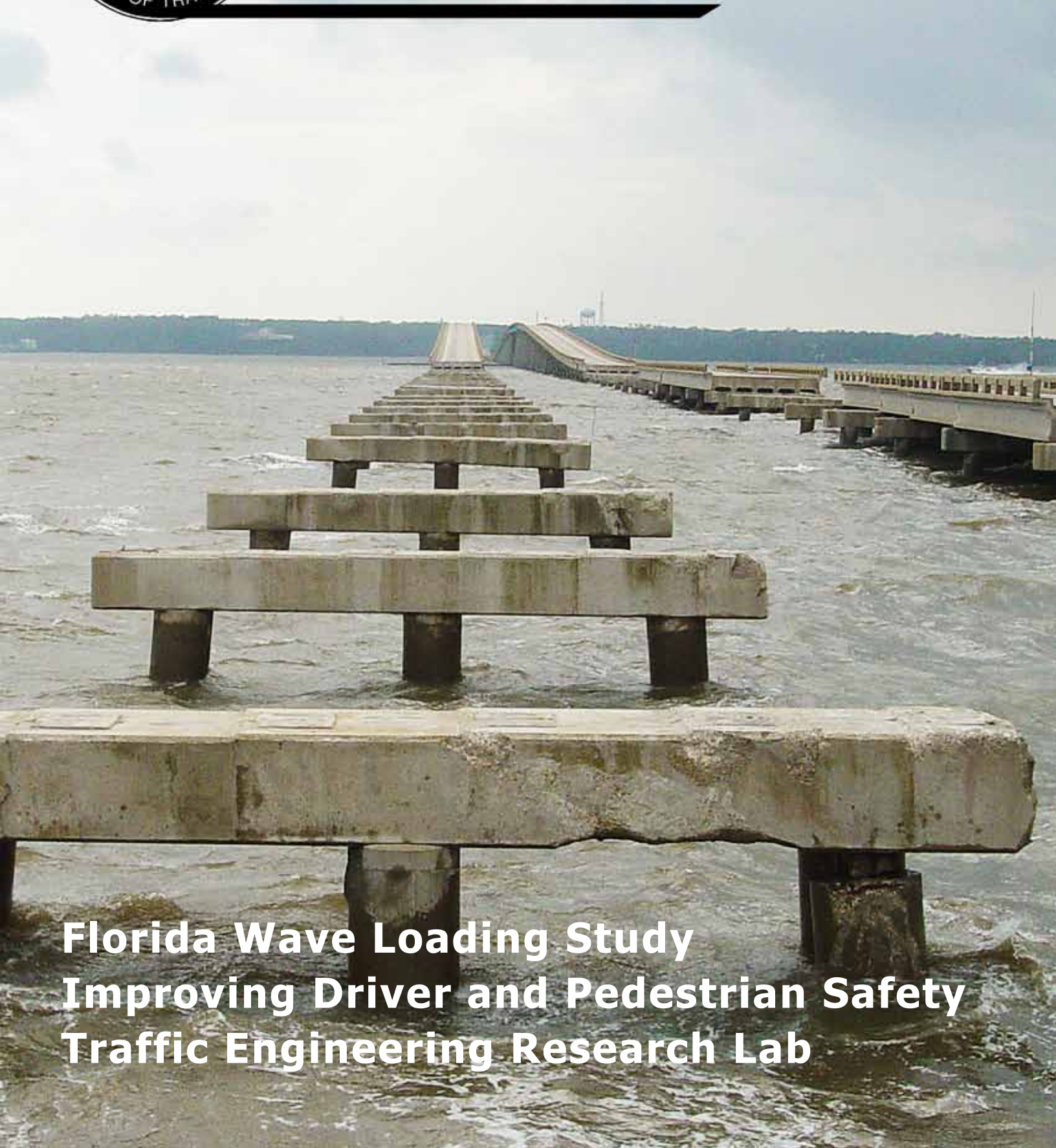




Fall/Winter 2010

# RESEARCH Showcase



**Florida Wave Loading Study  
Improving Driver and Pedestrian Safety  
Traffic Engineering Research Lab**



## Fall/Winter 2010

The Florida Department of Transportation (FDOT) Research Showcase is published to provide information regarding the benefits of FDOT-funded research.

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Back Cover: A solar-powered lighted and audio pedestrian crosswalk signal at the TERL test intersection

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# FDOT Research Showcase

The term “research” entered the English language in the late 16<sup>th</sup> century via the Middle French “recherche,” coined some 50 years earlier. That a term for seeking and scrutinizing should have been coined during the Renaissance is not surprising, as that was the age in which the art of learning, drawing from the Greek and Roman cultures, was revived. Engineers found in the ancients a vast source of information and knowledge, which they have continued gleaning ever since, including the science of making concrete, one of the most visible symbols of modern civilization. Applied research in the field of transportation today continues to seek out and scrutinize, albeit in a different and much evolved context.

