SUNGUIDE TRANSPORTATION
MANAGEMENT CENTER
Florida Department of Transportation
District VI
1001

Keeping South Florida Moving

A Message from the District Secretary

For the Florida Department of Transportation (FDOT) District Six Intelligent Transportation Systems (ITS) Program, keeping South Florida moving is priority number one.

Through the technology deployed by the program, like Closed Circuit Television (CCTV) cameras, Dynamic Message Signs (DMS), vehicle detectors and software, the program is able to deliver an integrated system dedicated to accomplishing that priority.

With our cameras and detectors, Transportation Management Center (TMC) Operators are not only able to locate incidents on our roadways, but also dispatch responders to them, which helps clear obstructions as quickly and safely as possible. Our DMS help inform motorists of possible congestion and travel times. The Road Rangers assist those who are stranded get back on the road. All of our software manages these tools and services to ensure the ITS Program operates as efficiently as possible.

That does not paint the whole picture, though. Sure, our technology and Road Rangers are the ITS Program's most visible assets, but a lot more goes on behind the scenes. The ITS team is constantly coordinating with its partner agencies in Miami-Dade and Monroe counties, agencies like the Florida Highway Patrol (FHP), the Monroe County Sheriff's Office (MCSO), fire rescue, the Miami-Dade Expressway Authority (MDX), the Florida Turnpike Enterprise (FTE) and several others.

Without these partnerships and coordination efforts, the ITS Program would not yield the same benefits it does today. The technology the program uses would be nothing without the people behind it – constantly planning, working, enhancing, and coordinating.

This annual report will fully paint that picture for you. You will see first-hand in these pages all the hard work our team put toward making District Six's ITS Program during fiscal year 2010-2011 as successful as it can be. With the entire team's help, the ITS Program kept South Florida moving – and will keep it moving during fiscal year 2011-2012 and beyond.

Gus Pego, P.E.
District Six Secretary of the
Florida Department of Transportation

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Introduction

The Florida Department of Transportation (FDOT) District Six Intelligent Transportation Systems (ITS) Program is a dynamic one – constantly evolving, enhancing and optimizing its services with one goal in mind: keeping South Florida motorists moving safely.

ITS is a powerful tool in meeting the Department's commitment to enhance system capacity and improve regional mobility by supporting and managing South Florida's transportation infrastructure through the applied use of integrated technologies. Fiscal year 2010-2011 again exemplified that ITS, and District Six's ITS Program in particular, is a viable alternative and/or supplement to traditional roadway enhancement projects.

The ITS Program is comprised of the five areas listed below.

- **ITS Deployments** – Providing planning, design and procurement of ITS equipment, such as Closed Circuit Television (CCTV) cameras, Dynamic Message Signs (DMS), vehicle detectors and communications.

- **TMC Operations** – Providing a central location for data collection and dissemination. This is the command center for monitoring and managing traffic and incidents.

- **Traffic Incident Management (TIM)** – Providing the Road Rangers – Florida's version of a safety service patrol – and additional incident management resources. Coordinating multi-agency meetings to identify issues and develop solutions to improve incident management.

- **Florida's Traveler Information System (FLATIS)** – Providing real-time traveler information services through various media, such as the telephone, Internet – and now, a smartphone application.

- **IT/ITS Maintenance** – Managing the maintenance of ITS field and TMC equipment to ensure system availability and stability, as well as software support.

Fiscal year 2010-2011 marks the sixth edition of District Six's ITS Annual Report. In this report, we highlight how the District Six ITS team focused its efforts on providing congestion-free travel on FDOT roadways by enhancing its project operation strategies, software and coordination efforts. We hope you find the report informative and welcome you to join District Six as we continue to lead South Florida toward a safer, more efficient traveling future.

ITS MISSION:

Enhance the safety, security, and efficiency of Florida's transportation system through the implementation of interoperable ITS technology in support of local, regional, and statewide mobility.

ITS VISION:

Be the national leader in ITS by promoting multijurisdictional coordination for the provision of an efficient, secure, reliable, and safe transportation system.

ITS Deployments

I t's safe to say that technology plays a very important role in the ITS Program. FDOT District Six is committed to the continuous enhancement of its ITS infrastructure, and fiscal year 2010-2011 saw the completion and commencement of several deployment projects aimed at further strengthening the program's effectiveness.

A summary of FDOT District Six ITS projects completed during fiscal year 2010-2011 can be found below:

- **DMS Replacement (FIN 417740-2-92-01)** – District Six was one of the first FDOT Districts to replace its legacy Dynamic Message Signs (DMS), and the project commenced during fiscal year 2009-2010. Construction continued during fiscal year 2010-2011, and was finally completed in November 2010, replacing 13 DMS on existing structures along Interstate 95 (I-95), State Road 826 (SR 826), SR 9, US 441 and the Florida Turnpike's spur.

- **Test Pole** – The District Six ITS team recently completed the installation of a test pole used for testing several ITS devices before deploying them in the field. The pole is located near the Transportation Management Center's (TMC) parking lot, providing easy access to ITS staff. The test pole will benefit the ITS program by providing a safer environment for device testing, as well as saving the ITS team time and resources by not having to travel to the field to perform these tests.

- **Microwave Vehicle Detectors** – The TMC now has full coverage on I-95 after installing 31 new state-of-the-art vehicle detectors on the south portion of the facility. These roadside vehicle detectors will allow the ITS team to expand its travel time information service by collecting speed, volume and occupancy data on I-95 between US-1 and Downtown Miami. The new vehicle detectors also have built-in cameras for calibration and confirmation of the data it collects (see picture below).

The test pole near the TMC parking lot.

One of 31 new microwave vehicle detectors installed on I-95. The photo shows an example of what the video feed from the detector looks like.

Other projects that were ongoing and/or planned during fiscal year 2010-2011 but will continue with construction through fiscal year 2011-2012 included:

- **SR 826 Section II** – This project's ITS-related components include the installation of a fiber optic backbone to replace the current wireless communications for the existing CCTVs on SR 826 between SR 836 and US-1. It will also add a DMS on the northbound side of SR 826, between SW 72 Street and SW 56 Street and eight arterial DMS. Construction is expected to begin in July 2011 and last six to seven months.

- **SR 826 Section V** – Similar to Section II, this project includes the relocation of current CCTVs and the addition of new ones, new DMS (one roadway

DMS and eight arterial DMS), vehicle detectors and fiber optic cables. The addition of these devices will provide the District with full coverage of the SR 826/SR 836 Interchange, and construction is already underway.

- **DMS Replacement and ITS Device Installation (FIN 417740-4-92-01)** – This design-build project will replace more DMS and install more CCTV and vehicle detectors with a fiber optic backbone in Miami-Dade and Monroe (Jewfish Creek) counties. A new contract was procured during fiscal year 2010-2011 for this project.

The table below summarizes the status of ITS deployment projects within FDOT District Six as of the end of fiscal year 2010-2011.

FDOT District Six ITS Deployment

Roadway	CCTV*		DMS		Detectors**		Ramp Metering	
	D	UC	D	UC	D	UC	D	UC
I-95	30	3	10		98	2	22	
I-95 Express	66		40		45			
SR 826	32	5	10	3	88	10		
I-75	7	2	3		30			
I-195	6	2	3		21			
I-395	10		2		11			
US 1 (SW 17 to 112 Ave	22		5		6			
US 1 (South of Florida City	44	7	11		2			
Card Sound Road	5							
SR 9	1		1					
US 441	2		2					
Florida's Turnpike Spur	1		1					
Other Arterials		24	11	16				
Total	226	43	99	19	301	12	22	0

D = Deployed
UC = Under Construction
*Includes static CCTV for DMS verification
**I-95 Loop Detectors are reported as a detector station and not by individual loop.

