Riding OUT THE Storm

ANNUAL REPORT

FISCAL YEAR 2017–2018

FDOT TSM&O
Transportation Systems Management & Operations

SUNGUIDE®
Florida's Intelligent Transportation System

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT SIX

Transportation Systems Management and Operations

FRONT COVER PHOTO: Motorists head north of Key Largo, Fla., on US 1, in anticipation of Hurricane Irma, Wednesday, Sept. 6, 2017. (AP Photo/Alan Diaz/used with permission)

A message from the District Secretary

Fiscal Year 2017-2018 proved to be a challenge not only for the District Six Transportation Systems Management and Operations (TSM&O) office but also for the entire District Six geographic region covering Miami-Dade and Monroe Counties. In early September 2017, Hurricane Irma directly impacted the Florida Keys as a Category 3 hurricane and affected the Miami area. Our Florida Department of Transportation (FDOT) District Six Emergency Operations Center (EOC) was activated early and coordinated our preparation efforts. The TSM&O staff at the SunGuide® Transportation Management Center (STMC) worked with and relayed information to the District Six EOC.

In the days before the storm, a mandatory evacuation of the Florida Keys was ordered. Road Rangers were sent to the Florida Keys to assist with relocating disabled vehicles that would delay evacuation efforts. The STMC kept the public informed through the dynamic message signs along our roadways.

Early projections were showing a Category 4 storm hitting the Miami area. The FDOT decided to evacuate the staff at the STMC, as the strength of the storm was expected to exceed the allowable limit of the physical building. A plan was put in place to continue operations from a remote location at the Florida's Turnpike Enterprise operations center in Turkey Lake. The remote operation was a success, and I am proud that the TSM&O office was able to assist our district throughout this significant storm event.

I am pleased that the STMC was able to assist our partnering agencies with traffic information and disseminating public service messages during and after the storm. Our local partner agencies, such as the Miami-Dade Expressway Authority, Miami-Dade County Traffic Signal and Signs Division, Miami-Dade Transit, and the City of Miami Beach, remain an important part of our transportation community.

The TSM&O office expanded its staff as projects and services increased in arterial and freeway operations. Although impacted by the hurricane, the adaptive signal control technology pilot project along SW 8 Street resumed operation after repairs were completed. Staff is currently preparing to assume operation and maintenance responsibilities for traffic signal devices in the Florida Keys along US 1/Overseas Highway, including 17 signalized intersections.

The TSM&O Strategic Plan was adopted in August 2017. This was a significant achievement that solidified the program's goals and objectives. Input to the Strategic Plan was provided by senior leadership in Central and District Offices, District Traffic Operation Engineers and local partners. District Six remains committed to the TSM&O concept and looks forward to implementing the Strategic Plan into the District Six philosophy.

The TSM&O office assisted with the opening of the initial portion of 75 Express, bringing express lanes from NW 170 Street in Miami-Dade County to I-595 in Broward County. Road Ranger and Incident Response Vehicle support for the portion in Miami-Dade County is being provided by District Six. We are excited for the future connection of Palmetto Express and the southern portion of 75 Express in 2019.

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, District Two, and the Florida's Turnpike as they continue with express lane operations along I-75, the Veterans Expressway, the Homestead Extension of the Florida's Turnpike, and I-295.

I am proud of our accomplishments and the hurdles our District Six team has overcome. I thank our TSM&O leadership team, consultants, and contractors for the sustained progress of our program. These dedicated people work constantly to make the program a continued success. I look forward to the future and integrating our TSM&O office into our multimodal transportation system, making it the best in the nation.

James Wolfe, P.E.
District Six Secretary of the
Florida Department of Transportation

Introduction

The theme for this year's annual report is "Riding Out the Storm" due to the significant impact Hurricane Irma had on our operations and community. The Transportation Systems Management & Operations (TSM&O) office takes storm and disaster preparedness seriously. A Hurricane Response Action Plan (HRAP) has been in place since 2007 and is updated annually. The HRAP was first envisioned after Florida was subjected to multiple hurricane strikes in 2004 and 2005, including infamous storms such as Charley, Frances, Wilma, and Katrina. The HRAP provides staff with the procedures for before, during, and after a storm. The lessons learned coupled with the changes in SunGuide Transportation Management Center (STMC) operations are used to update and improve the HRAP each year.

In the days leading up to Hurricane Irma's landfall, the storm was projected to go through Miami as a Category 4 storm. The STMC made the decision to evacuate and establish remote operations with a skeleton crew in Orlando, Florida.

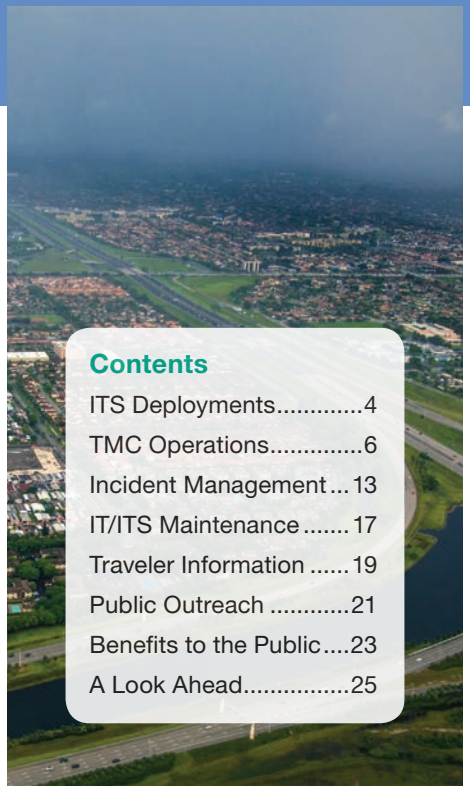
Hurricane Irma tested the STMC staff and TSM&O team in multiple ways:

- As mentioned, for the first time, the STMC was evacuated and staff was sent to a remote facility at the Florida's Turnpike Enterprise outside of Orlando to continue remote operations.
- The information technology (IT) team needed to provide a smooth transition of network connectivity from the STMC to the remote operation site.
- A mandatory evacuation was ordered for the Florida Keys, so our Road Rangers were dispatched to help clear US-1 of disabled vehicles that could impede traffic flow.
- The Intelligent Transportation System (ITS) Maintenance team was faced with a massive outage of devices in Miami-Dade and Monroe Counties.
- Operations staff helped convey information using the dynamic message signs (DMS) and Florida 511 for returning residents.
- The Road Rangers returned after the storm to help with disabled vehicles along US-1 in the Florida Keys due to many flat tires.

Florida Department of Transportation

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

TSM&O Vision:
TSM&O will increase the delivery rate of fatality-free and congestion-free transportation systems supporting the FDOT vision and Florida Transportation Plan goals.



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Even though the STMC is still recovering from the aftermath of Hurricane Irma, this fiscal year was not dominated by the storm. In addition to the traditional services provided by the STMC over the past 13 years, the TSM&O office successfully continued operations of the adaptive signal control technology (ASCT) system along SW 8 Street in Miami and prepared to expand traffic signal operations along US-1/Overseas Highway in the Florida Keys at the beginning of next fiscal year. The TSM&O concept embraces all of the resources available throughout the entire project lifecycle process including planning, design, construction, operations, and maintenance.

DOWNED TRAFFIC SIGNAL ALONG SW 102 AVE.

The Florida Department of Transportation (FDOT) adopted the TSM&O Strategic Plan during the past fiscal year. This is significant because it marks a solidified approach to the pathway TSM&O and FDOT takes now and in the future. The TSM&O office 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.

This FDOT District Six TSM&O Annual Report covers the fiscal year from July 1, 2017 to June 30, 2018 (FY 2017-2018). This TSM&O Annual Report aligns with the program's five primary functional areas.

ITS Deployments. ITS field devices provide the necessary data for STMC operations. The TSM&O office provides planning, design, and procurement of ITS equipment, including closed circuit television (CCTV) cameras, DMS, vehicle detectors, arterial systems, and communications.

TMC Operations. Operations provides the central location and clearinghouse 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. This functional area dispatches Road Rangers and other incident management resources to safely and quickly clear lane-blocking events and also assists motorists. An important part of the program is coordination with first responders to identify, develop, and implement solutions to improve incident management.

IT/ITS Maintenance. This functional area handles the critical tasks of maintaining the indoor STMC IT system and outdoor ITS devices, as well as providing software support, to ensure system availability and stability.

Traveler Information. This functional area provides real-time traveler information services through various sources, such as the telephone, internet, smartphone applications, and social media.

