

ITS PROGRAM

Annual Report



511 FL511

Reducing costs with ITS wide area network



SunGuide[®] Software

Making enhancements to improve mobility



Connected Vehicle

Florida moves forward with testing apps



CONTENTS

1

Welcome

Welcome letter from the ITS Program Manager, including program highlights.

2

Mission & Vision

FDOT's mission and vision, and ITS Program statement.

3

Program Overview

Description of the ITS Program areas and their major accomplishments in FY2014-2015.

11

Program Articles

Articles highlighting ITS projects.

Back Cover

Contacts

Statewide contact information.

11 **FLORIDA'S 511**

Finding Cost Savings

12 **FDOT EXCEEDS RTSMIP COMPLIANCE**

Exceeding the Traveler Information Bar

14 **CONNECTED VEHICLE**

Safety Demonstrations

16 **CONNECTED VEHICLE PILOT DEPLOYMENT**

Life-Saving Applications

18 **SUNGUIDE® SOFTWARE**

Release 6.1 Provides Major Improvements

20 **WAZE & SUNGUIDE® SOFTWARE**

A Winning Partnership for FDOT

22 **FDOT ITS TELECOMMUNICATIONS**

Next-Generation Network

24 **UPDATING FDOT'S MICROWAVE TOWERS**

Replacing an Aging System

26 **FDOT TERL**

Prepared for the Future

28 **FDOT'S APPROVED PRODUCT LIST**

Reuniting the APL & QPL

30 **COMMERCIAL VEHICLE OPERATIONS**

Moving Freight In Florida

32 **TRAFFIC INCIDENT MANAGEMENT**

Program Awareness

WELCOME



Florida Department of Transportation

RICK SCOTT
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JIM BOXOLD
SECRETARY

Dear Reader:

I am pleased to present this Annual Report for fiscal year 2014-2015 for the Florida Department of Transportation's (FDOT) Intelligent Transportation Systems (ITS) Program. During this past year, we have made progress with connected vehicle by performing demonstrations proving the combined abilities of connected vehicle technology and our SunGuide® software along with many other improvements to the overall program – some of which are highlighted in articles in this report.

FDOT is continually searching for ways to provide information to the traveling public while ensuring that we are using the best technology available at the most reasonable cost. This fiscal year, we found ways to do just that – deliver a good, solid product to our customers while cutting costs. You can read how our FL511 traveler information system is using the ITS wide area network and data from the National Weather Service to save costs on page 11.

During this fiscal year, FDOT developed SunGuide® software release 6.1. Considered a huge improvement in many ways, this release provides many enhancement and improvements, which are covered in an article on page 18. FDOT also formed a partnership with Google Waze® to exchange data. Shortly after the partnership was formed, FDOT set about integrating data received from Waze into SunGuide® software. The integration is two-phased and you can read about it on page 20.

We are coordinating the next-generation statewide ITS network that will provide an upgrade to our current ITS wide area network. You can read information on this modernization project on page 22. Right after that, on page 24, you can read how we are updating our microwave towers.

Over the past few years, we have also provided news from two programs with close ties to the ITS Program—Traffic Systems and Florida Commercial Vehicle Operations and Traffic Incident Management (CVO/TIM). Articles are available for the Traffic Systems (pages 26 through 29) and the CVO/TIM program (pages 30 through 33).

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

MISSION & VISION



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 Vision

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

FDOT Values

Fundamental principles that guide FDOT behaviour and actions:

- Integrity
- Respect
- Commitment
- One FDOT
- Trust
- Customer Driven

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 – Russell Allen, 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



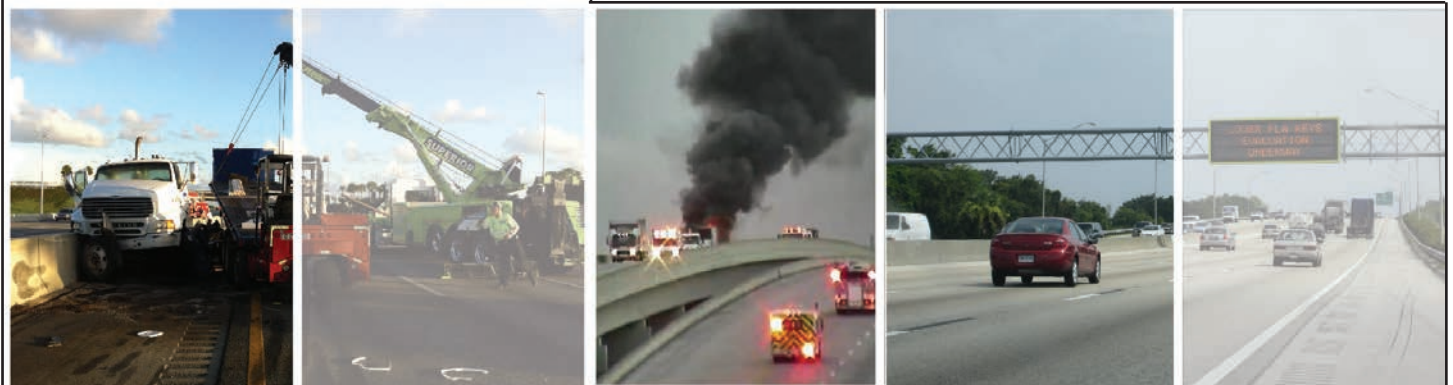
Connected Vehicle

Program Description

- Design connected vehicle deployments in Florida including short, medium, and long-term deployments.
- Develop outreach plans for engaging partners in connected vehicle deployments including public and private sector plans.
- Integrate District and toll agencies' connected vehicle programs and plans.
- Coordinate with SunGuide® software, Waze®, and HERE software users to integrate connected vehicle data into SunGuide software.
- Coordinate closely with the United States Department of Transportation to align research, program plans, and timelines for connected vehicle deployment.

Major Accomplishments

- Completed proposal to the United States Department of Transportation for roughly \$12M funding for a connected vehicle deployment.
 - FDOT's proposal included cross jurisdictional work with Osceola County, Pinellas County, and Florida's Turnpike Enterprises (FTE). FDOT is using FTE facilities for this pilot. FTE represents 461 miles of limited-access tolled facilities including the Mainline from Miami to Central Florida as well as the Homestead Extension to the Florida Turnpike, Sawgrass Expressway, Seminole Expressway, Beachline Expressway, Southern Connector Extension of the Central Florida GreeneWay, Veterans Expressway, Suncoast Parkway, Polk Parkway, Western Beltway, and I-4 Connector. By leveraging these FTE facilities, FDOT can deploy connected vehicle technology in a real-world environment supported by a SunGuide software system that already links connected vehicle data to TMC operations.
 - FDOT's regional test bed design is the foundation for a statewide deployment vision. Using the statewide SunGuide software as its central hub, Connected vehicle data can be gathered in each District and assimilated at the state level into a connected vehicle data warehouse. FDOT has already implemented a data warehouse that receives data from statewide deployments and archives these data, including FTE input.
 - The proposal was a needs-based analysis of mobility and safety concerns of all three regions. Based on interviews, statistical analysis of crash causes and traffic delay causes, combined with suitability for deployment, FDOT chose many deployments that were suitable to solve actual local problems as well as build on capability sets of various local partners.
 - Industry partners included:
 - SiriusXM
 - NASCAR
 - Quest Corporation
 - Peloton
 - Parkmobile
 - Cohda
 - Kapsch
 - MobilEye
 - INRIX
 - HERE
 - Econolite
- Created a task force to develop and deploy connected vehicle systems in the state of Florida. The group planned outreach activities to engage local and state partners in deployment and application development.
- Planned three major application deployments to facilitate an environment for technology development and economic growth in the state of Florida.



ITS Management/Deployments

Major Accomplishments

- Updated the Ten-Year ITS Cost Feasible Plan.
- Continued to provide support to District Traffic Operations and Work Program staffs to manage their portions of 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.
- Provided supporting documentation to the Florida Department of Transportation (FDOT) management to continue FL511.
- 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 marketing efforts for FL511 and developed the year's work plan.
- Produced Florida's 511 Progress Report—Information You Need to Arrive on Time for 2014.
- Managed the HERE contract that provides full statewide data coverage of limited-access facilities as well as arterials.
- Implemented changes on the FL511 dissemination components to incorporate Waze data attribution.
- Supported research with the University of Central Florida on real-time monitoring and prediction of reduced visibility events on Florida's highways.
- 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).
- Produced 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.
- Managed and reviewed comments on the survey report.
- Worked with the Federal Highway Administration (FHWA) Florida Division to develop and deliver Florida's Real-Time System Management Information Program report to FHWA by designated deadline.
- Completed As-Is Business Process Analysis Meetings for FDOT's Work Program Integration Initiative for *Ten-Year ITS Cost Feasible Plan*.

Program Description

- Promote intelligent transportation systems (ITS) deployments on Florida's limited-access roadways.
- Manage Florida's 511 (FL511) advanced traveler information system project.
- Manage marketing efforts for FL511.
- Participate in development of the next-generation FL511 traveler information system.
- Develop supplemental data sources to support FL511 in rural areas.
- Set up funding accounts for revenue generation using FL511 assets.
- Manage coordination to integrate FL511 data and Waze data.
- Manage the *Ten-Year ITS Cost Feasible Plan*.
- Manage the regional transportation management center operations and ITS equipment replacement cost allocations.
- Support the I-95 Corridor Coalition through the Travel Information Services Program Track Committee.
- Support the I-95 Corridor Coalition's Vehicle Probe Project.
- Support the National 511 Coalition Working Group.
- Develop and update standards and specifications for ITS devices.
- Manage the ITS general consultant contract.
- 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.
- Support Florida's revenue generation effort.
- Manage the statewide survey for travel information.

