SSUNGUDE DISSEMINATOR

Florida Department of Transportation's Traffic Engineering and Operations Newsletter

FTE Wrong-Way Driving Pilot Project Shows Promise

By John Easterling and Eric Gordin, Florida's Turnpike Enterprise

After months of planning, and modest signage and pavement marking improvements, the Florida's Turnpike Enterprise deployed its ramp-based wrong-way driving detection and deterrent system in mid-October 2014. The pilot project, encompassing six interchanges and ten ramps along the Homestead Extension of Florida's Turnpike in Miami-Dade County and five interchange ramps on the Sawgrass Expressway in Broward County, initially implemented enhanced signage and pavement markings at the ramp locations. As of October 16, 2014, Florida's Turnpike Enterprise commenced implementation and operation of the ramp-based detection and deterrent system.

This pilot project included the selection and deployment of light-emitting diode (LED)-highlighted flashing signage, multiple coordination meetings with Florida Highway Patrol (FHP) Troop K, their Lake Worth Regional Communications Center, and local law enforcement agencies to establish access to the web interface (provided by the manufacturer) for monitoring and alerts at each remote site location.

With the integration of the ramp technologies to the transportation



LED highlighted sign.

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Example photo from wrong-way detection on 1/2/2015

management center (TMC), Turnpike TMC operators and FHP dispatchers in Lake Worth have been monitoring the manufacturer's web site, which allows for immediate notification and visual verification of a wrong-way vehicle entry. The ramp technology utilizes front and rear radar as well as a high quality camera to capture images of the vehicle that activates the sign and generates an alert. When a vehicle enters the ramp in the wrong direction, the front radar first activates the sign and triggers the camera to begin taking images. As the vehicle passes the camera, the images are reviewed to determine motion in the wrong direction. Once the vehicle passes the camera and is detected by the rear radar, the images and time stamp of the event are transmitted wirelessly over a commercial cellular network to the web interface hosted by the manufacturer. The TMC and FHP regional communications center continually monitor the web site for an audible alarm, which is triggered when the web site is populated with event data. This occurs within approximately 60 seconds of the field event, allowing TMC operators to respond to the event, view the wrong-way driver on available closed-circuit television cameras, coordinate with the FHP dispatch, notify any Road Ranger service patrol located in close proximity, and activate dynamic message signs (DMS) in the area.

After approximately three months of operation, six vehicles have been detected entering the project sections in the wrong direction, all of which have resulted in a complete activation of TMC and FHP response plans, including DMS messaging in both directions for a 20 mile area advising motorists that a wrong-way driver has been reported and to use extreme caution. Evidence to date suggests that all vehicles have self-corrected, as no crashes have been reported.

As evaluation of the pilot program continues, Florida's Turnpike Enterprise realizes the importance in site selection to minimize the impact to motorists due to frequent sign flashing. As several sites are located at interchanges where on-ramp and off-ramp traffic movements are adjacent to each other, on-ramp traffic frequently activates the forward facing radar causing the signs to flash. These sites have already been selected for relocation to reduce this occurrence.

For information, please contact Mr. Gordin at (407) 264-3316 or e-mail to Eric.Gordin@dot.state.fl.us.



I-595 Reversible Toll Lanes Status Application

By Daniel Smith, FDOT District Four

Over the last several years, the Florida Department of Transportation (FDOT) District Four Intelligent Transportation Systems (ITS) Unit has focused on giving regional transportation management center (RTMC) operators the tools to enhance situational awareness on the status of the District Four transportation network. Every operator workstation is equipped with a mini-video wall. To further enhance situational awareness, speed data is projected onto vacant walls in the control room, and real-time performance measures and incident data are readily available on the video wall.

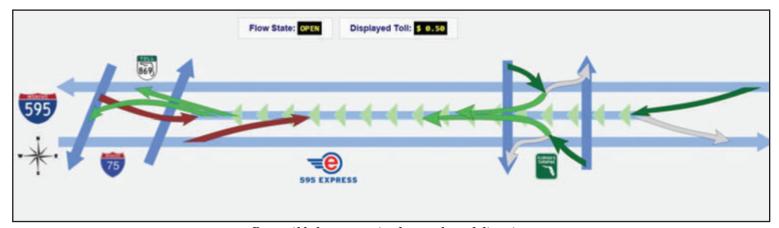
An enhancement this year added an I-595 reversible toll lanes status application to provide a real-time overview of the dynamic features of the I-595 reversible toll segment. This web-based application interfaces with the I-595 Express advanced traffic management system to obtain the flow state of



Speed data projected onto vacant walls in the TMC control room, and real-time performance measures and incident data are readily available on the video wall.

the reversible segment and the operational state of all the gates and barriers at the segment's entry points. The application also interfaces with the dynamic pricing system used to obtain the current toll amount for the segment.

