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FEATURE: Failures in the New Orleans levee system during Hurricane Katrina

Timothy M. Ruppert, PE
Section President 2006-2007

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President's Message

By Timothy Ruppert, PE

It is with honor and pleasure that I serve as Louisiana Section President this year. Our Section, established in 1914, has a long history of protecting the public, promoting the profession and supporting civil engineers working to build our great state.

Without a doubt, 2005 will be remembered as a year of trial and disaster. Hurricanes Katrina and Rita left permanent scars on our people, our communities and our memories. The damage directly inflicted to the coastal area reverberates throughout the state; everyone in Louisiana feels the burden of this disaster.

But as harsh as Mother Nature has been and will be, the people of Louisiana are made of stronger stuff. We have endured nature's harsh temper for many generations, and we will surely do so for many more.

Readers of this journal know that civil engineers have a vital role to play in the future of this state. Engineers will undoubtedly be the ones who rebuild the infrastructure, repair the buildings and restore public services. Engineers will lead the way in the design of hurricane protection barriers, including levees, gates and coastal features. Engineers will provide the construction management skills and the project management experience to support efficient and effective construction throughout the state.

But we must do more than simply clean up the mess. We must be more than just the hired labor that does all the heavy lifting with no decision-making authority. We need to be a part of planning a future that protects our communities from future storm events. We need to be out front and leading the way.

Here is how we will do this:

- Civil Engineers must speak out about building safer, smarter homes. Louisiana recently adopted the International Residential Code for the coastal area. But I think we all know that no matter what the code says, no matter how thoroughly designed and detailed, new buildings will only be as good as what contractors build on-site. With public safety and investment at risk, civil engineers need to engage local building inspection and code officials to encourage thorough and appropriate reviews of new construction.
- Civil Engineers must speak to the public about risk, safety and what we as a profession are doing to safeguard the public. Sound engineering can practically remove some risks and limit others, but there will always be some amount of risk remaining. We must speak out about that residual risk so that the public fully understands the risk they assume and for which they must prepare.
- Our first ethical canon instructs us to hold public safety above all other concerns. In the aftermath of Hurricanes Katrina and Rita, we must redouble our pledge to uphold this ethic. Civil engineers must speak up and speak out on this issue, both in closed project meetings and in public forums. As decisions are made in critical projects, we must constantly remind our customers in the public, industry and government that human lives are at stake.
- Civil Engineers must engage lawmakers to establish effective public policy. Too often, laws are passed after the fact or are based on knee-jerk, panicked reasoning. Other professions and trades are actively engaged in the legislative process and successfully maintain a dialogue with decision makers on issues of concern. Civil engineers must also make themselves available and their expertise accessible to representatives at all levels of government.

These issues are of importance to all citizens of Louisiana, not just those in the coastal area. Growing communities such as Shreveport and Baton Rouge might not be threatened by hurricane storm surge, but the need to build safer, stronger homes is just as important. The opportunity to engage lawmakers and the public in policy formulation is now while the public's attention is on the engineering profession.

I am happy to report that we have already made progress on these issues. For instance, we are already part of the revised Levee Board organization. The ASCE is specifically named as one of the organizations with a seat on the nominating committee that will select members for the new Southeast Louisiana Flood Protection Authority East and West Bank boards. Further, the new law requires a minimum number of the members of these new boards be engineers or other professionals in related fields.

Clearly, in the hour of need, Louisiana is counting on the ASCE and its members to be leaders in the protection of our coastal area. I pledge to do my part and I know I can count on each of you to do the same.

About the cover: The cover page contents for this issue are framed with an early draft version of the Section's website graphics (www.lasce.org/draft) that are presently being redeveloped. For the Section news when it is news in the interim between the quarterly issues of this journal, the .pdf files of past issues of this journal, extensive information about the organization, governance and operation of the Section, visit the Section's website (www.lasce.org).

Did you know...

...that the National Crash Analysis Center (NCAC) in Ashburn, Virginia, is a partnership between George Washington University and the USDOT's Federal Highway Administration and National Highway Traffic Safety Administration and that it conducts research to make highways safer with the ever-evolving vehicles produced by the industry? Nabih Bedewi is a George Washington University professor of engineering and the director of the Center that relies on high-performance computers and cameras in its research. According to Bedewi, the NCAC addresses the total safety problems of roads and cars such as:

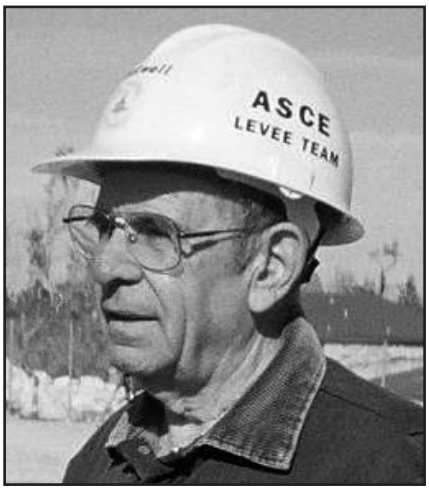
- reducing the number of highway injuries and fatalities due to traffic accidents — currently 42,000 fatalities a year
- the use of seat belts to reduce the probability of a fatality in a traffic accident — currently 70 percent — NCAC research led to improving seat belt design to eliminate an abnormally high probability of liver laceration.
- improving the interaction or compatibility between different size vehicles — mainly sport utility vehicles and small cars — and the behavior of vehicles related to roadside hardware
- testing security barriers to protect embassies and other government buildings against vehicle bomb attacks
- effectiveness of proposed infrastructure for homeland security

Full-scale crash tests at the NCAC Federal Outdoor Impact Laboratory in McLean, Virginia — scheduled to be replaced in 2005 by an 80,000-square-foot indoor facility in Ashburn — compare physical and computer model results to validate and calibrate the computer models. The $70,000 typical cost of a crash test is equivalent to the cost of 90 typical simulations performed with the computer models. An advantage of the computer simulation of crashes is the ability to adjust the speed of vehicles and the boundary conditions to test the various design standards. Highway safety measures conforming to current but aging design standards are periodically tested for the changed road conditions since their implementation. For example, their effectiveness is tested relative to changes in the character of the vehicle fleet — such as that caused by the increased portion of sports-utility vehicles.

- *Washington Times 1/29/04*

Failures in the New Orleans levee system during Hurricane Katrina

By Gordon P. Boutwell, PE, and Billy R. Proschaska, PE



Gordon Boutwell

Billy Prochaska

Summary

It is well known that the failures of the New Orleans hurricane protection system (HPS) — levees and floodwalls — during Hurricane Katrina caused massive flooding that resulted in over 1300 lives lost and untold billions of dollars in damages. The various investigations have proved that the vast majority of the failures in this catastrophe were due to the failure — breaching — of HPS components and not to floodwater overtopping from storm surges.

It will be demonstrated that the different levees failed for different technical reasons, but the overriding root cause was overall inadequate design. The 17th Street Canal floodwall underwent a foreseeable slope stability failure at less than design load because of improper soil strength selection. The London Avenue Canal failures resulted from clearly incorrect estimation of the groundwater pressure regime. The Mississippi River Gulf Outlet (MRGO) and New Orleans East levees failed in erosion because of conscious decisions not to armor them against overtopping. One Inner Harbor Navigation Canal (IHNC) floodwall failed because the designers used the wrong land-side geometry, another failed due to incorrect estimation of the groundwater pressure regime and lack of land side scour protection.

This many different and foreseeable causes for failure indicate a widespread systematic design problem which led to the largest civil engineering disaster in American history. The civil engineering profession — especially the hydrologic and geotechnical areas — has learned many valuable lessons from this disaster, but at a terrible cost. Surely we can do better next time.

Introduction

Geologic setting

The whole New Orleans area lies in an area that was eroded to depths of 60 to 100 feet during the last Ice Age. The resulting valley was filled with relatively weak and compressible deposits — typically clays. At various times, deposition slowed and peat bogs formed, and therefore, peat layers are often found. The upper 4 to 6 feet are normally clays that are stiff in consistency due to desiccation. Below that level, the clays and peats are very soft, with undrained shear strengths on the order of 100 to 200 psf. These strengths increase with depth at a rate of around 10-15 psf per foot of depth. In the area of the various drainage canals and the IHNC, there is a massive buried sand ridge. The depth to the top of this ridge varies from less than 10 to 30 feet below the ground surface. The entire area is subsiding due to natural causes from

- settlement from drainage improvements
- compaction of deep sediments and
- movements along deep buried fault planes.

Typical subsidence rates are on the order of 1 to 3 feet per century with higher rates locally. Figure 1 illustrates the general geology of New Orleans.

History and development of the levee system

The founders of New Orleans selected the highest natural levee of the Mississippi River in the area to establish the city. With the exception of the flooding from occasional Mississippi River floods and hurricane surges, the water from normal rainfall drained away from the River by gravity to the adjacent marsh and cypress swamps and eventually ended up in Lake Pontchartrain.

As the City grew, canal systems were built to enhance drainage. Canals, however, are like a double edged sword. They can serve their designed purpose — conducting the water to the desired location — but they can also defeat their purpose by conducting unwanted water to the area intended to be drained.

Drainage improvements had two undesirable side effects. First, they allowed development into former low swamp areas. Second, the resulting drop in the groundwater level incurred settlements in the underlying soft materials. The net result was that New Orleans became a bowl — or series of bowls — and the ground surface over much of the City was before and/or is now below sea level. Here is how this canal system developed, together with the levee system that it made necessary.

The first New Orleans Canal was constructed under the direction of the Spanish governor in 1794. This Old Basin Canal began at Basin Street in the French Quarter and terminated at Lake Pontchartrain. It was hand excavated by slaves and prisoners. This canal was later filled as other canals were constructed.

The New Basin Canal was constructed during the 1830s. It was excavated through the Metairie Ridge that had served as a levee to protect the city from the waters of Lake Pontchartrain. This canal was the source of the 1871 flooding of the city. During a period from the 1930s to the 1950s this canal was backfilled.

An 1833-34 survey by Charles Zimpel indicates that portions of the Orleans Canal, also known as the Girod Canal, had been excavated to convey the waters of Bayou Metairie into Lake Pontchartrain. A system of ditches had also been completed to carry water to a steam-powered pump station at the upper Orleans

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Billy R. Prochaska, PE, is a licensed civil engineer in Louisiana and Mississippi. He served 4 years in the US Navy Civil Engineering Corps followed by a 41-year career as a geotechnical engineer in private practice. He earned his BS degree from the University of Louisiana at Lafayette and his MS degree in civil engineering from the University of Florida. Prochaska retired as President of Soil and Foundation Engineers, Inc., in Baton Rouge and is currently a private practitioner. He is a member of ASCE, LES, NSPE, and LGWA, and the Civil Engineering Advisory Board at the University of Louisiana at Lafayette. He served as a member of Team Louisiana — the Governor's panel investigating the failure of the levees in New Orleans.

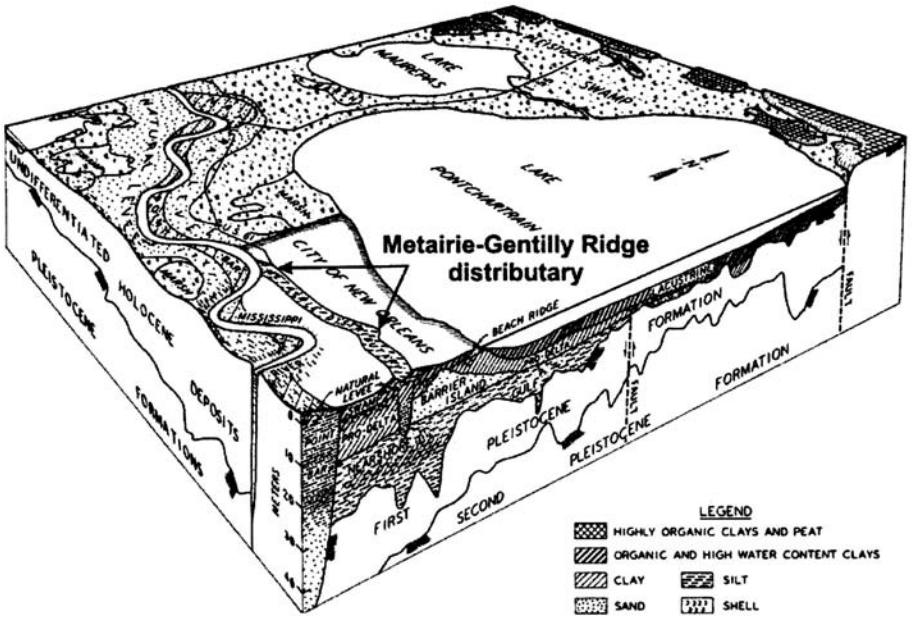

Figure 1. Block diagram of New Orleans geology (Seed, et al, 2006).

Canal that transferred its water to Bayou St. John.

During the period of 1854 to 1858 the Upper Line Protection Levee — now 17th Street Canal — was constructed. Since rainwater was trapped between the Mississippi River levees and the Metairie Ridge, a system of collection canals served by 4 steam-powered pump stations was designed and constructed. This work was accomplished by 4 drainage districts created by the legislature in 1859 and given the taxing power to fund and the authority to construct the pump stations.

After the failure of the Hayman Canal levee in 1871 a political crisis developed. The City Surveyor, W. H. Bell, advised the city to move the pump stations to the lake front or *heavy storms would result in water backup in the canals, culminating in overflow into the city.* Does this sound familiar? Over the following years various canal systems were constructed and in 1878 the city assumed control of the 36-mile-long system of canals draining into Lake Pontchartrain. This system was limited to removing 1.5 inches of rain per hour. With the increase in population from 8,000 in 1800 to 300,000 in 1900, better drainage was needed for the available areas, particularly as the low areas outside Broad Street began to be developed.

In 1893 a hurricane generated a storm surge of 13 feet on the south shore of Lake Pontchartrain. As a result the shoreline levee was constructed to an elevation of 6 feet above normal lake level. Later that year, the city council created the Drainage Advisory Board to develop the necessary topographic and hydrologic data to develop recommendations to solve the drainage problems. This resulted in the first report in 1895, the creation of the New Orleans Drainage Commission in 1896 and the first contracts for new pumping stations in 1897. In 1899 a tax was approved and later that year the Sewage and Water Board (S&WB) was established. The Drainage Commission was merged with the S&WB in 1903 and by 1905, 46 additional miles of canals had been constructed.

With the improved drainage, the real estate developers extended their projects to more low areas requiring additional drainage system construction. The invention of the Wood Screw Pump in 1913 greatly facilitated the pumping capacity. These pumps were 12 feet in diameter and powered by a 25 Hz AC motor. In 1915 the city let a contract for 13 of these pumps to be installed in 3 pump stations that year.

The IHNC or Industrial Canal was completed in 1923. This canal is owned by the Dock Board and was constructed to support maritime traffic between the Mississippi River and Lake Pontchartrain. Later the Gulf Intracoastal Waterway (GIWW) was tied into the IHNC and the MRGO was connected to the GIWW several miles to the east in 1963. Although not associated with the drainage system, another double-edged sword had been created. These waterways served to conduct Hurricane Katrina's storm surge to the heart of the city just as City Surveyor, Bell, in 1871 warned the canals to Lake Pontchartrain would do. If we would only study history!

After Hurricane Betsy in 1965, Congress passed Public Law 89-298, that authorized the Lake Pontchartrain Louisiana and Vicinity flood control project. Under this law, the New Orleans HPS was to be "...substantially in accordance with the recommendations of the Chief of Engineers" (Clough, et al, 2006). The U.S. Army Corps of Engineers (USACE) was assigned responsibility for the design and construction of the HPS (IPET, 2006). These flood control improvements were financed by 70 percent federal and 30 percent local funds. Their construction was delayed by environmentalist lawsuits and turf wars between the Orleans Levee Board and the S&WB throughout the project. Due to these problems and the sporadic funding by Congress, the project is still not complete 41 years later. Prior to Hurricane Katrina the completion date was projected as 2015. But, remember, even the Romans could not build Rome in a day. The original estimated construction cost of $95 million presented to Congress was approaching $1.0 billion when the project was investigated by the General Accounting Office in 1982.

Today, the New Orleans drainage system drains 95 square miles in Orleans and Jefferson Parishes through 90 miles of covered canals and 82 miles of open channels. The system has 22 main pumping stations with a total pumping capacity of 47,000 cfs and there are 50 of the Wood Screw Pumps still in service. In many cases, the present levees are constructed over the spoil banks from the excavation of the original canals. Through the years many levee projects have been completed and the elevations of the levees were raised with the most available fill material that was not always the select fill suited for levee construction.