TMC Operations

The FDOT District Six SunGuide Transportation Management Center (TMC) houses FDOT Operations Staff, who monitor and manage traffic, disseminate travel information and dispatch incident management resources on a 24 hour per day, seven day per week basis. TMC Operators coordinate with emergency responders and Road Rangers to clear incidents as quickly and safely as possible, and this coordination is enhanced by the co-location of the Miami-Dade Expressway Authority (MDX) TMC Operations Staff and the Florida Highway Patrol (FHP) Troop "E" dispatch within the TMC.

Software Enhancements – TMC Operators saw many new additions and enhancements to the control room's software catalog during fiscal year 2010-2011. These software additions and enhancements are aimed at streamlining procedures to increase operational efficiency.

- **Operations Task Manager (OTM)** – OTM integrated all existing TMC applications into one application when it was launched in December 2010. This standalone app includes the Express Lanes Manager (ELM), the Road Ranger Log, the Rapid Incident Scene Clearance (RISC) Watcher, Incident Notification, and the Florida Advanced Traveler Information System (FLATIS) modules. It also has advanced reporting capabilities that augment the existing SunGuide® software reports. Each one of these modules was designed to improve operator efficiency. For example, the Incident Notification module in OTM allows operators to not have to monitor several responder websites that were previously used for incident detection purposes. With the Incident Notification module, a mechanism was developed that gathers web data from several sources and reports it to operators to assist with incident detection. It provides alerts when new events are posted, information is updated, or when events are removed. As a result, TMC Operators detected 807 events from the FHP website – a significant increase to the 122 events detected last fiscal year.

  By integrating all of these modules into a single software application, TMC Operators can decrease the amount of time required to navigate the programs, and the maintenance of these modules is more efficient.
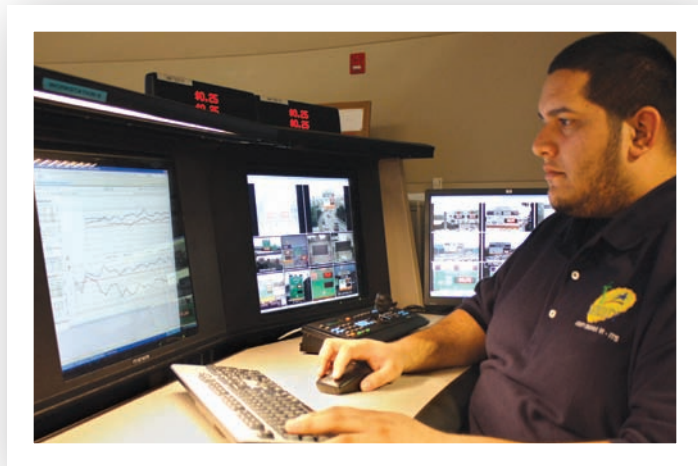

A TMC Operator monitors the Express Lanes Module in OTM.

- **SunGuide 5.0** – TMC Staff upgraded the TMC's SunGuide software to version 5.0 in December 2010. The new release and subsequent patches feature express lanes enhancements and a much-improved map interface, which allows for better use of Automatic Vehicle Location (AVL). With the improved AVL functionality, operators can now monitor the locations and availability of Road Rangers by glancing at the map, which can assist them in efficiently dispatching resources.

- **Operator Performance Quality Control (OPQC)** – The TMC Operational Services are provided through a performance-based contract, of which TMC Operators' performance is evaluated on 34 possible errors for each travel lane blocking event managed. This requires a detailed quality review of all travel lane blocking events. With the volume of events managed at the FDOT TMC, this effort was consuming approximately one-and-a-half full-time employees to complete. The OPQC software was developed to automate most of the evaluation effort, which has reduced this effort in half to approximately three-quarters of a full-time employee. The software can query SunGuide software data and compare it to established business rules in the TMC's Standard Operating Guidelines (SOG). Late in FY 2010-2011, the OPQC was deployed to the TMC control room for TMC Operators to perform a self check during lane blockage events. The software can then point out any errors the

operator might accrue if not addressed while the incident is still open. By providing this tool on the floor, the time it takes to train TMC Operators for acceptable performance has decreased, and the error-to-event ratios for veterans using it has reduced.

95 Express Operations – The 95 Express Project's first phase was completed during the previous fiscal year, and fiscal year 2010-2011 was the first complete year the facility operated in both the northbound and southbound directions of I-95. The 95 Express Project continues to have a positive impact on travel along the corridor as average speeds in both directions for both the express lanes (EL) and local lanes (LL) are well above the before-managed-lanes peak period speeds range of 18MPH to 20MPH. (**The afternoon peak period is defined as 4 p.m. to 7 p.m, NB, and the morning peak period as 6 a.m. to 9 a.m., SB.)

Express Lanes Speeds > 45 MPH (%)
Monthly Avg (FY 10/11)

Peak Period Speed (MPH)**
Monthly Avg (FY 10/11)

These higher speeds translate into more reliable travel as

measured in percentage of time the facility operates at speeds greater than 45MPH. As depicted in the first graph on the left side of this page, the average peak period speeds were all greater than 45MPH for the project's target of 90 percent for fiscal year 2010-2011.

