Deployments

FDOT District Six continues to improve 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, dynamic message signs, vehicle detectors as well as accommodating new projects such as the I-75/Palmetto Express Lanes and the SR 826/SR 836 Interchange Reconstruction. A summary of active FDOT District Six TSM&O projects being built during FY 2015–2016 can be found below.

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 these express lanes. Express lanes will be added along both directions of SR 826 from West Flagler Street 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 75 Express project will tie into the ongoing

project in Broward County. This will bring express lanes from SR 836 to I-595. These projects are scheduled for completion late 2017.

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 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 and is expected to be completed during late 2016.

95 Express Phase 2

This project, which began construction in November 2011, will extend the existing 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 will be installed. Phase 2 adds two express lane segments for a total of three segments in each direction of I-95. District 6 is updating

the statewide express lanes software to prepare for toll operations when the project is complete. This project is scheduled for completion during late 2016.

I-95 Express DMS and Toll Sign Panel Replacement Project

This project, beginning in FY 2015–2016, will retrofit existing toll signs, DMS, and confirmation cameras in preparation for the express lanes expansion. 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 expansion under the 95 Express Phase 2 project. This is a series of projects that will replace devices in stages. The first two projects are scheduled to be completed in 2016.

The table below illustrates the increase in deployed ITS devices from 2005 to 2016.

ITS Device	2005	2016
CCTV	69	299
DMS	22	140
Detectors	205	369
Ramp Signals	0	22



Concept for I-75 and Florida's Turnpike Interchange



Arterial DMS along NW 25 Street

TMC Operations

The FDOT District Six SunGuide TMC serves as the command and control center for proactive traffic management (including express lanes and ramp signaling) as well as its core functions of incident, work zone, emergency and special event management. The TMC operates 24 hours a day, seven days a week. TMC operators 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 benefiting arterial operations as well.



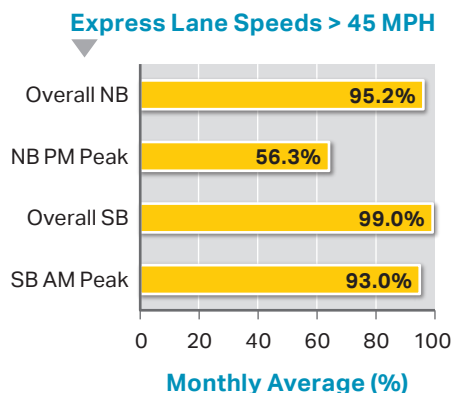
the amount of operator workstations from eight to 18. Each workstation was also reconfigured to allow operators to work more efficiently. The workstations were originally configured in a linear arrangement similar to a NASA command center. The new configuration has the workstations grouped into pods which facilitate more efficient communications among operators conducting like functions. For example, one pod is dedicated to I-95 operations and includes two workstations for express lanes, one for ramp signaling, one for incident management, and one for a supervisor. The expansion provides the growth needed to handle the future operations of 826/75 Express and arterial signal operations along SW 8 Street.

95 Express Operations

During FY 2015–2016, the 95 Express reached 142 million vehicle trips since inception and serviced over 22 million vehicle trips during the past year. The project has completed its seventh full fiscal year and has seen a steady increase in usage since inception. 95 Express is considered one of the most successful and highly used express lanes facilities in the United States.

Toll-exempt trips using the 95 Express (i.e., carpools of three or more occupants and transit vehicles) experienced an increase from 680,000 to 740,000 trips, an 8% increase. Of all toll-exempt trips, 17% are composed of HOV3+. Express Lanes Bus Rapid Transit service also experienced increased usage during FY 2015–2016 rising from 3,540 to 3,580 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 during the peak period when speeds remain above 45 miles per hour. The federal goal for this performance measure is 90%. The northbound afternoon peak period 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.



TMC Control Room Operations

The central operations control room where FDOT and MDX TMC operators work was quickly reaching staffing capacity and equipment was reaching the end of useful life. FDOT embarked on a design-build project to expand



Original Operator Workstation



New Operator Workstation

As a result of the decrease in reliability in the northbound direction during the afternoon peak, District Six continued its hard closure procedure. 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 "lane divers" from weaving between the express lane markers, and improve safety for responders.

As the District continues to operate the existing phase of the 95 Express, it is also working with its partners District Four and Florida's Turnpike preparing for the next phase of the facility. 95 Express Phase 2 is a 14-mile extension into Broward County currently under construction and is scheduled to begin operations during FY 2016-2017. Upon completion, this new phase will introduce two new tolling segments in each direction. Drivers who wish to use 95 Express for long trips will benefit from the expanded system between SR 836 (Dolphin Expressway) and I-95. As part of the effort to make this transition seamless for drivers, District Six worked with its partners to develop business rules which were translated into software design requirements to accommodate the new type of operations.