This marks the thirteenth 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.

ITS Deployments

The TSM&O office was able to ride out the storm during the past fiscal year from hurricanes to new infrastructure projects. The ITS devices that are installed along the district's roadways provide information to the STMC and in turn allows the STMC to send information to motorists. This proved immensely helpful in the lead-up and aftermath of Hurricane Irma, as the STMC was able to provide information for returning evacuees in Miami-Dade County, City of Miami Beach, and the Florida Keys. CCTV cameras and vehicle detectors are the eyes and ears of operations. The DMS, ramp signals, and other traveler information strategies are the messengers 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 expanding 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 Palmetto Express/75 Express and I-95 Pavement Rehabilitation. The following paragraphs summarize FDOT District Six TSM&O projects being built or completed during FY 2017–2018.

I-75 AND SR-826 INTERCHANGE

Palmetto Express and 75 Express 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 are being installed to support these express lanes. Express lanes will be added along both directions of State Road (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 75 Express project will tie into the new 75 Express system in Broward County, which opened to traffic in March 2018. The northern end of the Palmetto Express project will tie into a future express lanes expansion project along the east-west portion of SR 826 scheduled beyond 2020. When completed, this will bring express lanes from Coral Way to I-595. These projects are scheduled for completion in 2019.

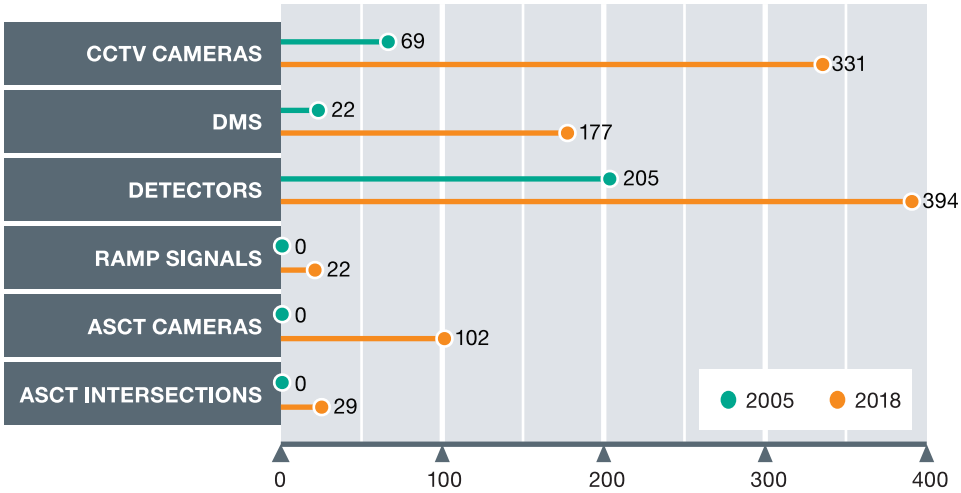
Palmetto Expressway (SR 826)/Dolphin Expressway (SR 836) Interchange Reconstruction Section 5. This major multilevel interchange reconstruction project was completed in November 2017. The project installed additional ITS devices such as new CCTV cameras, freeway DMSs, arterial DMSs, microwave vehicle detectors, and fiber optic cables along the SR 826 and SR 836 corridors. These new devices provide District Six and the Miami-Dade Expressway Authority (MDX) full coverage of the SR 826/SR 836 Interchange. The project also completed the final fiber optic cable link for SR 826 from West Kendall Drive to US-1. Construction began in 2009; the road and bridge improvements were completed in late 2016, and the ITS deployment was completed in November 2017.

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. However, one of the first tasks was the construction of new emergency stopping sites (ESS) in the median of I-95 to allow enforcement and motorist refuge areas along the express lanes. Three northbound and two southbound ESS between NW 62 Street and NW 131 Street were open for use in May 2018. The entrance to the northbound 95 Express was modified to allow pavement construction to progress while accommodating necessary lane closures. The pavement work is scheduled for completion in mid-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 warning gate system (WGS) as a pilot project to expedite the closure of several entrances to 95 Express. These gates will 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. The WGS is expected to be in use by September 2018.

The graph above illustrates the increase in deployed ITS devices from 2005 to 2018.

Deployed ITS Devices



I-95 EXPRESS LANE ENTRANCE WARNING GATE

TMC Operations

FROM TOP:

HURRICANE IRMA PREDICTED STORM TRACK AS OF SEPTEMBER 8, 2017

REMOTE OPERATIONS TEAM

ASCT SYSTEM IN PLACE ALONG SW 8 STREET

TMC Operations rode the storm out in more ways than one this year. Hurricane Irma tested staff in ways that had not been tested before. Hurricane Irma was approaching the District Six area as a Category 4 storm. Based on the information at the time, the decision was made for a planned evacuation of the building and to place a skeleton crew at a remote location. Due to its connection and redundant system equipment at the Network Access Point (NAP) of the Americans in downtown Miami, the STMC can operate from essentially anywhere in the world.

A skeleton crew of four operators and an IT technician were sent to the Florida's Turnpike Enterprise TMC at the Turkey Lake service plaza outside of Orlando. One day prior to their arrival, an IT technician was sent to the remote location to establish network connectivity and get the work room equipment ready. Once the remote staff was in place and ready to begin operations, a smooth hand-off was performed from the STMC to the remote operation. The remote staff covered 12-hour (alpha-bravo) shifts monitoring for as long as the communications network held up. They monitored local television sites and Waze alerts, then relayed information to the District Six EOC. During these significant storm events, the STMC maintains hourly communication checks with the District Six EOC.

Communication was maintained with partnering agencies and information provided as much as possible. Once operations returned to the STMC, staff posted public safety messages on DMS and Florida 511 such as road closures and boil water notices in addition to traffic information. Operations staff worked closely with the Monroe County Sheriff's Office to facilitate reentry efforts into the Florida Keys.

The STMC operates 24 hours a day, seven days a week, even when facing a storm event like Irma. The STMC serves as the command and control center for traffic management (including express lanes, ramp signaling, and arterial operations) as well as its core functions of incident, work zone, emergency, and special event management. 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 MDX TMC Operations staff and the Florida Highway Patrol (FHP) Troop E dispatch within the STMC.

SIGNALIZED INTERSECTION AT US-1

Arterial Operations

The STMC continued operations of the ASCT system along SW 8 Street. This system includes 29 signalized intersections from SW 142 Avenue to SW 67 Avenue including interchanges with the Florida's Turnpike and the Palmetto Expressway. The ASCT system optimizes individual signalized intersections based on real-time data while improving the traffic flow throughout the corridor.

The STMC arterial operations began operating the ASCT system in April 2017 as a 2-year pilot project; however, Hurricane Irma caused an interruption in service until May 2018. It was decided to restart the 2-year pilot project to give a full evaluation period. Arterial Operations staff is collaborating with Florida International University (FIU) for before and after evaluation. STMC arterial operators monitor the ASCT system, address motorist comments, track equipment availability, coordinate signal timing with Miami-Dade County, and dispatch maintenance staff for ASCT component repair.

Arterial Operations staff have been preparing for the operation and maintenance of 17 signalized intersections, with eight emergency signals, two drawbridge signals, and 26 flashing beacons in Monroe County along US-1/ Overseas Highway from Stock Island to Key Largo. Staff developed procedures, coordinated with local stakeholders, conducted training, and installed a new advanced traffic management system. Arterial Operations staff will be working closely with the ITS Maintenance staff. Other than the ramp signals along I-95, ITS Maintenance has not maintained full signalized intersections. It will be a challenge responding to maintenance requests in Monroe County, but the team is developing response plans and working closely with the Monroe County Sheriff's Office. Operations and Maintenance teams will be ready to start this new service on July 1, 2018.

Express Lanes Operations

95 Express. The STMC continued operations of 95 Express from SR 112 to I-595: a total of 21 miles. The project has completed its ninth full fiscal year in operation and has seen a continued increase in usage since inception. 95 Express is considered one of the most successful and highly used express lane facilities in the United States and has served as the springboard for other express lane projects in the region and the state.

The following graph highlights the reliability of 95 Express. Reliability is a key performance measure for the Express Lanes and is defined as the percentage of time that speeds remain above 45 miles per hour. The 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, freeway geometry issues north of the I-195 Interchange, and ongoing construction work zones from the I-95 Pavement Rehabilitation project. Likewise, the southbound morning peak period in Segment 2 (Ives Dairy Road to the Golden Glades) has concentrated traffic volumes for work commuters going to Miami.