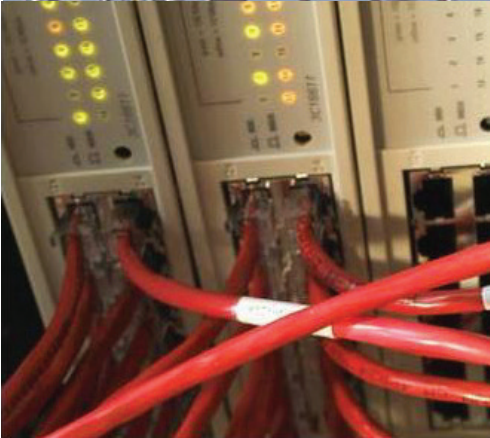
Telecommunications Program Management

Major Accomplishments

- Continued a project to expand the ITS WAN with a gigabit Ethernet connection between the FDOT Traffic Engineering Research Laboratory 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. A contract for fiber cable installation into the SEOC and various intermediate sites in the region was completed. A contract to furnish and install the networking equipment was awarded with completion scheduled later in 2015.
- Issued two Requests for Information (RFI) to explore current networking technologies. One RFI covered shortest path bridging and the other covered multi-protocol label switching. The responses received are helping FDOT move forward in future ITS WAN deployments.
- 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.
- Managed the ITSFM, including
 - Provided system administrative services including program management, user accounts, master code list maintenance, and web site updates.
 - Performed ITSFM webinars for ITS Florida and conducted implementation planning workshops with the Districts.
 - Continued implementation support of the ITSFM to better enable FDOT Districts to manage their overall telecommunications networks, field system configuration, and components.
 - Provided contractor oversight services in Districts One, Three, and Five, including training on "Best Practices," monitoring, and reporting on production, and performed quality audits to ensure deliverables met District requirements.
 - Continued development of a global positioning system (GPS) data dictionary and custom export routines designed to efficiently collect features and attribute information for easy importing into the ITSFM and as-built plan sheets.
 - Performed ITSFM manager/engineer and maintainer training for 55 new users; FDOT has trained 156 users in the use of ITSFM so far.
 - GPS mapped, encoded, and placed into production the Pensacola RTMC serving area, which serves as the District Three demonstration and training area, and included the development of custom training manuals.
 - Upgraded ITSFM software to version 3.3 to add:
 - Improvements in system administration to allow more functionality for District managers;
 - Improvements to Google Maps functionality;
 - Separated the Signal Equipment Cabinet from the ITS Equipment Cabinet to streamline attributes for Ramp Signaling and arterial systems;
 - Renamed the Travel Time System to the Automatic Vehicle Identification System and added devices and attributes;
 - Added toll system features and attributes, including gantries, toll equipment cabinets, and communication facilities such as toll plazas, toll booths, and equipment shelters;
 - Added microwave tower features, antenna sub features, and attributes and improvements to microwave system elements; and
 - Made various improvements to reports, attachments, and notes.

Program Description

- Guide deployment of a communications backbone to serve intelligent transportation systems (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 the Florida Department of Transportation's (FDOT) Federal Communications Commission (FCC) radio licenses (over 600 licenses).
- Manage the ITS Facility Management (ITSFM) system to provide asset, configuration, and as-built document management capability for FDOT and its regional partners to maintain the statewide telecommunications network.
- Manage the Wireless General Manager Agreements, a resource-sharing public/private partnership, which places commercial wireless carriers on FDOT rights-of-way.
- 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.



- 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 Jupiter FTE telecommunications site.
- Completed the Canoe Creek and Orlando West tower replacement projects.
- Continued design work at the Pompano and Yeehaw Junction tower sites, including structural analysis for new drilled shaft foundations and guys, corrosion protection, new obstruction lighting systems, and repairs to tower appurtenances and antenna systems.
- 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.
- Monitored and responded to ongoing active FCC dockets regarding interest by mobile communications company, LightSquared, who is lobbying the National Oceanic and Atmospheric Administration (NOAA) and the FCC to allow them to share frequency spectrum currently used by the FDOT. FDOT receives bridge wind speed data from the NOAA GOES satellite and is concerned that sharing will cause harm to its reception of satellite signals.
- Provided technical assistance on the development of the FirstNet public safety broadband initiative, which involved reviewing and commenting on documents including reports, requests-for-information, and filings with the federal government.
- Experienced a reduction of two wireless collocation subleases under the Wireless General Manager Agreement as a result of wireless carrier consolidations. Three new wireless collocation subleases were added as a result of expansion of the wireless industry and deployment of wireless broadband technology.
- Continued 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 design work on a project to replace generators at six tower sites in District Three and one tower site in District Five.
- Awarded a contract and began work on 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 contracts to replace obstruction lighting systems at the Falmouth, SR-16, and Andytown tower sites.
- Completed installation of multi-cast repeaters at the District Six headquarters tower site and at the Chiefland Forestry tower site in District Two.
- Completed a contract to replace radio interface equipment at the Sunshine Skyway Bridge and the Ruskin tower site.
- Continued 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 delivering bridge sensor data to Districts and their stakeholders from two ground stations used in conjunction with NOAA's satellite-based data collection service. Integration with SunGuide® software is underway, permitting the bridge sensor data to be viewed in real time in the RTMCs.
- Maintained WiFi® Internet access at four welcome centers, which has served over 227,000 users to date with an average of 650 login events per week.

Traffic Systems

Major Accomplishments

- Completed construction project providing multiple 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.
- Completed consolidation of the Qualified Products List (QPL) into the APL resulting in a single online list of products evaluated and approved by FDOT.
- Maintained a statewide APL vendor quality system program to evaluate the quality system of traffic control signal and device vendors requesting listing of their products on the APL- accepted 11, and re-accepted 36 quality systems.
- Maintained a statewide APL product approval program to certify/approve traffic control signals and devices used in Florida – approved 55 products.
- Tracked and closed seven alleged deficiency reports received from end-users through corrective action requests to APL vendors until resolution.
- Developed and updated multiple FDOT contract documents, including updates to 16 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.
- Refined TERL metrics reporting systems for the APL vendor quality system program and APL product approval program.
- 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.
- Provided technical support and assistance with equipment installation at the TERL to demonstrate connected vehicle technology and safety applications to FDOT leadership and other stakeholders.
- 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;
 - Development of minimum standards for event-based data loggers and performance measure definitions for signalized intersections.
 - Development of a test method for assessing the performance of traffic signal assemblies during hurricane force winds.
 - Human factors studies on flashing right turn signal with pedestrian indication to understand the potential of a new signal to increase awareness of, and attention to, crossing pedestrians.
 - Accuracy, consistency, and reliability of raw traffic data from vehicle detection 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 help ensure the safety and uniformity of traffic control devices used in Florida.
- Provide technical expertise and support for the use of traffic control device specifications developed by the Florida Department of Transportation (FDOT).
- Implement and improve the quality system utilized by the 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 system, 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.

Commercial Vehicle Operations

Major Accomplishments

- Reviewed 1,288 protests received by the Commercial Motor Vehicle Review Board, granting full or partial relief to 491 citations for a total relief in excess of \$351,000.
- Began work with the Motor Carrier Size and Weight Office on a Commercial Vehicle Information Systems and Networks grant funded project to install mainline weigh-in-motion systems at Florida's three port of entry sites. This system will allow commercial vehicles to be weighed while traveling at highway speed. The software will then sort the vehicles and determine if they need to pull-in the weigh station or if they can bypass.
- Signed an agreement with Drivewyze to provide a bypass service to commercial vehicles. To participate in this program, a driver or carrier must submit an application with their credentials and pay a monthly subscription fee that allows them to bypass weigh stations and/or agriculture interdiction stations if given the appropriate signal. This is the second bypass company that FDOT has an agreement with; this will further benefit the trucking community with time and fuel savings.

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 2014.
- Prepared and published the Road Ranger Comment Card Annual Report - September 2014.
- Prepared the fifth Annual Road Ranger Responder Survey.
- Supported the www.FloridaTIM.com web site.
- Initiated an annual face-to-face meeting with District TIM Program Managers.
- Enhanced outreach to District TIM programs – established monthly conference calls with District Program Managers to discuss projects, training, and events.
- Continued deployment of the Statewide Law Enforcement Radio System with ongoing training and support to the Districts.
- Continued to support the SHRP-2 National TIM Responder Training courses around the state.
- Conducted three train-the-trainer courses for the SHRP-2 National TIM Responder Training and certified 86 new trainers for the program.
- Created and launched an internal review of an interactive map for Road Ranger service patrol coverage areas statewide.

Florida's 511

Finding Cost Savings

By Russell Allen, P.E., FDOT and Jo Ann Oerter, Atkins

The Florida Department of Transportation (FDOT) is continually looking for ways to improve the travel information resources we deliver to our customers. As part of that delivery, we look to ensure we are utilizing the best technology available at the most reasonable costs.

As of May 2015, FDOT found two ways to cut costs while still maintaining, and in most cases improving, the product delivered to our customers. The first is the communication between each of the District offices that provide data to the Florida's 511 (FL511) system. Previously, each District had a leased line that allowed them to send data from their respective SunGuide® software systems to the FL511 database. The costs for these leased lines ranged from \$2,000 to \$8,000/month. FDOT Central Office made the decision to terminate the leased lines and transition to its intelligent transportation systems (ITS) wide area network (WAN) as the means to provide communications between the Districts and FL511.

Early fall of 2014, the first phase was implemented and each District set up new Internet protocols (IP) for their respective District. Once that was completed, FDOT activated a 100 mbps leased line between a FDOT facility in Orlando and the FL511 facility in Tampa. After this leased line was in place and operational FDOT scheduled a second phase transition for each District. During the second phase of the ITS WAN transition, the Districts had to transition to the new IP addresses that were associated with the new leased line, which were set up in the first phase.

All Districts completed their transition by mid April 2015. At this point, FDOT Central Office staff gave notice to our telephony provider to terminate all the leased lines for the Districts. With this change, FDOT will save more than \$315,000 annually.

The second initiative that FDOT embarked on to save additional money for the FL511 project was the termination of the current weather contract used to purchase data from Schneider's (formerly Telvent) data transmission network (DTN). After performing a comparison of the data received from DTN to the free data from the National Weather Service (NWS), we determined that the information from the NWS is more robust and will provide the Districts more resources to incorporate the weather information into their local SunGuide software systems as well as the FL511 system. FDOT will realize a cost savings from this contract termination of \$89,000 annually.