Express Lanes % of Overall Traffic
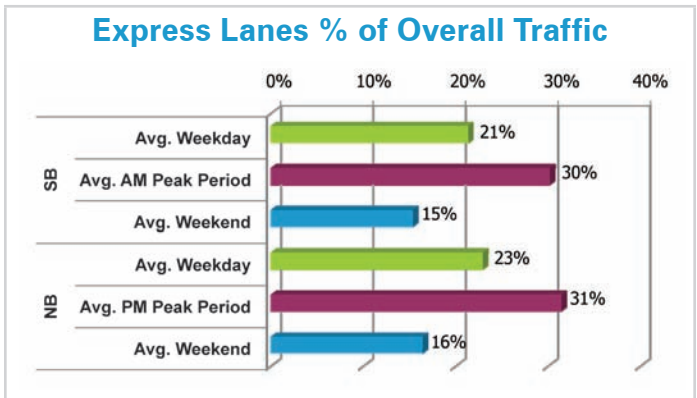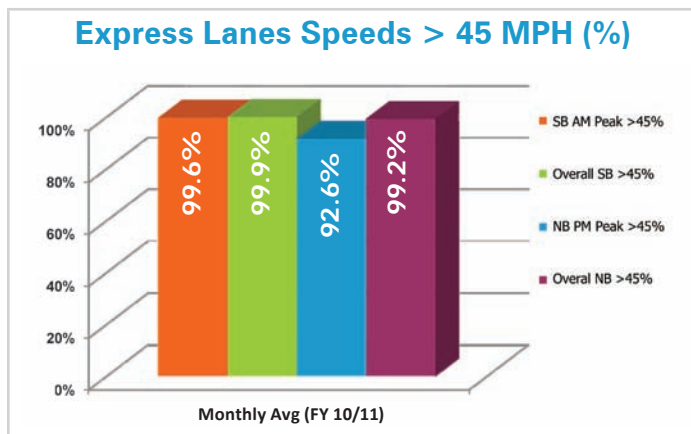
A more reliable trip also translates to greater demand for the express lanes. Since its inception, traffic volumes have increased steadily. For the northbound direction, average weekday traffic volumes have increased from 19,700 vehicles per day (VPD) to 29,500 VPD or 50 percent. For the southbound direction, average weekday traffic volumes have increased from 23,800 VPD to 29,600 VPD or 24 percent. Non-peak period travel on the express lanes increased during fiscal year 2010-2011 as well. The graph above depicts the average usage of the express lanes compared to the entire I-95 facility. While motorists do not gain much of a speed benefit when using the facility during non-peak hours, a survey showed these motorists found 95 Express to be safer and more reliable.
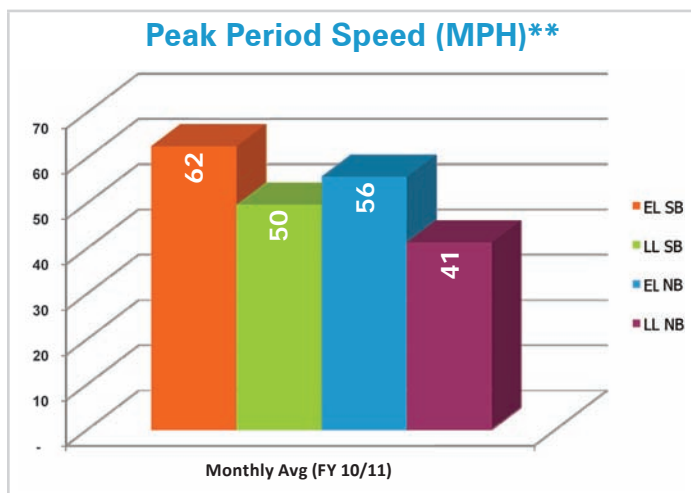
The FDOT District Six has successfully managed this increase in demand through closely monitoring the Express Lanes performance and by utilizing the highly configurable nature of the dynamic pricing algorithm in the Express Lanes Manager module in OTM. During fiscal year 2010-2011, 95 Express also improved mobility for transit users with a 22 percent increase in 95 Express Bus ridership. Public acceptance for the 95 Express Project is strong as it continues to provide a more reliable travel option to South Florida Motorists and transit riders. In a survey of nearly 5,000 South Florida commuters, 72 percent believed the express lanes to offer more reliable travel than the local lanes, and 57 percent wished to see the project further expanded.

Ramp Signaling Operations –Also a part of the 95 Express Project's first phase, the ramp signaling system saw its first full year of operation during fiscal year 2010-2011.
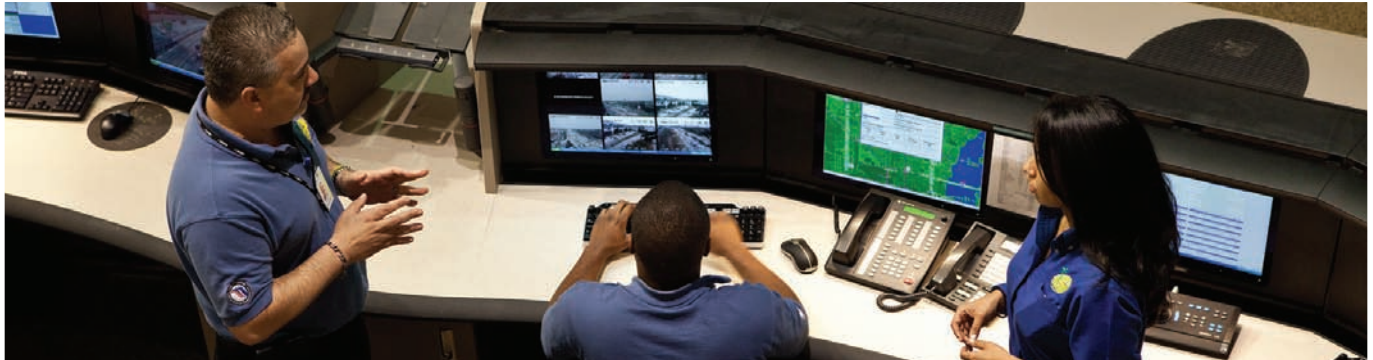
TMC Staff discuss congestion forming on one of South Florida's roadways.

The system consists of 22 total ramp signals, 10 on the northbound portion of I-95 and 12 southbound, which help keep traffic flowing. During FY 2010-2011, the FDOT District Six established key measures of effectiveness (MOE) for the ramp signaling operations. These key MOEs will allow ITS Staff to gauge the system's operational performance once two years' worth of data are collected for comparison. The MOEs are categorized into three groups:

- **Roadway Operations**
    - *Level of Service (Mainline)* - An indicator of whether or not an expressway is congested.
    - *Level of Service (On-ramp Merge)* - An indicator of overall operational status of a ramp merging area.
    - *Travel Time Reliability* - To evaluate travel time reliability, the ITS team will look at the Buffer Index (the extra time motorists must add to their average travel time to ensure on-time arrival at a given confidence level), Travel Time Index (an indicator of how much longer, on average, travel times are during congestion versus light traffic) and Planning Time Index (the total time a traveler should allot to ensure an on-time arrival).

- **Ramp Operations**
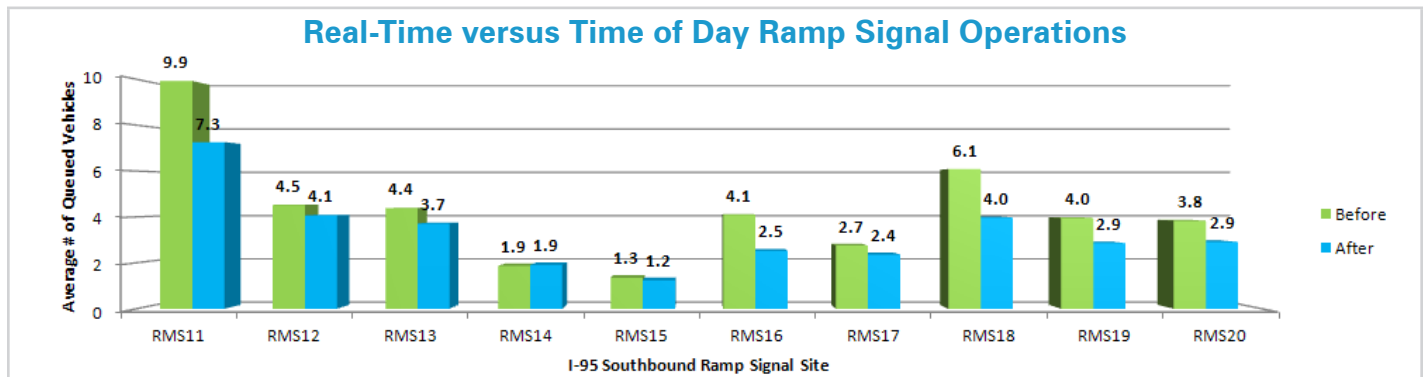   - *Queue Lengths* - The average length of a queue on a ramp during a ramp signal operation period.
    - *Delay Times* - The average travel time a motorist experiences from entering the ramp until passing the stop bar at a ramp signal. It is a good indicator of a ramp signal's operation.

- **Maintenance**
    - *System Availability* - The percentage of time a ramp controller is available. It is a good measurement of system reliability and efficiency of maintenance.
    - *Failure by Equipment Type* - A summary of the number of failures for each ramp signal. It provides insight on potential issues, can ease the identification of a failure and guide spare parts inventory.