SR 826/I-75 Express Operations

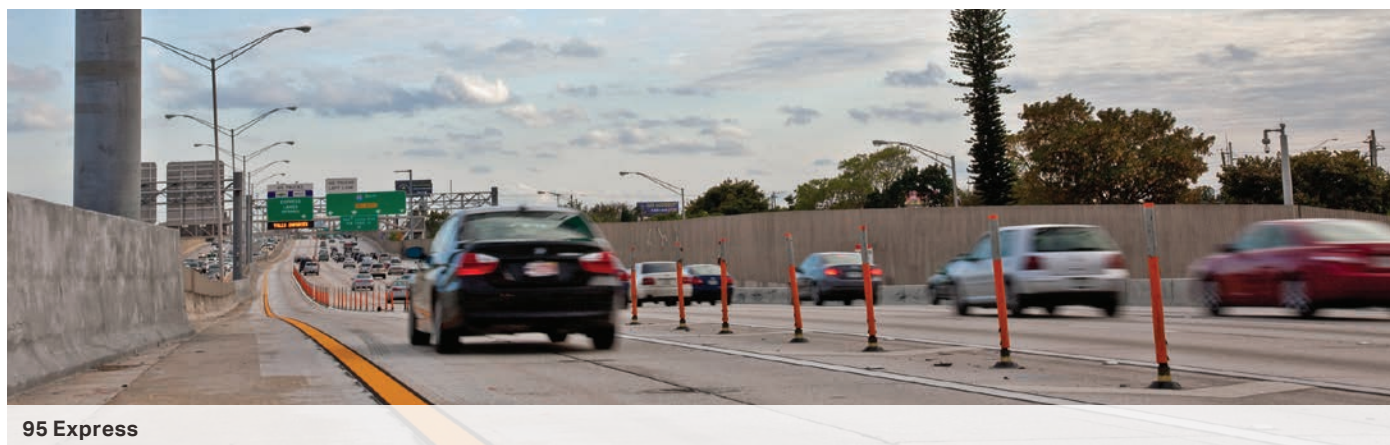
District Six is expanding its express lanes network in alignment with a regional plan established for South Florida. After 95 Express Phase 2, the next express lanes project to become operational for District Six is the SR 826/I-75 Express Lanes. The project limits are SR 826 from West Flagler Street 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.

The SR 826/I-75 Express Lanes will include a two-lane direct connect reversible flyover ramp to/from the I-595 Express Reversible Lanes System in the northern end of the project in Broward County. There will also be a single-lane flyover ramp that connects the southbound I-75 Express Lanes to the southbound Homestead Extension of the Florida's Turnpike (HEFT), and a single-lane flyover that connects northbound HEFT to the northbound I-75 Express Lanes. There will be a flyover ramp (one lane in both the northbound and southbound directions) that directly connects I-75 and SR 826. In addition to the physical geometric improvements, the I-SR 826/I-75 Express Lanes will also include the following additional system components: 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 Districts Four and Six. Both 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 that interfaces with the SunGuide Software and the Florida's Turnpike back office software. In addition, Florida Highway Patrol (FHP) and local police/fire rescue agencies will provide emergency response. The FHP will also be responsible for enforcement.

Ramp Signaling Operations

Another component of the 95 Express is the ramp signaling system, which entered its sixth full year of operation during FY 2015-2016. Consisting of 22 total ramp signals, the system improves operations along I-95 by regulating the flow of vehicles entering the roadway during peak periods of travel. TMC 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 following graph indicates the decrease in average travel times along I-95 from before the ramp signaling system's implementation (2008) to after its



95 Express

implementation (northbound in 2009 and southbound in 2010). Ramp signals are installed along northbound and southbound on ramps from NW 62 Street to Ives Dairy Road. Although 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.

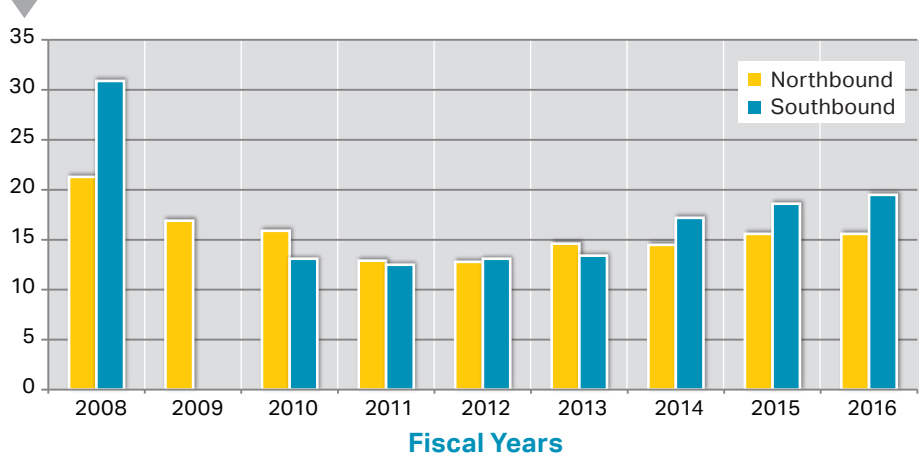
Construction and Special Event Coordination

A crucial component of 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 2015–2016, coordination between the TMC operations staff and these various agencies increased as several construction projects continued to affect District Six roadways.

