ANNUAL REPORT

Fiscal Year 2018-2019

A message from the

DISTRICT SECRETARY

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

The Future is Now. We have heard foretelling of the future in transportation for many years. Although I am still waiting for my flying car, the Florida Department of Transportation District Six and its Transportation Systems Management and Operations (TSM&O) office are on the cusp of embracing and implementing several new initiatives.

Fiscal Year 2018–2019 saw the first full year of operation for our adaptive signal control technology (ASCT) system along SW 8 Street and our advanced traffic management system (ATMS) along US 1 in Monroe County. The ASCT system was installed along SW 8 Street on 30 signalized intersections from SW 142 Avenue to SW 67 Avenue. The results show that along SW 8 Street, vehicle throughput increased by 5%, total delay decreased by 11.8%, and crash frequency decreased by 9.75%. The ATMS along US 1 includes 17 signalized intersections along 105 miles of the Overseas Highway. Having all intersections connected to our ATMS located at the SunGuide Transportation Management Center (STMC) facilitates more consistent operation, enables motorist concerns to be addressed efficiently, and increases uptime as alerts and system messages are received by operators at the STMC.

US 1 in the Florida Keys will be the test bed for the District's first connected vehicle (CV) project: Keys COAST or Keys Connecting Overseas to Advance Safe Travel. CV technologies enable cars, trucks, buses, and other vehicles to communicate to and with each other through in-vehicle devices to share important travel and safety information. The Keys COAST project will establish a CV corridor from Key Largo to Key West with the goal of improving traffic signal operations, traveler information, and commercial freight operations. We are very excited to be part of this important project.

The STMC and the TSM&O office play an integral part in these advancements serving as the data integrator, communication hub, and information disseminator. Operators at the STMC will be able to utilize information from the Keys COAST project and others like it to make intelligent decisions on operations that will affect customers on a daily basis.

District Six continues to prepare for expansions to its transportation network. Work has progressed on the new Golden Glades Multimodal Transportation Facility. With express lane systems firmly in place along I-95, I-75, and I-595, the district prepared for the opening of express lanes along the Palmetto Expressway. With the express lanes projects comes the opportunity for enhanced transit service and partnering with our regional transit agencies in Miami-Dade and Broward counties.

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The District Six TSM&O Core Group has held bi-monthly meetings with several department managers to discuss latest projects and initiatives. The meetings are helpful for integrating intelligent transportation systems and TSM&O concepts throughout the district. The TSM&O office was also active with the Regional Transportation Technical Advisory Committee for the Southeast Florida Transportation Council.

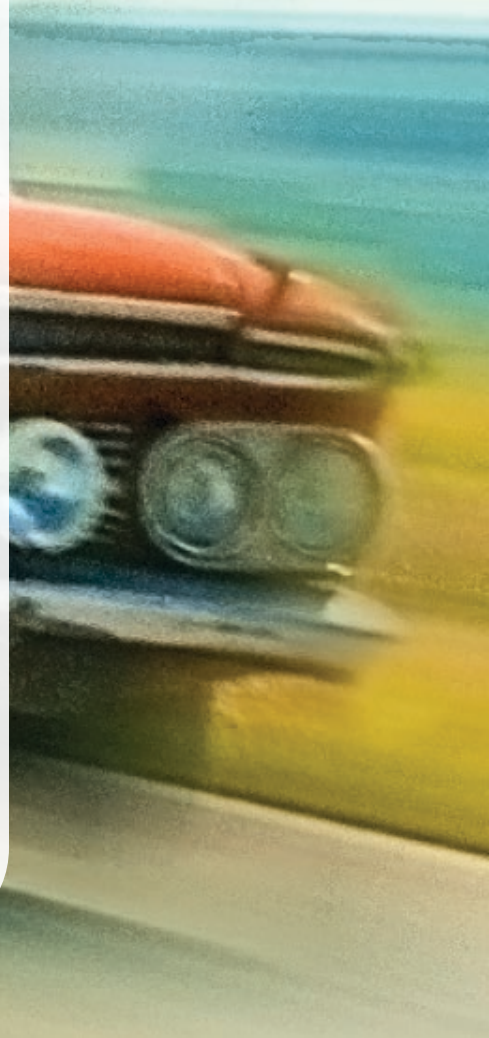
Our traditional services, such as Road Rangers and incident management, are still vital to the health of our freeway system. Despite the advancements in technology, the incident management team helps to keep our roadways safe and incident free. Our roadway incident clearance time this fiscal year averaged 25.7 minutes, representing a 49% reduction over the 2005 baseline of 50 minutes. Road Rangers responded to over 63,000 activations. We attribute these excellent results to the continued dedication of our Road Rangers and first responders.

We continue to see positive trends from the safety measures that the Department introduced in the summer of 2016 along 95 Express. New express lane markers (ELMs) were installed from State Road (SR) 112 to the I-95 flyover followed by the opening of five emergency stopping sites (ESSs) along the median of 95 Express between NW 62 Street and NW 131 Street in 2018. Three northbound and two southbound ESSs provide a safe temporary refuge for disabled vehicles and first responders. As of the end of June 2019, ELM replacement was down 89%, illegal lane changing was down 93%, and crashes within 95 Express were down 37%.

Now more than ever, cooperation with our local partnering agencies is a critical component to the overall regional transportation network. Having the Miami-Dade Expressway Authority Transportation Management Center (TMC), Florida Highway Patrol regional dispatch, and the Florida Wildlife Commission co-located at the STMC helps with intercoordination. Plans are moving ahead for two new tenants at the STMC: the City of Miami Beach and Miami-Dade County.

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 technical support to our partners at District Four, District Two, and the Florida's Turnpike as express lane operations and deployments continue throughout the state.

I invite everyone to join us in this future quest as we continue striving to make our transportation system the best in the nation... if not the galaxy.



INTRODUCTION

LOOKING SOUTH I-75 AND HEFT INTERCHANGE

The theme for this year's annual report is The Future is Now. The nation's transportation system is heading for a system-wide shift as a result of technological advancements changing the way we think about mobility. We are still some time away from getting our flying cars but car manufacturers have been developing their systems for self-driving or autonomous cars. This technology has much potential but is still some time away from a full rollout.

However, innovative new services, such as ride sharing, transit options, bicycle and scooter programs, and navigation applications, have supplemented our transportation experience. The nation now moves forward with initiatives in Connected Vehicles (CV) making it possible for the individual vehicle to talk to the transportation system and the other vehicles around it.

TRANSPORTATION SYSTEMS MANAGEMENT & OPERATIONS

Our Mission:

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

Our 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.

As the country continues to evaluate and improve its infrastructure, emerging technologies such as CV, autonomous vehicles, and last-mile solutions work to make the existing roadways more efficient. District Six has already implemented several efficiency improvements over the years, including:

- Express lanes
- Ramp signaling
- Adaptive Signal Control Technology (ASCT)
- Advanced Traffic Management System (ATMS)
- High definition (HD) closed-circuit television (CCTV) cameras
- Full matrix color dynamic message signs
- Multiplatform use of "big data"

The advancements being seen now cannot be completed by Florida Department of Transportation (FDOT) alone. The District Six regional partners help make this a reality.

Some of the latest accomplishments of the Transportation Systems Management and Operations (TSM&O) office this fiscal year include:

- Selection of the hurricane response action plan as a national case study for successful emergency planning by the National Operations Center of Excellence.
- Successful implementation of an ATMS along US 1/ Overseas Highway, including upgrades to traffic signal equipment and connectivity to the SunGuide Transportation Management Center (STMC) network.
- Initiation of the 95 Express warning gate system (WGS)
- Launch of a refreshed project website: sunguide.info.
- Utilization of multi-platform data into useful interactive dashboards.

The TSM&O concept embraces all of the resources available throughout the entire project lifecycle process including planning, design, construction, operations, and maintenance.

This FDOT District Six TSM&O Annual Report covers the fiscal year (FY) from July 1, 2018 to June 30, 2019 (FY 2018–2019) and aligns with the program's five primary functional areas listed below.

Intelligent Transportation Systems (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 CCTV cameras, dynamic message signs (DMS), vehicle detectors, arterial systems, and communications.

Transportation Management Center (TMC) Operations. The STMC provides the central location and clearinghouse for data collection and dissemination. It 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.

Information Technology (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 is the fourteenth edition of District Six's TSM&O Annual Report. The report contains informative details about the TSM&O program. We welcome you to join District Six as we strive to improve the reliability of the Southeast Florida multimodal transportation systems.

ITS DEPLOYMENTS

The TSM&O office has been preparing for the next wave of ITS and TSM&O equipment deployment to support new and upcoming emerging technologies. The ITS devices that are installed along the district's roadways provide information to the STMC and in turn allow the STMC to send information to motorists. Emerging technologies such as CV will change how data is shared with motorists and at the STMC.

