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Florida Department of Transportation's Traffic Engineering and Operations Newsletter

Partnering with FHWA for Connected Vehicle

By Steve Novosad, Atkins

The Florida Department of Transportation (FDOT) has partnered with the Federal Highway Administration (FHWA) on the Integrated Vehicle-to-Infrastructure Prototype (IVP) project. The IVP project provides a full complement of infrastructure capability—supporting vehicle-to-infrastructure (V2I) communications-based connected vehicle applications and documenting the design and prototype to enable subsequent implementation activities by other parties. This project provides the basis for moving the V2I connected vehicle research

program towards implementation. The initial phase of this project is being conducted at the Turner Fairbanks Highway Research Center (TFHRC). FHWA is developing a prototype platform that will be provided to FDOT for installation in various locations within FDOT's new regional test bed once completed. The objective of the prototype is to identify, develop, implement, test, document, and deploy a roadside prototype platform that supports an integrated, interoperable deployment of multiple V2I safety, mobility, and environmental applications. IVP consists of the following:

- Signal phase and timing
- Mapping
- Other roadside equipment (detectors, signage)
- Positioning/Corrections
- Communications (dedicated short-range communication, cellular)
- Security (over the air)
- Road condition and weather data

The prototype platform provides the interface system supporting the collection, integration, and dissemination of data between the infrastructure and vehicles for a wide variety of applications.

FDOT's current role on the project is to monitor the development of the prototype at TFHRC. FDOT is planning a visit to TFHRC in July to review the prototype status. FDOT will observe the applications that are being implemented as part of the

Inside This Issue July 2014

Partnering with FHWA for Connected Vehicle1
RISC Rotator Truck Debuted in FDOT District Four2
Improving Communications During Emergencies4
FDOT District Six Begins Move to Full Color Dynamic Message Signs 5
Spreading Awareness About Systems Engineering6
ITS Florida: Intelligent Transportation Systems – Fifty Years Ago?
Editorial Corner: Improving Processes10
Announcements 11
FDOT ITS Contacts 11

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IVP and will analyze them to see how well the applications fit into FDOT's traffic operations. Once the prototype is complete, FHWA will send several prototype platforms to FDOT along with documentation. FDOT will utilize the provided documentation to deploy the platforms at previously identified locations in the new regional test bed. FDOT will document what worked well and lessons learned from these deployments. Any applications that FDOT can take direct advantage of will be implemented on an evaluation basis in traffic operations. This information will be provided to FHWA for refining the prototype documentation. As FDOT rolls out its deployment of roadside units, FDOT plans to take advantage of the IVP project experience.

For information, please contact Ms. Elizabeth Birriel at (850) 410-5606 or e-mail to Elizabeth.Birriel@dot.state.fl.us.

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RISC Rotator Truck Debuted in FDOT District Four

By Gaetano Francese, FDOT District Four

In 2008, consistent with Florida's Open Roads Policy, the Florida Department of Transportation (FDOT) District Four Intelligent Transportation Systems (ITS) Program adopted an innovative roadway clearance strategy by implementing the Rapid Incident Scene Clearance (RISC) Program. Since first being implemented by the Florida's Turnpike Enterprise in 2004, the RISC Program has been adopted statewide and is a major component of District Four's traffic incident management program.

The purpose of the RISC Program is to expedite the safe clearance of major incidents from highways using heavy duty, specialized equipment. This program was put in place in conjunction with Florida's *Open Roads*



First-of-its-kind vehicle named the RISC Rotator used in District Four.

Policy, which states that roadways will be cleared as soon as possible with the goal of all agencies to clear incidents within 90 minutes of the arrival of the first responding officer. Financial incentives are offered to qualified, participating towing and recovery companies to respond to and provide complete clearance of incidents such as large vehicle crashes, rollovers, and cargo spills within a specified period of time.

In order to participate in the program, towing and recovery companies must meet equipment and training standards developed to ensure the safe and efficient clearance of major incidents. Potential contractors are given a list of required equipment in order to participate and are required to demonstrate to FDOT that they are qualified to provide RISC services 24 hours a day, seven



RISC Rotator uview from the back.

days a week. Delayed arrival times of wrecker services or arrival with the wrong type of equipment often leads to increased traffic delays and greater risk of secondary collisions.

