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Contributions to the newsletter are always welcome. If you have news that would be of interest to other CEEs or your classmates, please send it to us so it can be included in a future edition.

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# LSU

## Civil & Environmental Engineering Department

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### Inside this Issue

- 2 *ASCE Student Chapter Elects New Officers*
- 3 *LSU Civil Engineering Students Receive the Louisiana Asphalt Technology Scholarships*
- 4 *Gary Kelly Passes Away*
- 4 *CE 4430 Students Visit Port Facility*
- 5 *Coastal Engineering Graduate Program*
- 6 *Observations on Failure of Levee System in New Orleans*
- 8 *Dr. John B. Metcalf Receives Medal*
- 8 *Civil Engineering Design*

## Message from the Chairman

**Dr. George Z. Voyiadjis,**  
Boyd Professor, Chairman and Bingham C. Stewart  
Distinguished Professor



The Department of Civil and Environmental Engineering at Louisiana State University is spearheading the development of a new graduate academic program that will offer both Masters and Doctoral degrees in Coastal Engineering. Subsidence in the region of the Mississippi delta as well as coastal erosion initiated the demand for such a program. The recent natural disasters in the Gulf Region have accelerated the commitment of the Department to develop this program. All these natural effects will have a profound impact on the infrastructure of coastal Louisiana.

The immediate areas of concern are sediment transport and coastal hydrodynamics, marine geotechnics and the design of marine structures. In addition to the current faculty in our department who are involved in Coastal Engineering, we will recruit two to three new faculty in coastal engineering this year.

In the last five years the Department developed several laboratories that will help support this program. The small-scale physical model of the Mississippi River Delta in the Vincent A. Forte River and Coastal Hydraulic Engineering Laboratory and a recirculating flume are available for studies of river hydraulics and sediment transport. Wave-structure interactions can be studied by using our slosh tank and the recirculating flume. The laboratory for Quantitative Imaging and Computational Simulation is also another vital component for this program.

# ASCE STUDENT CHAPTER ELECTS NEW OFFICERS

The ASCE student chapter held their last Fall semester meeting on December 1, 2005. As is customary at this time of year, elections were held for new officers to be in charge during the 2006 calendar year. As a result we the team in charge consists of:

President: Matt Blackwell	Vice President: Danielle Chabaud
Treasurer: Robert Nuss	Secretary: Lauren Johnson
Community Service: Stuart Adams	Fundraising: Paul Govan
Meeting Coordinator: Neil Marinello	

We would like to acknowledge the outstanding performance of the outgoing team, which consisted of:

President: Garrett Sutley	Vice President: Anna Wheeler
Treasurer: Eric Colwort	Secretary: Katie Spansel
Meeting Coordinator: Megan Allain	Fundraising: P.J. Kocke

During their tenure, the outgoing team left more than one milestone. They conducted a successful meeting schedule with an outstanding group of speakers, and they assisted in welcoming Katrina displaced students. Furthermore, they secured the first place for the Deep South regional competition and won the THIRD place on the national level; a first time for LSU. Finally, it should be mentioned that this team broke all records for fundraising and is leaving a healthy balance for their successors.

We thank them for all their efforts. We are sure that the new team is going to try hard to beat this record. Who knows, maybe win the FIRST place in the national competition.



Outgoing team (l-r): Eric Colwort, Katie Spansel, Anna Wheeler, Megan Allain, Garrett Sutley, P.J. Kocke

# ALUMNI

The Department of Civil and Environmental Engineering wants to know where life has taken you. Who are you working for and what is your title? Have you received any recognition for your work? Are you working on an especially challenging project?

Please complete the following information and attach any additional comments you may have. Space permitting, we would like to use photos of you, your family or your latest project.

Please e-mail your information with attached photos to trisha@eng.lsu.edu, fill out an online form at www.cce.lsu.edu/~ceenews, or mail your submission to: Civil and Environmental Engineering, LSU, 3418 CEBA Building, Baton Rouge, LA 70803-6405.

