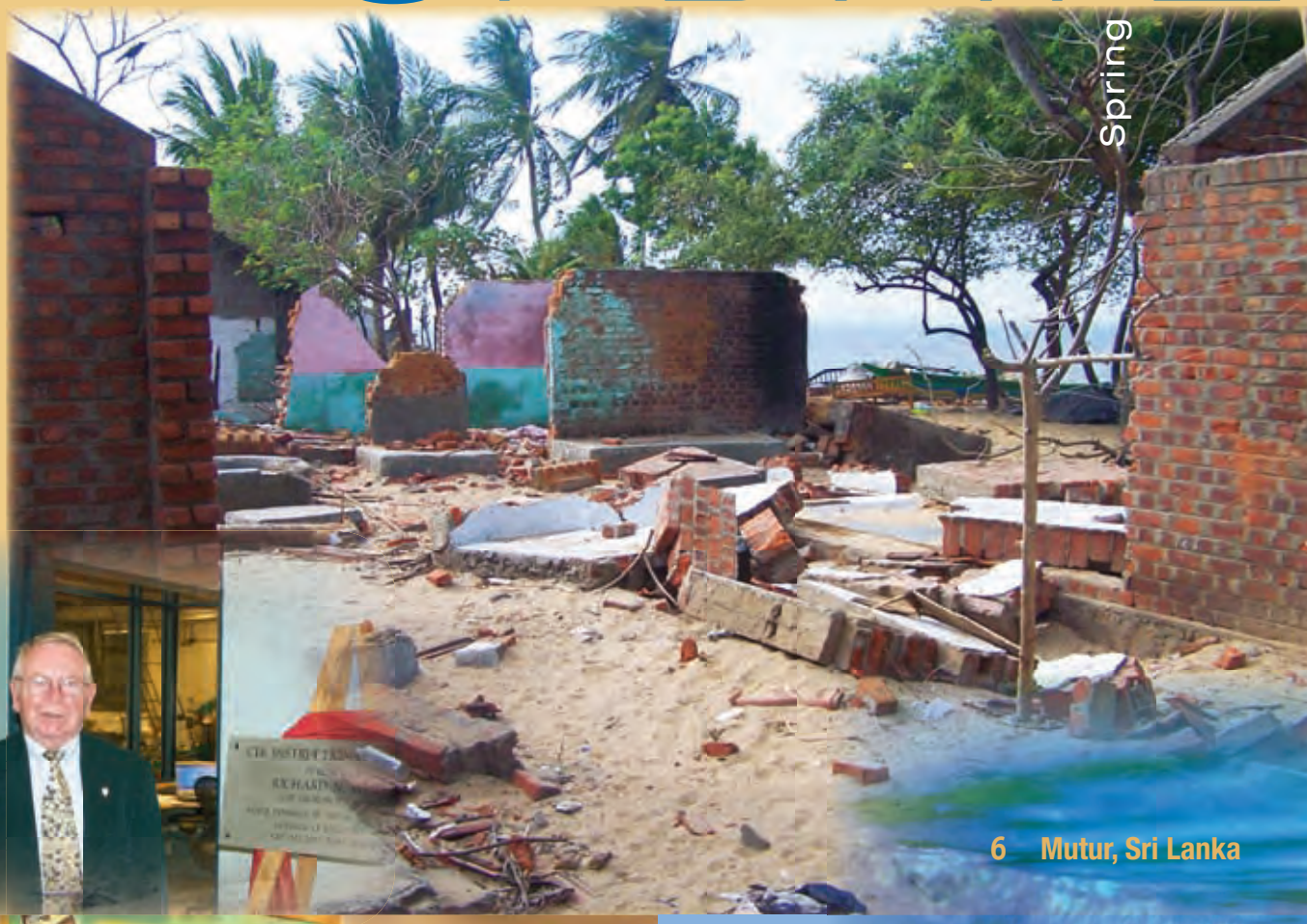
Cornell University
School of Civil and Environmental Engineering

# UPDATE

Spring 2005



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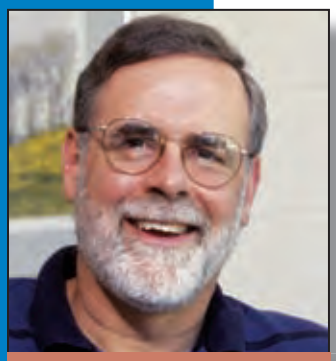
## Contents

FROM THE

# Director

## *Greetings, alumni and friends!*

This, my second year as director, has been a very busy one for both the School and me. Some highlights? In October, we unveiled the new Richard N. White Teaching Facility in Thurston Hall—a very high-tech electronic classroom/laboratory that sets a new standard for such facilities within the College of Engineering and was recently featured in a trade journal, *Sound and Video Contractor* magazine [http://svconline.com/mag/avinstall_cornell_universitys_school]. The White classroom/lab then figured prominently as control center for the "grand opening" of Cornell's NEES (Network for Earthquake Engineering Simulation) facility in November, an event attended by President Lehman that was webcast internationally.