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. A summary of active FDOT District Six TSM&O projects being built or completed during FY 2018–2019 follows.

Palmetto Express and 75 Express Miami-Dade Deployments. The Palmetto Express and 75 Express projects are a major expansion to the regional express lane network. Express lanes will be continuous from I-595 in Broward County along I-75 in Broward and Miami-Dade counties, to the Palmetto Expressway from NW 154 Street to Coral Way. These express lane projects began construction in 2014. The District Four component, which includes a portion of 75 Express to NW 170 Street was opened to traffic in early 2018. The 75 Express portion south of NW 170 Street and Palmetto Express are scheduled to open in the fall of 2019 with completion scheduled for early 2020. ITS devices, such as CCTV cameras, DMS, vehicle detectors, ramp signaling, and other infrastructure equipment, are being installed to support these express lanes. In total, the project spans 10 miles along the State Road (SR) 826 corridor and 3 miles along the I-75 corridor.

SOUTHBOUND 75 EXPRESS

In the future, express lanes will be added along both directions of SR 826 from Coral Way to US 1. Express lanes are also being designed along SR 826 from NW 154 Street to I-95. When fully completed, these projects will bring express lanes from Kendall to I-595.

I-95 Pavement Rehabilitation from NW 29 Street to NW 131 Street. This project is replacing the concrete pavement in both directions of I-95 from NW 29 Street to NW 79 Street. Along with ITS equipment deployment, the project created new emergency stopping sites (ESSs) in the median of I-95 to allow enforcement and motorist refuge areas along the express lanes. Three northbound and two southbound ESSs between NW 62 Street and NW 131 Street opened 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 project began in February 2017 and is scheduled for completion in early 2020.

I-395/SR 836/I-95 Design Build Project. This project began in January 2019 and will completely reconstruct the existing interchange and create a signature bridge that will span 1,025 feet over NE 2 Avenue and SR 5/Biscayne Boulevard. 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. The signature bridge with its high vertical clearance will transform the area beneath I-395 into 55 acres of vibrant open communal spaces for 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.

STMC staff closely monitor the overlap of this project with the I-95 Pavement Rehabilitation project to the north.

I-95 Express DMS and Toll Sign Panel Replacement and Warning Gate System Project. This project to retrofit existing express lane toll signs, DMS, and confirmation cameras along I-95 began in FY 2015–2016 and was completed early in FY 2018–2019. The ITS equipment was upgraded to HD cameras and full matrix color DMS. This project also installed a WGS for 95 express entrances. The WGS was installed as a pilot project to expedite the closure of several entrances to 95 Express. The gates are 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.

I-395 SIGNATURE BRIDGE

FUTURE ELEVATED SECTION OF SR 836

Districtwide ITS Replacement Project (Miami-Dade and Monroe Counties). This project began in February 2017 and includes replacement of 170 cameras with HD cameras. Many of these cameras are along US 1 in the Florida Keys, which were damaged by Hurricane Irma. This project essentially completes the conversion of all cameras to HD video. This will not only improve the quality of video for TMC control room operators but will also allow improved images for public facing applications such as FL 511. This project also replaced all ramp signal traffic lights along I-95, replaced four arterial DMS and one freeway DMS, and added microwave vehicle detectors in the Golden Glades Interchange area. This project is expected to be completed in the third quarter of FY 2019–2020.

The following table illustrates the increase in deployed ITS devices from 2005 to 2019.

ITS DEVICE	2005	2019
CCTV Cameras	69	412
DMS	22	207
Detectors	205	502
Ramp Signals	0	22
ASCT Cameras	0	106
ASCT Intersections	0	30

WARNING GATE AT GOLDEN GLADES INTERCHANGE TO SOUTHBOUND 95 EXPRESS

TMC OPERATIONS

TMC Operations has prepared for the future by upgrading communication systems, replacing ITS equipment, and embracing active traffic management. The latest CV technologies will provide new ways for vehicles to interact with their surrounding environment. Vehicles will communicate with other nearby vehicles, with the surrounding infrastructure, and with the traffic control and monitoring systems.

For the last 20 years, ITS has been the catch-all for emerging technologies. The landscape has expanded to beyond equipment and into holistic solutions, such as Smart Cities. The Smart City concept leverages the Internet of Things (IoT) to connect functions, improving the lives of citizens and visitors. On the transportation side, this means using sensor data and communications to manage traffic, suggest alternate modes of commuting, and improve efficiency of traffic operations.

In the short term, high-speed wireless data using short-range communications and fifth generation cellular (5G) will open a new world to vast amounts of useful data. Advancements in high-speed communications will drive the use of CV. Interactions of vehicle-to-vehicle, vehicle-to-infrastructure, and vehicle-to-other systems will generate synergistic data used by the transportation management centers to disseminate information, manage traffic, and coordinate with partnering agencies. Further in the horizon, autonomous cars will eventually begin to enter the traffic stream, but possibly initially through dedicated lanes for autonomous vehicles. Regardless, TMC operators will continue to have a wealth of information at their disposal to make critical assessments and decisions.

The STMC operates 24 hours a day, 7 days a week. 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 Miami-Dade Expressway Authority TMC Operations staff and the Florida Highway Patrol (FHP) dispatch within the STMC.

Arterial Operations

The STMC continued operations of the ASCT system along SW 8 Street. This system includes 30 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. This fiscal year saw the first full year operation of the ASCT system.

ASCT ALONG SW 8 STREET

Arterial Operations staff are working with Florida International University (FIU) for the operational assessment. The results over the past year from the FIU *SW 8th Street Adaptive Signal Control Evaluation* are positive, with analysis showing vehicle throughput increased by 5%, total delay was reduced by 11.8%, and crash frequency reduced by 9.75%. STMC arterial operators monitor the ASCT system, record motorist comments, track equipment availability, and coordinate signal timing changes with Miami-Dade County.

Since July 2018, Arterial Operations staff have been operating and maintaining 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. Arterial Operations staff work closely with the ITS Maintenance staff. Given the geographic coverage of the Monroe County Traffic Signal System, responding to traffic signal problems and maintenance requests is challenging. However, the partnership with the Monroe County Sheriff's Office helps with confirmation and initial troubleshooting of these issues.

Express Lanes Operations

95 Express. The STMC continued operations of 95 Express for 21 miles from SR 112 to I-595. The project has completed its 10th full fiscal year in operation and has seen a continued increase in usage since inception. 95 Express continues to be regarded as one of the most successful and highly used express lane facilities in the United States. The success of 95 Express has led to other express lane projects in the region and statewide.

The STMC began operating a WGS to close some of the entrances to 95 Express during incidents. The entrances include eastbound SR 112, eastbound on the ramp from NW 10 Avenue, and the southbound entrance from the Golden Glades Park-and-Ride. This system has supplemented the current hard closure procedure, freeing incident management resources to be used elsewhere.

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 within District Six is approximately 15 miles.

MEDIAN ESS ALONG 95 EXPRESS

The STMC has trained staff, developed new standard operating guidelines, and coordinated 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. Incident management will be coordinated among the three districts. District Six hosted meetings with the districts and local first responders to determine how the regional team would function. FHP and local police/fire rescue agencies will provide emergency response. The FHP will also be responsible for enforcement.