FL511 Cost Reductions/Year-based on System Modifications	
Total Ethernet Connectivity Cost Savings	\$ 315,696
Total Weather Information Subsystem Cost Savings	\$ 89,000
Total Cost Savings	\$ 404,696

FDOT EXCEEDS RTSMIP Compliance

Exceeding the Traveler Information Bar

According to the Federal Highway Administration, the RTSMIP identifies four areas that need to be addressed:

Construction activities. The timeliness for the availability of information about full construction activities that close or reopen roadways or lanes will be 20 minutes or less from the time of the closure for highways outside of metropolitan areas and 10 minutes or less from the time of the closure or reopening for roadways within metropolitan areas. Short-term or intermittent lane closures of limited duration that are less than the required reporting times are not included as a minimum requirement under this section.

Roadway or lane blocking incidents. The timeliness for the availability of information related to roadway or lane blocking traffic incident will be 20 minutes or less from the time that the incident is verified for highways outside of metropolitan areas and 10 minutes or less from the time that the incident is verified for roadways within metropolitan areas.

Roadway weather observations. The timeliness for the availability of information about hazardous driving conditions, roadway or lane closures, or blockages because of adverse weather conditions will be 20 minutes or less from the time the hazardous conditions, blockage, or closure is observed.

Travel time information. The timeliness for the availability of travel time information along limited-access roadway segments within metropolitan areas will be 10 minutes or less from the time that the travel time calculation is completed.

By Russell Allen, P.E., FDOT and Jo Ann Oerter, Atkins

On November 8, 2014, the Florida Department of Transportation (FDOT) delivered their report outlining their compliance with the first phase of the Federal Highway Administration's Real-Time System Management Information Program (RTSMIP).

As outlined in Section 1201 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, and codified by Final Rule as Part 511 of Title 23 of the United States Code of Federal Regulations, the RTSMIP requires each state to develop resources to collect and disseminate data. It also requires that they have the ability to share that data with other public and private parties who may use it to deliver value-added information products. States will use this Final Rule as a tool to develop plans and strategies that identify their long-range, real-time highway and travel monitoring needs.

The Final Rule requires that all state departments of transportation (DOT) must begin providing information on all interstate routes by November 8, 2014. The second phase of the rule will become effective on November 8, 2016, and mandates that the same information required for interstates be expanded to include routes of significance. This will expand the coverage to United States (US) and state routes (SR) as well as other major arterials.

The first phase of the RTSMIP outlined four areas that states are required to deliver and a timeline of when they need to disseminate the information. The state DOT shall disseminate the information for construction activities, roadway or lane blocking incidents, roadway weather observations, and travel time information within 10 minutes in metropolitan areas and within 20 minutes in rural areas. The RTSMIP also stated that each state DOT must have regional intelligent transportation systems (ITS) architectures.



In June 2014, FDOT began to investigate and determine where we stood; we realized that the features of our current SunGuide® software and Florida’s 511 advanced traveler information system (FL511) well exceeds the requirements defined by the RTSMIP. Florida is well ahead of the game. All of our interstates are already covered; we disseminate the information well within 10 minutes for all areas, not just the urban areas; and we provide a third-party data feed/closed-circuit television (CCTV) feed to external clients so they can incorporate it into their products. Additionally, FDOT already provides information on many of the routes of significant throughout the state, like US 1, US 41, US 192, SR 50, SR 202, multiple Turnpike facilities, and several arterials.

FDOT has already developed eight ITS architectures—one statewide and seven regional, and we are currently in the process of updating them all by the end of 2015.

Although there will be some work that needs to be done to ensure we have coverage on our routes of significance for the November 8, 2016, deadline, FDOT already exceeds compliance with the first phase of the RTSMIP requirements and is well-positioned to meet the requirements of the second phase.



Connected Vehicle

Safety Demonstrations

By Elizabeth Birriel, P.E., FDOT, and David Chang, P.E., P.T.O.E., PMP, Atkins

As part of the Florida Department of Transportation (FDOT) Intelligent Transportation Systems (ITS) Program's mission to improve congestion, mobility, and safety, FDOT provided two demonstrations in fiscal year 2014-15 using connected vehicle applications. The demonstrations were at FDOT's Traffic Engineering Research Laboratory in Tallahassee, in October 2014, and then at the Florida Automate Vehicle Summit at Walt Disney World Speedway in Orlando, in December 2014. Demonstrations included vehicle-to-infrastructure (V2I), vehicle-to-vehicle (V2V), and a combination of V2I and V2V applications (only demonstrated at the TERL). Using SunGuide® software, FDOT's advanced traffic management software, these demonstrations showed how connected vehicle could be applied to everyday driving through SunGuide software's ability to process connected vehicle data and provide it back to drivers to improve mobility and safety.

All demonstration vehicles were equipped with an on board unit (OBU). For these demonstrations, the OBU was a dedicated short-range communication (DSRC) radio, DSRC antenna, global positioning system antenna, and a computer. These components were integrated into a small suitcase for quick and easy installation in a vehicle. As part of OBU's function, it transmitted a basic safety message (BSM) ten times a second. The OBU-equipped vehicles received these BSMs as well as the roadside units (RSU).



OBU integrated in small case for easy use.

V2I Demonstrations

The two V2I demonstrations showed wrong-way driver detection and alert and over-height vehicle detection and alert. For the wrong-way driver detection and alert demonstration, a wrong-way detection zone was established by the RSU. When a vehicle entered the detection zone going the wrong-way, the RSU detected the wrong-way vehicle and sent an alert to the wrong-way vehicle that it was traveling the wrong-way. The other demonstration vehicles also received an alert from the RSU informing them that a vehicle driving the wrong-way was in their vicinity. Additionally, the RSU sent an alert to SunGuide software, which displayed a wrong-way driver icon on the operator map to alert the operator of the wrong-way vehicle. Once the wrong-way vehicle corrected its direction of travel, the RSU discontinued the alert.



Alert to vehicle driving in the wrong direction.

The over-height vehicle detection and alert demonstration illustrated how connected vehicle technology can be used to warn drivers of an impending collision with a road structure. In this demonstration, when a vehicle triggered an over-height detector, the RSU received a message from the over-height detector. The RSU sent an alert to the over-height vehicle warning them that they were over-height and instructions on how to proceed. If the over-height vehicle continued and ignored the instructions, the RSU sent another alert warning them of an impending collision with the road structure. However, if they turned away from the structure, the RSU cleared the alert. The RSU also sent an alert to SunGuide software, alerting the operator of an over-height vehicle.



Over-height detector installed at the TERL.



Alert provided to over-height vehicle.

V2V Demonstrations

The V2V demonstrations were safety-based applications. The emergency braking demonstration involved three vehicles traveling in the same direction and communicating with one another via DSRC. The lead vehicle accelerated away from the trailing vehicles then applied its brakes hard. An alert was broadcast to the trailing vehicle of hard braking ahead. This demonstration showed how a driver could take the necessary action to avoid a collision.



Emergency braking demonstration.

The emergency vehicle alert demonstration involved three vehicles, one of which simulated an emergency vehicle. The emergency vehicle began broadcasting an emergency vehicle alert. The other vehicles received the alert and a notification was displayed to the drivers showing the emergency vehicle's speed, direction it was approaching from, and its distance from the other vehicles. This demonstration provided real-time notification updates showing the distance decreasing/increasing as the emergency vehicle moved towards and past the other vehicles.

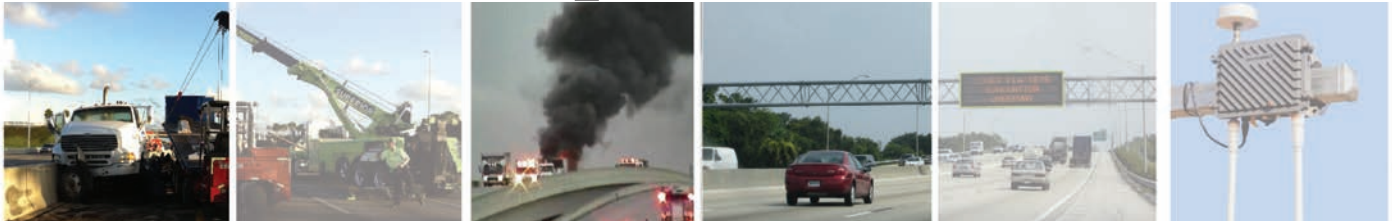


Emergency vehicle alert demonstration.

V2I/V2V Combination Demonstration

The final demonstration, the Mayday message relay, was a combination of V2V and V2I, which was only demonstrated at the TERL. For this demonstration, a vehicle was parked outside the RSU's communications range. The vehicle's OBU was equipped with a Mayday relay application which, when activated, began broadcasting a Mayday alert. A second vehicle equipped with a Mayday relay application passed by the stopped vehicle and received the Mayday message, which it stored as it continued traveling. When the vehicle with the stored Mayday message came within range of the RSU, the vehicle's OBU sent the Mayday message to the RSU. The RSU then sent the message to SunGuide software, which displayed the parked vehicle's location on the operator map, enabling the operator to inform the Road Ranger service patrol of the stranded vehicle.

Connected Vehicle Pilot Deployment



Life-Saving Applications

By Elizabeth Birriel, P.E., FDOT, and Suzanne Murtha, Atkins

During fiscal year 2014-15, the Florida Department of Transportation (FDOT) Intelligent Transportation Systems Program worked to set up a multi-agency and multi-private company partnership to establish a statewide approach to deployment of connected vehicle technology. As part of this effort, FDOT submitted a proposal to the United States Department of Transportation (USDOT) to improve pedestrian safety, reduce crashes, increase mobility for drivers, and promote the safe and efficient movement of commercial goods through connected vehicle applications.

