



*Dynamic Message Signs*

Open Roads Policy

*Road Watcher Program*

*Road Ranger Service Patrol*

Performance Measures

*Advanced Traveler Information System*

*Closed Circuit Television*

*Intelligent Transportation Systems*

*Severe Incident Response Vehicles*

Traffic Incident Management



2005

# Annual Report

# SMART SunGuide TMC

Florida Department of Transportation, District IV  
Ft. Lauderdale, Florida



## MESSAGE FROM THE TMC OPERATIONS MANAGER

This report, prepared by the Florida Department of Transportation (FDOT) District IV ITS Office, is the second annual report for the SMART SunGuide Transportation Management Center (TMC) located in Fort Lauderdale, Florida. This annual report reviews the performance of the ITS operations and summarizes the return-on-investment or benefit/cost ratio outcome that was calculated for 2005.

SMART stands for “Systems Management for Advanced Roadway Technologies.” FDOT District IV’s vision is for the SMART SunGuide TMC to become one of the leading TMCs in the United States. The Department recognizes the significant effort required to achieve this vision, as well as the challenges to overcome on the path to success. To focus these efforts, this path is referred to as “*The SMART Way*,” formalizing an approach that includes the following measures:

- Utilization of constantly changing, state-of-the-art technology.
- Building a superior work force through careful recruitment and continuous training and development.
- Meeting the needs of each customer by differentiating the products.
- Delivering superior customer service.
- Creating a high level of visibility and awareness of the services by a consistent and carefully targeted outreach strategy.

**MISSION**  
*To continuously provide outstanding ITS products and services to our internal and external customers.*

By doing it “*The SMART Way*,” the TMC programs will continuously make significant contributions in incident, traffic and emergency management while improving traffic safety, congestion and mobility.

A major focus of the 2005 annual report was to document the influence of the ITS program to the motoring public and to clearly demonstrate the outcomes in a quantitative format. The performance measures that are documented throughout the report detail a comparison between years 2004 vs. 2005 and the increased impact the ITS program had in 2005 on a daily basis. With the infusion of ITS devices last year, the data showed that closed circuit televisions (CCTV) were used as the first source of incident notification, detection and verification over 1,500 times using only eight cameras. This enabled the TMC to dispatch services quicker to the exact location decreasing impact to the motoring public. As an additional 36 CCTVs will be deployed during 2006, the frequency in using these cameras as a notification/detection/verification tool will increase, thereby yielding a higher return-on-investment.

A second focus for 2005 was the efforts made in collecting the data points of incident time lines. The development and integration of SMART (System Management for Advance Roadway Technologies) software has enabled the TMC Operations Team to utilize a computerized interface in the collection of time line data. This effort was undertaken realizing that this would enable District IV to be recognized as a leader in performance measure data collection. The challenge is to take the collected data and translate it into valuable information that can be used as an assessment tool in evaluating the ITS program’s overall performance. As an example of measuring performance, two measures -



Roadway Clearance Time and Incident Clearance Time (see below) - have been identified and shown in this report as critical performance measures. Both measures will be used in future years as an assessment tool to continuously track the performance of the ITS program.

Objective	Performance Measure	Outcome for 2005
Reduce roadway clearance time (defined as the time between awareness of an incident and restoration of lanes to full operational status).	Time between first recordable awareness (detection/notification/verification) of incident by a responsible agency and first confirmation that all lanes are available for traffic flow.	50.3 minutes. This represents an improvement of 22% in comparison to the "pre-ITS deployment" scenario.
Reduce Incident clearance time (defined as the time between awareness for an incident and removal of all evidence of the incident, including debris or remaining assets, from shoulders as well as disabled and abandoned vehicles).	Time between the first recordable awareness and the time at which the last responder has left the scene.	73.9 minutes FDOT District IV is the first DOT collecting this type of information. This measure will be used in future years to track performance improvement.

### 2005

During the past year, significant achievements were accomplished in supporting the SMART SunGuide TMC mission and vision:

- Development and integration of the SMART software as part of the TMC operations.
- Creation and operations of the SMART SunGuide website, [www.SMARTSunGuide.com](http://www.SMARTSunGuide.com).
- Expansion of TMC operations to 24 hours per day/7 days per week.
- Integration of the Statewide SunGuide software.
- Deployment of ITS devices (i.e., CCTV & detection).

These achievements represent a significant milestone in establishing the core services provided by the SMART SunGuide TMC to improve incident management with 24/7 coverage. This translates to savings to the motorists in terms of secondary accidents, travel delays and road-user costs.

### 2006

The continued efforts in obtaining the SMART SunGuide TMC vision will bring new challenges, including:

- Completing Phase I, as well as advancing Phase II, ITS deployment.



- Completing the Video Display Wall upgrade in the TMC.
- Creating ITS, Road Ranger and Traffic Incident Management (TIM) Strategic Plans.
- Automating travel time messaging to post on DMSs.
- Integrating FHP CAD data and VISIO PAD data into SMART software to automatically detect traffic stream interruptions (e.g., disabled or abandoned vehicle on the shoulder).

These achievements will elevate the SMART SunGuide TMC operations to the next level through the incorporation of these technology enhancements, yielding further benefits to the public.

In conclusion, this report documents the SMART SunGuide TMC's successes during 2005, and clearly defines the outline for the five-year plan to earn recognition as one of the leaders in TMC operations in the nation. The initial 2004 annual report serves as the baseline to illustrate quantifiable improvements achieved during 2005. The importance of producing annual reports enables the TMC Management Team to evaluate performance and make adjustments where necessary to stay on course with the 5-year business plan. In 2005, 11 of the 14 objectives identified in the Business Plan were accomplished. This demonstrates District IV's commitment to the Business Plan and illustrates the efforts and understanding in which it was created.

Quantifiable benefits in this report were calculated using two methodologies, the 2004 method and the 2005 method. The 2004 method uses the savings in motorist delay attributed to the operation of the Smart SunGuide TMC. The 2005 method is more detailed in its approach to a benefits analysis using the following values: savings in motorist delay, fuel consumption, emissions, safety, and Road Ranger services. During the management of the ITS Operation for 2005, the estimated motorist delay savings were over 2.7 million vehicle hours. The estimated savings vs. annualized capital, operations and maintenance costs were used to develop a benefit/cost ratio. The \$8,239,397 in annualized costs for the SMART SunGuide TMC in 2005 was divided into the annual benefits savings of \$86,002,364, yielding a benefit/cost ratio of 10.44. This translates to over ten dollars in benefits being returned to the public for every dollar invested in the program. Furthermore, the 2005 benefit/cost ratio represents an improvement of 27% compared to 2004 using the same methodology. Therefore, SMART SunGuide TMC programs continue to bring increased **value** and cost-effectiveness to the public.

**Steven Corbin**  
*TMC Operations Manager*  
FDOT District IV



## INTRODUCTION

**Details...Results...On-Time.** These terms clearly define the expectations of any customer. To the motorist and their outlook on transportation agencies, these terms also drive customer satisfaction when receiving information providing them the quickest and safest route to a destination. The SMART SunGuide Transportation Management Center (TMC) staff strives on performance and 2005 proved to be another successful year towards meeting their vision to ***“Become the best TMC in the nation by 2010.”***

The SMART SunGuide TMC was planned, designed, and constructed with the intent of establishing it as a central hub for information and as a leader for managing the transportation system in Broward County. Various modes of transportation are utilized within Broward County to ensure the mobility of goods and people; mobility that is critical to maintaining a thriving economy. Therefore, the SMART SunGuide TMC’s mission is ***“To continuously provide outstanding ITS services to our internal and external customers.”***

### Purpose

The inaugural edition of the SMART SunGuide TMC Annual Report introduced the FDOT District IV ITS program to its internal and external customers. The 2005 edition concentrates more on the statistical achievements of its first full year in a new facility utilizing its new incident management software – **SMART**.

## 2005 ANNUAL REPORT SMART SunGuide TMC

### TABLE OF CONTENTS

<b>1.0 PROGRAMS INSIDE THE TMC .....</b>	<b>2</b>
1.1 <u>ITS OPERATIONS</u> .....	3
1.2 <u>ITS DEPLOYMENTS</u> .....	13
1.3 <u>FREEWAY OPERATIONS</u> .....	13
<b>2.0 BENEFIT-COST ANALYSIS .....</b>	<b>18</b>
<b>3.0 PERFORMANCE MEASURES .....</b>	<b>20</b>
<b>4.0 BUSINESS PLAN .....</b>	<b>21</b>
<b>5.0 ACTIVITIES AND ACHIEVEMENTS .....</b>	<b>23</b>

## 1.0 PROGRAMS INSIDE THE TMC

The SMART SunGuide Transportation Management Center (TMC) is the central hub for three FDOT District IV Intelligent Transportation Systems (ITS) program areas: ITS Operations, ITS Deployments, and Freeway Operations. **Figure 1** depicts the organizational structure of these program areas. These program areas manage the following projects:

