UNIVERSITY OF FLORIDA

FALL 2004

Civil & Coastal Engineering

GATOR Engineering®

Message from the Chair

I am pleased to present this Fall 2004 issue of the CCE Newsletter. As in the past, this edition offers recent CCE Department news, spotlights on our newest faculty members, and reports notable student chapter activities. The CCE Newsletter serves as a vital link to our alumni, industry affiliates and friends of the Department, as we continually strive to strengthen and broaden ties to our constituency, and promote the excellence and prestige of our program.

In the pursuit of excellence, we gallantly dedicate ourselves to providing our CCE students with the highest quality academic training and preparation to meet the challenges of a rapidly changing world. In this regard we are delighted and thrilled with the addition of two outstanding faculty members, Associate Professors Lily Elefteriadou and Dennis Hiltunen (please see the announcements inside). Both professors join the CCE faculty after outstanding careers at Pennsylvania State University. Dr. Elefteriadou, a nationally recognized expert in traffic operations and simulation, also has been appointed the new Director of the Transportation Research Center (TRC), replacing Professor Ken Courage who retired last year. Dr. Hiltunen is a highly renowned geotechnical engineer with expertise in soil and foundation dynamics. Their scholastic talents and productivity will tremendously enhance our academic and research programs in transportation and geotechnical engineering.

Our student body continues to experience robust growth. For the Fall 2004 semester, the undergraduate student enrollment is 600 and the graduate student enrollment is 185. This makes the CCE Department one of the largest civil engineering programs in the country. For the 2002-2003 academic year, the CCE department ranked 10th nationally in BS degrees conferred, 8th in MS degrees and 12th in Ph.D. degrees…..GO GATORS!!!!

Sponsored research is the engine that drives the nation's elite engineering programs. Today, engineering education is intrinsically coupled to research, not just for graduate students, but for undergraduate students as well, who participate in both laboratory and computational studies. To this end, our faculty continue to distinguish

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Faculty Activities – Fall 2004

Dr. Bjorn Birgisson was promoted to the rank of Associate Professor with tenure in August of 2004 in recognition of his valuable contribution to the students of the University of Florida, to the profession, and the people of the State of Florida. Dr. Birgisson's field of research is in Materials Engineering.

Dr. Gary Consolazio was promoted to the rank of Associate Professor with tenure in August of 2004 in recognition of his valuable contribution to the students of the University of Florida, to the profession, and the people of the State of Florida. Dr. Consolazio's field of research is in Structures Engineering. Dr. Consolazio also presented the paper, "A Comparison of Barge Impact Loads Predicted by Design Specifications, High Resolution Finite Element Analysis, and Design-Oriented Dynamic Analysis" by Gary R. Consolazio, Ph.D., and Jessica L. Hendrix at the ASCE Structures Congress in Nashville, Tennessee in May of this year. The paper was selected as "Best Presentation in the Transportation Category" at the Structures Congress. Dr. Consolazio has been asked to give an expanded version of the presentation at the ASCE National Conference in Baltimore this month.

Co-author Jessica L. Hendrix was Dr. Consolazio's former graduate student who finished her masters degree in 2003. She is now a Bridge Designer with the Figg Engineering Group in Tallahassee, FL.

Dr. Max Sheppard, Professor, was granted Emeritus status in rank of Professor with full support of the Civil & Coastal Engineering faculty upon his retirement in March.

Dr. Donald Slinn was promoted to the rank of Associate Professor with tenure in August of 2004 in recognition of his valuable contribution to the students of the University of Florida, to the profession, and the people of the State of Florida. Dr. Slinn's field of research is in Coastal Engineering.

Dr. Thomas Sputo, Adjunct Professor was selected by the Florida Section of ASCE to receive the 2004 ASCE Faculty Advisor Certificate of Commendation based on his outstanding work and dedication as faculty advisor at the University of Florida Chapter.