## CEE ALUMNI INFORMATION

Name: \_\_\_\_\_ Degree: \_\_\_\_\_ Year: \_\_\_\_\_

Home Address: \_\_\_\_\_

Home Telephone: \_\_\_\_\_ Email: \_\_\_\_\_

Position Title: \_\_\_\_\_

Firm: \_\_\_\_\_ Business telephone: \_\_\_\_\_

Business Address: \_\_\_\_\_

Your News: \_\_\_\_\_

## Alumni Corner

**Keith E. Norwood (BSCE 1986), P.E., Director of Planning & Purchasing for the Bossier Parish School Board, is building new schools in the fastest growing parish in Louisiana.**

**Henry H. Mahier (BSCE 1950) retired from Civil Engineering after many years of working in other countries, U.S. Federal Highway Administration, N.D. LEA Ltd. and URS International.**

**Loyd Bourgeois (BSEnE 2002) recently graduated from Tulane University School of Law with a Juris Doctor and a certificate in Environmental Law. He also passed the Louisiana Bar exam to become a licensed attorney. He is currently an associate with the law firm of Reich, Meeks & Treadaway.**

**Murray Hunt Cunningham (BSCE 1937) passed away on November 10, 2005. He retired from both Exxon and the Corps of Engineers.**

# CIVIL AND ENVIRONMENTAL ENGINEERING DEPARTMENTAL CAMPAIGN

The Department of Civil and Environmental Engineering is continuing a fundraising campaign to enrich and enhance programs in the department. Your donation will enhance the Departmental Enhancement Fund supporting new initiatives so that we may continue to produce top-quality engineers. Our goal is to build an endowment of \$400,000 and an annual \$50,000 supplement to support the purchase of new lab equipment, computers and software, support of students, and support of faculty activities at professional meetings and conferences. Any amount will be greatly appreciated; however, donors giving \$200 a year for five or more years or over \$1000 initially will receive special recognition in our departmental newsletter and on the Departmental Enhancement Fund plaque displayed in the department. Company matching funds will also be acknowledged. Please consider the CEE department this year in your annual giving.

**DONOR INFORMATION:**

(please check)

- \$10,000 or more       \$5,000 to \$9,999       \$1,000 to \$4,999
- \$500 or more       \$200 to \$499       Less than \$200

I pledge \$\_\_\_\_\_ per year for the next \_\_\_\_\_ years to the CEE Departmental Enhancement Fund for a total of \$\_\_\_\_\_.

Please make your checks payable to the "LSU Foundation" and note 'for CEE Enhancement Fund'.

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_

TELEPHONE: \_\_\_\_\_ BUSINESS \_\_\_\_\_ HOME \_\_\_\_\_

FAX NUMBER: \_\_\_\_\_ E-MAIL: \_\_\_\_\_

GRADUATION DATE: \_\_\_\_\_ DEGREE: \_\_\_\_\_

EMPLOYER: \_\_\_\_\_

**Please mail donations to:** Civil and Environmental Engineering  
Louisiana State University  
3418 CEBA Building  
Baton Rouge, LA 70803-6405

You will be contacted by our development coordinator to confirm your pledge and support.

**THANK YOU**



Incoming team (l-r): Danielle Chabaud, Robert Nuss, Stuart Adams, Matt Blackwell.  
(Not pictured: Lauren Johnson, Paul Govan, Neil Marinello)

## LSU Civil Engineering Students Receive the Louisiana Asphalt Technology Scholarships

Eight civil engineering students, Megan Allain, Anna Wheeler, Sarah Moss, Christopher Buckel, Jonathan Hotstream, Jonathan Perry, Ryan Hedlund and Kate Landrum were recently named the recipients of the 2005-2006 of the George H. Wilson Scholarship, Ashton and Brent Fenet Scholarship, Charles E. Milner Scholarship, and Claire & Bobby Yeargain scholarship. Barriere Construction Company of New Orleans, R. E. Heidt Construction Company of Lake Charles, and Coastal Bridge Company and Asphalt Products Unlimited of Baton Rouge funded these scholarships. These scholarships, each \$2000, are presented yearly to college sophomores, juniors or seniors who are already enrolled in a full time civil engineering curriculum. These scholarships were offered to LSU students through the coordination efforts of Dr. Louay Mohammad, Associate Professor of Civil and Environmental Engineering and Director of LTRC's Engineering Materials Characterization Research Facility, with the support of the Asphalt Industry.



## Gary Kelly Passes Away

Gary Kelly passed away on Feb. 8, 2006. He was born in New Orleans on Dec. 16, 1932 and grew up in the neighborhood of Gentilly. He graduated from LSU with a Bachelor of Arts degree in 1955 and from Ohio State University with a Master of Science degree in 1964. He retired from the U.S. Air Force, after a full career, as a Major in 1976. During his USAF career, he specialized in aerial photography, photogrammetry, and geodesy. He retired from the Department of Civil and Environmental Engineering at LSU, where he taught until 1999. He is responsible for the establishment of the Surveying Minor at LSU in our Department, and for ALL of the 4000-level Surveying courses that are now offered.