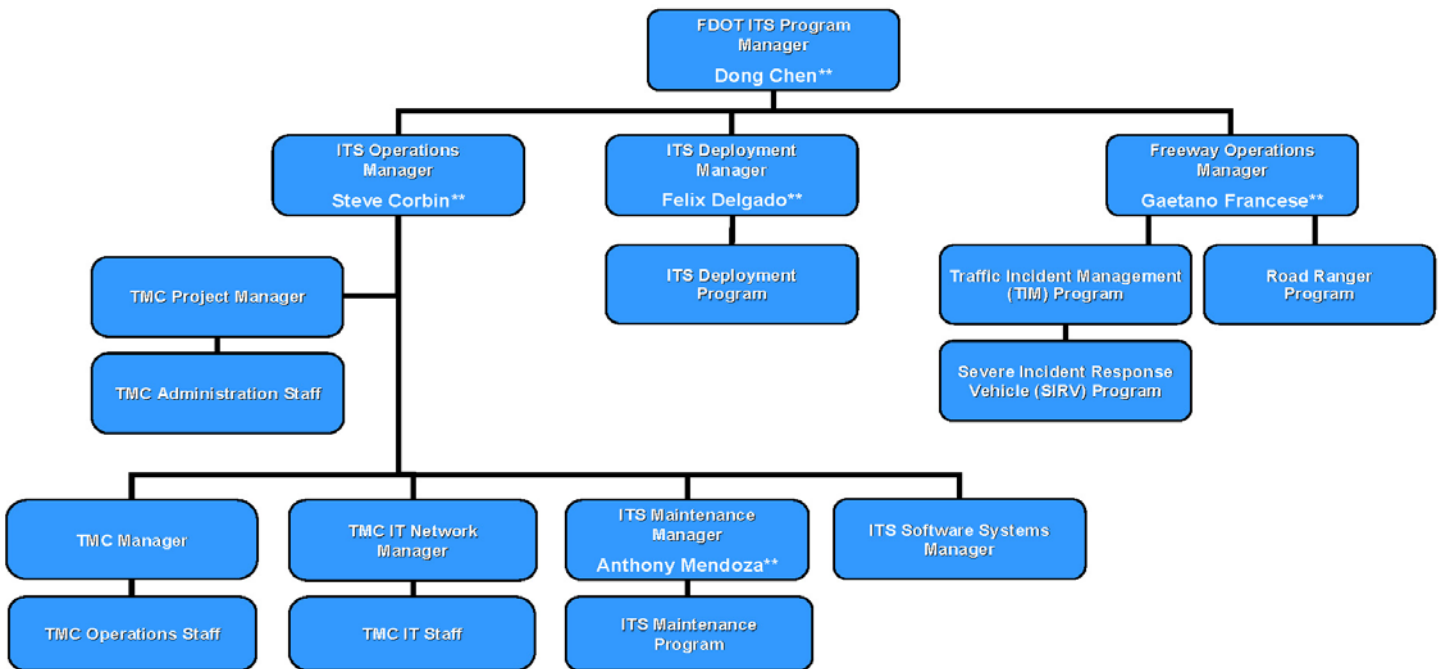
➤ **ITS Operations**

- TMC Operations (including Road Watchers, Amber Alerts, the Southeast Florida Regional TMC Operations Committee – SEFRTOC, and Public Outreach Programs)
- Information Technology / Network Management
- ITS Maintenance
- ITS Software Systems

➤ **ITS Deployments**

➤ **Freeway Operations**

- Traffic Incident Management (TIM) Teams, including the Severe Incident Response Vehicle (SIRV) Program
- Road Ranger Service Patrol



## Organizational Chart

\*\*Note – Only FDOT employee's names are represented.

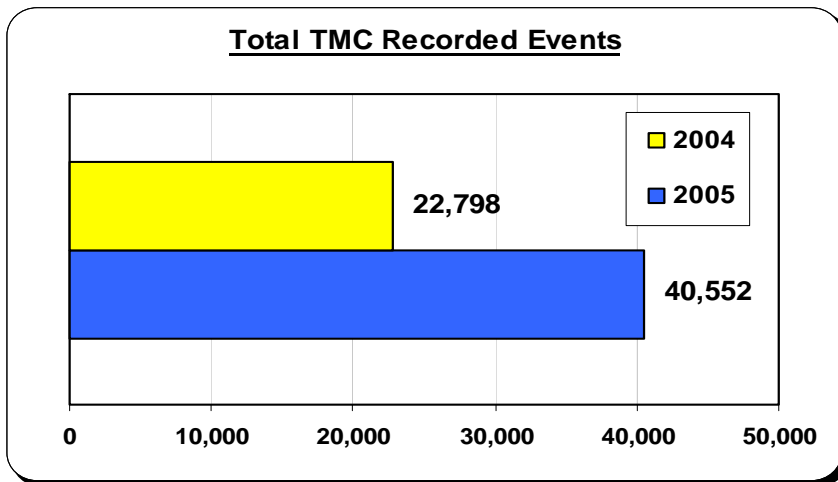
**Figure 1 – SMART SunGuide TMC Organizational Chart**

## 1.1 ITS Operations

### TMC Operations

The SMART SunGuide TMC Operators collect and manage data on all of the ITS services and activities available through the TMC on the SMART (Systems Management for Advanced Roadway Technologies) incident management software. At any time, and for any period of time, graphs and charts can be produced as a “snapshot” of a device or service’s performance. The graphs and charts shown throughout this Annual Report will depict the TMC’s statistical performance for 2005 based on annual totals and monthly/daily averages. The results of this analysis will be used specifically for training, maintenance, and planning purposes during the upcoming year.

Events recorded by the TMC Operators are the basis for all yearly statistics. **Figure 2** compares the total number of events recorded by the SMART SunGuide TMC in 2005 versus 2004.

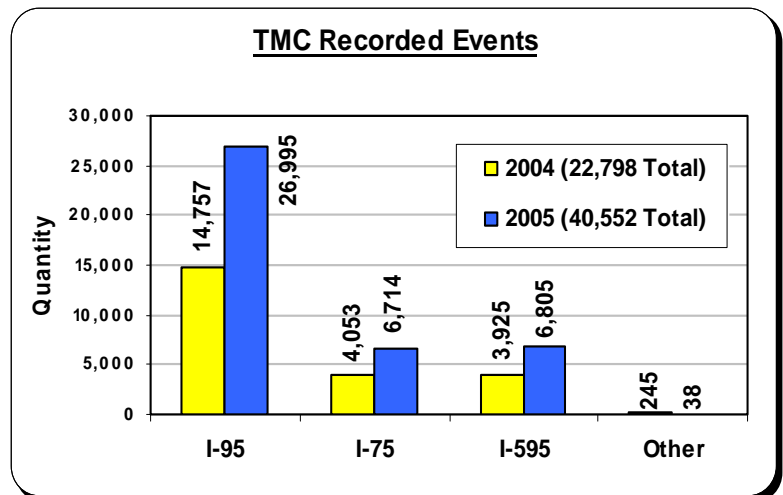


In 2004, the TMC only managed Broward County’s freeway traffic 14 hours per day, 5 days per week for the majority of the year; transitioning to 24 hours per day, 5 days per week by year end. Therefore, the totals shown in Figure 2 are not a true representation of the number of events that actually occurred in 2004.

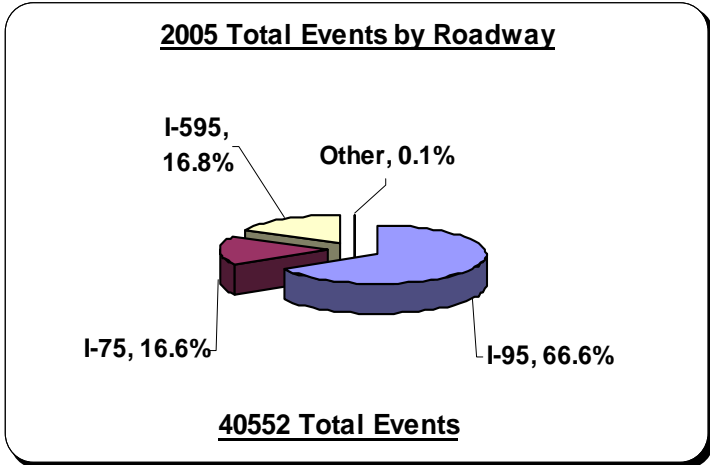
**Figure 2 – Total TMC Recorded Events**

**Figure 3** breaks down and compares the total number of events managed by the TMC on the three major freeways in Broward County.