FDOT District Four currently displays information from this application using high-definition projectors that flank the operations room at the District Four RTMC. The application's dashboard shown below presents a depiction of the I-595 reversible lanes along with major interchanges, entry and egress ramps, and other dynamic data that is updated in near real-time. Express lanes on I-595 reversible lanes are typically open on weekdays to eastbound traffic between 4 a.m. and 1 p.m. and for westbound drivers between 2 p.m. and 2 a.m. The express lanes are normally closed between 1 p.m. and 2 p.m. and between 2 a.m. and 4 a.m. for routine maintenance. On weekends, the express lanes are normally open in the eastbound direction only.



Reversible lanes open in the westbound direction.

This 'big picture' information is available at a glance to managers and operators to enhance system operations and provide our customers with a seamless experience on the District's roadways. The biggest beneficiaries of these improvements are the traveling public and RTMC operators. At a glance, operators are able to spot changes in traffic flow, possibly saving minutes and lives while making their camera checks.

For information, please contact Mr. Smith at (954) 847-2785 or e-mail to Daniel.Smith@dot.state.fl.us.



District Seven CEI ITS Training Summary

By Terry Hensley, FDOT District Seven, and Jonathan Tursky, Trans Core

Intelligent transportation systems (ITS) installations are highly complex and technical systems requiring specific skill sets.

The Florida Administrative Code indicates that roadway construction, engineering, and inspection (CEI) "work includes the administration and inspection of single or multiple construction contracts on rural, municipal, urban, and interstate facilities" and requires "at least one professional engineer, registered with the Florida State Board of Professional Engineers, having at least two years of responsible charge experience as a project engineer on a roadway construction inspection project."

The District Seven CEI Scope of Services states, "It shall be the responsibility of the CEI Consultant to administer, monitor, and inspect the Construction Contract such that the project is constructed in reasonable conformity with the plans, specifications, and special provisions for the Construction Contract. Observe the Contractor's work to determine the progress and quality of work. Identify discrepancies, report significant discrepancies to the Department, and direct the Contractor to correct such observed discrepancies."

Over the progress of several construction projects that included ITS installations, the Florida Department of Transportation (FDOT) District Seven ITS staff worked with the FDOT CEI staff to provide information and guidance to the field CEIs. During this time, it was determined that the majority of field CEIs had no training and little or no experience with ITS. So this begged the question, how can an engineer/inspector, without any ITS training or experience, effectively carry out the CEI requirements and duties?

The obvious response is that they cannot be expected to do so. Although a great amount of experience exists within these teams in regards to actual roadway construction, ITS is a fairly new addition to these projects and, therefore, deserved additional explanation and training.

The District Seven ITS and CEI staffs realized that there was a need to formally educate existing roadway inspection teams on the subject of ITS. District Seven ITS agreed to develop a program and provide training while CEI staff agreed to have all of their inspectors whose projects included any ITS component attend. Mr. Terry Hensley, District Seven ITS Operations Manager, coordinated this effort.

A training class, consisting of both classroom educational sessions and a field investigation of an ITS installation, was developed by District Seven ITS and their ITS maintenance contractor. The objective of this class includes:

- Educate the CEI within FDOT District Seven on the specifications and basics of ITS;
- Educate inspectors specifically on the FDOT District Seven ITS subsystems in order to help them to understand how an individual project will interact within ITS as a whole;
- Provide lessons learned from previous projects to avoid repeating the same mistakes in the future; and
- Provide material for reference on future projects.



An 8-hour class was created which summarized these goals and added some of the specific issues identified in District Seven. Each of the first three classes was conducted as described in the following.

The class included an introduction to ITS, a field investigation of a cabinet site with hands-on participation as well as a hands-on investigation of ITS devices and typical test equipment, and a classroom summary with questions and answers. The first three classes were held in the fall of 2014 with approximately 13 CEI inspectors in each class.