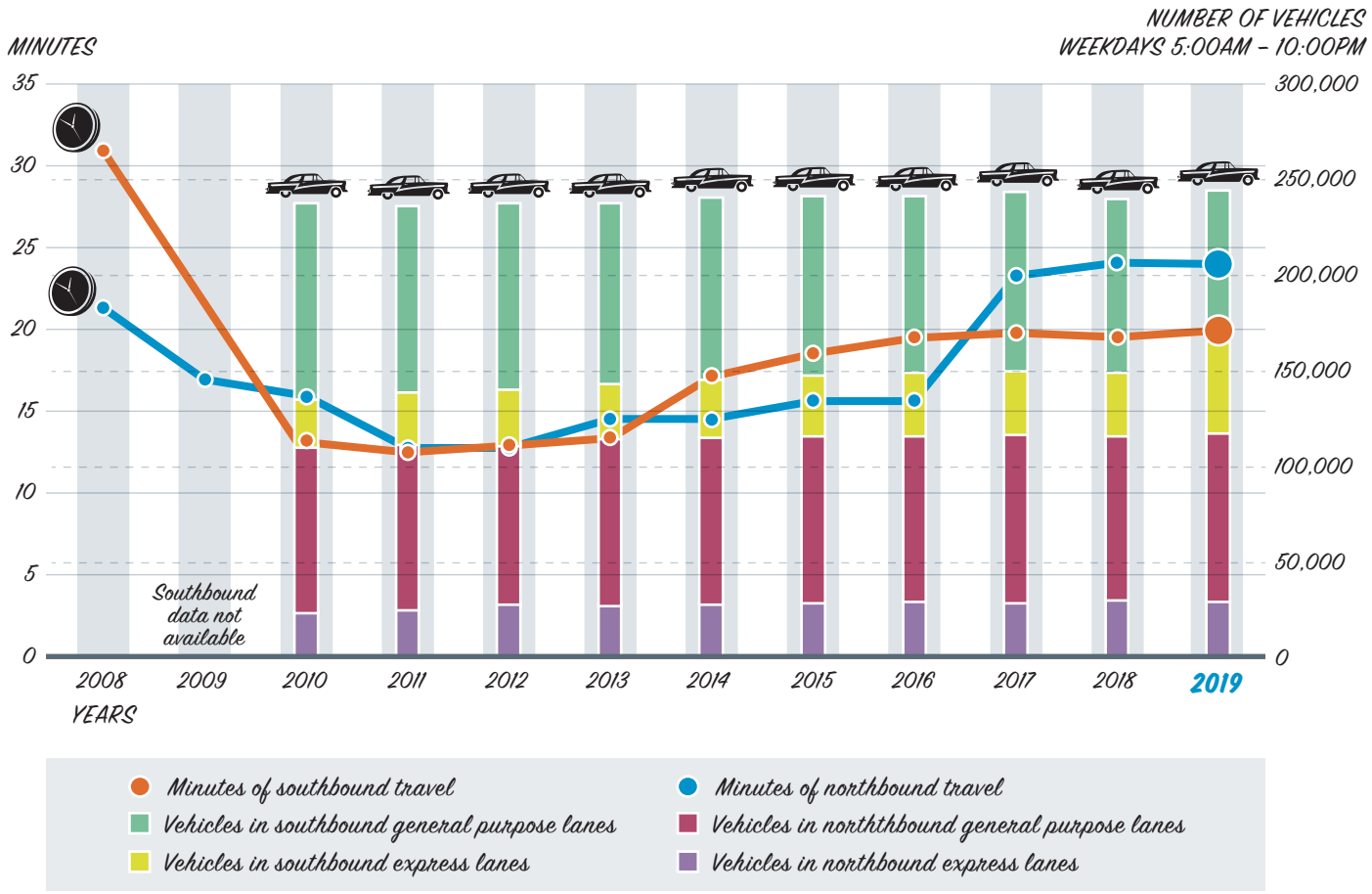
Ramp Signaling Operations

Ramp signals along I-95 entered a ninth 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 continue to be proactive in managing congestion. The graph below shows the average travel times along I-95 from before the ramp signaling system's implementation in 2008. 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. STMC operations are being expanded to include the ramp signals being installed along the Palmetto Expressway.

RAMP SIGNAL ALONG I-95

AVERAGE TRAVEL TIMES AND VOLUME 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 2018–2019, coordination between the STMC Operations staff and these various agencies increased as several construction projects continued to affect District Six roadways.

Construction Coordination. Roadway construction projects continue to pose a challenge for STMC Operations. Large projects along I-95, SR 826, I-75, and I-395 create different traffic patterns and dynamics during the overnight/early morning hours. 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 I-95 Pavement Rehabilitation, Palmetto Express and 75 Express, and I-395/SR 836/I-95 Interchange Reconstruction Project among others.

Special Event Coordination. STMC Operations staff coordinated with representatives from several special events. Special event traffic can cause temporary abnormal traffic congestion along District Six roadways. STMC Operations staff coordinate with these events to help ensure traffic can move as safely and efficiently as possible. This year a major tennis tournament was moved from Key Biscayne to the stadium in North Miami. The stadium also hosed international soccer, professional and college football, and music concerts. Other events, such as professional basketball and baseball games in downtown 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.

SUNGUIDE TMC OPERATORS

Software Enhancements

During FY 2018–2019, STMC Operations software development continued to focus on enhancing and supporting the Statewide Express Lanes Software (SELS). SELS was developed by District Six originally for the dynamic toll system for Segment 1 of 95 Express. SELS is the statewide software for all express lanes systems and District Six continues to support this effort.

SELS “lives” in our Operations Task Manager (OTM) software serving as an extension of the statewide SunGuide software. 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 2018–2019, SELS was enhanced to support new express lanes state legislation.

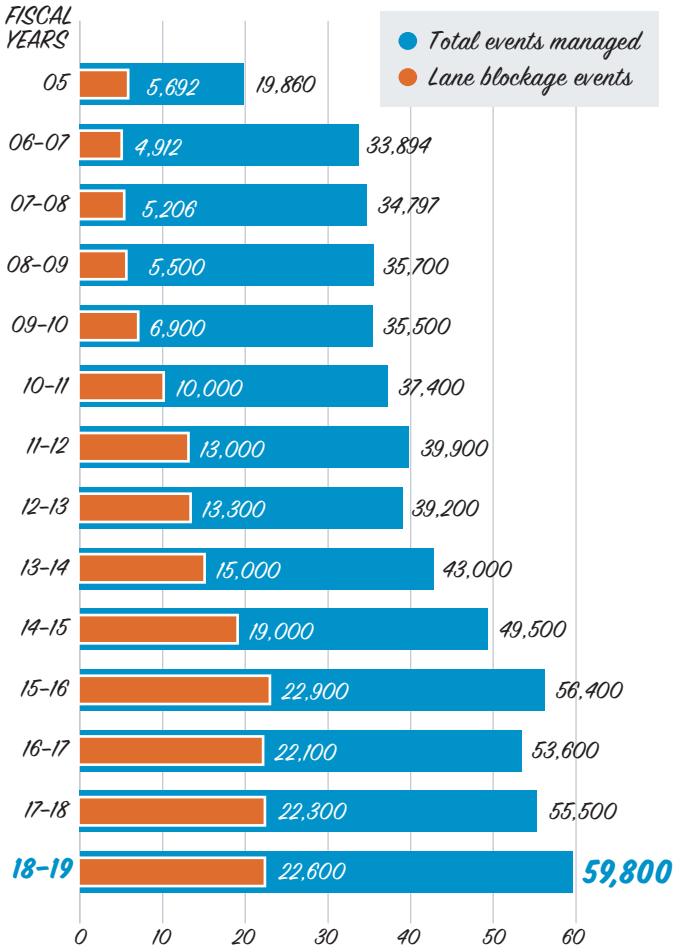
OTM will eventually be supported by the Florida’s Turnpike Enterprise. However, until that happens, District Six is enhancing and maintaining the software based on district needs. The SELS change management team (CMT) continued to be active as this transition begins to take place. The CMT representatives come from all districts and the Central Office. The group tracks the progress of other express lanes projects, coordinates software changes to meet project schedules, and manages by consensus any proposed changes to SELS.

Performance Measures

In December 2007, District Six set targets for key operational performance measures that have the greatest impact on the public. During FY 2018–2019, 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 page 12 shows the performance measures average results and targets. STMC Operations continues to exceed these goals, as operators managed 59,800 total events and 22,600 lane blocking events during FY 2018–2019. The graph to the right shows the number of events compared to previous years.

FDOT DISTRICT SIX EVENTS MANAGED



PERFORMANCE MEASURES

	FISCAL YEAR AVERAGES										
	09–10	10–11	11–12	12–13	13–14	14–15	15–16	16–17	17–18	**18–19**	Target
DMS Efficiency Percentage (GPL)	99.72%	99.82%	99.77%	99.87%	99.78%	99.74%	99.77%	99.86%	99.90%	**99.82%**	≥95%
DMS Efficiency Percentage (EL)	–	–	–	–	–	–	–	100%	100%	**100%**	≥100%
Operator Error / Event (GPL) (LB)	0.15	0.11	0.10	0.12	0.13	0.15	0.15	0.14	0.17	**0.17**	≤0.20
Operator Error / Event (EL) (LB)	–	–	–	–	–	–	–	0.06	0.06	**0.07**	≤0.10
Operator Error / Event (GPL) (NLB)	0.15	0.11	0.10	0.12	0.13	0.15	0.15	0.08	0.10	**0.07**	≤0.20
Operator Error / Event (EL) (NLB)	–	–	–	–	–	–	–	0.06	0.08	**0.07**	≤0.10
Minutes to Dispatch Road Rangers (GPL)	1.08	0.93	0.73	0.73	0.73	0.75	0.77	0.63	0.48	**0.28**	≤2.00
Minutes to Dispatch Road Rangers (EL)	–	–	–	–	–	–	–	0.35	0.30	**0.20**	≤0.60
Minutes to Confirm an Event (GPL)	0.38	1.52	1.70	1.67	1.80	1.18	0.95	0.43	1.27	**1.26**	≤2.00
Minutes to Confirm an Event (EL)	–	–	–	–	–	–	–	0.08	0.15	**0.13**	≤1.00
Minutes to Post DMS (GPL)	3.28	2.78	2.45	2.27	2.47	2.27	2.12	1.78	1.65	**1.40**	≤3.00
Minutes to Post DMS (EL)	–	–	–	–	–	–	–	1.00	0.92	**0.56**	≤1.50
Minutes to Notify Other Agencies (GPL)	1.32	1.25	1.18	1.50	1.70	2.30	2.47	2.18	1.77	**1.33**	≤7.00
Minutes to Notify Other Agencies (EL)	–	–	–	–	–	–	–	1.50	1.20	**1.10**	≤4.00