To minimize costs, rights of way were not enlarged as the elevations of the levees were raised. To attain the increased elevation required to protect from storm surge, the now famous/infamous *I-walls* that are cantilever sheet piles driven through the levees were used to avoid having to purchase the right of way to enlarge the base of the levee to support the raised crest elevation. By this time, the City area was divided as shown in Figure 2 into several *polders* or basins that are totally surrounded by levees/floodwalls. The primary polders enclosed

- Metro New Orleans,
- New Orleans East
- St. Bernard Parish and the Lower 9th Ward, and
- Plaquemines Parish.

The levee and floodwall designs reviewed by the authors were intended to achieve a safety factor of 1.3. For comparison, the Louisiana Department of Environmental Quality requires a safety factor of 1.5 against the slope stability failure of a sanitary landfill. This would lead one to question which is more consequential — a side failure in a landfill or the loss of a city? The HPS was tested by Hurricane Katrina and it failed to achieve its purpose — protect the City and its surrounding metropolitan area.

Flooding

Hurricane Katrina induced extensive damage to the HPS throughout the New Orleans area. The locations of the major failures of the HPS are illustrated in Figure 2. Some levees/floodwalls were overtopped but were damaged so little that their functionalities were not impaired. Conversely, others collapsed — breached — providing little or no resistance to the onrushing floodwaters. An analysis of the relative effects of breaching and overtopping provides the answer of why New Orleans experienced the catastrophe of the magnitude it did.

Unlike high river waters retained by the Mississippi River levees for weeks at a time, hurricane storm surge waters are retained for a relatively short period of time. Illustrated in the hydrographs shown in Figure 3, Katrina's storm surge water was typically within 4 feet of its peak value for only 4 to 6 hours.

If a levee/floodwall does not breach, the overflow time period is relatively short and the

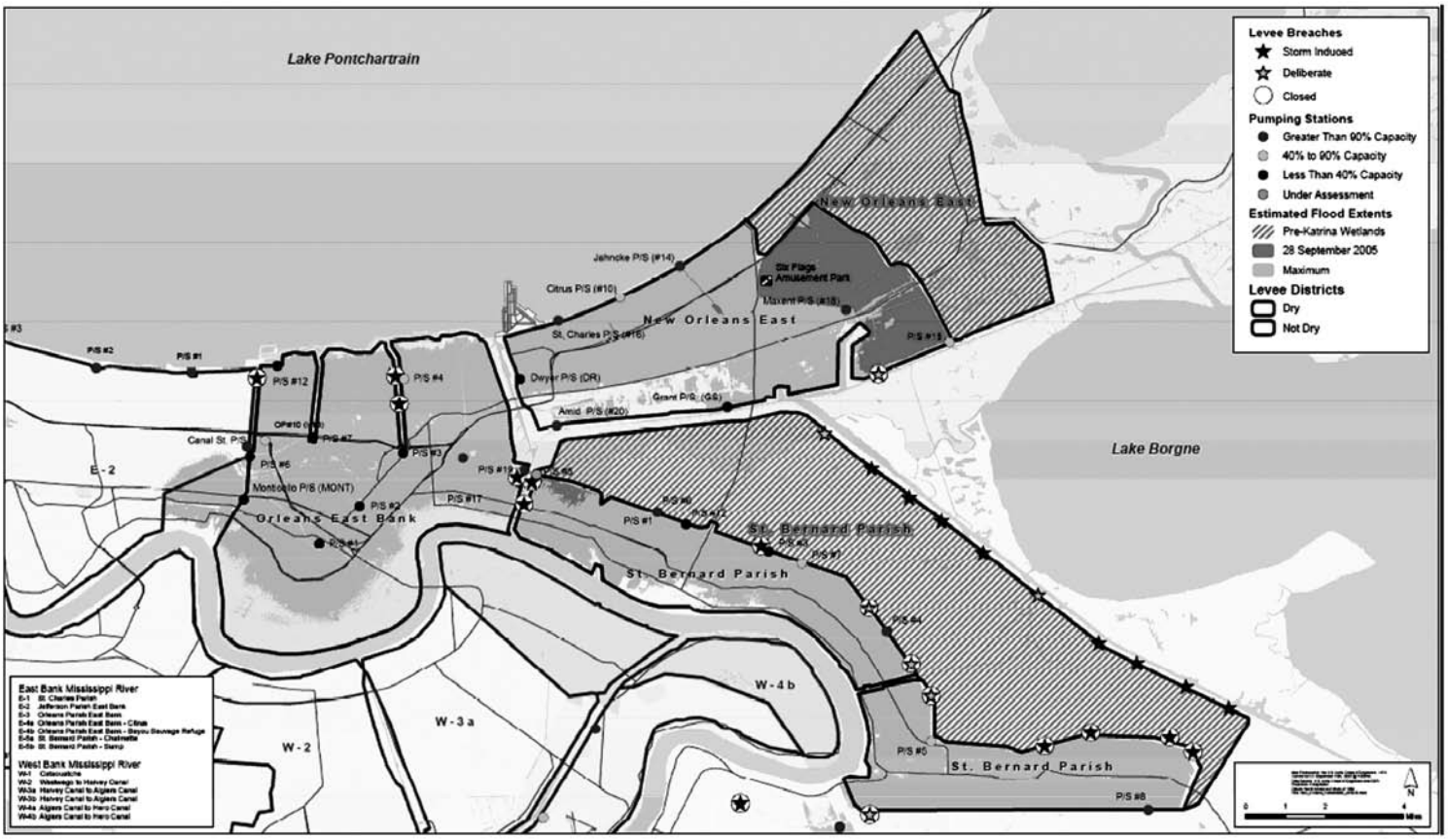

Figure 2. Map of main polders in the New Orleans area.

low head of the water over the crest of the levee results in low flow velocities. On the other hand, if a levee/floodwall is breached, water flow through the breach into the protected side of the levee continues for an extended period of time until the water level on the "protected" side equals the water level on the storm surge side. The depth of the head of the water over what may remain of the levee is much greater, resulting in a high flow velocity. The significant difference in the time of flow, its velocity and the depth of water over a levee crest compared to that through a levee breach results in a significantly different volume of water reaching the protected side.

Typically, a levee breach can transmit 100 to 1000 times more water per lineal foot than an unbreached levee. More detailed analyses have been made by the USACE (IPET, 2006), Team Louisiana (Van Heerden, et al, 2006), and by the lead author for St. Bernard Parish. The USACE estimated that some 2/3 of the floodwater volume came through the breaches and 1/3 of it from overtopping. The results of the calculated floodwater levels and flooded areas made by Team Louisiana are summarized in Table 1 for each of 3 major basins — Orleans Metro, New Orleans East and St. Bernard.

The lead author studied the flooding of St. Bernard Parish extensively (Boutwell, 2006) and concluded that if the levees and floodwalls along the east side of the IHNC had not breached, they would have allowed the passage of only 20 percent of the floodwater that actually entered the Parish. This would have resulted in the water level in the lower Ninth Ward not exceeding Elevation +1 to +2 feet or 0 to 2 feet above grade. If the IHNC levee system had not breached and it had been built and maintained to its design elevation, almost no water would have come into the lower Ninth Ward. The floodwaters approaching Chalmette and Meraux from the IHNC would not have overtopped Paris Road. Waters coming from the MRGO would have been stopped by the 40-Arpent Canal Levee and

(Continued on Page 25)

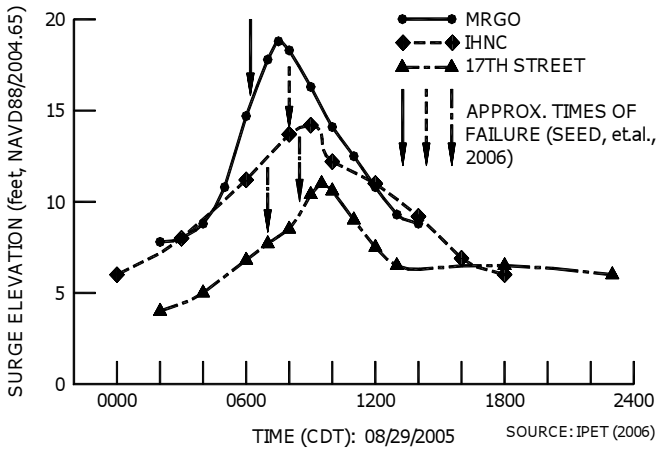

Figure 3. Storm surge hydrographs.

Relative Flooding: Overtopping versus Breaching				
Basin	Without Breaches (Overtopping Only)		Actual With Breaches	
	Area (Acres)	Avg. Depth (ft)	Area (Acres)	Avg. Depth (ft)
Orleans Metro	6,000	2	21,000	5
Orleans East	9,000	2	15,000	4
St. Bernard	8,000	2	21,000	10
Overall	23,000	2	57,000	6

Table 1.

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SHREVEPORT

By Elba U. Hamilton, EI, President

The planning of the Section's 2007 Annual Spring Meeting and Conference that will be hosted by the Branch is now under way. The Conference has been scheduled for March 22 — 23 and the Branch plans to continue to host it as in the past in the Clarion Hotel — the former Sheraton Shreveport Hotel in Shreveport. C. Eric Hudson, PE, was appointed by the Board to serve as the Chair of the Conference to lead the planning process.

The dates scheduled for the Conference were selected to coincide with the Deep South Conference of student chapters scheduled for March 23 — 24 in Ruston. This is intended to accommodate attendance for both conferences and particularly for attendance during the traditional student activities and awards ceremony being planned as part of the Awards Banquet held in conjunction with the Conference.

Elba Hamilton

The Board would greatly appreciate member ideas and insights about how the Conference may be improved and made more attractive to participants. We are in the process of identifying and soliciting potential speakers for the technical sessions planned and seeking vendors to provide booths during the Conference. If you know of someone who you believe can provide an interesting technical session during the Conference or if you are interested in a particular subject as a technical session, please let an officer know so that your interests can be accommodated if possible while the search for speakers is active. Also, if you have any other ideas concerning the Conference, please feel free to share them with any Branch officer. Please watch for future announcements and updates concerning the 2007 Annual Spring Meeting and Conference as plans are advanced.

The Board plans to spotlight engineering projects in the newly designed Branch newsletter. Therefore, Branch members are hereby being solicited to submit brief articles describing their recently completed projects. A Branch member whose article is chosen to be published in the newsletter will receive a gift certificate to a local restaurant. This is a great opportunity for Branch members who cannot attend the monthly membership meetings due to distance but would like to participate in Branch activities.

In other matters the Board agreed to continue the canned food drive that the Younger Member Group has organized for the past 2 years. The Board also approved, as it has in past, a reduced price of $5 each for the Louisiana Tech students and professors who attend any Branch membership meetings during this administrative year.

The September Branch membership meeting was a traditional joint meeting with the Shreveport Chapter of the Louisiana Engineering Society. The speaker for this meeting was Representative Mike Powell who represents the 6th House district contained in Caddo and Bossier Parishes. He serves on the House Transportation, Highways and Public Works Committee, Education Committee and Judiciary Committee. Representative Powell briefed us on the highly anticipated Youree Drive project. Representative Powell was instrumental in securing funds for the phase of the project that consists of, among other improvements, drainage on both sides of the road and an improved Portland cement concrete pavement.

The October Branch meeting was particularly interesting for those members from the Shreveport/Bossier area that have been seeing dynamic message signs along the interstates with the message "DOTD SIGN UNDER TESTING" being displayed. To help us understand the motivation behind these new signs, the speaker for this meeting was B. Keith Tindell, PE. He is the district traffic engineer for the Louisiana DOTD District 04 with its headquarters located in Bossier City. Keith additionally briefed the Branch members in attendance on the largest Intelligent Transportation System (ITS) project ever in the State.

The officers of the Branch who were elected to serve on the Board of Directors for its 2006-2007 administrative year were installed in May during the Branch membership meeting and luncheon that was held in conjunction with *The Spring Classic* golf tournament — an annual event sponsored by the Branch. The officers who will serve on the Branch Board of Directors are

- Elba U. Hamilton, EI, President
- Rusty L. Cooper, EI, President-Elect
- J. Cody Goodwin, EI, Secretary
- Jarred C. Corbell, EI, Treasurer
- Ashley T. Sears, Past President

Ashley Sears

Rusty Cooper

Cody Goodwin

Jarred Corbell

BATON ROUGE

By Brant B. Richard, PE, President

As I begin my term as President of the Branch, I want to thank the Board for nominating me and each member for the vote of confidence. I would like to personally thank past Branch President, Tommy Roberts, for the guidance and direction he provided over the past year. I hope that I can continue his efforts to effectively promote the Society and be a resource for all civil engineers in the Branch community.

I believe that it is an exciting time to be a civil engineer. As unfortunate as the hurricane devastation of the Gulf coast region is, it has created opportunities for civil engineers to assist in the rebuilding efforts for years to come. There will be many opportunities to participate in storm-related infrastructure projects typically including roadway, water, sewer, wastewater, site development, and other utility projects in both the private and public sectors. This will allow us as civil engineers to grow careers and thus open doors and public awareness of the importance of our profession.

We will face many challenges during this time of rebuilding. Our reputation and credibility are important factors that must remain a prevailing concern as we pursue our work. We will continue to have the opportunity to better assert ourselves in seeking and gaining a place at the table with the decision makers concerning the future growth and development in this region that so significantly depends on civil engineering works.

My goals during my term in office are to be an effective voice and representative of the Branch membership, promote the ASCE and our profession to the best of my ability, and develop a strong, influential voice for civil engineers in the Baton Rouge community. With these goals, I add a personal opportunity to demonstrate the integrity that will encourage more young people — the future of our profession — to become civil engineers.

I am very excited about the work being done to restart our Branch website http://branches.asce.org/batonrouge/index.htm planned to be completed in November 2006. It will be the primary basis for mass communication with Branch members. Here are some other items that we are working on:

- Publishing employment opportunities on the Branch website
- A monthly luncheon sponsorship program for consultants
- More opportunities to promote member participation in — and public exposure to — the Society's work

A change in venue for the October membership meeting and luncheon to the LSU campus featured Jason Soileau, Assistant Director of Facilities Services, as our speaker. He presented an overview of the LSU Master Plan. It included projects proposed for additional parking, new buildings, and limited vehicular access to on-campus streets. These projects are being designed in keeping with the aesthetics of LSU's beautiful campus.

Following the membership meeting, Calvin C. Thomas, Jr., PE, presented a PDH seminar

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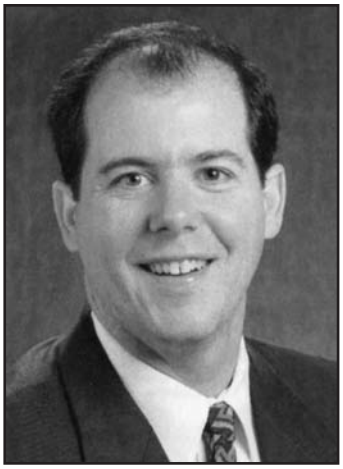
Brant Richard

Bob Jacobsen

Bill Wall

Jeff Duplantis



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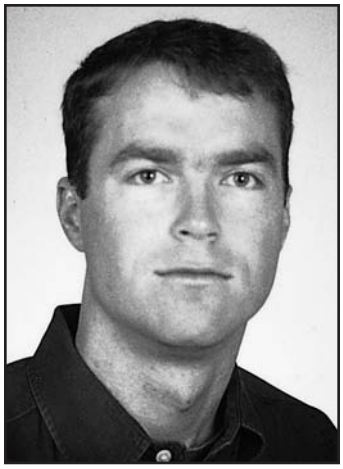
Adam Smith

Rudy Simoneaux



Tommy Roberts

NEW ORLEANS

By Christopher L. Sanchez, PE, President

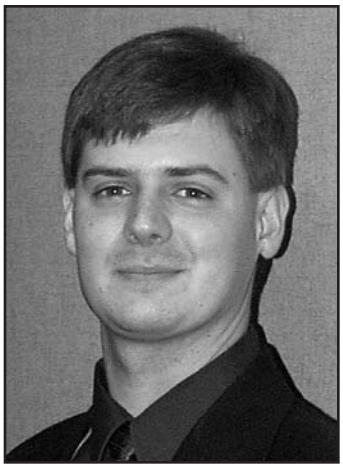
As it is now well known, the Branch operations were brought to a complete halt during the late months of 2005 in the aftermath of Hurricane Katrina. They remained disrupted at best well into the early months of 2006. We were and are rebuilding the Branch as we were and are simultaneously rebuilding our lives and careers. The results of the hard work of those serving in the Branch leadership that includes the Board and the various committee personnel have been extremely gratifying considering the new momentum being achieved. The 2005-2006 administrative year ended with what can only be interpreted as a great success. It came only with the willingness of the Branch leadership to continue programs as soon as possible with an unknown but significant risk of financial failure.