The success of District Four's RISC Program is due to cooperation and coordination among the agencies and towing companies. Having the proper equipment and qualified operators available maximizes clearance efforts, minimizes secondary crashes, and decreases the time the traveling public spends in congestion.

Recently, one of District Four's RISC contractors acquired a first-of-its-kind vehicle named the RISC Rotator. Designed by Miller Industries, the RISC Rotator is a 2015 Kenworth T800 with a Jerr-Dann 60-ton boom rotator equipped with a backup and under lift camera system. This rotator boasts and empowers a combination of heavy-duty lifting capabilities, superior stabilizing technology, commanding towing boom rotation, and unstoppable power. The most notable feature of this new body is that Jerr-Dan focused on providing storage for all of the tools and equipment required for one of the most demanding towing and recovery programs out there – FDOT's RISC Program.

For information, please contact Mr. Francese at (954)847-2797 or email to Gaetano.Francese@dot.state.fl.us. For more information on the District Four RISC program, visit http://www.smartsunguide.com/TIM.aspx#RISCProgram.

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Improving Communications During Emergencies

By Randy Pierce, FDOT Traffic Engineering and Operations

In the wake of Hurricane Katrina and, more recently, Hurricane Sandy, the Florida Department of Transportation (FDOT) has learned lessons about vital communications networks and how they perform during emergencies, which have had an effect on communications planning efforts at public safety agencies and related agencies such as state departments of transportation. In the past ten years, FDOT has improved and expanded its vital public safety voice radio network to ensure that all FDOT Districts have robust communications even during disasters or emergencies when nearby commercial telecommunications networks (cellular, internet, and telephone) have begun to fail. The two-way FDOT voice radio infrastructure is designed to public safety standards and is transported on a carrier class microwave system (intelligent transportation systems [ITS] network) that can remain operational for many days after vital services like electricity and fuel distribution have ceased to function in an affected area.

Another way that FDOT is improving its communications planning efforts is by introducing "interoperability" into the voice radio network. The word interoperability is popular in the current technology lexicon, but it means different things to different people and organizations. The general concept is to use technology to connect different communications networks together so that they can communicate across devices from one network to another. The most successful interoperability projects are those that simplify the interconnection methodology so the connection is easy to set up and tear down. It is also important for acceptance that the participants in each of the interoperable networks find the interoperability to be as seamless and effortless as possible.

FDOT is working toward an interoperable voice radio network in several ways, but one of the most promising and exciting ways is through the use of the Internet Protocol (IP) to connect the existing analog voice radio network to the smartphones of key FDOT and state personnel. This radioto-IP (RTIP) interconnection is accomplished at the District level. A specific strategic location is chosen in a District and an interface is established between the voice radio network and the 4G cellular telephone network. FDOT's radio network side of the interface is only voice radio traffic so there is no data or Internet connection to the statewide ITS network. As long as the strategic location is not close to the center of the affected area, the 4G cellular telephone network will be available to support this application. FDOT's voice radio network provides the connection via the microwave system into the affected area.



The interface to FDOT's voice radio network is accomplished with a device called a SiteCAST unit from Critical RF. The device receives and transmits analog voice radio transactions and converts them to IP traffic. The SiteCAST unit looks like just another radio to FDOT's analog voice radio network, which makes it very interoperable. On the other side of the SiteCAST unit, the IP traffic is passed back and forth to a computer managing the IP connection to the 4G cellular telephone network with the use of Critical RF server software. The computer has a stand-alone cellular 4G modem to connect to the cellular network and then the Internet. This last step is the key for users who may not have a radio or who may not be anywhere near the site of the emergency to access

FDOT's voice radio network. Through a simple smartphone, tablet application, or desktop computer, authorized users can monitor and even transmit into a District's voice radio network. Overall the cost impact for deploying this system is low because it involves only a small amount of equipment and utilizes FDOT's existing communications infrastructure.

Each smartphone user that is interoperable with FDOT's voice radio network will show up on the application screen. Generally these smartphoneconnected users will only be



Mock-up application screen.

monitoring the voice radio traffic coming from FDOT's field personnel working in the affected area. However, if needed, a smartphone-connected user can tap the "push-to-talk" button on the application to be connected to the voice radio network and have their voice heard by everyone using a radio in the District.