FDOT created a partnership among multiple agencies and leading private sector technology companies for a statewide solution. As part of this effort, FDOT responded to the Federal Highway Administration connected vehicle pilot deployment broad agency announcement (BAA) requesting proposals to deploy and maintain vehicle-to-infrastructure devices and applications. The BAA solicited responses that address “real-world” issues where connected vehicle technology could be implemented to address these issues.

The initial public agency partners include the Florida Turnpike Enterprise (FTE) as well as Osceola and Pinellas Counties. These agencies recognize the transformative benefits of connected vehicle for addressing challenges that face the state. FTE manages 461 miles of toll facilities across the state where challenges range from fog/smoke visibility issues to a need for better use of truck parking facilities to meet driver safety regulations. Osceola County hosts significant tourist traffic to the Central Florida attractions and is looking to connected vehicle to improve the safety of both pedestrians and drivers. Pinellas County will leverage their existing working relationships with local emergency services so that emergency vehicles will be able to reach motorists that need help more safely and rapidly.

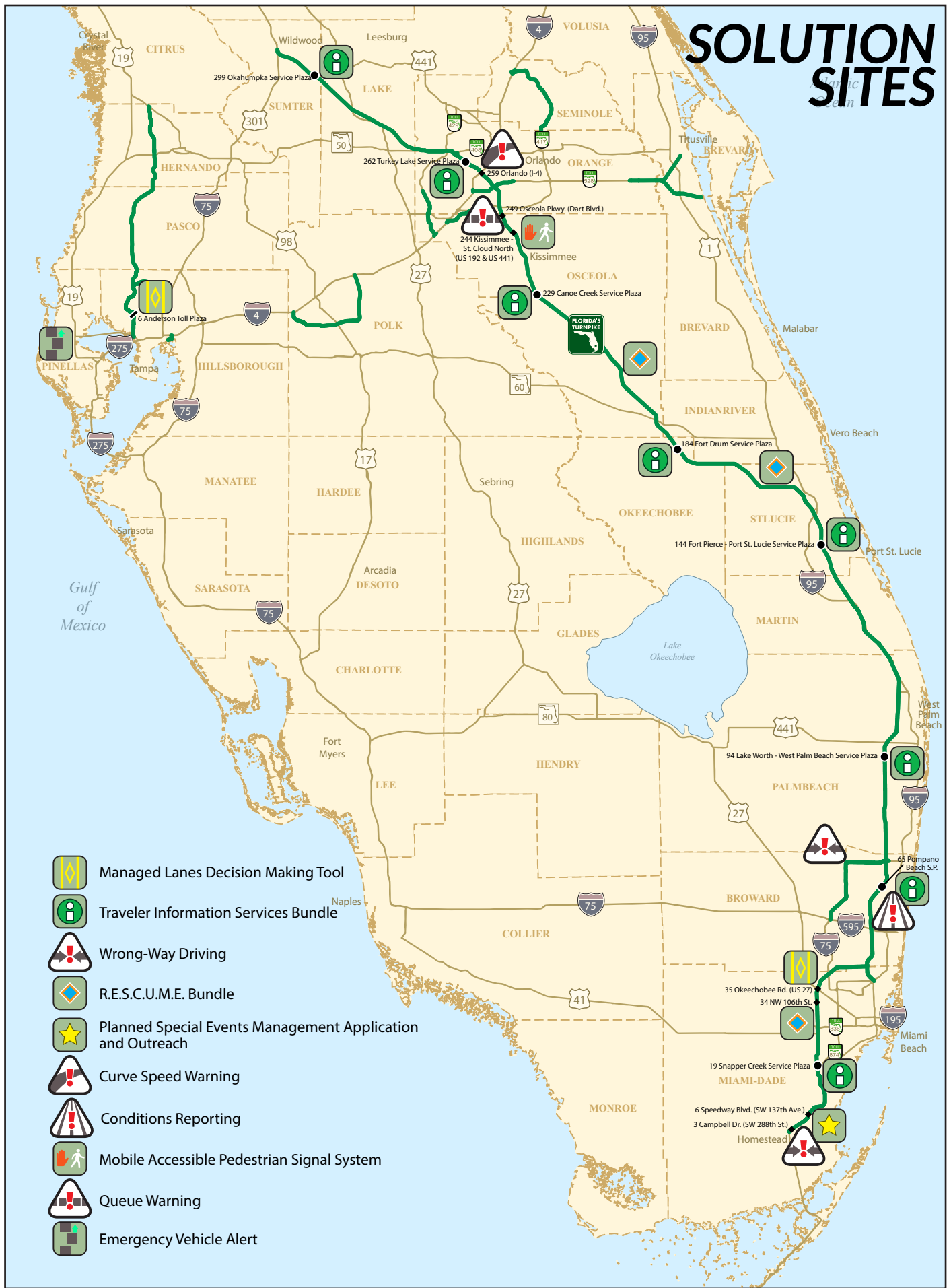
FDOT has been exploring the potential of connected vehicle since 2003, and more intently since the 2011 World Congress on Intelligent Transport Systems. FDOT has well-established relationships with many key connected vehicle private companies that will accelerate the adoption of these applications.

For the 2011 World Congress, FDOT enhanced its SunGuide® software to communicate with connected vehicle devices, and deployed the software into FDOT’s District Five production (real-world) environment. SunGuide software was the first known advanced transportation management software to send and receive connected vehicle data and use it for operations. Because of this experience, FDOT will use SunGuide software as the central connected vehicle system and repository. This will enable FDOT to easily expand connected vehicle deployments to other parts of the state.

FDOT proposed to implement 14 connected vehicle applications at 20 deployment sites. These applications are comprised of existing USDOT dynamic mobility application bundles: Traveler Information Services Bundle and Response, Emergency Staging and Communications, Uniform Management, and Evacuation (R.E.S.C.U.M.E) Bundle; existing USDOT connected vehicle applications, such as curve speed warning; existing FDOT connected vehicle applications, such as wrong-way driving and emergency vehicle alert; and new applications, such as a managed lanes decision making tool.

FDOT’s proposed applications are designed to be expanded throughout the state on both freeway and local roads and also included applications that can be scaled and replicated throughout the country.

SOLUTION SITES



-  Managed Lanes Decision Making Tool
-  Traveler Information Services Bundle
-  Wrong-Way Driving
-  R.E.S.C.U.M.E. Bundle
-  Planned Special Events Management Application and Outreach
-  Curve Speed Warning
-  Conditions Reporting
-  Mobile Accessible Pedestrian Signal System
-  Queue Warning
-  Emergency Vehicle Alert



SunGuide® Software

Release 6.1 Provides Major Improvements

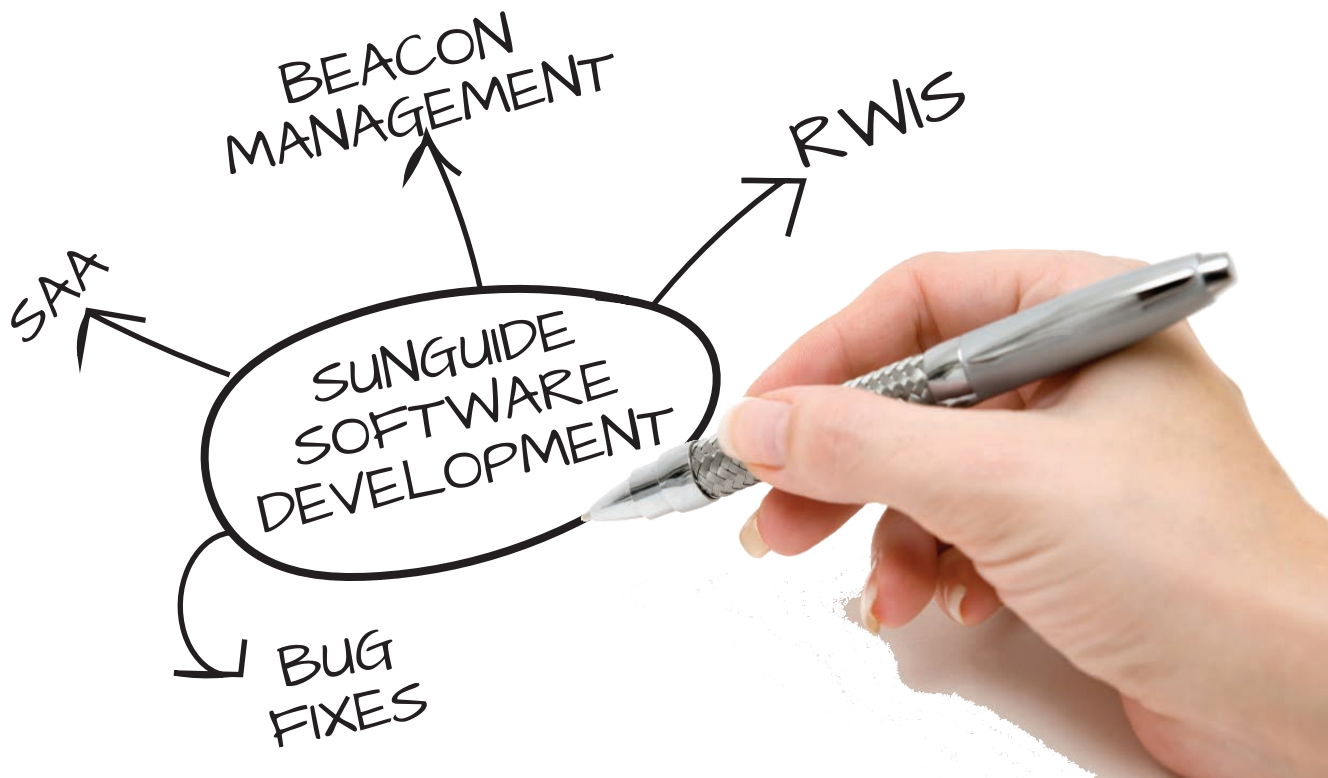
By *Derek Vollmer, P.E., FDOT and Clay Packard, P.E., Atkins*

SunGuide® software is the Florida Department of Transportation's (FDOT) advanced transportation management systems software, which allows transportation management centers to monitor traffic and manage incidents. It offers a comprehensive set of tools for all facets of traffic operations to reduce congestion and traffic delays, and keep the motoring public connected with time-sensitive traffic information.