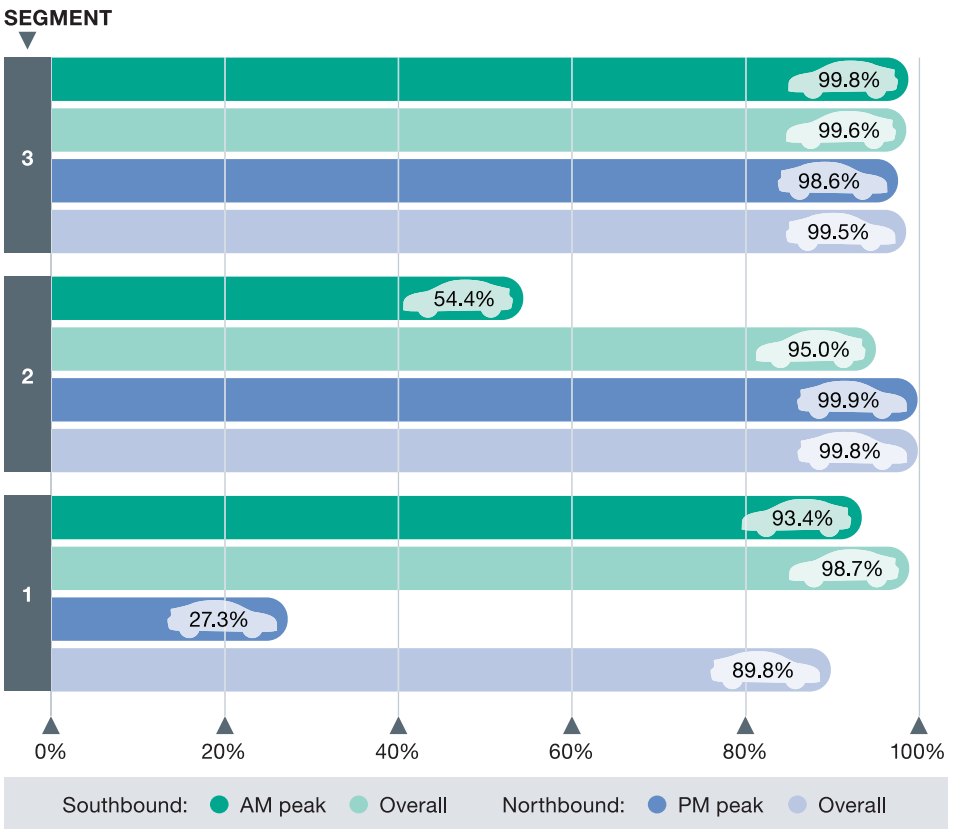
District Six continued its “hard closure” procedure as a result of the decrease in reliability in the northbound direction during the afternoon peak. Any traffic event within the express lanes expected to last longer than 30 minutes results in physically shutting down the entrances to the express lanes. 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.

The safety measures that District Six started in 2016 continued this fiscal year. The first phase was the replacement of all express lane markers from SR 112 to the I-95 flyover. The second phase was completed in May 2018 with the opening of five emergency stopping sites (ESS) along the median of 95 Express between NW 62 Street and NW 131 Street. Three northbound and two southbound ESSs provide a safe temporary refuge for disabled motorists and first responders.

Next fiscal year, the STMC will be operating a WGS to close some of the entrances to 95 Express during incidents. The entrances are: eastbound SR 112, eastbound on ramp from NW 10 Avenue, and the southbound entrance from the Golden Glades Park-and-Ride.

NEW ESS ALONG 95 EXPRESS

Express Lane Reliability



Palmetto Express and 75 Express. District Six continued preparing for the operation of the next express lanes piece in the regional network for South Florida: Palmetto Express and 75 Express. The project limits are SR 826 from Coral Way to NW 154 Street continuing along I-75 from SR 826 to I-595 in Broward County. The overall project length in Miami-Dade County is approximately 15 miles.

STMC staff is preparing for operating 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 Palmetto Express and 75 Express will also include system components such as DMS, vehicle detection, CCTV cameras, ramp signals (SR 826 only), electronic toll collection, and incident management. Operation of the Palmetto Express and 75 Express will be a joint effort among the TMCs in District Six, District Four, and the Florida's Turnpike. Coordination for incident management is ongoing in the three districts. FHP and local police/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

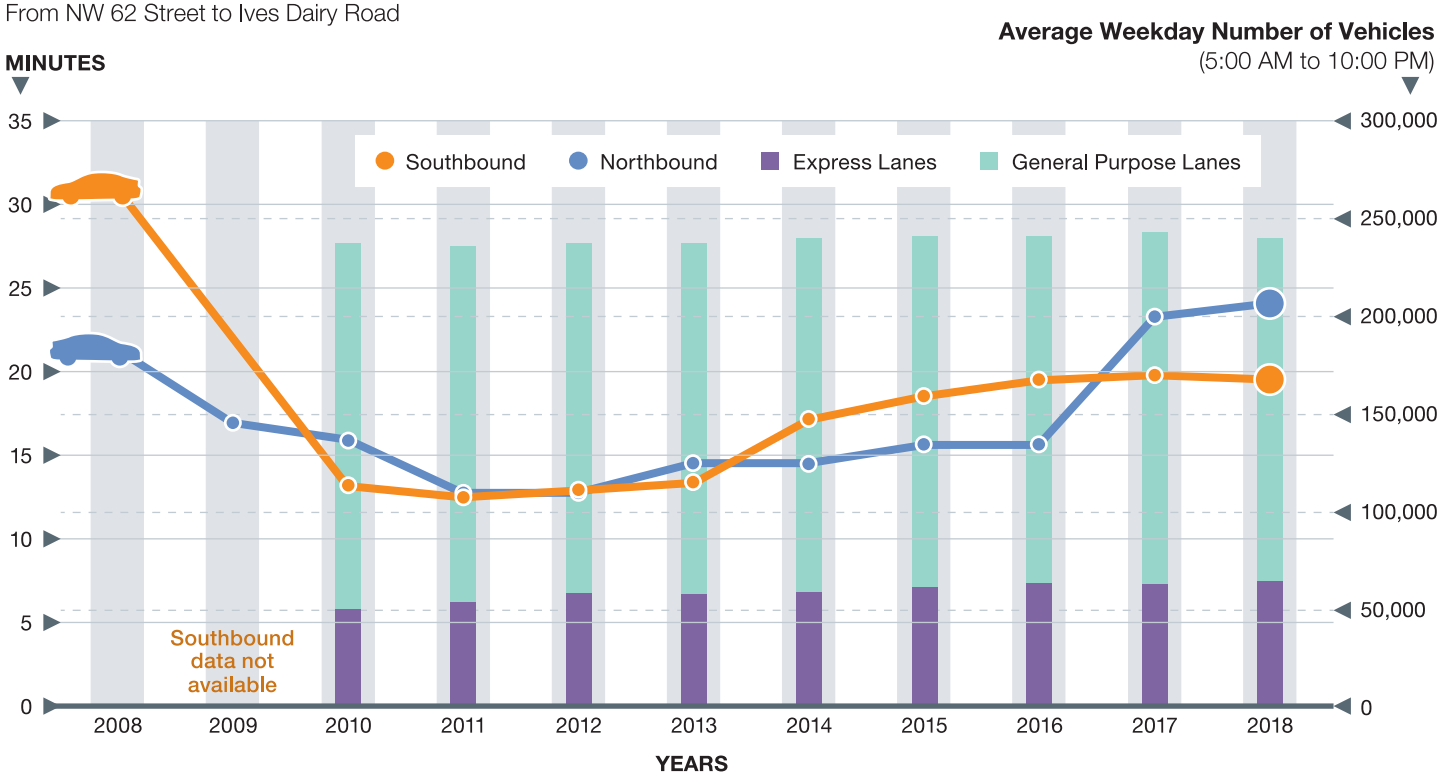
Ramp signals along I-95 entered its eighth full year of operation and continued to be an important tool for managing traffic along this busy corridor. There are 22 ramp signals along both directions of I-95 from NW 62 Street to Ives Dairy Road. The system improves operations along I-95 by regulating 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 to be proactive in managing congestion.

The graph on the following page 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 mainly due to increased traffic volumes and continued road construction along the I-95 corridor. Operations will be expanded to include the ramp signals being installed along the Palmetto Expressway.