Over the last year, projects spanning a dozen different functional areas have provided advances in areas such as erosion and sediment control, use of marginal materials, pile technologies, travel time reliability, automated rail track inspection, and transit travel assistance. During the same period, projects were initiated in many of these areas, and in others, such as energy conservation, cost assessment of alternatively fueled transit buses in Florida, and intelligent transportation systems, including ramp signaling, variable speed limit practices, and dynamic message sign applications.

The information, processes, and products developed through transportation research improves decision making, increases transportation system safety and reliability, improves environmental stewardship, reduces costs, and increases efficiencies. However, for all the good information contained in this issue, it also contains a sad note. Family, friends, and colleagues of Marc Ansley lost a fine person, an excellent engineer, and a passionate seeker of knowledge with his unexpected passing earlier this year. Marc was an active partner to this program and shall be missed.

Darryll Dockstader, Manager

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# Florida Wave Loading Study Improves Bridge Safety

The 2004 Atlantic hurricane season was one of the most costly on record, resulting in an estimated \$50 billion of damage. Five named storms made landfall in Florida: Hurricanes Charley, Frances, Ivan, and Jeanne, and Tropical Storm Bonnie. The 2005 Atlantic hurricane season was the most active in recorded history with 27 named storms, three of which made landfall in Florida: Hurricanes Dennis, Katrina, and Wilma. Combined, these storms caused \$43 billion in damages.

The intervening years have seemed deceptively tame. Tropical Storm Bonnie was the only named storm to affect Florida this year, yet 2010 was one of the most active hurricane seasons on record. Alongside 1995 and 1887, 2010 ranks third for total number of named storms (19), and it is tied with 1969 for generating the second highest number of storms that developed into hurricanes (12). Meteorologists forecast 17 named storms for the 2011 Atlantic hurricane season. Clearly, hurricanes pose an ongoing threat to lives and property. Research can help engineers plan and design, or retrofit, the transportation infrastructure to better withstand the effects of future storms.

The Florida roadway most severely damaged in the recent past was the 2.5-mile-long I-10 twin bridges crossing Escambia Bay. On September 16, 2004, Hurricane Ivan made landfall as a Category 3 storm



with 130 mph winds. Storm surge rose 15 feet above sea level. Ivan's force knocked 58 spans off the east and westbound bridges, misaligned another 66 spans, and destroyed 24 pile foundations. Severe erosion resulted in the destruction of the approaches to both the east and westbound bridges at the east end.

The I-10 bridges had been built using a "simply supported" design, i.e., each bridge deck was supported by and anchored on each end to a pier. Except for the portions of bridges that spanned navigable channels,



Top right: Within 14 days, two-way traffic was restored on the westbound I-10 bridge across Escambia Bay; misaligned decks are visible on the eastbound span.

Above left: Washed out approach to the westbound span of the I-10 bridge.

Above right and far right: Missing, submerged, and misaligned decks of the west and eastbound spans, respectively, of the I-10 bridge.

American Association of State Highway and Transportation Officials (AASHTO) specifications had called for bridges across coastal bays and inlets to be built 12 feet above the mean high water mark to avoid long-term corrosion caused by salt spray; they did not address wave avoidance.

In the days following Ivan, FDOT hydraulic and structures engineers visited the bridge site to gather field data on the storm's impacts. They determined that severe wave action caused air to become trapped under the bridge decks, increasing the upward force to 900,000 pounds, while 13-foot waves, on top of the surge and at the height of the storm, repeatedly slammed against the bridge decks. These waves caused the anchors to break and pushed the decks off their foundations and into the water, as evidenced by scrape marks on the sides of the piers. The wave forces had not only moved the decks laterally, but had rotated them, suggesting that the waves struck the decks diagonally, consistent with the direction of the hurricane force winds.

In 2005, FDOT contracted the University of Florida (UF) to conduct physical wave tank tests on both slab and girder-type spans in different water depths, span positions, and wave heights for various periods of time using field data from the I-10 bridges. The laboratory wave forces included wave frequency and wave force components. The researchers, led by Dr. Max Shepard, developed a wave force model that could determine drag and inertia coefficients needed to estimate wave forces.

The researchers and FDOT engineers used the data to hindcast the failure of the I-10 bridges and develop models to predict wave height. The models demonstrated that the I-10 replacement bridges should stand above the 500-year wave crest, or 25 feet above the

mean high water line, which is more than twice the height of the original bridges. Construction of the two replacement bridges began in 2005 and was completed in two years, eight months, at a cost of \$243 million.

In 2006, AASHTO and the Federal Highway Administration authorized a task force on bridge loading forces. Its charge was to develop new guidelines, specifications, and retrofit options for bridges vulnerable to coastal storms. Using the Florida research as its foundation, the task force prepared its report, "The Development of Guide Specifications for Bridges Vulnerable to Coastal Storms and Handbook of Retrofit Options for Bridges Vulnerable to Coastal Storms." This report contains new specifications, for estimating coastal hydraulic wave

*2010 was one of the most active hurricane seasons on record.*

forces on bridges, that were not included in previous bridge design provisions. In 2008, AASHTO adopted the wave force model.