After having no choice but to cancel the May membership meeting and luncheon that is usually scheduled for the election of officers and then having to postpone the June membership meeting and awards luncheon, the Branch was finally able to host an August membership meeting and luncheon for the election of officers and the presentation of awards. So the important election of the 2006-2007 Board of Directors and the presentation of the Branch membership recognition awards occurred during the August membership meeting. This meeting was held in the Audubon Tea Room in Uptown New Orleans and was attended by nearly 80 Branch members. It was clearly an important event reaffirming the sense of importance and continuity provided by the ASCE in the professional lives of our members.

New Board

The Branch Board of Directors for the 2006-2007 administrative year was elected during the August Branch membership meeting and installed with the Section Board of Directors during the Section Annual Meeting in September that was hosted by the Branch. They are

- Christopher L. Sanchez, EI, President
- Ronald L. Schumann, PE, President-Elect
- Nathan J. Junius, PE, Vice President
- Benjamin M. (Ben) Cody, PE, Treasurer
- Johann L. Palacios, PE, Secretary
- Margaret S. Adams, PE, Director
- Reid L. Dennis, PE, Director
- Heather Emry Meyers, EI, Director
- William H. Sewell, Jr., PE, Past President



Chris Sanchez

Ronald Schumann

Awards

The Board approved the recipients of the Branch awards recognizing the exceptional achievements of these civil engineers in the Branch community. They are

- **Angela Desoto Duncan,** PE, Outstanding Government Civil Engineer
- **Dale C. Biggers,** PE, Outstanding Civil Engineer
- **Heather Emery Myers,** EI, Outstanding Young Civil Engineer
- **John L. Niklaus,** Lifetime Achievement
- **Waldemar S. Nelson,** PE, Wall of Fame and
- **John J. Housey, Jr.,** PE, President's Award

These Branch awards were presented and the recipients honored during the August membership meeting and luncheon. The citations for each of the recipients follow:

Angela DeSoto Duncan, PE, was selected by the Branch Board of Directors to receive the Branch *Outstanding Government Civil Engineer* Award. She is employed as a Technical Manager and Team Leader by the U.S. Army Corps of Engineers and she is a licensed engineer in Louisiana. Duncan is a member of the ASCE, the Louisiana Engineering Society and the American Concrete Institute. She earned her BS degree from Tulane University in 1988.

In ASCE, Duncan served as the chair of the national Committee on Licensure and Ethics, an a member of the Task Committee on Academic Prerequisites for Professional Practice, as a member of the national Committee on Professional Practice, as a member of the Task Committee on Government Engineers, as the chair of the national Committee on Younger Members and as the President of the New Orleans Branch. In the Louisiana Engineering Society, she served as President of the New Orleans Chapter and Chair of the MathCounts competition. Duncan served as a judge for the American Concrete Institute, Louisiana Chapter Outstanding Concrete Project of the Year.

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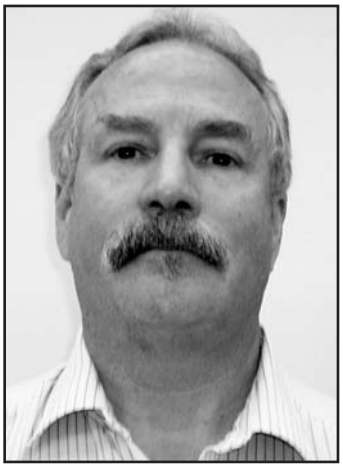
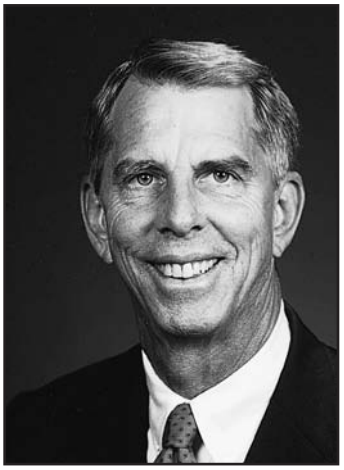
Nathan Junius

Ben Cody



Reid Dennis



Bill Sewell

Angela Duncan is honored as the Outstanding Government Civil Engineer for 2006 and receives her commemorative plaque from President Sewell.

Dale Biggers is honored as the Outstanding Civil Engineer for 2006 and receives his commemorative plaque from President Sewell.

Heather Meyers is honored as the Outstanding Young Civil Engineer for 2006 and receives her commemorative plaque from President Sewell.

Duncan is a member of the Tulane University Alumni Admissions Committee recruiting prospective students. She has been a volunteer for BeachSweep for 6 years, a Christmas in October for 3 years, and a senior judge for the Louisiana Science and Engineering Fair for 13 years and recently served as head judge for the senior team category.

A coauthor of the Interagency Performance Evaluation Task Force performance evaluation of the New Orleans and Southeast Louisiana hurricane protection system report, Duncan is also the Technical Manager for the Southeastern Louisiana Urban Flood Control, Orleans and Jefferson Parishes, and the Technical Manager for the Cousins Discharge Channel, Culvert and Floodwalls. She is a lead designer for approximately $30 million in hurricane protection projects in the New Orleans area.

Dale C. Biggers, PE, was selected by the Branch Board of Directors to receive the Branch *Outstanding Civil Engineer Award.* Biggers is employed by Boh Brothers Construction Company, LLC, where he serves as the Vice President of its Piling and Marine Department. Biggers is a licensed engineer in Louisiana and earned his BS degrees in math and civil engineering from Tulane University in 1966 and 1968. He graduated from the U.S. Coast Guard Officers Candidate School in 1969 as an Ensign in the U.S. Coast Guard.

Biggers served as the chair of the technical committee of the Pile Driving Contractors Association where he led the writing of the installation specifications for driven piles and he presented them to the American Association of State Highway and Transportation Officials for their inclusion in its guidelines. He is a member of the ASCE and he has served on the board of directors for the New Orleans Opera for 18 years.

Heather Emery Myers, EI, was selected by the Branch Board of Directors to receive the Branch *Outstanding Young Civil Engineer* Award. Myers is a certified engineer intern in Louisiana and she earned her BS and MS in Environmental Engineering in 1998 and 2006 from Tulane University. She is employed by MWH — Environmental Engineering, Construction Water and Power and an active member in the ASCE and the Society of Women Engineers.

Myers was an active member of the Tulane ASCE Student Chapter where she served on the Chapter's concrete canoe competition team and as Secretary and Vice President on its Board of Directors and was responsible for organizing Chapter social activities. Myers has been an active member of the New Orleans Branch Younger Member Committee and its Water Resources Committee and a volunteer for the Branch's Box City outreach effort in the Children's Village during the New Orleans Jazz Fest.

Myers is an active member of the Greater New Orleans Section of the Society of Women Engineers. She has served in the offices of Secretary and Treasurer on its Board of Directors and she has chaired several of its committees. The Section won the Membership Program Award for small sections under her leadership as chair of its Membership Committee and Myers' service has been twice recognized with the Section's Distinguished Member Award.

Myers has served on the Board of Directors of the Green Project with the mission "To match the issues of limited landfill space, neighborhood blight, pollution and waste, with solutions that will benefit the Greater New Orleans area." She initiated an office-level community outreach effort in her company and served as its community coordinator for 2 years. The effort supports beach cleaning, Christmas tree recycling, food bank, scholarship fund raising and other activities. Myers volunteered for community improvement projects with the Young Leadership Council, supporting the rebuilding efforts following Hurricanes Katrina and Rita including light demolition, construction and painting. Following the hurricanes, she assisted volunteer groups of college students nationwide to coordinate their volunteer rebuilding efforts in New Orleans with local non-profit organizations.

As project manager of the Water Master Plan for the City of New Orleans, Myers oversaw the daily tasks of the project team that includes 3 subconsultants. She is currently the project manager for the evaluation of the Jefferson Parish recycling program that is temporarily suspended following the hurricanes.

John L. Niklaus was selected by the Branch Board of Directors to receive the Branch *Lifetime Achievement Award.* Niklaus began his engineering career as a consultant and an instructor specializing in traffic and transportation engineering while working on his advanced degrees. He earned his BS and MS in civil engineering from Tulane university in 1955 and 1961 and his PhD in civil engineering from the University of Washington in 1967. Niklaus joined the Tulane faculty in its Civil Engineering Department in 1963 and became the Chair of the Department in 1984 — a position that he held until his retirement. During his tenure on the Tulane faculty his specialty areas expanded to include structural engineering while also teaching a much wider range of subjects.

During his career, Niklaus served as a member on the St. Charles Parish qualification-based selection committee for the selection of engineering firms to perform services for the Parish, the advisory committee to revise the New Orleans land use plan and zoning ordinance, and the technical committee to develop a statewide intermodal transportation plan for Louisiana. He also served as the director for the Canal Street improvement project for the New Orleans Chamber of Commerce.

Niklaus is a member of the ASCE, the Louisiana Engineering Society, the Society of Tulane Engineers, Tau Beta PI, and the Institute of Traffic Engineers. Prior to retirement, he was a licensed engineer in Louisiana. As a member of the ASCE, Niklaus served 2 terms as President of the New Orleans Branch, as a member of the steering committee of the Branch's Structures Committee, and two terms as a Director on the Louisiana Section Board of Directors. He also served on the host committees for 2 ASCE national conventions held in New Orleans. Niklaus served a term as the President of the Society of Tulane Engineers.

Waldemar S. Nelson, PE, was selected by

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John Housey is honored with the 2006 President's Award and receives his commemorative plaque from President Sewell.

John Niklaus is honored with the Lifetime Achievement Award and receives his commemorative plaque from President Sewell.

Waldemar Nelson is posthumously honored as a member of the Civil Engineering Wall of Fame and his son Ken Nelson receives the commemorative plaque from President Sewell.

the Branch Board of Directors to posthumously receive the Branch *Civil Engineering Wall of Fame* Award. He was Director Emeritus of Waldemar S. Nelson and Company, Inc. at the time of his death on November 15, 2005. Nelson earned his BS in Mechanical Engineering and Electrical Engineering from Tulane University in 1936 and he was licensed as a civil, electrical and mechanical engineer in 44 states. He was Fellow and Life Member of the ASCE.

Nelson served as Chair of the Louisiana State Board of Registration for Professional Engineers and Land Surveyors, Treasurer of the National Council for Engineering Examiners and received the NCEES Distinguished Service Award. He was a founding member and served as President of the Board of Advisors of the Tulane University School of Engineering, a trustee of the Tulane Engineering Foundation and the 1997 inductee into the Tulane Engineering Hall of Fame, the 1992 Tulane University Volunteer of the Year and the 1976 Tulane University Outstanding Engineering Alumnus.

Recipient of the ASCE New Orleans Branch Lifetime Achievement Award in 1998, Nelson was an active member of the Louisiana Engineering Society where he served a term as its President. In honor of his "outstanding service to the LES, in an unselfish manner in keeping with the highest professional standards of conduct, including active participation and leadership within the Society," the LES *Waldemar S. Nelson President's Award* was instituted. Also in honor of Nelson's "exemplary leadership and overall guidance to bring the Louisiana Engineering Center from a vision to a reality," the Center's Waldemar S. Nelson Conference Room was dedicated in 1999.

Other honors received by Nelson include the Times-Picayune Loving Cup, the James E. West Fellow — National Endowment Award; the Southeast Louisiana Council of the Boy Scouts of America — Distinguished Citizen Award; the Valley Forge Freedom Foundation, New Orleans Chapter — George Washington Honor Medal; the Junior Achievement of New Orleans — Entrepreneur of the Year, and inductee into the Junior Achievement Business Hall of Fame; and the Young Leadership Council — Role Model of the Year in Engineering.

Peter Casbarian receives his Life Member Certificate from President Sewell.

Special acknowledgment

The membership of the Branch and the Section received the following special acknowledgment by letter dated October 9, 2006. It is from Ken Nelson, who accepted the Louisiana Section 2006 Wall of Fame award for his father, Waldemar:

On behalf of the entire family and company, I would like to thank the membership of the ASCE Louisiana Section and New Orleans

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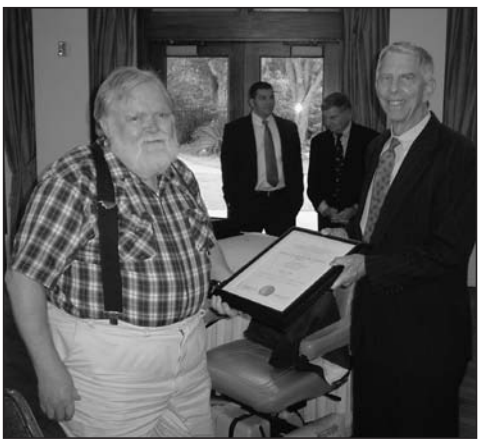
William Caver receives his Life Member Certificate from President Sewell.



Adrian Combe receives his Life Member Certificate from President Sewell.

Shashikant Suthar receives his Life Member Certificate from President Sewell.

ACADIANA

By Jamal Khattak, PE, President

The Branch is back to business after a fairly quiet summer. During the 2006-2007 administrative year, the Branch plans to focus on implementing Phase II of its campaign to market civil engineering as a profession of choice to local high school junior level students. The previous administrative year, the branch developed an intricate PowerPoint presentation about civil engineering that particularly focused on the civil engineering programs and projects in the Section.

Jamal Khattak

The Branch also plans to focus on coordinating a sprint technical seminar in 2007 that will be a 2-day event specializing in only one civil engineering technical specialty. In the interim, the Branch plans to continue focusing on providing high quality monthly membership meetings that focus on providing professional development hours for its members.

Congratulations are extended to Branch member Ray DesOrmeaux for being selected for the second consecutive year by the Section President to receive the President's Medal. This medal is given to a Section member for outstanding service to the profession during the previous calendar year. Congratulations are also due another Branch member Kenneth McManis, PE, who was recently selected as the new Civil Engineering Department Head at the University of Louisiana at Lafayette.

The nomination and election of the slate of new officers to the Board of Directors for the 2006-2007 administrative year was accomplished as part of the business of the September Branch membership meeting. All of the officers serving on the current Board agreed to be nominated advancing them in position and David Girouard with C.H. Fenstermaker & Associates agreed to be nominated to the position of Secretary. The slate of officers nominated was elected by a unanimous vote of the membership present.

The installation of the new Branch officers was part of the business of the October Branch membership meeting hosted in new LITE facility in Lafayette. On behalf of the Branch I would like to thank E.R. DesOrmeaux, PE, President-Elect of the Section, who installed the new officers. The following are the new officers on the Branch Board of Directors for the 2006-2007 administrative year.

- M. Jamal Khattak, PE, President
- Joseph P. Kolwe, Jr., PE, President-Elect
- Clint S. McDowell, PE, Vice President
- Joshua P. Stutes, PE, Treasurer
- David J. Girouard, EI, Secretary
- Dax A. Douet, PE, Past President

David Girouard

Joe Kolwe

Clint McDowell

Joshua Stutes

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Branch for posthumously naming Waldemar Nelson to the wall of fame. It has been very heartwarming to have so many of his friends and colleagues express their respect for him since his passing. His honor is an affirmation of his dedication to his profession, and an inspiration for us all to try to follow in his footsteps. As we work to put the Gulf coast back together after the recent hurricanes, we will often be reminded of his assertion that, "engineering is the foundation of civilization." The efforts of civil engineers have been crucial to the development of the region, and Waldemar would have been proud that his fellow ASCE members considered his life's work to be worthy of recognition. Thanks again to all who had a part in the granting of this honor.

Life Members

Also during the August Branch membership meeting the following Branch members recently achieving their Life Membership status were recognized and they received their Life Member certificates:

- **William W. Caver, Jr., PE**
- **Adrian J. Combe, III, PE**
- **Peter A.O. Casbarian, PE**
- **Shashikant M. Suthar, PE**

Structures Committee (Annual Report 2006)
By Om P. Dixit, PE

Like the other functions of the Branch, the activities of the Structures Committee were disrupted following Hurricane Katrina. The annual offshore seminar and another seminar scheduled for latter part of 2005 were cancelled. However, most of the Executive Committee members were back in New Orleans by the end of the year and planning for the ongoing activities of the Committee. The engineering auditorium at University of New Orleans was damaged during the flooding caused by Hurricane Katrina and the Committee had to temporarily find a new venue.