Jim Gossett

This past fall, we also underwent an evaluation (including a site visit) by the Accreditation Board for Engineering and Technology (ABET), as part of the periodic process for reaccreditation of our B.S.C.E. degree. We received high compliments, with no listed deficiencies, and were reaccredited for another six years. And while on the subject of academics, I'll note that the *USNews* rankings of graduate engineering programs was just released: Cornell Civil Engineering is ranked 8th nationally (improved from 11th last year); and Cornell Environmental Engineering is also ranked 8th (up from 10th last year).

This issue of *Update* highlights undergraduate research, a significant part of the "experiential learning" paradigm we emphasize in the School. More than 30 undergrads annually participate in research, working with faculty and graduate students on topics of mutual interest. We have chosen to illustrate the value of this activity—both to students and faculty—by focusing on one good example among many. I think you'll find the experience of Greg McLaskey '05 worthwhile reading.

It has been a busy year for Professor Philip Liu. The tsunami that devastated much of Southeast Asia in December, 2004, brought Professor Liu's research expertise to international prominence. He led a delegation of American scientists from the National Science Foundation's Tsunami Research Group and the U. S. Geological Survey, which toured the ravaged area after the event, in an attempt to learn lessons from this natural catastrophe. This issue of *Update* provides additional reading on the subject.

Our $7.1 million capital campaign for renovating three important instructional/research labs is in full swing. I have been traveling to meet with alumni and friends, informing them about the project and other School activities. This fall we held well-attended alumni events in Washington, D.C., and in Lexington (near Boston), Mass.; and this spring we are holding similar events in New York City and in Silicon Valley, Calif. I hope you will attend when we visit a locale near you. I really enjoy visiting with our ever-enthusiastic alumni—it's invigorating!

There is a symbiotic relationship between the CEE School and its alumni. While the reputation of the School opens professional doors to alumni, it is equally true that the accomplishments of our alumni are largely responsible for the School's excellent reputation. I've learned that no matter whether they've spent professional careers in engineering or whether they've moved into non-engineering professions, our alumni sound a common refrain: their Cornell CEE education taught them how to think and contributed greatly to their professional successes, regardless of their field. This *Update* contains an article about two alumni—Mike Rolband and Steve Benjamin—illustrating exactly this point. It's gratifying reading for us faculty.

Finally, I hope to see as many of you as possible at our upcoming Alumni Breakfast in June. We can promise you a good time.

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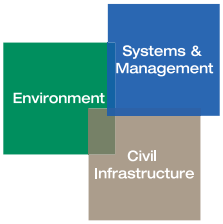

# Best Friends Challenge Classmates to Renovate Labs

Steve Benjamin (left) and Mike Rolband have been best friends for 25 years.

"I had no clue what was going on, so Mike would get out old tests and problem sets and we'd go through them together," says Steve Benjamin '80 of how Mike Rolband '80 coached him through his first year's classes. The thing is, Rolband, who Benjamin still describes with awe as the consummate engineer, wasn't having much fun either.

"I had come to Cornell the year before from a vocational high school," Rolband explains. "I had the idea that engineers built things—but that's not what you do the first two years; the calculus and chemistry and physics were a big shock."

So he dropped out.

Then he returned. Then he became a Co-op student and kept working instead of going back to class. He returned once again until he finally made it to the upper-level courses where Rolband found what he'd been looking for and reveled then—as now—in dissecting and solving novel problems. Meanwhile, Benjamin, hanging on, had taken hope in the prospect of business school.

"I'd gotten very keen on a program offered only in the OR School in which you did the bachelor's, MEng, and MBA all in six years," Benjamin recalls. "So I convinced the Johnson School to open it up to all majors." Most important, he convinced Rolband to do the program with him and helped him obtain a Lester B. Knight Fellowship.

Studying (and for a while living) together would cement a friendship in which, during the subsequent 25 years, they've turned to each other as sounding boards for all kinds of events, personal and professional. They have counted on each other when marriages fell apart and cancer struck.