**Since July 1, 2005, the SMART SunGuide TMC has been operating 24 hours per day / 7 days per week.**



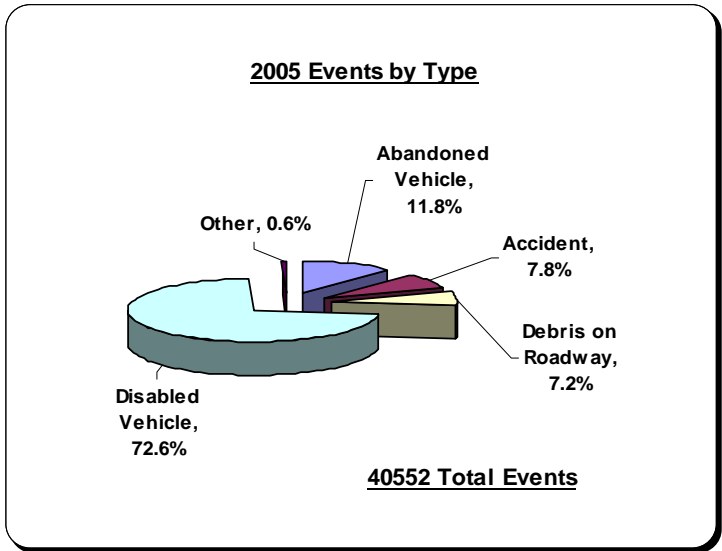
**Figure 3 – TMC Recorded Events**



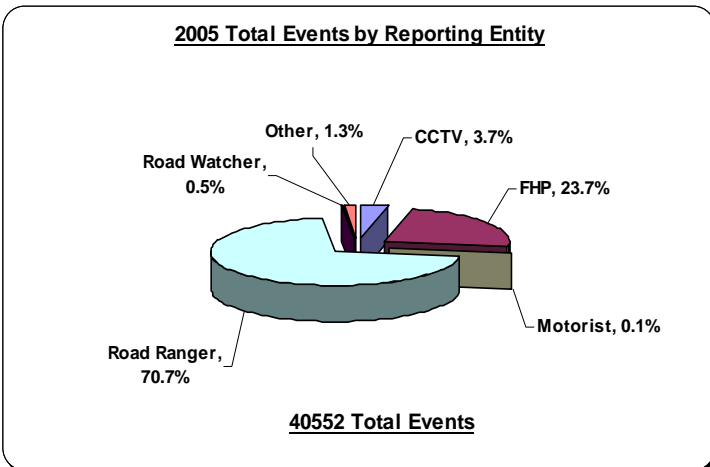
**Figure 4 – Total Events by Roadway**

I-95, I-75, and I-595 are the three major freeways traveled in Broward County. I-95 carries average annual daily traffic (AADT) of over 255,000 vehicles<sup>1</sup> and was responsible, on average, for 74 of the 111 events recorded daily by the TMC in 2005 as shown in **Figure 4**.

There were 1,502 lane blockage events recorded (and responded to) in 2005; more than double the number recorded in 2004. **Figure 5** shows that approximately 85% of the TMC's recorded events in 2005 were shoulder related events (disabled and abandoned vehicles typically occur on the shoulders).



**Figure 5 – 2005 Events by Type**



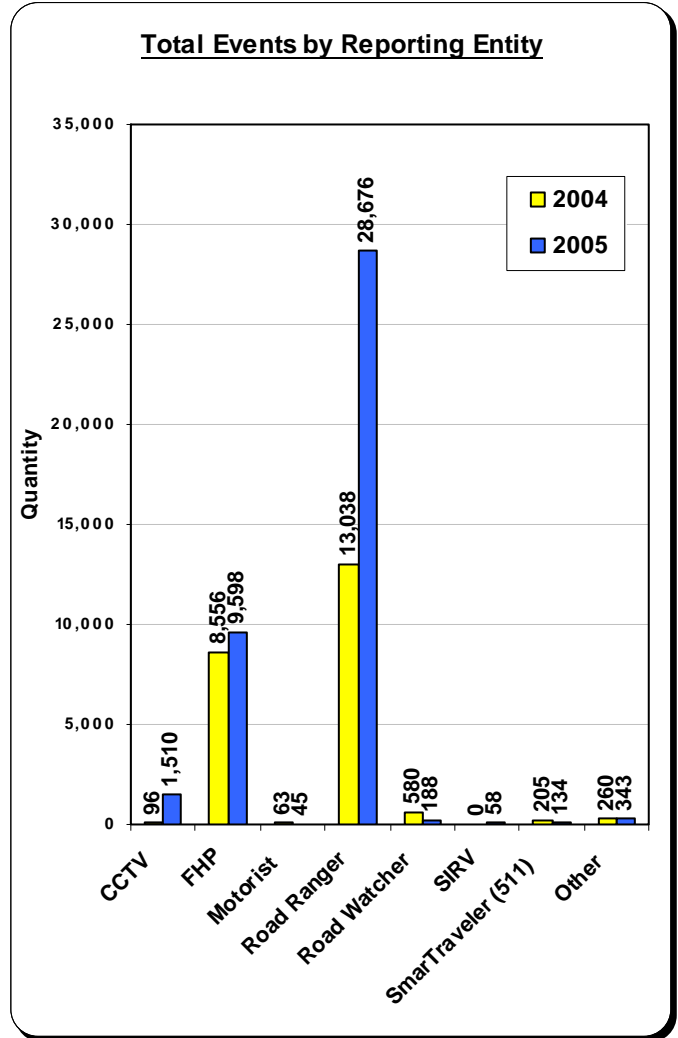
**Figure 6 – 2005 Total Events by Reporting Entity**

In 2005, 79 out of the 111 average daily recorded events in Broward County were first reported by the Road Ranger Service Patrol. As District IV's closed circuit television (CCTV) coverage continues to expand, the percentage of events reported (detected) by CCTV, as shown in **Figure 6**, will also increase. Subsequently, the percentage of Road Ranger reported events should decrease over time.

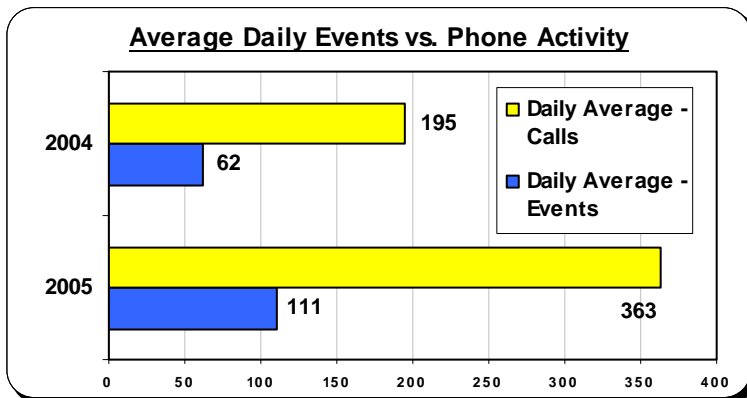
<sup>1</sup> Web site. Broward County, Transportation Planning Division. "Traffic Counts". March 2005. <http://www.broward.org/transportationplanning/tpi03100.htm>

The impact of CCTVs has already proven evident, as shown in **Figure 7**: 1 event reported daily in 2004 compared to 4 events reported daily in 2005. Looking forward, 2005 versus 2006 comparisons will provide a more accurate indication of the disbursement of “Events by Reporting Entity” as well as the benefits of CCTV coverage. Figure 7 is also an accurate indicator of the difference between managing events 70 hours per week (2004) and 168 hours per week (2005) as shown in the disparity of Road Ranger reported events.

**Figure 8** shows the amount of effort and constant coordination that occurs between the SMART SunGuide TMC Operators, the Road Ranger Service Patrol vehicles, the SIRV operators, and any other emergency response personnel on site during an event. The quantity for “phone activity” in this figure includes the numerous contacts made by radio and/or Nextel’s Direct Connect feature, not just “land line call made to the TMC.



**Figure 7 – 2005 Total Events by Reporting Entity**



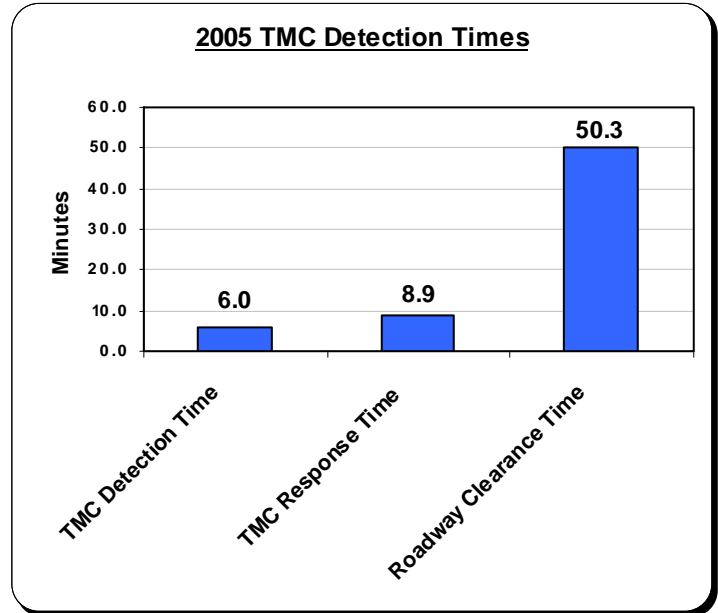
**Figure 8 – Average Daily Events vs. Phone Activity**

The “team effort” involved with lane blockage event coordination is reflected in **Figure 9** on the following page. “TMC Detection Time” includes the time elapsed from the first agency notified (e.g. Florida Highway Patrol - FHP) until the TMC is notified. The “TMC Response Time” is the time elapsed from when the TMC was first notified until a Road Ranger arrives on scene. In addition, the average of 8.9 minutes shown includes the time spent verifying an event by an operator or Road Ranger. “Roadway Clearance

Time” includes both of the other times shown and ends when the travel lanes are cleared. Hence, on average for 2005, lane blockage events required 35.4 minutes to clear from the

travel lane upon Road Ranger arrival (this is the result of subtracting 6.0 and 8.9 from the “Roadway Clearance Time” of 50.3).