RAMP SIGNAL ALONG I-95

Average Travel Times on I-95

From NW 62 Street to Ives Dairy Road



Construction and Special Event Coordination

An increasing challenge for STMC 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 2017-2018, coordination between the STMC 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. 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: SR 826/836 Section 5, I-95 Pavement Rehabilitation, Palmetto Express and 75 Express, All Aboard Florida rail crossings, and Miami Gardens Drive I-95 ramp improvements.

Special Event Coordination. Several special events occur in South Florida that cause abnormal 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. This year included Major League Baseball's All-Star Game and Home Run Derby. Other events, such as 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 as well as world class soccer matches at the stadium in North Miami, downtown Miami entertainment events (e.g., weekend-long music festivals), and running marathons in Miami and Monroe Counties are just a few examples of events handled by STMC Operations staff.

Software Enhancements

During FY 2017-2018, STMC operations software development continued to focus on enhancing and supporting the SELS. SELS was developed by District Six originally for the dynamic toll system for Segment 1 of 95 Express. Since then, 95 Express has expanded and other express lanes projects in the state have gone into operation or are nearing completion. SELS will be used statewide for managing and operating express lane systems.

District Six's Operations Task Manager (OTM) software serves as an extension of the statewide SunGuide software and is where SELS resides. OTM includes 12 modules that handle functions such as express lanes, ramp signaling, ITS device maintenance tracking, rapid incident scene clearance, operator quality control, and reporting. During FY 2017-2018, SELS in OTM was improved to accommodate the 75 Express project in District Four and the Veterans Expressway for the Florida's Turnpike. Veterans Expressway presented a unique challenge, as the dynamic express lane tolls would be in addition to the existing static toll. SELS also needed to be enhanced to incorporate new toll rules from the Florida Statutes.

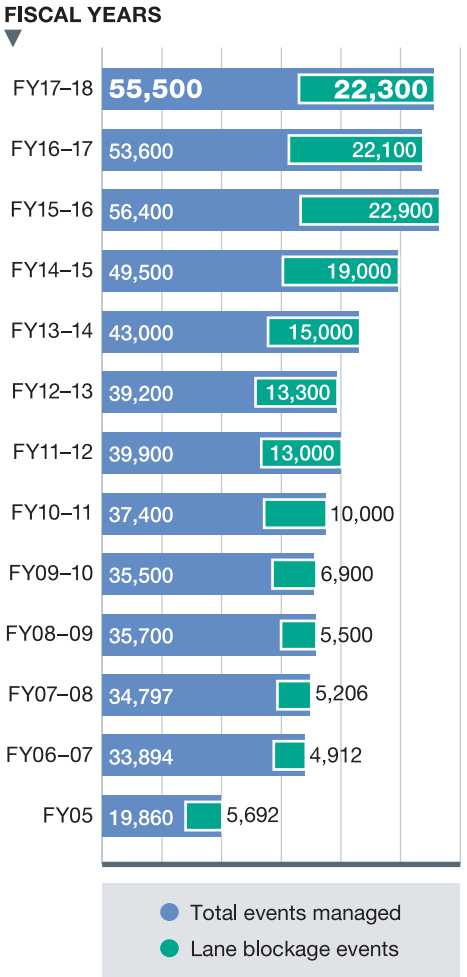
The plan moving forward is for the eventual transition of OTM to the Florida's Turnpike for continued support. District Six has committed to supporting OTM for the near future and will assist with the eventual transition of support to the Florida's Turnpike. Changes to the software are done through the SELS change management team (CMT). The SELS CMT is composed of representatives from all districts and the 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 2017-2018, STMC Operations staff 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 on the following page shows the performance measures average results and targets. These goals continue to be exceeded as operators managed 55,500 total events and 22,300 lane blocking events during FY 2017-2018. The following graph shows the number of events compared to previous years.

Number of Events Managed



Performance Measures

	FISCAL YEAR AVERAGES										
	08–09	09–10	10–11	11–12	12–13	13–14	14–15	15–16	16–17	17–18	Target
DMS Efficiency Percentage (GPL)	100%	99.72%	99.82%	99.77%	99.87%	99.78%	99.74%	99.77%	99.86%	**99.90%**	≥95%
DMS Efficiency Percentage (EL)									100%	**100%**	≥100%
Operator Error/Event (GPL) (LB)	0.10	0.15	0.11	0.10	0.12	0.13	0.15	0.15	0.14	**0.17**	≤0.20
Operator Error/Event (EL) (LB)									0.06	**0.06**	≤0.10
Operator Error/Event (GPL) (NLB)	0.10	0.15	0.11	0.10	0.12	0.13	0.15	0.15	0.08	**0.10**	≤0.20
Operator Error/Event (EL) (NLB)									0.06	**0.08**	≤0.10
Minutes to Dispatch Road Rangers (GPL)	0.78	1.08	0.93	0.73	0.73	0.73	0.75	0.77	0.63	**0.48**	≤2.00
Minutes to Dispatch Road Rangers (EL)									0.35	**0.30**	≤1.00
Minutes to Confirm an Event (GPL)	0.43	0.38	1.52	1.70	1.67	1.80	1.18	0.95	0.43	**1.27**	≤2.00
Minutes to Confirm an Event (EL)									0.08	**0.15**	≤1.00
Minutes to Post DMS (GPL)	3.43	3.28	2.78	2.45	2.27	2.47	2.27	2.12	1.78	**1.65**	≤3.00
Minutes to Post DMS (EL)									1.00	**0.92**	≤1.50
Minutes to Notify Other Agencies (GPL)	1.52	1.32	1.25	1.18	1.50	1.70	2.30	2.47	2.18	**1.77**	≤7.00
Minutes to Notify Other Agencies (EL)									1.50	**1.20**	≤4.00

Note:
GPL = general purpose lanes
EL = express lanes
LB = lane blockage
NLB = non-lane blockage

Incident Management

District Six's incident management team played a significant role in helping our community ride out the storm. According to the HRAP, Road Rangers and Incident Response Vehicles (IRV) stay on the roadways until winds reach a sustained 35 MPH. Yet there were many services that needed to be handled before the storm's arrival. For the first time, Road Rangers were deployed to the Florida Keys to assist with evacuation efforts. Clearing disabled vehicles became critical to making sure traffic continued to flow. Vehicles (and in some cases boats) were relocated off the main US-1 roadway. Road Rangers were also on standby to help with traffic control efforts at the northern end in Florida City south of the interchange with the Florida's Turnpike.

The multi-agency Traffic Incident Management (TIM) Team plays a significant role in helping FDOT reach its goal: to reduce traffic congestion, as well as decrease the chances of secondary events caused by prolonged exposure to traffic incidents.

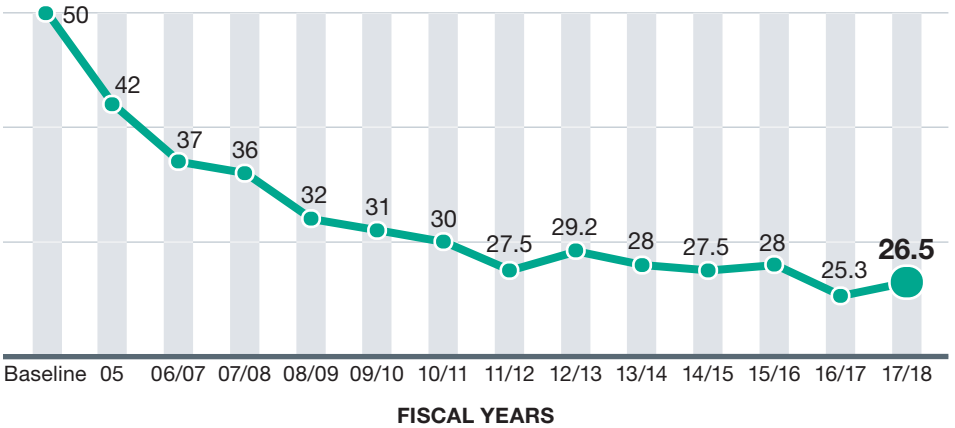
District Six's average annual roadway clearance time was 26.5 minutes during FY 2017-2018. The incident management team's dedication to clearing lanes continued to contribute to low roadway clearance times. The partners in the regional TIM Team played an important role as well. The following graph illustrates roadway clearance times for each fiscal year since 2005.

TIM. Special event coordination was an ongoing component of incident management efforts during FY 2017-2018. Interagency coordination within the TIM Team made that possible. The STMC's representatives continued coordination and outreach efforts 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 staff continue to share information and resources to help detect and manage incidents along District Six roadways more efficiently. The relationships 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.