Dr. Edward Minchin, Assistant Professor, was named Vice Chairman of the ASCE Committee on Construction Quality and Inspection at the Annual Meeting of the American Society of Civil Engineers. Dr. Minchin will assume the Chairman's position in autumn of 2006. Dr. Minchin has been a member of this committee since 1996.

Dr. Louis Motz, Associate Professor and Director, Florida Water Resources Research Center, has been awarded a Fulbright Scholar grant by the U.S. Department of State and the J. William Fulbright Foreign Scholarship Board for the 2004-2005 academic year. Dr. Motz will lecture and conduct research in water resources and groundwater hydrology at the Middle East Technical University in Ankara, Turkey. Dr. Motz also recently presented a paper entitled "Representing the Saltwater-Freshwater Interface in Regional Groundwater Flow Models" at the 18th Salt Water Intrusion Meeting SWIM 2004 in Cartegena, Spain on May 31, 2004.

Dr. Ronald A. Cook, Professor was appointed to be the US member of the Scientific Committee for the International Association of Bridge and Structural Engineering (IABSE) conference on "Structures and Extreme Events,"to be held September 14-16, 2005 in Lisbon, Portugal. IABSE is headquartered in Zurich, Switzerland and represents over 100 countries.

Drs. Kurt Gurley, Gary Consolazio and **Ralph Ellis** recently received notice of patent award for their technology, Temporary Low Profile Concrete Barrier for Roadside Work Zones which issued on July 27, 2004. The roadside barrier is designed to prevent vehicles from entering work zones by redirecting vehicles back onto the roadway.

CCE Announces their 13th Annual Alumni Reunion and Barbeque.

The Barbeque will be held on Homecoming, Saturday, November 13, 2004 two hours prior to Kickoff. The event will again be located at the bottom of the hill near our Soils/Structures Lab ("The Pit") behind Weil Hall. Come visit us and reacquaint yourself with old friends and professors. Please RSVP to Carol (carol@ce.ufl.edu).

Lily Ageliki Elefteriadou named director of the Transportation Research Center (TRC)

Lily Ageliki Elefteriadou has been named director of the Transportation Research Center (www.ce.ufl.edu/trc/). Prior to her appointment at the University of Florida, Elefteriadou was the Interim Director of the Pennsylvania Transportation Institute, and an Associate Professor of Civil Engineering at Penn State University. Her research interests include traffic operations, signal control optimization, highway capacity analysis, and traffic simulation.

Dr. Elefteriadou received the Transportation Research Board's Fred Burggraff award for excellence in research in January 2001, and she received a Fulbright Scholarship to perform research at the Technical University of Delft, Netherlands, September- December 2001. She also received the 2003 PSES Outstanding Research Award from the College of Engineering at Penn State. She received her Ph.D. from Polytechnic University, Brooklyn, New York.

Lily Ageliki Elefteriadou

Dennis R. Hiltunen

Dennis R. Hiltunen Joins Geotechnical Group

The Department of Civil and Coastal Engineering is pleased to announce the appointment of Dr. Dennis R. Hiltunen as Associate Professor. Dr. Hiltunen earned his B.S.E., M.S.E., and Ph.D. degrees in civil engineering from the University of Michigan, and is a registered Professional Engineer (P.E.) in the Commonwealth of Pennsylvania. He began his academic career in 1988 at Penn State University.

Dr. Hiltunen's research interests include geotechnical engineering, soil and foundation dynamics, and engineering geophysics. He is the recipient of the Chi Epsilon Excellence in Teaching Award in the Metropolitan District for 1992-93, the Penn State Engineering Society (PSES) Outstanding Teaching Award for 1999, and he was inducted Chapter Honor Member of the University of Michigan Chapter of Chi Epsilon in 2004. Dr. Hiltunen served as the National President of Chi Epsilon from 2002 to 2004, and he is the current chair of the Research Committee for the U. S. Consortium for Geotechnical Education and Research (USUCGER).