These figures were not collected in 2004, but will be compared to future years as part of the national Traffic Incident Management (TIM) performance measures. “Roadway Clearance Time” is one of the critical performance measures recognized in the candidate program.<sup>2</sup> Another national TIM performance measure that was tracked for 2005 was “Incident Clearance Time Reduction.” This objective is defined as “the time between the first recordable awareness (of an incident) and the time at which the last responder has left the scene.”<sup>3</sup> The SMART SunGuide TMC average “Incident Clearance Time” for 2005 was 73.9 minutes and will be compared to future years in subsequent reports.



**Figure 9 – 2005 TMC Detection Times**

The 2004 SMART SunGuide TMC Annual Report showed an average lane blockage time of 43.85 minutes, as shown in **Table 1**, and was based on 699 total events. This number was calculated by “throwing out” event anomalies or “outliers.” These outliers were events that were deemed to be erroneous by the TMC staff and only consisted of events with abnormal times on the “high side.” For 2005, a similar “smoothing” of the data was performed; however, a more statistically approved method of smoothing was used by “throwing out” the high and low five percent (5%) of the data during calculations. The result of this method produced an average lane blockage duration for 2005 of 50.3 minutes (based on 1502 total events).

However, comparing the Lane Blockage durations in 2004 and 2005 (**Table 1**), does not represent a true indication of performance.

Table 1			
Incident Data Comparison			
	No ITS	2004	2005
<b>Lane Blockage Duration (min.)</b> (With Smoothing)	64.7	43.85 <sup>4</sup>	50.30 <sup>5</sup>
<b>Lane Blockage Duration (min.)</b> (All Events, No Smoothing)	76.4	58.19	59.28

In 2004, the TMC only managed events 14 hours per day, 5 days per week. In 2005, the

<sup>2</sup> Federal Highway Administration (FHWA). “FHWA Focus States Initiative TIM Performance Measures Regional Workshops Workshop Proceedings, Table 4 – Candidate-Level Traffic Incident Management Performance Measures”. December 2005.

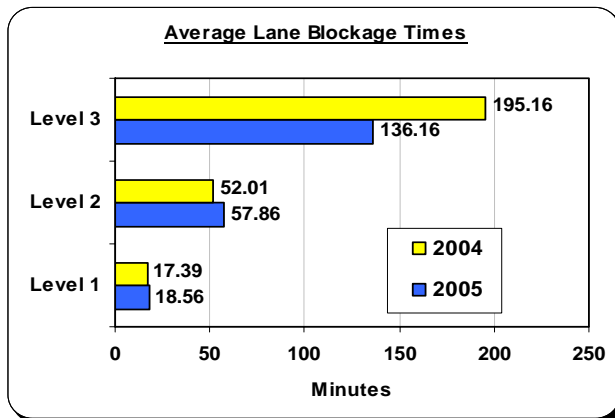
<sup>3</sup> Ibid.

<sup>4</sup> FDOT District IV. **2004 Annual Report, SMART SunGuide TMC**. “Exhibit 17 – Incident Data Comparison (2004 vs. 2003)”, January 2005. Page 34.

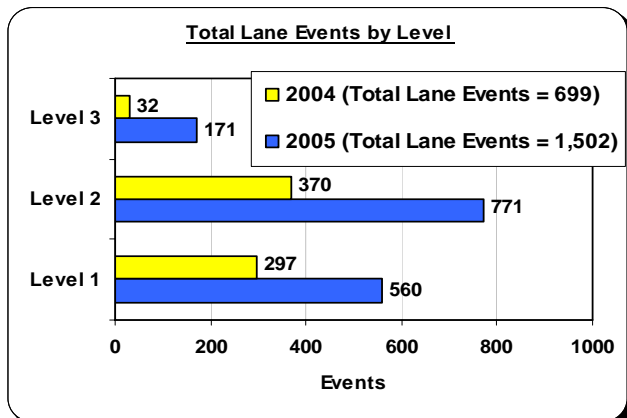
<sup>5</sup> Hadi, M., Zhan, C. Florida International University. **Benefit-Cost Analysis of FDOT District 4 – Fort Lauderdale SMART SunGuide ITS Operations**. “Table 4-3 Incident Durations Used in the Analysis”, January 2006. Page 20.

TMC managed events 24 hours per day. Therefore, in order to have a true representation of the TMC's performance for lane blockage durations, an analysis of the data was performed comparing the 2004 duration of 43.85 minutes to the 2005 events which occurred during the same time period: Monday through Friday from 6 am to 8 pm only. *The results of this secondary analysis showed that for 844 events managed in 2005 during the 2004 daily operational time period, the average Lane Blockage duration was 44.11 minutes (compared to 43.85 in 2004); a difference of 15 seconds.*

As shown in **Figure 10**, the average lane blockage time in 2005 for Level 3<sup>6</sup> events decreased by 59 minutes compared to 2004. This average 1-hour savings per event is more meaningful, when looked at in **Figure 11**, due to the 5-to-1 increase in the number of Level 3 events recorded in 2005.

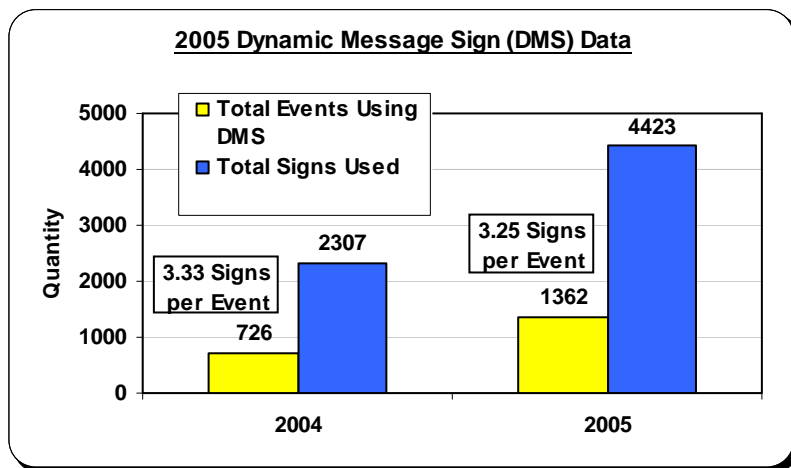


**Figure 10 – Average Lane Blockage Times**



**Figure 11 – Total Lane Events by Level**

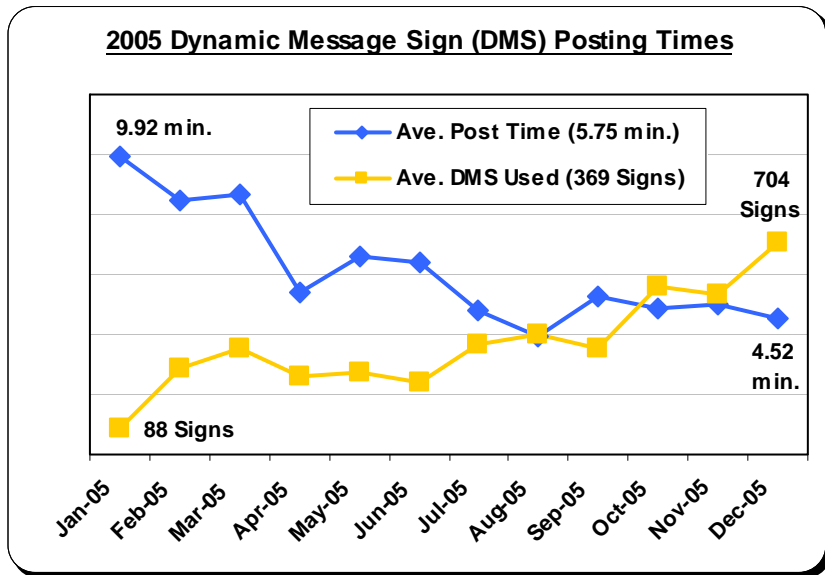
Though the 2005 totals for “Events Requiring Dynamic Message Signs (DMS)” and the “Total Signs Used” approximately doubled compared to 2004, as shown in **Figure 12**, the number of DMS utilized per event basically remained unchanged. This is a direct indication of the level of training received by the TMC operators, as well as their consistency and adherence to TMC guidelines for DMS usage.



**Figure 12 – Dynamic Message Sign Data**

<sup>6</sup> **Definition:** Impact to traffic is estimated to be more than 2 hours or complete road closure in any single direction where significant area-wide congestion is expected.

Continuous training of the TMC Operators is one of the keys to success for traffic management. **Figure 13** shows the product of the staff's continuous improvement throughout 2005. The operators reduced the amount of time spent posting a message to a DMS for an event by over 54%. As the number of signs utilized grew by a factor of eight by year-end, the operators had reduced their time spent by 5.4 minutes per event.



**Figure 13 – DMS Posting Times**

*Eight (8) Level One Operators (six full-time and two part-time employees) successfully completed their training and testing in 2005 and were proudly promoted to Senior Operator status.*

**Road Watchers**

The Road Watcher program is an incident detection program that enlists volunteer FDOT commuters, traveling to and from work, who act as advisers to the TMC reporting real-time information regarding incidents and traffic conditions along their travel routes.

*The number of Road Watcher reported events fell from 514 in 2004 to 188 for 2005 along I-95, I-75, and I-595 within Broward County.* This equates to 0.46% of the total events reported in 2005. This decrease is directly related to the increased number of events detected by the SMART SunGuide TMC Operations staff via use of CCTV.