Each classroom participant was provided with a tabbed binder containing a syllabus, Request for Proposal (RFP) / Minimum Technical Requirements (MTR) example, ITS Standard Specifications, and ITS Design Standards along with relevant reference materials and a glossary of abbreviations and commonly used terminology.

Mr. Greg Reynolds, FDOT District Seven ITS Construction Project Manager, opened the class with an overview of the District's ITS and a brief discussion of the District's specific issues. The ITS maintenance contractor conducted the remainder of the morning classroom session. Subjects covered during session included:

- Document Order of Precedence (RFP packages, special provisions, plans standards, etc.,
- Approved Products List / Qualified Products List,
- FDOT Standard Specifications (as they relate to ITS),
- Design Standards (as they relate to ITS),
- FDOT District Seven Design and Construction Checklists, and
- MTR (project specific).

After a break for lunch, the class resumed outside at a mock cabinet site installed for the purposes of this class. The cabinet was purposefully installed incorrectly and inspectors took turns inspecting the site to identify as many issues as they could find. Items such as kinked fiber optic cable, loose conduit, and missing grounding items were some of the several issues created.

The cabinet exercise was followed by a hands-on introduction to each piece of ITS hardware installed in the District Seven system. Participants were given the opportunity to touch each device, ask questions, and see proper installation techniques. The same process was conducted with test equipment. A tutorial was given with an optical time domain reflectometer, three-point ground resistance tester, spectrum analyzer, and signal generator.

The class was finalized with a slide show of issues found during previous ITS project inspections and poor installation photos

compiled over the past ten years. This process encouraged a large amount of feedback and discussion of proper installation techniques and the advantages to particular procedures conducted during the installation process.

Evaluations were conducted at the conclusion of each class. A total of 39 individuals have attended the class to date with 98 percent positive feedback received from the attendees. One example of a comment received which appeared to indicate the successful execution of the original goals was, "Overall a very comprehensive, good look at ITS." At this time three future classes are planned for the spring of 2015 and, if necessary, additional classes will be added to train all local CEI staff.

"Word of mouth" feedback has been excellent. One unexpected response was that construction and engineering personnel, not involved specifically with CEI, are requesting to attend the class. District Seven's intention is to accommodate them.

For information, please contact Mr. Hensley at (813) 615-8600 or e-mail to Terry. Hensley@dot.state.fl.us.



Cabinet used for CEI training.



FTE Tower Infrastructure Upgrade and Replacement

By Randy Pierce, FDOT Traffic Engineering and Operations, and Danielle Morales, RCC Consultants

Florida's Turnpike Enterprise (FTE) intelligent transportation systems (ITS) telecommunications network includes a microwave network consisting of 19 microwave tower facilities. This microwave network carries mission critical statewide law enforcement radio system infrastructure, FTE maintenance radio traffic, and District regional transportation management center traffic along Florida's Turnpike mainline. The microwave tower infrastructure, which is critical to the telecommunications network, has been installed and maintained in full operation for over 30 years. The FTE, with the assistance of the Central Office, has developed a plan to replace, upgrade, or refurbish the 19 tower sites along Florida's Turnpike.

As the FTE microwave towers have been in continuous operation for decades, improved structural standards have evolved to ensure reliability and safety of the tower infrastructure. The FTE and Florida Department of Transportation Central Office are now engaged in a program that will upgrade and replace this critical infrastructure to sustain communications reliability. Five towers have been identified as needing replacement. The remaining towers require



Microwave tower in the FTE telecommunications network.

structural modifications, such as foundation and guy cable replacement, corrosion treatment and painting, and replacement of aviation obstruction lighting systems. Also, an upgrade of radio infrastructure items, such as antennas and transmission lines, is underway to support FTE's growing ITS data transmission capacity requirements.

In the first phases of this project, the FTE competitively procured design-build contracts to replace four of the five towers identified for replacement. The Wildwood and Canoe Creek towers have already been replaced with new self-supporting tower structures. The Orlando West self-supporting tower is under construction and the Clermont / Leesburg replacement tower is under contract to begin construction this year.