There's been a lot to talk about on the business side alone. From early on, both recognized in each other an entrepreneurial bent. After twists and turns in their careers, they each came to found, and build, successful service companies, along the way relying on each other's advice on the problems common to all small business owners.

In 1988 Benjamin and his wife, Sheri, an expert in public relations, started the Benjamin Group, a public relations and marketing company that would expand into four sites in northern California and institute innovative employee benefits, among them a fully accredited on-site day care center that the Benjamin's own children attended.

On his own, Benjamin founded Benjamin Strategic Consulting, a customer loyalty measurement and management company. Both companies were sold, and he's now a partner, with his brothers, in Stromiga Inc., a real estate development company operating in the United States and his native Canada.

Rolband eventually found a way to combine his love of hiking with his passion for geotechnical engineering and construction to become a national pioneer in the technical and business aspects of wetland and stream banking—which makes possible development without "a net loss in aquatic system functions or values." Rolband's Virginia-based company, Wetland Studies and Solutions Inc., takes care of the host of natural, water and cultural resource issues that land developers must face when applying for a permit from the Army Corps of Engineers, which is responsible for the country's wetlands.

Rolband's 95 employees carry out wetland delineation, surveying, geographic information systems, stream restoration, wetland restoration, permitting, flood plain studies, endangered species surveys, and archeology.

"I could never do what I do if Cornell hadn't taught me how to think and to learn new things," says Rolband, referring to his success in a field that didn't exist when he was in school. The first Army Corps of Engineers manual on wetland delineation was published in 1987, and wetland mitigation was rarely required until the early 1990s.

That's why Rolband has financially supported the School since graduation (he's also active with the CEE Advisory Council). When it came to a special reunion gift, it was his turn to be the persuasive one. Rolband convinced Benjamin, who has also supported the School since graduation, (and gives his time to the Entrepreneurship and Personal Enterprise program's advisory council), to make a joint contribution of $50,000 toward completing the renovation of the Civil Infrastructure Complex, the first of three large laboratories in the overall project.

Together they're challenging their classmates to a match. And the Class of '80's effort is accomplishing exactly what Harry Bovay '36 had envisioned through his own lead gift—that his personal commitment would inspire future gifts from fellow alumni in the School.

Benjamin believes that the motivation for charitable giving is simple: gratitude.

"A quality education is a large factor in changing not only your station but that of the generations to follow," Benjamin says. "What happened to me at Cornell greatly affected my life, so giving to the School seems like the least I can do."

Then there's the cause, a most worthy one, both friends agree.

"The most enjoyable aspect of all my classes were the labs—especially Hydraulics Lab with Professor Liu who taught me techniques I actually use in the field today; but I also remember the poor conditions of the labs when we were in school and now they are only worse," Rolband says, with Benjamin adding: "In a world-class institution, they need to be better."

*– Metta Winter*

# Focus on Undergraduate Research: Gregory McLaskey '05

One day in April 2004, Gregory McLaskey '05 mentioned to Professor Mary Sansalone—his advisor and professor in CEE 376—his desire to spend the summer between his junior and senior years at Cornell. He asked if there might be a job available in one of the laboratories. Sansalone, who had noted McLaskey's interests in topics related to computational modeling, dynamics, stress wave propagation and signal analysis, and earthquake engineering, instead asked him if he might be interested in a research project. McLaskey readily agreed and requested a project that involved both numerical and experimental studies.

Coincidentally, that same summer, Cornell was building a new test facility in the Civil Infrastructure Laboratory Complex for studying the behavior of structures, such as buried pipelines or components of buildings and bridges under static and dynamic loading. One component of this facility, which is part of the Network for Earthquake Engineering Simulation (NEES), is a massive, concrete reaction wall. This wall consists of two dozen hollow, reinforced concrete blocks post-tensioned together with steel rods to form a low wall 15m long and a high wall 6m tall (Fig. 1).

Figure 1

Before the reaction wall could be used as intended, however, an understanding of the response of the wall under dynamic loads was needed so that any experiments that might be designed and carried out did not accidentally excite modes of vibration in the wall itself. If the frequency of cyclic loading that is applied to a test structure in an experiment happens to coincide with the frequency of any of the natural modes of vibration of the wall, then the wall itself will start to vibrate and the validity of the experimental measurements will be undermined. Determining the natural modes of vibration became the focus of McLaskey's undergraduate research project.