Average Annual Roadway Clearance Duration in Minutes

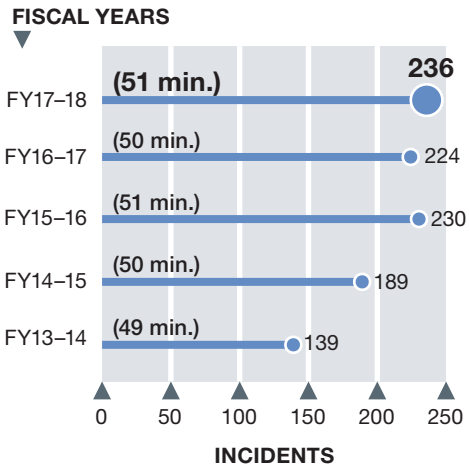


Road Rangers. One of the main services provided from the STMC is the Road Rangers. Road Rangers are the face of FDOT that many motorists see. This fiscal year, the Road Rangers helped District Six ride out the storm. Road Rangers provide incident response and motorist assistance along I-95, I-75, SR 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 pick-up trucks. In 2009, flatbed wreckers were added, and in 2013 a heavy-duty wrecker was implemented.

The graph at right shows the impact on clearance times of the heavy-duty wrecker, which is used to quickly clear vehicles such as transit buses, school buses, and heavy vehicles.

Incidents Responded to by Heavy-Duty Wrecker

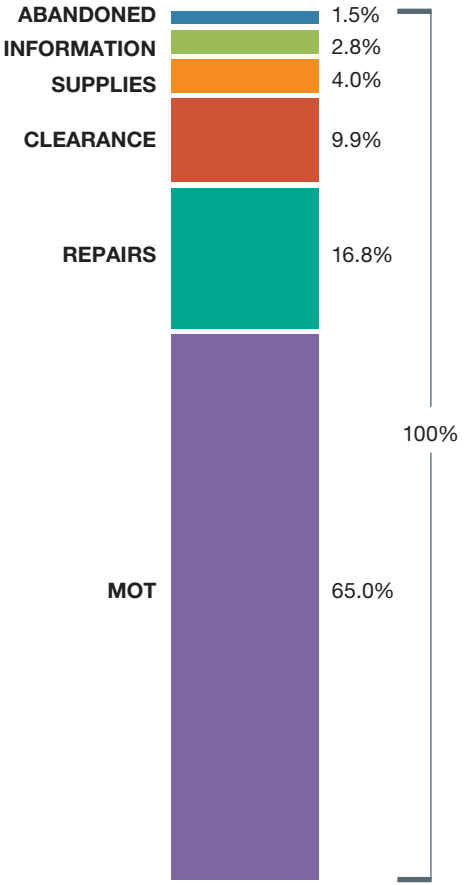
(with clearance times in minutes)

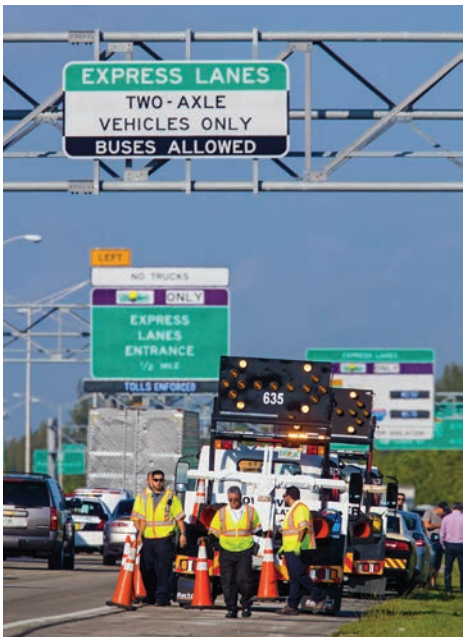


ROAD RANGER ALONG 95 EXPRESS

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

Road Ranger Assists by Type



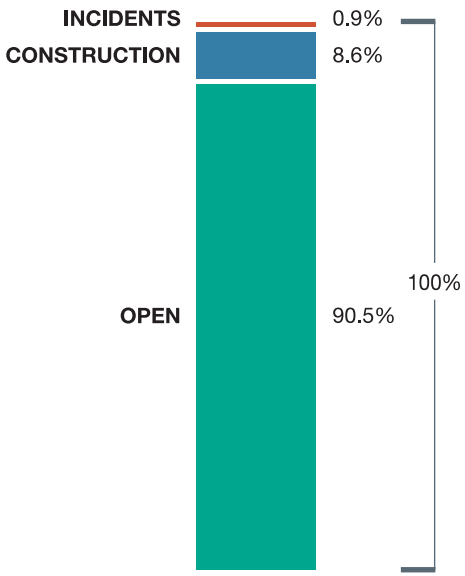


IRV OPERATORS AND OTHER RESPONDERS KEEP 95 EXPRESS LANES OPEN 90.5% OF THE TIME

Incident Response Vehicles (IRV). District Six's IRV program expanded its operation this FY, adding two IRV trucks to support the newly opened 75 Express. IRV operators responded to 1,368 events during FY 2017-2018. IRV operators, along with the FHP, Road Rangers, and other responders were instrumental in keeping the 95 Express lanes open and available for use 90.5% of the time during the fiscal year, with the facility remaining closed due to incidents 1% of the time as illustrated in the following chart.

The average travel lane blockage duration in the express lanes was 26.8 minutes in the northbound direction and 31.2 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 expanded this fiscal year to support the opening of 75 Express. Next fiscal year we anticipate starting operations on Palmetto Express. The IRV fleet has grown from three to seven trucks to accommodate having IRV operators staged along I-95, SR 826, and I-75 in support of the current and new operation.

District Six continued coordination between its IRV Operations staff and the District Four incident management team. This coordination is needed due to the overlapping limits for the 95 Express and 75 Express expansions into Broward County.

RISC EVENT ALONG I-195

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 and specialized resources 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.

As shown in the following table, during FY 2017-2018, the average RISC response time was 49 minutes, while the average RISC travel lane clearance time was 61 minutes. In total, STMC Operations staff summoned RISC resources 17 times during FY 2017-2018. The RISC program has responded to 129 events since its inception in 2009.

RISC Response Times by Fiscal Year Since Its Inception

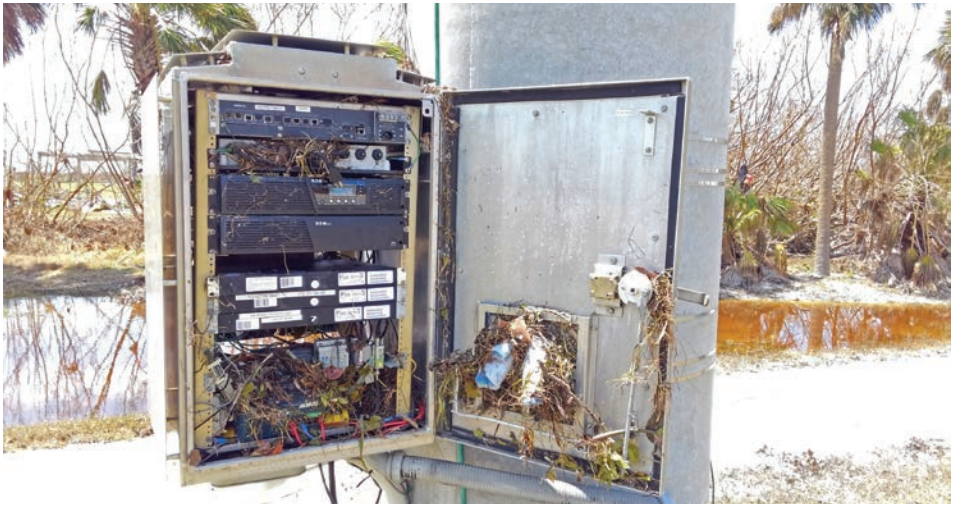
RISC PERFORMANCE	2010–2011	2011–2012	2012–013	2013–2014	2014–2015	2015–2016	2016–2017	2017–2018	TARGET
Activation Time	21 m	10 m	28 m	23 m	28 m	28 m	16 m	17 m	--
Response Time	37 m	39 m	46 m	45 m	43 m	47 m	50 m	49 m	60 m
Travel Lane Clearance Time	60 m	88 m	85 m	68 m	57 m	63 m	60 m	61 m	90 m
Total Incident Clearance Time	128 m	161 m	225 m	161 m	141 m	146 m	132 m	148 m	--
Total RISC Events	12	9	7	19	18	15	19	22	--

IT / ITS Maintenance

None of the before and after storm operational activities could take place without the support of the IT/ITS Maintenance team. Like operations, keeping the IT and ITS infrastructure running under normal circumstances is a 24/7 endeavor. However, the Maintenance staff stepped up for Hurricane Irma. IT staff prepares for events like Irma by safeguarding network connections on a year-round basis. Testing with the NAP connection was completed in the lead-up to the storm. Field ITS Maintenance staff checked on critical devices, made sure backup generators were ready to be deployed, and secured any loose equipment.