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

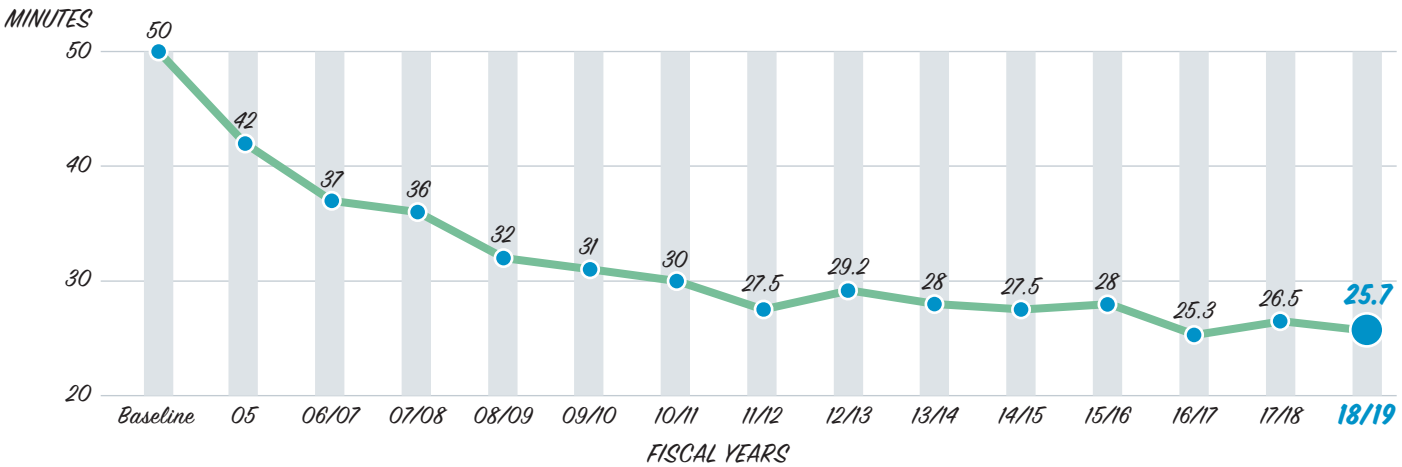
INCIDENT MANAGEMENT

Emerging technologies will will create opportunities for incident management. Improvements in communication and data usage will help responders communicate with each other and with the STMC. CV technology will provide responders with constant data than can help in selecting the quickest route, communicating with other vehicles that an emergency vehicle is traveling through the traffic stream, and communicating with other responding agencies. However, advances in automobile technologies present concerns, such as towing requirements for new model cars and fire mitigation for hybrid and electric vehicles. Preparations underway include training incident management responders on these current and upcoming changes.

District Six remained active with the Traffic Incident Management (TIM) team. Partner agencies collaborate to share information and lessons learned for improved response and recovery scenarios. The primary goal, other than being safety focused, is to support the Open Roads Policy by clearing travel lanes of incidents as quickly and safely as possible. The incident management team continues to support this as evidenced by this year's average clearance time of 25.7 minutes (see graph below). This is a 3% reduction over last year and an overall 48.6% reduction since the benchmark of 50 minutes in 2005.

Being able to strategically deploy incident response resources throughout the coverage area is critical to incident clearance. Incident response staging areas can change throughout the day with the change in traffic patterns. A new staging area was created at the I-95 and SW 8 Street interchange. This staging area is paved and well illuminated at night creating a safe place for incident management resources to quickly access I-95.

AVERAGE ANNUAL ROADWAY CLEARANCE DURATION IN MINUTES



SW 8 STREET STAGING AREA

TIM TEAM MEETING

ROAD RANGER ALONG 95 EXPRESS

TIM. TIM team meetings continued this fiscal year. These meetings are important, from a regional perspective, to increase awareness of participating agencies on construction and special events, trends in incident management procedures, and lessons learned from incident management event clearance. Meetings were arranged with agencies within the TIM team, including 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.

TIM meetings are held in Miami-Dade and Monroe Counties. Recent meetings in Miami-Dade County have included express lane system expansion and construction coordination. Monroe County meetings tend to focus on hurricane preparation, special events, and coordination. Because of the success of these meetings and the diverse traffic trends in the region, District Six plans to increase the number of TIM meetings using a corridor approach. The Miami-Dade County TIM team will hold additional meetings for the I-95 and Palmetto Expressway corridors. An additional TIM meeting will be held in Monroe County. The intent is to create a forum style meeting that will focus on the unique traffic concerns along these corridors.

The TIM team developed short videos as part of a campaign to increase public awareness about who is a Road Ranger and how to get Road Ranger assistance.

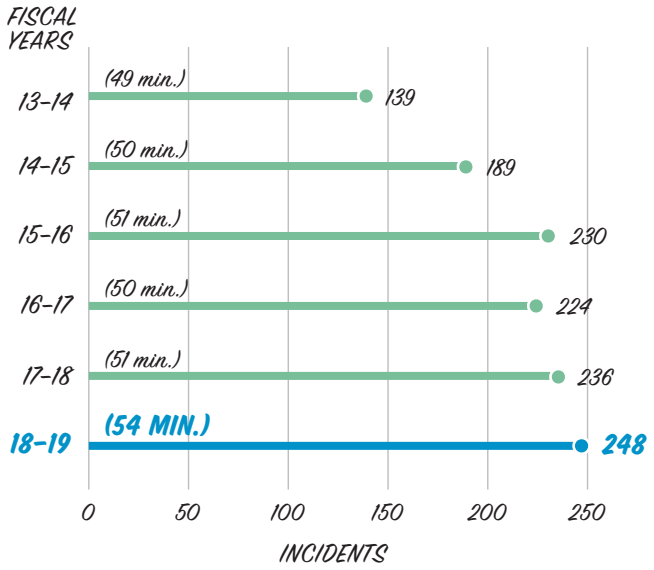
Road Rangers. The most public facing service from the STMC is the Road Ranger program. This fiscal year began with a new Road Ranger support services contract. The transition to the new contract was smooth and continued to provide a valuable service to the motoring public.

A pilot project was conducted this fiscal year to explore the effect of response time for incidents that occur on I-95 north of NW 95 Street. The project included staging Road Ranger resources along 95 Express at the median emergency stopping site south of NW 95 Street during the PM peak period (3:00 PM to 7:00 PM). The study yielded positive results, showing a reduction in arrival time. The incident management team is investigating creating a separate staging area, thereby leaving the emergency stopping site for its intended uses by disabled vehicles and law enforcement.

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 addition of the heavy-duty wrecker still provides a benefit to the program. The following graph shows the impact on clearance times of the heavy-duty wrecker, which is used to quickly clear disabled vehicles such as transit buses, school buses, and heavy vehicles.