In fiscal year 2014/2015, FDOT modified SunGuide software to release 6.1, which is right around the corner for deployment, so that users can enjoy the benefits of the many enhancements and improvements, and realize the value of all of the hard work put into this release.

The software installer underwent a major overhaul, with many value-added features implemented to help simplify the installation process. These added features include the ability to verify that the environment is properly configured for successful operation and to provide automation and flexibility in how the software is deployed. This release incorporates the ability to batch upgrade multiple servers remotely and concurrently. One of the new tools is a completely revamped configuration file editor that performs validation of the configuration file, suggests values for each configuration item, and has a rich user interface. These improvements help ensure that a system is properly deployed before being turned over to operations, and to make the deployment simpler and more accessible for District technical administrators to perform without relying as heavily on technical support and post-installation troubleshooting. Having local technical administrators able to more successfully deploy the software gives them a better understanding of the system, less downtime during upgrades, and fewer operational failures from deployment errors.

Another more significant enhancement was to migrate user and permissions management to the Software Administration Application (SAA), which was initially developed for the Texas Department of Transportation. SAA improves user management by treating users and groups much like a Windows Active Directory system, allowing management of a group rather than individual users when assigning permissions. This saves time in managing security within SunGuide software and improves the accuracy and consistency in how permissions are applied. It also paves the road to allowing multiple groups to have permissions only to their respective set of devices if devices from multiple agencies are integrated into the same SunGuide software system. The user interface has also been built into the operator map using Windows Presentation Framework (WPF), which replaces the Admin Editor User Management page. WPF is the graphical user interface (GUI) platform



that all new SunGuide software GUI screens are being developed in; existing GUI screens are migrating to this interface in order to take advantage of a richer and more robust functionality and user experience. This will replace the web-based Administrative Editor that utilized the Internet Explorer web browser rather than being integrated into the operator map application. This will also allow each user to have their own permissions to make configuration changes rather than using a shared administrative account. Users will be able to make changes to different parts of the system rather than having to coordinate one at a time access to the Administrative Editor.

Release 6.1 also comes with a more comprehensive road weather information system (RWIS) subsystem, which is now integrated into the incident detection subsystem (IDS). This allows any RWIS data field on each RWIS device to have an alarm and recovery threshold. Once an alarm is triggered, RWIS can raise an alert through IDS, which was enhanced to allow the visibility alarms to automatically create and activate response plans. RWIS visibility alerts are introducing the first automatically created events and activated response plans. These response plans include the ability to send emails, post messages on dynamic message signs, and activate flashing beacons within a configured distance of an alert's location.

In support of the RWIS enhancement and automatically activated response plans, a new beacon management subsystem (BMS) will manage beacons attached to static signs. This comes with a BMS web relay driver to communicate with the web relay device deployed on static signs in the field to physically turn the flashing beacons on and off.

The reporting subsystem and the scheduled action subsystem also had their GUIs moved to WPF along with a set of enhancements, providing much greater flexibility and usability. One scenario highlighting the benefits of the GUI enhancements to these two subsystems is the ability to generate reports on a schedule and have them emailed to a list of recipients.

Release 6.1 introduced several new protocols. An IDS driver was built for the Wavetronix Click!512 wrong-way driving (WWD) detection device. This device connects to an existing Wavetronix high definition sensor to filter out WWD detections and sends only the WWD detections to the SunGuide software for an immediate alert to the operator and emails to a pre-configured list of recipients. This release also introduced a new camera driver to support the Open Network Video Interface Forum (ONVIF) camera control protocol. The ONVIF protocol is becoming the new industry standard, and supporting this in SunGuide software will open up the intelligent transportation systems (ITS) market to more camera manufacturers and models. Since the SunGuide software RWIS driver was last updated, the RWIS portion of the National Transportation Communications for ITS Protocol (NTCIP) was updated to version 2 and again to version 3 to support these newer protocol versions. In Release 6.1, the SunGuide software RWIS driver was updated to support these newer versions of the protocol.

This release also provides a small enhancement with a potentially big impact. The closed-circuit television camera portion of the center-to-center module now includes video stream URLs. A remote SunGuide software installation can use this so that, while another District's cameras are already visible on their map, they can now access the video from the camera using the video on desktop application. This enhancement would be extremely helpful for the Emergency Operations Center during a statewide emergency.

In addition to these enhancements, there were 140 footprint issues resolved, and we believe this version of the software will be the highest quality ever released. Even after 6.1, we will continue to enhance the software, making it more robust and reliable, to perform its part in fulfilling FDOT's mission for safer and more efficient roads for Florida's motorists.



Waze & SunGuide® Software



A Winning Partnership for FDOT

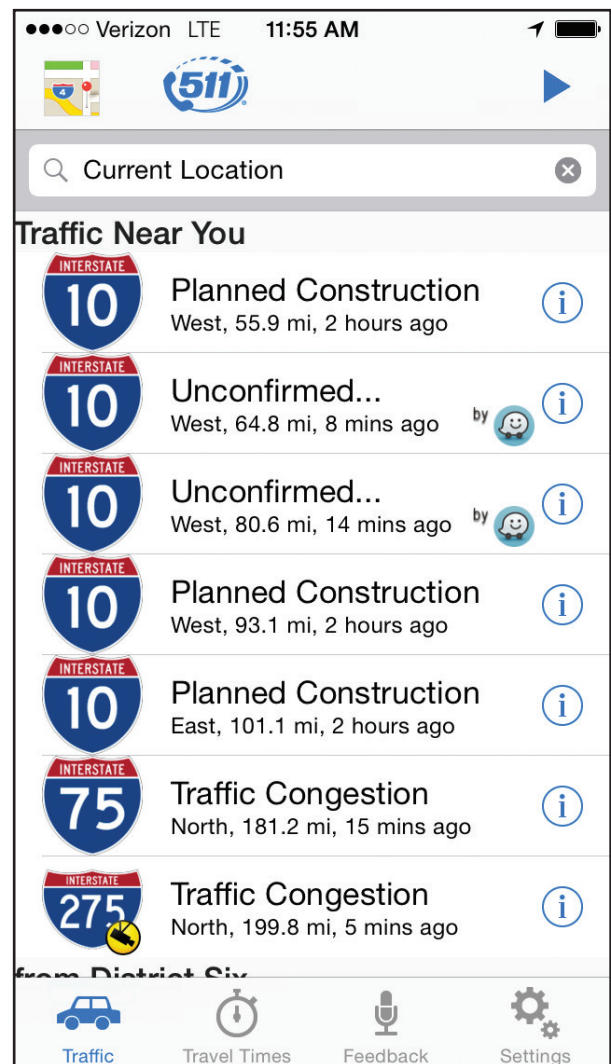
By Derek Vollmer, P.E., FDOT

This year, the Florida Department of Transportation (FDOT) and Google Waze formed a partnership to share data. The agreement was made in March 2014, with a brainstorming meeting in June 2014. Shortly after this, work to integrate Waze data into the SunGuide® software was underway. The effort started by conceptualizing a quick solution and a long-term solution to integrate the Waze data.

The quick solution identified using center-to-center components to display Waze alerts on SunGuide software's operator map. This solution required a lot of manual work by operations staff. It also did not provide FDOT with the ability to map Waze alerts to SunGuide software events. The Central Office SunGuide software project team worked diligently to create the components needed to integrate Waze data into SunGuide software. The integration effort also involved creating operating guidelines, a quick reference guide, and offering training to operations staff on how to handle Waze alerts. The quick solution, or first phase of integration, was released in October 2014.

After phase one was released, work began on creating a concept of operations for completely integrating Waze data into SunGuide software. The benefits of this phase include automatic population of Waze alert information into SunGuide software events, linking Waze alerts to SunGuide software events for future analysis, allowing Waze alerts to appear where all other alerts appear in the SunGuide software, and a less complicated data sharing method with FDOT District SunGuide software deployments.

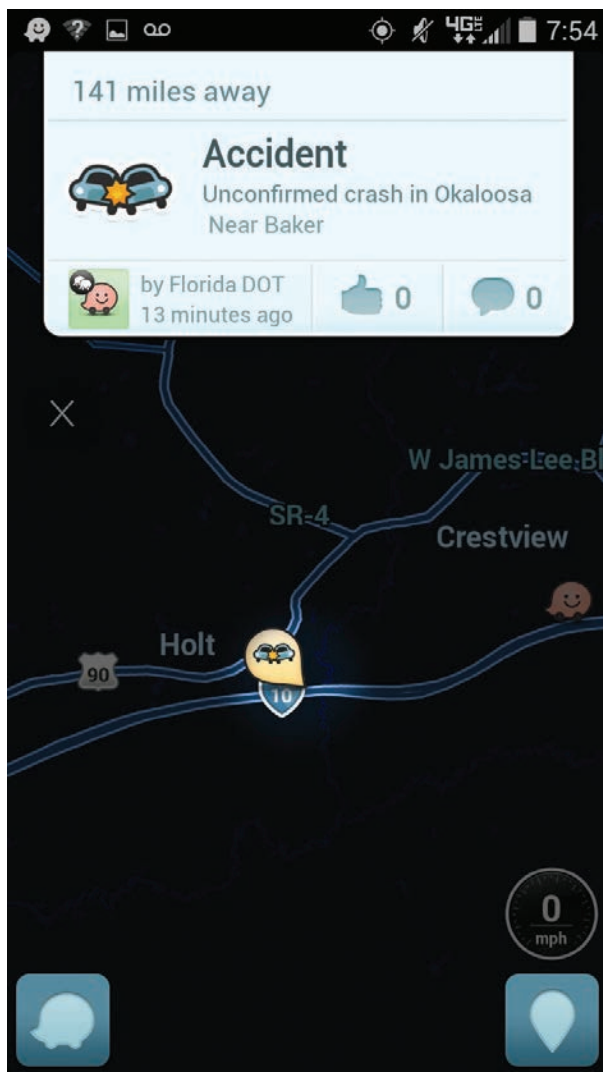
There were challenges encountered along the way. The data in the Waze feed made it challenging to filter alerts based on a roadway. This was important because FDOT sends a limited data set to each District based on the geographic region they manage. Florida's Turnpike Enterprise (FTE) runs through multiple Districts, and they only focus on a very limited set of roads within those Districts. Without a roadway filter, FTE received a great deal of alerts that did not pertain to them. This made it difficult for their operators to detect Waze alerts that pertained to their roadways. FDOT worked with the FDOT Transportation Statistics Office, Geographic Information System section to determine a way to filter the Waze alerts down to only the roadways FTE managed. This was a great improvement for FTE and could also be used down the road for other Districts.