Once the decision was made to evacuate the STMC and establish a remote TMC at the Florida's Turnpike Operations Center in Turkey Lake, IT staff was dispatched to make sure network connections and equipment were ready to go prior to Operations staff arrival. An IT technician accompanied the Operations staff for troubleshooting any network issues.

ITS maintenance staff was busy after the storm performing damage assessments and then conducting repairs. A schedule was developed to get critical devices working as soon as possible. Most issues in Miami-Dade County were related to power and communication, but Monroe County was a different story. The entire ITS infrastructure was disabled south of Florida City. In some cases, devices were damaged or completely blown away. The ITS infrastructure in Monroe County is dependent on a wireless microwave communication system. Communication was lost as antennas were blown off their poles.



ITS CABINET IN FLORIDA KEYS AFTER HURRICANE IRMA

Annual Average System Availability

SUBSYSTEM	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
CCTV	95.47%	97.56%	94.73%	92.73%	92.42%	86.69%
DMS	93.85%	96.66%	96.15%	98.25%	96.66%	87.00%
Vehicle Detectors	94.90%	96.13%	95.05%	87.44%	87.48%	77.73%
Video Wall	97.49%	97.43%	98.86%	99.90%	99.43%	98.93%
SunGuide	97.97%	99.86%	98.97%	97.98%	96.93%	95.19%
OTM	99.85%	99.97%	99.68%	99.98%	99.99%	99.61%

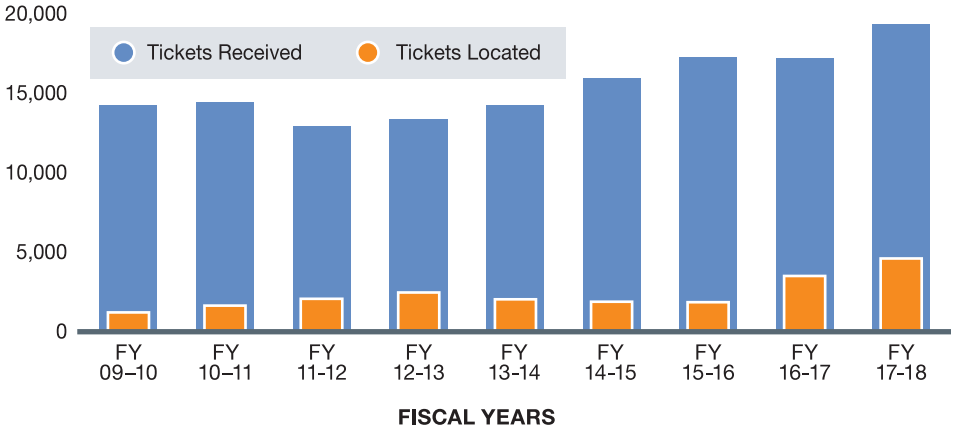
Maintenance staff systematically completed repairs to ITS devices; however, there remain some detectors in Miami-Dade County and most of the devices in Monroe County to complete. Our staff is working on projects to install a new communication system and to replace all CCTV cameras in the Florida Keys. The table above shows the availability of key system components during FY 2017-2018 as compared to the previous fiscal years.

Utility Infrastructure Location Services. An important service provided by the IT team is locating utilities for the District Six underground fiber optic cable and electric conductors. Locating and marking the underground infrastructure prior to a third party doing any nearby work helps to prevent damage from outside entities. Notifications are received from Sunshine 811 regarding activity that may interfere with underground utilities. The tickets are reviewed and, when necessary, the ground is physically marked showing the location of the ITS underground infrastructure. During this fiscal year, 19,321 Sunshine tickets were received and 4,498 Sunshine tickets were located.

The following graph shows the number of locates since FY 2009-2010.

IT TECHNICIAN CHECKING ON NETWORK STATUS

Locate Ticket Summary



Network Security. During FY 2017-2018, the IT/ITS maintenance staff implemented several security measures making the overall network more secure. An authentication process was put in place for off-site access. This requires remote users to enter additional security information prior to getting access to the system. Also, a fifth-generation firewall was installed to make emails, file sharing, and remote operations more secure.

Traveler Information

Traveler information proved to be a critical function during Hurricane Irma. 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, a smartphone application, and a phone-based Interactive Voice Recognition system. District Six's TSM&O website, SunGuide.info, allows motorists to view live feeds of the TSM&O office's CCTV cameras in Miami-Dade and Monroe Counties.

FDOT continued its partnership with Waze, a crowd source traffic application for use on a smartphone. Waze proved to be useful in riding out the storm. The remote operations team used Waze alerts to help identify traffic problems and relayed this information to the District Six EOC and partnering agencies. In normal operations, Waze roadway alerts pop up on a STMC operator's SunGuide map, helping to find and confirm traffic events.

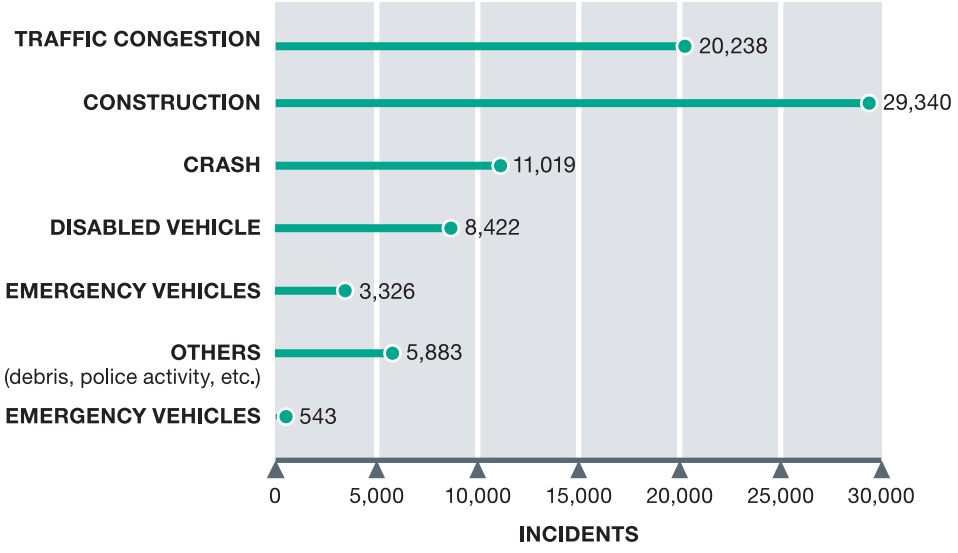
Florida's Advanced Traveler Information System (FLATIS)

During FY 2017-2018, the 511 service continued to receive a large number of calls statewide, and users from southeast Florida made up a considerable portion of those calls. District Six STMC operators published over 78,500 event updates of lane blockage and congestion events on roadways managed by the District Six STMC. The graph on the following page shows the different types of published events.

STMC CONTROL ROOM

IMPORTANT TRAVELER INFORMATION IS DISPLAYED ON DISTRICT SIX'S DMSs

Traffic Information Published by FLATIS Event Type
(78,771 total events listed by event type)



DMS Messaging

An important component of District Six's traveler information service is its system of dynamic message signs (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 2017-2018, more than 413,000 messages were displayed on District Six DMSs, with most messages for incidents and construction.

Public Outreach

Public Information (PI) staff did not let the hurricane put a damper on their outreach throughout the fiscal year. Our PI staff serves a dual role, providing not only information to the motoring public but also customer service for 95 Express, upcoming express lane projects, and starting next fiscal year, traffic signals. Staff partnered with the multiple agencies and the media to promote the program's public services. The STMC hosted tours, published articles, and participated in industry conferences to enhance its profile within the local community and at the national level.

This fiscal year, the PI staff focused on creating material to be used as part of the TSM&O office rebranding. The PI staff helps provide information to motorists, the media, and other political and municipal agencies. As the state transitions to more TSM&O initiatives with the adoption of the TSM&O Strategic Plan, District Six produced updated material, including fact sheets, brochures, and folders. This new material is used to educate the public on what the TSM&O office does and how it impacts traffic and the community.