Finally, the Committee started the year by hosting the Annual David Hunter Seminar in April 2006 that proved to be successful. The Committee has either hosted or is planning to host the following seminars:

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STUDENT CHAPTER NEWS

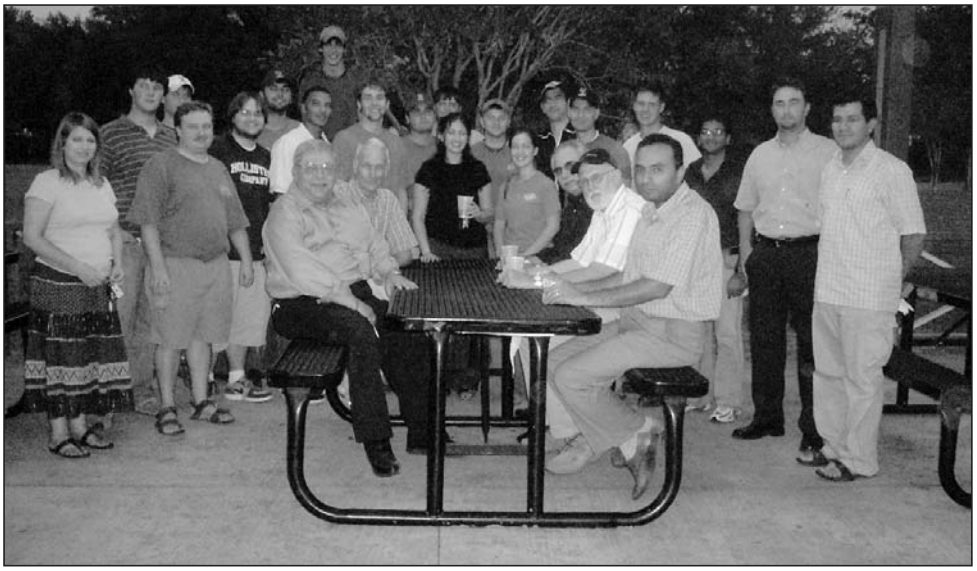
UNIVERSITY OF LOUISIANA AT LAFAYETTE

By Sehati Atieh, Secretary

The first Chapter membership meeting of the school year was in August. Many of the recently enrolled civil engineering students — both freshmen and sophomores — were accompanied by the upperclassmen to this function. The 60 plus students present had the opportunity to meet and hear a presentation by Dr. Kenneth L. McManis, PE, the newly appointed head of the Department of Civil Engineering. He discussed his vision for and the expected direction of the Department.

The Chapter officers encouraged all students present to begin planning for the 2007 Deep South Conference. In addition, the officers revealed their plans for the Chapter's alumni awareness program that is intended to acquaint local engineers and engineering firms with the activities of the Chapter for the current academic year.

The annual barbecue in Girard Park adjacent to the campus was held in September. The students present had the opportunity to visit socially with professional civil engineers who practice in the local community and the faculty members of the Department of Civil Engineering.



Group picture of the civil engineering students, faculty and practitioners who attended the annual barbecue in Girard Park.

LOUISIANA TECH UNIVERSITY

By Nathan Linhardt, President

The 2006-2007 academic year at Tech is a busy one for the Chapter. A new level of participation along with a larger group size has allowed us to partake in many worthwhile social, professional, and community service events. Thanks to the participation of our 33 members and the efforts of our officers, this year has already been filled with memorable events.

To kick off the year for our chapter and the Tech College of Engineering and Science, the Chapter hosted the COES Tailgate at the first home game with a dunking booth for the entertainment of fans of all ages. The honorary *dunkees* were Professor Dixie Griffin and Chapter President Nathan Linhardt. It was a huge success. Also to welcome our new and returning members, we held the Fall Burger Burn. It is a great opportunity to mingle with the faculty and the ASCE members in the professional community.

We have continued to provide professional activities and networking opportunities for members through a series of guest speakers during the monthly Chapter meetings and attending the membership meetings of the Shreveport Branch. In September, Shelly Brock from Applied Research Associates, Inc. made a presentation on security engineering and progressive collapse analysis of structures. In October, Kyle Blank from Pate Engineers, Inc. made a presentation on projects related to hydrology, structures, and transportation planning.

We are looking forward to the remainder of the academic year which is marked by some significant events

Tech Student Chapter members attending the October membership meeting of the Shreveport Branch. From left are John Brown, Charlie Franklin, Michael Rister, Nathan Linhardt, Hailey Prince, Mary Lou Schwaller, Carlos Vidas, Elba Hamilton, Shreveport Branch President, and Paul Will.

- Up Till Dawn at Louisiana Tech University, our student chapter will be helping to raise money for St. Jude's Hospital to support cancer research and awareness (November 2, 2007). For more information contact Paul Will at pjw005@latech.edu.
- The December Chapter membership meeting will feature guest speaker Jeff Feaster from NCI Building Systems from Houston, Texas.
- Annual Civil Engineering Banquet will feature guest speaker William Marcuson, III, PE, President of the ASCE. We will be honoring our outstanding students for academic and service achievements, and presenting the faculty awards for Professor of the Year and the Crying Towel (February 13, 2007).

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Section News and Information

Highlights of the August Board of Directors meeting

The Section failed to receive copies of the annual report from any of its 7 student chapters for the 2005-2006 administrative year. Consequently the Section's $200 contribution made to its student chapters in conjunction with the receipt of the student chapter annual report was not made this year.

The money for the graduate fellowships funded out of the Hurricane Relief Fund was scheduled to be disbursed to representatives from the recipient universities during the Board meeting. Louisiana State University, University of Louisiana at Lafayette, Southern University and the University of New Orleans were represented. Their representatives present were respectively **Steve S.C. Cai,** PE, Assistant Professor Civil and Environmental Engineering Department; **Patrick Carriere,** PE, Chair of Civil and Environmental Engineering Department; **Mark Zappi,** PE, Dean of Engineering, and **Norma Jean Mattei,** PE, Associate Professor, Department of Civil and Environmental Engineering. They were each photographed with representatives of the Section Board of Directors receiving the money to fund the fellowships.

The Section's investment accounts, the Fidelity Fund, Spartan Money Market and Spartan Market 500 Index Account, are not performing as well as ordinary CDs. The paperwork for the authorization for current Board members to gain access of these accounts has been completed but not filed with the respective investment account administrators. It was suggested that these accounts should be liquidated and at least moved to CDs to improve the investment return. However, this cannot happen until a Board member gains access.

The Board acted to eliminate the Section's Outstanding Civil Engineering Senior Student Award. The recipient of this award was selected from among the recipients of the Distinguished Civil Engineering Senior Student Award selected by the civil engineering department chairs and student chapter faculty advisors of the Section's 7 universities with a student chapter. The reason the Section's Outstanding Civil Engineering Senior Student Award was recommended to be discontinued was that the opportunities on the various campuses to participate in campus organizations and fraternities vary substantially and seriously affect the candidates' chances in the judging process. The Distinguished Civil Engineering Senior Student Awards to members of the 7 student chapters will be continued with some upgrades in their recognition.

It was proposed and tentatively adopted in the unapproved Section budget that "gifts" of $1000 per year each be made to the universities with student chapters to subsidize their civil engineering students' needs. There are no recurring funds in the Section's income to fund this and some other proposals made. It was vaguely suggested that the Section's reserves should be spent down to cover these costs and no direction was given beyond that eventuality.

The Board acted to approve the funds requested by the faculty advisor, Luke Lee, of the Louisiana Tech Student Chapter for the section to support the Chapter with a $1500 contribution in its efforts to host the 2007 Deep South Conference of student chapters. It was noted that there were also funds budgeted to support any of the 7 student chapters in the Section that may win a competition in the regional contest and advance to compete in the national competition.

There seemed to be some confusion about the Section's participation in the Rebuilding New Orleans Forum, that is under the auspices of the Georgia Institute of Technology. Participation in the Forum is limited to invited guests only and there is confusion about what role the Section members who are invited will play if any.

A formal report of the Legislative Committee Chair was presented orally and in writing covering the issues raised by — and the final disposition of — the various bills that would affect the practice of engineering and engineering businesses that were considered during the 2006 regular legislative session. The 2 bills that passed were first, HB 284. It changed the engineering registration law. However, it was substantially amended to gut it of offending regulations that would have inappropriately affected engineering business in Louisiana. This left a revision to the dates of the terms served by the members of the Louisiana Professional Engineering and Land Surveying Board. Second, HB 689 provides that all surveys that include elevations be referenced to the NAVD88 datum and reference the LSU continuous operation reference or some other established reference mark.

Highlights of the September Board of Directors meeting

The desire was expressed to only schedule the Board meetings from the aggressive number of those tentatively scheduled to be consistent with good reasons to meet. The remainder of the tentatively scheduled Board meetings that are not necessary will be canceled. This need will be predicated mostly on handling the Board's business by email communications when the business is not subject to the need for interactive debate.

The initial presentation and discussion of developing and adopting a parallel vision and a resulting series of goals for the Section similar to what the national organization has adopted was placed on the table for ongoing discussion in future Board meetings. The initial email feedback on the subject requested did not yield the significant input needed to begin an effective discussion in a Board meeting. The Board members were asked to give the subject some thought and provide the needed feedback before the next scheduled Board meeting.

Some of the most important issues that the Section needs to resolve to more effectively execute its business that is essentially to effectively serve its members are:

- providing clarity to the issues through clearly stated goals and programs with expected accomplishments and time frames set for accountability.
- identifying the important issues that will be programmed and actively pursued through the Section committee structure or by other means, and cease appointing chairs to the several committees that historically have been inactive or functioning ineffectively.
- defining a clear relationship between the Section and its branches and as a subset of this the division of labor between the Section, its branches and other ASCE entities.

The Board was advised that there is a memorandum of understanding has been developed that establishes the relationship between the Section and the national ASCE organization through its Committee on Government Affairs. This MOE establishes the process by which the Section will take the initiative to select a candidate for the ASCE appointed member to the nominating committee for the members of the Southeast Louisiana Flood Protection Authority — East and the Southeast Louisiana Flood Protection Authority — West Bank subject to the approval of the Committee on Government Affairs.

The Board selected Jerome M. Klier, PE, as its recommendation to serve as the ASCE appointed representative to the subject nominating committee for the members of the Southeast Louisiana Flood Protection Authority — East and the Southeast Louisiana Flood Protection Authority — West Bank subject to the approval of the Committee on Government Affairs. His name will be submitted to the ASCE Committee on Government Affairs.

There was an extensive discussion about dispensing the "surplus" Section funds to the branches and the original intent. There was concern that some of the Branches were not programming the expenditure of these funds on programs to effectively serve their membership as they were intended. Instead it would appear that the surplus funds are being held indefinitely in some branch reserves. It was decided that when the Section's surplus funds to be disbursed have been determined, the branches — to receive the disbursement — will be requested to present their plans to expend the disbursements consistent with their intent. Part of these plans will include the plans for the immediate use or the

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Fellowships

By E. Raymond DesOrmeaux, PE

The Section announced on August 14, 2006 the distribution of money for graduate fellowships from the Hurricane Relief Fund to the universities in the Section and their eligible graduate students who were affected by Hurricanes Katrina and Rita. Representatives from each of the recipient universities were present for the brief ceremony and the presentation of the funds during the Section Board meeting in Baton Rouge August 11, 2006. These fellowships were incorrectly referred to as scholarships in an earlier article titled "Scholarships Announced."

On being advised of the news, Tom Smith, the member of the ASCE headquarters staff that had been very instrumental in helping the Section develop the plans to award the graduate scholarships from the Hurricane Relief Fund that had accumulated, sent this note to Ray DesOrmeaux who chaired the Section's Hurricane Relief Committee.

> We on staff appreciate you all including us in this very worthwhile project. We were proud to be able to help, and the real thanks goes to you, Tim, Norma Jean and the rest of the volunteer leadership ... who have pulled together during difficult times to do this. I am not sure if anyone knows how hard you have worked on this project, but it is very gratifying to see the fruits of your labor for the benefit of the profession, the ASCE, the Louisiana Section and I am sure some very grateful students. Congratulations and thanks again for your dedication and leadership. Best regards.
>
> Tom Smith
> Assistant Executive Director
> and General Counsel

As the memorandums of understanding concerning the administration of the graduate fellowships were being executed by the officials of the participating universities prior to this ceremony, each of the university deans of engineering and/or civil engineering department chairs unanimously expressed appreciation on behalf of their universities. They also acknowledged the ASCE for its leadership in the timely commitment of resources and assistance to the profession and to higher education particularly in terms of the direct assistance to their students.

Pictured from the left are Bill Sewell, Norma Jean Mattei, Ray DesOrmeaux, Kim Garlington and Tim Ruppert as Ray DesOrmeaux presents to Associate Professor Norma Jean Mattei the Section's contribution to the University of New Orleans graduate fellowship.

Pictured from the left are Yvette Weatherton, Patrick Carriere, Ray DesOrmeaux, Kim Garlington and Charles Eustis as Ray DesOrmeaux presents to Civil and Environmental Department Chair Patrick Carriere the Section's contribution to the Southern University graduate fellowship.

Pictured from the left are Roy Wagenspack, Stephen Cai, Ray DesOrmeaux and Kim Garlington as Ray DesOrmeaux presents to Assistant Professor Steven Cai the Section's contribution to the Louisiana State University graduate fellowship.

Pictured from the left are Dean of Engineering Mark Zappi, Ray DesOrmeaux, Ray Authement and John Landry as Ray DesOrmeaux presents to University President Ray Authement the Section's contribution to the University of Louisiana at Lafayette graduate fellowship.

Section Board installed

The Section Board of Directors was installed during the Section Annual Meeting and banquet hosted by the New Orleans Branch in September. This event was held the evening following the conclusion of the Louisiana Civil Engineering Conference and Show sponsored by the New Orleans Branch and The Louisiana Chapter of the American Concrete Institute. The Annual Meeting and banquet usually hosted in one of the local country clubs was hosted in the historic Arnaud's Restaurant in the French Quarter.

The Board for the 2006-2007 administrative year was elected earlier in March during the Section Annual Spring Meeting hosted by the Baton Rouge Branch in Baton Rouge. Thomas L. Jackson, Past President of the national ASCE, presided over the installation ceremony for the Section and the New Orleans Branch Boards of Directors. The 2006-2007 Section Board of Directors are

Tim Ruppert

Ray DesOrmeaux

Officers:
- Timothy M. Ruppert, PE, President
- E.R. DesOrmeaux, PE, President-Elect
- Ali M. Mustapha, PE, Vice President
- Christopher P. Knotts, PE, Secretary-Treasurer
- Kim M. Garlington, PE, Past President

Directors-at-Large:
- André M. Rodrigue, PE
- Kurt M. Nixon, PE
- Christopher G. Humphreys, PE
- Dax A. Douet, PE

Branch Directors:
- M. Jamal Khattak, PE, Acadiana
- Brant B. Richard, PE, Baton Rouge
- Christopher L. Sanchez, PE, New Orleans
- Elba U. Hamilton, EI, Shreveport

Assigned Branch Directors:
- Daniel L. Bolinger, PE, New Orleans
- André M. Rodrigue, PE, Baton Rouge

There were two awards presented during the Annual Meeting. **Waldemar S. Nelson,** PE, was posthumously named to the Section's Wall of Fame and **E. R. DesOrmeaux,** PE, was awarded the President's Medal by President Kim M.

(Continued on Page 18)

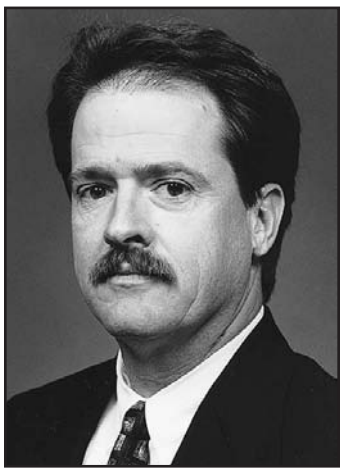
Ali M. Mustapha

Chris Knotts

Kim Garlington

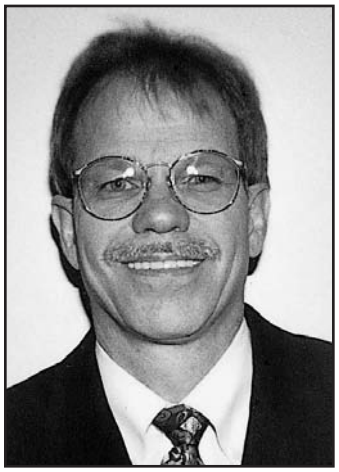
Andre Rodrigue

Kurt Nixon



Chris Humphreys

Dax Douet



Daniel Bolinger

Opportunity: Congressional *Fly-In*

By Kurt M. Nixon, PE

I had the privilege of representing our Section at the ASCE national Congressional Fly-In March 29-30, 2006. If you are not familiar with this program, the ASCE national has been sponsoring the Annual Leadership Training in Government Relations Program in Washington, DC, referred to as the Fly-In, for 6 years. It is a way for members and leaders of the ASCE to develop valuable skills in government relations and gain personal experience in influencing policy during the lawmaking process.

The training began with Brian Pallasch, Director of the ASCE Government Relations Program and a full time lobbyist for the ASCE, giving the Fly-In participants an overview of the legislation that ASCE was emphasizing during its policy week. These issues included the renewal of the Dam Safety and Security Act of 2002 (HR 4981) that established the National Dam Safety Program, and the consideration of a new law to create a similar program, the National Levee Safety Program Act (HR 4650). It turns out that the bill, HR 4650, was a very hot item particularly among the Louisiana delegation, many of whom are co-sponsors. As a follow up to the status of HR 4650, it is stalled and has yet to be considered by the House.