FDOT engineers have used the UF study in a project to screen and prioritize at-risk bridges in Florida according to criticality and vulnerability criteria. A bridge's criticality is a function of its importance to the surrounding community, the state, or the nation, such as serving as an emergency evacuation route. Its vulnerability is measured by its tendency to sustain damage during a storm. Prioritizing Florida's bridges enables FDOT to direct funding more strategically and effectively for bridge retrofits or replacement.

FDOT engineers have evaluated all coastal bridges in FDOT District 7, which stretches from Citrus County south through Pinellas and Hillsborough counties, to determine which are most vulnerable to storm forces. They now are evaluating the structural capacity of bridges identified as vulnerable to determine which are likely to fail under design loading from hurricanes.



FDOT engineers will then perform criticality evaluations to identify the effects of losing one or a combination of bridges in District 7 and the resulting impacts on the transportation network. They plan to screen and prioritize coastal bridges elsewhere in Florida during 2012. ●

# Human Factors Research to Improve Driver and Pedestrian Safety

Florida is the number one retirement destination in the United States. According to 2008 U.S. Census population estimate data, Florida leads the nation with 17.4 percent of its population age 65 years or older, compared to the national average of 12.8 percent. By 2030, the Census Bureau projects that 27.1 percent of Florida's population will be 65 and older, compared to 19.7 percent for the rest of the nation.

FDOT is continually seeking ways to improve the safety of Florida's highway system through the implementation of safety enhancements and comprehensive safety programs. To help increase driver and pedestrian safety for older citizens, FDOT has established the Safe Mobility for Life Program to improve safety, access, and mobility for Florida's growing elderly population. One of the program areas focuses on enhancing the safety of mature drivers and pedestrians through the implementation of roadway improvements that compensate for the effects of aging, such as reduced visual and decision-making abilities.

FDOT recently contracted the Florida State University (FSU) to conduct human factors studies to help determine how age affects the ability of drivers and pedestrians to accurately interpret road signs and traffic signals on Florida's roadways. The ability to quickly and accurately interpret signs and signals can help reduce driver and pedestrian error.

Dr. Neil Charness, Professor of Psychology at FSU and principal investigator of the study, investigated how sign characteristics under daytime, nighttime, and different weather conditions affect comprehension and decision-making processes of drivers and pedestrians in three age groups: younger (median age 24), middle-aged (median age 58), and older (median age 75). A unique aspect of the project was that it combined laboratory and field-based tasks to predict real world settings for younger, middle-aged, and older driver and pedestrian populations. Dr. Charness and his research team conducted studies both at the Traffic Engineering Research Lab (TERL) and in the field.

In one part of the study, the researchers used both pattern matching (showing a replica of the sign to the driver) and comprehension probes (giving a verbal description to the driver) to examine how quickly



A countdown pedestrian crosswalk signal at the TERL facility.

drivers could identify warning signs as a function of the type of sheeting (fluorescent yellow and standard yellow) and the age of the driver. Consistent with earlier literature findings, the results showed a small, though nonsignificant, advantage for fluorescent sheeting over standard sheeting. However, the research indicated that this effect might be partially affected by the intensity of the headlights, with fluorescent sheeting being more visible when lit with low beams and perhaps less visible when lit with high beams. Additional field testing would be required to examine the full impact of headlight beam intensity on both fluorescent and standard yellow sheeting before policy recommendations could be developed.

In another part of the study, researchers assessed the legibility of countdown pedestrian signals for younger and older pedestrians. The researchers also examined the decision-making processes of these age groups when entering short (50 feet), medium (75 feet), and long (115 feet) intersections with full or partial time displayed on the countdown pedestrian signal. Legibility accuracy was uniformly high across all age groups (94 percent) with older pedestrians comprehending signs at a significantly shorter distance (307 feet versus 375 feet) than younger pedestrians. However, since standard countdown pedestrian signals are



Examples of traffic warning signs drivers evaluated for visibility under day and night conditions during human factors tests.

highly legible to both younger and older pedestrians at distances greater than the length of most intersection crosswalks, the researchers determined that current FDOT guidelines are adequate for both groups.

The study results also showed that older pedestrians, despite being more conservative about initiating the crossing of an intersection than younger pedestrians, were more likely to cross without sufficient time to complete the crossing at medium and long length intersections. Consequently, the researchers recommended that FDOT adopt more conservative crossing times at intersections frequented by older pedestrians. The Manual on Uniform Traffic Control Devices (MUTCD), 2009 Edition, scheduled for adoption on January 1, 2011, reduces the recommended minimum crossing speed time from 4 feet per second to 3.5 feet per second; however, no policy changes will be made at this time.

Currently, FDOT and FSU's Psychology Department are conducting additional human factors studies involving elderly drivers and pedestrians at the TERL facility. The researchers will study the effects of word order on changeable message signs; the role of headlight beam settings on sign perception by elderly drivers; the efficacy of pedestal traffic signals; the comparative effectiveness of internally illuminated street signs and highly reflective sheeting; the comparative effectiveness of pedestrian confirmation and no confirmation; and the efficacy of character size for dynamic message signs.

Human factors studies provide FDOT with valuable information to assist in making policy decisions aimed at reducing driver and pedestrian error and improving transportation safety for Florida's residents and visitors. ●



Researchers measure vehicle speed to help determine sign comprehension distances in human factors studies.