The remaining phases will determine whether the Jupiter and Pompano Beach towers must be replaced or upgraded; upgrade and refurbish the Yeehaw Junction tower; replace the Site X tower, and upgrade and refurbish all other remaining FTE towers.

This plan to replace, upgrade, or refurbish the microwave towers will preserve FTE's ITS microwave telecommunications system, significantly improve reliability, and lower operation and maintenance costs. Additionally, it will prepare the microwave system for future high-capacity build-out to support tolls data, FTE ITS, and statewide ITS telecommunications.

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



Connected Commercial Vehicles

By Steve Novosad, Atkins

With the National Highway Traffic Safety Administration's (NHTSA) issuing an advanced notice of proposed rulemaking in August 2014, indicating that it may require dedicated short-range communications in light vehicles, it is logical to assume that NHTSA will perform similar activities for commercial vehicles. For some time, the United States Department of Transportation has performed connected vehicle research with regard to commercial vehicles. Some of the light vehicle applications have been reported to operate in commercial vehicles. One of the challenges of a commercial vehicle is that there are potentially two or more pieces to the vehicle—the tractor and one or more trailers. Because of this variability, the ability to determine the vehicle's location is challenging. When the tractor does not have any trailers, the vehicle's position would be the center of the tractor. However, when one or more trailers are added, the center moves. The length of the total vehicle is needed so that connected vehicle applications can determine where the vehicle is as well as the total space the vehicle takes up.

There are several research initiatives for commercial connected vehicles. These initiatives are divided into application bundles. An application bundle contains several applications that utilize similar data to accomplish a task.



Freight-Specific Dynamic Travel Planning and Performance is an application bundle whose purpose is to include traveler information, dynamic routing, and performance monitoring data that can be used to provide commercial vehicle operators with information they can use to make critical decisions. This data may include real-time freeway/expressway speeds and volumes, associated arterials speeds and volumes, incident information, work zone information, route restrictions, bridge heights, truck parking availability, other speed and volume data sources, weather data, and real-time speed data from fleet management systems. Some applications that are derived from this bundle are Freight-Specific Traveler Information, Smart Truck Parking, and Spot Weather Impact Warning. Freight-Specific Dynamic Travel Planning and Performance enhances traveler information systems to address specific freight needs such as wait times at ports, road closures, work zones, and route restrictions. Smart Truck Parking provides information such as hours of service constraints, location and supply of parking, travel conditions, and loading/unloading scheduling to allow commercial vehicle operators to make advanced route

planning decisions. Spot Weather Impact Warning is both a commercial vehicle and light vehicle application that warns drivers of local dangerous weather conditions by relaying transportation management center and other weather data to roadside units, which re-broadcasts the information to vehicles within their range.

Drayage Optimization is an application bundle whose purpose is to combine container load matching and freight information exchange systems to fully optimize drayage operations. The result of implementing this application bundle is to minimize wasted miles and reduce congestion by spreading out truck arrivals at intermodal terminals. This application bundle will require data from many independent sources including ports, rail carriers, metropolitan planning organizations, transportation management centers, customers, and the freight carriers. Utilizing this data will provide the opportunity to coordinate commercial vehicle carriers such that movements in congested areas can be improved, thus saving time and fuel, reducing greenhouse gas emissions, and improving the overall operator experience.

As connected vehicle technologies and applications emerge, the Florida Department of Transportation is studying how these technologies and applications can be utilized to improve the transportation system for all users.

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



FDOT District Six Replaces Signs in Miami-Dade County

By Javier Rodriguez, FDOT District Six

The Florida Department of Transportation (FDOT) District Six is beginning its yearly intelligent transportation systems (ITS) replacement plan that aims to replace older ITS resources with newer versions. This low bid design-build project will replace two dynamic message signs (DMS) that have reached the end of their life with new color DMS. In addition, District Six will also replace four microwave vehicle detector system units along Interstate 95. The project will be completed in June 2015.

These new DMSs, which are on FDOT's Approved Product List, will offer motorists clearer messages with wider viewing angles. Color DMS displays offer several advantages over the current and much older monochromatic units. They are made up of smaller pixels arranged in a dense configuration of light-emitting diodes. This pixel configuration results in a DMS that will be brighter, have higher resolution, and be able to project colors. This feature offers transportation management center operators more flexibility in both the length and type of message they can display. For instance, the new signs will allow an operator to incorporate text with simple graphics, such as a roadway logo or warning signs to enhance communications with drivers.