In January 2011, the southbound ramp signals began traffic responsive operations (northbound began in January 2010) based on real-time traffic conditions along the I-95 Local Lanes and the on-ramps. This improved the performance of the ramp signal operations by reducing queues on the ramps and spillback to the arterials. The chart below compares May/June 2010 data (before) with May/June 2011 data (after). Overall, the average number of vehicles queued was reduced by 30 percent, and the spillback on to the arterials was eliminated on all but one ramp.

Real-Time versus Time of Day Ramp Signal Operations

I-95 Southbound Ramp Signal Site	Before	After
RMS11	9.9	7.3
RMS12	4.5	4.1
RMS13	4.4	3.7
RMS14	1.9	1.9
RMS15	1.3	1.2
RMS16	4.1	2.5
RMS17	2.7	2.4
RMS18	6.1	4.0
RMS19	4.0	2.9
RMS20	3.8	2.9

Monroe County Support – The TMC continued support for Monroe County by assisting with 61 percent more events in fiscal year 2010-2011 than the previous year. In addition, the TMC provided a video distribution link to its Monroe County TIM partners and included key Monroe County staff on the SunGuide e-mail alert distribution. This coordination resulted in more travel information disseminated to motorists traveling to and from the Florida Keys. TMC Operators post pre-event messages on DMS, 511 and FL511.com, as well as messages during construction events. In fiscal year 2010-2011, TMC Staff averaged 278 Monroe County DMS messages per month – about a 31 percent increase from last fiscal year.

Performance Measures – In December 2007, District Six set targets for key operational performance measures that have the greatest impact to the public. In fiscal year 2010-2011, the ITS team was once again able to exceed those targets thanks to quality control procedures that include daily reviews of all travel lane blocking events. These procedures help address procedural errors and potential ways to improve the efficiency of TMC operations. Compared to last fiscal year, the TMC Staff improved in all but one performance measure. The largest improvement was in TMC Operator Error Rate, which was reduced by 27 percent (see table below).

This reduction in error rate was a challenge, since both the number of events managed (+4 percent) and the number of lane blocking events (+44 percent) increased year over year (see graph on top right). The Time to Confirm an Event performance measure increased significantly from last year with the launch of the new incident detection module in OTM. In summary, the TMC detected events quicker than last year, and these earlier detections were primarily travel lane blocking events.
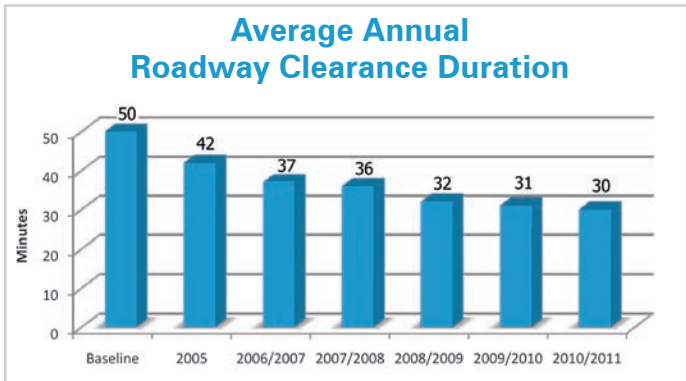

FDOT District Six Events Managed
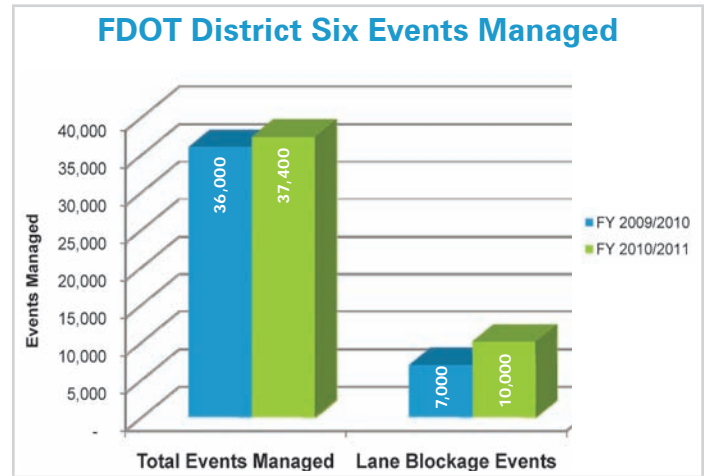
Construction Coordination – In fiscal year 2010-2011, FDOT had three major construction projects start up, increasing the need for TMC construction support. This support included closely monitoring changes in scheduled roadwork, attending monthly meetings for advanced coordination, and overseeing the contractors' Road Ranger services. This increase in support required an additional part-time TMC staff role. As a result, the TMC ensures the public is properly informed of all construction activities before and during events.

| Performance Measures	FY 09-10 Average	FY 10-11 Average	Target
DMS Efficiency	99.72%	99.82%	>95%
TMC Operator Error Rate	0.43%	0.32%	<0.69%
Time to Dispatch Road Rangers	00:01:05	00:00:56	<00:02:00
Time to Confirm an Event*	00:00:23	00:01:31	<00:02:00
Time to Post DMS	00:03:17	00:02:47	<00:05:00
Time to Notify Other Agencies	00:01:19	00:01:15	<00:07:00

*Does not include events detected by Road Ranger

Incident Management

District Six's Incident Management service helps maintain roadways free and clear of road blocking incidents. This effort can't be accomplished alone, however. This is why the Incident Management team promotes a multi-agency approach to incident response with the goal of reducing traffic congestion and reducing the chances of secondary crashes caused by prolonged exposure to traffic incidents. With the help of all the agencies involved in District Six's incident management efforts, the average annual roadway clearance time on District Six roadways was 30 minutes during fiscal year 2010-2011.

Average Annual Roadway Clearance Duration

	Baseline	2005	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011
Minutes	50	42	37	36	32	31	30

Road Rangers – The TMC serves as the control center for dispatching and coordinating field operations, and a large part of the field operations are the Road Rangers. They are the most visible incident management service the District provides, and their resources are provided on I-95, SR 826, I-195, I-395/Macarthur Causeway and I-75 (dispatch only). During fiscal year 2010-2011, two additional Road Rangers were added to patrol during weekdays between 5 a.m. and 9 p.m. (Oct. 2010, I-95, SR 826), further expanding the program's effectiveness.

