ITS Program

FISCAL YEAR 2013/14

ANNUAL REPORT

CONNECTED VEHICLE

EXPANDING FLORIDA'S TEST BEDS AND IMPLEMENTING NEW TECHNOLOGY

FL511

DETERMINING THE VISION FOR THE FUTURE OF FL511

SUNGUIDE® SOFTWARE

KEEPING UP WITH TRAFFIC MANAGEMENT TECHNOLOGY ADVANCES

FLORIDA DEPARTMENT OF TRANSPORTATION

Intelligent Transportation Systems

FDOT

CONTENTS

WELCOME

Florida Department of Transportation

RICK SCOTT
GOVERNOR

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ANANTH PRASAD, P.E.
SECRETARY

Dear Reader:

On behalf of the Florida Department of Transportation (FDOT) Intelligent Transportation Systems (ITS) Program, I am pleased to present this Annual Report for fiscal year 2013-2014. During this past year, the Traffic Engineering and Operations Office secured funding needed to expand projects in the *Ten-Year Cost Feasible Plan*. These projects will close the gap in ITS by completing deployments on I-10, I-75, and some small segments on I-95.

The ITS Program has been measuring and reporting operations performance now for ten years. These measures help us to assess the overall health of our ITS operations, enabling us to determine the benefits the program is providing to the traveling public. More information on performance measures is available on page 10.

Since the Florida 511 advanced traveler information system was first deployed in central and southeast Florida in 2002, we have worked to make it a premier system, implementing new technologies as they came along to improve the user's experience. Florida routinely experiences adverse weather and this year we added ice storms to our list. You can read how our 511 system played a big role in keeping travelers informed on page 13.

SunGuide® software continues to grow and to offer the answers needed as a traffic management software system. This past fiscal year, SunGuide software added not only the ability to use full color dynamic message signs, but a new user-friendly scheduler, and so much more. Articles relating to the software can be found on pages 14 and 18 of this annual report.

The ITS facility management project is moving forward, allowing system users to manage deployed assets, understand systems configuration, and distribute as-built documents. Highlights on ITS facility management can be viewed page 20.

Over the past few years, we have also provided news from two programs with close ties to the ITS Program—Traffic Systems and Florida Traffic Incident Management and Commercial Vehicle Operations (TIM/CVO). This year is no exception; articles are once again available for the Traffic Systems (pages 24 and 32) and the TIM/CVO program (pages 26 to 30).

I hope this quick overview of the information provided in this annual report entices you to take more time to read about our accomplishments. We have a great program that we are excited to share with you!

Elizabeth Birriel

Elizabeth Birriel, P.E.
Deputy State Traffic Operations Engineer
ITS Program Manager
Florida Department of Transportation

VISION & MISSION

FDOT Vision

Serving the people of Florida by delivering a transportation system that is fatality and congestion free.

FDOT Mission

Provide a safe transportation system that ensures the mobility of people and goods, enhances economic prosperity, and preserves the quality of our environment and communities.

FDOT's ITS Program endeavors to provide a safe transportation system that ensures the mobility of people and goods, enhances economic prosperity, and preserves the quality of our environment and communities.

PROGRAM OVERVIEW

Area Descriptions and Major Accomplishments

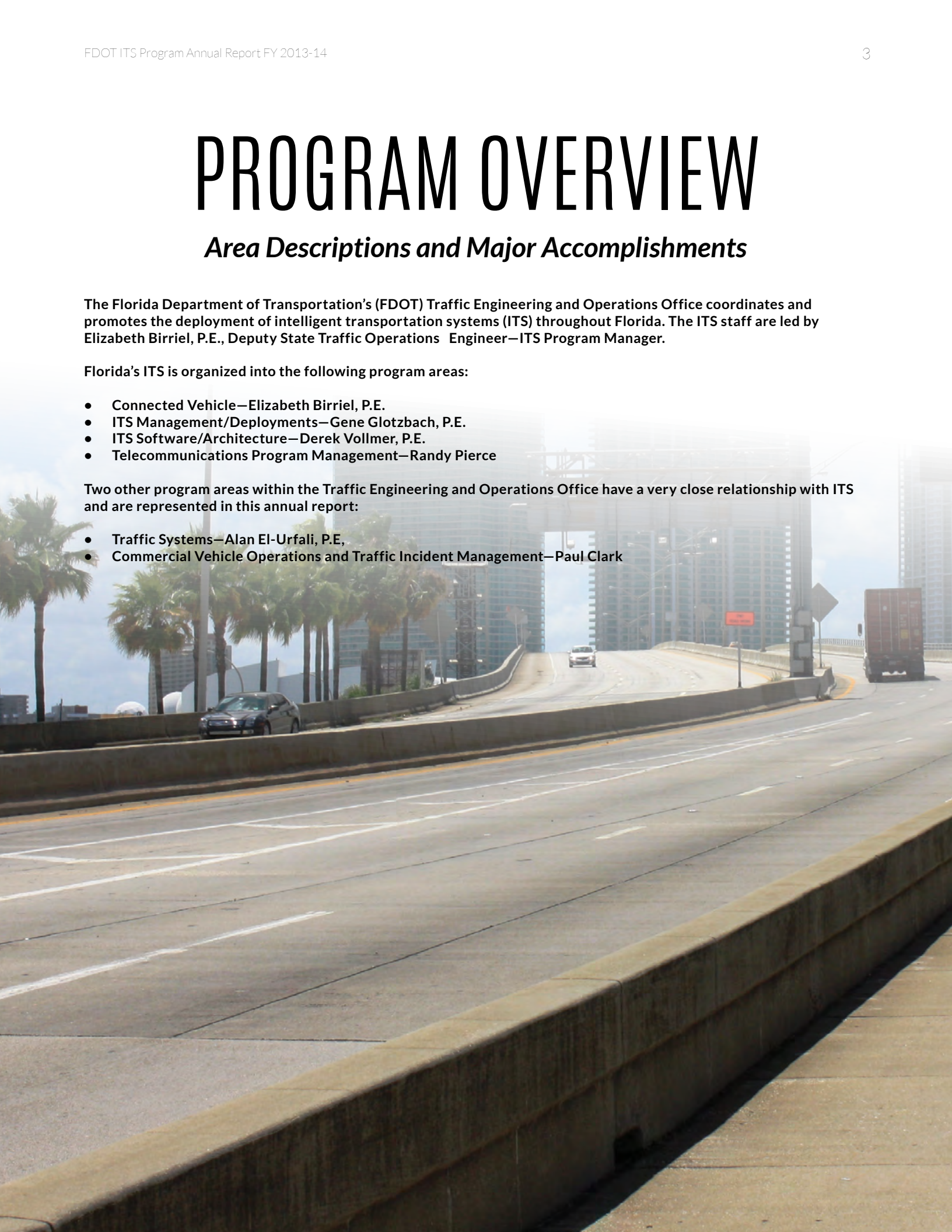
The Florida Department of Transportation's (FDOT) Traffic Engineering and Operations Office coordinates and promotes the deployment of intelligent transportation systems (ITS) throughout Florida. The ITS staff are led by Elizabeth Birriel, P.E., Deputy State Traffic Operations Engineer—ITS Program Manager.

Florida's ITS is organized into the following program areas:

- **Connected Vehicle—Elizabeth Birriel, P.E.**
- **ITS Management/Deployments—Gene Glotzbach, P.E.**
- **ITS Software/Architecture—Derek Vollmer, P.E.**
- **Telecommunications Program Management—Randy Pierce**

Two other program areas within the Traffic Engineering and Operations Office have a very close relationship with ITS and are represented in this annual report:

- **Traffic Systems—Alan El-Urfali, P.E,**
- **Commercial Vehicle Operations and Traffic Incident Management—Paul Clark**



ITS Management/Deployments

Program Description

- Promote intelligent transportation systems (ITS) deployments on Florida's limited-access roadways.
- Oversee Florida's 511 (FL511) advanced traveler information system operations.
- Participate in development of the next-generation FL511 traveler information system.
- Manage the *Ten-Year ITS Cost Feasible Plan*.
- Manage the regional transportation management center operations and ITS equipment replacement cost allocations.
- Develop supplemental data sources to support FL511 in rural areas.
- Support the I-95 Corridor Coalition through the Travel Information Services Program Track Committee.
- Support the National 511 Coalition Working Group.
- Develop and update standards and specifications for ITS devices.
- Manage the ITS general consultant contract.
- Manage marketing efforts for FL511.
- Manage deployment of a video aggregation system to support the State's Emergency Operations Center.
- Support development of the *Florida 's 511 Progress Report* and the *ITS Program Annual Report*.
- Implement the federally mandated real-time system management information program established in Section 1201 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users.

Major Accomplishments

- Updated the *Ten-Year ITS Cost Feasible Plan*.
- Updated the operations and equipment replacement information to allocate funds to the Districts for the operation of their transportation management centers and replacement of aging equipment.
- Secured funding to complete ITS deployments on rural portions of interstate highways.
- Provided information on funding budgeted for the ITS Program for the next five-year work cycle to support development of the Florida Transportation Commission's annual report.
- Implemented enhancements to FL511 to provide a better user experience.
- Conducted a charrette to determine the future of FL511 in Florida.
- Implemented enhancements to the iPhone and Android™ apps.
- Maintained the Video Aggregation System II contract to provide streaming video to the State Emergency Operations Center to support evacuations.
- Managed the marketing efforts for FL511 and developed the year's work plan.
- Contracted with Global-5 to provide FL511 marketing for another year.
- Produced *Florida's 511 Progress Report—Capturing Advancing Technology* for 2013.
- Replaced INRIX data, which only provided coverage on I-10 and the northern portions of I-75, with HERE data that expands to full statewide coverage of limited-access facilities as well as arterials.
- Developed other sources for traffic flow data.
- Supported research with the University of Central Florida on real-time monitoring and prediction of reduced visibility events on Florida's highways.
- Continued to provide support to District Traffic Operations and Work Program staffs to manage their portions of the *Ten-Year ITS Cost Feasible Plan*.
- Continued to support and provide quality assurance to the Traffic Engineering and Research Lab and the ITS lab to test ITS equipment operability using the SunGuide® software.
  - Continued to support the maintenance and enhancement of SunGuide software.
  - Continued to support the Change Management Board and process engineering change proposals.
  - Continued participation in the ITS Working Group Meeting.
  - Continued to produce the *SunGuide Disseminator* (the Traffic Engineering and Operation's monthly newsletter).
  - Continued to produce the *ITS Program's Annual Report*.
  - Continued to develop ITS specifications and maintain existing specifications based on field experience with deploying various ITS devices.
  - Worked on consolidating specifications between ITS and traffic signals.
  - Performed technical reviews and provided support for project-specific requests related to specification modifications (modified special provisions).
  - Held quarterly FL511 Working Group Meetings to discuss issues and enhancements to the 511 system.

ITS Software/Architecture

Major Accomplishments

- Deployed SunGuide software release 6.0.
- Conducted operator training for SunGuide software release 6.0.
- Added SQL server support within the SunGuide software.
- Supported the Districts with the maintenance and creation of SunGuide software report templates.
- Launched the next phase of the central data warehouse with the University of Maryland, which will include the integration of Florida's probe data and the subscribed data feed from HERE.com.
- Maintained the SunGuide software project web site.