The PI staff also worked on streamlining the process of documenting, tracking, and closing out customer inquiries. The current system, TMC Connect, will be phased out as we transition to a new application. TMC Connect is a database tool developed in-house that allows PI staff to enter and track all customer inquiries for 95 Express and other services provided by the TSM&O office. However, the team investigated different software options to facilitate more multi-agency coordination with inquiries and to handle the expected increase of inquiries with the opening of Palmetto Express and 75 Express. The new software is a cloud-based, web-based application designed to manage multiple inquiries as they are handled by a multidisciplinary group of agencies. This transition will position the TSM&O office as the "one stop shop" for southeast Florida customer service.

PANAMA ENA FIELD VISIT

Tours. The District Six TSM&O office conducts tours of the STMC. Tours typically include a presentation of the TSM&O office, viewing of the control room operations, and in some instances a walkthrough of the STMC. Staff facilitated tours during FY 2017-2018 for:

- University of Miami College of Engineering
- FDOT Secretary of Transportation, Mike Dew
- PortMiami
- Florida International University chapter of Institute of Transportation Engineers
- Tokyo Bay Highway
- ITS Colombia
- FDOT Interns
- Bring Your Child to Work Day
- Nova Southeastern University
- Carrie Meek Elementary School
- Job Shadow Day
- Panama Empresa Nacional de Autopista (ENA)

STMC VISIT BY FLORIDA SECRETARY OF TRANSPORTATION (FROM L TO R: JAVIER RODRIGUEZ, TSM&O PROGRAM ENGINEER; RUDY GARCIA, DISTRICT SIX DIRECTOR OF OPERATIONS; MIKE DEW, FLORIDA SECRETARY OF TRANSPORTATION; JAMES WOLFE, DISTRICT SIX SECRETARY

Press Conferences. The District Six TSM&O office hosted several press conferences with other programs and agencies during the fiscal year. These press conferences promoted awareness and special initiatives for the public and news media. The main press conferences included a 95 Express safety update to highlight operational improvements due to implemented safety programs; a holiday safety update that educated the public on highway safety and congestion awareness due to the end of year holiday season; and a Move Over, Drive Safe initiative creating awareness for the state's Move Over law requiring motorists to move over one lane when approaching incident management vehicles assisting a motorist.

Customer Service. Customer service efforts continued to be a high priority as 95 Express experienced several changes during this fiscal year with the construction of emergency stopping sites in the median and ongoing construction from the pavement rehabilitation project. As a result, staff processed 295 comments from a variety of topics that included tolling, transit, and data requests for academic and professional institutions.

PI staff is currently working on revamping the program's webpage (sunguide.info) with a new look and new content.

Benefits to the Public

Having the TSM&O office and the STMC available in our community was a tremendous benefit throughout the Hurricane Irma event. It is difficult to quantify the benefit of assisting other agencies with distributing information, providing regional status updates to the District Six and regional EOCs, providing information to travelers on our roadways, and utilizing incident management forces throughout the region, including the Florida Keys.

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 26.5 minutes. This represents a 47% reduction from the 2005 FDOT District Six established baseline average duration of 50 minutes.

The FDOT District Six TSM&O office's budget for FY 2017-2018 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 $3.0 billion. The improved incident clearance time of 26.5 minutes had a significant impact during

I-95 AND I-395 INTERCHANGE

Fiscal Year 2017-2018 Costs

ITS Operations	$9,064,418
ITS Maintenance*	$4,064,770
Road Rangers	$6,653,418
RISC	$59,000
FDOT Cost Center Operating Budget**	$4,991,939
Other (Consultants, FTE, FHP, FIU)	$6,548,210
Total Annual Operating Costs	**$31,381,755**
Total Annualized Capital Costs	**$38,936,342**
Total Annual Costs	**$70,318,097**

* Includes express lanes ITS maintenance and express lane marker repair

** Includes utilities for express lanes

Fiscal Year 2017-2018 Benefits

Incident Management	$3,046,466,083
Express Lanes / Ramp Signals	$26,864,651
Total Benefits	**$3,073,330,734**

FY 2017-2018. There were 22,300 events that blocked travel lanes during the past fiscal year. The number of events with blocked travel lanes coupled with lower clearance time resulted in significant time savings compared to the 2005 benchmark clearance time of 50 minutes.

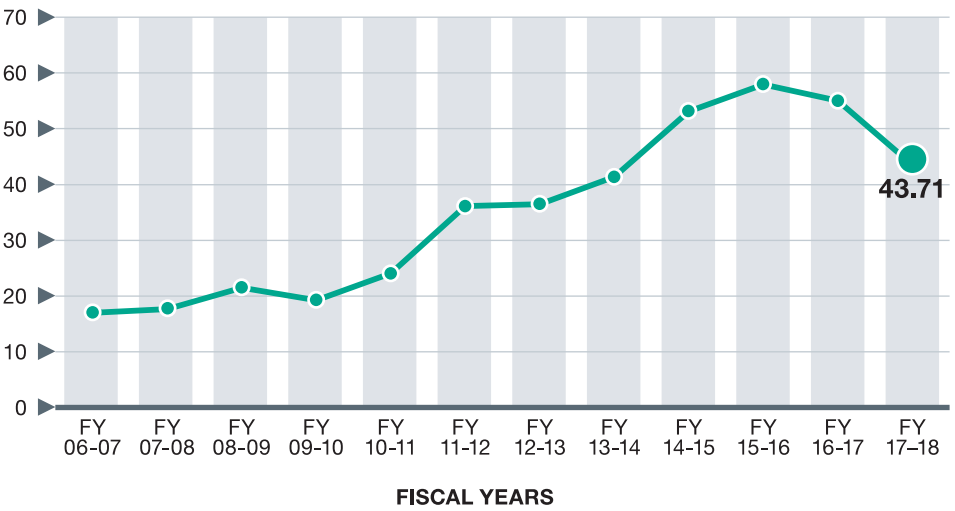
Additionally, 95 Express and the Ramp Signaling System also contributed to the reduction of delay during peak hours, translating into savings of $26.9 million. This estimate was calculated using widely accepted statistical methods for estimating the cost implications of traffic delays. The estimate only includes time saved by motorists; it does not address road user cost savings.

When comparing the total estimated benefits of the TSM&O office during FY 2017-2018 to the total annual operating expenses and capital investments (annualized over 10 years at 7%), the TSM&O office is shown to be yielding $43.71 in economic benefit for every dollar spent (Benefit-Cost Ratio of 43.71:1).

A comparison of the Benefit-Cost Ratio for FY 2017-2018 versus the previous 10 years is presented in the graph to the right. Although still showing a favorable Benefit-Cost Ratio, the decrease from the previous trend is attributed to an increase in operational expense and a change in how vehicle delay costs are estimated.

ONE OF THE MOST IMPORTANT BENEFITS OF THE TSM&O PROGRAM IS THE REDUCTION IN INCIDENT DURATION

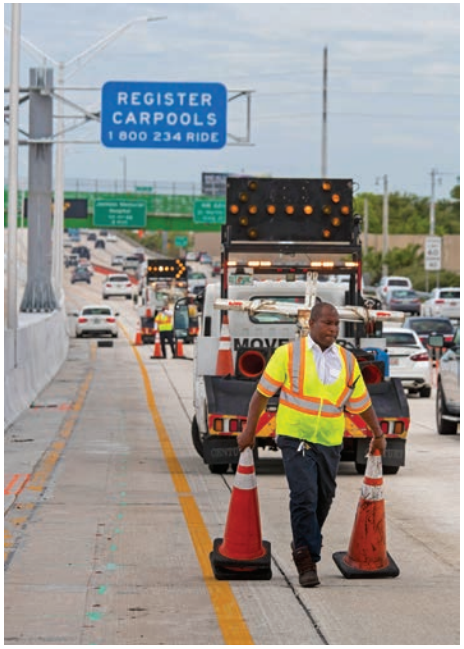
Benefit-Cost Ratio



A Look Ahead

The FDOT District Six TSM&O office prides itself on taking advantage of lessons learned. The next annual HRAP update will incorporate the lessons learned from Hurricane Irma, making the program more resilient for the next big storm. The next fiscal year will bring a new set of challenges as we prepare for traffic signal operations in the Florida Keys and operation of Palmetto Express and 75 Express, and participate in planning and design efforts for ITS and express lanes along SR 826 and at the Golden Glades Interchange while entering into new initiatives such as connected vehicles.