- **Focus on Safety** – FDOT implemented new procedures that advised Road Rangers, and other first responders, to block additional travel lanes if their vehicle or Maintenance of Traffic (MOT) is touching the white line that separates one lane from another – all in the name of enhancing the safety and security of South Florida's first responders. Additionally, the TMC enhanced MOT procedures to address blind spot locations by dispatching additional Road Ranger back-up along hills and curves.
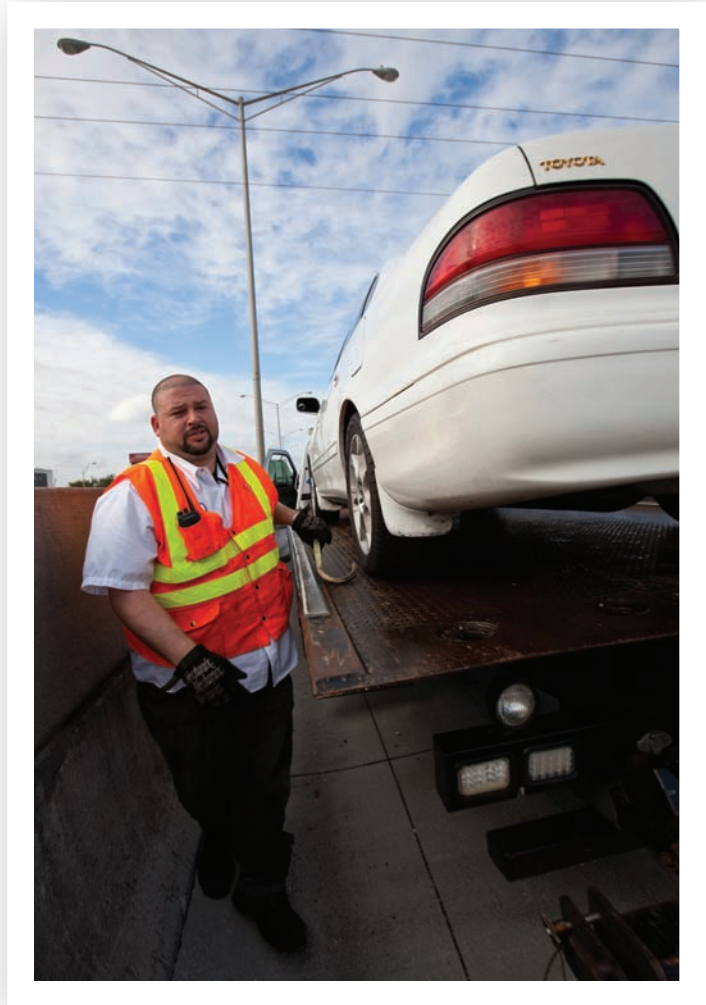
A Road Ranger prepares to tow a disabled vehicle on I-95.

- **AVL Integration in SunGuide** – The Automatic Vehicle Locator (AVL) used to be accessed via a separate website, but with its integration into the SunGuide map, SunGuide is now a one-stop-shop for Road Ranger dispatching and monitoring tools, which improved dispatching operations.

- **Quick Reference Guide** – The Incident Management team redeveloped and published the Incident Management team Quick Reference Guide, which serves as a cheat sheet for first responder procedures and guidelines. A copy of the quick reference guide was placed in each Road Ranger vehicle for easy access and reference.

- **SLERS** – The TMC's lead Incident Response Vehicle (IRV) operator evaluated the value of using Statewide Law Enforcement Radio Systems. SLERS is interoperable with other first responding agencies and is currently being tested at District Six. While the costs are still being evaluated, the SLERS radio system will bring key benefits in terms of reliability and enhanced information sharing.

- **RRDIS** – The Road Ranger Driver Information System (RRDIS) was integrated with the inspection software used by TMC staff and the Road Ranger contractor. This now allows management to run reports right from the RRDIS software, making it easier to access reports and to verify all inspections are being completed on time or sending e-mail notifications if inspections have not been submitted.
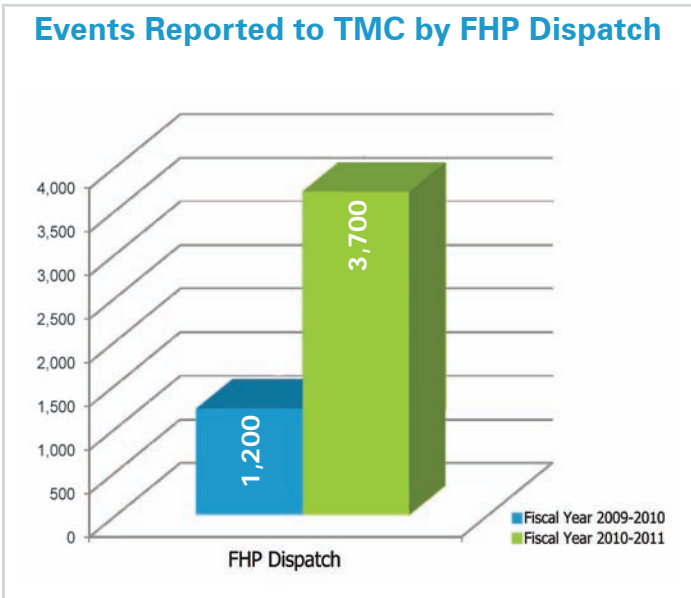

An IRV Operator arrives at the scene of a major crash involving a rolled over 18-wheeler.

Road Rangers had more than 38,200 responses to 29,600 events. They provided nearly 70,000 assists. A majority of them were MOT (57%), which demonstrates their value in providing safety to stranded motorists and responders.
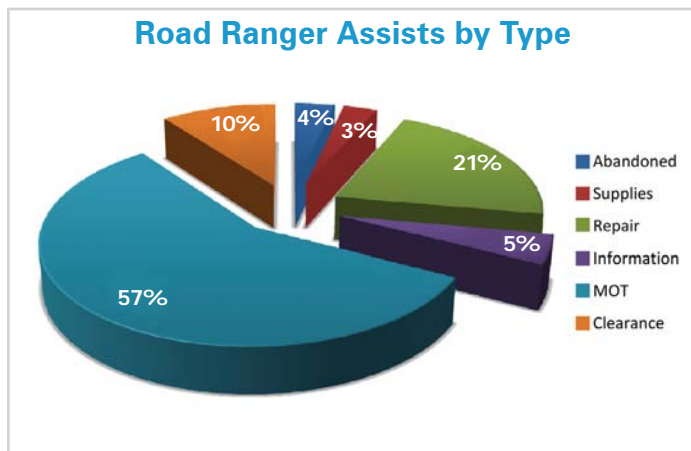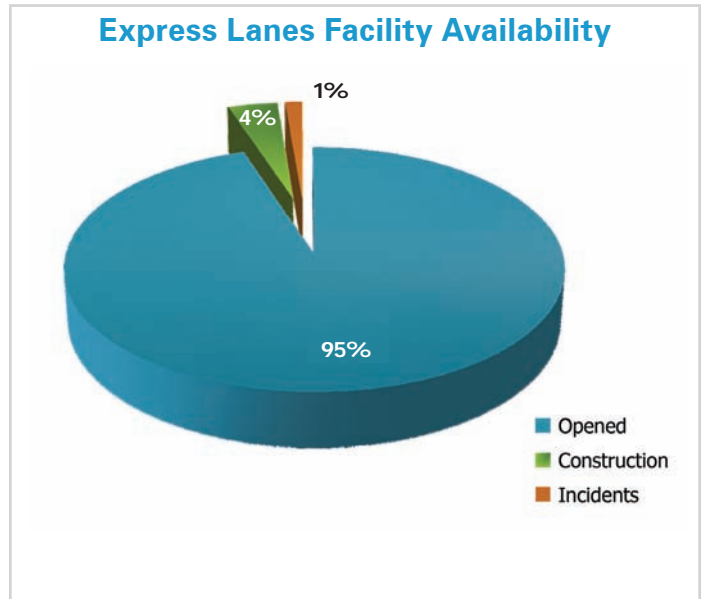
Continued Coordination – Making South Florida's roadways safer and more efficient is not a job that can be carried out by TMC staff alone. This is why TMC management constantly coordinates with several local agencies year-round. This coordination has evolved from traditional bimonthly meetings to more of a targeted outreach effort to address specific coordination concerns as they arise. TMC management held 27 different meetings with incident responders like the Florida Highway Patrol (FHP) and fire rescue that resulted in improved communications and stronger relationships among these key responders. While not always, most of the outreach efforts stem from post incident analysis (PIA) meetings. The PIA meetings review major incidents and identify things that work and areas of improvement. Coordination efforts and the new incident detection module of OTM paid off for fiscal year 2010-2011. For example, the number of events reported to the TMC from FHP dispatch in fiscal year 2010-2011 increased significantly from last fiscal year (see bar graph on the following page).