Construction Coordination. One of the most significant challenges is the impact of ongoing roadway construction. TMC 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 following is a list of projects that TMC operations staff developed these plans for: SR 826/836 Section 5, NW 25th Street Viaduct Phase 2, I-95 Pavement Rehabilitation, I-75 and SR 826 Express Lanes, and 95 Express Phase 2.

Special Event Coordination. Aside from construction projects, several special events occur in South Florida that cause unusual traffic congestion along District Six roadways. TMC 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 games in downtown Miami, a major tennis tournament in Key

Average Travel Time on I-95 from NW 62nd St to Ives Dairy Rd (minutes)



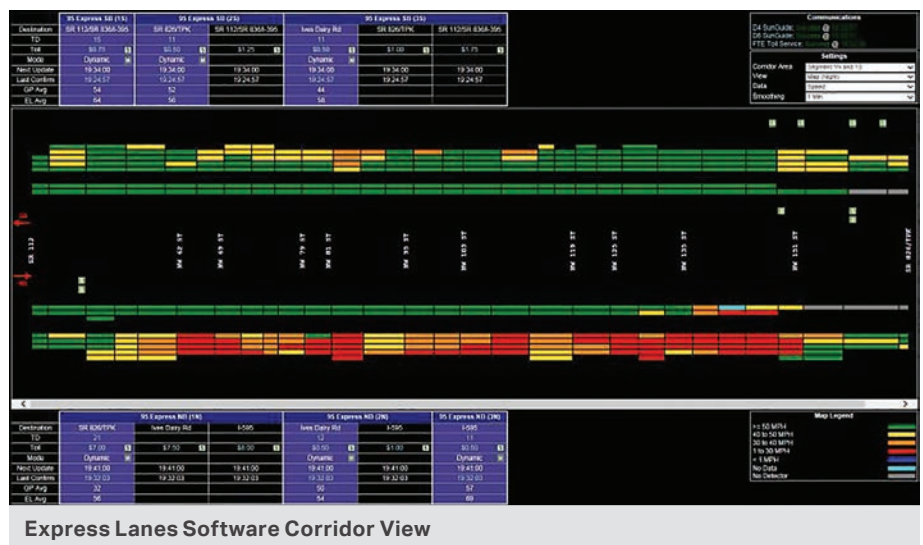
Biscayne, all college and professional football-related events including the college bowl game at the stadium in North Miami, and downtown Miami entertainment events (e.g., weekend long music festivals) are just a few examples of events handled by TMC operations staff.

Software Enhancements

During FY 2015–2016, TMC operations software was enhanced to streamline procedures, increase operational efficiency and provide optimized quality assurance and quality control of TMC operator data entry.

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

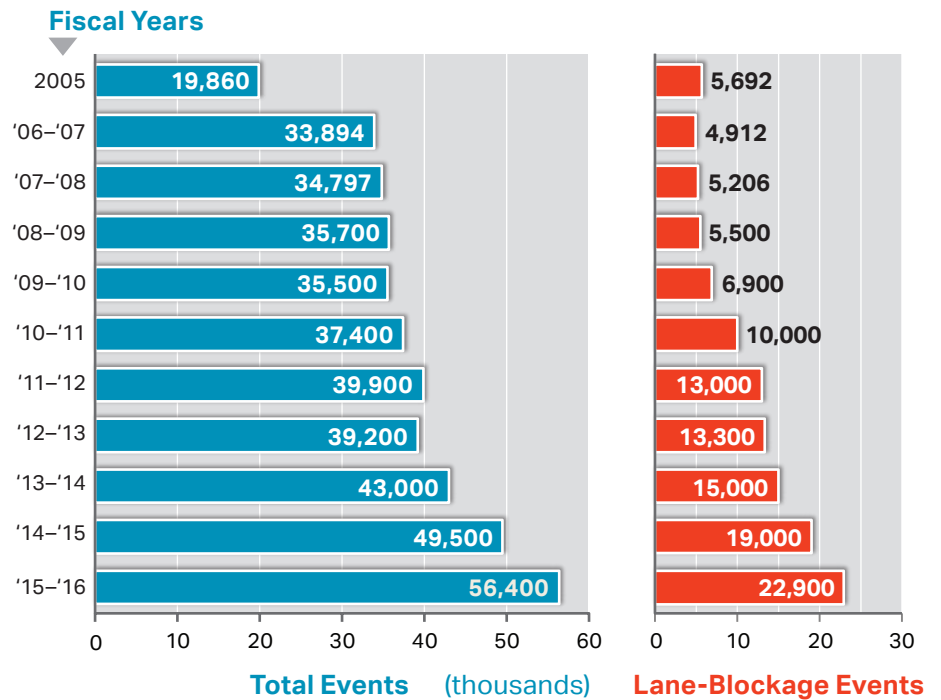
OTM includes ten modules handling functions such as express lanes, ramp signaling, ITS device maintenance tracking, rapid incident scene clearance, and reporting functions. During FY 2015–2016, the Express Lanes module in OTM was improved to accommodate the expansion of Phase 2 project. The Express Lanes module builds upon the success of the current Phase 1 project and has been selected as the statewide software for express lanes.