Program Description

- Develop and maintain the Statewide ITS Architecture (SITSA) to promote an integrated ITS; assist in development of District, regional, and corridor ITS architectures to ensure SITSA conformance.
- Develop and promote the use of the systems engineering management and configuration management processes to the FDOT Districts.
- Manage the SunGuide® software development process, including support and maintenance of the software at transportation management centers (TMC).
- Manage FDOT's ramp metering firmware software used to control and monitor ramp meters.
- Manage the smart phone (Android™) application for Road Rangers used to collaborate with TMC personnel.
- Manage the central data warehouse system to host statewide traffic and incident data.
- Coordinate ITS training to enhance the quality of the state's ITS workforce.
- Coordinate ITS research with the Districts to identify the needs, priorities, and applicability of emerging ITS concepts.
- Coordinate traffic operations and ITS support for public-private partnerships and managed lanes projects.
- Coordinate with SunGuide users/members of the Change Management Board to ensure SunGuide continues to meet their needs through ongoing enhancement.

Telecommunications Program Management

Program Description

- Guide deployment of a communications backbone to serve ITS deployments on major corridors.
- Implement and manage the statewide ITS wide area network (WAN) to support ITS deployments.
- Manage the operations and maintenance program for the statewide ITS telecommunications network to support ITS deployments and various ITS research and development initiatives.
- Manage all of FDOT's Federal Communications Commission (FCC) radio licenses (over 600 licenses).
- Manage the ITS Facility Management (ITSFM) system to provide asset and configuration management capability for FDOT and its regional partners to maintained the fiber optic and electric cable networks, ITS, signal, toll, and statewide telecommunications network equipment site components.
- Manage the Wireless General Manager Agreement, a resource-sharing public/private partnership, which places commercial wireless carriers on FDOT rights-of-way with Lodestar/American Tower.
- Develop operations standards and equipment specifications to support District telecommunications initiatives in their ITS, Maintenance, and Traffic Incident Management programs.
- Design and implement statewide ITS telecommunications network infrastructure expansions and upgrades.

Major Accomplishments

- Continued a project to expand the ITS WAN with a gigabit Ethernet connection between the FDOT Traffic Engineering Research Laboratory (TERL) and the State Emergency Operations Center (SEOC) in Tallahassee. The connection will support the SEOC with streaming video and data from the District regional transportation management center (RTMC) during emergency operations as needed over FDOT's private networks. The City of Tallahassee traffic systems fiber infrastructure will provide the fiber optic connection.
- Completed work to install the ITS WAN in Districts One and Seven. Optical path tests and performance parameter measurements were made to assure reliable long-distance communications.
- Awarded a project for a one-gigabit Ethernet connection between the RTMCs in Districts One and Seven to improve the reliability of the ITS WAN until District fiber optic deployments are complete along I 75.
- Provided ITS statewide telecommunications services comparable to those of major telecommunications carriers. Our improvements to backup power systems and emergency generators played a major role in the delivery of these services leaving us far less vulnerable to network outages.
- Continued implementation support of the ITSFM system to better enable FDOT Districts to manage their overall telecommunications networks, field system configuration, and components.
- Developed standardized process and custom tools to assist with preparation of the ITSFM implementation plan and budget packages.
- Developed a global positioning system data dictionary design to efficiently collect feature and attribute information for easy import into the ITSFM system.
- Performed ITSFM manager/engineer and maintainer training for 24 new users. FDOT has trained 101 users in the use of ITSFM so far.
- Upgraded ITSFM software to add new devices, features, and capabilities to the software.
- Continued a major design/build program to support Florida's Turnpike Enterprise (FTE) in repairing and refurbishing or replacing 19 radio towers along with their associated antenna and tower lighting systems. Central Office is providing scope design, procurement support, and field inspection services.
  - Awarded a contract to replace a tower at the Clermont FTE telecommunications site.
  - Completed construction of the Wildwood tower replacement; two other replacement towers projects are underway at the Canoe Creek and Orlando West telecommunications sites. The work will be completed in the upcoming fiscal year. Central Office is providing field inspection services and contract monitoring for FTE on these projects.
  - Began design work including structural analysis for new drilled shaft foundations and guys, corrosion protection, new obstruction lighting systems, and repairs to tower appurtenances and antenna systems at three tower sites
- Continued a project to support the Florida Rail Enterprise in radio systems operations. Researched requirements for transferring ownership of all radio system licenses from CSX to FDOT in support of new District Five SunRail operations. Worked closely with CSX to initiate transfer of all required FCC radio licenses. Established relationship with the Association of American Railroads to facilitate additional required transfers of railroad signal system radio licenses. Coordinated with FDOT District Five stakeholders.

- Experienced a reduction of two wireless collocation subleases under the Lodestar/American Tower Wireless General Manager Agreement as a result of wireless carrier consolidations. Two new wireless collocation subleases were added as a result of expansion of the wireless industry and deployment of wireless broadband technology.
- Completed a contract for deployment of permanent emergency generator power systems at the Cocoa Florida Highway Patrol (FHP) statewide ITS telecommunications network site to provide continuity during power outages.
- Awarded a contract for deployment of permanent emergency generator power systems at the Everglades Academy statewide ITS telecommunications network site to provide continuity during power outages.
- Completed a project for replacement and upgrade of high-capacity backup battery plants at 16 statewide ITS telecommunications network sites, to provide continuity during power outages.
- Began design and development of a Phase 2 procurement scope for replacement and upgrade of high-capacity backup battery plants at 17 additional statewide ITS telecommunications network sites, to provide continuity during power outages.
- Completed installation of a multi-cast repeater at the Miami 79th Street Causeway tower site in District 6.
- Procured 1,087 VHF low band mobile radios to complete a five-year program to replace over 1,800 mobile radios in FDOT's radio system. Districts are completing the installation of these mobile radios.
- Awarded a contract for installation of multi-cast repeaters at the District Six headquarters tower site and at the Chiefland Forestry tower site in District Two.
- Trained District Six trainers in the operation of the new mobile radios and their operation in the new repeater network.
- Completed testing and proof of concept in providing capabilities to access FDOT's radio network utilizing smartphone and/or tablet technology systems for Districts' upper management.
- Began testing radio interoperability at nine remote tower sites. Using FDOT's ITS-WAN we are testing the capabilities associated with IP multi-casting in providing voice communications.
- Continued reporting weather data from eight field weather stations in support of the Federal Highway Administration's Clarus initiative, a program to provide information to all transportation managers and users to alleviate the effects of adverse weather (e.g., fatalities, injuries, and delays).
- Completed contractor work for two ground stations for use in conjunction with the National Oceanic and Atmospheric Administration satellite-based "data collection service" to deliver bridge sensor data to Districts and their stakeholders.
- Maintained WiFi® Internet access at four welcome centers, which has served over 145,000 users to date with an average of 600 login events per week.
- Deployed the mobile WiFi® trailer at Operation Radar II, a Florida communications interoperability training exercise for local, state, and federal agencies.
- Installed a forward-looking infrared camera on the WiFi trailer to assist with remote nighttime roadway monitoring for an upcoming deployment at Paynes Prairie.
- Assisted FDOT State Maintenance Office (SMO) with their rest area WiFi deployment project. Drafted a WiFi test plan for ensuring new rest area WiFi Internet services are adequate. Coordinated with installation vendors to perform testing at first installed location. Provided feedback to SMO on recommendations for future testing. Began coordination effort to perform future testing at all rest areas.

Traffic Systems

Program Description

- Operate the Traffic Engineering Research Laboratory (TERL).
- Develop, maintain, update, and publish standard specifications, standard drawings, and payment methods for traffic control signals and devices; evaluate and certify/approve these devices for use in Florida.
- Maintain and improve the Approved Product List (APL) vendor quality system program and product approval programs. These programs are used to list equipment on the Florida Department of Transportation's (FDOT) APL to ensure a uniform system of traffic control devices in Florida.
- Provide technical expertise and support for the use of traffic control device specifications developed by FDOT.
- Implement and improve the quality system utilized by TERL such that it is compliant with an industry-accepted standard for quality management systems of product certification bodies (International Organization for Standardization (ISO) 17065).
- Provide testing, verification, and validation services for ongoing development of FDOT's SunGuide® software, Florida's advanced traveler information software, and other statewide transportation software and system applications.
- Provide support services and infrastructure for intelligent transportation systems (ITS) telecommunications and central data warehouse functions.
- Provide technical assistance and training relating to the design, implementation, and operation of traffic control signals and devices used in Florida.
- Provide support for red-light running camera system structural design pre-approval and equipment self-certification.
- Represent Florida on national technical advisory groups that develop traffic control and ITS device standards.
- Maintain and update traffic operations asset inventory.

Major Accomplishments

- Maintained a statewide APL vendor quality system program to evaluate quality systems of traffic control signal and device vendors requesting listing of their products on the APL – accepted 12, and re-accepted 25 quality systems.
- Maintained a statewide APL product approval program to certify/approve traffic control signals and devices used in Florida – approved 54 products.
- Tracked permit requests for traffic control products and issued six permits.
- Tracked and addressed five non-conformance reports received from end-users through issuing/tracking corresponding corrective action requests to APL vendors until resolution.
- Developed and updated multiple FDOT contract documents, including updates to 22 installation and equipment specifications for the FDOT *Standard Specifications for Road and Bridge Construction* (*SSRBC*).
- Completed the consolidation of requirements for traffic control signals and devices that were formerly published in FDOT's *Minimum Specifications for Traffic Control Signals and Devices* (*MSTCSD*) into corresponding sections of the *SSRBC*.
- Developed an automatic data analysis and metrics reporting system using Microsoft® (MS) Excel and live feed from MS SharePoint for the APL vendor quality system program and APL product approval program.
- Revised quality system evaluation process requirements for Florida-based businesses in the *Product Certification Handbook*.
- Developed and implemented an APL product evaluation tracking system, including automated evaluation task assignments.
- Automated the publication of the on-line *Acceptable Quality System List*, *Acceptable Independent Test Lab List*, and *List of Products under Corrective Actions* using RSS feed from MS SharePoint.
- Coordinated statewide submittal reviews and structural approvals for red light running cameras.
- Performed end-to-end system testing of various SunGuide software components, interfaces, and field devices, including independent verification and validation testing.
- Completed plans and selected a contractor for improvements to the TERL campus, including rehabilitation of campus roads used for product testing, expansion of power and communications infrastructure, and establishment of test areas for evaluation of pedestrian safety features and signal hanger hardware.
- Managed and/or supported research projects for the following subjects:
  - Damage to ITS, traffic control, and roadway lighting equipment from transient surge and lightning strikes;
  - Development of automated testing tools for traffic control signals and devices;
  - Managed lanes operations, including time-of-day versus dynamic pricing;
  - Human factors research, regarding pedestrian buttons, illuminated street name signs, DMS character sizes, and additional traffic signal heads;
  - Development of roadway and intersection safety calibration factors; and
  - Hurricane survivability of traffic signal attachment hardware.

Commercial Vehicle Operations

Major Accomplishments

- Reviewed 1,172 protests received by the Commercial Motor Vehicle Review Board, granting full or partial relief to 454 citations for a total relief in excess of $552,000.
- Purchased 20 United States Department of Transportation (USDOT) readers that allow automated look-up of motor carrier status. This status includes safety violations, out-of-service violations, delinquent fines, etc. In addition to improving safety by identifying and removing unsafe carriers from the roadways, FDOT recognizes that the USDOT readers will also allow Florida to identify and collect delinquent fines and/or taxes from motor carriers utilizing Florida roadways.
- Started to streamline the overweight/over dimensional permitting process. FDOT currently offers a web-based permit application system. This system allows online submittal of the permit application and auto-issue on certain permit configurations. Currently the system has 70 percent utilization and this is expected to rise as ongoing enhancements are completed.
- Continued development of Florida's commercial vehicle container number database system for tracking container/vehicle movements and presenting data graphically. This database provides storage and the ability to query container numbers and ancillary data (container location and time-stamp) from Department of Agriculture and Consumer Services and license plate reader system data from the Motor Carrier Size and Weight system.