# Our Research Partner: Traffic Engineering Research Lab (TERL)

Traffic control devices, such as traffic signals, traffic signal controllers, illuminated street signs, and pedestrian crosswalk signals, are common features of the modern roadway system. However, before any traffic control product can be used on Florida's roadways, it must undergo rigorous and extensive testing to ensure it meets uniformity, safety, reliability, and compatibility requirements. This testing is conducted at the Florida Department of Transportation's Traffic Engineering Research Lab (TERL).

Section 316.0745, Florida Statutes, requires FDOT to implement a safe and uniform traffic control system. To meet this requirement, TERL develops standards, specifications, testing procedures, testing tools, and testing capabilities to evaluate and approve transportation equipment for use in Florida.

The goal of the testing and evaluation performed at TERL is to ensure that equipment listed on the FDOT Approved Product List (APL) meets all required specifications, is of high quality, performs as intended, and is safe the first time and every time it is used. Due to the growth of Florida's transportation system and continuing technology innovations, FDOT's traffic control device testing and certification program now consists of over 1,000 approved products manufactured by more than 100 qualified vendors. TERL also provides FDOT with technical and applications engineering support, and supports the transportation industry through the development of standards, specifications, and performance criteria for traffic control and intelligent transportation systems (ITS) in Florida.

FDOT's Traffic Engineering and Operations Office began operating a traffic equipment evaluation and testing shop in the 1970s at the Tallahassee FDOT maintenance yard, a 12-acre site on Springhill Road. In 1996, the shop was transformed into TERL, a research and testing facility staffed jointly by FDOT and Florida Agriculture and Mechanical University-Florida State University (FAMU-FSU) College of Engineering personnel. The facility has since expanded to provide researchers with the means to evaluate the ever-increasing complex traffic engineering technologies being used on Florida's streets and highways, such as new and more efficient traffic control devices, software systems, ITS network communications equipment, and video surveillance systems.

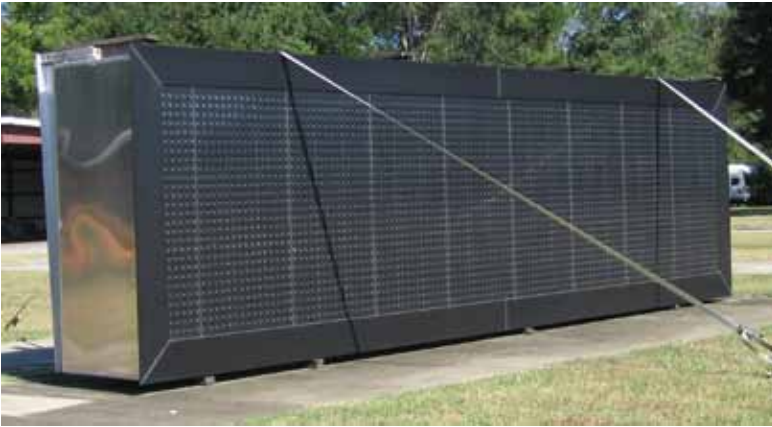
The TERL facility includes two main buildings that were recently renovated to better accommodate modern traffic engineering electrical and electronics testing technology. One building includes a research and development area and laboratory space that houses a mock-up traffic management center (TMC) and ITS test area. The TMC/ITS test area features a

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An increasingly common feature on Florida's roadways is the presence of electronic traffic control devices. TERL currently is testing the equipment shown at left. Clockwise from left center: closed circuit TV camera attached to a lowering device; side-fire microwave multiple-lane vehicle detector; side-fire microwave multiple-lane vehicle detector (mounted under mast arm, made by a different manufacturer); closed circuit TV camera and lowering device (made by a different manufacturer). Box on back of pole: toll tag reader cabinet. Other devices located on the mast arm not shown include vehicle detection cameras, a microwave single lane vehicle detector, and a toll tag reader.







Permanently mounted, dynamic message signs (DMS), like the one above, undergo testing at TERL. DMSs are placed strategically over Florida's turnpike and interstate highways to provide travelers with information about roadway conditions.

Right: Inside a DMS. The signs are large enough to allow workers to walk in and make repairs safely.



video display wall and wide area network video feeds from various areas of the state that allow researchers to test and analyze traffic monitoring devices.

TERL tests various video and microwave, non-intrusive detection technologies, and various closed-circuit television (CCTV) cameras and CCTV camera lowering devices using a test site located on the road in front of the facility's entrance. As a direct result of the non-intrusive detection research, TERL developed product minimum specifications for all known types of non-intrusive detection technologies. Rather than being located in the pavement like a typical inductive in-ground loop, non-intrusive vehicle detectors are

mounted overhead on a signal mast arm or pole. Overhead detectors, typically video or microwave, detect vehicles as they approach a traffic signal. They require fewer repairs than in-ground detectors, saving cities and counties time and money, and reducing the impact to the traveling public.