Message from the Chair
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themselves in the competitive research arena. The CCE Department prides itself with a number of major research activities associated with significant scientific advances in mechanics and modeling, advanced sensing systems, and nano-technology and new materials. Research expenditures for the 2002-2003 academic totaled nearly $17 million, which is among the highest for civil engineering programs nationwide. In each addition of the CCE Newsletter, we will continue to highlight the activities of several of our key faculty researchers to keep you informed of their significant and innovative contributions.

Finally, I would like to recognize the achievements of our ASCE Student Chapter. This past July, the Chapter was awarded the 2004 Zone II Vice President's Award as the most outstanding student chapter. Also, Student Chapter member Jennifer Wiewiora was awarded first place in Zone II for the 2004 ASCE Daniel W. Mead Student Essay Contest. Lastly, and most deservingly, for his outstanding service, ASCE Faculty Advisor Dr. Tom Sputo received the 2004 Faculty Advisor Certificate of Commendation from the ASCE National Committee on Student Activities.

In closing, I would like to express my deepest gratitude to all our loyal alumni and friends for their generous financial support of the Department. In these times of diminishing support from the State, your continued support is essential to maintaining the high quality of our education and research programs to which you have grown accustomed. I know you share my sentiments in proudly proclaiming…It's great… to be …a Florida Gator.

Joseph W. Tedesco

Hurricane Charley: Evaluation of Residential Structural Performance

Damage to pre-1994 Manufactured Home, Port Charlotte, FL

Hurricane Charley was the most costly storm to impact Florida since Andrew. In addition to the loss of life, property loss was significant, with residential structures taking the brunt of the damage. Professor Kurt Gurley has been part of a multi-university effort to study the effects of hurricane winds on residential housing. He and his teams were there to measure winds during Charley's arrival, and to document the resultant damage to site built and manufactured housing. Detailed analyses and reports are forthcoming later in the fall semester. This article will provide one of the first looks at what they've found.

The researcher team includes participants from the University of Florida, Clemson University, Florida International University, and the Institute for Business and Home Safety (IBHS: see link below). The project, known as the Florida Coastal Monitoring Program (FCMP) was initiated in 1999 through funding from the Florida Department of Community Affairs (DCA). The DCA has provided funding to develop portable instrumented towers to place in the path of a land falling storm to collect wind velocity data. As of 2003 these towers provide the data in real-time to a public access website (see link below). In addition to the towers, 32 homes along the Florida coast have been specially outfitted to measure the wind uplift at multiple roof locations (see map). While the closest data collection houses were outside the region of significant winds, the 4 portable towers were able to capture hurricane force winds from Charley and relay the data directly to researchers at the National Oceanic and Atmospheric Administration's (NOAA's) Hurricane Research Division. The real-time data are used to help calibrate an experimental model that projects the hurricane winds over Florida as the storm progresses (see link below). The portable tower data sets collected since 1999 are currently being analyzed to develop quantities relevant to design loads, such as gust factors, based on this high-resolution ground-truth information that is 'straight from the horses mouth'. Additional support has been provided by NOAA, the National Institute for Standards and Technology (NIST), and Sea Grant.

The post storm damage documentation effort took place over three days (8/15 – 8/17/04) and covered both site built and manufactured housing in Port Charlotte, Punta Gorda, Arcadia, and Pine Island. The goal of this study was to provide statistically significant, detailed engineering based performance evaluations of old and new housing. Between 75 and 100 homes were examined. Construction details (sheathing type and nail spacing, roof cover, roof to wall connections, age, etc.) and damage were documented on a 6 page form developed by Tim Reinhold at IBHS. Extensive photo documentation was also employed. The projected outcome is to provide a side-by-side comparison of the relative vulnerability of homes built to the new and old code standards. The findings presented next are strictly anecdotal. The statistical studies of the collected data will completed this fall and will produce more quantitative results.