According to research presented in FDOT's Color Dynamic Message Sign Support Concept of Operations, DMSs with multi-color capabilities enhance message comprehension for non-native English language speakers as well as elderly drivers. This is especially beneficial for District Six 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



Monochromatic DMS in District Six.

these signs will help operators convey traffic conditions more clearly and thus improve traveler information efforts on the region's highways. Additionally, color DMSs will better support messaging efforts for more complex systems, such as the upcoming expansion of 95 Express, which will introduce multi-segment tolling principles to the community.

This effort is a yearly undertaking by District Six, which receives funding from FDOT's Central Office to make these improvements as certain types of equipment reach their end of life stage. Additionally, District Six will incorporate more of these color DMSs and other improved systems as new contracts and improvement projects begin. In many cases, new equipment will replace existing equipment that is over a decade old and has reached its end of life—meaning they will no longer be supported by their manufacturer or have become too cost-prohibitive to maintain. This program is an example of FDOT's commitment to improving roadway conditions and the way it communicates with drivers.

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



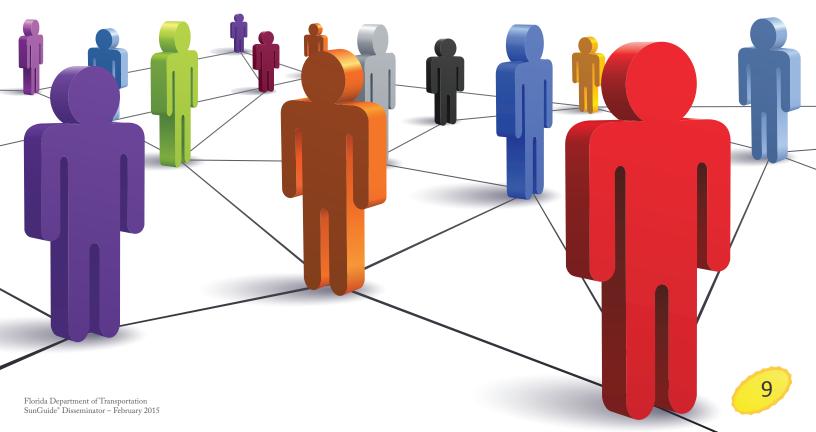
ITS Florida: President's Message

By Ken Jacobs, on behalf of ITS Florida

I want to start by thanking the membership of the Intelligent Transportation Society of Florida (ITS Florida) for providing me the opportunity to serve as the president for a second time in 2015. I have been involved with ITS Florida for the past ten years and it has benefited me on both a personal and professional level. The ability to meet, interact, and learn from many of the most knowledgeable intelligent transportation systems (ITS) professionals in the state has provided a truly unique and valuable experience that I would recommend to anyone in the industry.

ITS in Florida is in the midst of some major changes and ITS Florida needs to provide timely information and assistance to those affected by these changes. We will continue with our primary mission by advocating ITS deployments, offering training and guidance, and encouraging interest in ITS throughout the state. One of our newest efforts is to provide information to our Technical Subcommittee, which keeps track of new ITS technologies being developed to provide the most up-to-date information to our membership.

As the implementation of the Florida Department of Transportation's freeway management systems continue towards completion, there will be a shift from implementation to management and operations, and new projects will be implementing ITS on the arterial roadway systems. With these changes it is important to involve local agencies that have not previously been engaged in ITS activities. As an organization, ITS Florida possesses a vast amount of knowledge and talent that can assist



anyone who is entering the world of ITS, and I would encourage anyone involved in these types of projects to consider joining ITS Florida.

Undoubtedly, the strength and success of an organization like ITS Florida is derived from the effort and dedication of its members and volunteers. We are always looking for volunteers and appreciate all those who give us some of their time. ITS Florida has several committees, including:

- · Outreach,
- Events,
- Member Services,
- · Professional Capacity Building, and
- Technical Solutions Subcommittee.

Feel free to contact me or any other ITS Florida Board member to let us know where your interests lie and how you would like to participate.

In 2015, we are calling on member companies and agencies to involve their younger professionals in ITS Florida events. As I mentioned previously, my involvement in ITS Florida has been a valuable opportunity and we should constantly seek to provide our employees with this type of professional and personal growth. Your company will most certainly benefit from this effort. If you are a senior professional or manager that is involved in ITS Florida, make a concerted effort to develop and rejuvenate our membership by seeking to involve young and mid-tier employees in ITS Florida.