The second main building at the TERL facility houses the certification lab, where researchers test traffic controllers, cabinet assemblies, traffic signals, and pedestrian crosswalk devices. The facility also includes a light-testing tunnel used to test the intensity and color of light emitted by traffic signals, confirmation lights, in-roadway crosswalk lights, street name signs,



Above: The video wall enables TERL to simulate a Transportation Management Center.

Right: A video feed of I-95 in Miami.





Two trailer-mounted temporary dynamic message signs (DMS) undergoing testing at TERL.

work zone warning lights, and electronic message signs. In 1999, researchers developed specifications and procedures to test light-emitting diode (LED) traffic signals in-state, saving approximately \$700 per test. Energy-efficient LED traffic signals, which are more cost effective to operate and maintain, are now the state standard.

Researchers use outdoor areas of the TERL facility to test equipment such as trailer- and overhead-mounted electronic dynamic message signs (DMS). Testing these devices includes illumination, visibility, and durability analyses. Trailer-mounted dynamic message signs are placed on roadsides and provide motorists with information concerning construction, detours, and other temporary roadway conditions.



TERL's first test intersection is equipped with span-wire hanging traffic signals, traffic controllers, in-ground inductive-loop vehicle sensors, and closed circuit TV vehicle detection cameras.

Larger, permanently mounted overhead dynamic message signs are strategically installed on Florida's turnpike, interstate highways, and other facilities. They display timely information about travel times, congestion, lane closures, incidents, and weather conditions. Law enforcement and emergency managers also utilize the signs to advise motorists where they may experience traffic congestion and accidents. Messages on trailer-mounted signs are programmed on-site, whereas messages on overhead signs are programmed remotely at FDOT traffic management centers.

One of TERL's most notable accomplishments was the recent development of the Florida-specific National Transportation Communications for Intelligent Transportation Systems Protocol (NTCIP) requirements and testing program for dynamic message signs. This testing program has since been gaining national recognition as other public agencies accept manufacturers that have been tested and listed as certified on the FDOT APL.

Perhaps the most unique aspect of the TERL facility is that it has two test intersections that can be used to simulate on-system installations. The older of the two test intersections includes hanging traffic signals mounted to wire that spans the intersection between four concrete strain poles. Here, researchers test three- and five-section head traffic signals, signal hangers, and various other traffic control devices for durability and compliance with FDOT specifications. The intersection also allows researchers to study the performance of traffic control devices under high wind conditions. The intersection contains everything found in a typical span-wire intersection, including vehicle detection camera systems and hurricane-resistant static sign and traffic signal mounting hardware.

The newer test intersection, built to current state roadway design specifications, features mast arms that facilitate the installation and testing of numerous products, including traffic signals, video and radar vehicle detection devices, and illuminated signs that would be installed at a typical mast arm intersection. Mast arms improve intersection functionality and appearance. They have been used extensively in Florida over the last several years because their low wind profile makes them less susceptible to damage during hurricanes, which not only reduces repair work but provides safety benefits during evacuation and recovery efforts.



Researchers test a variety of traffic control devices at TERL’s new mast arm test intersection. Devices being tested include mast arm and pole-mounted traffic signals, traffic control cabinets, in-ground inductive-loop vehicle sensors, overhead vehicle sensors, closed circuit TV cameras, and pedestrian crosswalk signals. The intersection also features sidewalks, curbs, and bike lanes.

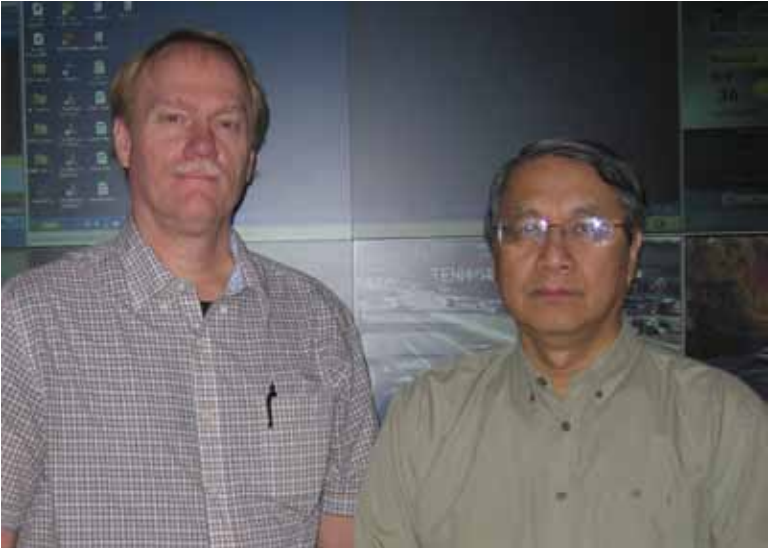
Insert: Underutilized space at the TERL facility prior to construction of the mast arm intersection.

TERL’s mast arm intersection features a variety of traffic signals, mounted both horizontally on the mast arms and vertically on the support poles; various pedestrian crosswalk signals, including those that provide audio indications of the walk/don’t walk state; each of the two types of traffic controller assemblies used in the U.S. (NEMA and 170); and sidewalks, curbs, and bike lanes.