Preliminary Study Results

Manufactured housing (MH): There was a stark difference in performance for MH constructed before and after the 1994 HUD statute on acceptable MH construction practice (HUD CFR 24 section 3280). In addition to these

Damage to post-1994 Manufactured Home, Port Charlotte, FL

Old Site built home on Pine Island, FL

New site built home: garage and barrel tile failure. Punta Gorda, FL

federal regulations, the State of Florida has had strict MH installation rules in place since 1996 (Chapter 15 C-1: Rules Of Department of Highway Safety and Motor Vehicles - Bureau of Mobile Homes and Recreational Vehicles-revised in 1999). These rules include such details as how the MH must be anchored to the ground, acceptable materials, etc. These installation rules were developed such that, along with the federal HUD regulations on construction, a new MH installed in the State of Florida would perform as well as a site built home built the current ASCE 7 codes.

Manufactured housing communities in the regions selected for this study typically consisted of mostly MH built and installed before 1994, with a small handful of MH built after 1994. The post-1994 were for the most part still inhabitable, with the few exceptions partially related to debris damage from other older homes. The older MH (pre-1994) were for the most part a total loss, with entire roof and / or wall failures not uncommon. The most significant damage to post 1994 MH were the after-market attached structures that were not installed in a fashion up to par with the rest of the home (car-port, attached screened enclosures, etc.).

No significant sliding or overturning was observed for the post-1994 MH study subjects. It was not uncommon to observe an older MH reduced to a pile of aluminum next door to a post 1994 MH that was in need of only superficial repairs. Overall the MH study lends some credibility to the concept that the modern regulations on MH construction and installation have greatly reduced their vulnerability to wind damage. An important side note is that surge related flooding was minimal for Charley, but could be a significant risk for those post-1994 MH near low-laying coastal regions.

Missile meets palm tree in a MH park in Punta Gorda, FL

Site-Built Housing (SH): The relative performance of older and newer SH closely reflected that observed for MH. Older SH roof cover and sheathing were vulnerable, and lead to significant water damage. Un-braced (non-hurricane rated) garage doors had a high failure rate, and possibly lead to further sheathing loss due to internal pressurization. Many gable-end failures were observed for older SH, as has been observed in past events. Newly built SH communities performed very well, with the exception of barrel-tile type roof cover and attachments. While architectural shingles were relatively undamaged, the barrel-tile cover showed a range of performance from excellent to poor. Homes with tiles fastened with nails and / or adhesive were likely to experience mild to significant cover loss, while homes with tiles that were screwed to the sheathing experienced little cover loss. The resultant damage from the airborne tiles was not insignificant, with many new homes requiring major exterior repairs due to tile-debris damage. In fact, the team found one home whose steel hurricane shutter on a front window had been pierced by a clay tile from the across street neighbor. Many shattered car windows were the result of tile debris. Attached structures such as screened enclosures generally experienced at least mild and often severe damage. The good news is that significant structural damage (e.g. rafter collapse or significant sheathing loss) was not observed for new SH as it was for older SH.

The team gratefully acknowledges IBHS for their financial and logical support during Hurricane Charley.

Primary P.I.s

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Tim Reinhold
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Kurt Gurley
Clemson University
David Prevatt
Florida Institute of Technology
Jean-Paul Pinelli
Florida International University
Forrest Masters
Ward Edwards Inc. Engineering
Scott Robinett

Homepages

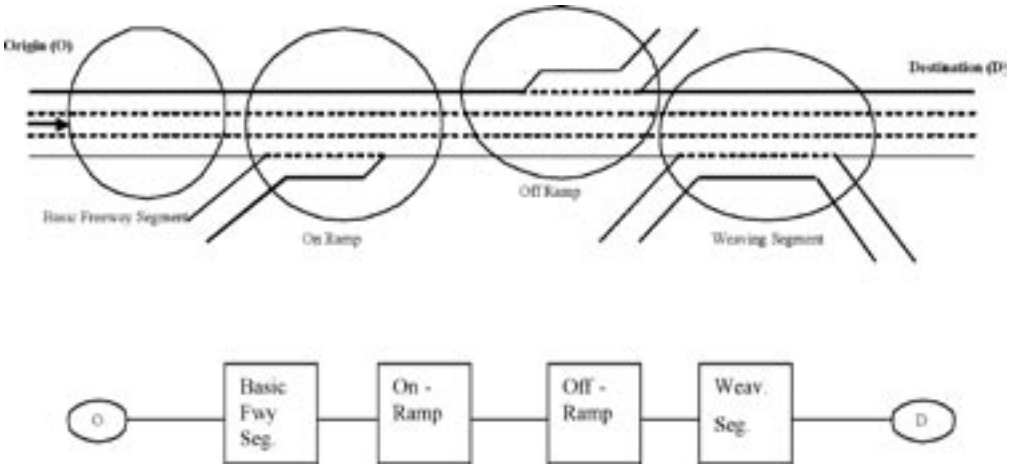
IBHS: www.ibhs.org
Florida Coastal Monitoring: www.ce.ufl.edu/~fcmp
NOAA Wind Field Model: www.aoml.noaa.gov/hrd/data_sub/wind.html