## AMBER Alert

***The state of Florida has activated 97 AMBER Alerts since August 30, 2000<sup>7</sup>. Of the 19 additional activations for 2005, five occurred in the Miami-Dade, Broward, and Palm Beach County area and the SMART SunGuide TMC assisted with DMS messaging for all five of these regional events.***

The public plays a key role in the success of the AMBER Alert program. The following Southeast Florida “Success Story” from the Florida Department of Law Enforcement (FDLE) website<sup>8</sup> depicts how the public can help by utilizing the information posted on DMS signs.

***November 17, 2005***

***An AMBER Alert was requested by local law enforcement when it was reported that a 17-year-old child was missing and in the company of a 39-year-old registered sex offender. A citizen realized he was behind the suspect vehicle after seeing the vehicle description on the dynamic message signs. The Florida Highway Patrol executed a felony traffic stop and the child was rescued.***

## South East Florida Regional TMC Operation Committee (SEFRTOC)

SEFRTOC is comprised of managers from the five TMCs in southeast Florida. Through regular meetings, coordinated communication, and planned resource sharing, the committee has established a regional approach to ITS Operations and incident management. Standard Operating Guidelines clearly identify the partners and the roles and responsibilities of each with regard to interagency communication, DMS messaging structure, resource sharing, documentation, performance measurement, and the incident review process.

***In 2005, SMART SunGuide TMC assisted SEFRTOC partners in DMS messaging 86 times.***

## Public Outreach

The general public and public agencies are relatively uninformed about ITS; what services are provided, how well they function, and how they can benefit from them. This limited understanding can have a negative impact on the potential benefits ITS provide. In 2005, the SMART SunGuide TMC actively worked to organize communications with the public in order to increase public awareness of ITS, while promoting the services of the SMART SunGuide TMC.

***In 2005, more than 30 TMC tours were given to various local, state, federal and international agencies.***

To supplement the tours, off-site presentations have been given at the local Police and Fire Chief’s meetings as well as at 12 Broward County Sheriff’s offices, delivering the message to the local police officers during their daily role call meetings.

<sup>7</sup> FDLE Web site: <http://www.fdle.state.fl.us/amberplan/>

<sup>8</sup> Ibid.

A successful advertisement campaign for the Road Ranger Service Patrol was initiated in 2005 by displaying “banners” on Broward County buses (public agencies do not pay for the display on the buses; the only cost is for the production of the banners). This effort is unique in nature, provides visible support from FDOT to the motoring public, and is low cost with high return (for example, an “ad on a BCT bus will be seen by approximately 1.5 million people in the metropolitan Broward area”<sup>9</sup>). Currently, there are ten banners displayed on transit routes throughout Broward County with more planned for the future.

***On December 6th, 2005, FDOT District IV was awarded the ITS Florida “2005 Organizational Member of the Year” award for “Development and Implementation of an Outstanding ITS Public Outreach Program.”***



## Information Technology / Network Management

In January 2005, the TMC replaced its outdated FDOT Incident Database System (FIDS) software with SMART software for incident management. The Central Computer System (CCS) was still used for all of 2005 for placing messages on the dynamic message signs (DMS); however, this task will soon be replaced by the TMC’s other new software – the Statewide SunGuide software, which was deployed in mid-2005. ***For 2005, the TMC exceeded its uptime goal for all in-house systems; the CCS server, SMART server, Video Display Wall, and other TMC servers combined operational percentage (uptime) equaled 99.965 percent.***

The following sections will describe the TMC’s newest incident management software packages.

### **SMART Software**

The SMART system uses a web based system to track all activities for the Road Rangers, and the SIRV operators, which allows much more data to be collected and tracked. Injury severity, lane configuration and affected lanes, weather conditions, secondary events, and responding agencies are just a few examples of the types of data that the Operators now track during events that were not available using FIDS.

The result of the additional data tracking is an improved reporting system; giving the TMC the locations where the Road Rangers are most active, the types of services provided, and their response times. SMART software also allows District IV to share more of this information with the public. Lane blocking incident information is available real time on the SMART SunGuide Web site and via SMART email alerts that are sent to partnering agencies.

Additional enhancements for SMART will be the integration of FDOT District IV ITS maintenance staff activities, the tracking of ITS device trouble tickets, and mobile data collection from the Road Rangers. SMART alerting systems will also be expanded in 2006 to allow motorists to sign up on the website for SMART alerts that will be tailored to their daily commutes.

<sup>9</sup> Broward County Transit website: [http://www.co.broward.fl.us/bct/about\\_advertising.htm](http://www.co.broward.fl.us/bct/about_advertising.htm)

## Statewide SunGuide Software

In summer of 2005, the Statewide SunGuide software was deployed at District IV; the pilot site for the new software application. Select TMC staff participated in several testing stages and onsite visits to Southwest Research Institute (SwRI) in Texas, the designers of SunGuide.

The key to the success of the SunGuide software is its ability to control all devices common to a TMC from one application. The SunGuide software supplied an immediate benefit to the TMC by giving its Barco video display wall the flexibility to easily place any video easily on to a desired location. Prior to SunGuide, the TMC only had static display of cameras and the Operators had not been given the ability to make any changes to the Barco video display wall. SunGuide also added the ability to control the CCTV camera's pan/tilt/zoom (PTZ) functions through both a software interface and a hardware joystick.

In 2006, District IV ITS looks forward to adding its DMS signs to SunGuide, as well as its soon to be completed vehicle detection system. ***These two ITS additions will make District IV's investments noticeable to the motoring public, resulting in faster and more accurate posting of DMS messages and the option for travel time displays on the DMSs.***

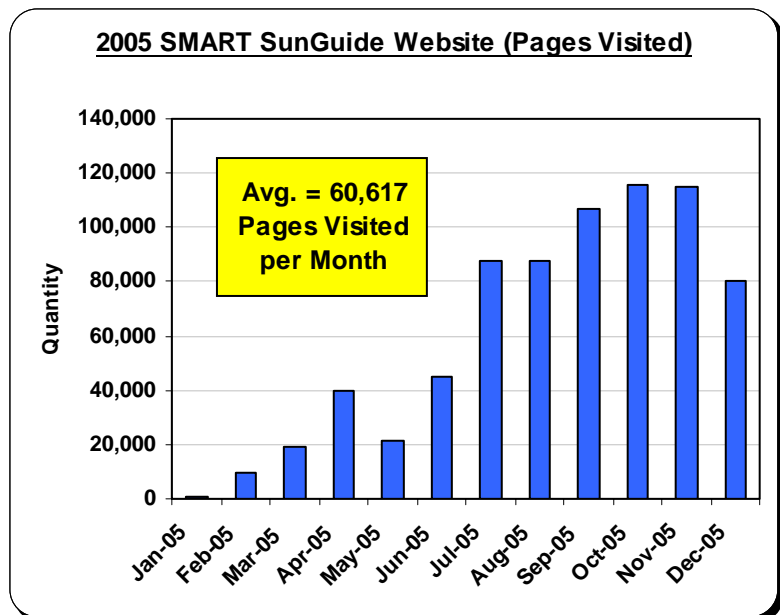
## SMART SunGuide Web Site

The SMART SunGuide TMC Web site - [www.smartsunguide.com](http://www.smartsunguide.com) - was designed, developed, and successfully launched during the first year of operations. The website includes a live traffic map showing real-time events and Road Ranger assists as they are recorded in the SMART incident management software. In addition, DMS messages and CCTV video images can be viewed by "mousing-over" map icons. The website also provides a means



for the public to contact the TMC, provide feedback regarding TMC and Road Ranger services, submit information requests, and schedule tours. Public forums have also been created for the sharing of transportation-related information and ideas.

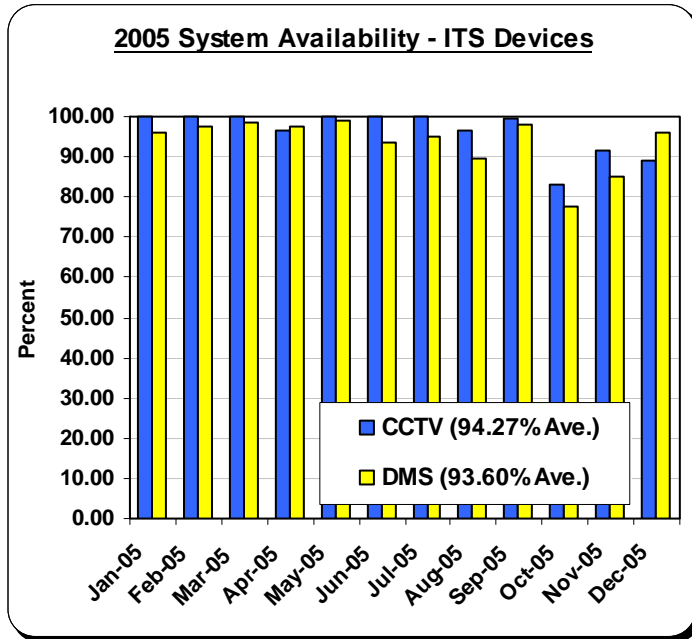
The SMART SunGuide TMC website was deployed in January 2005. As shown in **Figure 14**, the website enjoyed an average of over 60,000 web "hits" (pages visited) per month in its first year; growing from just over 500 hits in January to over 115,000 hits by year end.