Performance Measures

In December 2007, District Six set targets for key operational performance measures that have the greatest impact to the public. During FY 2015–2016, TMC operations staff once again exceeded those targets, thanks to quality control procedures that include daily reviews of all travel lane blocking events.

The table below shows the performance measures average results and targets. These goals continue to be exceeded as operators managed 56,400 total events and 22,900 lane blocking events during FY 2015–2016. The graph to the right shows the number of events compared to previous years.



Average Performance Measures by Fiscal Year

	DMS Efficiency	TMC Operator Error Rate	Time to Dispatch Road Rangers	Time to Confirm an Event	Time to Post DMS	Time to Notify Other Agencies
'07-'08	99.00%	0.19%	0:00:51	0:00:59	0:02:15	0:02:04
'08-'09	100.00%	0.30%	0:00:47	0:00:26	0:03:26	0:01:31
'09-'10	99.72%	0.43%	0:01:05	0:00:23	0:03:17	0:01:19
'10-'11	99.82%	0.32%	0:00:56	0:01:31	0:02:47	0:01:15
'11-'12	99.77%	0.30%	0:00:44	0:01:42	0:02:27	0:01:11
'12-'13	99.87%	0.36%	0:00:44	0:01:40	0:02:16	0:01:30
'13-'14	99.78%	0.38%	0:00:44	0:01:48	0:02:28	0:01:42
'14-'15	99.74%	0.44%	0:00:45	0:01:11	0:02:16	0:02:18
'15-'16	99.77%	0.45%	0:00:46	0:00:57	0:02:07	0:02:28
Target	> 95.00%	< 0.59%	< 00:02:00	< 00:02:00	< 00:05:00	< 00:07:00

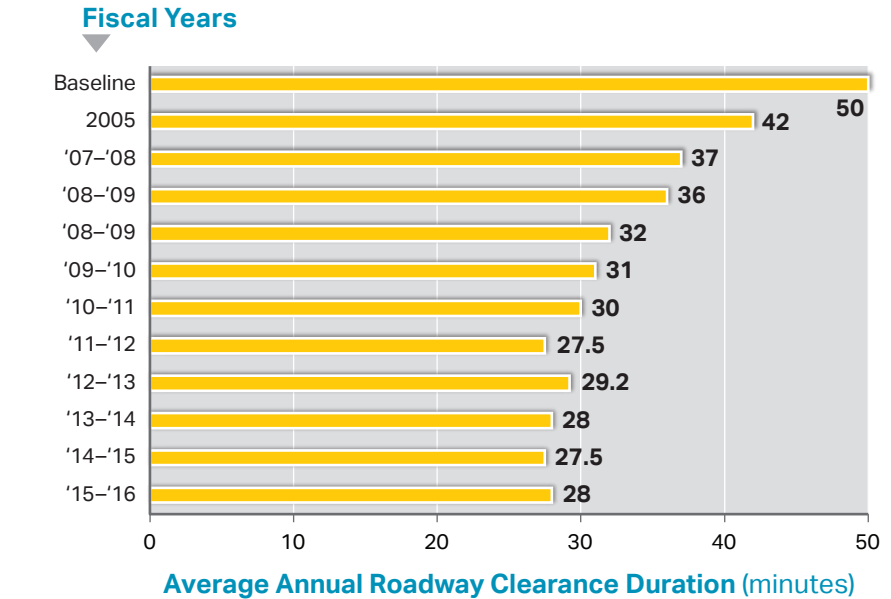
Incident Management

District Six's incident management service helps maintain roadways free and clear of road blocking incidents. The multi-agency Traffic Incident Management (TIM) Team plays a significant role in helping FDOT to reach its goal: to reduce traffic congestion, as well as decrease the chances of secondary events, caused by prolonged exposure to traffic incidents.