Program Description

- Promote commercial motor vehicle safety as it relates to commercial vehicle operators as well as the traveling public.
- Chair and manage the Commercial Motor Vehicle Review Board representing the Florida Department of Transportation (FDOT) Secretary as required by the Florida Administrative Code.
- Manage Florida's Commercial Vehicle Information Systems and Networks (CVISN) program, a nationwide program under the direction of the Federal Motor Carrier Safety Administration, which strives to streamline commercial vehicle industry regulations and helps motor carriers and motor coach operations in Florida function more efficiently. The Florida CVISN team consists of various partners, including FDOT, Department of Highway Safety and Motor Vehicles, Department of Revenue, Department of Agriculture and Consumer Services, and private sector representatives from motor carrier companies and the Florida Trucking Association. The CVISN program focuses on ensuring safety enforcement resources in high-risk commercial operators; integrating federal and state regulatory systems to improve access to and verification of operating credentials; improving efficiency through electronic screening of commercial motor vehicles; and enabling online application and issuance of operating credentials.

Traffic Incident Management

Program Description

- Provide technical support and assistance to the Florida Department of Transportation's (FDOT) District Offices and other partners in regards to traffic incident management (TIM).
- Develop and update scope of services, policies, and procedures for FDOT's Road Ranger and Rapid Incident Scene Clearance (RISC) Programs.
- Support the Federal Highway Administration's (FHWA) Strategic Highway Research Project (SHRP 2) National TIM Responder training efforts.
- Assist the State Emergency Operations Center with evacuation management.
- Collect TIM-related data to determine areas of improvement for future planning.

Major Accomplishments

- Prepared and published the RISC Annual Report – September 2013.
- Prepared and published the Road Ranger Comment Card Annual Report - August 2013.
- Prepared the fifth Annual Road Ranger Responder Survey.
- Supported the www.FloridaTIM.com web site.
- Enhanced outreach to District TIM programs – ongoing video conferences.
- Continued deployment of the Statewide Law Enforcement Radio System with ongoing training and support to the Districts.
- Continued coordinating the revision of the *Open Roads Policy*, in cooperation with the Florida Highway Patrol. Revised *Open Roads Policy* approved and signed February 2014.
- Continued to support the SHRP 2 National TIM Responder training courses around the state. Thirty-five training sessions were held with 720 attendees during this fiscal year.

By Elizabeth Birriel, P.E., FDOT, and Anita Vandervalk, P.E., Cambridge Systematics

Performance Measures

Developing and Reporting Measures

The Florida Department of Transportation (FDOT) is committed to implementing statewide, fully integrated intelligent transportation systems (ITS) in a cost-efficient manner to better accommodate Florida's rapid growth in population, tourism, and commerce. Developing and reporting operations performance measures is a high priority for FDOT to demonstrate and document the benefits of ITS.

FDOT has been addressing performance measures since 2004. Initially, Districts were limited to measures of basic production and usage (*output*). The initial output measures reported statewide were Total Annual 511 calls, Road Ranger Stops, and centerline miles of limited-access highways managed by ITS.

The proliferation of ITS deployments and integration allows more accurately documented and reported performance measures and the resulting benefits (*outcome*). In 2006, FDOT started reporting three ITS outcome performance—incident duration, travel-time reliability, and customer satisfaction.

Performance Measures Results

Data for the fiscal year (FY) 2013/2014 was collected for the period beginning July 1, 2013, and ending June 30, 2014. This year there is an exception for the travel-time reliability data. FDOT is currently revising the speed detector configuration procedures and the fourth quarter travel time data is now available. The reporting period for travel time reliability is April 1, 2013 to March 31, 2014. However, the reported results adequately represent the FY 2013/2014 timeframe. The customer satisfaction survey is currently being conducted and is not included in this article.

Miles Managed by ITS

As of June 30 2014, 1,296 miles of limited-access Florida Intrastate Highway facilities were managed by ITS. This is 62 percent of the total system mileage. No new miles managed were added this year; however several projects are currently underway.

511 Calls

Approximately 1.7 million calls to Florida 511 were made during FY 2013- 2014. The FL511.com web site received 908,395 visitors during that time. There were 880,659 visits to the 511 mobile applications in the past year, which is a 39 percent increase over the past year. Another option for travelers is 511 Twitter feeds, which had 9,308 subscribers to 12 feeds at the end of June 2014. Tracking the phone calls to Florida 511 is no longer the sole indicator of system usage as more travelers use automated and mobile applications to customize their experience. Over 14 million messages, calls, visits, and alerts were made in FY 2013-2014 keeping travelers on Florida's highways informed

Road Ranger Stops

In FY 2013/2014, there were 382,403 Road Ranger stops made statewide. All seven Districts and Florida's Turnpike Enterprise provided Road Ranger services. This is a small increase from FY 2012-2013.

Incident Duration

The annual average time of incident duration from reporting Districts is 46.54 minutes. The Open Roads Clearance Duration averages about 38 minutes for reporting Districts. This is well under the *Open Roads Policy* target of 90 minutes.

Travel Time Reliability

Travel time and planning time indices were calculated for ITS-managed corridors in each District. The planning time index (PTI) is the 95th percentile travel time divided by free flow travel time.

Roadway segments that consistently show congestion and unreliable travel times are tracked and reported on quarterly. The most unreliable section calculated throughout the state was in Miami (District Six) on I-95 southbound during the morning peak period (PTI of 2.75).

Summary

FDOT continues to improve data collection, analysis, and reporting related to operations performance measures. Quarterly reports are generated for all six measures for FY 2013-2014.

By Gene Glotzbach, P.E., FDOT

The Future of FL511

Making a Decision

What is a charrette? Of French origin, the Anglicized meaning of a charrette is an intensive planning session where a team of experts get together to discuss a particular topic and to develop a vision regarding that topic. The charrette provides a forum where all involved can come together to provide input to develop a path to reach a particular goal.

The Florida Department of Transportation (FDOT) held a charrette to help determine the vision for the future of the FL511 advanced traveler information system. The existing FL511 system was designed seven years ago and incorporated technology that was current at that time. As technology has moved forward, FDOT has made efforts to incorporate these new technology into the system to improve the user's experience. However, as technology and system capabilities continue to improve, Florida is reconsidering its traveler information system investments that provide real-time information to people.

Participation in the charrette included representatives of states that have deployed 511 systems as well as information service providers. The charrette will look at comparative frameworks in both the public and private sectors; identify institutional, technological, and policy barriers to reaching an end state; describe the service requirements for Florida's traveler information system; and determine options for building, buying, or partnering with external entities to achieve the objective. In short, the charrette will help FDOT to define a path to move forward with providing traveler information to the public.

FDOT is looking at three potential options for the future of the FL511 system. The first option would be to continue with the current system's architecture where information would be distributed through an interactive voice response system (IVR), web site, mobile apps, and Twitter feeds. The second option would be to modify the architecture to eliminate the IVR and rely on the web site and mobile apps as the primary means of disseminating information. The third option would be to turn the FL511 system operation over to private industry and rely on their ability to get information to the public through their products and applications. FDOT could support private industry by supplying data we collect.

The Intelligent Transportation Society of America (ITS America) is in the process of taking the information presented at the charrette along with information gleaned from various discussions during the charrette to develop recommendations regarding the direction FDOT should take in providing traveler information to the public. With the increases of access to traveler information becoming more available from private industry, state agencies are struggling to determine how to best utilize this resource in providing information to the public. This charrette was developed to help determine the balance between the use of privately and publicly collected information and how/who should be disseminating that information to the public.

ITS America will provide a final report within the next two months. This report will outline the results of the charrette and provide some recommendations on the approach FDOT should take to provide information to the public.

By Gene Glotzbach, P.E., FDOT

The Florida Department of Transportation (FDOT) has embarked on an ambitious plan to deploy intelligent transportation systems (ITS) statewide. To this end, the *Ten-Year ITS Cost Feasible Plan* was approved in 2002 and funds were allocated to FDOT's Districts to begin deploying ITS. Every District was provided some level of funding in order to deploy ITS.

When we speak of deploying ITS, we are talking about deploying field devices to actively manage FDOT's limited-access facilities. These devices include roadside sensors to detect traffic problems, closed-circuit television cameras to verify the problem, and dynamic message signs to provide feedback to the public regarding problems they may encounter. This is all coordinated at each District's regional transportation management center (RTMC).

The initial plan distributed funding to deploy ITS on about 60 percent of the state's limited-access facilities. This provided good coverage in Florida's urban areas, but provided little coverage for the rural areas of the state. Over the past 12 years, traffic has increased considerably on the state's limited-access facilities, including the rural segments of I-95 and I-75. These rural segments have high traffic volumes that are characteristic of urban areas and are in need of ITS.

Completing ITS

ON LIMITED-ACCESS FACILITIES

In July 2013, at FDOT's Executive Board Workshop, the Traffic Engineering and Operations Office provided information on the need to expand the ITS projects included in the *Ten-Year Cost Feasible Plan* in order to include the unfunded rural sections of these interstate highways. The Executive Board agreed to allocate funding to close the gap in ITS by approving projects on I-10, I-75, and a couple of small segment on I-95. These projects, coupled with others that are already in FDOT's Work Program will complete the deployment on the state's limited-access facilities.

These new projects are scheduled for deployment in fiscal years 2015 through 2017. Once they are completed and accepted (in about five years), RTMC operators will be able to detect and verify incidents, dispatch response, and warn motorists of roadway conditions that they are about to encounter.

This will be a tremendous benefit to the public as the impacts of traffic incidents will be minimized and traffic flow restored quicker.

FL511 Shines In Bad Weather

By Gene Glotzbach, P.E., FDOT

During this past year, the northwest region of Florida had its share of bad weather—ranging from ice storms to severe rainstorms. From January 28 through the 30th, winter hit northwest Florida with its mighty fury. Snow and freezing rain fell and closed down many of the roads and bridges that carry traffic across this region. Large portions of Interstate 10 and U.S. Highway 90 were closed for extended periods or at spot locations where travel across bridges became too treacherous for safe travel.

As if that was not enough, on April 30th, this region was hit by severe rainstorms that flooded many roads. Over 20 inches of rain fell in a 48-hour period in the Pensacola area, washing out and flooding many of the roadways, including Interstate 10. A Pensacola scenic highway was completely washed out in several locations, sending several vehicles into the ravine.

Residents got a lot of their travel information from the local radio and television stations, which provided constant information on road closures. However, residents also accessed Florida's 511 advanced traveler information system (FL511) to get information on road conditions. The FL511 system provided information on weather events as icons on a map that is displayed when accessing the FL511.com web site or through the 511 interactive voice response (IVR) system when asking for a particular roadway. Information was also provided as a floodgate (alert) message for roadways that are not normally covered by the FL511 system.