The reaction wall is a type of structure not commonly built and analyzed, and there were no documented cases with which to compare or from which to predict dynamic behavior. In addition, the L-shaped wall geometry (Fig. 2) does not lend itself to analytical solutions derived for more conventional structures such as beams, frames, or plates. Therefore, numerical modeling was used in conjunction with experiments to identify the frequencies and corresponding deformed shapes of the modes of vibration of the high wall (Fig. 3).

The numerical results were then used to predict the response of the actual wall and to design the experiments, which involved the use of mechanical impact (a 500 lb iron slug) to excite the modes of vibration and sensors to monitor the acceleration of the wall (Fig. 4).

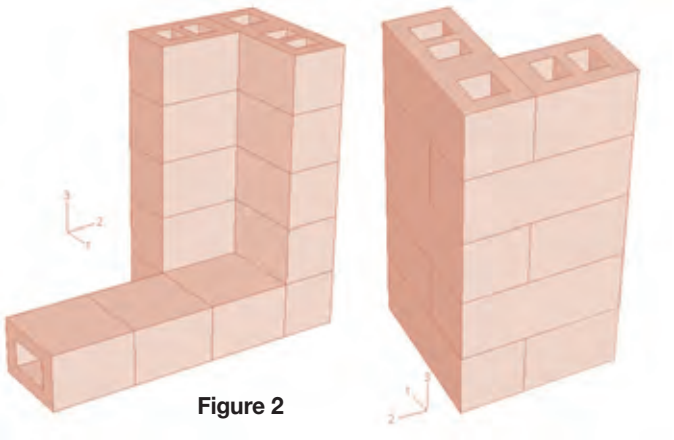

Figure 2

Figure 3

Gregory McLaskey '05

The location of the impact and locations and orientation of sensors were chosen in each test to try to isolate each of the key modes of vibration. A typical set of results shown below identifies the first and most important mode of vibration (pure bending) at a frequency of about 16 Hz (Fig. 5). Other key frequencies were found at about 21, 36, and 42 Hz. These results provide valuable information to anyone who might use the test facility in the future.

McLaskey's research project was sponsored by the College of Engineering Undergraduate Research Program. The project drew upon his interests in structures, dynamics, sensors, and signal processing and challenged him to think creatively and find innovative ways to accomplish his goals. The project also required a lot of individual learning, hard work, and persistence. But this way of thinking and working came naturally to McLaskey.

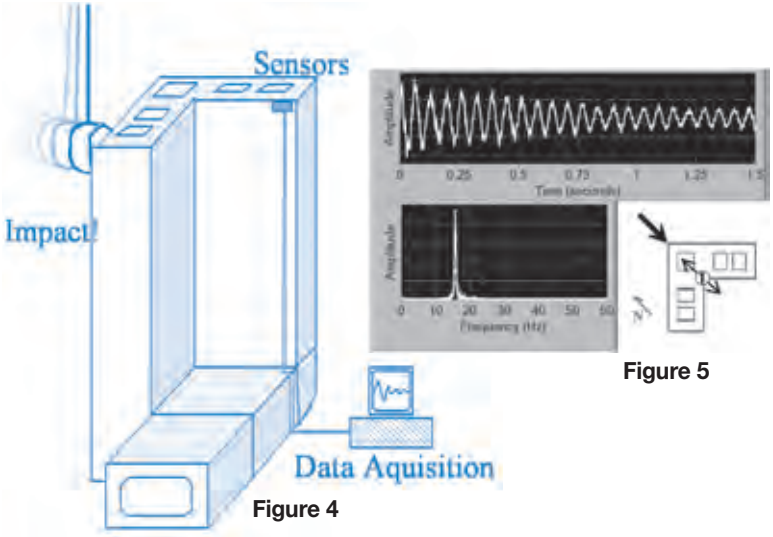


Figure 4



Figure 5

"I was fortunate to grow up in northern Puget Sound, an area rich with potential for scientific research in marine biology. I was able to attend field trips and participate in summer courses where I was exposed to modern science at a young age. Be it poking at sea anemones and learning about tidal ecosystems or watching a flight simulator in action or seeing fiber optics and laser technology, I now realize the importance of this early exposure and can attribute my decision to study science and engineering in college to these experiences. However, it was my undergraduate research experience at Cornell that caused me to think about graduate studies," he says. "Through my studies and research at Cornell, and by observing other research projects being conducted around me, I was able to see how an engineering breakthrough leads to the advancement of science, while knowledge of science provides engineers with the means to create more advanced tools. In my research I used tools, such as accelerometers, Fourier transforms, and numerical models to aid in my understanding of the dynamic characteristics of a concrete reaction wall. This experience introduced me to research, demonstrated how interrelated science and engineering are and how far-reaching the impacts can be, and propelled me to pursue advanced studies [research] in engineering in graduate school."