He was an ordained deacon and actively served as an ordained elder at Highland Presbyterian Church. He was past Lieutenant Governor of Kiwanis and an active member of the LSU Kiwanis Club. He was a faculty board member and a member since his early days at LSU of Phi Delta Theta fraternity. He is survived by his beloved spouse, Joan, and their daughters, the Rev. Dr. Kathleen "Katie" Kelly Hopper and husband Jimmy of Danville, Ill., and Colleen Kelly Russ and husband Jim of North Augusta, S.C. He is also survived by four grandchildren, two brothers, and a sister. Interment was in Roselawn Memorial Park. Gary was a kind and generous soul, and he wore a splendid beard in his sunset years. His warmth will be sorely missed.

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## CE 4430 Students Visit Port Facility

Mr. Clovis Morrison recently took his CE 4430 class on a tour of the facilities at Globalplex Intermodal Terminal in Reserve, LA. On this tour Mr. Morrison talked about design and engineering techniques involved in the construction of maritime infrastructure. Feedback from the students showed this trip was beneficial as it exposed them to real life examples of what was designed in class. An article, "Engineering students visit port facility," was published in The Picayune on Sunday, January 8, 2006. Below and following on the next page are pictures from the tour.



**Dr. Brian Wolshon** published the book *Convertible Lanes and Roadways*, National Cooperative Highway Research Program, Synthesis 340, by the Transportation Research Board. He also published two book chapters that include Chapter 13 - "Geometric Design of Streets and Highways" in the *Transportation Engineer's Handbook* and Chapter 5 - "Geometric Design," in the Institute of Transportation Engineers and Federal Highway Administration's *Toolbox on Intersection Safety and Design*.

**Dr. Steve Cai** received research funding for "Development and Performance Evaluation of Fiber Reinforced Polymer Bridge" FHWA-IBRC Program funded through LTRC, Louisiana DOTD, \$220,537, 11/15/2005-5/14/2008. This project will develop the first FRP bridge in Louisiana. Corresponding performance evaluation and monitoring procedure will be developed. Fiber optical sensors are proposed for the monitoring. Fiber optic sensors will hopefully last for many years on the bridge site.

**Dr. Frank T-C. Tsai** obtained the following grants: Louisiana Board of Regents, Research Competitiveness Subprogram/Development of a Generalized Parameterization Method under the Geostatistical Framework, 06/2005-05/2008, \$97,981; City of Chandler, Arizona/Development of Production Well Management Model, 07/16/05-11/15/06, \$46,750; Louisiana Water Resources Research Institute/A Pilot Study on Modeling and Management of Hurricane-Accelerated Saltwater Encroachment in Coastal Aquifers, 03/2006-02/2007, \$15,500; Faculty Research Grant Program, LSU/ Development of Saltwater Intrusion Management Model for Coastal Aquifer Protection, 07/01/05-06/30/06, \$10,000; LSU Summer Stipend/Modeling of Saltwater Encroachment in East Baton Rouge Parish, July 2005, \$5,000.

**Dr. Frank T-C. Tsai** and **Dr. Vijay Singh** obtained a grant for the U.S. Geological Survey & National Institute for Water Resources/Saltwater Intrusion Management with Conjunctive Use of Surface Water and Ground Water, 09/01/2005-08/31/2008, \$172,842.

**Dr. Frank T-C. Tsai** and **Dr. Kelly Rusch** obtained a grant for the Louisiana Sea Grant College Program/Development of a Fate and Transport Model for Pathogen Tracking in Coastal Subsurfaces Impacted by Anthropogenic Pollutant Sources, 02/01/2006-01/31/2008, \$150,659.

## Dr. John B. Metcalf Receives Medal

Dr. John B. Metcalf, Freeport-McMoRan Chaired Professor of Engineering, Department of Civil and Environmental Engineering, was awarded the James M. Todd Technological Accomplishment Medal by the Louisiana Engineering Society. He received the award in recognition of his central role in the development of an accelerated loading facility (ALF) for the testing of road pavements and for his work in the area of low volume roads and construction quality control. ALF's are used in Australia, China, with the Federal highway Administration in Washington, DC and at the Louisiana Transportation Research Center. The award was presented at a banquet held by the LES February 23 in Baton Rouge.

The Louisiana Engineering Society awards the James M. Todd Technological Accomplishment Medal as conditions warrant, but not more often than annually, for Distinguished Service by an Engineer for Technological Advancement or discoveries as contributions to the advancement of engineering. The purpose of honoring engineers with this award is to encourage and inspire other engineers to reach even greater heights of professional achievement.