**Figure 14 – SMART SunGuide Website**

## ITS Maintenance

### System Availability – Field Devices



**Figure 15 – System Availability – ITS Devices**

To ensure that District IV’s ITS assets are available as needed, the SMART SunGuide TMC employs an ITS maintenance contractor. This helps to avoid/minimize system downtime, reduces total cost of operation, improves effectiveness, and extends the life of ITS assets. The ITS maintenance contractor performs regularly scheduled preventative maintenance, and is required to be readily available 24 hours a day/7 days a week to resolve issues with the ITS devices.

For purposes of this report, system availability is described in terms of uptime percentage (a measure of the percentage of time the system or service is available).

In 2004, only the DMS subsystem (31 signs) was functional in Broward County and it had a 93.8 percent system availability rate on average for the year, as shown in **Table 2**.

In 2005, the TMC not only managed 31 DMS throughout the year, but District IV increased its number of CCTV cameras from 1 to 9 by year end, which the TMC also managed. By mid-year 2006, the District’s CCTV camera coverage will increase to 45 units; covering 40% of the Broward County freeway infrastructure.

Year 2005 percentages were directly affected by Hurricane Wilma’s devastation to Southeast Florida, but as shown in **Table 2**, the difference in annual average availability compared to 2004 was negligible.

Table 2	
Total ITS Device Availability	
2004	93.8%
2005	93.7%

## 1.2 ITS Deployments

There are approximately 84 centerline miles of major freeway under FDOT District IV in Broward County's jurisdiction (I-95, I-75, and I-595). *In order to "be the best TMC in the nation by 2010", District IV ITS has put a deployment plan in place to have 100% of these centerline miles covered with DMS, CCTV, vehicle detectors, and fiber optic backbone by year-end 2007.*

There are two ongoing deployment projects, termed Phase I and Phase II. **Table 3** illustrates the progress of the Phase I deployment as of the end of 2005.

Table 3 – Phase I Deployment					
ITS Field Devices	Phase I Programmed		Phase I Completed (2005 Year-End)		
	Number of Systems (I-95, I-595, I-75)	Centerline Miles to be Covered	Number of Systems (I-95, I-595, I-75)	Percent Phase Complete	Percent Centerline Miles Covered
<b>CCTV</b>	45	40%	9	<b>20.0%</b>	<b>8.0%</b>
<b>Detector Stations</b>	67	40%	3	<b>4.5%</b>	<b>1.8%</b>

## 1.3 Freeway Operations

### Traffic Incident Management (TIM) Team

The multi-agency TIM partners meet bimonthly to discuss issues and identify solutions related to incident management. The TIM team in Broward County has approximately 60 members. To maintain momentum and increase productivity, the teams typically break out into working groups. The working groups are specific to certain aspects of the incident management process, and each group's members have expertise or special interest in that particular area.

Since 2003, the Federal Highway Administration (FHWA) has facilitated assessments of TIM programs in the largest 75 urban areas of the United States. The purpose of the assessments is to enable state and local program managers and practitioners to evaluate their TIM programs and identify strengths and weaknesses in their programs in order to prioritize program activities and initiatives. At a national level, the assessments enable FHWA to evaluate progress in traffic incident management and to identify national TIM program initiatives.

The assessment consists of 34 questions covering the three main TIM program areas – (1) Program and Institutional Issues, (2) Operational Issues, and (3) Communications and Technology Issues. The current national average score is 46.5% (100% maximum score). *The Broward County TIM Team's self assessment score increased from 58.6% in 2004 to 76.5% in 2005.* The increase was a direct result of the Team's dedication to incident coordination, planning, and goal achievement.

### Severe Incident Response Vehicle (SIRV)

The Severe Incident Response Vehicle (SIRV) pilot program consists of one leased vehicle that is available around the clock to serve as an incident command station and FDOT liaison during major incidents. The SIRV staff (based at the SMART SunGuide TMC) provides improved coordination and communication between Road Rangers and incident response team members in the field, as well as with TMC operations and FDOT maintenance staff. The SIRV staff also conducts incident debriefings and assists with inspections of the Road Ranger vehicles.



*For 2005, the SIRV vehicle and staff reported 0.14% of the total recorded events and responded to 284 out of 296 (97%) requested events.*

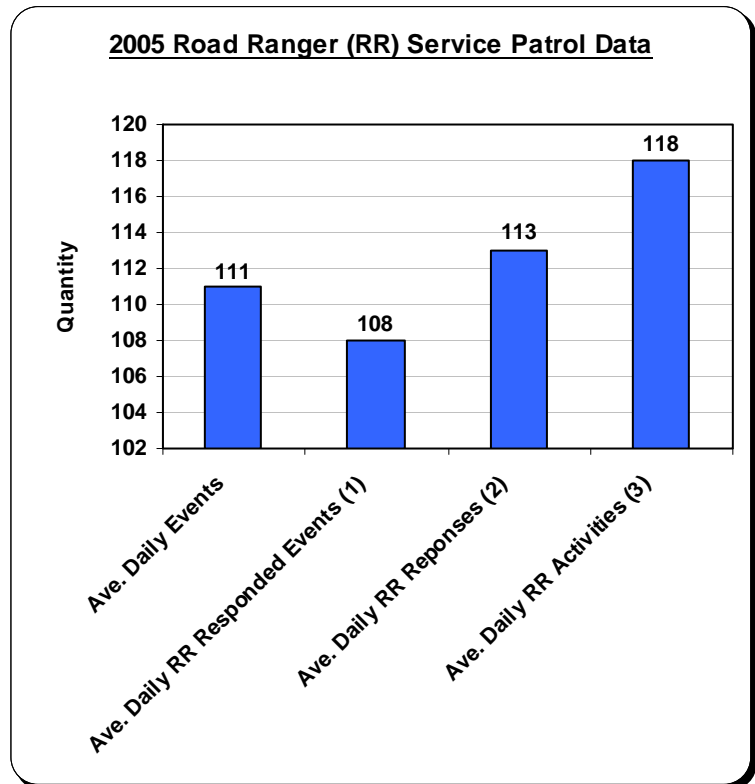
### Road Ranger Service Patrol

The Road Ranger Service Patrol program in Broward County utilizes 11 service vehicles covering approximately 84 centerline miles along I-95, I-595, and I-75 (terminating at the east toll plaza along Alligator Alley). The Broward County Road Ranger fleet (all of which are currently dispatched from the SMART SunGuide TMC) consists of the following:

- 11 daytime vehicles (6:00 am–7:00 pm) each weekday;
- 6 nighttime vehicles (7:00 pm–6:00 am) each weeknight; and,
- 6 vehicles for both weekend day and nighttime shifts.

*For 2005, the Road Ranger Service Patrol (1 of 15 possible reporting entities) was responsible for approximately 71% of the notifications for the 40,552 total recorded events at the TMC.*

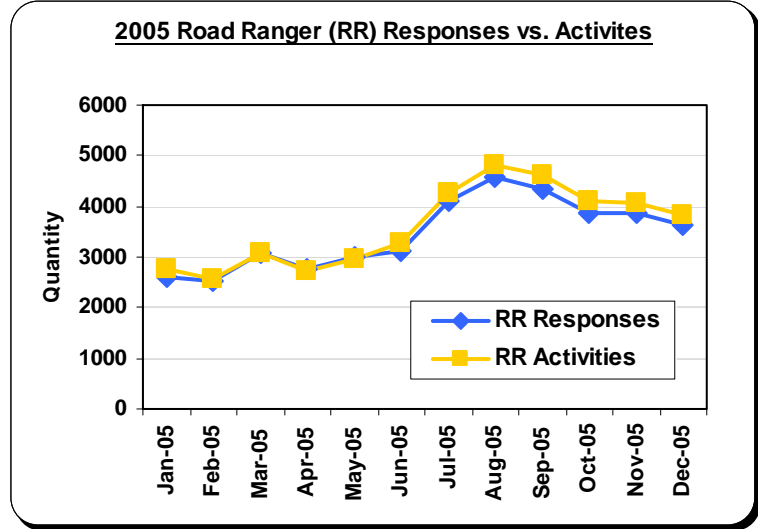
Of the 111 events recorded on average daily in 2005, as shown in **Figure 16**, approximately 108 events were responded to by Road Rangers, which equates to a 97% “responded to” rate [Item (1)]. Item (2) reflects the number of Road Ranger vehicles responding to events daily. This figure is



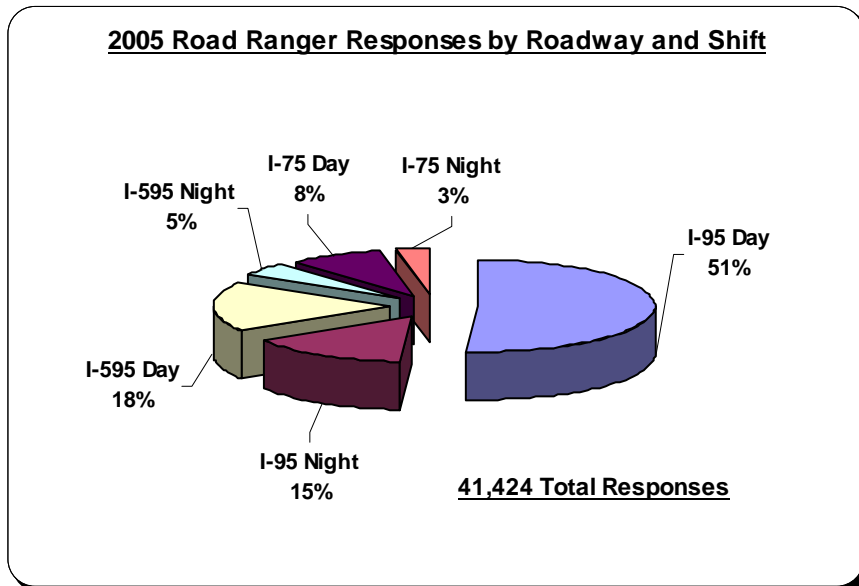
**Figure 16 – Road Ranger Service Patrol Data**

roughly 5% higher than Item (1) due to multiple Road Ranger vehicles responding to the same event. Item (3), "Road Ranger Activities" shows that, on average, Road Rangers performed approximately 1.1 "free" services per event in 2005.