Estimating Travel Time Reliability for a Given Route

Traffic Management Center, Philadelphia, PA

University of Florida professor Lily Elefteriadou and Ph.D. student Jiyoun Yeon, in collaboration with researchers at Penn State University, are working on an NSF-funded project to develop models that provide travel time reliability estimates for a given route as a function of the probability of congestion occurrence at each segment of the route. The final outcome of this project will be models that estimate the probability that the travel time between O and D will be between X and Y minutes, as a function of the demands (assumed to be given) within the route. The researchers are using data obtained from the Philadelphia Traffic Management Center (TMC).

Traffic Management Centers (TMC) typically monitor freeway conditions through Closed-Circuit Televisions (CCTV) in "real-time" for incident detection and removal. (See Figure 1, TMC in Philadelphia, PA). They also obtain traffic flow and speed data via detectors (typically loop detectors) to assist in monitoring and improving freeway operations. When properly archived and processed, such traffic data can be used in planning improvements, developing and updating traffic management strategies, and providing traveler information. A private company, Mobility Technologies, in collaboration with the US DOT, has deployed a multitude of sensors in several urban areas, including Philadelphia, for collecting real-time traffic flows and speeds at a few hundred freeway locations using microwave sensors. The Philadelphia TMC monitors their respective freeway systems through CCTVs, and the Mobility Technologies systems. In addition to the real-time information, a wealth of archived data can be obtained for the locations monitored using the Mobility Technologies microwave sensors. As is typical of most TMCs, the current applications of these two systems are limited to incident detection and removal, and traveler information systems. The wealth of data available however makes this a unique opportunity to address congestion-related problems through the development of breakdown probability distributions and travel time reliability models. The models to be developed in this study will use data from the Philadelphia area, however the methods are transferable to any other highway network around the US and internationally.



Illustrative Example of a Freeway Route and Segment Types

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Hiltunen and Students "Looking Into the Ground"

By Dr. Dennis R. Hiltunen, Associate Professor of Civil and Coastal Engineering

Current site investigation practices for bridge foundations in karst terrane have been widely described as inadequate. In karst, rock conditions are often highly variable, and such conditions result in great uncertainty in foundation design and construction. Improved definition of subsurface conditions, including top of rock profile and quality of rock, is highly desirable.

Typical design practice for bridges is to conduct two to three geotechnical borings per substructure unit to select and design a foundation. Both shallow and deep foundations are employed, and the decision is based primarily on depth and quality of bedrock encountered in the borings. Shallow foundations are typically used where bedrock is shallow and of sufficient quality, while deep foundations are used for the remainder (and majority) of cases.

Due to uncertainty in subsurface conditions, experience with this process has led owners to also conduct exploratory drilling at selected sites as part of the construction contract. Based upon judgments gathered from the original design borings, these exploratory borings are conducted on a small grid pattern over the area of a selected substructure unit, and they employ either traditional geotechnical boring equipment or air rotary drilling techniques. The intent is to reveal a more detailed subsurface model for the location prior to foundation construction, and the information is often able to provide this more detailed model. Because of significant lateral variability in karst terrane, this detailed model can be significantly different from that revealed by two or three borings conducted for the original design. In this case, significant foundation design changes may be required after the construction contract has been awarded and begun, leading to significant overall cost increases. Also, because contractors are aware of large uncertainty, contingencies can also be incorporated within the original agreement. It would appear that a more detailed subsurface model would be beneficial at the design stage. In addition, it would be desirable that these improved models not require expense of exploratory geotechnical borings conducted on a small grid pattern.