This communications tool is a powerful form of connectivity and interoperability. Having the ability to remotely monitor an emergency situation in real-time enables FDOT Districts and other stakeholders, such as FDOT's Central Office or the Florida State Emergency Operations Center, to respond with support in a more timely and coordinated manner. This increased situational awareness not only improves safety for field personnel, but helps ensure that needed resources are being applied to an emergency situation in a more efficient manner.

The prototype deployment of the RTIP system is in operation in District Two. The strategic location for the connection between the District Two voice radio network and the 4G cellular telephone network is Lake City. Should an emergency situation arise on either coast requiring the response of FDOT maintenance crews, key District Two personnel have the smartphone application already installed and are prepared to further assist their field crews by monitoring radio communications in the affected area. Several other Districts have already expressed an interest in the system. It is a low-cost tool and it is expected to help bring interoperability to FDOT Districts around the state.

For information, please contact Mr. Pierce at (850) 410-5608 or e-mail to Randy.Pierce@dot.state.fl.us.

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FDOT District Six Begins Move to Full Color Dynamic Message Signs

By Javier Rodriguez, FDOT District Six

The Florida Department of Transportation (FDOT) District Six is installing five new color dynamic messaging signs (DMS) as part of an effort to enhance its roadways and improve how the District communicates with drivers in southeast Florida.

The project, which is currently in the final testing stage, requires the removal of existing monochromatic, ambercolored DMSs along northbound and southbound Interstate 95 (I-95) at NW 27th Street and SW 8th Street, and along westbound I-195 west of Alton Road. Structural analysis was performed to make sure the new DMSs would fit and be secure on the existing structures.

All DMSs installed as part of this project will be integrated with, tested by, and operated from the District's SunGuide® Transportation Management Center (TMC). District Six will follow the guidelines set in the Federal Highway Administration's (FHWA) Manual on Uniform Traffic Control Devices (MUTCD) to ensure consistent messaging on color DMSs.

These color DMS units offer several advantages over the current monochromatic amber units. Color DMS screens are made up of smaller pixels that are lit by light-emitting diodes (LED) that shine brighter, are able to project colors, and



District Six installs color DMS board onto overhead structure.

replicate more complex messaging. This feature offers operators more flexibility in the type and length of message they can display by incorporating text with simple graphics, such as a roadway's logo or caution signs.

According to research presented in FDOT's *Color Dynamic Message Sign Support Concept of Operations*, the signs' multicolor capabilities have enhanced message comprehension for non-native English language speakers as well as elder drivers. This is especially beneficial for the District since in addition to being comprised of a multi-cultural population, it also supports seasonal residential traffic during the winter months and international tourists year-round. The added capabilities of these signs will help operators convey traffic conditions more clearly and thus improve traveler information efforts on the region's highways. Additionally, the color DMSs will better support messaging efforts for more complex systems, such as the upcoming expansion of 95 Express, which will introduce multi-segment, trip building principles to the community.



A color DMS is split into segments separating graphics from text. According to the MUTCD and the concept of operations, drivers prefer the text in amber next to a color logo.

The District will incorporate more of these color signs as new contracts and improvement projects begin. In many cases, these new signs will replace signs that are over a decade old and have reached their "end of life," meaning they will no longer be supported by their manufacturer or are cost prohibitive to maintain.

District Six expects to complete this first color DMS project in August 2014.

For information, please contact Mr. Rodriguez at (305) 470-5757 or e-mail to Javier.Rodriguez2@dot.state.fl.us.

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Spreading Awareness About Systems Engineering

By Derek Vollmer, FDOT Traffic Engineering and Operations

The Florida Department of Transportation's (FDOT) Intelligent Transportation Systems (ITS) Program provided a presentation on systems engineering at the 2014 Design Training Expo held on June 10-12. The goal of the presentation was to spread awareness of the federal rule that requires a systems engineering analysis be performed on ITS projects that receive Highway Trust Funds from the Federal Highway Administration (FHWA). In addition to that, the project manager's role as the responsible party for ensuring that systems engineering analysis is completed per the federal rule was also discussed.