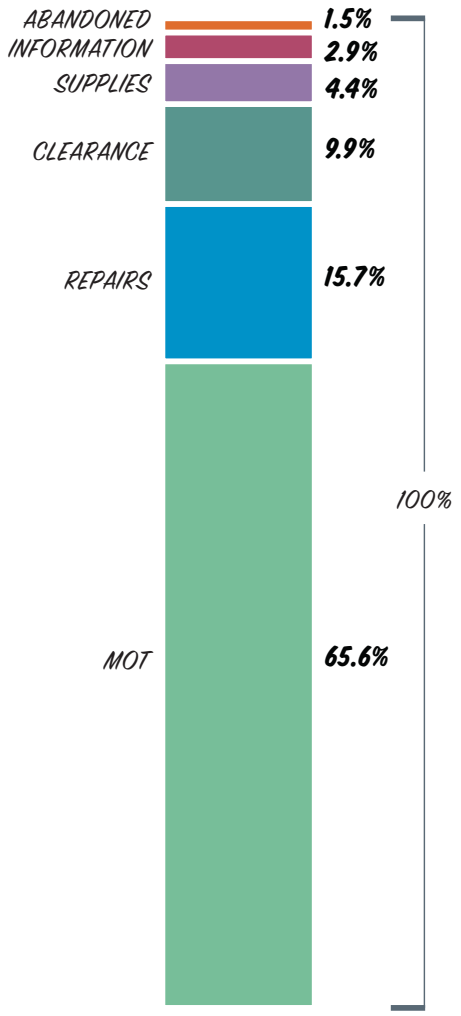
INCIDENTS RESPONDED TO BY HEAVY-DUTY WRECKER

WITH CLEARANCE TIMES IN MINUTES



As shown in the following graph, 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

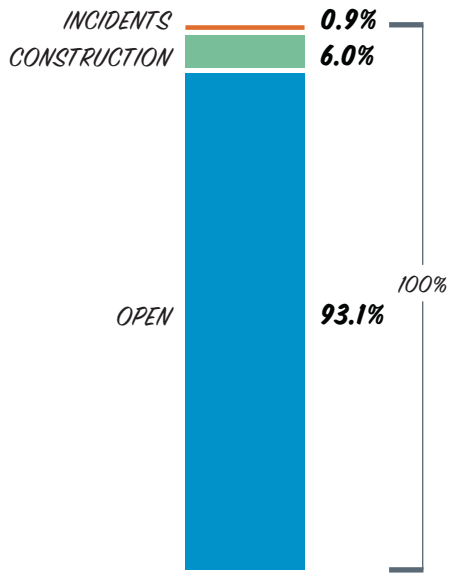


IRV OPERATOR

Incident Response Vehicle (IRV). District Six's IRV program continued its full complement of seven active IRV trucks covering 95 Express, Palmetto Expressway, and I-75. IRV operators responded to 2,161 events during FY 2018–2019. IRV operators, along with the FHP, Road Rangers, and other responders were instrumental in keeping the 95 Express lanes open and available for use 93% of the time during the fiscal year, with the facility remaining closed due to incidents 1% of the time as illustrated in the graph on the following page. The average travel lane blockage duration in the express lanes was 27.5 minutes in the northbound direction and 22 minutes in the southbound direction. Even though IRV operators focus mostly along the express lanes, they also assist motorists in the non-tolled general purpose lanes as well.

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

EXPRESS LANES FACILITY AVAILABILITY

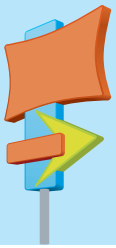


Rapid Incident Scene Clearance (RISC) Updates. RISC, an incentive-based program for the rapid removal of the more complex incidents that occur along District Six roadways that would normally require additional time for clearance, continues to support Florida's Open roads Policy. RISC contractors must respond with all required vehicles within 60 minutes and clear the travel lanes within 90 minutes to receive the incentive. The RISC coverage area includes all major freeways, Krome Avenue, and Okeechobee Road. During FY 2018–2019, the average RISC response time was 49 minutes, while the average RISC travel lane clearance time was 60 minutes. In total, STMC Operations staff summoned RISC resources 20 times during the fiscal year. The RISC program has responded to 146 events since its inception in 2009. The following table summarizes historical RISC response times by fiscal year.

In the next fiscal year, we will be expanding RISC service to include US 1 in Monroe County from Stock Island to Florida City.

RISC PERFORMANCE

	RISC PERFORMANCE (MINUTES)				
FISCAL YEARS	ACTIVATION TIME	RESPONSE TIME	TRAVEL LANE CLEARANCE TIME	TOTAL INCIDENT CLEARANCE TIME	TOTAL RISC EVENTS
2010–2011	21 m	37 m	60 m	128 m	12
2011–2012	10 m	39 m	88 m	161 m	9
2012–013	28 m	46 m	85 m	225 m	7
2013–2014	23 m	45 m	68 m	161 m	19
2014–2015	28 m	43 m	57 m	141 m	18
2015–2016	28 m	47 m	63 m	146 m	15
2016–2017	16 m	50 m	60 m	132 m	19
2017–2018	17 m	49 m	61 m	148 m	17
2018–2019	**19 M**	**49 M**	**60 M**	**141 M**	**20**
TARGET	–	60 m	90 m	–	–



IT / ITS MAINTENANCE

A robust and active IT/ITS Maintenance program is the backbone of STMC Operations allowing current systems and emerging technologies to work properly and reliably. The IT/ITS Maintenance program at the District Six TSM&O office has been preparing for the future by creating resilient, redundant communication systems and performing upgrades to system equipment to handle data and video requirements while remaining vigilant with respect to network security issues.

Being able to respond to problems with field equipment is critical to keeping the overall ITS functioning properly. Systems such as express lanes, ramp signals, and arterial traffic signals rely on equipment that works consistently in the field. During FY 2018–2019, the ITS Maintenance team managed more than 2,200 trouble tickets and overall a total of 6,000 tickets, which includes field equipment maintenance by contractors on active construction projects.

IT networks need to take into account the amount of data that will be received from emerging technologies such as CV and Automated Traffic Signal Performance Measures (ATSPM). The IT team is constantly reviewing current infrastructure, future needs, and equipment life cycles to project when equipment upgrades will be needed and then planning accordingly.

IT staff examined data from multiple sources and how it could be combined with data generated by the STMC. This study resulted in an effort to aggregate these data and provide interactive dashboards for key functions at the STMC. Currently, there are dashboards for inventory of ITS devices, evaluation of ITS device maintenance, incident management measures, operation measures, travel times, and ITS component availability. Most of the dashboards can be filtered for historical ranges and by roadway.

The following table shows the availability of key system components during FY 2018–2019 as compared to previous fiscal years. The cameras along US 1 in the Florida Keys were not included as they are in the process of being replaced as a result of damages sustained during Hurricane Irma.

ANNUAL AVERAGE SYSTEM AVAILABILITY

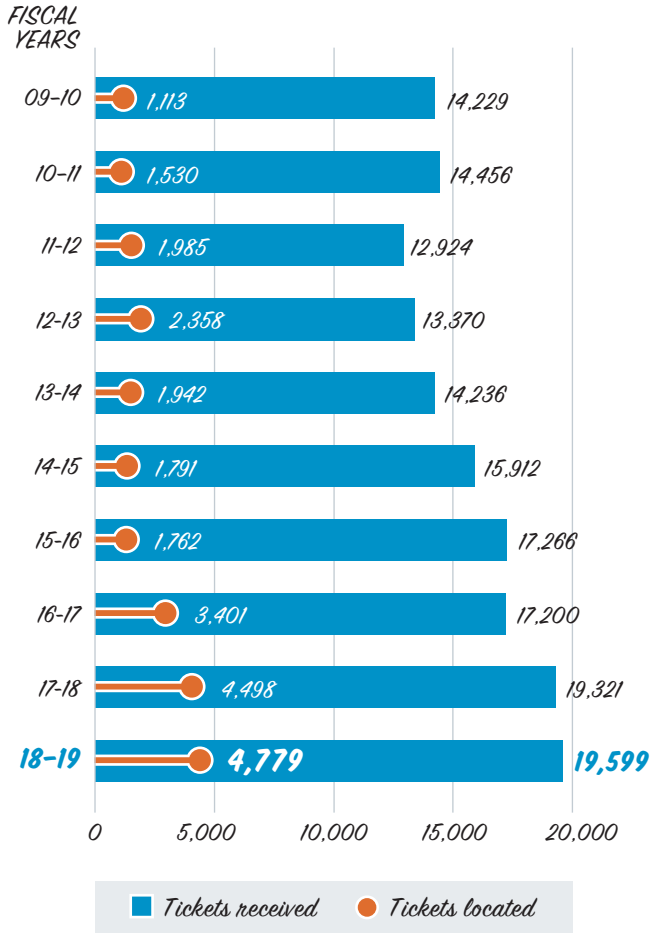
	SUBSYSTEM					
FISCAL YEAR	CCTV	DMS	VEHICLE DETECTORS	VIDEO WALL	SUNGUIDE	OTM
2012–2013	95.47%	93.85%	94.90%	97.49%	97.97%	99.85%
2013–2014	97.56%	96.66%	96.13%	97.43%	99.86%	99.97%
2014–2015	94.73%	96.15%	95.05%	98.86%	98.97%	99.68%
2015–2016	92.73%	98.25%	87.44%	99.90%	97.98%	99.98%
2016–2017	92.42%	96.66%	87.48%	99.43%	96.93%	99.99%
2017–2018	86.69%	87.00%	77.73%	98.93%	95.19%	99.61%
2018–2019	**93.53%**	**96.26%**	**89.91%**	**99.67%**	**98.51%**	**99.98%**

IT TECHNICIAN CHECKING FIBER OPTIC CONNECTIONS

Utility Infrastructure Location Services. Dependable power and communication are important to current systems and future technologies. The combination of an extensive underground infrastructure and an active construction environment can result in damages and disruptions of service. A critical function 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 before construction begins helps to prevent damage. Notifications are received from Sunshine 811 about upcoming activity that may conflict 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, 19,599 Sunshine tickets were received, and 4,779 Sunshine tickets were located. The following graph shows the number of locates since FY 2009–2010.