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## Civil Engineering Design

Faculty have reviewed the teaching of design classes in the senior year of the Civil Engineering Curriculum and have made an important change. The intent of the change is to expose seniors to many of those aspects of practice that are related to the exposure of engineers to non-technical and often non-engineering issues which may have an impact on a design. In addition, the changes will seek to better cover such matters like the selection of consultants, the estimation of costs, the bidding process, contract law, and specifications.

The changes create a two-semester senior design sequence made up of one class, CE 4750, now **required** for all Civil Engineering project class electives plus the elective.

The new course, **CE 4750 Professional Issues and Concept Design in Civil Engineering** is a 1 hour lecture, 2 hour lab class for 2 credit hours, CE 2700 is the prerequisite with proficiency in English and senior standing. The course covers civil engineering design processes and systems, constructability and sustainability, use of consultants and contactors, project management, scheduling, economics and costing, ethical, health and safety, social, political and environmental considerations.

The intended course outcomes are:

- Ability to function on a multi-disciplinary team
- Ability to identify, formulate and solve engineering problems
- Ability to communicate design to client using oral and written presentations and engineering plans
- An understanding of professional practice issues such as: procurement of work; bidding versus quality based selection processes; ethical concerns; how design professionals and construction professional interact to construct a project; how to prepare a detailed scope of work; and how to schedule engineering design work; adherence to applicable building code requirements; and how to properly document design work.

## Coastal Engineering Graduate Program

The LSU Department of Civil and Environmental Engineering has begun the process to create a graduate program in Coastal Engineering. This program, which will offer both M.S. and Ph.D. degrees within the department, is being developed in response to the need for qualified coastal engineers within the consulting community and to conduct the research necessary to properly rebuild, protect and restore the Louisiana coast. Protection, restoration and rebuilding will require trained coastal engineers possessing coastal science knowledge dealing with the river and delta sediments, coastal infrastructures, and environments that constitute the bulk of the region. Thus, this program will rely upon collaboration and interaction with scientists within the School of the Coast and the Environment and the College of Basic Sciences here at LSU.

A letter of intent (LOI) for this new program has been approved by the department faculty and forwarded to the Dean of the College of Engineering's office. From there, the LOI will be reviewed by the LSU Graduate Council, the upper administration, and then sent to the LA Board of Regents (LABoR). Once approved by the LABoR, the department can then begin the official application process. The entire process is expected to take approximately two years.

In an effort to strengthen the department's coastal expertise, we are currently interviewing prospective candidates with backgrounds in coastal engineering for two or three new faculty positions. In particular, we are looking for candidates with expertise in coastal hydrodynamics, sediment transport, or coastal structures. The new faculty will make up the core of the new program and, in addition to teaching the core coastal engineering classes, will interact with current faculty members working on coastal-related research projects investigating wave-structure interactions, river and sediment diversions, coastal protection measures, and wetland construction and design.

We would be happy to hear from you with any questions, feedback or comments about this exciting new program.



# Observations on Failure of Levee System in New Orleans

## Background

Katrina, a category 4/5 hurricane, hit three States (Louisiana, Mississippi, and Alabama) on August 29, 2005. Massive damage in the coastal areas of all the three States has been reported in the media. The impact of the hurricane itself was not so catastrophic on the city of New Orleans, but the flooding caused by the breaches in the levee system was so overwhelming that it rendered the city inhabitable and the entire city had to be evacuated. Fig. 1(a) shows the location of major breaches and Fig 1 (b) shows water overflowing over a part of levee.