Some of the key points from the Code of Federal Regulations Title 23 Part 940 (23 CFR 940) were discussed. This rule requires a systems analysis for ITS projects, but it is also important to know how an ITS project is defined. 23 CFR 940 defines an ITS project as "any project that in whole or in part funds the acquisition of technologies that provide or significantly contribute to the provision of one or more ITS user services as defined in the National ITS Architecture." This means that a small ITS deployment on a large project that received Highway Trust Funds would be classified as an ITS project per this definition. It is important for a project manager to identify a project as an ITS project and reach out to the FHWA Florida Division representative early in the project. The rule also defines seven minimum systems engineering analysis items. These include:

- Identification of portions of the regional ITS architecture being implemented;
- Identification of participating agencies roles and responsibilities;
- Requirements definitions;
- Analysis of alternative system configurations and technology options to meet requirements;
- Procurement options;
- Identification of applicable ITS standards and testing procedures; and
- Procedures and resources necessary for operations and management of the system.

Next, an overview of the systems engineering process was presented. There was a brief discussion of the regional ITS architecture with an emphasis on making sure the project is consistent with the architecture. The concept of operations document was emphasized as an important document to capture stakeholder needs, and should be written in a way for the technical stakeholders to develop requirements. System requirements, which are high-level requirements that capture all of the stakeholder needs, are then developed. Traceability between the different stages was emphasized in order to make sure that all stakeholder needs are met at the end of the project. The benefits of using the systems engineering process was discussed with an emphasis on meeting stakeholder needs while staying on schedule and within cost.

Next, there was a brief discussion of the Project Systems Engineering Management Plan (PSEMP) document. The PSEMP document describes how the technical development will be managed, details how the systems engineering process will be tailored and developed, and explains how the process activities are brought together. It identifies risk elements and risk mitigation strategies, documents resource allocation, identifies training needed, identifies known constraints, and contains all of the schedules to complete the effort. The PSEMP document is a top-level plan for managing the systems engineering effort and is used throughout the project.

We discussed the systems engineering and architecture procedure under development by FDOT's ITS Program. Projects can be classified as high- or low-risk projects, and a form is under development to assist in determining the project's risk. An ITS Checklist is also under development to identify all of the 23 CFR 940 requirements. We also mentioned the role of the project manager and discussed what the project manager will be responsible for on ITS projects receiving Highway Trust Funds.

This presentation was a good high-level overview of key topics related to ITS projects that receive Highway Trust Funds. Some of the next steps to reach a larger audience will be to update key documentation, like the Project Management Handbook, to include requirements for ITS projects. Overall, the presentation was a good experience and brought awareness of the federal requirements for a systems engineering analysis on ITS projects to a different audience.

For information, please contact Mr. Villmer at (850) 410-5615 or e-mail to Derek.Vollmer@dot.state.fl.us.





ITS Florida: Intelligent Transportation Systems - Fifty Years Ago?

By Pete Yauch on behalf od ITS Florida

Did you realize that intelligent transportation systems aren't as new an idea as you might think? There are numerous examples of technology applications on Florida roads that date up to fifty years ago. Some were experimental and remained in place only a few months or years; others were predecessors to more sophisticated systems that remain today. Here are some examples.

Traffic Signal Countdown Display – An experimental traffic control device was deployed at intersections in both Tallahassee and Clearwater in the late 1960s. Approaching an intersection, drivers would be advised of an impending yellow light by a single digit display within the traffic signal's yellow lens; at nine seconds before the start of yellow, the "9" would display and the signal would count down until the full yellow lens was illuminated.

In the Clearwater installation, the device remained for about six months, until an evaluation showed that there had been a significant increase in crashes at the intersection. Motorists were seeing the countdown signal come on and reacting in two different ways – speeding up to make the light, or slowing down to stop for the light. This confusion caused multiple rear-end collisions.

FLASH System – In the late 1960s, Interstate 4 was a new, lightly traveled corridor through Central Florida. The Disney mouse hadn't arrived yet, and Orlando was still a sleepy little town. If you were driving along the interstate through Polk or Osceola Counties and had a breakdown, summoning assistance was difficult. Cell phones didn't exist, and the citizen band radio craze of the 70s hadn't yet started.