Statistics for the winter storm in January showed an increase in access to the FL511 system of about 460 percent. Phone calls to 511, web visits, and mobile app visits were all up during the three-day period of the storm. During normal weather conditions, the northwest region provides about 2 percent of the usage of the FL511 system. That usage grew to 32 percent during the winter storm. A normal three-day average for the combination of phone calls, web hits and mobile app visits is about 28,000. For the three-day period of the winter storm, the combined usage jumped to about 158,000 statewide. A more telling statistic for this area shows that during a normal three days, the average combined usage is about 573 requests. During the period of the winter storm, the requests jumped to a total of 49,186.

During the heavy rains in April, the FL511 system saw similar results. The system got about four times the normal usage during the rain event. Normal access to the combination of IVR, web site, and mobile apps is about 10,000 requests. During April 30th, the access jumped to about 38,000 requests. The calls to the 511 phone number doubled. The big increase came with the web site where the number of visits increased by 10 times.

During weather events, the FL511 system is a proven source of information on travel conditions that people go to. When all else fails, 511 will be there.

By Derek Vollmer, P.E., FDOT, and Clay Packard, P.E., Atkins

The Florida Department of Transportation's (FDOT) SunGuide® software release 6.0 brought many welcome changes and opportunities to advanced traffic management. The ability to use full color dynamic message signs (DMS) was a welcome addition, allowing a much richer presentation of traveler information to motorists. Studies have shown that images increase the ease of message recognition and are able to provide additional information. Images could not be used on traditional DMSs due to sign resolution. In addition to enhancing the system to support color DMS, all DMS-related dialogs were overhauled to support the color and images. This presented a good opportunity to enhance all DMS dialogs to use the Windows Presentation Framework (WPF).

The scheduler is another key enhancement in release 6.0. Prior to release 6.0, the scheduler was configured through the Admin Editor, and was not user-friendly. In release 6.0, the scheduler was enhanced to use WPF, accessible from the operator map, and designed with an Outlook Calendar style interface, which is very user-friendly. Additionally, travel times can be scheduled to ensure that they are turned on and off at the appropriate times by the transportation management center operation. In release 6.1, operators will be able to schedule reports and even email them to a recipient list.

In addition to the ability to schedule reports, a queue is also be provided to allow management of report requests. With more and more data requests, emphasis on performance measures, and years of data already collected, the software needs to have the ability to terminate a report if it is taking too long or is no longer needed. SunGuide software release 6.1 makes this new report queue possible.

FDOT management is focusing more and more on operational performance measures as well as roadway, incident, and ITS deployment status along with team building among operators. The shared displays and video walls provide great places to put performance-based information common to all operators. Monitoring an entire roadway's closed-circuit television (CCTV) camera feeds is more of an operation for a single operator, while other operators monitor other roadways. This can be done on a personal display. With more and more powerful workstations and a higher quantity of monitors, the SunGuide software's video on desktop application makes this possible and provides many additional high value enhancements that increase productivity. Operators can now access video feeds right from the CCTV camera icons on the map, arrange a plethora of feeds within a video on desktop window, and full screen the window on one or more of their monitors to create a personal video wall within the SunGuide software running on their workstation. They can save their layout, create tours, and customize their video on desktop experience for several different layouts for different operational assignments. Each few seconds from each action of managing video viewers saved for each shift by loading pre-saved layouts or accessing video directly from an icon adds up to significant time savings.

As video rendering on viewers has improved, so has the camera hardware. SunGuide software will be enhanced to support the Open Network Video Interface Forum protocol, an industry standard. As traffic operations is a very small piece of the camera market, supporting this new protocol opens the door for much greater competition for cameras, including cameras with high definition quality resolution and better compression algorithms offered by the H.264 video compression format.

As FDOT's Intelligent Transportation Systems Program includes more emphasis on active arterial management, SunGuide software has evolved to support it. SunGuide software has architectural and operational concepts that could potentially serve as a great foundation for supporting active arterial management. Probe detection data provides actual travel times between probe detectors along the roadway. Since arterial roadways are interrupted by stop lights, having the actual travel times seems to provide much more meaningful traffic conditions than the instantaneous

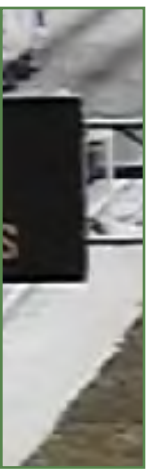
ADVANCING TRAFFIC MANAGEMENT

WITH SUNGUIDE® SOFTWARE

speeds at one point of the roadway. Release 6.0 provides support for two different probe detection systems and Release 6.1 will provide support for two additional for a total of four different probe detection systems. Release 6.1 will also be enhanced to support additional configurability to the probe detection's travel time algorithm. This will help account for the many different traffic flow patterns presented by roadways with stoplights, allowing traffic engineers to tweak various thresholds in the algorithm when fine tuning the deployment for a specific roadway.

There are still a couple more enhancements to the software that would be particularly helpful in managing arterials. The event management system allows users to define locations that are to be configured, managed, and used in events, response plans, and Florida's 511 advanced traveler information system. Each location has a lane configuration that matches the roadway. SunGuide software already has all of the lane types used by the freeways built into its system, but arterial roadways introduce turn lanes as an additional lane type, which is needed. SunGuide software will be enhanced to include turn lanes. In addition to operational benefits, there is great analysis benefit to origin-destination information that probe devices are able to collect.

Another data source that has not only benefit to freeways, but great benefit to arterials, is the HERE data. HERE provides data for limited access facilities as well as arterial roads. SunGuide software has been enhanced to pull in data from the HERE data feed, similar to how it pulled in data from INRIX in the past.



SunGuide software is approaching another frontier – the harmonization back with the original system from which it was created, Texas Department of Transportation's (TxDOT) Lonestar software. FDOT's SunGuide software and TxDOT's Lonestar software are nearly conceptually and architecturally equivalent; however, over time, both agencies have modified their software to their own needs without using the same code base. An effort is underway to bring these software systems back to a common code base, from which enhancements, fixes, and any modifications can be shared efficiently, reducing the overall cost to both agencies.

FDOT has indicated a strong desire to address the wrong way driving (WWD) issue and SunGuide software will support a pilot project to receive WWD events from radar detectors, log WWD occurrences, automatically send an email to a preconfigured list of recipients, and provide an integrated response plan for WWD events.

Another effort on the horizon is to improve the road weather information system (RWIS) support in SunGuide software. The next version of the National Transportation Communications for Intelligent Transportation System Protocol's (NTCIP) standard for RWIS will be supported, and there will be a major improvement of the graphical user interface with added integration into the response plan system. Additionally, beacons will be managed as a part of the response plan to notify drivers of recurring weather events such as fog or smoke ahead.

This will all be package by a brand new installation program that will be much more user-friendly to install the software. The new installer will come with tools that verify that a platform is capable and ready to run the software, schedule automatic backups of the entire deployment, and support high availability features such as clustering.

By Elizabeth Birriel, P.E., FDOT, and Stephen Novosad, Atkins

CONNECTED VEHICLE

PLANNING THE FUTURE

In preparation for the 2011 World Congress on Intelligent Transport Systems, the Florida Department of Transportation (FDOT) Intelligent Transportation Systems (ITS) Program established a connected vehicle test bed in Orlando in proximity to the Orlando-Orange County Convention Center. This test bed was established to demonstrate connected vehicle technology and remained in place for use following the World Congress. The test bed was established along Interstate 4, International Drive, and State Road 528, as show on the right.

Twenty-nine roadside units (RSU) were deployed and connected to FDOT's District Five regional transportation management center (RTMC) via the FDOT fiber optic network. FDOT's advanced traffic management system (ATMS) software, SunGuide® software, was modified to communicate with the RSUs. The RSUs communicate with onboard units. Following the 2011 World Congress, FDOT continues to operate and maintain the connected vehicle test bed deployment.

In 2012, the United Stated Department of Transportation (USDOT) identified the Orlando deployment as one of the original seven national test beds. The goal of these test beds was to share information and lessons learned that occurred at each respective test bed. More recently, the USDOT has placed a greater emphasis on these test beds, renaming them to affiliated test beds.

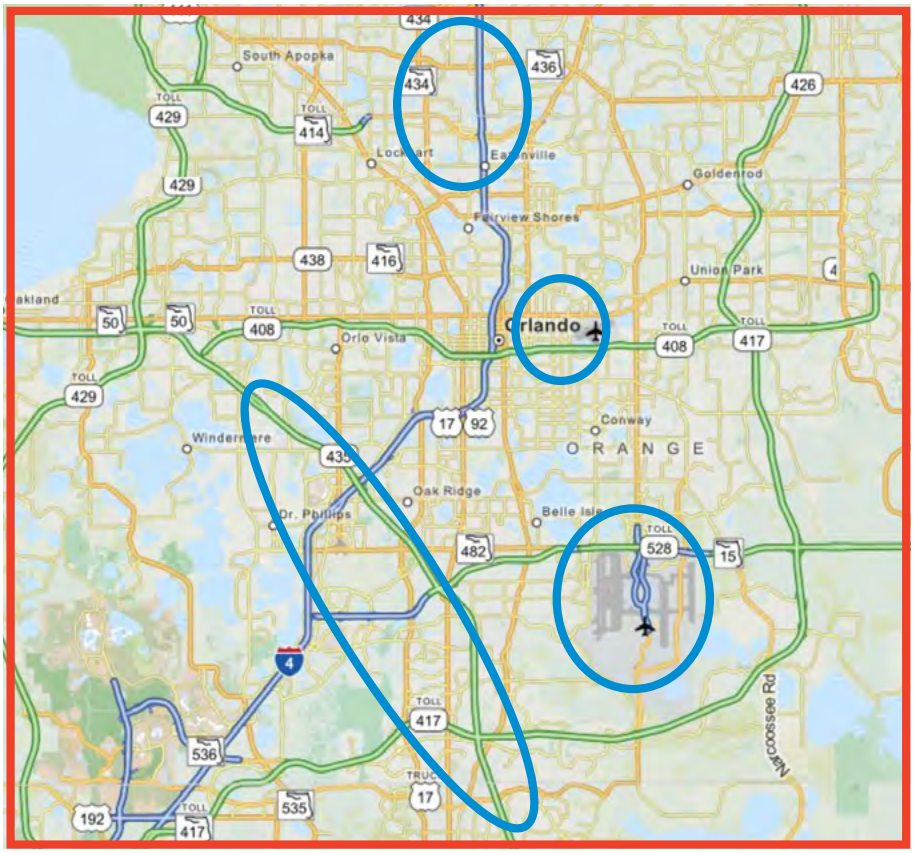
As one of the original affiliated test beds, FDOT's Orlando connected vehicle deployment was the first deployment to integrate connected vehicle data into an ATMS software. This application has been the staple for FDOT's affiliated test bed.

During the past three years, FDOT has been evaluating the right time to expand its affiliated test bed. Now that the safety pilot model deployment has generated the connected vehicle data for evaluation and the National Highway Transportation Safety Administration has ruled that dedicated short range communications (DSRC) radios will be mandated in future light vehicles, FDOT is preparing to upgrade its connected vehicle infrastructure. Connected vehicle technology has made significant strides in the last three years and some of the devices have become stable enough for FDOT to initiate its planned growth for the affiliated test bed.

With the dramatic increase in smartphone applications, connected vehicle applications have begun to exploit additional communications medians such as WiFi® and cellular. Over the past year, the definition of connected vehicle has started to blur as original equipment manufacturers (OEM) have started equipping some vehicle models with applications and onboard sensors and calling this connected vehicle technology.

FDOT has recognized this transition and is planning a new and expanded test bed that will encompass not only DSRC, but WiFi and cellular as well. By utilizing multiple communications medians, the size of the test bed can be greatly expanded.