The mast arm test intersection provides TERL with a more effective means to test and certify advanced transportation systems and equipment and to fulfill its mission to provide a safe, uniform, and reliable system of traffic control devices to the traveling public. ●

The intersection was designed to accommodate as many testing and research scenarios as possible. In addition to testing traffic control products, the test intersection enables researchers to conduct human factors research on driver and pedestrian safety issues, such as perception, visibility, and ease of navigation.

For the past 15 years, Jeff Morgan, FDOT-TERL Project Manager (left), and Dr. Leonard Tung, Principal Investigator, FAMU-FSU College of Engineering (right), have partnered on research projects to develop testing tools, evaluation procedures, and equipment standards. The goal of their research is to ensure that the traffic control devices and signals used on Florida’s roadways create the safest possible driving environment.



# Meet the Project Manager

Gina Bonyani, Planning Analyst  
FDOT Systems Planning Office

Gina Bonyani is dedicated to finding ways to enhance Florida's transportation system and the travel experience of Florida's citizens through the development of multimodal transportation planning tools.

Bonyani has managed many projects that have focused on the development of FDOT's Quality/Level of Service (Q/LOS) Handbook and its accompanying LOSPLAN software. The handbook and software are used by engineers, transportation planners, and decision makers throughout Florida to analyze roadway capacity. The handbook includes tools to quantify multimodal transportation LOS and combines the nation's leading automobile, bicycle, pedestrian, and bus evaluation techniques into a common analysis process, resulting in better multimodal decisions for projects in planning and engineering phases.

Bonyani has managed several updates of the Q/LOS manual, which has incorporated three component software programs that analyze service levels on arterials, freeways, and highways. Each component implements Highway Capacity Manual (HCM) analysis procedures for its respective facility type. The developed LOSPLAN software has 1,200 users nationwide.

Bonyani has also managed several projects on truck traffic. Her research evaluated the potential for reserved truck lanes and truckways in Florida to more efficiently and effectively move freight. Her research developed a methodology to identify problem areas on highways that are commonly used for freight transportation and that might be appropriate for special use or as exclusive facilities. The model provides researchers with a tool to further study the economies of providing exclusive highway facilities to improve the flow of freight traffic.

Another project explored the concept of developing a method to assess LOS for trucks separately from cars within the same traffic stream based on maneuverability measures. Although trucks have different size and performance characteristics than passenger cars, those characteristics are not accounted for in current transportation modeling software. Her research focused on establishing a truck LOS methodology that



can be incorporated into LOSPLAN software. However, additional data needs to be collected to improve the accuracy of the methodology before it can be incorporated into LOSPLAN.

Bonyani has managed projects on the influence of demographics on the capacity of signalized intersections and arterials. Her research found that driver behavior varies depending on whether drivers live in urban, transitioning, or rural areas. Driver behavior characteristics were incorporated into LOSPLAN to provide transportation planners with a more accurate estimate of available roadway capacity.

Currently, Bonyani is studying trip internalization in multi-use developments to determine internal trip-generation characteristics, such as time of travel, driver destination, and mode of travel. This research will enable transportation planners to obtain more accurate vehicle trip estimates when analyzing the impacts of multi-use developments on roadway capacity.

Bonyani serves on the National Cooperative Highway Research Program (NCHRP) panel, "Traffic Signal Analysis with Varying Demand and Capacities" (03-97). The panel is working to determine the effectiveness of traffic signal operations and timing plans to improve traffic flow, reduce queuing, and better respond to unique traffic conditions. The results of the study are expected to be considered for inclusion in the 2010 edition of the HCM.

She also recently served as a panel member for another NCHRP project (03-83), "Low Cost Improvements for Recurring Freeway Bottlenecks." The panel identified and quantified highway bottlenecks that delay trucks and increase costs, and developed recommendations for low-cost improvements to freeways to relieve congestion. The panel developed a technical guide that identifies recurring freeway bottlenecks and recommends low-cost mitigation measures.

"As Florida continues to grow," Bonyani says, "I want to help ensure that all citizens have access to a safe and efficient multimodal transportation system." ●

# Meet the Principal Investigator

Albert Gan, Deputy Director, Lehman Center for Transportation Research, Florida International University

Planning, designing, operating, and maintaining efficient and effective transportation systems require the analysis of massive amounts of data. FDOT uses transportation data to make informed decisions about how to maximize capacity, minimize congestion, and make roadways safer. Dr. Albert Gan, Deputy Director for the Florida International University's Lehman Center for Transportation Research, has been crafting solutions to data collection and analysis for over a decade. He has developed or assisted in the development of over a dozen desktop, web-based, and mobile software applications for FDOT in the areas of planning, public transit, and safety. His software systems have made transportation data easier to collect, access, and share.



To help meet the data and information needs of the Florida transportation modeling community, Gan and his team created the Florida Transportation Modeling Portal. Named FSUTMSOnline, the portal provides the transportation modeling community a central location for accessing and analyzing geographic data through the web. The website allows Florida's transportation modelers to exchange and share data, information, and ideas. The website allows for easy and frequent updates by designated administrators, and features modeling newsletters, training registration and management, web-based training, model documentation, research projects, and discussion forums. It also includes pages for transportation coordinators to post model and data files for easy data sharing. All of these capabilities have significantly enhanced the efficiency and effectiveness of transportation modeling in Florida.