After the legislative overview was presented by Pallasch, he and Leslie Nolen, Senior Manager in the ASCE Government Relations Program, led the Fly-In participants in a seminar on methods of being active in engineering policy issues at the local government level. The methods presented where not revolutionary or earth-shattering but common sense ideas. They included such mundane things as

- writing letters
- making phone calls and
- making personal visits.

Most importantly, the ASCE government relations staff did a great job of demonstrating how effective these methods actually are in influencing policy. It was emphasized quite effectively that the breadth and depth of knowledge possessed in the civil engineering community is intimately related to many important governing issues and the resulting laws. How well the civil engineering community participates in the lawmaking process can significantly affect the quality of the policy and the related decision making process. Therefore, any hesitancy or reluctance of the civil engineering community to effectively participate in the lawmaking process is a detriment that must surely be overcome. It is something that I believe we — as responsible civil engineers — can easily affect to the benefit of both our profession and society as a whole.

The training culminated with a hands-on opportunity for each of the Fly-In participants to visit with the Senators and Representatives from their individual state's congressional delegation. It gave us the opportunity to discuss with our congressional delegation the legislation being emphasized by the ASCE during its policy week. For me, this was a wonderful opportunity to represent the Section, and learn important political skills and appreciate their value to civil engineers. I was very impressed by how much time the members of our congressional delegation and their respective staff members spent with us discussing the issues and the thoughtfulness of the questions they asked in the process.

Kurt Nixon (left) visits with Louisiana Congressman Jim McCrery to discuss pending federal legislation as part of the ASCE Congressional Fly-In program.

It was definitely a significant learning experience for me in how the policy development process works in lawmaking and how we as civil engineers can become involved and influential in that process. The ASCE Government Relations staff did a superb job in preparing the Fly-In participants and arranging for the visits with their respective congressional delegations in a way that no prior knowledge or experience was required.

Therefore, I strongly recommend the Congressional Fly-In to the Section member who is interested in personally becoming an effective participant — or a more effective participant — in the national, state and/or local lawmaking processes. I believe the training and the first-hand experience that I gained by participating in this Congressional Fly-In will be invaluable to anyone in achieving this goal. If this is your interest, I urge you to contact someone in the Section's elected leadership to express your interest and desire to be considered to represent the Section during the next scheduled Fly-In.

Editor's note: A principal goal of the Congressional Fly-In is to develop a cadre of grassroots ASCE members who will effectively participate and facilitate the effective participation of others in the lawmaking processes. Through sharing his Fly-In experience here, Kurt Nixon partially contributes to this goal and justifies the investment that was made in his training. For this and his continuing service to our profession we should be truly grateful.

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dedication and scheduled use of the funds.

Concern was expressed over the lack of participation in the Section that was indicated from the rate — near 50 percent — of the ASCE members who choose to pay their volunteer Section dues. There were several situations that could explain the apparent lack of interest expressed by the ASCE members assigned to the Section and demonstrate it by not paying their section dues. They are the ASCE members who:

- live in the remote parishes far from the densely populated center of the branches
- participate only in national ASCE committee activities and programs.
- maintain their membership for resume purposes only.
- do not need or seek the values that Section membership offers

There was further discussion about the possibility of establishing additional, smaller branches that would bring the remotely located ASCE members assigned to the Section geographically closer to a branch center. It was noted that the Lake Charles area, the next largest area after the Shreveport Branch, was previously considered infeasible as a branch.

It was noted that the immediate urban population of Shreveport and Bossier City in the Shreveport Branch was apparently not adequate to easily maintain a roster of newly minted officers sufficient to sustain its Board of Directors and its appointed leadership. It had previously been observed that the Lake Charles Chapter of the Louisiana Engineering Society that is probably much larger in membership than a Lake Charles Branch of the ASCE would be is sustained only by several of its perennially active leaders being willing to regularly recycle themselves as officers on its Board.

The Section's more than $40,000 in investment accounts in the Fidelity Fund, Spartan Money Market and Spartan Market 500 Index Account are still not accessible to the Section. Access to these funds has been denied since 2003 due to a discontinuity in the membership of the Board when the individual officer with authorized access resigned and moved out of state. The paperwork for the authorization for the current Board members to gain access of these accounts was completed but never filed with the respective investment account administrators.

(Continued from Page 17)

Garlington, PE, for his exceptional service to the Section as its Vice President during the 2005-2006 administrative year. This is an award given by and at the discretion of the Section Presidents to acknowledge the service of the individual who in their estimate served exceptionally in the Section's leadership during their administration.

Changing directions

Recent email communications between Section leaders may be signaling a planned change in the future character of the Section leadership and in the way it views its business — popularly referred to in management literature as a *paradigm shift.* Current President Tim Ruppert and the President-Elect, Ray DesOrmeaux, have had discussions about how to begin what they see as a needed redirection of the Section's leadership and its related management. To succeed, their plans include how the planned redirection if effective may be given future impetus to be ongoing and more effective in the management and leadership of the Section.

An ongoing observation and concern among the Section's recent leadership has been the relative decline and near disappearance of the Section's standing and ad hoc committee activities. Over 15 years ago, the Section Board of Directors was increased by 4 directors-at-large with the intention to bring active and capable section members into the Section elected leadership and service thereby creating a potential pool for future Section officers. An ulterior motive was to assign the Section's standing and ad hoc committee responsibilities to these directors-at-large as a means to demonstrate their effectiveness and to facilitate committee functions and input through a chair that is also a member of the Board.

The actual experience has been almost the exact opposite of the original expectations. The problem appears to be quite basic. There has not been a spontaneously precipitated and evolving strategic plan that defines and regularly revisits the informal vision, mission, goals and the related objectives around which the Section's priorities and programs are developed and pursued by its leadership. The close association of the appointed (committee) and elected leaders of the Section being one and the same and in regular attendance at board meetings did not naturally precipitate planning with priorities and effective programs.

A more aggressive, formal and intentional effort appears to be necessary. This effort will be expedited by the Board either acting as a committee of the whole or on the recommendation of a strategic planning committee. The Board will attempt to go through a formal planning process and future plan updating cycles in successive years to clarify and focus its priorities and programs. In doing this, it is hoped that the Section's high priorities and related programs will be effectively identified and implemented by negotiating their scope and the annual expected achievements between the Board and the appointed committee chair/members. Further, for each committee at least one officer will agree to serve as its champion encouraging, tracking and reporting its progress, facilitating its needs and representing its cause to the Board.

Through this active awareness, it is hoped that the Section leadership will get on a steep learning curve to more effective committee service stimulated through clarified responsibilities and effective leadership provided by the Board. In this hothouse environment, program progress should be more measurable and regularly monitored with few surprises relative to success or failure. Based on the Section's ongoing programs and priorities identified by each new administration, decisions can be made on whether to continue programs, try again or redirect efforts more productively based on changed priorities and past performance. For continuing programs, strong attempts should be made to retain the ongoing services of the effective committee chairs/members to sustain the momentum of the previous success and avoid retooling.

Flood protection authorities

On September 30 Louisiana's voters considered adopting the constitutional amendments that will enable the previously passed legislation that establishes the Southeast Louisiana Flood Protection Authority — East and the Southeast Louisiana Flood Protection Authority — West Bank and overwhelmingly passed the first 3 proposed amendments covering the flood protection authorities. In anticipation and expectation that the voters would adopt the amendments, the Section leadership begins a Section-wide search for qualified candidates to be considered by the nominating committee to fill the 18 positions of the two authorities. If you are interested in contributing in the candidate search, please feel free to contact your Section of branch leadership. The ASCE will have representation on the nominating committee.

The organization of the authorities and the qualifications/eligibility for candidates for nomination that includes licensed engineers and related professionals is spelled out in Act 1 of the First Extraordinary Session, 2006. The Act repeals, or amends and reenacts portions of Title 38, 42 and 49 of the Louisiana Revised Statutes.

- Career Benchmarks -

Section members **Allison K. Boucvalt,** PE, **Stephen W. Buskie,** PE, **Naveen Chillara,** PE, **Robert J. Delaune Jr.,** PE, **Natalie J. Forbes,** PE, **Clay E. Gottschalck,** PE, and **Christopher W. Normand,** PE, recently earned their professional engineering license in Louisiana. If you are in contact with any of these engineers, please offer your congratulations on their accomplishment.

Louisiana residents **Marshall L. Babin,** PE, **John L. Ball,** PE, **Caryn E. Benjamin,** PE, **Anthony J. Bertucci,** PE, **Jason D. Cardon,** PE, **Nicholas I. Chachere,** PE, **Micah J. Crochet,** PE, **Katrinna O. Durbin,** PE, **Julie R. Fourrier,** PE, **Bill R. Irwin,** PE, **Theodore A. Johnson,** PE, **Charles M. Munley, Jr.,** PE, **Scott M. Perrien,** PE, **Brian S. Smith,** PE, **Travis G. Smith,** PE, **Fang-Fu Tang,** PE, **Michael L. Thompson,** PE, and **Xuyong Wang,** PE, recently earned their professional engineering license in Louisiana and they are not members of the ASCE. A copy of this issue of the journal is sent to them as an informal introduction to the Section. If any of them wish to join and/or find out more about the ASCE, they are hereby invited to visit the ASCE national website, http://www.asce.org. If you are in contact with any of these engineers, please consider formally introducing them to the Section by inviting them to attend a branch meeting as your guest.

Editor's note: There are three disciplines that are licensed by the Louisiana Professional Engineering and Land Surveying Board and that may be considered closely related to civil engineering. They are the environmental, structural and architectural engineering disciplines. As of June 2006, the active engineering licenses conferred by the Board were approximately 5937 in civil, 741 in environmental, 58 in structural and 8 in architectural.

— net surfing—

ASCE national organization:
http://www.asce.org

Note: Most ASCE-related pages can also be addressed through links at this website. All section and branch officers are listed at:
http://www.asce.org/gsd/localofficers

ASCE Acadiana Branch:
http://www.asceacadiana.net

ASCE Baton Rouge Branch:
http://branches.asce.org/batonrouge/index.htm

ASCE New Orleans Branch:
http://www.asceno.org

Louisiana Tech ASCE Student Chapter:
http://www.latech.edu/tech/orgs/asce/

UNO ASCE Student Chapter:
http://www.uno/~engr/asce/asce.html

ULL ASCE Student Chapter:
http://www.engr.usl.edu/cive

LSU ASCE Student Chapter:
http://www.ce.lsu.edu/~asce

ASCE Louisiana Section:
http://www.lasce.org

Louisiana Engineering Society:
http://www.les-state.org

Louisiana Professional Engineering and Land Surveying Board:
http://www.lapels.com

Taxing consequences: What to do with a large IRA that has been inherited or accumulated

By Thomas R. Thurmond

At some point you may come into a large sum of money or property as the beneficiary of a deceased IRA holder or from a distribution to you as a retirement plan participant. Understanding the tax consequences may prove helpful.

IRA beneficiary

As an IRA beneficiary you have several options:

- Take a lump-sum distribution of the IRA now.[1] Lump sums from traditional IRAs are generally subject to income tax, except for the amount of nondeductible contributions made to the IRA, while Roth IRA distributions may be free from taxation.
- Surviving spouse beneficiaries may treat an IRA received as a beneficiary as his or her own and name new beneficiaries to *stretch* the IRA to subsequent generations.[2]
- Non-spouse beneficiaries may take annual required minimum distributions over their own life expectancies and name a beneficiary to *stretch out* their remaining IRA balance.
- Beneficiaries can withdraw the entire IRA balance at any time.[1] Beneficiaries may take more than the minimum required amount from the IRA at any time.

Retirement plan lump sums

When the time comes to decide what to do with your distribution from an employer's retirement plan, you may consider rolling the account balance into an IRA. You may have increased flexibility with your investment options and withdrawals. Be sure to initiate a *direct rollover* of these assets from your employer's retirement plan or mandatory withholding of 20 percent of the distribution may apply for income taxes.

For more information

Contact us about receiving an in-depth retirement review. We can also help you with an inherited IRA or a lump-sum retirement plan distribution.[3] Be sure to consult a competent tax professional as well.

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[1] Withdrawals from a traditional IRA generally are subject to ordinary income taxes. Withdrawals from a traditional IRA or Roth IRA prior to age 59½ may be subject to a 10 percent federal penalty. Exceptions apply, including the exception for withdrawals taken from an account for an owner's death. Roth IRA withdrawals may be income tax-free under certain conditions. Required minimum distributions from traditional and Roth IRAs must begin by December 31 of the year after the IRA owner's death, with exceptions that apply if the surviving spouse is the sole beneficiary.

[2] A stretch IRA's goal is to extend the period of tax-deferred earnings beyond the lifetime of the person who created the account. It may not be appropriate for a person who will need the money for retirement or short-term expenses. You should also consider possible tax law changes.

[3] The tax laws are complex and subject to change. This information is based upon current federal tax rules in effect at the time this was written.

Thomas R. Thurmond, Senior Vice President, Wealth Advisor with Morgan Stanley in New Orleans, Louisiana. He may be contacted by e-mail at thomas.thurmond@morganstanley.com or by telephone at (504)587-9669 or (800)659-0009.

Section website

The development of the Section website, www.lasce.org, is belatedly but well under way and rapidly maturing. The front page of this issue is framed with an early draft of the Section website page redesign. If you have not visited the site in recent months, please do. And if you identify a feature that is not present or not well developed that would be an asset to you, please send your comments to Jim Porter (jimporter@dotd.la.gov) or Ray DesOrmeaux (erd@erdesormeaux.com). One particular feature that is planned to be used regularly in the near future by the Section and is already being used by some branches is *mass email*. Mass email will be used to inform Section members of Section news and information, and of meeting opportunities on a more real time basis.

As web access becomes more ubiquitous among the ASCE membership, the web can be expected to become a — if not the — primary means of communication. This will lead to the national/section/branch websites becoming the primary means for the ASCE membership to communicate in and with the ASCE organization structure and to make queries to keep themselves informed.

The typical experience appears to indicate that email and website communications tend to be very efficient, very fast and relatively inexpensive compared to other means of communicating and transacting business. More reliance on web access for communication will likely be a continuing trend throughout the ASCE and for this reason it is very important for you as an ASCE member to keep your email address as active and current as your mailing address. You may be one of the over 300 Section members with no email address in your current contact information or one of the estimated 200 Section members with an inactive email address listed. ***Please check your email address.*** If your email address is not current, you may be substantially limiting the effectiveness of your current and surely your future communications with the ASCE.

Your membership contact information can be checked and updated only at the national level. This is accomplished most easily by reviewing and updating your contact information on the national ASCE website www.asce.org — the same way you can update your mailing address and any other contact information. Membership contact information may also be updated by the alternative means of calling the ASCE national headquarters toll free at (800)548-2723.

One branch in the Louisiana Section is already using mass email as its exclusive form of communication with its general membership for meeting notices and newsletters. It no longer mails printed matter to members via the U.S. Postal Service. As part of this trend, you have surely noticed that in the recent national elections, alternative balloting on the web is offered to the voting ASCE members. Similarly, an alternative registration can be transacted on the web for most of the ASCE meetings and continuing education seminars.

To minimize the impact on some Section members who may have limited computer resources or who have complained and feel imposed upon by receiving emails with voluminous messages and/or with large attachments such as the .pdf files of newsletters, the Section plans at this time to send only very brief summary email messages. The details for the brief summaries provided in the email message will be referenced through one or more URLs in the same message for the members who may be interested. The URLs will provide direct access to the details if and when a member wishes.

Nominating committee position filled

The national ASCE organization endorsed the recommendation of **Jerome M. (Jerry) Klier,** PE, to serve as the ASCE appointed member of the nominating committee that will nominate the members who will serve on the Southeast Louisiana Flood Protection Authority – East, and the Southeast Louisiana Flood Protection Authority – West Bank. Jerry's selection as the Section's recommendation was made by the Section Board of Directors during its regular October meeting.

The statutes revised by act of the Louisiana Legislature to form Southeast Louisiana Flood Protection Authorities replace the old levee boards that were considered a significant part of the problems that caused the deficiencies in the flood protection system that failed during Hurricane Katrina. The revised state statutes that establish the nominating committee to provide a qualified slate of nominees for the Governor's consideration for appointment were recently encoded into Louisiana Law when voters approved the enabling amendments to the State Constitution. The Board acted early to make its selection so that any unexpected delays in the process would be less likely to affect the representation of the ASCE on the nominating committee or delay the important business at hand.

Klier's selection was done in conjunction with the process established by a memorandum of understanding that established the required relationship between the Section and the national ASCE organization. In the process, the name of the individual selected by the Section Board as the recommendation of the Section is submitted to and received by the ASCE Committee on Government Affairs for its review and consideration for approval. Once approved, the ASCE appointment is submitted by the ASCE to the State of Louisiana.