Propel him it did. McLaskey's research work was so outstanding that Prof. Sansalone suggested he write up his results and submit them for publication. In February, he submitted his first paper—"Nondestructive Dynamic Evaluation of a Concrete Reaction Wall: Numerical and Experimental Studies"—to the *ASCE Journal of Performance of Constructed Facilities*. Also, McLaskey presented his research at Cornell's April 2005 Undergraduate Research Forum and will present at the fall '05 Convention of the American Concrete Institute. McLaskey has been awarded fellowships for graduate study from Cornell University, the University of California at Berkeley, and Stanford University. He has decided on graduate work at Berkeley, opting for both the West Coast and sunshine!

McLaskey learned about Cornell from his elementary school principal–a graduate of Cornell. He visited the Cornell campus during his senior year in high school and recalls that "during my visit that I heard about the pumpkin on McGraw Tower. The story gave me a warm feeling about Cornell and put Cornell at the top of my list."

McLaskey also loves creative writing as well as science and engineering, and in addition to taking three engineering courses and a creative writing seminar this spring to complete his BS requirements, he is currently finishing his first children's book.

## WHY UNDERGRADUATE RESEARCH IS IMPORTANT

Cornell's CEE School is committed to "experiential education." Undergraduate students have many opportunities to put their newly acquired engineering skills to work on projects—individually or as members of teams—in formal courses, in student-initiated community-service projects and national competitions, and as partners with faculty in research. The accompanying article focuses on one undergraduate's research experience, illustrating how this activity helped Greg McLaskey chart his career path. Last year, more than 30 CEE undergraduates participated in research. Some of the students initiated their own projects, but most of them joined ongoing research projects, teaming with faculty and graduate students. The interaction between undergraduate and graduate students is a significant component of the research experience. The undergraduates learn from the graduate students, and the graduate students learn how to mentor the undergraduates. McLaskey's experience is a good example of Director Jim Gossett's assessment of the program: "Undergraduate research enhances the students' assimilation of knowledge, while building community and relationships—peer with peer, students with faculty members, and students with staff members. It's an extremely important part of what we do here."

# Liu Finds Facts and Tragedy in Wave-Ravaged Sri Lanka

Philip Liu went to Sri Lanka to pull hope from calamity.

Only days after the deadly Indian Ocean tsunami hit Asian coastlines on Dec. 26 last year, Professor Liu led a delegation of American scientists from the National Science Foundation's Tsunami Research Group and the U.S. Geological Survey (USGS) into wave-ravaged Sri Lanka.

In a preliminary report upon returning from his trip, Liu said three large waves engulfed Sri Lanka's coastal areas, and it was the second wave—the largest of the three—that cost people their lives.

A veteran of examining tsunami effects, Liu was struck by the power of this killer wave. "The destruction was more severe than I anticipated, and the magnitude of destruction was beyond any imagination," he says. "The 1992 tsunami in Indonesia was severe, but it was nothing like this one."

Liu spoke to many eyewitnesses. They explained they saw three waves, and this corroborates the general belief that three earthquakes over a 10-minute period caused the tsunami series. The waves traveled at jetliner speeds—about 500 miles an hour—through the Indian Ocean, and struck Sri Lanka about two hours later.

Because the coastal plain of Sri Lanka is relatively flat—that is, with a very slight slope—the ocean water poured inland between 500 meters (the length of five American football fields laid end-to-end) and two kilometers (about a mile and a half).

To learn the height of the highest wave, Liu and his team examined the trunks of trees in the vicinity of the shore. The wave was so powerful, it easily stripped away the bark and left a high-water mark. He found ocean silt on the rooftops of structures still standing.

Liu's research centers on understanding the characteristics of ocean-wave climates and the way that waves interact with coastlines and coastal structures. In the case of the Indian Ocean tsunami, water was lifted by energy generated by a massive earthquake northwest of Indonesia, Sumatra, then fell back, creating a massive wave system that spread outward from the earthquake's epicenter. It slammed into the coastlines of Indonesia, Thailand, India, and Sri Lanka with devastating force.

"We are engaged in theoretical research on the propagation and transformation of linear and weakly nonlinear water waves over complex ocean bathymetry [changes in water-depth measurements]," Liu says. His Cornell team has developed a model to calculate wave amplitude and the direction of wave propagation in the near-shore environment.