Network Security. During FY 2018–2019, the IT/ITS Maintenance staff continued to work on security measures making the overall network secure. A security test was conducted to identify potential vulnerabilities and weaknesses in the network. The IT/ITS Maintenance staff continue to work with the FDOT's Office of Information Technology to identify and minimize potential security risks.

LOCATE TICKET SUMMARY



TRAVELER INFORMATION

95 EXPRESS FLYOVER

Traveler information is poised to change with the advancement of new technology. Onboard navigation systems and enhanced notification applications can take advantage of new data from vehicles sharing data with other vehicles and the surrounding infrastructure. 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.

The STMC uses several other online resources to supplement information coming in from the SunGuide system. Waze continues to provide useful notifications of possible traffic events. RITIS (Regional Integrated Information System) is used as a data aggregator of vehicle detection data. RITIS is useful in areas where ITS infrastructure does not yet have vehicle detectors.

The next wave of traveler information will be through social media. Capturing information from services such as Twitter could provide the STMC with advanced indication of a possible traffic event. This will be explored further in the next fiscal year.

Florida's Advanced Traveler Information System (FLATIS)

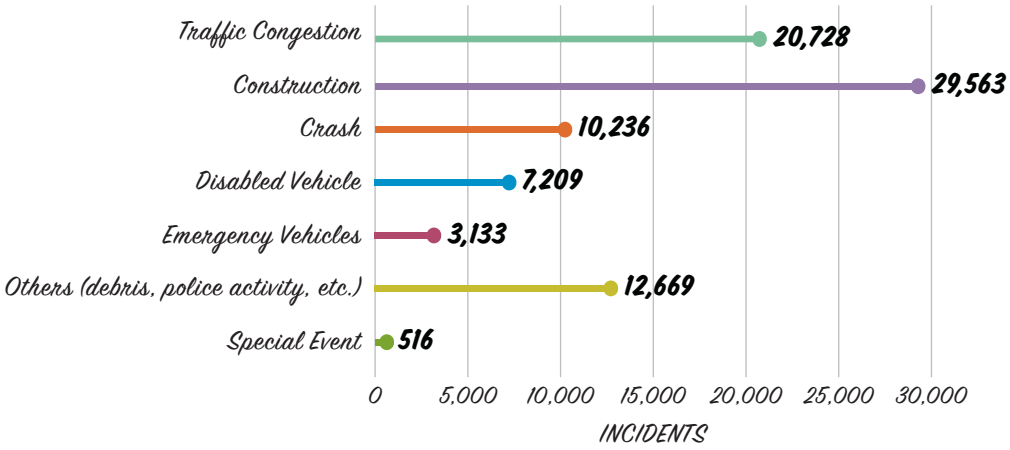
During FY 2018–2019, the 511 service continued to receive calls statewide, and users from southeast Florida made up a sizable portion of those calls. District Six STMC operators published over 84,000 event updates of lane blockage and congestion events on roadways managed by the District Six STMC. The following graph shows the different types of published events on the 511 service.

DMS Messaging

Given the improvements with information dissemination, one of the key elements of District Six's traveler information service is its system of DMSs. These signs display lane blockage information, travel times, pre-event messages, and congestion messages—all of which help motorists with their travel experience in both Miami-Dade and Monroe Counties. DMSs also display service announcements, such as child abduction alerts and silver alerts. During FY 2018–2019, more than 419,000 messages were displayed on District Six DMSs, with most messages for incidents and safety announcements. The bottom graph summarizes the types of DMS messages displayed this fiscal year.

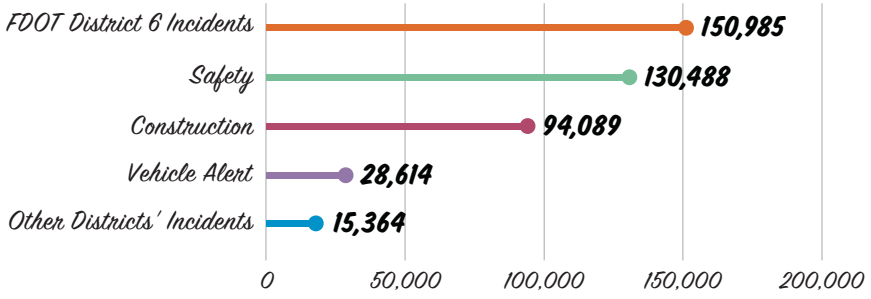
FLATIS-PUBLISHED TRAFFIC INFORMATION BY EVENT TYPE

84,054 TOTAL PUBLISHED EVENTS UPDATES

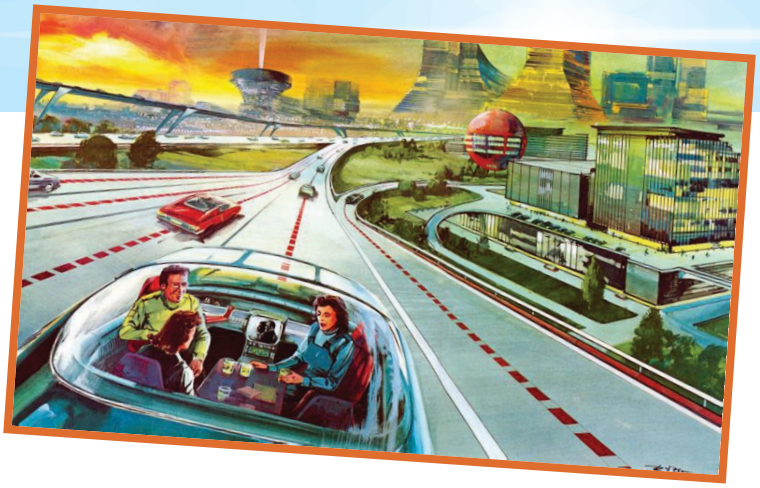


POSTED DMS MESSAGES BY TYPE

419,540 TOTAL MESSAGES



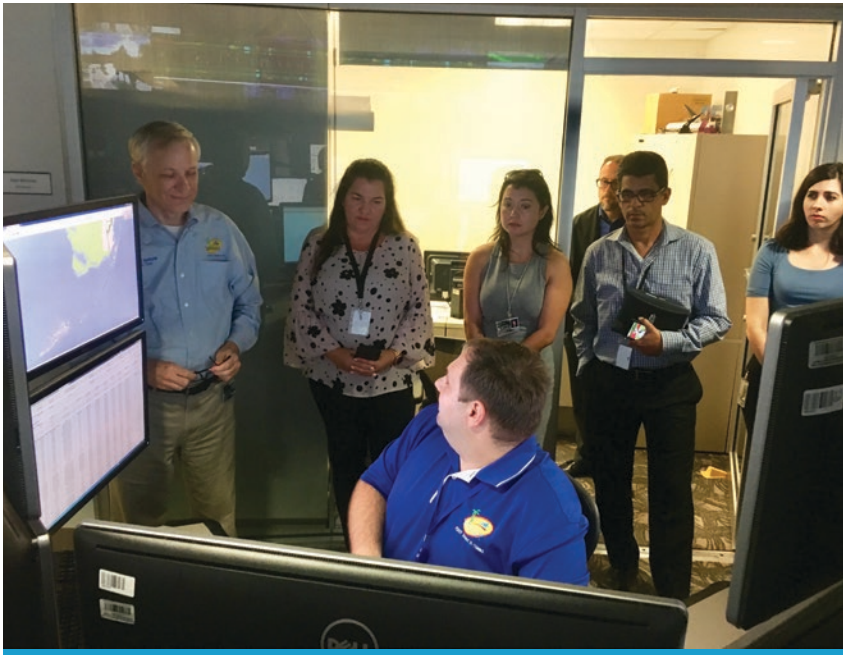
PUBLIC OUTREACH



Public Information (PI) has the opportunity to utilize new technologies to reach customers on a level not seen before. PI staff serve multiple roles as customer service for general transportation, express lanes, and arterial operations. Staff partnered with multiple agencies and the media to promote the program's public services. The STMC continually hosts tours, publishes articles, and participates in industry conferences to broaden its profile within the local community and nationally.