The chart to the right shows that with the help of all its partners in the TIM Team, District Six's average annual roadway clearance time was 28 minutes during FY 2015–2016.

TIM

Special event coordination was an ongoing component of incident management efforts during FY 2015–2016. Interagency coordination within the TIM Team made that possible. Thanks to the relationships built within the TIM Team, the TMC'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 as well as conducts post incident analyses of recent large scale events to apply lessons learned. FHP Troop E and TMC operations staff continue to share information and resources to help detect and manage incidents along District Six roadways more efficiently. The re-



lationships built in 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 TMC serves as the control center for dispatching and coordinating field operations and one of the largest parts of District Six's field operations are the Road Rangers. The Road Ranger program began in 1999 and has evolved into an incident management arm for the STMC. As the most visible component of District Six's incident management service, Road Rangers provide incident response

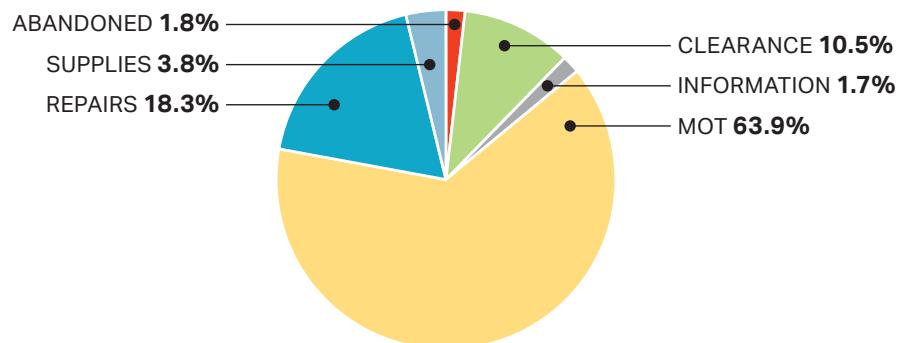
and motorist assistance along I-95, I-75, SR 826, I-195, I-395 and the MacArthur Causeway. The initial vehicles included tow trucks and pick-up trucks. In 2009, flatbed wreckers were added and in 2013 a heavy duty wrecker was implemented. The graph (below left) shows the impact of the heavy duty wrecker which is used to quickly clear vehicles such as transit buses, school buses and heavy vehicles.

As seen in the pie chart below, more than 90% of Road Ranger assists are for Maintenance of Traffic (MOT), repair or clearance (includes tows, car pushes, and motorist transports) services.

Incidents Responded to by Heavy-Duty Wrecker



Road Ranger Assists by Type FY 2015–2016



Incident Response Vehicles (IRV)

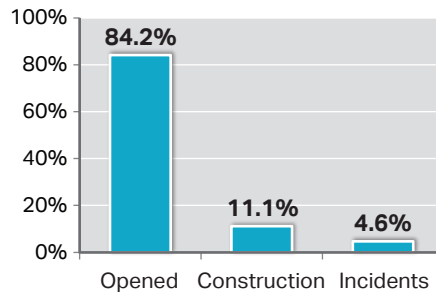
District Six’s IRV Program responded to 1,315 events during FY 2015–2016. IRV operators, along with the FHP, Road Rangers and other responders were instrumental in keeping the 95 Express lanes open and available for use 84.2% of the time during the fiscal year with the facility remaining closed due to incidents 4.6% of the time as illustrated in the chart to the right. The average travel lane blockage duration in the express lanes was 26 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.

A new staging area was constructed to allow quick access to 95 Express along northbound I-95. The staging area is located between northbound I-95 and I-195 westbound ramp to northbound I-95. This staging area is large enough to accommodate vehicles from IRV, Road Rangers, and FHP.

Safety and SIRV Coordination

District Six continued coordination between its IRV operations staff and the District Four TMC’s Severe Incident Response Vehicle (SIRV) Team. This coordination is needed due to the overlapping construction limits for the 95 Express Phase 2 project. The two teams meet and discuss IRV/SIRV procedures and lessons learned. Both teams met for cross training in the handling of incident management operations between the two Districts. Coordination will continue through the opening of 95 Express Phase 2 scheduled for next fiscal year.

Express Lanes Facility Availability FY 2015–2016



New IRV Staging Area



RISC event: Overturned tractor trailer

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 more complex incidents that occur along District Six roadways that would normally require additional time for clearance. RISC contractors need to respond with all required vehicles within 60 minutes and clear the travel lanes within 90 minutes to receive the incentive. TMC operations staff use the RISC module in Operations Task Manager to track RISC activation, resources arrival and clearance times. During FY 2015–2016, the average RISC response time was 47 minutes while the average RISC travel lane clearance time was 63 minutes. In total, TMC operations staff summoned RISC resources 15 times during FY 2015–2016. The RISC program has responded to 90 events since its inception in 2009.