Notification of the endorsement of Jerry Klier as the ASCE appointment to the nominating committee came to the Section October 25, 2006 via email message. The image of the letter from the ASCE headquarters to Renee F. Free, Deputy Undersecretary of the office of the Louisiana Secretary of State, notifying her of the appointment was attached to the email.

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- 27 April 2006 **The World Trade Center Investigation: Analysis and Recommendations:** Dr. Fahim Sadek from NIST, Washington, DC, presented the recommendations from the investigations of The World Trade Center collapse. This was the Annual David Hunter Lecture.
- 6 June 2006 **New Orleans Levee Failure:** Gordon P. Boutwell, Jr., PE, from Baton Rouge presented the facts from the Investigation Committee Report about the New Orleans Levee Failures during Hurricane Katrina. A record more than 150 members attended this seminar.
- 17 August 2006 **Achieving Flood-Resistant Design Seminar:** Chris Jones from North Carolina gave a timely seminar about ways to design structures that will be flood resistant.
- 26 October 2006 **Sheet Pile Design Seminar (8 Hours):** Dr. Richard Hartman from New Jersey will present an 8-hour seminar on sheet pile design. A handout of design examples will be part of this seminar. The seminar is a joint effort with the Joint Committee for Continuing Education and L. J. Foster and Co.
- 14 November 2006 **Offshore Seminar:** Jose Vasquez of Houston, Texas will present the Annual Offshore Seminar on Soft Berth concept.
- 7 December 2006 **Are you using ASCE-SEI 07/05 Correctly for Wind Design?:** Dr Frank Bernardo from Florida will present the ways to use ASCE-SEI 07/05 for wind design. The new code has become very complex for normal use. Lessons learned from practice in Florida will be part of the seminar.

Most of our committee members are back in town as may be indicated by the number in attendance during the recent seminars. The New Orleans Levee Failure seminar attracted over 150 members and other seminars are also being very well attended.

The Structures Committee achieved another milestone this year. Effective October 1, 2006 the Structures Committee became a local chapter of ASCE Structural Engineering Institute (SEI). It will also remain the Structures Committee of the Branch. After over 2 years of effort the bylaws of the Committee were revised to change the name of the organization to the *ASCE-SEI New Orleans Chapter.* Under the revised charter the Committee can freely serve all ASCE and SEI Members.

The ASCE Institutes were formed to make it possible for a non-civil engineer professionals to participate in the ASCE through its institutes. Similarly, a person without a civil engineering degree and with expertise in the field of structural engineering can participate as a member of the ASCE-SEI New Orleans Chapter. The new change will make it possible to serve the interests of a larger group of members interested in — and/or associated with — the field of structural engineering. From now on the operations steering committee in the ASCE-SEI New Orleans Chapter will be referred to as its Executive Committee.

All seminars are held at the University of New Orleans. Seminar dates, pertinent information, and registration can be found posted on the Branch website at www.ascceno.org. You may add your name to the mailing list of the Committee with an email request to Mark Gonski (mark.h.gonski@mvn02.usace.army.mil). The committee is always interested in new topics and speakers. Your recommendations for topics and speakers can be sent to Jim Danner jdanner@densoneng.com.

The Committee has also continued its support of the MATHCOUNTS competition and the regional science fairs. The Committee provided judges, monetary awards and donations to both. Committee member Norma Jean Mattei, PE, organized the annual ASCE-sponsored outreach event at the New Orleans Jazz and Heritage Festival held at the Fairgrounds. The event is an activity that attempts to foster an understanding in some aspects of civil engineering in younger children. The Committee provided funds to University of New Orleans Student Chapter to rent a truck to haul their concrete canoe to the Deep South Conference competition because they lost their trailer during Hurricane Katrina.

One of the Executive Committee members and a prominent ASCE member, Herbert J. Roussel, Jr., PE, died in September 2006. Roussel was a member of the Executive Committee from its inception. Another Executive Committee member, Pramod M. Patel, PE, moved to Houston, Texas in July. The Committee wishes him all the best. The services of both these gentlemen and their contributions to our community will be missed. A new member, Jayant S. (Jay) Jani, PE, who is an accomplished consultant and a social volunteer, has been added to the Executive Committee.

The Structures Committee elected new leadership for the 2006-07 administrative year. They are

- James R. Danner, Jr., PE, Chairman
- James R. Danner, Jr., PE, Treasurer
- Thomas M. Smith, PE, Vice Chairman and
- Mark H. Gonski, PE, Editor

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- The Deep South Conference of student chapters is being hosted by the Chapter (March 22-25th). For more information or if you would like to be a sponsor please contact Mary Lou Schwaller at chair@deepsouthconference.com or check out our conference website at www.deepsouthconference.com.
- Hacker's Classic Golf at Tech's golf course. The annual Chapter fund-raiser will be scheduled for early May. Please look for announcements/flyers as plans mature. For more information contact Michael Rister at mcr015@latech.edu.

The ASCE student chapter is going strong, led by its officers

- Nathan Linhardt, President
- Michael Rister, Vice President
- Jim Ellingburg, Treasurer
- Hailey Prince, Treasurer and
- William Watson, Marshall

and its committees

- Paul Will, Community Service Chair
- Mary Lou Schwaller, Conference Chair
- Brittney Rojas, Conference Vice Chair and
- Rachel Hicks, Conference Vice Chair

For more information or if you'd like to meet our student chapter please email Nathan Linhardt at nli002@latech.edu.

Editor's Journal

By James C. Porter, PE

Getting from here to there

The aftermath

The national dialog regarding the technological integrity of the hurricane protection system in the New Orleans region after its partial but critical failure appears to follow a narrow and probably inappropriate criticism. By its very nature, the legacy hurricane protection system in the New Orleans region was constructed, enhanced, maintained and operated over generations of technology applications with apparently little interim consideration for maintaining its integrity assessment based on current technology and conditions. However, much of the criticism — though definitely not all — appears to be based on a critique considering only current technology to explain the shortcomings and find fault with the original design.

The state of the technological integrity assessment of the hurricane protection system in the New Orleans region appears to have been consistent — nonexistent — with what I believe is a perceptual disconnect in the civil engineering community. This disconnect has long existed, still exists and can continue to lead to inadequate and failed engineered facilities of unknown current character. It would appear to be a cultural problem that is founded in the way civil engineering is generally perceived, practiced and taught in the United States.

Professional behavior

It would appear that the U.S. Army Corps of Engineers did a reasonably credible job of explaining a significant shortcoming of its own. In the past, it tended to salute and follow Congressional dictates regarding the authorization of its projects without question no matter what inherent engineering shortcomings may have existed in those dictates. While this may be considered respectful professional military behavior, it is neither appropriate nor responsible behavior for a professional engineer or a professional engineering organization.

The Corps appears to recognize it has a professional engineering obligation that was always there to provide responsible feedback concerning the engineering shortcomings in Congressionally authorized projects and thereby encourage responsible modifications or at least a conscious public understanding and acceptance of the perceived shortcomings.

Conclusions drawn by early investigators assigning culpability in criticizing the engineering appeared to be unfounded. They appeared to be inappropriately extrapolated from the field investigations of the physical problems that explained the failures, and evidence of possible errors in engineering and possible but not proven poor judgment. This served only to cause early and unproductive finger pointing and defensiveness and reflects poorly on the otherwise high integrity of the investigations.

Culture

I believe that there is an inappropriate cultural behavior that is not unique to the Corps but extends profession-wide among civil engineers in the United States. It is the tendency to *partially* engineer systems and facilities — typically and indiscriminately depending on the desires and instructions of the client. It is what may be considered a narrow *design/build focus* with the goal to facilitate only the expressed desires of the client. The resulting deficiencies of partial design considerations from a facility's completion on are typically ignored relative to professional assessment of operations and maintenance until it either becomes obsolete, deficient or fails. The typical conditions of the facilities reported in the ASCE infrastructure report card and the complaints typically lodged by structural and geotechnical engineers related to the poor conditions in their practice would appear to confirm this observation.

Doctors increasingly don't typically sit around and wait for their patients to get ill to treat their ailments. They are taking the initiative, recommending regular check-ups and advising their patients about diet and life-style choices that can affect their health. Unprofessional design engineers with no initiative don't advise their clients about design, construction, operations and maintenance issues that can result in costly premature deterioration and failure of their partially engineered facilities, and cause public health and/or safety problems. As with the medicine model, engineering services for design and construction should include an assessment of anticipated operations and maintenance as part of the routine services provided. They should not be separate on-demand services particularly relegated to a time after what are otherwise avoidable problems that manifest themselves.

History

The history of the highway bridges on the public road system of the United States provides what may be an insight into a parallel history of — and future for — the New Orleans hurricane protection system. As such, it may provide an insight into the future opportunities for engineered operations and maintenance of the hurricane protection systems and all other engineered systems and their facilities that have a similar historical legacy.

Maintaining a current technological assessment of a facility including an estimate of its resilience in failure if or when an unlikely failure event may occur are important concepts. They are known and the failure of the hurricane protection system in the New Orleans region is a direct result of a failure to systematically maintain and respond to a current technological assessment. Even the deficiencies in the original design would have been discovered early on and possibly corrected if a current technological assessment had been maintained. In highway bridge structures for example, resilience is often accomplished by structural redundancy and ductility that will deter sudden collapse. There are parameters and details for hurricane protection facilities that can provide resilience and mitigate damage under extreme flood conditions that exceed their design capacity no matter how improbable yet still possible.

A philosophical shortcoming in the culture and practice of civil engineering would appear to have led to some of the problems experienced with the hurricane protection systems. It is the same shortcoming that led to the problems with — and reassessment of — highway bridge engineering on the public road system in the United States. It is the narrow design/build focus leading to partially engineered facilities. This inadequacy was clearly exposed by the 1967 collapse of the Silver Bridge across the Ohio River near Point Pleasant, West Virginia resulting in 46 fatalities.

The solution was a major philosophical change in the practice of highway bridge engineering. It will hopefully be rediscovered and implemented for flood control systems and their facilities. It is the application of current engineering technology not only to the initial design and construction of facilities but to the ongoing custodial functions — the routine engineering assessment of the operations and maintenance practices over the life-cycle of the individual facilities and in perpetuity for the entire system.

When the Romans built public facilities with the apparent intention that they would last indefinitely they invested substantial resources and materials to build facilities that survive in service today and sometimes seem to have thrived on neglect. Some of their roads and bridges have been in service for over 2000 years. By comparison, the temporary nature of the American frontier culture appears to have filtered into the contemporary philosophy for the engineering of its infrastructure. Bridges and roads such as the original pavement on the Interstate system have been typically designed with the expectation of a 20-year service life. This is an inexplicable lack of forethought. Inappropriately, some relatively frail "engineered" facilities designed for a short service life continue in service well beyond it while there is typically no routine engineering assessment of their acceptability relative to the ongoing operations and maintenance practices.

Life-cycle management

The balance sought in *completely* engineered facilities is found in what may be referred to as *life-cycle management*. This is where facilities are designed and constructed for a realistic service life that is supported with responsible engineering operations and maintenance practices over the actual service life. Responsibly managed engineered facilities are operated and maintained consistently with how they were originally engineered in design and construction or they are operated and maintained consistently with an engineering assessment of the actual operations and maintenance practices and the existing conditions using current technology. In this envi-

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State highway system

In his article titled "Louisiana still wants free ride" in *The Advocate 8/6/06*, columnist Will Sentell notes that

Any bid to improve roads in Louisiana always seems to boil down to two facts:

- The need is there.
- The political will to pay for it is not.

Sentell did his homework noting that Louisiana's current $12 billion backlog in highway needs is growing at the rate of $300 million a year and that by 2009 the declining purchasing power of Louisiana's highway trust fund dollars supported by state gasoline taxes will result in the state not being able to match the federal funds available that provide 80 to 90 percent of the construction cost on the federal aid highway system in Louisiana. In 2002, then Chair of the House Transportation Committee, Juba Diez, recognized this deficiency and advocated an 8 cents per gallon increase in the state gasoline tax. He noted that "Something has to be done soon..." Of Louisiana's 20 cents per gallon gasoline tax, the Louisiana Highway Trust Fund is supported by 16 cents and the remaining 4 cents is a temporary tax dedicated to the Louisiana TIMED program.

The perception that has been historically and frequently promoted by the local press that the Louisiana DOTD is not competent to manage the state highway system or its funds is not a reality. However, it is being used as an illogical excuse not to adequately fund the state's highways. Louisiana DOTD Secretary Bradberry, who has been struggling to overcome this perception, was quoted as saying, "Running a better business is not going to get it." The bottom line and the reality, Sentell notes, is that

> Highways are like other expensive issues in Louisiana. Lots of voters want something for nothing. They want better roads but think someone else should pay for them... (They) have never gotten over the days when energy dollars paid for many state services.

Sentell supports his observation by quoting previous DOTD Secretary Movassaghi who said "I think it has to do with our culture. In the past we hardly paid for anything."

Without substantial voter support, it is clear that there is no collective will nor willingness in Louisiana's elected and appointed leadership to exercise the leadership needed to resolve the problem of the clearly deficient highway funds. The problem has transcended administrations resulting in a significant and predictably accelerating debilitation in the serviceability of the state highway system.

This political gridlock leads one to wonder if the transportation public awareness campaign being organized by an alliance of "stakeholders" can convince the seemingly intractable Louisiana voters and their timorous representatives to act in their own best interest. These stakeholders — engineers and contractors — will benefit most from the increased highway funding they will espouse because their businesses and employment rely substantially on state highway engineering and construction work. The obvious, self-serving conflict of interest will not go unnoticed by savvy voters. However, what the stakeholders do have going for them is that they are articulate, responsible and influential citizens who are close to the situation and appear to understand its realities, and they live here too.

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ronment, each new generation of engineering technology is routinely applied to facilities system-wide by systematic uniform engineering assessments of the integrity of the system and its facilities.

For a hurricane protection system and its component facilities — as with any other engineered system — every component would be subject to scheduled routine engineering maintenance inspections followed by an engineering assessment of the operations and maintenance practices using current technology and reflecting the current conditions. This may mean that additional soil investigations will be required to support the current engineering assessment and current surveys of the cross sections of levees may be needed to support another part of the engineering assessment. Such uniform and routine engineering assessments will reveal system deficiencies and vulnerabilities based on current standards. This information would be the basis for objective system upgrade priorities and planning, and system effectiveness reports.

The National Levee Safety Program Act proposed by HR 4650 would require the Corps of Engineers to inspect and assess all levees for the purpose of protecting human life and property. It is hoped that if this bill passes the implementing rules will allow the Corps to delegate its inspection and assessment responsibilities to the local government organizations that manage the flood control systems while it would retain the responsibility for establishing policy and technological standards such as reliability-based flood analysis standards and process enforcement. This would allow the talent for responsible engineering maintenance and operation to exist in the organizations nearest to the problems and in the greatest need of the sophistication to be a viable participant in the hurricane protection process. Thomas P. "Tip" O'Neill, Jr., former Speaker of the House, is credited with saying "All politics are local." The same premise for good engineering is suggested here. Good — if not all — civil engineering is also local especially that which deals with unique local hydrological and geological or earth science issues that rely on local engineering experience and technology.

Civil engineering practice and education do not typically provide for or address the applications required to support life-cycle management. These applications include not only the technological applications that *provide* but also those that *sustain* the integrity of engineered systems and facilities. The engineering technology that is taught and generally practiced focuses almost exclusively on cookbook design and construction applications. The application of engineering technology to the custodial functions of operations and maintenance is generally not taught, not appreciated and not practiced. I believe that this can leave a huge hole in public health and safety that is uniquely the responsibility of the unassuming civil engineer.

Systems thinking

After having been employed continuously by the same government organization for over 40 years, I have been through several reorganizations under as many different guises and notions. The one thing that never seems to change is the basic work and work relationships of the individuals in — and basic components of — the organization other than in response to usually external, basic conditions imposed. In the meantime individuals and organizational components have been moved logically, illogically; helter-skelter all over creation with little consequence other than causing initial confusion, frustration and anger.

One consequential observation is that most of the problems in an organization come from the *system* and not the *individual.* The system is the combined *relationships* between the individuals and/or the organizational components to accomplish the work. Organizational dysfunction is found mostly in the dysfunctional relationships between the individuals and the organizational components rather than in the work of the individuals where the blame for dysfunction is most often placed. Keeping the individuals and the functions of an organization in a state of flux due to regular reorganization for its own sake would not appear to be helpful.