This fiscal year, the PI staff focused on streamlining the way customer comments are received, logged, routed, and resolved. Customer questions and comments are important as they can lead to valuable feedback into how the transportation system is servicing the public. It is important to have the correct answer so the customer is informed with the response and because it instills trust in those delivering the response. In-house customer service software, TMC Connect, had been used for this purpose. As transportation services continue to grow, customer comments may need to be routed to other service providers, such as transit agencies or other FDOT districts. Working with regional partner South Florida Commuter Services, PI staff helped to implement a new system for tracking customer comments. The new system is a cloud-based web application that provides a platform for comments to be received from multiple interfaces then routed, shared, and answered by multiple stakeholders—in essence creating a "one stop shop" for southeast Florida customer service. This new customer service interface will be crucial to help manage the anticipated inquiries from new services, such as Palmetto Express and 75 Express.

The PI staff help provide information to motorists, the media, and other agencies in our community. One of the outlets is our project website, sunguide.info. PI staff completed an update of the website, creating a fresh new look and new content while providing a more user-friendly interface. Interactive performance dashboards were added so users can see current and past performance.



STMC VISIT BY DISTRICT SIX EXECUTIVE MANAGEMENT
From Left to Right: James Wolfe, District Six Secretary; Yamilet Diaz, TSM&O Engineer-Arterials; Cindy Capdevila, District Six Transportation Support Manager; Rudy Garcia, District Six Director of Operations; Cherie Rodriguez, Senior Engineer Trainee

MOVE OVER / DRIVE SAFE PRESS CONFERENCE

Tours. The District Six TSM&O office frequently conducts tours of the STMC. Tours typically include a presentation by the TSM&O office, viewing of the control room operations, and, in some instances, a walkthrough of the control room. Staff facilitated tours during FY 2018–2019 for:

- Department of Homeland Security
- Government of Dominican Republic
- Miami-Dade and Broward Transit
- State Representative James Bush III
- Florida International University chapter of Institute of Transportation Engineers
- FDOT Job Shadow Day
- Siemens Intelligent Transportation Systems
- Smart Cohort
- Panama Empresa Nacional de Autopista

Press Conferences. The District Six TSM&O office hosted several press conferences with other programs and agencies during the fiscal year. Press conferences promote awareness for the public and news media. One highlight was the Move Over/Drive Safe press conference. This press conference shined a spotlight on a critical concern, the safety of first responders on site at a traffic event. Multiple law enforcement and incident management agencies participated, delivering a unified message. Motorists approaching a first responder or incident management provider must move over a lane or slow down to 20 miles per hour below the speed limit.

Customer Service. Customer service efforts continued to be a high priority as the District added arterial operations as part of its core services and anticipates the opening of new express lane facilities. As a result, staff processed 341 comments on a variety of topics that included tolling, transit, and data requests for academic and professional institutions. PI staff also assisted with citizen comments on the signal systems along SW 8 Street and along US 1 in the Florida Keys. There were 72 comments for SW 8 Street and 37 comments for US 1.

BENEFITS TO THE PUBLIC

Emerging technologies along with the TSM&O office's traditional services will continue to benefit to the region. Making the overall ITS network more resilient, improving the quality of CCTV camera video, disseminating information quicker to motorists and incident management responders, maintaining a fleet of efficient Road Rangers and IRVs, and coordinating with partnering agencies all contribute to positive gains. The TSM&O office also has a positive impact by providing assistance during emergency situations, such as hurricanes, large-scale events, and other regional emergencies. Key capital investment through the replacement projects and new roadway improvement projects helps keep needed infrastructure in place. Significant operations and maintenance funds are needed to keep the systems working correctly and efficiently.

The key benefit of the TSM&O office is getting the roadways cleared of events quickly so that motorists and freight can continue moving. Reducing incident duration reduces the delays to traffic

The FDOT District Six TSM&O office's budget for FY 2018–2019 included operating, maintenance, and capital improvement costs. The costs displayed in the table on page 25 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 $3.3 billion. The improved incident clearance time of 25.7 minutes had a significant impact during FY 2018–2019 for the 22,600 events that blocked travel lanes.

SUNGUIDE TRANSPORTATION MANAGEMENT CENTER RECEPTION

Additionally, 95 Express and the Ramp Signaling System also contributed to the reduction of delays during peak hours, translating into savings of $22.9 million. This estimate was calculated using widely accepted statistical methods for estimating the cost implications of traffic delays. The estimate only includes time saved by motorists; it does not address road user cost savings.

When comparing the total estimated benefits of the TSM&O program during FY 2018–2019 to the total annual operating expenses and capital investments (annualized over 10 years at 7%), the TSM&O program yields $33.05 in economic benefit for every dollar spent (benefit-cost ratio of 33.05:1).

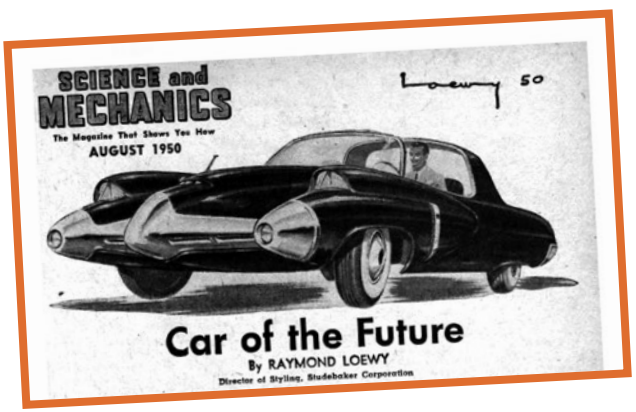
FISCAL YEAR 2018-2019 COSTS

ITS Operations	$10,231,445
ITS Maintenance*	$5,623,407
Road Rangers	$8,980,309
RISC	$43,000
FDOT Cost Center Operating Budget	$4,982,968
Signal Maintenance Agreement, Miami-Dade County	$6,461,175
Signal Maintenance Agreement, City of Key West	$59,363
Other (Consultants, FTE, FHP, FIU)	$23,867,680
Total Annual Operating Costs	$60,249,347
Total Annualized Capital Costs	$40,282,664
TOTAL ANNUAL COSTS	**$100,532,011**

* Includes express lanes ITS maintenance and express lane marker repair

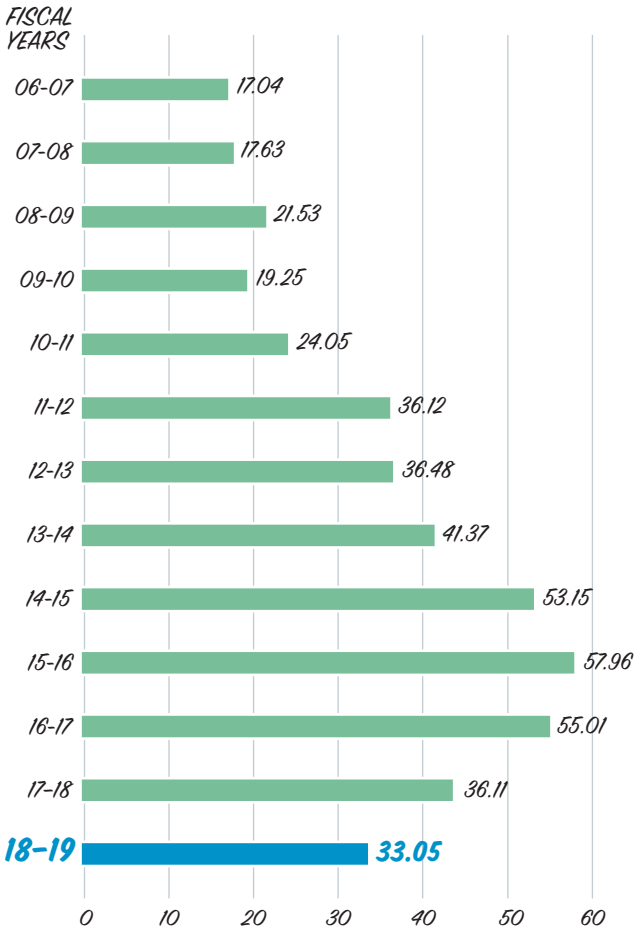
FISCAL YEAR 2018-2019 BENEFITS

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



The following graph shows the benefit-cost ratio for FY 2018–2019 and the previous 10 years. Although it still shows a favorable benefit-cost ratio, the decrease from the previous years is attributed to an increase in operational expenses and additional capital expenses.

BENEFIT-COST RATIO



A LOOK AHEAD

It is interesting to have the future on our doorstep knowing that technology will continue to evolve. The one constant in the foreseeable future is that traffic will continue to be there in whatever shape or form it takes as people and freight need to get from point A to point B. The FDOT District Six TSM&O office takes advantage of lessons learned. All of our standard operating guidelines and support documents are updated annually. As the roadway system changes and technology's impact increases, processes are in place to adapt and learn from these changes.