Attribution to Waze by FDOT on the FL511 system.

Through this partnership, Waze also receives data from FDOT. This data includes closed-circuit television camera images, dynamic message sign messages, FL511 (Florida’s advanced traveler information system) floodgate messages, traffic events, traffic speeds, and travel times. Waze quickly integrated FDOT data that was pertinent to them into their application. When Waze uses FDOT data, Waze attributes/credits the event to FDOT. Similarly, if FDOT uses Waze data to create an event, then FDOT attributes the event on the FL511 web site. FDOT benefits from receiving Waze data by having an additional notification source for incidents, especially on roadways that are not instrumented. FDOT also benefits by providing data to Waze, because more motorists can be reached with important roadway condition information.

So far, the partnership has been a good one. It will be interesting to see how much more we learn when we roll out the second phase of Waze integration. The concept is finalized, approved, and will be included in SunGuide software version 6.2. We look forward to our continued relationship with Waze and learning more about what we can achieve with their data.



Attribution to FDOT by Waze.



Connected Citizens Partner Summit

In the spirit of partnering, Waze hosted a summit at their facility in Mountain View, California, in May 2015, for their various partners to get together to share experiences and interact with Waze technical staff. Representatives from Rio de Janeiro, Latvia, Hungary, the City and County of Los Angeles, City of Boston, departments of transportation (DOT) (including Florida, Kentucky, Tennessee, and District of Columbia), Castle Rock Associates, and Waze staff from Israel and the United States attended this summit.

After brief introductions and updates from Waze staff, the focus turned to the partners and how they are integrating and using Waze data. While FDOT’s focus is on integrating Waze data for state roadway operations, some city agencies were interested in other information, such as:

- The District of Columbia DOT had an initiative called “Potholeaploozza,” which focuses on potholes with a goal to repair them within 48 hours of being reported.
- The City of Boston was also interested in potholes, but more unique to Boston was how “vehicle stopped on shoulder” could be interpreted; they discovered a vehicle stopped on the shoulder usually meant a car was double parked. They are using this data to determine areas where this occurrence happens more frequently, so they can work on solutions.
- Rio de Janeiro showed how they used information from Waze during the World Cup and for a visit from Pope Francis; also, how they plan to use Waze during the 2016 Summer Olympics.
- Some state DOTs are trying to integrate their snowplow location data into Waze to allow Waze users to know which routes have been plowed.
- Kentucky DOT used Waze data to help replace missing signs in a more efficient manner on their roadways.

Waze demonstrated their commitment to these partnerships by listening and implementing changes based on what the partners needed. Throughout this summit, it became apparent that Waze listens to their partners’ needs and implements changes, wherever possible, to meet those needs.

FDOT ITS Telecommunications Next-Generation Network

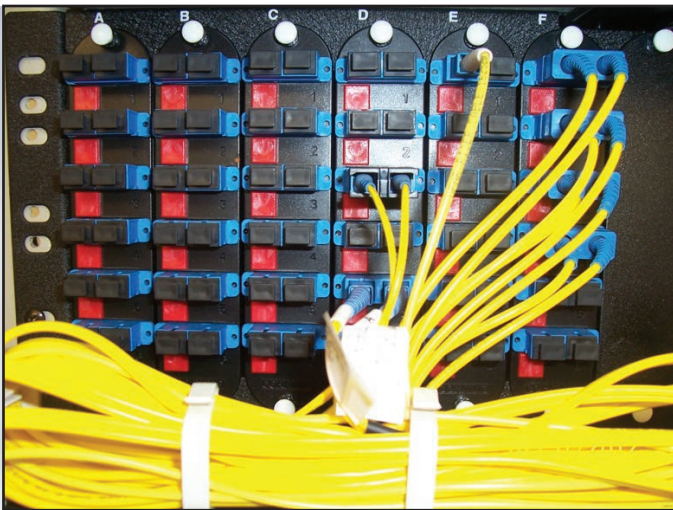
By Randy Pierce, FDOT, and David Heupel, Schneider Electric

The Florida Department of Transportation (FDOT) Intelligent Transportation Systems (ITS) Program's Telecommunications Program Management is coordinating the upgrade of an ITS wide area network (WAN), interconnecting regional transportation management centers (RTMC) and other transportation partners across the state. FDOT made progress to modernize its ITS WAN during fiscal year (FY) 2014-15. The FDOT ITS WAN is a network comprised of a statewide microwave data system and a fiber optic network, of which the majority is currently located in South Florida. However, during FY 2014-15, FDOT District Three installed 210 miles of fiber optic cable along the Interstate 10 corridor in support of its ITS operations. District Three has allocated a buffer tube (12 strands) of this fiber optic cable for ITS WAN use, and the ITS WAN team has plans to light this fiber, likely during FY 2015-16.

FDOT also commissioned an in-depth study of WAN technologies. A technical evaluation committee was formed and reviewed several different network routing protocols, namely carrier Ethernet, shortest path bridging, and multi-protocol label switching. One or more of these technologies will become the base of the next-generation statewide ITS network. The committee met regularly to discuss findings from their own research on these technologies and ultimately issued formal Requests for Information, which detailed certain network modernization scenarios, and requested equipment manufacturers to explain how they would best engineer strategies for modernizing segments of the network, while maintaining connectivity with legacy segments of the network.

The technical evaluation committee also developed standard equipment requirements and specifications, which any new networking equipment must meet to be considered for use in the next-generation statewide ITS network. Among these standards is a requirement for new ITS WAN fiber optic communications using FDOT-owned fiber facilities to be commissioned at no less than 10 Gigabits per second (Gbps), and new long-haul microwave links will, at a minimum, support approximately 300 Megabits per second (Mbps) bandwidth. Upgrading the bandwidth capacity of FDOT's ITS WAN is critical to support emerging technologies such as vehicle-to-vehicle and vehicle-to-infrastructure communications, among other applications and services riding on the network.





Fiber optic patch panel.

The ITS WAN team, in cooperation with the City of Tallahassee, finished the build-out of a 10 Gbps fiber optic ring within the City of Tallahassee. This new ring is comprised of five key locations: the FDOT Transportation Engineering Research Laboratory (TERL), the Troop H Florida Highway Patrol (FHP) station, the City of Tallahassee Public Safety Complex, the Rhyne Building which houses FDOT's Traffic Engineering and Operations Office, and the State Emergency Operations Center (SEOC).

Having this new 10 Gbps network provides FDOT with several benefits. First, it provides communications for the City of Tallahassee's transportation management center (TMC) and the District Three regional TMC in Pensacola. Second, it allows statewide traffic flow video and data to be shared with the SEOC. The ring also provides a means for network connectivity between the next-generation network and the legacy network at the joint FDOT/FHP Troop H tower site. In addition to these benefits, an annual cost savings of nearly \$60,000 will be realized due to decommissioning of a 100 Mbps leased circuit, which provided connectivity between the TERL and the FDOT/FHP Troop H tower site. Finally, it provides FDOT staff and contractors direct access to manage the networks that comprise the legacy ITS network and the next-generation statewide ITS network, which is in its initial stage of implementation by virtue of this project.

FDOT ITS Central Office and the ITS WAN team also received a request for new services from the Florida 511 (FL511) advanced traveler information system program. Prior to FY 2014-15, each FDOT District had a leased data circuit that transported data from their SunGuide® software server(s) to the Cyber Center in Tampa, Florida. The Tampa Cyber Center houses aggregation services for traffic video and other transportation-related data. This video and data is then made

available to the public via FL511, providing information about Florida's roadways including construction, travel times, delays due to traffic incidents, images from traffic flow cameras, and other such information. This data now gets to the Cyber Center via a single leased circuit, rather than eight separate circuits, and the data from each FDOT District travels over the ITS WAN. The elimination of these leased data circuits saves Florida taxpayers nearly \$368,000 a year.

In FY 2014-15, the ITS WAN team, in cooperation with District Five and Florida's Turnpike Enterprise (FTE), began a project to provide a redundant fiber optic ring within District Five. This ring will serve several purposes. First, it will provide redundant ITS WAN connections for District Five, FTE, and FTE Toll Operations. These redundant connections are necessary to hedge against service outages along the Interstate-4 (I-4) corridor during the I-4 Ultimate Improvement Project due to a fiber cut. Additionally, it provides a means for District Five to participate in managed lanes variable-rate tolling, and gives FTE and Toll Operations redundant connections for their applications including disaster recovery backups. As this project was being engineered, the ITS WAN team received an added benefit—a key location used for this ring includes an FDOT microwave tower site at the Cocoa FHP station near Interstate 95. This key location now provides a means to link the fiber and microwave networks together, providing further protection against network disruption. District Five and FTE have already allocated dark fiber strands to support this ring, and the Telecommunications Program Management anticipates completion of this project between FY 2015-16 and FY 2016-17.

In the coming years, the Telecommunications Program Management will undertake other similar projects that will enhance the ability for regional TMCs and other transportation partners to augment operational efficiencies, provide disaster recovery capabilities, improve communications, and share traffic control data across operational boundaries.