Gan developed a computer based training program for users of the Florida Standard Urban Transportation Model Structure (FSUTMS). The FSUTMS model structure helps transportation planners to forecast travel demand and develop long-range plans. Gan's online training program provides an overview of the transportation planning process, travel demand forecasting methodologies, and FSUTMS models and data requirements. Participants learn how to execute FSUTMS, use the menu systems, interpret and create standard output results, and edit and create

networks through a series of hands-on computer exercises. The online course allows those who cannot attend district workshops to learn the modeling individually online, and provides a means for all attendees to review course material.

To help fulfill FDOT's mission of providing a safe transportation system, Gan developed a database and analysis system called the Crash Reduction Analysis System Hub (CRASH). The CRASH application automatically calculates the cost-benefit ratio of each type of roadway safety improvement to help FDOT

engineers make better decisions on selecting safety improvements projects.

Currently, Dr. Gan and his team are helping to meet the data needs of the new SafetyAnalyst software program. Developed by the Federal Highway Administration (FHWA), SafetyAnalyst provides state and local highway agencies with a comprehensive set of tools to improve their programming of site-specific highway safety improvements. A complementary, Florida-specific project is currently underway to identify Florida's crash analysis practices and needs and to avoid costly duplication of efforts in software development and maintenance.

Gan is also developing traffic management software for use with ramp signaling analysis. Ramp signaling, also called ramp metering, is a traffic management strategy that aims to improve the flow of traffic by controlling the rate at which vehicles enter freeways. Ramp signals currently are in use on I-95 in Miami-Dade County and are being considered at various other locations across the state. Although a year from completion, the software will allow district offices to access and analyze, in one web application, data from various databases to evaluate potential locations for ramp signaling. The software may also be used as a general tool to allow engineers to quickly retrieve data for specific project locations.

"Data preparation is usually a tedious process and often consumes more than half of the budget of a typical transportation study," says Gan. "Anytime you can make it easier for people to get their hands on the data you are likely to be of great help to them." ●

# In Memoriam

## Marc Ansley, P.E., Chief Structural Research Engineer

The Florida Department of Transportation recently lost one of its finest structural engineers and a valued colleague. Marcus H. Ansley, manager of FDOT's Structures Research Lab in Tallahassee, died suddenly on June 16, 2010, while vacationing with his family in North Carolina. He was 53 years old. A Tallahassee native and Georgia Tech graduate, Ansley spent over 20 years of his professional career with FDOT, the last nine as Chief Structural Research Engineer.

Ansley was instrumental in transforming the Structures Research Lab into a state-of-the-art testing facility. He expanded lab testing and work spaces to increase in-house testing capability; designed movable load frames to increase flexibility and efficiency; and strengthened the bridge testing program by adding two load testing trucks and cranes.

A registered professional engineer, Ansley represented Florida on the American Association of State Highway and Transportation Officials (AASHTO) Subcommittee on Bridges and Structures, and served on other AASHTO technical and Transportation Research Board committees. He also served on National Cooperative Highway Research Panels and authored or co-authored many research papers. Ansley was an active and valued contributor to the field of structural engineering research.

Ansley managed and participated in dozens of research projects on topics including base plates, sign structures, bearing pads, pile splices, box culverts, vehicle-column collisions, prestressed concrete beams, vessel impact, steel grid deck systems, and impact factors. He was also an astute programmer, initiating and developing computer design programs and design standards for a variety of structures.

Ansley was passionate about his profession and energetic in acquiring knowledge. He was also an excellent team leader, mentor, and teacher. Ansley fostered a spirit of cooperation and led by example,

encouraging his team to develop its expertise by practice and training, and to provide input on all matters.

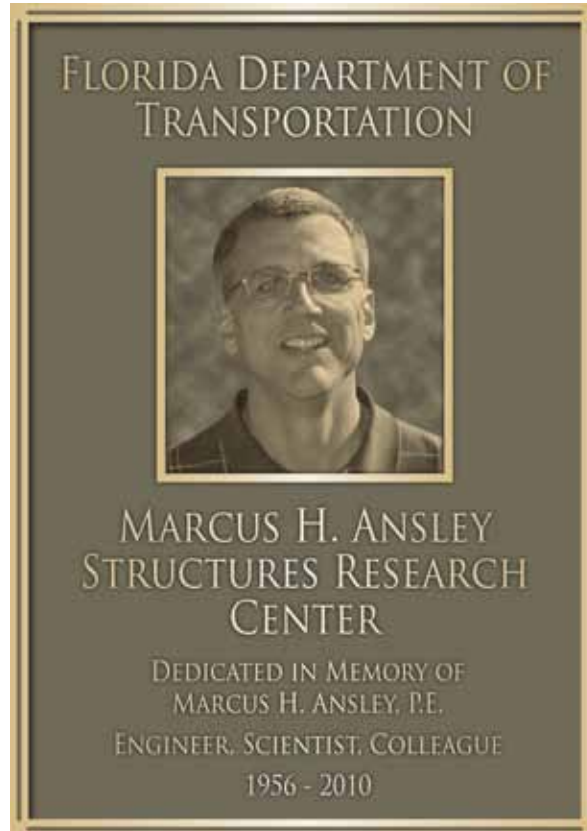
He served as adjunct professor at the Florida Agricultural and Mechanical University-Florida State University (FAMU-FSU) College of Engineering for courses including Timber Design, Prestressed Concrete, and Engineering Mechanics. Ansley's students lauded his enthusiasm, clarity, practical knowledge, and technical expertise.