FY 2019–2020 will bring more challenges and services to the TSM&O office. The next express lanes corridor along I-75 and SR 826 will open with tolling and ramp signals. Our arterial operations program will continue to expand as the traffic signals along state roads in the City of Key West will be operated and maintained by District Six. CV will become a reality with the first project along US 1 in the Florida Keys.

RISC Services in Monroe County. The TSM&O office will begin RISC services in Monroe County in the next fiscal year. US 1 is the only road that provides access into and out of the Florida Keys. This is also a critical hurricane evacuation route. One overturned tractor trailer along US 1 can close the road for a significant length of time. Adding RISC to Monroe County will help to clear these large-scale events quicker and supports the Open Roads Policy of the State of Florida. The Monroe RISC program will cover US 1 from Stock Island to Florida City.

Traffic Signals in City of Key West. In the next fiscal year, the STMC will begin preparations to expand its signal system. In FY 2020–2021, the number of traffic signals operated and maintained by the STMC will double. Beginning in July 2020, 17 traffic signals along state roads in the City of Key West will be added to the Monroe County Traffic Signal System. The STMC will be working closely with the City of Key West on this transition and will coordinate with the City of Key West Police

US ROUTE 1 CONNECTS THE FLORIDA KEYS TO THE MAINLAND

ARTERIAL DYNAMIC MESSAGE SIGN ALONG US 1

BUS RAPID TRANSIT ALONG 95 EXPRESS

GOLDEN GLADES MULTIMODAL TRANSPORTATION FACILITY

Department to identify signal problems and conduct initial troubleshooting.

Express Lanes Projects. Express lanes projects will continue to be active in the next fiscal year. District Six is prepared to begin operation of the Palmetto Express and 75 Express. Additional express lane operators and IRV operators will help to manage these corridors. This will be the first system-to-system express lanes connection with the direct connection of the express lanes along I-75 and the Palmetto Expressway. The project will also connect the 75 Express portion in District Six with the existing system in District Four. Commuters will have a full express lane experience from 595 Express in Broward County to 75 Express and Palmetto Express in Miami-Dade County. Plans are currently being developed for additional Palmetto Express segments, eventually connecting to 95 Express to the north. Studies are being finalized for the extension of the south Palmetto Express to US 1.

Express lane activity will continue in the region with Phase 3 of 95 Express entering its third year of construction and extending this facility into Palm Beach County. Completion of this project is expected in 2022.

ITS Device Replacement Project. The ITS device replacement projects will continue in the next fiscal year. The retrofitting of remaining analog cameras with HD digital cameras will be completed in the next fiscal year. The next replacement project will include more DMS and camera replacement plus the migration of ITS devices along I-95 to new fiber optic cable.

Golden Glades Multimodal Transportation Facility. District Six started a project this fiscal year 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 June 2021.

CONNECTED VEHICLE SYSTEM PLANNED FOR US ROUTE 1 / OVERSEAS HIGHWAY

Connected Vehicles. District Six supports the Florida Connected Vehicle Initiative. The projects from this initiative will connect transportation users to the transportation system in new ways. 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 Keys COAST project will be implemented along US 1/Overseas Highway in the Florida Keys. This project will also provide signal phasing and timing (SPaT) information and introduce ATSPM. Using performance measures at signalized intersections facilitates optimal signal timing and proactively corrects problems. Upgrading signal controllers to support high-resolution data allows a multitude of real-time data to be collected and used.

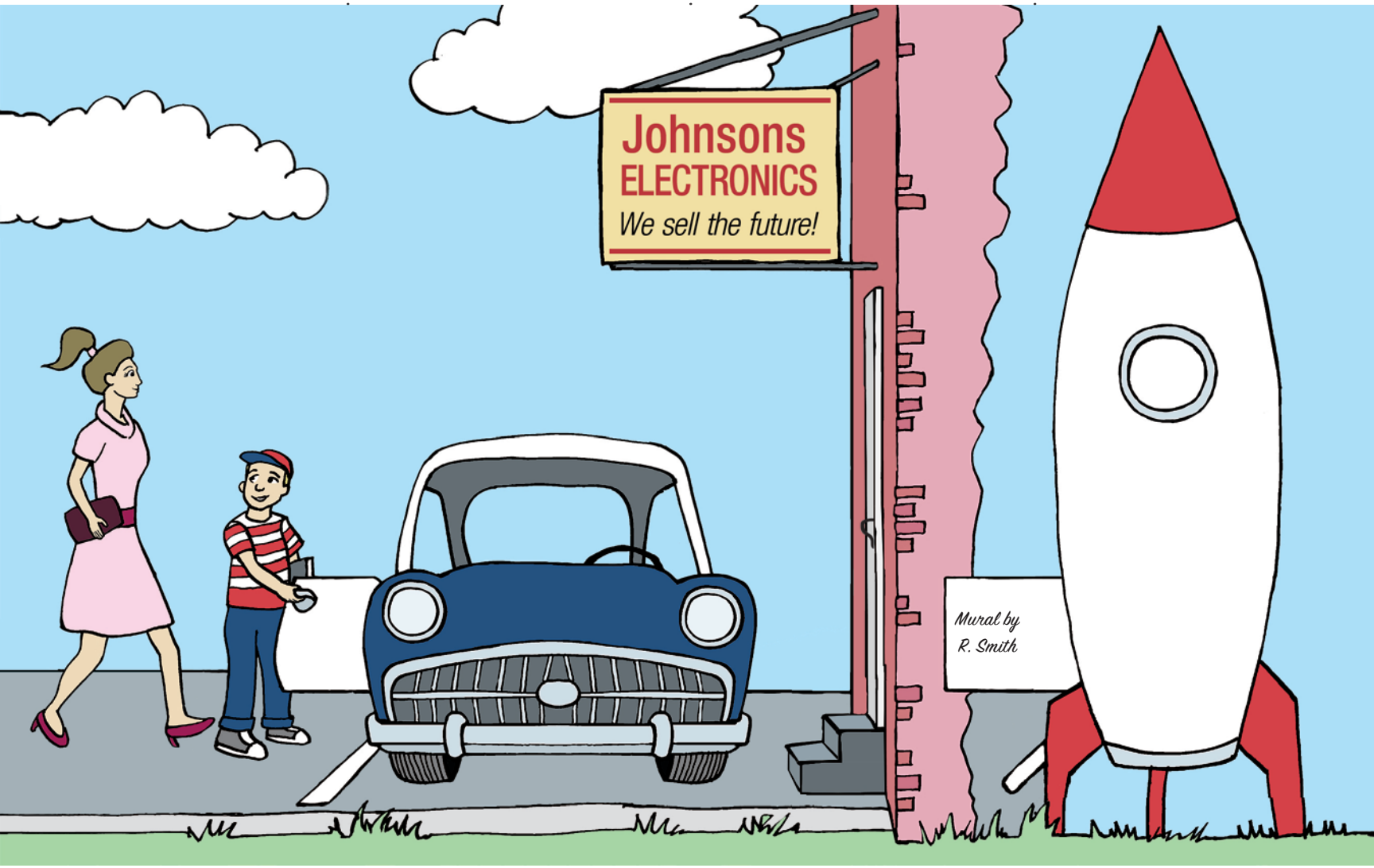
An ASCT project is near completion along NW 119 Street (SR 924) east of the Gratigny Parkway. This project includes 15 signalized intersections. Phase 1 is the deployment of an ASCT system along the corridor. Phase 2 will introduce CV. New traffic signal controllers have been installed that can transmit SPaT information to roadside equipment and vehicle onboard systems.

WHAT DOES EVERY KID WISH THEY COULD RIDE AROUND TOWN IN?

THIS ANNUAL REPORT WOULDN'T BE COMPLETE WITHOUT A FUN FDOT FOLD-OVER

Fold right side of page over left along dotted lines to match up **1** *and* **2**

1 ▶ ◀ 1



MOMS REGULARLY DRIVE THEIR KIDS ALL OVER TOWN IN THE FAMILY CAR, NEVER REALIZING WHAT THE KIDS ARE DREAMING ABOUT EVERY SINGLE TIME THEY GET IN THE CAR.

ARTIST: BILLY RUPPERT

2 ▶ ◀ 2

FDOT

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Javier Rodriguez, P.E.

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Page 25: August 1950 issue of *Science and Mechanics*, page 67, "Car of the Future" by Raymond Lowey

Back Cover: General Motors 1956 Oldsmobile Golden Rocket Motorama show car