Systems thinking is how the employee — the lowest common denominator — in the organization visualizes things. For instance, rather than visualizing the overall work in the organization as a near paralyzing, chaotic series of complex interconnected functions, individuals visualize only how they and their particular work fits into the system and connects to other individuals and their work in the system. The other important component of systems thinking is each individual focuses and works toward the same now banal goal — serving the customer. Experience demonstrates that enabled and facilitated systems thinking by individual employees spontaneously leads to increased profits and efficiency, and both employee and customer satisfaction. Experience also demonstrates that partial implementation of systems thinking is effective. As the familiar lyrics goes, "Who can ask for anything more..."

Dubbing the opposite of systems thinking as *chaotic thinking* (my term) is done here to distinguish the dynamics and results of the two forms of thinking and acting. If individuals, or more particularly the leadership of an organization, are prone to chaotic thinking, they perceive the overall work as a chaotic series of complex interconnected functions. The only possible solution

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discussing the key structural aspects of the recently completed Upper West Tiger Stadium project, and the challenges encountered during its design and construction and with the time constraints. Calvin, the lead structural engineer and engineer of record of this high profile project for the Tiger Athletic Foundation, also led a walking tour of the project for the 40 branch and student chapter members present.

One of the main challenges, Calvin explained, was to have the project completed between football seasons. This had never been done in the United States and definitely a tremendous feat to accomplish. Most of the subsurface foundation work was completed during the 2004 football season and the required demolition began at its conclusion. Then the race was on to have the new upper deck operational for the 2005 football season. No thanks to Hurricane Katrina, this project was completed and operational for the first home game of the 2005 football season.

The members of the Branch Board of Directors for the 2006-2007 administrative year are

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In closing, I am very excited about serving as your Branch President and look forward to the challenges as well as being your representative.

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would appear to be for the most enlightened and intelligent — the leadership with a perception of the *big picture* — to carefully study the complex work of the organization and solve the efficiency and productivity problems from the top-down. This is typically done by making a *quick-fix* from an educated guess or a wild stab in the dark. It is a decision to maybe downsize this or to reorganize that...

Immediately following World War II corporate America was so inefficient that nearly any reasonably rational quick-fix worked at least modestly well or temporarily validating its practice. Now that corporate America is more trim, quick-fixes generally do not work and they usually make things worse.

Systems thinking is founded mostly in the long-established principles developed by W. Edwards Deming that were implemented by the Japanese automobile industry following World War II. Their application and ongoing success to this day cannot be denied. In fact, it is no accident that systems thinking is referred to as the *Toyota model*. Deming espoused that no one knows an individual's job better than the individual that does it. Given systems thinking and education and empowerment of the individual to institute and measure local improvements in collaboration with the other employees whose work is connected, Deming's idea becomes a powerful organization-wide engine for continuous improvement. With the implementation of systems thinking, continuous improvement — another Deming idea — spontaneously breaks out organization-wide without the need of new staff or expensive consultants. Intelligent downsizing, redefining and redirecting the work focusing on — and being consistent with — customer service; and simultaneous employee satisfaction are the expected outcomes.

A corollary to systems thinking applied to individual employees is that it can be applied to the organizational component and its relationship with other components and to the organization and its relationship with other organizations. In each case, promoting and acting on the effectiveness of the relationship by systems thinking is a key to continuous improvement. In this sense, the local levee boards or their successor organizations have to become participants in an effective relationship with the Corps in providing effective hurricane protection systems. Rather than providing their historical political content to the process, the local levee boards should develop some technological sophistication and provide services to the process to become part of the process and a real partner. It would appear that only then can the opportunity for systems thinking exist and then be enabled between the participating organizations to promote and act on the effectiveness of their relationship leading to the continuous improvement of the hurricane protection systems.

Mixing politics and technology

System decisions must be engineering-based and intelligently developed. The Bureau of Public Roads, later the Federal Highway Administration, recognized the value of the long-term, corporate memory of the technologically sophisticated state highway agency and its value to the technological assessment of bridges. Otherwise, an unsophisticated owner/operator levee board — one having no depth of technological understanding and no comprehensive assessment of its system and its individual facilities — cannot competently participate in the operation and maintenance of a hurricane protection system. Historically, the custodian organization like the south Louisiana levee board has been an unsophisticated, counterproductive participant believing that politics and not engineering drive effective decisions. This validates the conclusion of the aphorism, "If the only tool you have is a hammer, all problems look like nails."

Ongoing systems development does not appear to be an appropriate function for temporary contract engineering services because the collaborative support of system decisions requires historical knowledge and relationships that are not appropriate to the nature and scope of short-term contracts. Competent system decisions are the natural product of the long-term corporate memory of a sophisticated, responsible custodian or owner/operator supported by a comprehensive assessment of the system and its facilities. As a sophisticated client, the owner/operator can competently participate in the administration of the design and construction contract services defining scope, satisfying system needs/budget and providing consistency in performance from one contract to the next.

The reorganization of the levee board systems by the Louisiana Legislature through the initiative of Senator Boasso's Senate Bill 8 became Act 1 of the First Extraordinary Session of 2006 offers some important new opportunities though the final version did descend into a rather byzantine organization typical of Louisiana politics. Four regions are established including 2 new authorities and 2 districts that include 4 existing levee boards in each. The 2 new authorities — the Southeast Louisiana Flood Protection Authority-East and - West Bank — will be headed by a board of commissioners.

The authorities provide a real opportunity to effectively guide the competent development, operations and maintenance of the hurricane protection systems via commissioners who are required to be mostly knowledgeable professionals including experienced engineers who should understand the need for a professional staff. The ringer in the deal may be that the authorities and districts are all under the purely political Coastal Protection and Restoration Authority that could easily eviscerate these subordinate authorities by undermining their best efforts. The end results could easily be no different than that produced by the parochial levee boards of the past.

Another thing that can continue to plague the process of providing effective hurricane protection systems is the ineffective and often estranged relationships between local, state and federal politicians, engineers and entities. If history is any indication, it is reasonable to expect that in Louisiana the political appointments will not necessarily be made as an investment in the interest of the public or in the intelligent management of safe hurricane protection systems.

The new mix of politicians and engineers overseeing the authorities does open the opportunity to build a responsible, technologically sophisticated, custodial organization that can set the course for competent hurricane protection systems in south Louisiana. Technological sophistication can provide the organization with the credentials and the respect to become a competent stakeholder in the development, operation and maintenance of safe hurricane protection systems. This changed dynamic should also provide the opportunity to implement systems thinking enabling effective relationships between the authorities and the Corps that heretofore were dysfunctional. With any success, systems thinking can become contagious among the most skeptical stakeholders as has been experienced previously and thereby serve Louisiana's citizens well.

Figure 4a (above). Sand boil at foot of London Avenue east side levee.

Figure 4b (left). Damaged I-Wall on east side of London Avenue north.

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basically confined to flooding the undeveloped marsh north of the 40-Arpent Canal, and Chalmette and Meraux would have been spared their ordeal.

Overall, breaching changed the flooding situation from what would have been a nuisance with minor damage to a national disaster. It is therefore imperative that the civil engineering profession understand why these failures occurred. Several teams were formed to investigate the HPS failure. The largest and best-funded ($19 million) was the USACE Interagency Performance Evaluation Team (IPET). The ASCE had 2 teams — the reconnaissance team under Dr. Peter Nicholson from the University of Hawaii and the External Review Panel (ERP) which reviewed the IPET findings. Governor Blanco commissioned the only local group, Team Louisiana. The final major player was the National Science Foundation (NSF) Team, led by the Civil Engineering department of the University of California at Berkeley. Together, the authors served on 3 of the 4 independent investigative groups.

Levees that Failed

While failures of civil engineering works may be highly embarrassing to the design/construction team, they also provide the profession with case histories. Proper analyses of these failures can lead to improved design methods and this is certainly the case with the Hurricane Katrina event. A discussion of technically the most important failures follows. They are presented together with the direct reasons for them.

The failures that flooded the majority of Metro New Orleans were those of the London Canal that drains the Gentilly area and the 17th Street Canal that drains the Lakeview area. The Lower Ninth Ward and part of St. Bernard Parish were flooded by breaches in the IHNC and small failures in the west wall of the IHNC. New Orleans East flooded primarily from collapse of the MRGO/ICWW levees on its Lake Borgne side. St. Bernard Parish flooded from the collapse of the MRGO levee along its north border, and Plaquemines Parish flooded from overtopping of its Hurricane *Back* Levee.

London Avenue Canal

It runs south about 2 miles from Lake Pontchartrain to the pump station. There was no floodgate or other protection at the Lake end, due to S&WB concerns and environmentalists' lawsuits. As the storm surge from the Lake shown in Figure 3 reached about Elevation +11 feet, two floodwalls at Elevation +14 feet collapsed. The North Breach — west side at Robert E. Lee Boulevard — and the South Breach — east side at Mirabeau Avenue. Gus Cantrell, an ASCE member, lived adjacent to the North Breach and saw it develop. Homes adjacent to the breaches were damaged, but the whole area was flooded and covered with sand eroded from the underlying old beach ridge and carried by the torrent of water rushing through the breaches. This canal had been constructed into the Pine Island Ridge and, in fact, the borings made in the canal indicate it had been excavated into this buried beach deposit. The sand is covered by varying thickness of clay and marsh/peat deposits.

The North Breach failure occurred when the surge was rising and the water level at Elevation +8 to +9 feet was below the design elevation of +14 feet. The cause of failure is attributed to lateral movement of the levee and wall that allowed the water to reach the ground surface with sufficient velocity to carry the sand with it. Based on the lateral movement and the volume of sand observed at the site, the failure mechanism described appears appropriate. The lateral movement occurred because of excess hydrostatic pressure in the sand stratum which was woefully underestimated in the design.

Immediately across the canal from the breach, small sand boils as shown in Figure 4a, and some heave of small buildings was observed at the toe of that levee. The I-wall on the levee had moved several inches. From these observations, it is commonly agreed that had the west side not failed and relieved the surgewater pressure, the damaged east wall at this location and shown in part in Figure 4b would have failed.

The South Breach occurred in the west wall just north of the Mirabeau Boulevard bridge. This failure was due to a sand boil that undermined the wall. The hydrostatic pressure under the approximately 8 feet of soft organic clay lifted it, allowing the sand to be carried from under the wall. The wall collapsed and tore into several segments. One of the segments — monoliths — flipped over so that when the remedial work began the sheetpile tips were pointed up and the concrete wall was at the bottom.

It is very simple to calculate the factor of safety against this type of failure. Figure 5 presents the geometry of the problem. Using statics — the summation of vertical forces — the factor of safety can be calculated by this simplified analysis. There are some head losses between the exposure of the sand in the channel and the sand in the land side toe of the levee. However, unless the result is very near the required value for stability, neglecting these head losses should be adequate. If the stability is questionable with such a simple approach, a more rigorous analysis can be made.

Had a calculation of this type been made during the design, the sheet piles would have been designed as the original draft of the Design Memorandum had proposed and the failures experienced probably would not have occurred.

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— Calendar of Events —

December 6-8, 2006	ASCE Seminar * Dam Breach Analysis Using HEC-RAS, Atlanta Georgia.
December 14-15, 2006	ASCE Seminar * Wind Loads for Buildings and other Structures, Dallas, Texas.
December 14-15, 2006	ASCE Seminar * NPDES Stormwater Permit Compliance, Atlanta, Georgia.
December 28-29, 2006	ASCE Seminar * Pumping Systems Design for Civil Engineers, Atlanta, Georgia.
January 11-12, 2007	ASCE Seminar * Introduction to Detention Pond Design: Parking Lots and Urban Drainage, San Antonio, Texas.
January 11-12, 2007	ASCE Seminar * Financial Management for the Professional Engineer, San Antonio, Texas.
January 25-26, 2007	ASCE Seminar * Geotextile Tube Designs, Applications and Case Histories, New Orleans.
January 25-26, 2007	ASCE Seminar * Bridge Rehabilitation, Dallas, Texas.
January 25-26, 2007	ASCE Seminar * Design of Buildings in Coastal Regions, Austin, Texas.
January 25-26, 2007	ASCE Seminar * Design for Cold Formed Steel Structures, Atlanta Georgia.
February 1-2, 2007	ASCE Seminar * Earth Retaining Structures Selection, Design, Construction and Inspection, Orlando, Florida.
February 8-9, 2007	ASCE Seminar * Designing Durable Concrete Structures, Atlanta, Georgia.
February 13, 2007	Louisiana Tech University ASCE Student Chapter Annual Winter Awards Banquet, Ruston.
February 15-16, 2007	ASCE Seminar * Testifying and Forensic Report Writing Skills for Civil Engineers, Orlando, Florida.
March 14-16, 2007	ASCE Seminar * Structural Design of Buildings and Industrial Facilities for Bomb Blast Loads and Accidental Explosions, Houston, Texas.
March 15-16, 2007	ASCE Seminar * Low Impact Development, New Orleans.
March 15-16, 2007	ASCE Seminar * Design of Metal Buildings: Avoid Pitfalls in Specifying and Procuring, Atlanta, Georgia.
March 21-23, 2007	ASCE Seminar * Structural Vibration Analysis, Design and Troubleshooting, Houston, Texas.
March 21-23, 2007	ASCE Seminar * Streambank Stabilization for Restoration and Flood Control Projects, Atlanta, Georgia.
March 22-23, 2007	ASCE Seminar * Structural Design of Residential Buildings Using the 2003 International Residential Code, Memphis, Tennessee.
March 22-23, 2007	Louisiana Section Annual Spring Meeting and Conference, Shreveport.
March 23-24, 2007	Deep South Conference of ASCE student chapters meeting hosted by Louisiana Tech University, Ruston, Louisiana.
March 29-30, 2007	ASCE Seminar * Progressive Collapse Mitigation: Practical Analysis Methods and Proven Solutions, Atlanta, Georgia.
March 29-30, 2007	ASCE Seminar * Low Impact Development Applications for Water Resource Management, New Orleans.
March 29-30, 2007	ASCE Seminar * Preparation of Contract Documents and Specifications for Engineers and Technical Staff Members, Texas.
March 29-30, 2007	ASCE Seminar * Probabilistic Design, Orlando, Florida.
May 13-17, 2007	ASCE Conference * Coastal Sediments, New Orleans.

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It should be noted that the T-walls being constructed to repair these breaches have the seepage cut-off piles extending through the 50+ feet of sand into the underlying clay.

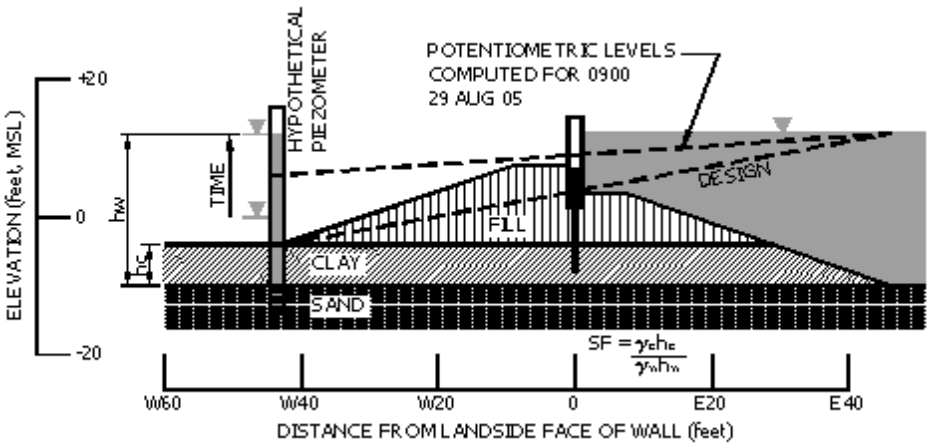

Figure 5. Geometry and potentiometrics at London Avenue south.

17th Street Canal

This canal also runs south about 2 miles from Lake Pontchartrain to its inland pump station and it had no surge protection at its Lake end for the same reasons previously explained in the London Avenue discussion. A storm surge to about Elevation +11 feet came down this canal from the Lake. The surge had reached only Elevation +8 to +9 when about 500 feet of Elevation +14 feet floodwall on the east side of the canal collapsed, sending a wall of water into the Lakeview and Lakewood Subdivisions. Residential structures up to 3 blocks away were pushed off their foundations. The floodwall on the west side bowed several inches and tilted. It was at incipient failure and avoided collapse only because the east side collapse caused the water level in the canal to recede.

The failure at this Canal was made famous by its constant press coverage as the disaster unfolded. The I-wall structure was constructed in 1994 though it had been under design as a S&WB project since 1981 when the original borings were made. In that project, the canal

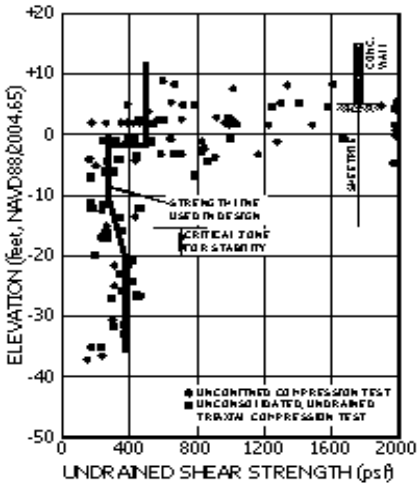

Figure 6. Design and actual soil strengths at 17th Street Canal.