The RISC arterial pilot program continued during FY 2015–2016 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. This program was launched in 2011 to address the problem of major incidents along these roadways that experience high commercial vehicle traffic volumes.

RISC Performance	Fiscal Years							Target
	2009–2010	2010–2011	2011–2012	2012–2013	2013–2014	2014–2015	2015–2016	
Average Activation Time	n/a	21 m	10 m	28 m	23 m	28 m	28 m	--
Average Response Time	50 m	37 m	39 m	46 m	45 m	43 m	47 m	60 m
Average Travel Lane Clearance Time	76 m	60 m	88 m	85 m	68 m	57 m	63 m	90 m
Average Total Incident Clearance Time	n/a	128 m	161 m	225 m	161 m	141 m	146 m	--
Total RISC Events	10	12	9	7	19	18	15	--

IT/ITS Maintenance

District Six's TSM&O Program is highly dependent on technology to be able to process the tremendous amount of data throughout the STMC's computer network. 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 established a presence at the Network Access Point (NAP) of the Americas in downtown Miami. This essentially serves as a backup system in case a system failure happens 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 2015–2016 as compared to the previous fiscal years.

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 amount 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 will physically mark the ground showing the location of the ITS underground infrastructure. During this fiscal year, 17,266 Sunshine tickets were received and 1,762 Sunshine tickets were located. The graph below shows the amount of locates since FY 2009–2010.

Some of the current accomplishments by the IT/ITS Maintenance staff include the following.

IP Address Configuration

During FY 2015–2016, 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 change will allow flexibility and growth as more devices are installed and implemented in the network.

Transition from Oracle to SQL Server

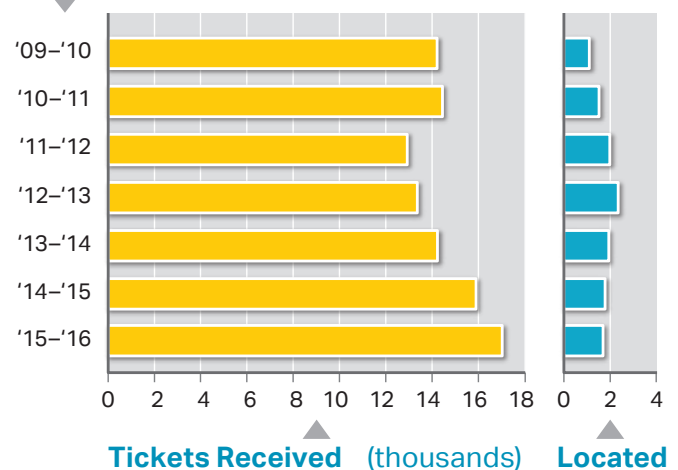
FDOT decided to migrate the database engine for the SunGuide software from Oracle to SQL Server. It was determined that SQL Server was more cost efficient and easier to use from a technical perspective. The IT/ITS staff completed the migration to the new database engine with the release of SunGuide 6.1. Minor changes were made to the OTM software to ensure functionality.

Installation of Workstations for Control Room Retrofit Project

The IT/ITS staff configured, installed, and cutover all 36 computers for the control room retrofit project. The configuration for these computers was very important as they are handling a significant amount of CCTV camera video which requires significant processing power. The IT/ITS staff ensured that the required hardware was configured and ready to go for this important project.

Sub-system	Average System Availability per Fiscal Year			
	'12-'13	'13-'14	'14-'15	'15-'16
CCTV	95.47%	97.56%	94.73%	92.73%
DMS	93.85%	96.66%	96.15%	98.25%
Detectors	94.90%	96.13%	95.05%	87.44%
Video Wall	97.49%	97.43%	98.86%	99.90%
SunGuide	97.97%	99.86%	98.97%	97.98%
OTM	99.85%	99.97%	99.68%	99.98%

Locate Ticket Summary
Fiscal Years



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 app for use on a Smartphone. This partnership started in 2014 and allows data sharing between the two partners. Waze roadway alerts pop-up on a TMC operator's SunGuide map helping to find and confirm traffic events.