Generally, WiFi and cellular will be available through the test bed (shown in the red rectangle). The highlighted areas (blue) would have DSRC available for communications as well. These highlighted areas, or hotspots, can be used by DSRC-equipped vehicles to exchange information with RSUs connected to signal controllers, SunGuide® software, and other devices and applications implemented by FDOT.



As part of the test bed rollout, FDOT is developing two connected vehicle applications that will demonstrate the benefit of connected vehicle technology in managing and keeping the roadway network safe. The implementation of a wrong-way driving application is underway. Reducing wrong-way driving has become a priority for FDOT. Utilizing connected vehicle technology, FDOT is implementing an application that will allow wrong-way driving vehicles to be identified quickly. The wrong-way driving vehicle information will be sent to the RTMC, which can then pass the information to the Florida Highway Patrol or other law enforcement agencies to assist in locating the wrong-way driving vehicle.

FDOT is implementing a second connected vehicle application, which focuses on improving work zone safety for workers, construction vehicles entering and exiting the work zone, and drivers approaching and traveling through work zones. Connected vehicle technology will be used to perform activities such as alerting drivers that they are entering a work zone and the work zone speed limit, alerting drivers entering the work zone of vehicles that may be entering/exiting the roadway from/to the work zone, alerting workers of vehicles that are approaching the work zone and could enter the construction area, and alerting construction vehicles entering/exiting the work zone of vehicles that could potentially cause a dangerous situation.

As part of its expanded test bed, FDOT is analyzing what real-world issues exist within the test bed. FDOT is also reviewing a connected vehicle application suite that the USDOT has developed. FDOT plans to compare the issues with the USDOT applications and identify one or more applications that could be used to solve the real-world issues.

Finally, FDOT is structuring the regional test bed to include capabilities for autonomous vehicle testing. FDOT recognizes that autonomous vehicle technology is moving at a rapid pace with companies such as Google demonstrating autonomous vehicles and the OEMs announcing plans for autonomous vehicles. A union of autonomous and connected vehicle technologies is the next step toward a vehicle that can not only move travelers without human intervention, but also reroute travelers in real-time as traffic information is provide from the infrastructure. This combination of technologies is known as automated vehicle technology.

As part of its effort to continue development of infrastructure applications, FDOT has partnered with the Federal Highway Administration (FHWA) on the Integrated Vehicle to Infrastructure Prototype (IVP) project. The IVP project provides a full complement of infrastructure capability—supporting vehicle to infrastructure (V2I) communications-based connected vehicle applications and documenting the design and prototype to enable subsequent implementation activities by other parties. The objective of the project is to identify, develop, implement, test, document, and deploy a roadside prototype system that supports an integrated, interoperable deployment of multiple V2I safety, mobility, and environmental applications

FDOT's current role on the project is to monitor the development of the prototype at the Turner Fairbanks Highway Research Center (TFHRC). FDOT is planning a visit to TFHRC in July to review the prototype status. FDOT will observe the applications that are being implemented as part of the IVP and will analyze them to see how well the applications fit into FDOT's traffic operations. Once the prototype is complete, FHWA will send several prototype platforms to FDOT along with documentation. FDOT will utilize the provided documentation to deploy the platforms at previously identified locations in the new regional test bed. FDOT will document what worked well and lessons learned from these deployments. Any applications that FDOT can take direct advantage of will be implemented on an evaluation basis in traffic operations. This information will be provided to FHWA for refining the prototype documentation. As FDOT's rolls out its deployment of RSUs, FDOT plans to take advantage of the IVP project experience.

By Derek Vollmer, P.E., FDOT, and Clay Packard, P.E., Atkins

SunGuide®

The Florida Department of Transportation (FDOT) kicked off the central data warehouse project to house all traffic detection and incident data for Florida's roadways. There are over 12,000 miles of roadways with more than 3,000 miles instrumented with some type of traffic sensor. This provides a wealth of data to FDOT's Intelligent Transportation Systems (ITS) Program in the Traffic Engineering and Operations Office along with other FDOT offices and partners. That's a lot of miles and a lot of data!
FDOT initially launched their first complete production central data warehouse through using the Regional Integrated Transportation Information System (RITIS), built and operated by the University of Maryland's (UMD) Center for Advanced Transportation Technology. RITIS provides FDOT with a high reliability system with plenty of horsepower through a fleet of server and storage systems. RITIS has received both live and historical detector and event data and made that data available to users.

Software's

FDOT's detector deployments along most of their limited-access facilities are predominately point detectors. Point-based detectors, such as inductive loops and side fire radar, are used to obtain speed, volume, and occupancy at a point along the roadway where the point-based detector is deployed. FDOT also has a few probe detectors. Probe detectors, including toll tag readers and Bluetooth® readers, are used to calculate travel times between two of these point-based detectors. SunGuide® software, Florida's advanced traffic management software, collects all of this live detector data and sends the data to RITIS. FDOT also has a contract with HERE, Nokia's mapping application, to provide statewide traffic speed data for limited-access facilities. SunGuide software receives data from HERE's third-party data feed. This data helps fill in gaps where detectors are not deployed, provides data for arterial roadways, and provides a secondary source of traffic conditions data.

One of the enhancements RITIS will develop under this contract will be a Vehicle Probe Project Suite, which will integrate probe data from FDOT's probe detector deployments provided by the SunGuide software as well as probe data from HERE's third-party data feed. Each probe detector and the segment of roadway covered will be shown on traffic maps. The probe detector icons will be colored to represent the status of the device and the roadway segments will be colored according to the traffic conditions being detected by the device. With just one or two clicks of the mouse, graphs and other forms of data analysis will also be available. In addition to this, a suite of analysis tools will be available to provide analysis of the probe data. This Vehicle Probe Project Suite will allow agencies to support operations, planning, analysis, and research, and generate performance measures using probe data through web-based tools. These web-based tools will include a dashboard, data downloader, congestion scans, data explorer, bottleneck ranking, and user delay cost analysis—each with plenty of details and options. These web-based tools will allow users to download reports, visualize data on maps or in other interactive graphics, and download raw data for off-line analysis.

When issues arise, users report them to FDOT's Central Office where they are reviewed and prioritized by FDOT and RITIS project managers. RITIS developers then address issues based on assigned priority; any needed modifications are scheduled for upcoming RITIS upgrade. Prior to the new contract, issues were collected and formatted so that they would be easy to understand and begin investigating and resolving.

SunGuide software Release 6.0 brought a change in how detectors were identified within the system. RITIS had to react to this change and deal with the new numeric identifications used by detectors. This was a required enhancement needed to continue to operate the system; however, as with most systems, users with hands-on experience provide many of the ideas for enhancing FDOT's RITIS experience. Future enhancements to RITIS for FDOT are discussed at FDOT's ITS Program Change Management Board and coordinated with RITIS through FDOT's Central Office.

UMD's forward-thinking use of innovative technology and user-centered software design for information visualization provides a great benefit to FDOT through not only data archiving, but also retrieval and analysis.

By Randy Pierce, FDOT, and Tim Sapp, Schneider Electric

The Intelligent Transportation Systems ITS Facility Management (ITSFM) system is a nationally recognized tool that allows transportation agencies to manage deployed assets, understand systems configuration, and distribute as-built documents to system users across Florida. ITSFM continues to gain acceptance from the Florida Department of Transportation (FDOT) Districts and increase the number of miles implemented within the statewide database. As the implementation increases so does the need for new equipment types and additional functionality.

ITSFM Software Enhancements

ITSFM is an asset, configuration, and document management tool designed to support the varying needs of transportation managers, engineers, information technology (IT) professionals, and maintenance technicians. Improvements in this fiscal year include:

- Ability for maintenance technicians to add, modify, or delete equipment housed at any authorized equipment site;
- Addition of administrative tools to manage user accounts, login activity, inventory activity and edit tracking;
- Means to single input shared files and notes across a serving area;
- Ability to sort "Locate" results by column;
- ITSFM web pages improvements to:
  - Home page with user access to the ITSFM and report applications, links to ITSFM downloads, industry sites, FDOT specifications, etc. and
  - Reports page with category buttons to allow users to select reports from a drop down menu then set filter criteria.
- Addition of automatic vehicle identification (AVI) equipment, and
- Toll system features including:
  - Toll equipment shelters and cabinets,
  - Gantries and equipment lane assignments, and
  - AVI, loop, and video sensors.

ITSFM Implementation Process

FDOT's Central Office ITS Program continues to work with the Districts and regional partners in support of the statewide implementation. The ITSFM implementation planning process includes:

- Identifying local system requirements by user type (i.e. managers, engineers, IT, and maintenance staff),
- Setting policies and procedures to ensure:
  - Internet connection is available to office and field users,
  - The database is maintained as intended, and
  - Regional partners have access to view shared facilities.
- Establishing the scope of work for:
  - Data collection,
  - Global positioning system (GPS) mappings,
  - Equipment site inventories, and
  - Database encoding.
- Developing cost estimates and schedules.

FDOT's Central Office has developed standard work tasks for GPS mapping, equipment site inventory, and database encoding used to implement the ITSFM. The work task includes detailed descriptions of the work to be performed, pay item measurement, and task deliverables. A custom GPS data dictionary was developed to simplify the mapping and equipment inventory tasks. The GPS data collector uses this dictionary to efficiently capture feature specific attributes at sub-foot accuracy. It is aligned with the District's data requirements and set to ensure all required fields are collected.

The mapping data is GPS-corrected, exported to comma-separated or shape files, and then mass imported into the ITSFM.

The design-build contractor is currently using this tool to document as-built conditions on 51-miles along I-75 in Manatee and Sarasota Counties.

Minimum Requirements and Database Sharing

FDOT's Districts are using various computerized maintenance management system (CMMS) software tools to manage technician labor and work assignments, measure response times and failure rates, inventory spare parts and equipment sites.

Often, the CMMS and ITSFM systems share overlapping equipment information, such as equipment type, manufacturer, model, installation date, etc. This necessitates the need for a computer-to-computer interface that will automatically synchronize the systems and eliminate the need for users to maintain multiple database entries.

FDOT's Central Office ITS Program is working with the Districts to define minimum requirements needed in the ITSFM database so a bi-directional "data pump" can be developed to automatically synchronize other databases with the statewide ITSFM database. This tool will eliminate duplicate work and ensure data accuracy across platforms.