"As long as we know the variations in water depth, the computer model we already have [COMCOT, which stands for Cornell Multi-grid Coupled Tsunami Model] for how tsunamis propagate and move through deep oceans works pretty well," Liu explains. "What we don't know very well is what happens when a tsunami approaches and interacts with the shore, because the situation there is very complex: sediment, vegetation, buildings, infrastructure."

In addition, field data mapping the relative ocean depths close to shore are available for only a few places in the world, and those—among them Florida and Japan—are only in the developed world.

Liu has a team of nine graduate students and two post-docs, all of whose research in wave behavior has the potential to shed light on tsunamis; half have specific tsunami-related projects. Sediment transport is a major focus because much of a tsunami's destructiveness comes from its power to transport large pieces of debris as well as extremely fine sediment.

"When you look at the videos, you see that the tsunami leaves behind a lot of junk," Liu says. "Many people are killed because they get trapped in it."

These moving objects are also responsible for much of the physical damage. Currently, Liu and his students are creating numerical models to estimate the impact force of objects on buildings and other aspects of the infrastructure. These models will someday allow physicists and engineers to estimate the debris flow from tsunamis.

Likewise, the movement of sediment, even sand as small as 0.2mm, can wreak havoc with homes and other buildings.

"If you've ever stood on a beach with your feet in the waves, you've seen how, as the water recedes, it leaves behind 'scouring holes' where the sand is washed away," Liu explains. When the waves are large enough, scouring holes can be so deep they undermine the integrity of building foundations. Geologists on the Sri Lankan survey team, led by Liu, are collecting soil samples as a means of calculating the size of each of the tsunami's three waves—the current best guess is five to ten meters—from which can be calculated the amount of sediment each wave could move.

Liu and his students are focusing much of their attention on what happens in the surf and swash zones, because the currents here, just off shore, carry 80 percent of all sediment. It is known that sediment moves in three directions: on shore, off shore, and along the shore. How the sediment moves in these directions, Liu believes, is determined by what happens when waves break, a process about which little is currently known.

***Above:*** **Devastation in Kinniya, Mutur, and Kalmunai, Sri Lanka.**
***At left:*** **Professor Philip Liu speaks to members of the press Jan. 21 in front of his wave tank in Hollister Hall. Liu's press conference was held to discuss his trip to Sri Lanka, where he led a delegation of American scientists to survey tsunami damage.** *Robert Barker/University Photography*

"When waves break there is a lot of turbulence in which air bubbles get trapped," Liu explains. "Through our numeral and theoretical modeling, and laboratory experiments, we hope to discover the interaction with the sediment at each stage: as the wave breaks, as the turbulence is generated, as the air is entrapped, and as the turbulence and air bubbles decay."

Too, the wave height field data is invaluable in Liu and his students' research into wave/structure interactions. Typically, buildings are damaged first by the great force of the wave, then they are progressively weakened as the sediment washes away their foundations. First, Liu and his students build a numerical model. Then they conduct laboratory experiments to measure the forces and pressure distributions on structures to understand better how the flow moves around solid objects.

To test the validity of his models, Liu conducts experiments in three tanks, sometimes called flumes. These tanks range in length from 60 to 110 feet. Suspended over a layer of sand in the bottom of one is a fiberscope. This tube (2mm in diameter) is fitted with a light source and a camera. It's the same device used in medical procedures to photograph inaccessible regions of the body, such as the lining of the esophagus.

In the wave tank, Liu and his students can create what is called a "solitary wave," which represents the leading wave of the tsunami. Using the fiberscope, they can photograph the action of the sand as the wave passes over it. In this way, they can record in minute detail how the sand interacts with the water and with other sand particles and how it behaves when flowing around stationary objects.

"We're on the cutting edge here," Liu says. "No one else has used this type of instrumentation to gain a fundamental understanding of sediment transport."

Another of the wave tanks—currently devoted to experiments on how tsunamis originate—is equipped with a slide. It is thought that the Papua New Guinea tsunami of 1998, which killed more than 4,000 people, was caused by a submarine landslide. Liu and his students are taking detailed measurements of how tsunami waves are created when different types of material—from fine sands to heavier soils—rush into the water.

The Environmental Fluids Teaching Laboratory, now in dire need of renovation, is critical to the success of Liu's research funded by the National Science Foundation. The tanks' modest size makes them ideal. They are easy to control and economical and quick to operate, allowing the testing of many ideas and fine-tuning of instrumentation. Liu collaborates with other scientists at Oregon State University where the National Science Foundation has funded a wave tank that, at 100 meters long by five meters deep, more closely approximates a field prototype.