The FLASH system, for "Flash Lights And Send Help," was implemented as a test to determine the operational feasibility of motorists flashing their headlights to aid distressed motorists. At several locations along Interstate 4 marked by signing, motorists were asked to flash their headlights three times if they had seen a disabled vehicle



during the past segment of highway. These flashes were sensed by an optical light sensor at the location; to avoid false calls, the system was designed to sense multiple groups of flashes before relaying the information to the Florida Highway Patrol station in Lakeland, who would then dispatch help.

The system was discontinued and removed at the end of the trial period.

Moving Merge Control System – Almost immediately after the completion of the downtown Tampa interchange (now Interstates 4 and 275), it was obvious that the Ashley Street on-ramp to the elevated eastbound Interstate 275 had merging problems due to sight obstructions and a short taper. In the mid-1970s, the University of Florida implemented an experimental project known as the moving merge system. This computer driven system employed loop detectors on the mainline interstate; a series of green fluorescent tubes, placed linearly along the last 400 feet of the on-ramp (above the guardrail); and a blank-out yield sign at the merge point. The system monitored the loop detectors and generated a "moving band" of the green fluorescent lamps along the ramp when a gap in the outside lane was detected; motorists were advised to drive alongside the green band in order to merge. If a main line lane change occurred, and a vehicle moved into the identified gap, the green band was extinguished and the blank-out yield sign was illuminated.

The initial implementation was modified in conjunction with a second project led by the Florida Technological University, now known as the University of Central Florida. The system was ultimately discontinued in the late 1970s; the ramp geometrics were updated with the interchange reconstruction in 2006.

Howard Frankland Bridge Surveillance and Control

System – The Howard Frankland Bridge, now known as Interstate 275 across Tampa Bay, was originally a four-lane divided roadway without shoulders. Completed in 1960, the lack of shoulders was almost an immediate problem; the high level portion of the bridge created a crest vertical curve that severely reduced sight distance. Motorists would top the hump and be surprised by a disabled vehicle blocking a lane.

In the mid-1960s, an electric overhead sign, reading "Stalled Vehicle," was placed in advance of the hump in each direction. The sign could be manually activated by the driver of the stalled vehicle by pressing one of the emergency buttons installed beyond the hump. Lane changing on the bridge was prohibited by a double solid white line and signing, but was generally ignored by motorists. Serious crashes continued, and in the late 1970's a more sophisticated system was designed and installed.

This new system was computer-based and operated from the Florida Highway Patrol's Pinellas Park station. Automatic incident detection was deployed on the bridge, using loop detectors installed at one-third mile intervals, and video monitoring cameras were located along the bridge. Overhead lane use control signs (red "X" and green " Ψ ") directed motorists out of closed lanes, and a pair of matrix dynamic message signs were installed in advance of and on the bridge to alert motorists to the problem.

The Gandy Bridge and Crosstown Expressway (now the Selmon Expressway) were established as a diversion route for the Howard Frankland Bridge. Traffic diverting signs consisting of drum or flap type signs routed motorists off the interstate at key locations, with guidance to follow a series of unique trail blazer signs along the diversion route. An automated dialer system at the Crosstown Expressway toll plaza gave a recorded message to stop collecting tolls, and a radio interconnected system called a special signal timing pattern along the Tampa side of Gandy Boulevard.

This system was maintained until the mid-1990s, when a parallel bridge was constructed and the original bridge reconfigured as one-way with shoulders.

It's hard to believe that these concepts in traffic control and management existed that long ago. The Howard Frankland Bridge system included many of the elements we use in transportation systems management and operations and active arterial management. We've gone through the use of motorist aid call boxes, now made obsolete by the general availability of cell phones. We hear requests for countdown timers on our yellow lights so motorists don't get "trapped" by red light cameras. And, some people still have problems merging onto the Interstate. But, it's also good to know what was tried in the past, if it worked, and why it worked; otherwise, we are destined to repeat our mistakes!

If you are interested in more information about ITS Florida or would like to submit an article on behalf of ITS Florida, please contact Sandra Beck at ITSFlorida@ITSFlorida.org.