Engineering geophysics is a promising solution to this problem. Engineering geophysics uses methods adapted from seismological and petroleum industries for characterization of

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Estimating Travel Time Reliability for a Given Route

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In the first phase of the project the researchers obtained field data, and developed probability of breakdown distributions for various freeway segment types. For purposes of traffic analysis and according to the Highway Capacity Manual (2000), a freeway system consists of four segment types: merge segments (on-ramp joining the freeway), diverge segments (off-ramp departing from the freeway), weaving segments (on-ramp followed by an off-ramp with the two connected by an auxiliary lane) and basic freeway segments (without lane-drops, on- or off-ramps). Figure 2 illustrates a freeway route including these segment types.

In the second phase of the project, the research team obtained travel time distributions for each segment as a function of the probability of breakdown at that segment. Travel time reliability models for the route are being developed as a function of the probability of breakdown at each segment along the route, considering the temporal and spatial interactions between segments. These interactions are being modeled using stochastic processes techniques. An important objective of the project is to enhance the educational experience for civil engineering students by developing case studies and class projects related to the research project.

This project will provide tools for improving the congestion management and highway performance monitoring functions of transportation agencies. It will result in better understanding the process of congestion occurrence on a route, and the findings will assist transportation practitioners in reducing the probability of breakdown (and congestion) and in improving traffic operations.

The methodology developed in this project can ultimately be used in the planning and design of work-zones, operations during special events (such as concerts, athletic events, etc.), and in developing emergency evacuation plans.

"Looking Into the Ground"
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shallow subsurface ground conditions, and enables "seeing" between boreholes (figure 1) or from instruments along the ground surface (figure 2). Coupled with tomographic algorithms, a two-dimensional slice or a three-dimensional volume of the subsurface under study can be produced. Methods are analogous to medical techniques such as an X-ray or MRI. The geophysical methods being explored in this research are nondestructive, in situ test procedures used to determine a material's seismic wave velocity profile. Seismic wave velocity is an important physical parameter that can be used as a tool to characterize stiffness changes with depth. A tomogram will present the variation of seismic wave velocity within the subsurface.

The vision of the research is to develop a characterization technique that will establish a credible subsurface model for a site for the design stage of a project. The model should be of sufficient detail such that significant and costly design changes during the construction contract are minimized, and contingencies for uncertain subsurface conditions are reduced. The methodology should be efficient with respect to both money and time, and capable of implementation in a wide variety of terrane and other surface and site conditions. The hypothesis is that images of seismic wave velocity produced from geophysical measurements at a site can be used in conjunction with traditional geotechnical borings to establish a credible model.