"From the scientific point of view, we like to have large and small facilities," Liu explains. "We can understand phenomena better by comparing experiments of different scales."

Liu expects that research conducted in Hollister Hall will someday have repercussions closer to where he grew-up, in Taiwan: from more reliable early-warning systems and tsunami maps showing land areas vulnerable to sudden flooding, to construction guidelines so that the coastal towns in even the poorest countries can have one tsunami-proof structure to which its citizens could flee, when the big waves come again.

*The Environmental Fluids Teaching Laboratory is one of three laboratories slated for renovation. If you have any questions, contact Carol Eichler, Campaign Director, at 607-255-7757 or cme24@cornell.edu.*

***– Blaine P. Friedlander, Jr. and Metta Winter***

# Building Our Future–
## Campaign Update

With one year completed of a multiyear capital campaign to renovate our laboratories, much progress has been made and much more is still ahead. Early funding enabled initial renovation work last June. Two spaces within the Civil Infrastructure (CI) Laboratory Complex have been completed and now serve as observable examples of the School's pioneering vision—one in which students are immersed in all aspects of their engineering program. There are four more spaces within the CI Lab Complex next slated for a major updating.

The first of these completed spaces is the White Teaching Facility, dedicated in October in honor of Professor Emeritus and past director of the School, Dick White. As Prof. Harry Stewart noted, "Dick has always been involved with innovative teaching methods and experimental research. The classroom-lab facility [bearing his name] brings these interests together, where we can teach, perform experiments, observe both, and pipe everything that happens inside this [classroom] and outside in the high bay, to anyone connected to the Internet." (For the full text of Stewart's speech, go to www.cee.cornell.edu/academic/index.cfm?abbrev=facilities&shorttitle=rnwtf.)

Through an NSF–funded initiative, the Winter High Bay Lab is the second space that has been modernized into a premier center for large-scale earthquake simulation. The lab's particular focus is on lifelines such as utilities and telecommunications systems, and research results will be applicable to other natural and man-made events affecting lifelines as well (for more information, see www.news.cornell.edu/releases/Nov04/Earthquake.lab.opens.deb.html).


Washington, D.C.


Boston


Boston

Two additional labs—the CI Projects Lab and the Environmental Fluids Teaching Lab—encompass the scope of the renovations through 2008. Like the CI Complex, these labs form the backbone of support for CEE's exceptional academic and research programs.

The School has been reaching out to alumni to communicate our vision and plan for the future. Alumni events were held last fall in Boston and Washington, D.C., and, this spring, in New York City. We are almost halfway toward our $4 million goal for the CI Lab Complex. This is the first time ever that the School has turned to its entire alumni body to support a project of this scope, part of CEE's ongoing efforts to revitalize its academic program.

For more information about how you may join in this effort, contact Carol Eichler, Campaign Director, at 607-255-7757 or cme24@cornell.edu.

### Naming Opportunities for the Lab Renovations Campaign

Civil Infrastructure Laboratory Complex

| | |
|---|---|
| Entire CI Laboratory Complex | Named |
| White Teaching Facility | Named |
| Materials Technology Laboratory | $450,000 |
| Fabrication and Testing Laboratory | $200,000 |
| Electronic Control Center | $150,000 |
| Curing Room | $100,000 |
| Electronics Laboratory | $100,000 |
| Entire Civil Infrastructure Projects Laboratory | $950,000 |
| Entire Environmental Fluids Teaching Laboratory | $750,000 |
| Wall of Recognition | All gifts of $10,000 and above |

# Event News

## GERGELY LECTURE

The eighth annual Gergely Lecture was held on campus October 5, 2004. The speaker was Ian G. Buckle, director of the Center for Civil Engineering Earthquake Research at the University of Nevada, Reno, whose lecture was titled, "Improving the Earthquake Performance of Highway Bridges."

Classmates of 1949

## REUNION 2004

More than 70 alumni and guests returned for the CEE reunion breakfast in June, 2004. The Class of 1949 had the most classmates back to celebrate their 55th reunion; they were well decorated with class T-shirts that made the event especially festive. Professor Tom O'Rourke gave a presentation on "Lessons Learned for an Extreme World: an Engineer's Perspective on the WTC Disaster," to a standing-room-only audience.

## ALUMNI RECEPTION IN NEW YORK CITY

Professor Phil Liu gave a talk titled, "The Sumatra Tsunami: The Science Behind the Headlines," to an interested group of alumni gathered at the Cornell Club in New York City on April 19. Liu's presentation gave an overview of his research work devoted to the study of tsunamis and a fact-finding trip he led to Sri Lanka in January. Also attending was CEE director Jim Gossett, who provided an update from the School.