User Training

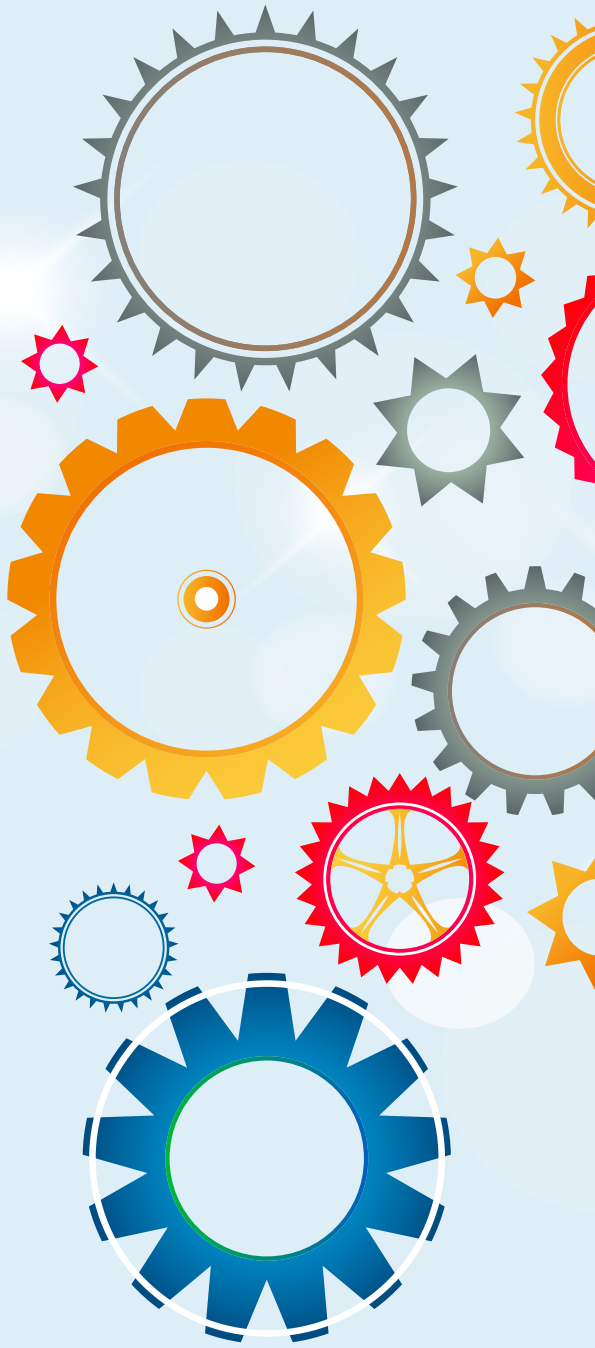
FDOT's Central Office ITS Program developed two comprehensive ITSFM training courses: one for manager/engineers and another for maintainers. The formalized ITSFM training is focused on users; it provides hands-on experience, and it serves as the requisite 'gateway' to becoming authorized to use the system.

Training for the ITSFM system is available for all users and is highly encouraged. To date, 76 users in FDOT's Central Office and Districts One, Six, and Seven; and Brevard and Pinellas Counties have completed training and received login credentials to the ITSFM.

By Derek Vollmer, P.E., FDOT

SYSTEMS EN

Managing Risk



The Code of Federal Regulations Title 23 Part 940 (23 CFR 940) requires that a systems engineering analysis be performed for intelligent transportation systems (ITS) projects that receive Highway Trust Funds from the Federal Highway Administration (FHWA). The systems engineering analysis must be submitted to the FHWA for review and approval prior to receiving the Highway Trust Funds. FHWA is working on a procedure with the Florida Department of Transportation (FDOT) ITS Program to make sure everything in rule is met for these ITS projects.

First, it is important to know how an ITS project is defined. 23 CFR 940.3 defines an ITS project as "any project that in whole or in part funds the acquisition of technologies (or systems of technologies) that provide or significantly contribute to the provision of one or more ITS user services as defined in the National ITS Architecture." This means that a small ITS deployment on a large project that uses Highway Trust Funds would meet this definition of an ITS project. Once a project that receives Highway Trust Funds is identified as an ITS project, FDOT's procedure will require that a risk assessment form be filled out to determine if a project is high or low risk. Low risk projects can follow the traditional road project process; however, high risk projects must follow the systems engineering process. FDOT's ITS Program is currently fine-tuning the risk assessment form to make sure that enough information is provided to FHWA to ensure whether a project is low or high-risk.

Another aspect of 23 CFR 940.3 is to identify that the project is consistent with the Regional ITS Architecture (RITSA). It has been a while since all of the RITSAs have been updated, so FDOT's ITS Program is taking the steps needed to perform a statewide update. This will include updating the Statewide ITS Architecture along with the RITSAs. These architectures will be updated to include service packages and information flows, and to also be consistent with version 7.0 of the National ITS Architecture.

One goal of FDOT's systems engineering procedure is ensure that project managers are more involved and more aware of the system engineering requirements. Project managers will need to identify if a project would be considered an ITS project, engage with FHWA concerning project oversight, make sure all of the systems engineering documentation is created for the project, and submit the documentation to FHWA prior to receiving Highway Trust funds. FDOT's ITS Program hopes

NGINEERING

to bring awareness of the systems engineering requirements for ITS projects by coordinating with other offices to update specific documents to reference the systems engineering procedure. Some of the initial documents to update are the Project Management Handbook, the Local Agency Program Manual, the Project Development and Environment Manual, and the Construction Project Administration Manual.

FDOT's Systems Engineering and ITS Architecture Procedure (750-040-003-c) is still under revision and will undergo one more round of stakeholder review and comments. Once the document is finalized it will be published online at http://www.dot.state.fl.us/proceduraldocuments/procedures.shtm. There is some good documentation out there for applying systems engineering to ITS projects, including FHWA's Systems Engineering for ITS – An Introduction for Transportation Professionals, which can be found at http://ops.fhwa.dot.gov/publications/seitsguide/seguide.pdf.

Systems engineering is not something we do because a federal rule mandates it; systems engineering is something we do because of the benefits. The systems engineering process helps ITS projects remain on schedule, reduces cost overruns, increases the likelihood of meeting user needs, and provides documentation that can be reused on similar projects.

By Alan El-Urfali, P.E., FDOT, and Ron Meyer, Atkins

WRONG-WAY DRIVING

TERL Contributes to Evaluation of Countermeasures

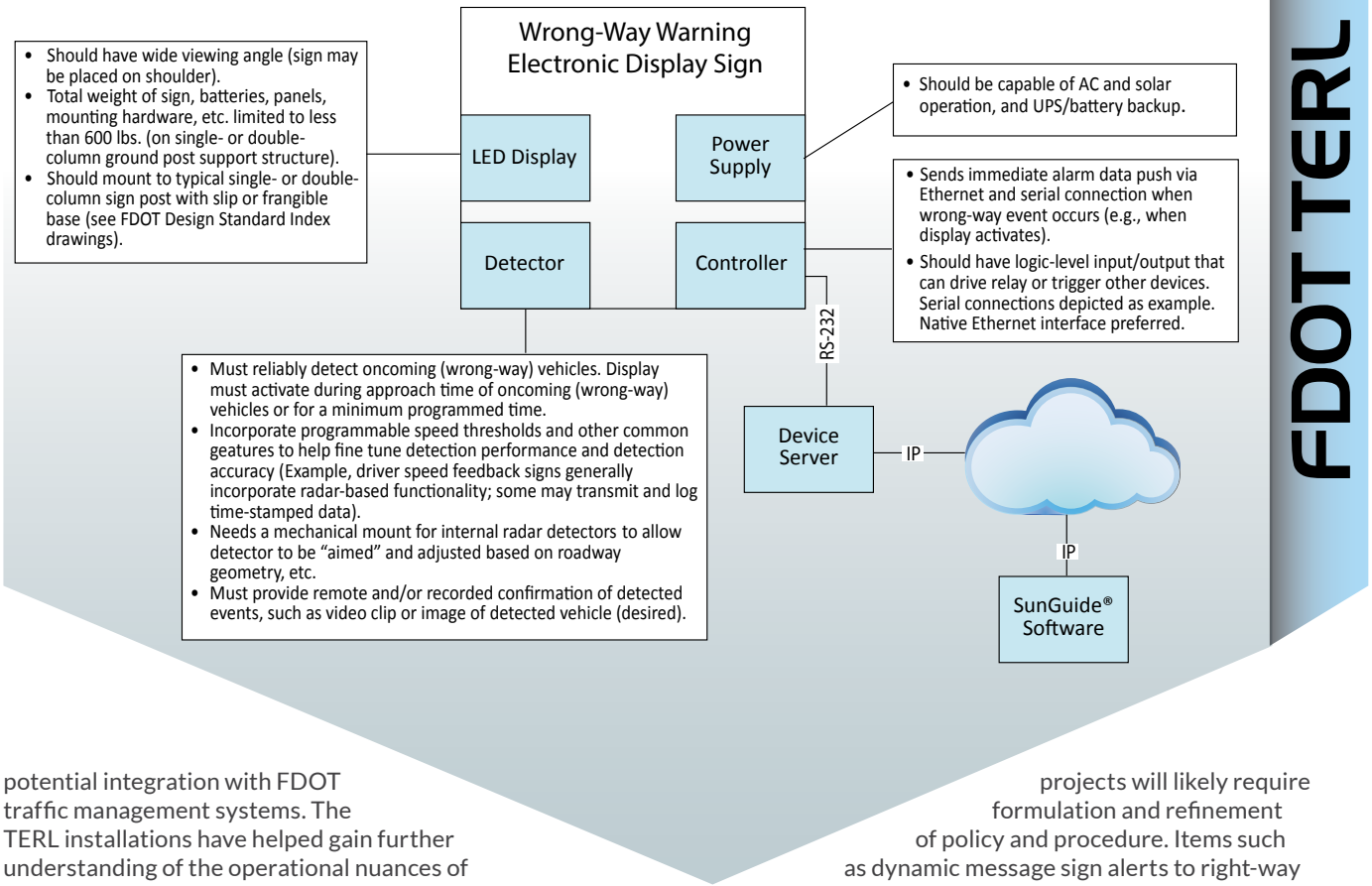
During the past fiscal year, the Florida Department of Transportation's (FDOT) Traffic Engineering Research Laboratory (TERL) has been an integral part of an FDOT team investigating and implementing countermeasures to reduce wrong-way crashes. Staff from the Traffic Engineering and Operations Office in Tallahassee, including TERL team members, participated in the 2013 National Wrong-Way Driving Summit. This inaugural event brought together over a hundred participants from dozens of stakeholder organizations across the nation to share research, ideas, programs, strategies, and countermeasures to mitigate wrong-way crashes.

While wrong-way crashes represent a relatively small percentage of all crashes, they are among the most severe and fatal. Due to their often horrific nature and deadly consequence, these are the crashes that generate headlines. They draw the focus of the public, elected officials, law enforcement, and transportation professionals. Crash fatalities in general have steadily declined over the years, yet fatalities as a result of wrong-way crashes remain relatively unchanged.

Multiple efforts were initiated this past fiscal year to help reduce wrong-way crashes and much progress has been made. These efforts include a statewide research project to perform further analysis of wrong-way crash data, assess contributing factors, and investigate potential countermeasures. It also included the development and initial construction of pilot projects that will allow FDOT to deploy and determine the effectiveness of various wrong-way detection and warning systems.

As part of these FDOT efforts, the TERL has been actively engaged with product manufacturers, the SunGuide® software development team, and our District counterparts to provide technical expertise with regards to potential field devices that could comprise larger warning and countermeasure systems. The TERL investigated the application of existing detection systems on the Approved Product List (APL) as part of wrong-way warning systems and performed preliminary evaluation of newly developed products such as electronically enhanced signs that are activated when approaching wrong-way vehicles are detected. The hope is that these signs may help inadvertent wrong-way drivers self-correct before putting themselves and others in grave danger. Several of these products have been installed and operated in the safe and controlled environment offered by the TERL in order to gain familiarity with operation and

Wrong-Way Warning Sign Conceptual Diagram



potential integration with FDOT traffic management systems. The TERL installations have helped gain further understanding of the operational nuances of different products; gain insight into their installation, configuration, and integration; and should help reduce the likelihood of operational or functional issues arising on pilot project deployments.