Arterial DMS along NW 36 ST

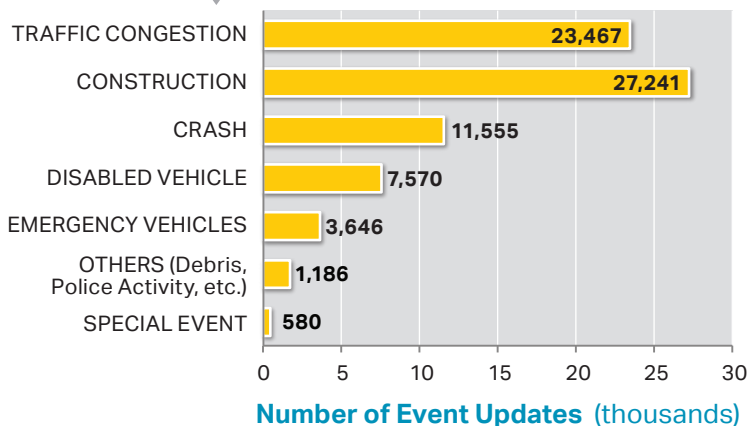
Florida's Advanced Traveler Information System (FLATIS)

During FY 2015–2016, 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 TMC operators published over 75,000 event updates from lane blockage and congestion events on roadways managed by the District Six TMC; a 24% increase over last fiscal year. The graph below shows the different types of published events.

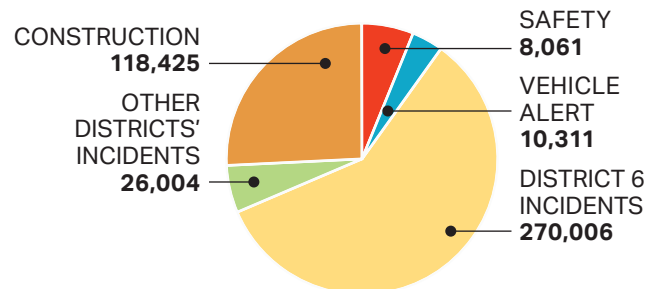
DMS Messaging

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 2015–2016, more than 460,000 messages were deployed on District Six DMSs, with the majority of messages being for incidents and construction. This is an 8% increase compared to the previous fiscal year.

FLATIS Published Traffic Information by Event Type
(75,672 Published Event Updates) FY 2015–2016



Posted DMS Messages by Type
(460,069 Messages) FY 2015–2016



Public Outreach

Public Information (PI) staff remained committed to raising public awareness and completed various initiatives to support this mission throughout the fiscal year. Staff partnered with the media to promote the program's public services and their benefits. The TMC hosted tours, published numerous articles and participated in industry conferences to enhance its profile within the local community and at the national level. The PI staff has been a tremendous help providing information to motorists, the media, and other political and municipal agencies.

The TSM&O staff was honored to welcome the State Secretary of Transportation as he visited the STMC as part of his Work Day event outreach. The Secretary was given a hands-on experience about what it takes to be an Express Lanes Operator. He was given a spot at an operator workstation and was guided through the procedures as he monitored traffic in the express lanes, managed a minor crash and posted information on the DMS.

FDOT District Six supported the 15th International Conference on Managed Lanes sponsored by the Transportation Research Board. Professionals and advocates from around world attended this event focusing on managed lanes, congestion pricing, and bus transit systems. TSM&O staff supported this event by presenting at the event, hosting a bus tour of managed lanes projects in the region, and hosting a tour of the STMC with presentations on the various services provided.

Tours

The District Six TSM&O program conducts tours of the STMC. 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. Staff facilitated tours during FY 2015–2016 for:

- Cubic Transportation Systems
- Boston Consulting Group
- ITS Florida
- GEWI Traffic Technology
- Miami-Dade City and County Managers Association
- Bring Your Daughters and Sons to Work Day
- Gold Coast Institute of Transportation Engineers
- RS&H Toll Services
- Washington State
- New Zealand Transportation Authority
- Sistemas Inteligentes en Red (ITS Colombia)
- Pennsylvania Turnpike
- Central Texas Regional Mobility Authority
- Empresa Nacional de Autopista (Panama)
- Meridiam / Cintra
- Michigan DOT
- FDOT District 2
- Florida International University Summer Camp

Interviews

District Six TSM&O PIO staff conducted interviews with media and other programs to help increase awareness of the TSM&O program. Some of the interviews conducted during FY 2015–2016 included:

- Telemundo
- Univision
- WSVN Channel 7
- WPLG Channel 10
- WIOD 610 AM
- WLRN 91.3 FM

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 560 comments from a variety of topics that included tolling, transit and data requests for academic and professional institutions from around the world.



State Secretary of Transportation Work Day



Presentation to TRB Managed Lanes Conference



FIU Summer Camp

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 28 minutes. This represents a 44% reduction from the 2005 FDOT District Six established baseline average duration of 50 minutes.