We continue to focus our efforts on providing valuable benefits to our membership with opportunities for professional growth. The Florida ITS web site was redone over the past year to provide a better online experience and an effort is being made to develop an interactive forum for members to ask questions and offer information to others. As you know, membership involvement is important for this technical forum to be successful.

In this off-Transpo year, we are looking to provide an enhanced technical and training program. In May 2015, we will host a joint event with the Florida Section Institute of Transportation Engineers (ITE) and International Municipal Signal Association (IMSA). This will bring representatives from all areas of the transportation business to one conference. This meeting will include IMSA training classes, technical sessions developed by ITS Florida and Florida Section ITE, coupled with a broad range of vendors and exhibits. This is a perfect opportunity to get to know folks from different areas of the transportation field and will definitely provide something for everyone.

I look forward to meeting with as many of you as possible during the upcoming year and if you have any ideas, thoughts, or comments on how we can better serve you, please feel free to contact me directly. If you are not currently a member of ITS Florida, please consider joining our organization. You can reach me at:

Ken Jacobs, President ITS Florida 22211 US 19 North, Building 1 Clearwater, Florida 33765 Office (727) 464-8922 Email kjacobs@pinellascounty.org

For more information on ITS Florida, please check the ITS Florida web site at www.itsflorida.org or contact Sandy Beck, Chapter Administrator, at itsflorida@itsflorida.org.

If you wish to contribute an article to the *SunGuide® Disseminator* on behalf of ITS Florida, please email Stephanie Hoback at Stephanie.Hoback@Wavetronix.com or Sandy Beck.



Editorial Corner: Using Data to Improve Florida's Roads

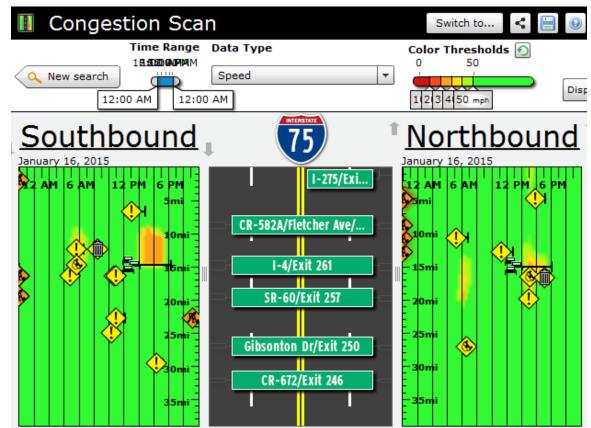
By Derek Vollmer, FDOT Traffic Engineering and Operations

The Florida Department of Transportation (FDOT) has over 12,000 miles of roadways instrumented with transportation sensors. FDOT uses data collected from these sensors to help fulfill the mission of traffic operations. FDOT also sends this data to the University of Maryland's Regional Integrated Transportation Information System (RITIS) for storage and analysis. This data can be used for:

- Performance measures and travel time reliability reports to show how well the transportation system is operating and how much it has improved,
- Inputs for testing scenarios used by the SunGuide® software testing team, and
- Analysis and realistic simulations used by university teams to solve new transportation problems.

FDOT also receives data from Nokia HERE. This data includes roadway segments that FDOT has not instrumented with transportation sensors. The data provides speed information for thousands of segments throughout the state. SunGuide software can use this speed data to alert operators of potential congestion locations. The HERE data is also provided to RITIS.

RITIS has a set of tools to help analyze data. A congestion scan can be produced to visually indicate where the congestion was and how long it lasted by using different colors with configurable speed thresholds. A bottleneck tool shows where bottlenecks formed on a map with a spiral graph on the right to indicate the



Picture of a congestion scan, which visually indicates the location and duration of congestion.

durations and severity. There is a trend map to show the travel time index for selected routes. A user can also download the raw data to perform their own analysis.

Now that the HERE data is available in RITIS, it will be interesting to see how the data and tools are used to help improve traffic on Florida's roadways.

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





FDOT Traffic Engineering and Operations Mission and Vision Statements

Mission:

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

Vision:

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

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