The TERL and SunGuide software development teams continue to work with colleagues in multiple Districts as well as multiple manufacturers, to experiment with the use of existing intelligent transportation systems (ITS) infrastructure to detect wrong-way vehicles and provide a variety of alerts. Active signage and detection systems have been installed and operated at the TERL. Preliminary proof-of-concept device integration with SunGuide software has been performed. Pilot projects are under construction and will deploy several of these solutions in the near future. These pilot projects include a variety of treatments, including enhanced lane markings, additional and enhanced static signage, active warning signs, wrong-way vehicle detection, and automated response mechanisms. The TERL has helped ensure that the electronic traffic control devices that are being used as part of these projects meet applicable FDOT minimum requirements and have appropriate approvals. Several proof-of-concept experiments were also performed at the TERL to help ensure solutions considered were fundamentally viable.

We expect that future projects will build upon the activities to date and address the "4 Es"—engineering, education, enforcement, and emergency response. In addition, these projects will likely require formulation and refinement of policy and procedure. Items such as dynamic message sign alerts to right-way traffic, notification and dispatch of responders, and surveillance by transportation management centers (TMC) will most likely be among the many items considered. The actions of traffic operations staff, law enforcement, and Road Ranger service patrols that are coordinated from our TMCs already provide fast and effective response to many types of incidents, but we are hopeful that the new tools and strategies deployed in the future will yield further improvement. The TERL will continue to assist these efforts by providing technical assistance, expertise, and support.

In the future, we also expect that the lessons learned from preliminary product evaluations and pilot projects will help shape statewide specifications and minimum requirements for various electronic wrong-way countermeasures. Working with FDOT's Specifications and Estimates Office, the TERL will develop, refine, and publish these requirements and then utilize them to evaluate future products for listing on the APL.

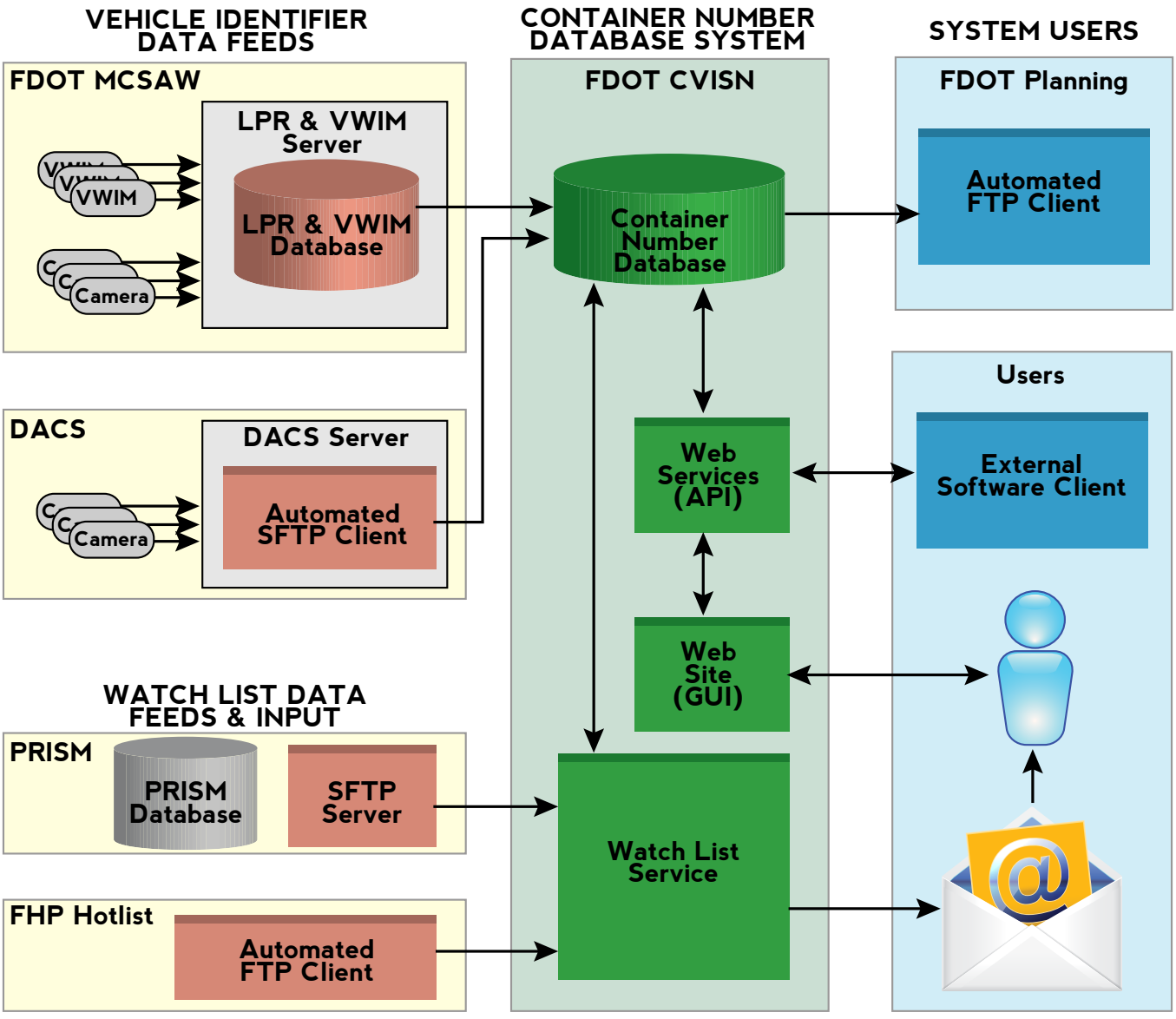
In the past, FDOT has undertaken projects to provide wrong-way warning systems or enhanced sign treatments that were mostly localized, varied, and deployed on a project-by-project basis. FDOT is now looking to open a new chapter in our history of combating wrong-way driving through more widespread deployments, in a more consistent fashion, with products that have been vetted by TERL evaluators, certified to meet statewide specifications, and approved through our standard APL process.

By Paul Clark, FDOT, and Clay Packard, P.E., Atkins

CONTAINER NUMBER DATABASE

Finding Out-of-Compliance Commercial Vehicles

As a result of out-of-compliance commercial vehicles, Florida has over $9 million in unpaid commercial motor vehicle citations and thousands of unsafe, out-of-service commercial vehicles on the road. That is a serious tonnage of out-of-compliance commercial vehicles. The Florida Department of Transportation's (FDOT) Commercial Vehicle Operations (CVO) Program has teamed with FDOT's Motor Carrier Size and Weight (MCSAW) office and the Department of Agriculture and Consumer Services (DACS) to pool resources with Commercial Vehicle Information Systems and Networks (CVISN) technology to find out-of-compliance commercial vehicles, make Florida's roads safer, and collect unpaid citations to save taxpayers money as a whole.



FDOT's CVO Program vision, to bring the CVISN team together, has been extended to include tying together several CVISN systems with a container number database (CNDB). The CNDB stores commercial vehicle identification numbers (CVIDN), including container numbers, license plate numbers, and United States Department of Transportation (USDOT) numbers read at weigh stations and agricultural interdiction stations. It also provides retrieval and display of this data to users authorized by FDOT's CVO Program.

The CNDB also stores out-of-compliance lists from multiple agencies and individual users to identify sightings of CVIDNs of interest. It uses a target file containing out-of-service vehicles provided by USDOT's Performance and Registration Information Systems Management (PRISM) and an overdue citations hotlist provided by the Department of Highway Safety and Motor Vehicles, Florida Highway Patrol (FHP) computer-aided dispatch. CNDB users can also add custom out-of-compliance lists for CVIDNs.

This database provides MCSAW weigh stations and DACS interdiction stations with the real-time information needed to identify out-of-compliance commercial vehicles. Each weigh station and interdiction station can identify commercial vehicles with cameras that capture license plate numbers, USDOT numbers, and container numbers. These stations can now dispatch law enforcement agents to pull over non-compliant vehicles for processing almost immediately as they come within range of the cameras.

The CNDB allows users to search for vehicles by their license plate, container number, or USDOT number. The results are listed and displayed on a map.

The CVO Program has recruited two additional partners to the CVISN team to make this possible. The USDOT Federal Motor Carrier Safety Administration and FHP both provide real-time information for out-of-compliance commercial vehicles. The CVO Program brings real-time information from their respective systems into the CNDB to be distributed to the MCSAW weigh stations and the DACS interdiction stations.

The CNDB does more than just forward out-of-compliance lists – it receives all CVIDNs from MCSAW and DACS cameras in real time. The CNDB is the only system that has statewide CVIDN reads from both MCSAW and DACS in one place, which can be plotted together on an interactive map for viewing in any web browser. With this real-time information from both agencies, the CNDB can detect an out-of-compliance commercial vehicle and send out email notifications to law enforcement in real-time, which allows them to pursue, process, and investigate the vehicle and carrier. The CNDB also provides a user interface that plots the locations of commercial vehicles of interest on an interactive map. This makes investigating a specific vehicle much easier by entering a number into a search box on a single system's browser interface, rather than going to multiple systems. Investigators or enforcement officers can register with the CNDB system to receive future notifications for specific commercial vehicles. Notifications can be for a customized, user-entered out-of-compliance list or for agency-provided lists, which can currently include FHP overdue citations and PRISM out-of-service target list.

The CNDB architecture includes a Microsoft SQL Server 2012 database, several windows processes, and a web application interface. Other systems feed data into the CNDB through a variety of interfaces.

As more out-of-compliance commercial vehicles are processed, the value of the CNDB will be further realized. More agencies will provide real-time information that could be integrated into the database. This will help FDOT to capture more unpaid citations and get unsafe vehicles off the road. There are also other ways in which the database can be used. The CNDB lends itself as an ideal source for origin/destination information of commercial vehicles, which would be a great benefit to FDOT transportation planning by providing a rich set of commercial vehicle data for analysis.

The future is bright for the CNDB in Florida as it is a tool that provides value to FDOT's CVO Program and demonstrates the program's and FDOT's strong leadership through innovation in the industry, improvements to safety through fewer out-of-compliance commercial vehicles, and cooperation with multiple agency partners and their systems.

By Marie Tucker, FDOT

The Florida Department of Transportation (FDOT) is the chair to the Commercial Motor Vehicle Review Board and also manages all the day-to-day activities related to processing citation protests. This includes ensuring that protests meet requirements to be reviewed before the Board; replying to protests regarding agendas, scheduling, and holding the meetings; and providing final dispositions of protests to protesters. This past year the Board reviewed 1,172 protests, granting full or partial relief to 454 citations for a total relief in excess of $552,000.

The Commercial Vehicle Operations (CVO) Program also manages Florida's Commercial Vehicle Information Systems and Networks (CVISN), a nationwide program under the direction of the Federal Motor Carrier Safety Administration. This program strives to streamline regulation of the commercial vehicle industry and helps motor carriers and motor coach operations in Florida function more efficiently. The Florida CVISN team consists of various agency partners, including FDOT, Department of Highway Safety and Motor Vehicles, Department of Revenue, Department of Agriculture and Consumer Services (DACS), private sector representatives from motor carrier companies, and the Florida Trucking Association. The CVISN program focuses on ensuring safety enforcement resources in high-risk commercial operators; integrating federal and state regulatory systems to improve access to and verification of operating credentials; improving efficiency through electronic screening of commercial motor vehicles; and enabling online application and issuance of operating credentials. Since 2007, the Federal Motor Carrier Safety Administration has awarded FDOT $5,854,521 in CVISN grants. FDOT is the recipient of the grant dollars, but works closely with the CVISN partner agencies to plan projects to further the CVISN program.