Road Ranger Assists by Type

10%	
4%	
3%	
21%	
5%	
57%	

Legend:
- Abandoned
- Supplies
- Repair
- Information
- MOT
- Clearance

Events Reported to TMC by FHP Dispatch

Express Lanes Facility Availability

Rapid Incident Scene Clearance (RISC) Update – RISC is a highly innovative program that supports Florida's Open Roads Policy. It is an incentive-based program for the rapid removal of the more complex incidents that would normally require additional time for clearance. The program launched during fiscal year 2009-2010. RISC contractors are required to respond (within 60 minutes) and clear the travel lanes (within 90 minutes) within specific time limits to receive the incentive. The TMC uses the RISC Watcher application, which was integrated into Operations Task Manager (OTM), to track RISC activation, resources arrival and clearance times. RISC achieved an average response time of 37 minutes and a travel lane clearance time of 60 minutes while responding to 12 events during fiscal year 2010-2011 (see table below).

The RISC arterial pilot program is still in the works; the contract was re-advertised after the District revised the scope of services to include arterial roads like Krome Avenue and Okeechobee Road. District Six hopes to launch the RISC arterial pilot program during fiscal year 2011-2012.

Incident Response Vehicle (IRV) – While their focus is the 95 Express lanes, the IRV staff responded to approximately 1,200 events in fiscal year 2010-2011. The IRV, along with FHP, Road Rangers, and other responders were able keep the 95 Express lanes moving (see graph above). In this fiscal year, the 95 Express Lanes were closed due to incidents less than 2 percent of the time. In addition, the average travel lane blockage duration in the Express Lanes was just below 19 minutes, which is much lower than the district average duration of 30 minutes per event.

RISC Performance	FY 10-11 Average	Target
Average Activation Time	00:20:55	--
Average Arrival Time	00:37:25	<00:60:00
Average Travel Lane Clearance Time	01:00:15	<01:30:00
Total Incident Clearance Time	02:08:20	--
Total Events	12	--

Traveler Information

The Florida Department of Transportation (FDOT) provides real time traffic information through the Statewide Florida Advanced Traveler Information System (FLATIS), commonly referred to as 511. This service disseminates real time traffic information to the public through the Internet on FL511.com and a phone based Interactive Voice Recognition System (IVR). Other forms of traveler information can be found on District Six's many Dynamic Message Signs (DMS), which display lane blockage information and travel times.

During fiscal year 2010-2011, TMC Staff worked on streamlining the operation of publishing and unpublishing information in the FLATIS system.

FLATIS Module – Last fiscal year, the software TMC Operators used to perform quality control on the data published to FLATIS was the 511 Watcher. The watcher played a significant role as it allowed operators to perform and document multiple checks on the data to ensure quality information was being provided to the public. However, the 511 Watcher required too much interaction from TMC Operators. So during fiscal year 2010-2011, the software was redesigned to reduce operator interaction by automating most of the checks performed, allowing operators to maintain their focus on event detection and management. This new software is known as the FLATIS Module, and it is integrated into Operations Task Manager (OTM), which is detailed in the TMC Operations section.

DMS Messaging – Another important component of District Six's Traveler Information program is its Dynamic Message Signs (DMS), which can display

lane blockage information, travel times and pre-event messages; all of which help motorists in trip planning and avoiding congestion. By posting these types of messages and assisting in the reduction of congestion, the mobility and safety of the District's surface transportation systems increase. During fiscal year 2010-2011, nearly 71,300 messages were deployed, with the majority of them being for incidents and construction. This is a 32 percent increase compared to last fiscal year. The largest increase was for District Six events, which supports the 44 percent increase in travel lane blocking events compared to last fiscal year.
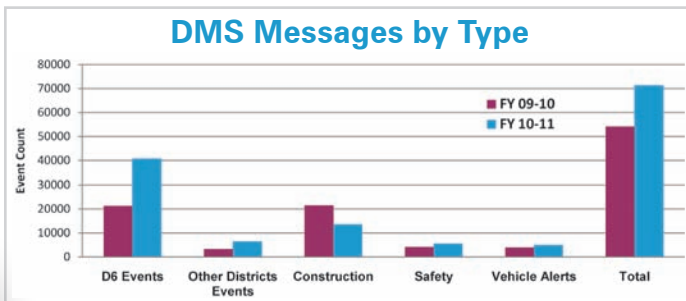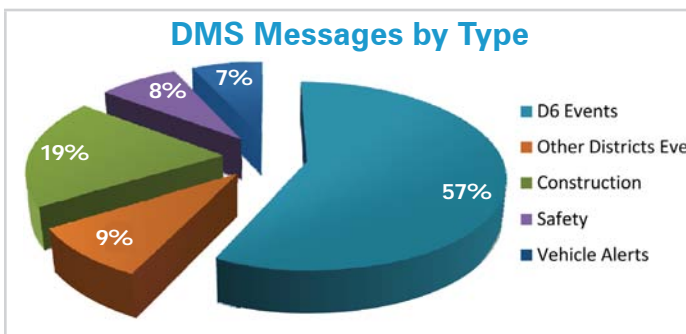
Travel Times – During fiscal year 2010-2011, District Six enhanced its travel time information dissemination service by including travel times to Miami International Airport (MIA) from I-95 and I-195, as well as travel times to Broward County on I-95. TMC Staff was able to achieve this by partnering with FDOT District Four and the Miami-Dade Expressway Authority (MDX). This increased the total number of travel time messages posted to 38, covering 12 different destinations. With the deployment of more roadside vehicle detectors during 2010-2011, the District's travel time information service will expand even further during fiscal year 2011-2012.

*DMS displaying a travel time message on I-95 Southbound.*

IT/ITS Maintenance

The FDOT District Six ITS Program is highly interactive and dependent on state of the art technology that is used to efficiently manage roadway operations. The IT/ITS Maintenance Staff manage and maintain the equipment in the TMC and out in the field. The entire network of equipment, the vehicle detectors, CCTV cameras, DMS, communication infrastructure, server/computers, video wall and software applications must remain operational 24 hours per day, seven days per week. These systems, in turn, call for an aggressive maintenance program that ensures ITS equipment is operating adequately to support the goals of the District.

In fiscal year 2010-2011, District Six procured a new ITS Maintenance Contract for the field equipment and video display wall. This procurement will take the ITS Maintenance Program to a higher level of efficiency. It establishes standard operating procedures, enhances the performance requirements, and provides a pricing structure that is more cost effective for the District while providing an environment for the Contractor to find ways to operate more efficiently.