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Editorial Corner: Improving Processes

By Paul Clark, FDOT Traffic Engineering and Operations

I have been back with the Florida Department of Transportation (FDOT) for five years and in that period have served as the chairman of the Commercial Motor Vehicle Review Board (Board) for 58 of the last 60 Board meetings. That's a lot of cases to review. As I am sitting here reviewing last year's statistics for the Board, I am amazed at how things have changed in the last several years.

To begin with you need to understand that Chapter 316, *Florida Statutes (FS)*, and Rule 14A, *Florida Administrative Code (FAC)*, provide for an appeal process for commercial carriers who have received citations. This process provides carriers with an opportunity to be heard before the Board. The Board does not adjudicate guilt, but rather serves to grant relief where appropriate.

The Board consists of three permanent members:

- FDOT Secretary,
- Director of the Department of Highway Safety and Motor Vehicles, and
- Commissioner of the Department of Agriculture.

The fiscal year 2014 members were:

- Chairman of the Board, Secretary Ananth Prasad (represented by myself),
- Executive Director, Terry Rhodes (represented by David Helton), and
- Commissioner Adam Putnam (represented by Jay Levenstein).

Rule 14A-1.004(4), *FAC*, allows for persons, firms, or corporations assessed with a penalty for violations of Section 316.516, 316.545, 316.550, or 316.3025, *FS*, that have complied with all applicable requirements of the rule to appear in person, through an authorized representative, or through legal counsel. Parties have an opportunity to present the Board with any written or oral evidence relating to the Board's consideration of these matters.

Members of the Board may direct questions to any witness at any time during the proceedings, and only testimony and evidence pertinent to the Board's action is allowed. In each case, after the conclusion of both presentations and all inquiries by the Board members, the Board renders a decision regarding the penalties imposed. Written confirmation of that decision is sent to the protesting parties within 30 days.

This past fiscal year, we have seen a sharp increase in the number of protested citations reviewed by the Board. In fiscal year 2013, the Board reviewed 813 citations versus 1,172 citations reviewed in fiscal year 2014. That's an increase of over 44 percent. While we did see an increase in the overall caseload, the relief percentage (approximately 38 percent) remained consistent.

Processing this many cases can be extremely difficult and we have been able to actually do so by modernizing many of our processes. When I first started with the Board everything was paper-based; the Board assistant at that time would take approximately 500 plus documents a month to the print shop to develop the Board agenda. Now everything is scanned and developed in to a master portable document format, resulting in a higher quality and easier to produce document.

While the Board has become more efficient over the years, we also need to look at how can we make things better for the protesting parties. The Board will have a special session, in the upcoming months, to discuss next year's agenda as well as improvements to our processes that should help the commercial carrier protesting the citations. Our goal with the Board is to continually look at ways to improve our processes and determine how we can make things better for all parties.

For information, please contact Mr. Clark at (850) 410-5607 or e-mail to Paul.Clark@dot.state.fl.us.

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Announcements

21st World Congress

The 21st World Congress on Intelligent Transport Systems is coming up very soon. Now is the time to make plans to attend.

This year, the World Congress is at the newly refurbished Cobo

Center in Detroit, Michigan—America's original Motor City—on September 7-11. The World Congress only comes to North America every third year so this will be the most important ITS gathering until 2017.

Information on registering and/or participating is available at http://itsworldcongress.org/.

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ITS 3C SUMMIT [2014] Mobile, AL

ITS 3C Summit

Registration is open for the the 2014 ITS 3C Summit, a joint annual meeting between the Gulf Region Intelligent Transportation Society, the Intelligent Transportation Society of Florida, and the Intelligent Transportation Society of Georgia. The meeting will be held September 14 - 17, 2014 at the Arthur R. Outlaw Convention Center in Mobile, Alabama. More information is available at http://www. its3csummit.com.

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Mission:

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INTELLIGENT TRANSPORT SYSTEMS

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Provide leadership and serve as a catalyst in becoming the national leader in mobility. Vision:

FDOT Traffic Engineering and Operations Mission and Vision Statements

Provide support and expertise in the application of Traffic Engineering principles and practices to improve safety and mobility.

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