**Figure 17** shows the 2005 monthly totals comparing the number of Road Ranger Responses to Roads Ranger Activities; Items (2) and (3) of Figure 11, respectively. The increase shown in the chart is directly related to inclement weather and the popular travel months in South Florida.



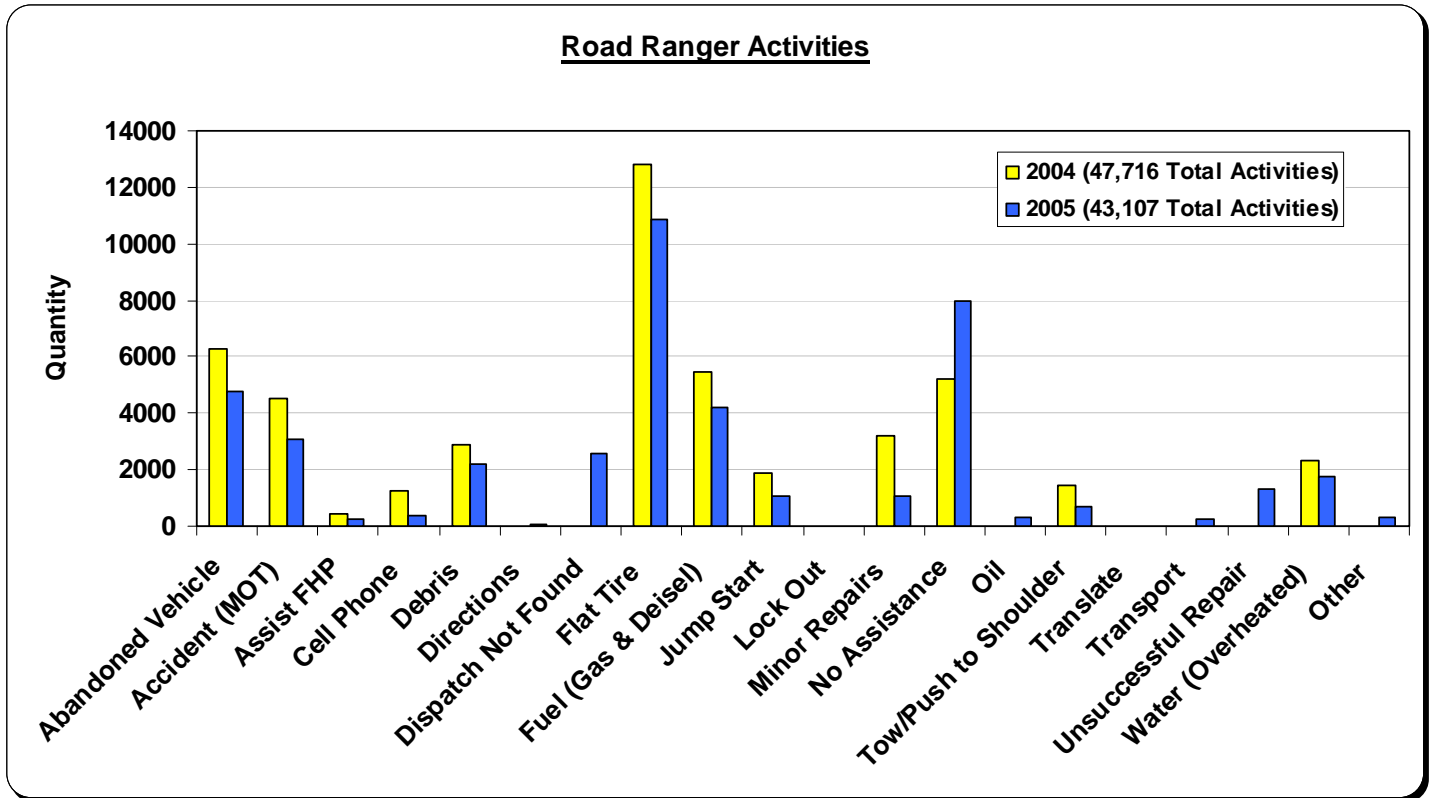
**Figure 17 – Road Ranger Responses vs. Activities**



Thirty-five percent (35%) of the Road Ranger fleet, as shown in **Figure 18**, responded to 51% of the total number of events recorded in 2005. This number equals 6 Road Ranger vehicles out of a possible 17 on any given week. This chart will be used over consecutive years to evaluate the Road Ranger Service Patrol Program for fleet disbursement and expansion.

**Figure 18 – Road Ranger Responses by Roadway and Shift**

The “Road Ranger Activities” chart, **Figure 19**, tracks the total number of “free” services performed by the Road Ranger Service Patrol. The number of activities shown is directly related to the number of events responded to annually. In addition, numerous activities shown are close to zero or are zero. This is due to the number of types of activities that were tracked from 2004 to 2005 increased from 12 to 21. As part of the Benefit-Cost Ratio (b/c) Report<sup>10</sup>, the “free” services in 2005 were added as a new and additional component to the b/c analysis for annual benefits. In 2005, the 43,107 activities performed by the Road Ranger equated to over \$4 million in “free” services to Broward County motorists.



**Figure 19 – Road Ranger Activities**

**Joint Road Ranger/Operator Training**

Road Rangers are an integral part of FDOT District IV’s ITS program. Essential to the success of the Road Ranger program is the training of the drivers. Day in and day out, TMC Operators and Road Rangers communicate constantly sharing information and working together to respond to incidents along the highways and aid motorists in need.

In September 2005, the SMART SunGuide TMC provided a unique learning experience as part of the never-ending training philosophy. For the first time ever, Road Rangers and TMC

<sup>10</sup> Hadi, M., Zhan, C. Florida International University. **Benefit-Cost Analysis of FDOT District 4 – Fort Lauderdale SMART SunGuide ITS Operations.** “Table 4-3 Incident Durations Used in the Analysis”, January 2006. Page 20.



Operators spent two full days watching presentations and participating in various exercises as part of the joint training program. The training covered safety, emergency response, communication protocols, and maintenance-of-traffic (MOT) procedures. While there was much to learn for all who attended, the training was also an opportunity for the Road Rangers and TMC Operators to gain insight into each other's roles and responsibilities while better understanding the challenges faced by each.

***Because of the success of the joint training program, it will be held semi-annually beginning in March 2006.***



## 2.0 BENEFIT-COST ANALYSIS

The Benefit-Cost Analysis<sup>11</sup> for 2005 was produced by the Lehman Center for Transportation Research at Florida International University in Miami, Florida as a functional, standardized tool for the SMART SunGuide TMC to utilize for future years. As per the report, **“the benefit/cost analysis performed in this study confirms the cost-effectiveness of the SMART SunGuide operations”**. The 2005 benefit-cost ratio (b/c) equals 10.46 as shown in **Table 4**.

### Benefit-Cost Ratio

The \$6,558,081 in annual costs for SMART SunGuide TMC in 2004 was divided into the annual delay benefits for 2004 of \$51,543,107, yielding a benefit/cost ratio of 7.86.

In 2005, however, as shown in **Table 4**, the benefit/cost ratio is shown twice: 9.97, which is the result of comparing

this year’s benefit-cost analysis to the methodologies used in 2004; and, 10.44 showing the addition of the new component based on the cost of the “free” Road Ranger services.<sup>12</sup> The total benefit for 2005 equals \$86,002,364. ***This new combination will become the standard method for benefit-cost ratio output for future Annual Report comparisons.***

Table 4 – Benefit-Cost Ratio		
	2004	2005
<b>Benefit-Cost Ratio</b>	7.86	9.95
<b>Benefit-Cost Ratio</b> (Including Additional Service Patrol Annual Monetary Benefits)	N/A	<b>10.44</b>

<sup>11</sup> Hadi, M., Zhan, C. Florida International University. **Benefit-Cost Analysis of FDOT District 4 – Fort Lauderdale SMART SunGuide ITS Operations**. January 2006.

<sup>12</sup> Hadi, M., Zhan, C. Florida International University. **Benefit-Cost Analysis of FDOT District 4 – Fort Lauderdale SMART SunGuide ITS Operations**. “Table 4-9 Calculation of the monetary benefits of Road Ranger Service Patrols”, January 2006. Page 34.