District Six has deployed a database application that assists with tracking the early detection, reporting, troubleshooting and, ultimately, the repair of IT and ITS field equipment. The table below compares annual average system availability year over year. As indicated in the table, the expansion of ITS spare parts, as well as the replacement of some DMS, in fiscal year 2010-2011 continued to positively affect systems reliability for ITS field equipment. The slight decrease in
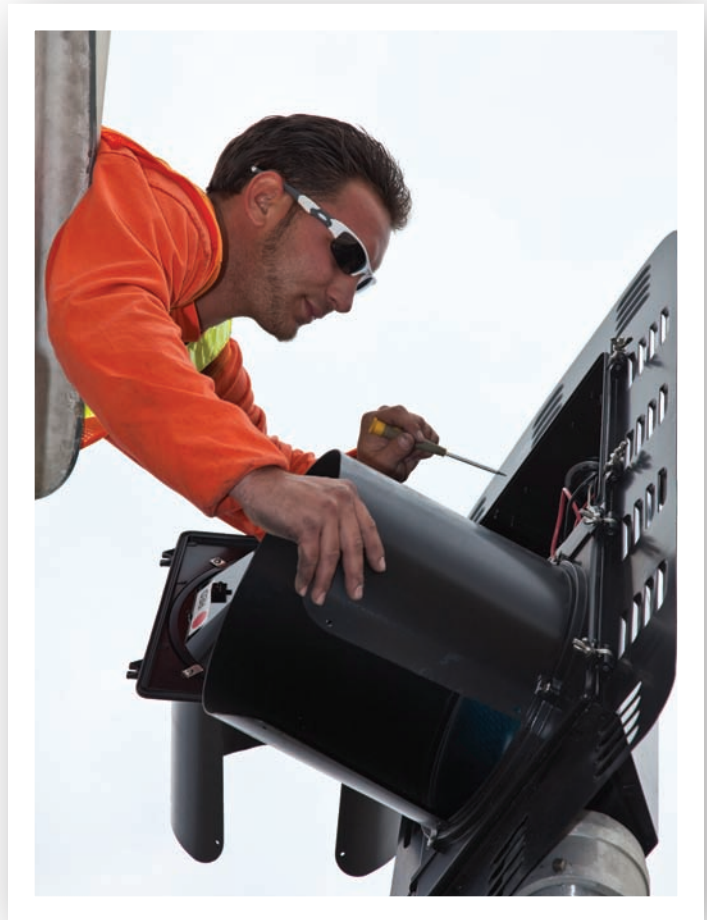
Maintenance staff works on a ramp signal.

Annual Average ITS System Availability

Subsystem	2009/2010	2010/2011	Difference
TMC Systems (critical)	99.98 %	99.98 %	+0.00
Video Wall	99.96 %	98.87%	-1.09
SunGuide™ Software	99.01 %	99.04%	+0.03
CCTV	97.48 %	98.84%	+1.36
DMS	96.10%	98.22%	+2.12
Detectors	98.87%	99.21%	+0.48
Workstations (non-critical)	98.47 %	99.93%	+1.46

*   Critical is defined as SunGuide Software related servers, operator workstations, fax machines, network servers, network switches, SAN, firewall, and VPN.

** Non critical is defined as laptops, staff workstations, network printers, and other ancillary equipment.

*** These metrics measure ITS field equipment reliability. As such, indirect field failures to ancillary components that might cause extended downtime are not counted directly against the CCTV, DMS, and Detector subsystem availability.

video wall reliability can be attributed to the aging of the equipment, which in a few more years will reach the end of its life cycle and will need to be replaced. (Note: These system availability metrics measure ITS field equipment reliability. As such, indirect failures to ancillary components that might cause extended downtime are not counted directly against the CCTV, DMS, and Detector subsystem availability.)

Listed below are the major maintenance and upgrade activities that occurred in the various subsystems throughout the fiscal year.

95 Express / Ramp Signal – In preparation for taking over the maintenance of the 95 Express equipment, TMC staff developed a critical parts list required to maintain a high level of system availability to support 95 Express operations. The 95 Express equipment included 53 CCTVs, 40 DMS, 72 vehicle detectors and 2 communications hub sites. Also, there were a number of improvements to the vehicle detectors to provide quality data. This included installing and integrating newer detection technologies in the District, such as Sensys and Automatic Vehicle Identification (AVI) readers, which read SunPass-equipped vehicles to estimate travel times.

Infrastructure Improvements – District Six is always exploring ways to improve the reliability of the ITS infrastructure. In fiscal year 2010-2011, the wireless communications network in the Florida Keys was reconfigured into three separate networks resulting in significantly increased reliability from 94 percent (7/09 through 12/09) to 97 percent (7/10 through 12/10).

Communication hubs are a single point of failure that impact many devices. Therefore, District Six installed generators at five communication HUB buildings to provide back-up power during power failures. In addition, internal security cameras and security access key pads were installed on the hub building sites. This removes the need for key access by technicians and enhances site security through tracking personnel access remotely. Other enhancements included:

- Developed critical parts list for the procurement to support the two speed feedback signs along Killian Drive.

- Installation of trace wire at various locations along the I-95 fiber optic backbone to facilitate underground locating requirements.

- Upgrade and integrate the warning flashing beacons along US-1 in the Florida Keys.

- Improved the communication reliability on some CCTV cameras in Monroe County by changing

Maintenance staff at work in the SunGuide TMC server room.

video encoders.

- Ran new conduit from the US-1 South HUB to the existing Turnpike splice vault to create a fiber optic redundancy link.

Partnering with Sister Agencies and Media Sharing – District Six completed the installation and integration with TrafficLand for sharing District Six video with the public and completed the installation and integration with Miami-Dade County for sharing video with various county government agencies.

Vandalism/Theft of ITS Field Devices – District Six continued with infrastructure hardening in high risk areas by implementing security locks for cabinets, security inserts, verification cameras, and more perimeter fencing around the Whatley hub to prevent any vandalism/theft.

Utility Locates – ITS Staff is diligent in making sure its ITS equipment does not interfere with any of the several construction projects occuring in the Miami-Dade and Monroe counties. During fiscal year 2010-2011, District Six received nearly 14,500 total utility locate tickets, of which just more than 1,500 were located (see table below for breakdown by county).

Annual Total Utility Locates By County

County	Total Tickets Received	Total Tickets Located
Miami-Dade County	9,831	1,318
Monroe County	4,625	212

Public Outreach

During fiscal year 2010-2011, TMC Staff continued its effort to educate the public on the ITS Program. They also continued to provide customer service for the ITS Program's services. By educating the public on its services and taking care of its customers, the ITS Program received national and regional exposure for not only its projects, but its experience in the ITS field.

Statewide – TMC Staff attended and presented information on the ITS Program and its services at an FDOT Community Traffic and Safety Team Presentation, the Team Florida Quarterly Meeting, the Dori Slosberg Conference and Transpo.

National – Presentations were given at ITS America. The program also gained attention from media outlets like National Public Radio and the Los Angeles Times.

International – TMC Staff members are leading the coordination efforts at ITS World Congress for a session on ITS public information, which is set to take place in late 2011. The ITS Program also gained media attention from the Tokyo International Network (TIN) from Japan.

ITS Public Information Coalition – TMC Staff took a leadership role in the regional ITS Public Information Coalition meetings to enhance regional public information efforts, forge new partnerships and increase awareness of South Florida's ITS Programs and their services. District Six now coordinates and hosts monthly meetings and establishes goals for the group. South Florida Commuter Services joined the team, and the agency is partnering with other members from District Four, the Florida Turnpike Enterprise and the Miami-Dade Expressway Authority (MDX) to help with cross-promoting efforts. The group was instrumental in getting 511 advertisements placed on Miami-Dade Transit and Monroe County Transit buses and is working on finding more ways to spread the word on ITS.

Engaging the Public – TMC Staff assisted with the 95 Express Public Survey disseminated to the public via e-mails and the Internet. The team also updated 95express.com with new information, tools, reports and an educational video. SunGuide.org was also enhanced to be a more effective outreach tool. The team also shared their lessons learned through the following:

- Published 15 articles
- Published 7 Press Releases
- Published 4 Newsletters
- Hosted 26 Public Tours/Presentations

A local TV news station interviews a TMC Staff member.