The FDOT District Six TSM&O Program's budget for FY 2015–2016 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 due to 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 \$3.1 billion. The time savings due to clearing incidents quicker had more of an impact during FY 2015–2016. The number of events that blocked travel lanes increased from last fiscal year by 3,900 events – a 20% increase. An increase in events coupled with lower clearance time resulted in significant time savings compared to the 2005 benchmark clearance time of 50 minutes.



Prudential Productivity Award Recipients

Additionally, 95 Express and the Ramp Signaling System also contributed to the reduction of delay during peak hours translating into savings of \$31.4 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 2015–2016 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 \$57.96 in economic benefit for every dollar spent (Benefit Cost Ratio of 57.96:1).

A comparison of the Benefit Cost Ratio for FY 2015–2016 versus the previous nine years is presented in the graph below. The continuous increase in benefit is indicative of the continual improvement in the program as well as the increased value of travel time and less capital expenditures since the critical ITS infrastructure is mostly in place.

Fiscal Year 2015–2016 Costs

ITS Operations	\$6,387,723
ITS Maintenance*	\$3,489,748
Road Rangers	\$5,289,419
RISC	\$42,500
FDOT Cost Center Operating Budget**	\$4,330,214
Other (Consultants, FTE, FHP, FIU)	\$5,135,438
Total Annual Operating Costs	\$24,675,042
Total Annualized Capital Costs	\$30,597,806
Total Annual Costs	\$55,272,848

Fiscal Year 2015–2016 Benefits

Incident Management	\$3,172,002,409
Express Lanes / Ramp Signals	\$31,395,791
Total Benefits	\$3,203,398,200

* Includes Express Lanes ITS Maintenance and Marker Repair

** Includes Utilities for Express Lanes

Benefit Cost Ratio



A Look Ahead

Next year the FDOT District Six TSM&O program will be busy with opening Phase 2 of 95 Express and continue working on the overall regional express lanes network. The TSM&O program will also be prepared for the operations of traffic adaptive signal systems along arterial roadways in Miami-Dade County. This will require upgrades to the

ITS infrastructure in the field, improvements to software systems, synergy with new partnering agencies, and a refocus on staffing. Despite the advances in technology it is still the people, the dedicated staff that constantly work to monitor and enhance the TSM&O program making the STMC a success.

STMC Support Services. The current STMC support services contract will end in June 2016. The continuation of this support will begin in July 2016. The new support services contract continues all existing services including incident management, freeway and 95 Express operations, information technology, public information, and engineering services. However, the new contract adds additional services for traffic signal arterial operations, 826 Express and I-75 Express operations, and enhanced incident management by adding IRV along 826 Express and I-75 Express.

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 features replacement of older technology amber DMS with full matrix color LED DMS. This will allow messages to be displayed in different colors and including graphics such as roadway signs. Included with these projects will be a pilot project installing automatic warning gates at select entrances to 95 Express.

STMC Maintenance Support Services. The current field maintenance contract will end in July 2017. A new contract will be advertised in early 2017 with commencement at the start of FY 2017/2018. This contract includes maintenance of all field deployments such as dynamic message signs, CCTV cameras, detectors, and fiber optic communication network.

TSM&O Initiatives. FDOT District 6 will continue to be active with TSM&O initiatives in the coming years. The District Six TSM&O Core Group will begin meeting to update the District's TSM&O Strategic Plan.



The Core Group is a multi-discipline team that coordinates new projects in the spirit of the TSM&O concept which provides a higher level of operational integration among the freeway, arterial and transit systems. District Six has started construction of an adaptive signal control technology (ASCT) pilot project. The goal is to improve traffic conditions along SW 8 Street between SW 142 Avenue to SW 67 Avenue utilizing traffic adaptive technology at 29 signalized intersections. Traffic adaptive technology optimizes individual signalized intersections based on real time data while improving the traffic flow through a corridor of intersections. This project is anticipated to be operational during the first quarter of 2017. Planning is beginning for a similar system along NW 119 Street (SR 924) east of the Gratigny Parkway. This project will be constructed in phases. Phase 1 will be the implementation of an 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 that can transmit signal phasing and time (SPaT) information to roadside equipment and vehicle onboard systems. These projects along SW 8 Street and NW 119 Street will require close coordination between FDOT and Miami-Dade County.

Express Lanes Projects. The opening of 95 Express Phase 2 is expected in October 2016. District Six will continue to support the project by preparing all necessary documents to ensure 95 Express continues to be a success. These documents will update software requirements, policies, procedures, training, and incident management resources to handle the project's 14-mile expansion into Broward County. Phase 3 construction started this 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. To fully realize and maximize the benefits provided by express lanes, each individual express lanes facility will be developed as part of an overall network of express lanes facilities. Construction has started along SR-826 and I-75 as well as portions of the Florida's Turnpike. The express lanes along SR-826 and I-75 are expected to open early 2018.





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