**Table 5** outlines the total annualized costs of the SMART SunGuide TMC for 2005.

**Costs**

<b>Table 5 – 2005 SMART SunGuide TMC Costs</b>				
<b>Deployment</b>	<b>Estimated Capital Cost</b>	<b>Estimated Current Operation Cost</b>	<b>Estimated Maintenance Cost</b>	<b>Annualized Cost (\$/year)</b>
<b>Smart SunGuide TMC</b>	\$6,700,000	\$1,670,200	\$293,889	\$2,548,329
<b>Road Ranger</b>		\$2,500,000		\$2,500,000
<b>Severe Incident Response Vehicle</b>		\$309,503		\$309,503
<b>Dynamic Message Signs</b>	\$11,000,000	\$18,600	\$750,000	\$2,263,500
<b>TIM</b>		\$400,000		\$400,000
<b>CCTV and Detection System Phase I</b>	\$2,845,462		\$167,000	\$43,065
<b>CCTV and Detection System Phase II</b>	\$15,520,168			\$0
<b>ATIS System</b>		\$175,000		\$175,000
<b>Total =</b>				<b><u>\$8,239,397</u></b>

### 3.0 PERFORMANCE MEASURES

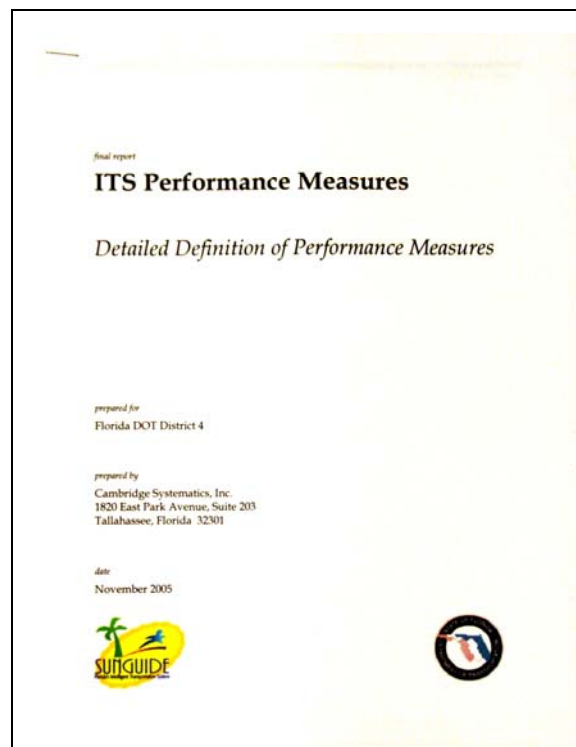
Monthly, quarterly, and yearly performance measurements are important tools to determine progress, help set goals and standards, detect and correct problems, improve processes, and document accomplishments. In 2005, seventeen separate performance measures were tracked using SMART software and the annual results have been displayed with charts and graphs throughout this Annual Report.

The amount of data currently being collected at the SMART SunGuide TMC is already well beyond most transportation management center programs while integrating the established statewide and national ITS performance measures as part of the program. The new program, however, has expanded from the aforementioned 17 performance measures to 60, using both the SMART and the Statewide SunGuide software platforms for data collection and archiving.

This comprehensive performance measurement program will enable District IV to:

- assess all aspects of their ITS activities and operations of the District's freeway system; and,
- describe to FDOT Management and the public quantitative benefits of the ITS Program.

***In 2005, the District IV ITS Program took a huge step towards achieving its vision by developing a performance measure program that will be a model for the state of Florida and the nation.***<sup>13</sup>



<sup>13</sup> Cambridge Systematics, Inc., "ITS Performance Measures – Detailed Definition of Performance Measures", Final Report, Nov. 2005.

## 4.0 BUSINESS PLAN

This section presents a high-level five-year business plan for the SMART SunGuide TMC. This section was developed with a proactive mind-set that focuses on bringing value to the SMART SunGuide TMC customers.

The business plan presented below is consistent with the methodology adopted by the FDOT at the statewide, district, and program levels. It includes developing a vision (who we want to be) and a mission (what we do every day).

Once the objectives have been established, the business plan becomes a tool for guiding measurement of performance—introducing accountability into the organization. In addition, this section identifies a five-year implementation plan that will help the SMART SunGuide TMC consider needs for tomorrow’s projects in today’s activities.

### Status and Implementation of Plan

**District IV ITS successfully completed eleven out of fourteen objectives outlined in their 2005 Section Business Plan.** The three outstanding items have been reassigned for completion in 2006 along with an aggressive new plan through 2010.

<b>SMART SunGuide TMC 5-Year Implementation Plan</b>
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#### 2006

- Complete conversion of existing Road Ranger, Operations, and Information Technology (IT) training materials and presentations into interactive training programs (from 2005).
- Complete data collection system to support performance measures (from 2005)<sup>14</sup>.
- Complete Phase I deployment of 45 CCTVs and 106 vehicle detectors (from 2005).
- Service mark **SMART** acronym and new logo (see image on this page).
- Begin construction of Phase II deployment, which includes 10 DMS, 55 CCTVs, 224 vehicle detectors, and 50 miles of fiber optics communications.
- Complete Video Display Wall upgrade to thirty-three 67-inch seamless projection cubes.
- Establish metrics baseline for speed and vehicle detection data after deployment and testing of traffic detection system.
- Implement video distribution system to TMC partners and general public.
- Conduct focused training based on results of performance directly related to reducing operator errors.



<sup>14</sup> Cambridge Systematics, Inc., “ITS Performance Measures – Detailed Definition of Performance Measures”, Final Report, Nov. 2005.



- Provide travel-time information to transit, TMCs, and other transportation partners.
- Integrate FHP CAD data and VISIO PAD data into SMART.
- Conduct semi-annual, regional Joint TMC Operations/Road Ranger training.
- Implement GPS based ITS infrastructure inventory.
- Establish permanent SIRV Program.
- Increase TMC Public Outreach effort for regional promoting of SMART SunGuide TMC services.
- Participate in ITS America annual conference.
- Participate in TRANSPO biennial conference.
- Develop SMART SunGuide TMC Strategic / Business Plan.
- Create TIM Strategic Plans and Memorandum of Understanding (MOUs), respectively.
- Automate travel time messaging for DMS system.

## 2007

- Host annual statewide FDOT Working Group meeting.
- Become a member of a National Board for Performance Measures.
- Install a Gigabit-Ethernet communications plant to support ITS.
- Complete Phase II ITS deployment.
- Procure Design-Build teams for Palm Beach County and Northern Counties ITS Projects.

## 2008

- Research/Develop predictive algorithms for incidents.
- Deploy Palm Beach County and Northern Counties ITS Projects.
- Integrate public safety/security with TMC Operations' functions as per FHWA national directive.

## 2009

- Automate CCTV pan/tilt/zoom (PTZ) functions on incidents.

## 2010

- Expand Road Ranger coverage to Northern Counties as pilot program.

## 5.0 ACTIVITIES AND ACHIEVEMENTS

### Hurricanes

2005 brought a wave of unusual weather to South Florida. In addition to record-setting rainfall, two devastating hurricanes hit our region in a period of less than two months:

- Hurricane Katrina (August 25, 2005; Maximum Sustained Winds (MSW) = 70kt; Over \$100 Billion in total losses between FL, LA, and MS)<sup>15</sup>
- Hurricane Wilma (October 24, 2005; MSW = 105kt; Over \$12 Billion in total losses to FL and Mexico)<sup>16</sup>

### Awards

District IV continues to take a proactive, regional approach to integrating the services of the SMART SunGuide TMC and, as such, is thankful and honored to have been recognized by fellow transportation organizations and partners for the following two awards in 2005:

***On August 10th, 2005, FDOT District IV & Broward County were awarded the ITS Florida “Outstanding Achievement Award - In Recognition of Your Continuing Leadership and Innovativeness Toward the Advancement of ITS in the State of Florida, and for Your Successful Design and Deployment of the SMART SunGuide TMC to Serve the Greater Broward County Region.”***



In 2005, the SMART SunGuide TMC developed six awards to recognize the excellence, commitment, and hard work demonstrated by supporting members of the ITS team:

- Road Ranger – “Dedication to Motorist Assistance”
- Traffic Incident Management – “Participation and Contribution in Meetings”
- ITS Operations – “Customer Service and Mentoring”
- ITS Management – “Innovation and Leadership”
- ITS Maintenance – “Dedication to System Availability”
- Road Watcher – “Dedication to Motorist Safety”

Upcoming for 2006, the TMC has added a seventh award category – Public Partnering – “Commitment to Teamwork”, and due to the tremendous efforts of certain individuals during Hurricane Wilma, special “Hurricane Heroes” awards will also be distributed. The staff is very much looking forward to distributing these awards at the 2<sup>nd</sup> Annual Outstanding Service Awards Ceremony in February 2006.

<sup>15</sup> National Climatic Data Center Web site: <http://www.ncdc.noaa.gov/oa/climate/research/2005/hurricanes05.html>

<sup>16</sup> Ibid



# DOING IT THE SMART WAY

**Systems Management for Advanced Roadway Technologies**



**SMART** stands for “**Systems Management for Advanced Roadway Technologies.**”  
Our vision is for the SMART SunGuide TMC to become the best in the nation by 2010.

By doing it “**The SMART Way**”, FDOT District IV’s transportation management center programs will continuously provide outstanding ITS products and services to its internal and external customers.

**SMART SunGuide TMC**  
2300 West Commercial Boulevard  
Fort Lauderdale, Florida 33309  
954.847.2785