- Hosted 1 Media Availability Day
- Conducted 8 Media Interviews
- Attended 4 Community Events

SunGuide.org – New features were launched on SunGuide.org (District Six's ITS website) during fiscal year 2010-2011, such as e-mail alerts and Really Simple Syndication (RSS) feeds, which allow visitors to stay in touch with District Six ITS news even when not directly visiting the site. Real-time traffic videos were added to the site as well, and the videos are another tool offered to the public to assist them with trip planning. Finally, a mobile version of the website was developed in June 2011. It is currently accessible via smartphones equipped with iOS or Android operating systems.

Public Inquiries – TMC Staff handled or assisted in the handling of more than 300 public inquiries during fiscal year 2010-2011. The majority of public inquiries (91 percent) were related to the 95 Express Project; about 25 percent of the total inquiries were related to the tolling component of the project. The high amount of inquiries handled by District Six and its partners led to the development of a new software, TMConnect, which can enter and store all public inquiry data in a database for easy retrieval, tracking and reporting. TMConnect wrapped up production and entered the testing phase in June 2011. It will be launched early during fiscal year 2011-2012.

Benefits to the Public

The FDOT District Six ITS Program budgets for fiscal year 2009-2010 include capital improvement, operating and maintenance costs. The total costs shown are considerably less than the normal capital costs associated with expanding highways and facilities. Reducing incident duration has both a direct and financial benefit for South Florida motorists as well, substantially trimming the costs they must absorb. When the delays associated with incidents are reduced, motorists save time - which can be directly translated to dollars. In 2005, FDOT District Six established a baseline average duration of 50 minutes for incidents blocking travel lanes. During fiscal year 2010-2011, the average duration was reduced to 30 minutes. In addition to the reduced delays due to incidents, the 95 Express and Ramp Signaling projects have also contributed to reduced delays during peak periods.

The Road Ranger program not only contributes to reduced delays due to incidents, it also provides a direct benefit to the public. Using published, widely accepted statistical methods for estimating the cost implications of traffic delays, the reduced delay translates into savings of over $1.15 billion. This estimate only includes motorists' time saved; it does not address road user cost savings. When this estimate is weighed against the total capital investments (annualized over 10 years at 7 percent) and annual operating expenses, the ITS program is shown to be yielding a benefit-cost ratio of $24.05 in economic benefit for every dollar.
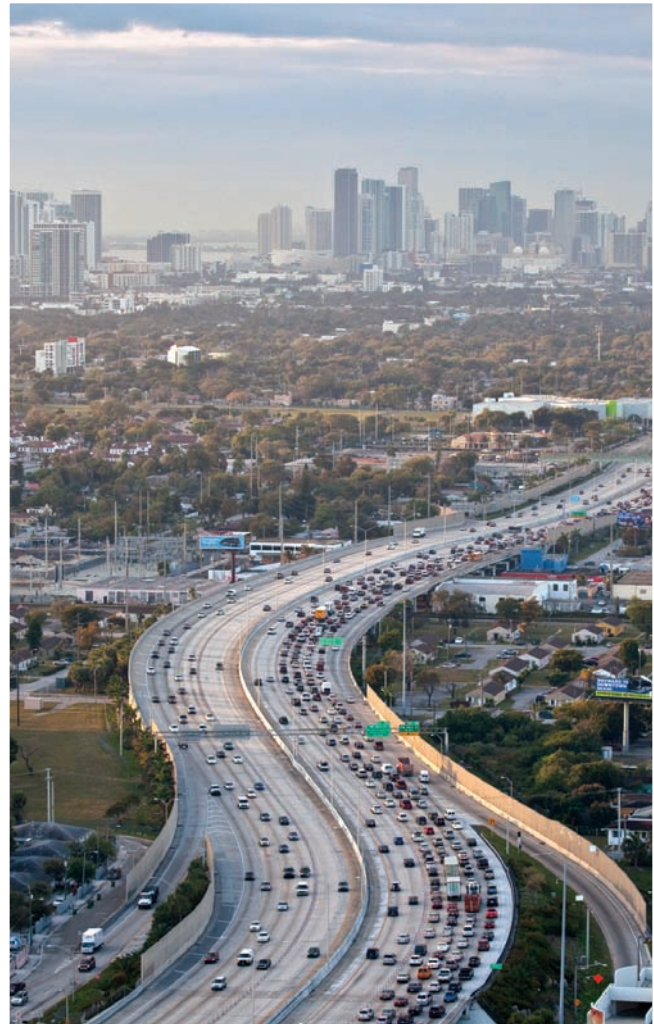
An overhead shot of I-95 during the morning peak period.

Fiscal Year 2010-2011 Costs	
ITS Operations	$5,857,993
ITS Maintenance*	$4,265,563
Road Rangers	$3,315,959
ATIS	$308,225
FDOT Cost Center Operating Budget**	$1,658,044
Other (Consultants, FTE, FHP, FIU)	$3,402,993
Total Annual Operating Costs	$18,808,777
ITS Field Deployment Projects Completed Through Fiscal Year 2010-2011	$204,358,668
Total Annualized Capital Costs	$29,096,077
Total Annual Costs	$47,904,854

Fiscal Year 2010-2011 Benefits	
Incident Management	$1,112,782,312
Express Lanes / Ramp Signals	$39,279,034
Total Benefits	$1,152,061.346

* Includes Express Lanes ITS Maintenance and Delineator Repairs
** Includes Utilities for Express Lanes

A Look Ahead to Fiscal Year 2011-2012

The District Six ITS Program has identified milestones for fiscal year 2011-2012 that will help the ITS team provide innovative solutions to address future transportation needs. Key activities include:

95 Express Phase 2 – The design and implementation efforts for Phase 2 the 95 Express Project are underway with an estimated completion date of 2014. District Six will be supporting the project by preparing all the necessary documents to ensure the 95 Express operations continue to be a success. These documents will update software requirements, policies, procedures, and incident management resources to handle the 14-mile expansion into Broward County. FDOT District Six will be working closely with its partners to ensure all stakeholders' needs and concerns are adequately addressed and to maintain a regional approach across jurisdictional boundaries.

Software Tools – The District has had great success with the development of software tools to improve operator efficiency. For fiscal year 2011-2012, the TMC will upgrade its SunGuide Software to Release 5.1, which will significantly improve the reliability of the software and introduce support for Connected Vehicles' future national initiative. Other initiatives will include developing software to automate collecting key operational performance measures for ramp signaling and enhancing the existing ITS Maintenance Database to automate the detection of equipment failures, better track system availability and assist with managing the new performance-based ITS Maintenance Contract.

Expanding to Arterials – District Six will complete an evaluation of technologies for deployment along arterials to collect travel times. These technologies will take a look at collecting travel times directly, instead of converting volume, speed and occupancy into a travel time. This will expand the District's ability to post travel times along key signalized corridors, such as US 1. In response to local TIM Team member's request, the District will begin a pilot RISC program along arterial routes with heavy truck traffic, such as Okeechobee Road and Krome Avenue.

A look at the current SR 826/SR 836 Interchange (above) and a look at what it will look like upon the project's completion (below).

Port of Miami Tunnel Project – The Port of Miami Tunnel project is underway, and District Six will support the project with incident management and travel information services. The District Six TMC will also serve as the backup location for Port of Miami Tunnel operations.

SR 826/836 Interchange Reconstruction Project – TMC Operators already manage incident management resources within the SR 826/SR 836 project limits, and District Six will continue providing full operational support throughout the project's construction.