Some of the on-going projects during fiscal year 2013-2014 included:

- The purchase of 20 United States Department of Transportation (USDOT) readers that allow automated look-up of motor carrier status. This status includes safety violations, out-of-service violations, delinquent fines, etc. In addition to improving safety by identifying and removing unsafe carriers from the roadways, FDOT recognizes that the USDOT readers will also allow Florida to identify and collect delinquent fines and/or taxes from motor carriers utilizing Florida roadways.
- Streamlining the overweight/over dimensional permitting process. FDOT currently offers a web-based permit application system. This system allows online submittal of the permit application and auto-issue on certain permit configurations. Currently the system has 70 percent utilization and this is expected to rise as ongoing enhancements are completed.
- Continued development of Florida's commercial vehicle container number database system for tracking container/vehicle movements and presenting this data graphically. Ancillary data will include container location and time-stamp. This project will develop a database for storage and query of container numbers and ancillary data (from the DACS system), plus license plate reader system data (from the Motor Carrier Size and Weight system), and develop software for tracking the container/vehicle movements and presenting this data graphically.

Upcoming projects for fiscal year 2014-2015 include:

- IPAS Kiosk

  FDOT is currently developing a new method for deployment of the Permit Application System (PAS) at weigh-in-motion facilities throughout the state. This project will allow FDOT to purchase and deploy the necessary hardware for kiosks to be successful. To complement public and private sector permitting process improvements, an internet-based interface (IPAS) to the PAS will be provided to allow commercial vehicle operators the ability to apply, pay for, and receive permits on site.

- DACS Operation and Maintenance

  This project involves upgrading the license plate reader (LPR) systems deployed by DACS. The LPR system currently reads all trucks that pass through DACS interdiction stations throughout Florida. Because all trucks, including rental trucks must pass through the DACS interdiction stations, these LPR systems read and check approximately 15 million license plates each year. The numbers are then run against various databases to check for illegal activity. As technology continues to evolve, the original equipment is past industry end-of-life, and new technology will allow the system to better perform in the difficult environments at the Florida agricultural inspection stations. The upgraded operating system will support use of the latest software versions, improving image capture performance. Improved camera lens technology will improve the current optical character recognition accuracy. Fewer components in the computer design reduce the number of system failures, and the fanless design improves performance in the dirty environment at these stations. Strobed light-emitting diode illumination will reduce power consumption and monthly bulb replacement.

By Shawn Kinney, FDOT

TRAFFIC INCIDENT MANAGEMENT

REDUCING CONGESTION

According to information provided by the United States Census Bureau in 2012, Florida's population was approximately 19.32 million. In addition, about 60 million people visit the state each year. That adds up to a lot of people traveling on the streets and highways of our great state. As transportation professionals, it is our responsibility to ensure that our residents and visitors have access to the safest and most reliable transportation system possible.

To assist states in providing safety and reliability to the traveling public, Congress authorized the second Strategic Highway Research Program (SHRP 2). Its mission is to address some of the most pressing needs related to the nation's highway system. With regard to traffic incident management (TIM), this means implementing measures that prevent or reduce the severity of highway crashes by understanding driver behavior and reducing congestion through incident reduction, management, response, and mitigation. Working together, the Florida Division of the Federal Highway Administration (FHWA) and the Florida Department of Transportation (FDOT) will accomplish the mission by setting achievable goals and focusing on the objectives.

First, FDOT's Central Office TIM Team conducted an assessment of the District TIM programs. This assessment took a brief look at the coordination of training with other agencies, the types of personnel attending, and what obstacles, if any, are hindering their ability to train. It is important to understand the District perspective when considering potential solutions. Having input from all parties gives ownership in their portion of the program and motivates them to give maximum effort.

The next step was to develop and utilize a core curriculum designed to provide TIM responders with established policies, procedures, and best practices used nationwide that have proven to be effective in ensuring the safety of responders and the traveling public. This step has been accomplished by the creation of the National Traffic Incident Management Training Program Train-the-Trainer course. With the Transportation Research Board maintaining oversight, the course will be periodically reviewed and potentially revised, as needed.

Thirdly, FDOT Central Office will work with the District TIM program managers to identify training coordinators for the program. In most cases, it will be the TIM program manager, but in some cases, the coordination may be delegated to another team member. The training coordinator will be responsible for making arrangements for FDOT-offered TIM training sessions, coordinating with local agencies for any joint training, and providing program updates as they become available.

With a core curriculum established and training coordinators identified, the primary focus of the next phase will be on initiating an outreach program. Outreach will be conducted via email, public meetings, and other TIM-related functions.

The long-term goal for this program is not only to deliver training that provides a safe environment for travelers and responders on our roadways, but to build professional relationships that encourage continuous communication, collaboration, and coordination. While everyone agrees that the safety of travelers and responders is the most important reason for what we do, the next most important reason is the benefit that the program brings to an agency. This can be achieved through an incentive program. The incentive program can be performance or policy based. For the purpose of the TIM program, it will be both. The performance-based incentive can be used for entities that are independent of FDOT. If they meet the criteria, they could possibly receive some type of uniform (reflective vest) or equipment (traffic cones, signs, etc.). The policy incentive could be as simple as criteria being added to scopes of work for Road Ranger, asset maintenance, or other contracts that require working in and/or around traffic.

With the implementation of these consistent, predictable, and repeatable measures, FDOT's TIM Team can provide a safer more efficient traveling environment for its citizens and visitors.

By Alan El-Urfali, P.E., FDOT, and Armelle Burleson, Ph.D., P.E., Atkins

TERL'S QUALITY SYSTEMS

EMBEDDING THE CULTURE OF CONTINUOUS IMPROVEMENT

A common characteristic of organizations with successful quality systems is a "culture of quality" that is embraced by all members of the organization at all levels. The management and staff responsible for the operation of the Florida Department of Transportation's (FDOT) Traffic Engineering Research Laboratory (TERL) and Florida's Approved Product List (APL) continue to embrace this philosophy and continue to incrementally improve processes and tools that support the TERL's own quality system, the evaluation of products, and the maintenance of the APL.

Multiple improvements to internal operating processes and tools were realized this past fiscal year at the TERL. These improvements included implementation of automated workflows and tracking tools to help ensure timely processing of applications, and bringing additional consistency to vendor quality system evaluations and APL product evaluations. Improvements to internal systems this fiscal year included:

1. Development and implementation of an automatic data analysis and metrics reporting system using live data from the TERL's Microsoft© (MS) SharePoint site for the APL vendor quality system program and APL product approval program;
2. Development and implementation of the APL Product Evaluation Status tracking system, including automated evaluation task assignments and task reminders; and
3. Automatic publication of the on-line Acceptable Quality System List, Acceptable Independent Test Lab List and List of Products under Corrective Actions using rich site summary feed from MS SharePoint.

FDOT's Traffic Engineering and Operations Office established its MS SharePoint intranet site in 2009, including site pages for each section within the office. The TERL quickly adopted SharePoint as an internal document repository and revision control system. As the years have progressed, the use of SharePoint for internal tools and automation has increased. The TERL intranet site is now used to house a number of different document libraries and execute automatic workflows related to product evaluation status (PES) tracking, vendor quality system evaluation tracking, specification development, and other activities.

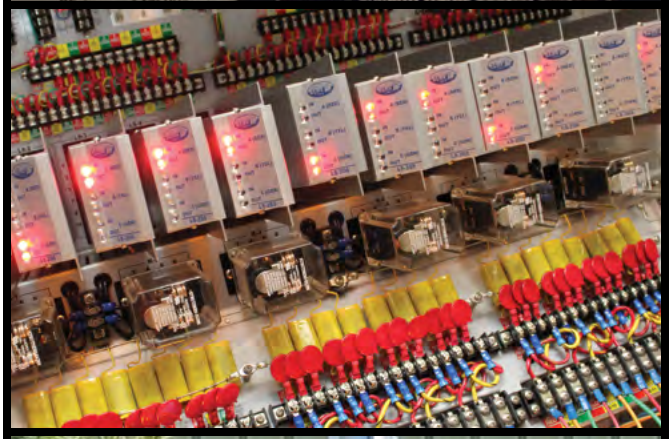
The PES portion of the internal site is used to capture events associated with product evaluation. TERL staff must provide log entries into the system that correspond to steps in the APL process. For instance, the request for product consideration (RFPC) is the first step that an applicant must take in order to have a product listed on the APL. When an RFPC is received

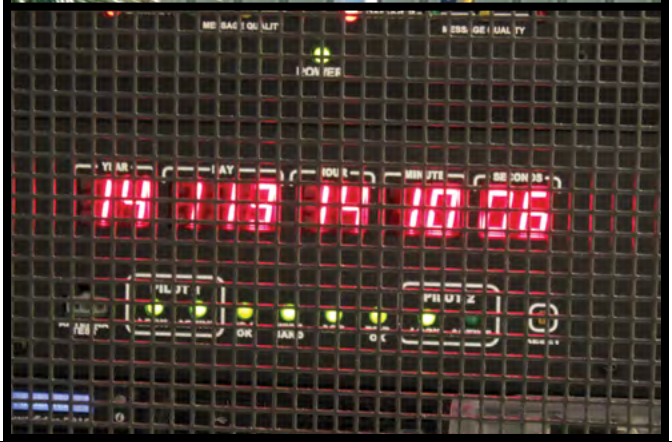
from an applicant, it is recorded as a log entry in the PES database. Similarly, when TERL staff provides a response to the applicant concerning their RFPC, this is also recorded as a log entry in the PES database. The TERL has an internal goal to respond to all RFPCs within 14 business days and the PES database allows this response time to be tracked along with other activities at various stages during product evaluation. Critical dates, such as when applications are received, when documents are approved, when requests for information are made, and when products are approved, all have associated log entries within the PES database. This allows a number of reports and performance measures (such as RFPC response times) to be generated, reviewed, and analyzed. It also allows summary information to be charted and graphed such as quarterly metrics that are regularly reviewed to help gauge staff workload, backlog, and progress.

In addition to providing various metrics and evaluation tracking capabilities, the PES sends automatic reminders to the evaluator(s) assigned to a given product evaluation, helping to ensure that each step of the evaluation process (review/approval of documentation, requests for information, report generation, etc.) is completed in a timely fashion. These automatic workflows help ensure consistency while also helping to document all critical activities relating to vendor quality system evaluations and product approvals. The automated workflows and archival functions of the current system implemented in the last year have also improved the ability of TERL staff and management to track the progress of dozens of concurrent evaluations that may be underway at any given moment.

In addition to providing a document repository for evaluation materials, the SharePoint libraries developed by TERL staff also provide revision control for documents such as TERL-authored specifications, forms, and published information. The system also allows partial automation of document publication, making it easier to post documents like the Acceptable Quality System List, Acceptable Independent Test Lab List, and List of Products under Corrective Actions to the TERL web site. Minor revisions and updates in progress are made within the system. These minor revisions are tracked and archived, but only visible to authorized TERL staff on the internal network. Once the revisions have been approved through automated workflows, the release number is incremented to a major version and can be posted without requiring significant manual updates of web pages and file transfers by an FDOT web master. This has significantly simplified and sped up the posting process for various documents that are regularly posted and updated on the TERL web site.

We expect that the foundation systems created and implemented in the past fiscal year will continue to help the TERL operate efficiently. The examples provided here are only a few of the ways in which these tools have helped streamline and improve processes, and these systems will continue to be leveraged and adapted to realize future improvements.





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