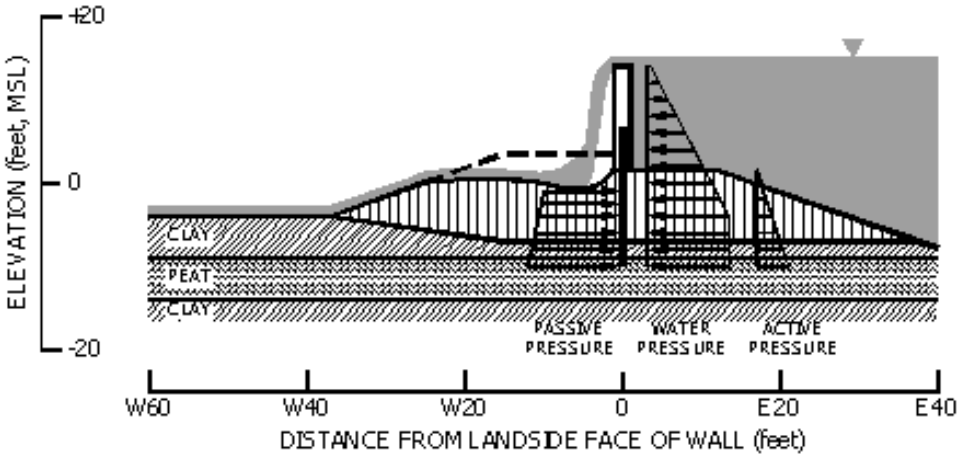

Figure 7. INHC floodwall failure by landside scour.

was dredged to a thalweg Elevation of -18 MSL. To maintain a satisfactory factor of safety with the increased slope height the levee had to be degraded and additional wall height needed was attained by building concrete monoliths on the sheet piles that were driven to a tip Elevation of -17.5 MSL. The top of the wall was designed to Elevation +14 feet with the landside levee crest at +5.5 feet and the waterside at +1.5 feet. The natural ground at the landside levee toe was at approximately -5 feet MSL. There has been some debate about the time of failure since some leakage was reported prior to the collapse. Local residents complained of seepage in the area even during the low water levels 10 months before Katrina.

The soil profile consists of soft clay and peat to approximately 35 feet below the levee crest where the Pine Island sand stratum is encountered. The levee fill consists of the original dredge spoil from the 1850s covered with additional material added over the next 100 years. There was a peat layer containing large amounts of undecomposed roots and other organic matter between approximately Elevations -10 and -15 feet. This layer was underlain by a stratum of very soft clay. Early statements attributed the failure to the peat layer.

The failure was predictable using the soils data developed in the 1981 soils investigation. The design strength profile presented in Figure 6 shows that in the zone of Elevation -15 to -20 feet, approximately 75% of the data points fall well below the assigned design strength. This design strength profile covers 8200 lineal feet of levee, and indicates the average shear strength in this zone critical for stability was 200 psf. It is interesting to note that the deeper shear strengths have the same range of values whether the sample was from the toe of the levee or under its centerline. The IPET team initially attributed the failure to the lower shear strength at the toe and not the over optimistic values on their strength plot. The IPET team, after reading a USACE report from 1988 — 6 years before construction — made a significant discovery. The sheet piles are so stiff compared to the weak soils that they do not bend in the normal manner. Rather they rotate rigidly about the tip creating a vertical void on the water side between the sheet pile and levee fill, through which full hydrostatic water pressure is applied to the wall. Including this effect yielded IPET a factor of safety well below 1.0, which they classified as "marginally stable."

Using the Modified Bishop Circular Arc analyses, the factor of safety was calculated as 1.05. Using the same geometry and the Janbu method of Generalized Slices the factor was calculated as 0.98. Both of these methods of analyses were developed in the 1950s and have been in use since. Finite element and centrifuge modeling were not necessary to demonstrate the wall should have failed. The IPET failure mechanism and storm surge level in the canal were also applied, and the factor of safety was calculated as 0.75 using the 200 psf soil strength in the critical depth zone. This confirms that the failure should have occurred with the water level in the canal several feet below that assumed in the design.

Inner Harbor Navigation Canal

This north-south waterway had two major floodwall collapses on its east side, totalling about 1500 feet in length. These failures produced walls of water that literally destroyed every structure within 4 to 6 blocks of the floodwall, and caused flooding throughout the Lower Ninth Ward. This water also contributed to flooding in St. Bernard Parish. On the west side, water gushing from the floodwall collapse destroyed several industrial facilities and contributed to the flooding of Metro New Orleans. The storm surge here came westward from Lake Borgne down the GIWW/MRGO and it peaked at about Elevation +14.2 to +14.4 feet. The floodwall tops were designed to be at Elevation +15 feet.

The south failure was due to overtopping. The top of the wall was nearly 2.5 feet below its design flood elevation. Some of this was due to subsidence, since the wall was built in 1965, and some was due to the benchmark elevations used for construction that had not been corrected for subsidence in years. As the water cascaded over the wall and impacted the levee surface at 20 to 25 feet per second, an erosion trench quickly developed. This trench increased the cantilever length of the wall and it did not take long for the wall to fail.

As shown in Figure 7, the load on the cantilever wall increases as a function of the square of its unsupported length and the moment in the wall increases as a function of the cube of its unsupported length. From this, the authors calculate that a 4 to 5-foot erosion trench would change the factor of safety from greater than 2 to less than 1.0. Scour trench depths of near 4 to 5 feet were observed by the authors in areas where this floodwall did not fail. After failure, the wall was tilted and had moved so much that an active wedge had dropped down along the water side of the sheets over one foot. At some locations it appeared that water had entered the waterside vertical crack and had piped under the sheetpile tips, thus accelerating the erosion on the passive side.

The north failure has been reported to have been similar to the North Breach failure of the London Avenue Canal. This failure occurred before overtopping occurred. Instead of failure in the soft clay Seed et. al. (2006) stated that the peat layer below the sheetpile tips caused piping erosion of the clay at the landside toe of the levee leading to a lateral movement of the wall and eventual collapse. Based on the limited length of the failure — approximately 200 feet — and the depth of the post-failure scour hole, the failure mechanism described appears appropriate.

These failures were avoidable. Adequate analysis/design tools and the experienced engineers necessary for this project were available before the Lake Pontchartrain HPS was authorized. What happened?

Mississippi River-Gulf Outlet

This 14-mile-long levee runs northwest-southeast from the GIWW/MRGO intersection, along the north side of St. Bernard Parish. It was primarily a hydraulic fill with large amounts of sand and silt without any erosion protection. Some parts used a sheetpile floodwall to bring the top to design grade. However, the sheetpiles were only 15 feet long with only 1/3 to 1/2 of this length embedded in the soil — far too little

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Figure 8. MRGO levee obliterated by erosion.

Figure 9. ICWW levee which survived the storm surge.

for stability. The storm surge coming across the MRGO from Lake Borgne reached elevations of +18 to +20 feet. A portion of the levee was at its design elevation of +17.5 feet, but the elevations of some portions were as low as +15 feet. Most of this levee was totally obliterated. The resulting flooding crossed 3 miles of marsh, to the secondary (40-Arpent) levee, overtopped that levee, and flooded the populated area in and around Chalmette and Meraux with water to Elevation +12 feet. Seed, et al (2006) uses the MRGO levee photograph shown in Figure 8 to illustrate the breached condition.

Visual reconnaissance of the failures by the authors is reported in Seed, et al (2006) and Van Heerden, et al (2006). The visual evidence clearly demonstrated that the earthen portions of this levee failed by erosion and scour caused by the storm surge and associated waves as they attacked the erosion-susceptible levee material. Boutwell (2006) reports results from erosion calculations using the overtopping wave/surge velocities from IPET (2006) and the erosivity tests on materials from the few undamaged portions of the MRGO levee by Briaud, reported in Seed, et al (2006). The IPET data shows the overtopping water here had velocities of at least 10 to 15 fps. Using Briaud's data, the erosion rates are 6 to 8 feet of soil lost per hour without accounting for the increase in water depth as erosion occurs. Including this phenomenon, the analyses showed that breaches 10 feet deep would develop within 30 to 60 minutes after waves began reaching the top of the levee. The actual failure time corresponds to a surge elevation of around +15 feet, or 2.5 feet below the design top elevation.

The designers made a conscious decision not to provide armoring against erosion for this erosion-prone material. The MRGO levee also had some sections where the upper 8 to 10 feet of the levee was actually a cantilever sheetpile wall. These sections failed as overtopping water plunged onto the landside soil producing at least 8 feet of erosion per hour and eroded a deep trench adjacent to the sheetpiles. As in the case of the IHNC floodwalls, this trench removed the soil which was providing passive pressure to support the sheetpiles. Eventually, the driving force due to the high water overcame the resisting stresses in the soil, and failure resulted.

Concerning this levee, Sills, et al (2007) state

> The levee along the Mississippi River Gulf Outlet that fronts Lake Borgne was constructed with hydraulic fill that contained significant amounts of sand and silt; it experienced numerous breaches and total loss of the levee section.

Sills was a member of the IPET.

New Orleans East Levee

The easternmost portion of the levee along the north side of the GIWW was built in a manner similar to that of the MRGO levee. It was hit with a similar storm surge coming from Lake Borgne. Large portions of this levee collapsed, flooding New Orleans East. It failed by the same mechanisms as did the MRGO levee.

Plaquemines Parish Back Levee

This earthen levee had a design top elevation near +17 feet. It was struck by a storm surge exceeding Elevation +20 feet that crossed the marshes from Breton Sound. The levee had a few breaches, but it was overtopped so severely that floodwater rushed westwards to the Mississippi River levee at Elevation +15 feet and flowed out over that levee 4 feet deep! Virtually all structures between the Back and River levees were demolished. Some were stranded on the River levee while others were carried into the River and floated away.

Levees that survived

Conversely, some levees performed successfully. The 19 miles of main levees along Lake Pontchartrain with top Elevations of +14 to +18 feet never breached though they were exposed to a storm surge Elevation +10 to +13 and were occasionally overtopped by wave action. One area near the Lakefront Airport breached due to differing levee heights provided by the different jurisdictions responsible and a damaged floodgate that had not been repaired.

The levees on the north and south sides of the *ICWW/MRGO* west of Paris Road were overtopped by as much as 3 feet, but fared well. These successful levees were composed of compacted clay. Figure 9 is a post-Katrina photograph in this area that illustrates how these levees performed.

A special case is the *Orleans Avenue Canal*, that is parallel to and located between the 17th Street Canal and London Avenue Canal. This canal had no breaches or other significant distress. The primary reason for this was a disagreement between the Orleans Levee Board and the S&WB. It left about 200 feet of this levee near the pump station some 4 feet below the tops of the adjacent floodwalls. This low section formed a spillway. While water coming over this spillway contributed to the flooding of Metro New Orleans, it also lowered the surge water level in Orleans Canal enough so that its deficient floodwalls were not overstressed and breached.

The *Duncan Canal* levee located on the Jefferson Parish/St. Charles Parish line is an interesting case. It is the most recently constructed of the walls. It did not breach, but it is difficult to determine why it did not. The majority of this project was proposed to be T-wall construction with only about 200 feet of I-wall construction. The USACE Design Memorandum for this project cites the I-wall construction as yielding 2 percent in savings over the construction of a T-wall at this location. The affected length of wall is estimated at 750 feet or more. Neither construction nor as-built drawings were available for this project. This wall was designed for an +11.5 foot storm surge according to the Design Memorandum. During Katrina, the actual surge experienced at this location was on the order of +7.5 feet.

The wall on the Duncan Canal levee has a

paved slope and an apron on the canal side as shown in Figure 10a. Since construction, this wall has subsided approximately one foot and these concrete monoliths have tilted. The wall has settled enough relative to the levee to tilt the adjacent apron slab toward the wall and the slope paving is cracked. At one location the joint opening between the monoliths is approximately 2 inches. Figure 10b shows the land side conditions before the USACE placed several feet of fill to buttress the wall until proper repairs can be made. Estimated movements due to this added fill were not available.

Transitions

The authors observed numerous levee breaches at transitions between levee and floodwall structure types and the construction differences between jurisdictions. An example of a structure type transition was the Bayou Dupre lock structure that is part of the MRGO levee. This structure is supported on driven piles and abutted by the earthen levees on both sides. The designers were concerned apparently — and rightly — about the effects of the differential settlement between the lock structure and the adjacent levee caused by the weight of the heavier levee on the adjacent pile foundations — for example, negative skin friction. Differential settlement between the levee supported on compressible soils and the pile-supported structure founded in deeper, less compressible soils could also open seepage pathways. To minimize these problems, the adjacent levee design in the transition was a lightweight shell fill. This fill will reduce differential settlement, but it is also far more susceptible to erosion than compacted clay. The storm surge eroded the shell fill, leaving the pile supported lock structure no longer connected to the levee — in other words, a large breach.

A classic jurisdictional problem occurred at the south end of the Orleans Canal out by the pump station. The floodwalls have top Elevations +12 to +13 feet. However, the levee segment under the interstate route I-10 bridge some 200 feet long had a gap with a top elevation some 6 feet lower than the adjacent floodwalls. Because of a jurisdictional dispute over who would pay for the fill in this gap, it remained 6 feet lower and at Elevation 4+ feet below the storm surge for the Canal District when Katrina hit. Filling this gap probably amounted to less than 3000 cubic yards of fill. However, it is likely that if this gap had not existed, the full surge pressure would have destroyed the walls of the Orleans Canal Pump Station and flooded the area anyway.

Synthesis

The USACE observed that the levees constructed of compacted, select clay fill performed well and even survived overtopping (IPET, 2006). Seed, et al (2006) tabulated 20 failed locations and listed the causes that they had determined for each failure. They are summarized in Table 2. It should be noted that the two locations along the MRGO levee that together are more than 5 miles of complete obliteration were combined in the tabulation so that the "Erosion from Overtopping" category is somewhat under-represented. Of the 20 failure cases, 16 are directly related to design. These 16 fall under 5 or possibly 6 different technical areas. This leads one to conclude that something clearly was wrong in the *culture* that

- recommended design levels
- designed to these levels after authorization and
- constructed the facilities

and then to have these facilities experience failures from so many different basic technical causes.

Lessons learned

The breaching of the New Orleans metropolitan area levees during Hurricane Katrina turned what would have otherwise been a nuisance into a major disaster. At least 70 and more probably 80 percent of the flooding, damage, and loss of life occurred because the levees breached. Contrary to the media reports, there was no single technical cause for the breaches of the levees in New Orleans. Rather, the technical causes were 40 percent erosion-related, 15 percent failure to properly account for groundwater pressures, and 15 percent due to incorrect slope stability analyses. At least 80 percent of the failures were due to design errors such as setting program goals — storm surge levels — or geotechnical analyses. The deeper cause, however, is believed to be rooted in the culture fostered by the design agency. Fortunately, it is taking steps to invigorate that culture, by upgrading technical procedures such as

- updating the *Project Hurricane* to provide more realistic storm surge levels for design.
- designing for full-length hydrostatic water pressure on sheetpiles supporting I-walls realizing that in the soft levee materials they tilt rigidly under hydrostatic load forming a water-side vertical conduit for water to essentially reach their toe.
- using conservative procedures for evaluating soil shear strength, including the effects of effective overburden pressure on strength.
- constructing levees of compacted select clay fill, rather than of hydraulically placed hetrogeneous materials.
- providing protection against erosion due to overtopping with armoring part of the waterside face, the top, and the landside face for levees and landside armoring adjacent to floodwalls.
- making a rational analyses of the groundwater pressure regime in pervious zones caused by storm surge water.
- using risk-based design, or at least a safety factor commensurate with the consequences of failure.

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Figure 10a. Settlement, cracking, and distortion at Duncan Canal I-Wall.

Figure 10b. Subsidence of I-Wall at Duncan Canal.

Causes of Breaching and Frequency	
Cause	Number of Cases
Erosion from Overtopping	5*
Landside Floodwall Scour	3
Classic Slope Stability Failure	3
Groundwater Pressure	3
Jurisdictional Problems	2
Transitions	2
2005 Human Error	1**
Pure Overtopping	1

* Accounts for most lineal feet of breaches

** Damaged floodgate not replaced

Table 2.

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• conducting an independent, third-party peer review for life-critical structures.

Of these upgrades in the technical procedures, the last one listed is deemed the most important of all — an outside, independent, third-party peer review conducted for all life-critical structures such as the HPS.

Addreviations

psf — pounds per square foot
cfs — cubic feet per second
fps — feet per second

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