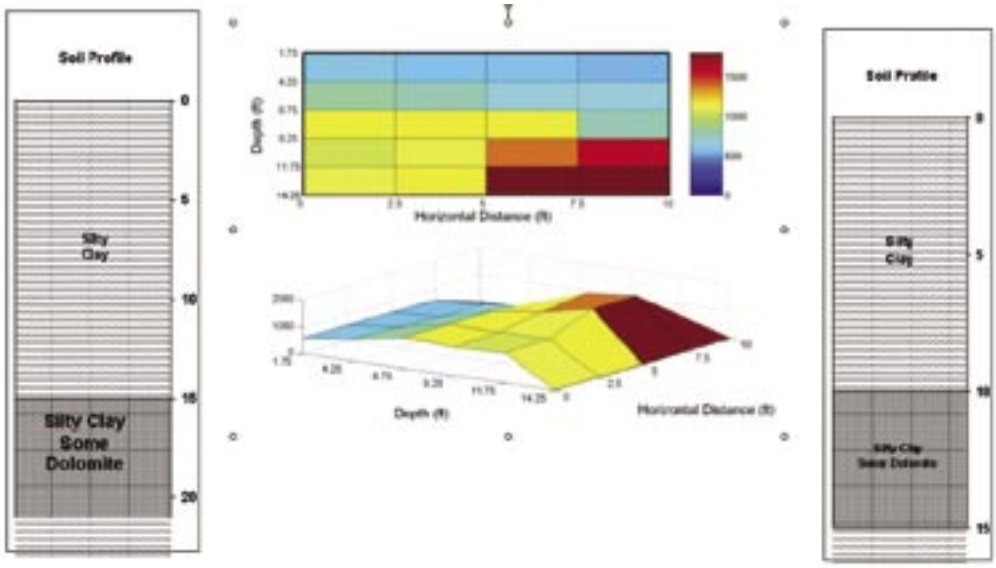

Figure 1. Shear Wave Velocity Tomogram (ft/s) and Boring Logs from Crosshole Seismic Test

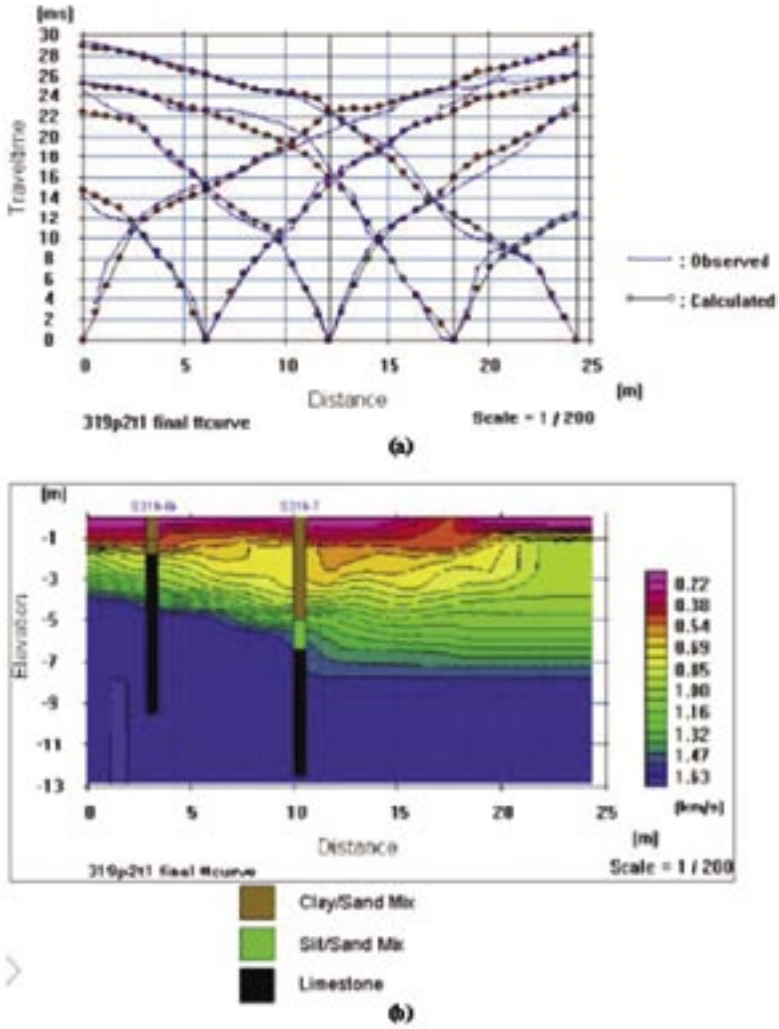

Figure 2. Seismic Refraction Test Results and Geotechnical Boring Logs: (a) Observed and Calculated Travel Time Curves, and (b) Interpreted Velocity Tomogram

UF-ASCE Student Chapter Receives National Recognition

The UF American Society of Civil Engineers (ASCE) Student Chapter and its members received much deserved recognition for their activities and accomplishments over the past year. With 250 members, UF-ASCE Student Chapter is one of the largest and most active student organizations at the University of Florida, and one of the largest ASCE student chapters in the nation.