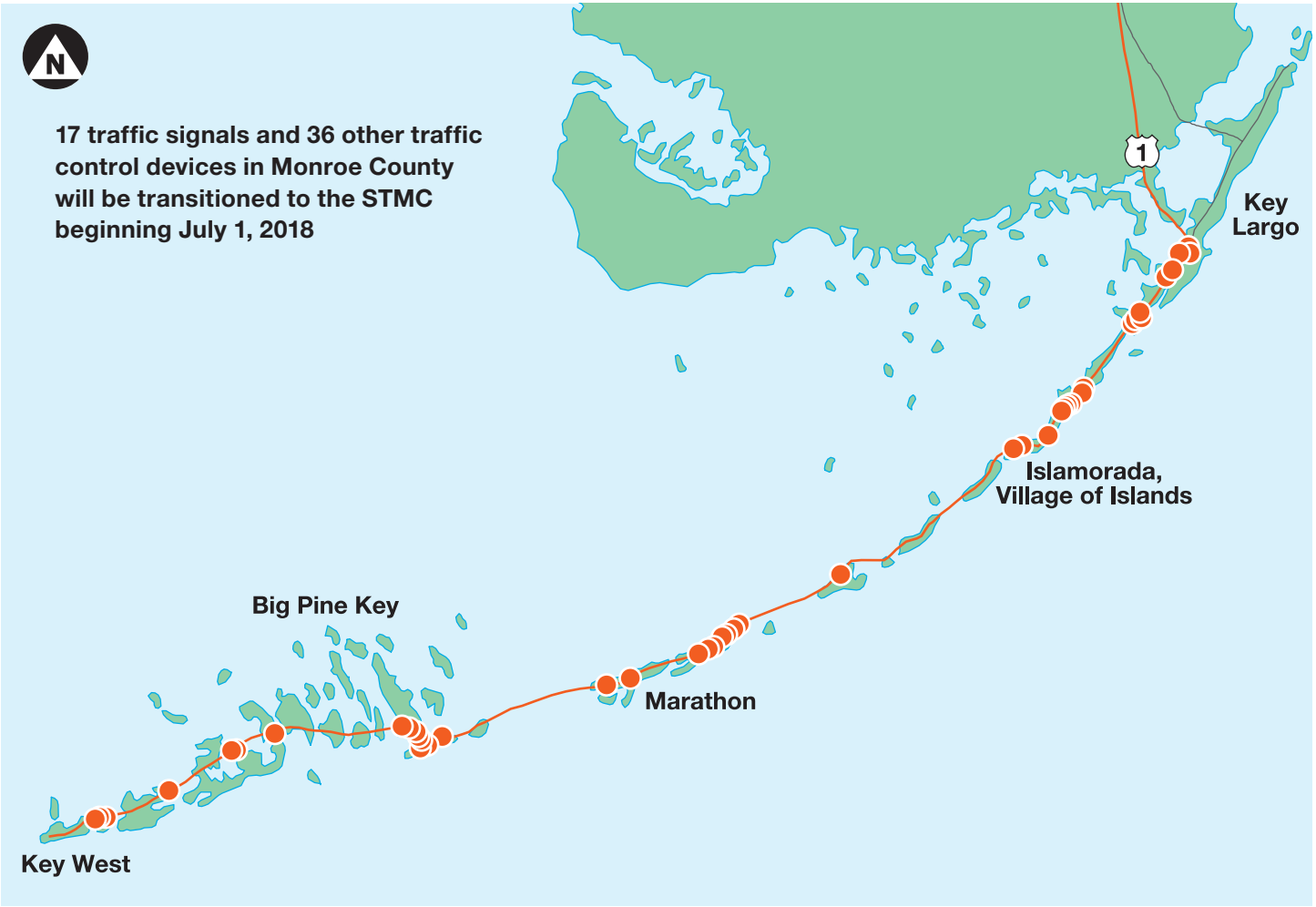
Road Ranger Support Services. The STMC will begin the next fiscal year with a new Road Ranger support services contract. The new contract was advertised in early 2018 with commencement scheduled for July 2018. This contract includes Road Ranger services to support and promote the "Open Roads Policy" of the State of Florida. All the current roadways with the addition of Palmetto Express and 75 Express are covered in the contract. The Road Ranger fleet is comprised of pickup trucks, tow trucks, flatbed wreckers, and an on-call heavy-duty tow truck.



ROAD RANGER ON I-95

Traffic Signals in Monroe County. The STMC has prepared for the operation and maintenance of the traffic signal devices along US-1/Overseas Highway in Monroe County starting on July 1, 2018. The 17 signalized intersections, eight emergency signals, two drawbridge signals, and 26 flashing beacons along US-1 in Monroe County from Key Largo to Key West will be transitioned to the STMC (refer to map on following page). This will include the operations, monitoring, and maintenance of these signalized intersections.

Express Lanes Projects. Express lanes projects will be active throughout the next fiscal year. District Six is preparing for the opening of Palmetto Express and 75 Express in 2019. Preparation includes developing documents for operating the facility, creating configuration strategies for setting up SELS, configuring ramp signals, hiring and training additional staff, and coordinating with District Four and the Florida's Turnpike. TSM&O staff is currently reviewing plans for the expansion of Palmetto Express along the east-west portion of SR 826 from I-75 to I-95. Plans are also being reviewed for a major improvement for the Golden Glades Interchange. Planning efforts continue for the southern portion of Palmetto Express from SR 836 to US-1.



There is much express lane activity around the District Six region as well. Phase 3 of 95 Express enters its second year of construction and will extend 95 Express into Palm Beach County. Ultimate completion of this project is expected in 2022. Construction projects along the Homestead Extension of the Florida's Turnpike (HEFT) south of SR 836 are expected to open in segments from 2020 to 2022. Planning efforts are ongoing for the HEFT north of SR 836, the mainline Florida's Turnpike, and the Sawgrass Expressway.

ITS Retrofit Projects. The ITS retrofit projects will continue next fiscal year with the replacement of remaining analog cameras with HD digital cameras. HD cameras give STMC operators a clearer view of events. One of the initial activities of this project was to upgrade the video wall system to allow enough bandwidth to display HD camera feeds.

THE I-395 SIGNATURE BRIDGE WILL PROVIDE ADDITIONAL ROADWAY CAPACITY AND IMPROVED MOBILITY

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 SR 5/Biscayne Boulevard, 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 capacity to I-395 with three through lanes in each direction and provide separate connector ramps for traffic to and from I-95. The limits on I-395 are from the SR 836/I-95/I-395 Interchange to the MacArthur Causeway, approximately 1.4 miles long. The project also includes work on SR 836 from NW 17 Avenue to the SR 836/I-95/I-395 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, rising over the center of SR 836 and allowing drivers to bypass the I-95 Interchange touching down at I-395 east of I-95.

Golden Glades Multimodal Transportation Facility. District Six started 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 takes advantage of the diverse modes of transportation available in this area (Tri-Rail, Miami-Dade Transit, Broward County Transit, Greyhound, freight, and connection to 95 Express) and incorporates a transit hub with retail accommodations. TSM&O concepts are evident in this project, showcasing transit by combining multiple modes of transportation at a facility that is more than just a bus station. This design-build project is anticipated to be completed in April 2021.

CV SYSTEMS CONNECT VEHICLES AND INFRASTRUCTURE FOR IMPROVED INFORMATION SHARING AND TRAFFIC MANAGEMENT

Connected Vehicles. With advancements in technology, data collection/aggregation, and communication systems, FDOT has moved forward with the Florida Connected Vehicle Initiative. The projects from this initiative will connect transportation users to the transportation system in new ways. Connected Vehicle (CV) systems connect vehicle-to-vehicle, vehicle-to-infrastructure, and vehicle-to-other transportation services, providing information to the motorist and the vehicle for informed decisions as well as to the STMC for active traffic management.

The District Six TSM&O office will begin this journey with some near-term projects. An ASCT project is underway along NW 119 Street (SR 924) east of the Gratigny Parkway. This project includes 15 signalized intersections. Phase 1 is the deployment of an ASCT system along the corridor. Phase 2 will introduce CV. New traffic signal controllers will be installed that can transmit signal phasing and timing (SPaT) information to roadside equipment and vehicle onboard systems.

Another project will be implemented along US-1/Overseas Highway in the Florida Keys. This project will also provide SPaT information and introduce automated traffic signal performance measures (ATSPM). Using performance measures at signalized intersections facilitates optimal signal timing and proactively corrects problems. Upgrading signal controllers to high-resolution data allows a multitude of real-time data to be collected and used.

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