Updating FDOT's Microwave Towers

Replacing an Aging System

By Randy Pierce, FDOT, and Terry Posey and Nick Adams, Schneider Electric

They stand tall and unwavering in the cloverleaves. You drive right past them every day in your commute, usually without noticing. They endure the ever changing Florida weather cycles of blazing sun, freezing cold, torrential rain, and relentless wind. They blink white and red to warn aircraft of their presence. They endure, year after year, serving to enable the Florida Department of Transportation's (FDOT) intelligent transportation systems (ITS) communications from Pensacola to Key West.

FDOT's microwave tower network supports the antennas for the microwave radio system, which passes traffic data, video, and other information between the regional transportation management centers, FDOT headquarters, and the State Emergency Operations Center. Constructed of galvanized steel, the towers must be designed extremely robust to resist hurricane strength wind and provide a reliable, long-lasting platform with minimum maintenance.

Canoe Creek Service Plaza: Old guyed tower and new self-supporting tower.



Recent information compiled from hurricane research indicates that new design parameters are needed to survive the severe and extreme weather encountered in Florida. The Telecommunications Industries Association (TIA) is tasked with providing specifications for tower construction throughout the United States. TIA-222, Revision G, has been adopted and must be followed when a tower is designed. The new rules require a stronger tower and a larger foundation than previously allowed. Any replacement towers must comply with this new standard.

As strong as these towers are, they eventually require replacement. Many of the existing FDOT and Florida Turnpike Enterprise (FTE) towers are over 25 years old. Florida Department of Management Services, Division of Communications, has determined that towers have an approximate life expectation of 25 years. Also, as requirements have grown, capacities have diminished. Many towers have no remaining load capacity to hold additional antennas for new systems coming on line. As towers age, they require more frequent maintenance to ensure their reliability.

FDOT's Traffic Engineering and Operations Office provides engineering services to the Districts and the FTE through the ITS Section for construction and maintenance of towers. A program was initiated in 2012 to refurbish and replace 16 FTE towers. Replacement of Wildwood, Canoe Creek Service Plaza, and Orlando West have already been completed with new self-supporting structures. Clermont and Jupiter are under contract with construction commencing in 2015.

The remaining phases will replace the Pompano Beach, Site X, and Yeehaw Junction towers. All other FTE towers (a total of eight) will be included to refurbish or replace as this ongoing project moves forward.

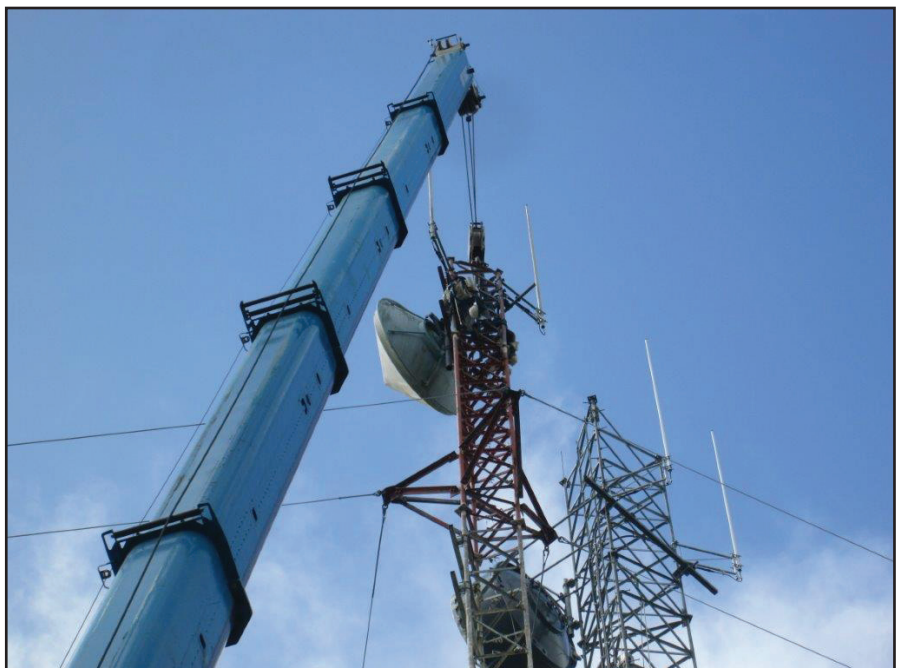
This project will preserve the FTE ITS microwave telecommunications system, significantly improve reliability, and lower operational and maintenance costs. Additionally, this project will prepare the microwave system for future high-capacity build-out to support toll systems, engineering and operations, Turnpike ITS, and statewide traffic operations ITS.



Aligning anchor bolts for drilled pier tower foundation at Canoe Creek Service Plaza.



Lowering rebar for steel reinforced concrete drilled pier tower foundations at Canoe Creek Service Plaza.



Dismantling the old guyed tower at Wildwood, with new self-supporting tower in the background.



Prepared for the Future

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

The use of new technologies and innovative products continues to expand rapidly within the traffic industry. Intelligent transportation systems, including vehicle detection systems, dynamic message signs (DMS), video systems, and the networks that support them, have demonstrated their value in maximizing the safety and efficiency of Florida highways and streets. Traffic control systems, in general, are becoming more advanced and the application of next generation systems is quickly growing to encompass local roads as well as highway and interstate systems.

As this has happened, more vendors and products have entered the transportation marketplace and there is increased need to evaluate new products and technologies in a safe environment. For many years, the Traffic Engineering Research Laboratory (TERL) has been responsible for providing the technical expertise and facilities necessary for the Florida Department of Transportation (FDOT) to evaluate a variety of traffic control devices and systems. The TERL is keenly aware of FDOT's need to remain engaged and at the forefront of traffic technology. Because of this, the team at the TERL has regularly championed projects that build upon the current capabilities of the lab and also help ensure that it is prepared for the future. Significant campus improvements were made during the past year that provide the facilities necessary to evaluate traffic control systems and technologies for years to come.





New features and improvements made to the TERL campus this past year included rehabilitation and upgrades to an existing span wire intersection, installation of new pedestrian crosswalks for human factors research, resurfacing and expansion of existing roads on the campus, sidewalk installations, expansion of campus communications and electrical systems, and the addition of multiple test areas for evaluation of various devices.

The project realigned and extended roads at the TERL's span wire intersection, providing the ability to operate the intersection as a true 4-legged approach. The extension of the main road also allows better access to test areas used for the evaluation of large outdoor items such as DMSs and trailer-mounted maintenance of traffic products. The newly extended road was quickly put to use recently during the evaluation of an automated gate system proposed for use on FDOT express lanes projects.

In addition to the extension of the main road, almost all of the existing asphalt around the campus has been resurfaced. This resurfacing portion of the project included reconstruction of an old, eroding section of roadway that had previously been constructed of millings several decades ago. The new roadway in this section now forms a usable part of a complete loop circuit between the northern and southern ends of the TERL campus. The new road has already been used to host demonstrations of connected vehicle systems and autonomous vehicles.

Connected vehicle demonstrations utilized the new roads at the TERL shortly after resurfacing. The demonstrations included examples of safety applications such as a wrong-way driving detection/warning system, an over-height warning system, and the relay of a "mayday" message. All of

these demonstrations required vehicle-to-infrastructure integration and depended heavily on TERL campus facilities for communications, power, structural support, and a safe track to perform various maneuvers that would require road closures to perform on public streets. The new road was also recently used to demonstrate an automated truck that included a truck-mounted attenuator, cone placer/retriever, barrel mover, and other features. The company is working on fully autonomous versions of the vehicle that will perform multiple operations while driverless.

These are just a few recent examples of activities that have taken advantage of new TERL facilities. We expect that as FDOT and industry continue to move forward with connected vehicle and autonomous vehicle initiatives, the lab will progress further into the evaluation of connected vehicle equipment and applications. With recent renovations completed, TERL campus roads and intersections are well-suited to support the evaluation of systems involving signal phase and timing transmission, and other products and applications that are beginning to emerge out of technical advancements taking place today.

It has been rewarding to see the project plans become reality and the TERL is now poised to take full advantage of these new facilities. These renovations and improvements have already served to facilitate evaluation and approval of emerging systems and technologies and will continue to provide this capability for years to come. In addition, these recent enhancements continue to expand the lab's capacity to evaluate and approve traffic control devices as well as support research into driver and pedestrian behavior, connected vehicle systems, signal performance measures, and other future products and technologies that can be applied to traffic operations.

FDOT'S Approved Product List

Reuniting the APL & QPL

By Jeffrey Morgan, FDOT



On October 20, 2014, the Florida Department of Transportation's (FDOT) new Approved Product List (APL) was made public revealing our single new listing for all of FDOT's preapproved transportation products. After approximately 25 years of separation, FDOT's Qualified Products List (QPL) and APL were reunited. The decision to merge the QPL with the APL was made by FDOT management who wanted a single list to go to for any approved product, regardless of the product type. The new APL includes all products that were included on the former QPL and APL.

This decision from management to merge the two lists together occurred at the same time the Traffic Engineering Research Laboratory (TERL) was developing requirements for a new web database that would update the former APL. These requirements included a more user-friendly interface similar to common Internet shopping sites such as Walmart, Best Buy, etc., and the capability to display more product information on the APL. The capability to place more images of approved products on the APL, along with updated tools to make navigating easier for external and APL administrative personnel was also included. The timing of this decision from management turned out to be perfect for accomplishing both tasks - combining the QPL with the APL database and updating the new APL web database with the look, feel, and functionality as noted above.



Requirements for the new list had been developed by the TERL, but to this point had not involved the QPL. To ensure all features needed by everyone were included in the new database, a survey was sent to APL users and detailed requirements were finalized, working with QPL administrative personnel to ensure all features and functions needed by all interested parties would be included in the new database.

A contractor was selected to develop the new APL and work began in September 2013, with regular meetings being held with the contractor to ensure all requirements were understood and incorporated. Acceptance testing occurred in March 2014, with a release date scheduled for April 1, 2014. Due to numerous issues with the new web database, implementation of the new APL did not occur until October 2014.

Lessons learned from this project were that to accomplish adequate testing (and retesting after problem resolution), more than one week is needed for acceptance testing. Due to the short test period and hard project end date of April 1, many issues were left unresolved that will have to be handled in an enhancement update at additional cost.