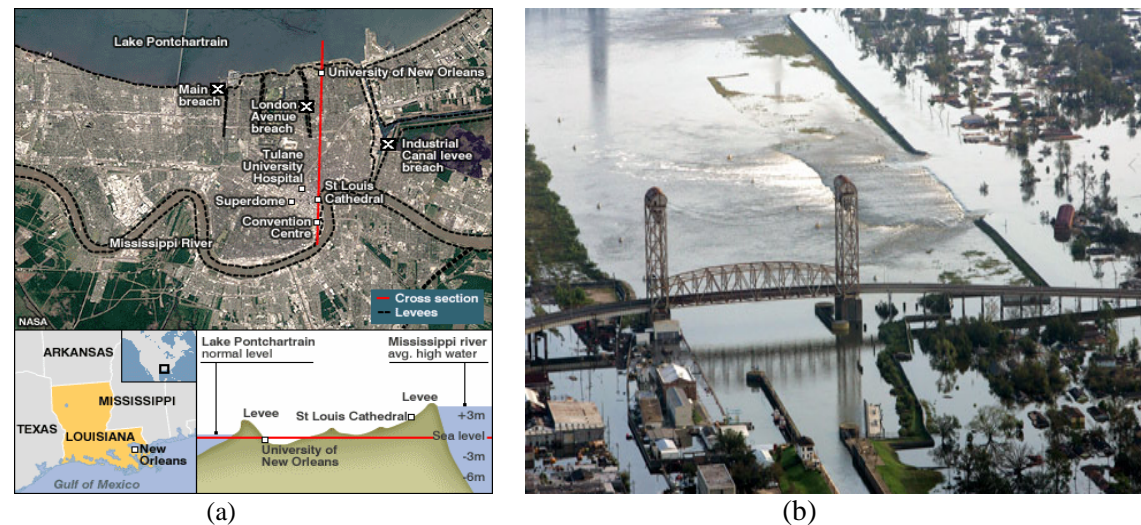


Fig. 1: Failure of levee system: (a) Location of breaches (b) Overflow over a breached part

Initial efforts of controlling and repairing the breach in the levee system could not be successful, which added to the disaster impact. The levee system was repaired using the technique illustrated in Fig.2 (a) and the drainage system (see Fig.2 b) is optimized to achieve fast rate of pumping out flood water without risking further breach of the levee system.

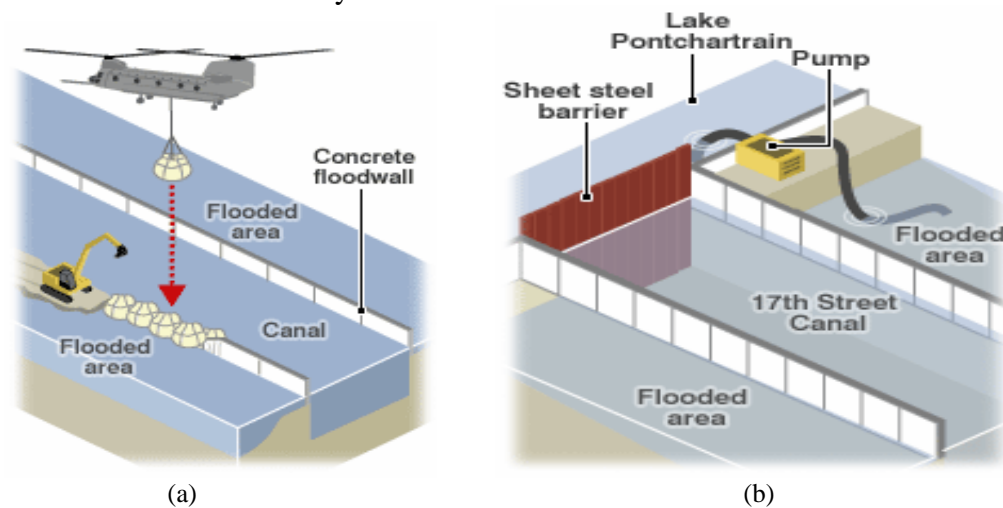


Fig. 2: (a) Repair of levee breach (b) Drainage system for flooded areas.

The levee system is critical component of flood prevention and control for the city of New Orleans, most parts of which are a few feet below the sea level. One of the problems during the levee breach was that the information about the failure was slow to reach the public which was caused by the fact that there was

no reliable system of monitoring the performance of the levee was in place. For example, there were no sensors installed to provide data about the stresses generated by the storm surge, displacement of the levees, pore water pressure. In the absence of such data, the levee failure became a sudden disaster which the emergency services could not cope with. Also in absence of monitoring system the second failure of the repaired levee section on Industrial Canal could not be predicted and it resulted in another major flooding the 9<sup>th</sup> ward area.

## Observations on Failure Mechanisms

Numerous breaches of the levee system in New Orleans occurred in the wake of Hurricanes Katrina and Rita. It seems that most failures were complex caused by a number of processes including failure of foundation soils and earthen levee embankments as well as overtopping which occurred in the event of the storm surge rising over the tops of the levees. The overtopping produced erosion/scour that subsequently led to failures and breaches. In some cases a particular mechanism might have been a major failure mode whereas in other cases a combination of mechanism could be responsible. The failure mechanism illustrated here are based on field work, but should not be treated as final as more detailed analyses and field data are required. The failure mechanisms are illustrated in the following Figures with the aid of pictures from the failure sites.



Fig. 3: Lateral sliding of the levee system and the earth next to it on the 17<sup>th</sup> Street Canal.



Fig. 4: Professor Sharma inspects the concrete cap panels separated from the sheet piles and moved outward.



Figure 5: Joint of concrete cap over-stressed and about failure.



Figure 6: Scour resulting from overtopping.