In July the Chapter was awarded the 2004 Zone II Vice-Presidents Award by the ASCE Committee on Student Activities. This award is made annually to the most outstanding student chapter in each of the 4 ASCE regional zones. This distinction was earned by less than 2 percent of all ASCE Student Chapters nationwide. Additionally, for his outstanding efforts, ASCE Faculty Advisor Dr. Thomas Sputo was one of only nine faculty advisors selected nationally by the Committee on Student Activities to receive a 2004 Faculty Advisor Certificate of Commendation.

ASCE Student Chapter member Jennifer Wiewiora was awarded First Place in Zone II for the 2004 ASCE Daniel W. Mead Student Essay Contest, placing her paper as one of the top 4 papers in the national contest. In addition to receiving a cash award from ASCE, Jennifer's paper will be published in the ASCE Journal of Professional Issues.

This past March the chapter participated in the 2004 ASCE Southeast Region Student Conference, held in Tampa. Facing stiff but collegial competition from 24 other student chapters from around the southeast, the UF Chapter emerged as the well deserved 1st Place overall winner.

Chapter activities this summer included sending observers to the National Student Steel Bridge Competition at the Colorado School of Mines and the National Concrete Canoe Competition in Washington DC. Additionally, a dozen Steel Bridge Team members participated in the inaugural "UF Steel Bridge Summer Camp", where they learned welding and metal fabrication skills, along with analysis and design techniques for application to steel structures.

Thomas Sputo

The Chapter looks forward to the challenges of the 2004-2005 school year with the goal of improving their leadership, management and technical skills. If you would like to recruit a UF ASCE Student Member for employment or graduate study, or would like information on how you can assist the Chapter in its activities, please contact Dr. Sputo at sputo@ufl.edu.

2004 UF Steel Bridge Team at Southeast Regional Student Conference

CCE Alumni and Friends News

Dr. Alejandro Palacios was recently awarded the "Julio Garavito" presidential medal from the President of Columbia for his exceptional contributions to the field of Civil Engineering. This is the highest honor that con be bestowed upon a civilian in Columbia.

Dr. Palacios was a UF graduate student in Civil Engineering working under Dr. John Schmertman in Geotechnical Engineering during the 1960's. His work involved teaching at the University of Cali and providing consulting services on numerous projects throughout Columbia.

The Department of Civil and Coastal Engineering wishes to extend its congratulation for his outstanding achievements as exemplified by this award.

Inspiring Future Engineers

The Department of Civil and Coastal Engineering has been active in introducing engineering concepts to local high school, community college, and UF Undergraduate Engineering students. Mr. Claude Villiers, a Ph.D. Materials student under the supervision of Drs. Mang Tia and Reynaldo Roque has been instrumental in working with high school and undergraduate students. The department recently sponsored two high school students to be tutored, supervised, and mentored through the Precollegiate Education/Training and the National Science Foundation Alliance for Graduate Education and the Professoriate Summer Programs.

Coming with limited or no laboratory experience, these high school and undergraduate students learned how to sieve, batch aggregates, mix, and compact asphalt mixtures. They conducted laboratory tests such as bulk and maximum specific gravities. They were exposed to computer programs and learned how to input and analyze the data in order to draw valuable conclusions from the test results. They learned practical writing and presentation skills. In addition, they participated on a training session conducted by the Florida Department of Transportation and visited an asphalt plant in Jacksonville, Florida.

The CCE Department welcomes the opportunity to offer real life engineering experiences to aspiring engineers and looks forward to continuing its participation in these valuable programs.

(Below) 2004 UF Concrete Canoe – "The HemiGator"

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CCE Needs Your Support

In this time of receding support from the State Government, we need the help of our loyal alumni and friends. Any donations you can make to the Department will help to sustain the vitality and quality of our education programs. Thank you in advance.

Joseph Tedesco

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