"Marc embodied the true definition of an engineer," said Dr. Ronald A. Cook, professor at the University of Florida's Department of Civil and Coastal Engineering, and principal investigator for many of Ansley's research projects. "His goal was to solve practical problems by applying scientific knowledge. His end target was to figure out what the essence of the problem was, put the results into a usable form, and make recommendations."

When not conducting load, vibration stress, and impact tests on bridges, Ansley and his team could be found in the lab assembling structures and conducting structure failure tests for research projects. He was especially enthusiastic about his team's work on concrete failure theory. He reveled in having the occupational opportunity to break things. He often said he had "the best job in the world. Who wouldn't want to do this?"

One of Ansley's last projects was the design and construction of a 50-foot tall pendulum to be used for impact testing. In a ceremony on December 15, 2010, FDOT Secretary Stephanie Kopelousos dedicated the lab to Ansley, which is now the Marcus H. Ansley Structures Research Center. His family released the pendulum to shatter a bottle of champagne at its base to commemorate the event.

"Today, we are compelled to honor Marc and celebrate the research lab that he tended and grew," the Secretary said. ●



# Putting Research Into Practice

## Asphalt Research Improves Safety, Lowers Costs

Rutting is a potentially dangerous type of pavement distress that can occur in hot mix asphalt concrete (HMAC). Ruts allow water to collect on the pavement surface, causing unsafe driving conditions that can result in phenomena such as hydroplaning. Repairing pavement suffering from rutting typically requires HMAC removal and replacement.

The State Materials Office has approved a developmental specification, based on recent FDOT-sponsored research that reduced rutting on pavements in a

controlled test environment. This specification doubles the amount of polymer-modified binder allowable in HMAC and will be ideal for application at locations where heavy traffic volumes and loads cause rutting.

Field tests in FDOT Districts 2 and 7, in north and central Florida, are planned for 2011. If they prove successful, the specification could soon be used state-wide. Anticipated benefits include improved safety, increased service life, and lower long-term maintenance costs. ●

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## For More Information

### Florida Wave Loading Study

BD545-58, Wave Loading on Bridge Decks  
Max Sheppard, Ph.D., P.E., Principal Investigator  
Rick Renna, P.E., Project Manager

BD545-72, Development of Probabilistic Bridge Design Procedures for Wave Forces  
Max Sheppard, Ph.D., P.E., Principal Investigator  
Lex Collins, Project Manager

### Improving Driver and Pedestrian Safety

BD543-17, Intersection and Pedestrian Safety Research  
Neil Charness, Ph.D., Principal Investigator  
Gail Holley, Project Manager

BDK83 977-09, Aging Driver and Pedestrian Safety: Human Factors Studies  
Neil Charness, Ph.D., Principal Investigator  
Gail Holley, Project Manager

### Traffic Engineering Research Lab (TERL)

BC352-04, Advanced Traffic Engineering and ITS Technologies  
Leonard Tung, Ph.D., Principal Investigator  
Jeff Morgan, Project Manager

BC352-13, Equipment Standards and Testing Development Research  
Leonard Tung, Ph.D., Principal Investigator  
Jeff Morgan, Project Manager

BD543-06, Standards Research, Testing, and Training Development for the Transportation Engineering Research Laboratory  
Leonard Tung, Ph.D., Principal Investigator  
Jeff Morgan, Project Manager

BD543-18, Quality Assurance Monitoring and Sampling Method Development for ITS and Traffic Control Signal Devices  
Jim Simpson, Ph.D., Principal Investigator  
Jeff Morgan, Project Manager

BD543-16, Florida-Specific National Transportation Communications for Intelligent Transportation System (ITS) Protocol Management Information Base Development for Actuated Signal Controller, Closed-Circuit Television (CCTV), and Center-to-Center Communications with SunGuide Software and Intelligent Transportation System Device Test Procedure Development  
Leonard Tung, Ph.D., Principal Investigator  
Jeff Morgan, Project Manager

BDK83 977-08, Development of Automated Testing Tool for Traffic Control Signals and Devices  
Leonard Tung, Ph.D., Principal Investigator  
Jeff Morgan, Project Manager

### Asphalt Research Improves Safety, Lowers Costs

BD543-20, Effects of Aggregate Gradation, Aggregate Type, and SBS Polymer Modified Binder on Florida HMAS Fracture Energy Properties  
Virgil Ping, P.E., Principal Investigator  
Bruce Dietrich, Project Manager

CROSSWALK