Although there is still some work to be done, the TERL feels the goals and objectives of the consolidation effort were accomplished – the APL and QPL are now merged into a single list and improvements/enhancements were included that will result in a more user-friendly list for both external and internal admin APL users.

The new APL is available online at <https://fdotwp1.dot.state.fl.us/ApprovedProductList>.





Moving Freight In Florida

By Marie Tucker, FDOT

The Florida Department of Transportation (FDOT) is the chair to the Commercial Motor Vehicle Review Board and manages all the day-to-day activities related to processing citation protests. This includes ensuring that protests meet the requirements for Board review; replying to protests regarding agendas, scheduling, and holding the meetings; and providing final dispositions of protests to protesters. This past year the Board reviewed 1,288 protests, granting full or partial relief to 491 citations for a total relief in excess of \$351,000.

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 (DOR), 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 \$6,262,021 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 2014-2015 included:

- Installing mainline weigh-in-motion (WIM) systems at the three port-of-entry weigh stations: Pensacola at I-10; White Springs at I-75; and Yulee I-95. Mainline WIM systems will weigh commercial trucks at highway speeds. The software will then gather the gross axle weights and spacing and sort the truck based on information provided. This will determine if the vehicle needs to pull into the weigh station or if they can bypass. Once complete, the trucking community will benefit from this with time and fuel savings along with preventing weigh stations back ups on the ramp.

- Deploying kiosks at weigh stations that will allow commercial carriers to purchase oversize/overweight permits through the Permit Application System (PAS). The kiosks will provide an Internet-based interface to the PAS that will allow commercial vehicle operators the ability to apply, pay for, and receive permits on site.
- Last fall FDOT signed an agreement with Drivewyze, a company that provides a bypass service to commercial vehicles. To participate in this service, a driver or carrier must submit an application with their credentials and pay a monthly subscription fee that allows them to bypass weigh stations if given the appropriate signal. With this agreement in place FDOT weigh stations and Florida DACS interdiction stations now support two bypass systems – Drivewyze and PrePass. This will benefit the trucking community with time and fuel savings and also by preventing lengthy backups at the stations.

Upcoming project for fiscal year 2015-2016:

DACS and DOR have a longstanding partnership to gather bill of lading (BOL) data from shipping companies that import goods into Florida. DOR uses BOL data to ensure that businesses and individuals pay taxes on goods purchased out of state with no taxes, and imported for use in Florida. The DACS interdiction stations currently scan BOLs to images, which are then electronically transferred to the DOR. DOR researches the BOLs to determine the taxability of the items coming into Florida, then contacts the end users of the products to collect any applicable taxes. The process of imaging the BOLs sometimes causes trucks entering the inspection stations to back up onto the interstate, causing safety issues.

To help alleviate interstate congestion and speed up movement of goods, the electronic bypass program was initiated at the DACS interdiction station. This is a grant project that allows trucking companies who do not haul agricultural products to apply to DACS, with the approval of DOR, to by-pass the Florida inspection station. As in the past, DOR will continue to contact AgPass participants to have them submit their BOL data electronically. DOR will explain the registration, filing frequency, and data submission requirements.

This grant project will allow DOR to build and maintain an on-line registration process that will create user accounts and allow users to submit BOL data via the web site. Users will have several options available for submitting data. The unstructured data will convert into a standard format and be transmitted to DOR for storage.



Traffic Incident Management



Program Awareness

By Shawn Kinney, FDOT

In 2005, Congress authorized the second Strategic Highway Research Program (SHRP-2). The program's focus was to address a number of challenges facing the nation's highway system and incident responders. One of those challenges was that the cost of traffic congestion was mounting and reached far beyond the roadway. Traffic congestion contributed to the number of crashes and fatalities, to greenhouse gas emissions, to increased costs of moving goods, and to driver frustration and diminished quality of life.

In an effort to address the contributing factors of traffic congestion, the Federal Highway Administration (FHWA) worked with state and local officials to develop the National Traffic Incident Management (TIM) Incident Responder Training Program. Since the first course was offered, more than 4,109 incident responders from the state of Florida have completed the training. This is roughly seven percent of the nearly 57,367 incident responders identified by the United States Department of Labor and industry associations located in the state of Florida. The FHWA goal is to have at least 20 percent of Florida's incident responders trained by 2016. The Florida Department of Transportation (FDOT) has coordinated interdisciplinary training events and supported local agencies in delivery of this important training; however, there is still a lot of work left to do in reaching the 2016 goal.

First, in order to train incident responders, there must be trainers available to deliver the training. Some organizations have an active training cadre that are willing and able to maintain a robust training program. Some organizations may have the desire to offer training, but lack the staff to conduct training and maintain continuity of operations simultaneously. This is a paradoxical choice that puts an organization in the unenviable position of having to choose between providing a necessary service or allowing its employees to attend training that could save lives in the future.

The next challenge is very closely related to the first. There may be instances where training is scheduled, the location has been set, and there are trainers in the surrounding areas that could assist in delivering the training. However, if local trainers are not aware of the training event or are not invited, they remain an unutilized asset. The utilization of local trainers can reduce training costs and bolster participation by local responders.

There are many challenges when it comes to distributing information about training events that are designed for a specific discipline or group of disciplines. One of the biggest challenges is finding ways to make your message stand out from among every other important message they receive on a daily basis. This means finding innovative methods that allow the message to avoid being held up by any one person in an organization without circumventing established approval processes. So, how can the tide be turned?

First, FDOT Central Office will work to create a strategic plan for the delivery of TIM training to incident responders statewide. The framework of this plan will consist of three tiers that target specific personnel responsible for TIM:

- Tier 1 – TIM Responder Training Program
- Tier 2 – Advanced TIM for Mid-Level Managers
- Tier 3 – Executive Level Briefings for Decision Makers

Tier 1 training focuses on response, while Tiers 2 and 3 focus on TIM programs and the importance of obtaining high-level support for all TIM-related initiatives.

Once the plan is complete and the target audience for each tier has been established, the program information needs to be easily accessible. All FDOT web sites that promote TIM program components will be updated with the latest information and resources. Development of new applications to interact with current technologies will be researched and considered. Bringing the program up to date and making it compatible with current media outlets will be a daunting task, but, with the right adjustments, will provide big rewards for the long term.

Next, FDOT Central Office will provide support to the District TIM Program Managers through the following methods:

- Training Staff – In situations where there are no trainers available, FDOT TIM/Road Ranger Section will contract with trainers to conduct Train-the-Trainer courses. If trainers are available, coordination will be conducted to establish a partnership between District trainers and other agencies for current and future offerings. To assist in the coordination, a statewide list and corresponding map of trainer locations will be provided;
- Literature – Printed materials for training sessions can be produced at the Central Office Reprographics Office.
- Web Site Hosting – TIM/Road Ranger sites can advertise District training events;
- Statewide Training Calendar - Initiate the use of existing statewide training calendars hosted by agencies from other disciplines to offer future training sessions and track attendance.

Finally, FDOT Program Managers will follow up with trainers and incident responders after they attend the training. This will be accomplished by encouraging them to attend their local TIM Team meetings, providing program updates, in-person office visits, and the open exchange of best practices developed in response to real-life situations. Getting incident responders to attend the training is just the first part of the task. Keeping them engaged is the tougher challenge. Leadership expert Dr. John Maxwell is often quoted as saying that “Success is a journey, not a destination!” That statement rings true in the world of TIM. Building and sustaining solid professional relationships with other incident responders will be the key to a successful program that makes our roadways a safer place to work.



SHRP-2 TIM team training in FDOT District Four.

FDOT ITS Contacts

Central Office

Mark Wilson, P.E.

State Traffic Operations Engineer
(850) 410-5600

Elizabeth Birriel, P.E.

Deputy State Traffic Operations Engineer
(850) 410-5606

Russell Allen, P.E.

ITS Deployments
(850) 410-5626

Randy Pierce

ITS Telecommunications
(850) 410-5608

Derek Vollmer, P.E.

ITS Software and Architecture
(850) 410-5615

Paul Clark

Commercial Vehicle Operations and
Traffic Incident Management
(850) 410-5607

Alan El-Urfali, P.E.

Deputy State Traffic Operations Engineer
(850) 410-5413

Physical Address:

Rhyne Building
2740 Centerview Drive, Suite 3-B
Tallahassee, FL 32301

Mailing Address:

Burns Building
605 Suwannee Street, MS 90
Tallahassee, FL 32399

District Offices

District 1

Chris Birozak
FDOT District 1 Traffic Operations
PO Box 1249
Bartow, FL 33831
(863) 519-2490

District 2

Joshua Reichert, P.E.
FDOT District 2 Traffic Operations
2198 Edison Avenue
Jacksonville, FL 32204
(904) 360-5630

District 3

Lee Smith, P.E.
FDOT District 3 Traffic Operations
1074 Highway 90 East
Chipley, FL 32428-0607
(850) 638-0250

District 4

Dong Chen
FDOT District 4 Traffic Operations
2300 W. Commercial Blvd.
Ft. Lauderdale, FL 33309
(954) 777-4350

District 5

Jeremy Dilmore, P.E.
FDOT District 5 Traffic Operations
719 S. Woodland Blvd., MS 3-562
DeLand, FL 32720-6834
(386) 943-5310

District 6

Javier Rodriguez, P.E.
FDOT District 6
1000 NW 111th Avenue, MS 6203
Miami, FL 33172
(305) 470-5312

District 7

Chester Chandler, P.E.
FDOT District 7 Traffic Operations
11201 N. McKinley Dr.
Tampa, FL 33612
(813) 615-8600

Florida's Turnpike Enterprise

Eric Gordin, P.E.
Florida's Turnpike Enterprise
PO Box 9828
Ft. Lauderdale, FL 33310-9828
(954) 975-4855



Published by:
Florida Department of Transportation
ITS Program
605 Suwannee Street, MS 90
Tallahassee, Florida 32399