## DEDICATION OF RICHARD N. WHITE TEACHING FACILITY

Immediately after classes ended in early May, 2004, construction began on the Richard N. White Teaching Facility located in the Civil Infrastructure Lab Complex in the basement of Thurston Hall. Throughout the summer we guided the construction and watched as the space was transformed from a dusty construction zone to a high-tech, electronic-classroom facility. On Friday, October 8, while our advisory council was on campus, we dedicated the facility. Dick White and his wife, Marge, were in attendance along with Dean Fuchs, alumni, faculty, and staff. This facility, connected to the outside world through fiber-optic cable (achieving a 1-gigabyte/sec transmission rate), raises the bar on electronic-classroom technology in the Engineering College.

The first undergraduate classes already have been held in the facility, whose leading use will be as a classroom for civil and environmental engineering and as a communications center for the earthquake research facility being built in an adjoining space. Among the new White center's high-tech capabilities are high-speed Internet-2 transmission, Polycom video conferencing, multiple remote cameras for viewing lab activities, and Internet-2 grid software for multiple functions, including storage of streaming data from experiments.

**In the photograph above, CEE directors past and present attended the White Teaching Facility dedication ceremony. They are, from left: John F. Abel, Arnim H. Meyburg, Richard N. White, James M. Gossett, William McGuire, and Walter R. Lynn.**
*Photograph by Nicola Kountoupes/Cornell University Photography*


**Attendees at the Symposium Honoring Professor John Abel October 16, 2004**

1. Gregory Deierlein, BS '81
2. Dat Duthinh, PhD '80
3. Jerome Hajjar, MS '85, PhD '88
4. John Gross, BS '69, MEng '70, PhD '80
5. Professor John Abel
6. Robert Haber, BArch '77, PhD '80
7. Mark Shephard, PhD '79
8. Sheng-Chuan Wu, PhD '81
9. Professor Anthony Ingraffea
10. Said Ibraham Hilmy, MS '81, PhD '84
11. Shang-Hsien Hsieh, MS '90, PhD '93
12. Ronald Ziemian, BS '84, MEng '85, PhD '90
13. Christis Chrysostomou, BS '85, MEng '86, PhD '91
14. Tao-Yang Han, MS '81, PhD '84
15. Sanjeev Srivastav, PhD '91
16. Gyula Greschik, PhD '92
17. Ammar Al-Sayegh, MS '01
18. Alejandro Mota, PhD '00
19. Donald White, MS '85, PhD '88
20. Paul Wawrzynek, MS '87, PhD '91
21. Renato Perucchio, PhD '84
22. Christopher Conley, MS '80, PhD '83
23. Professor Richard White
24. Marcelo Gattass, PhD '82
25. Professor William McGuire
26. Carlos Pesquera, MS '81, PhD '84
27. Luis Fernando Martha, PhD '89
28. Professor David Billington

*Photo by Kenneth Hover*

## JOHN F. ABEL HONORED AT SYMPOSIUM AND DINNER

On October 16, 2004, alumni and faculty gathered in McManus Conference Center to honor Professor John F. Abel, who retired after 30 years of service on the faculty. An all-day symposium was held with 12 former graduate students and colleagues presenting technical presentations in honor of Professor Abel's research legacy. The day's event was followed by a dinner for Abel, who was accompanied by his wife, Lynne, daughter, Britt, son, Bill, and 17-month-old granddaughter, Natasha.

Planned by several of his former students and three faculty colleagues, the day was enlightening, energizing, and memorable, with lots of conversation centering around Abel's research accomplishments in structural engineering and those of the many students he mentored.

Prof. Abel has had a long and active career, first teaching at Princeton University for four years, then coming to Cornell where he taught courses in structural analysis and design, numerical methods, and structural mechanics. A unifying theme in his research with his graduate students was the development of numerical approaches to problems in structural engineering and structural mechanics, frequently taking advantage of interactive computer graphics.

Newly appointed as a professor emeritus, Abel plans to stay active in the School and the College of Engineering while living in Ithaca.

## NEES OPEN HOUSE

An "earthquake" occurred on November 15 in CEE's White Teaching Facility—with massive compressive forces of the ground causing a 30-foot section of pipeline to buckle and bend. The temblor at Cornell was a simulation, part of an open house publicly launching the facility, which is part of the National Science Foundation (NSF) Network for Earthquake Engineering Simulation (NEES).

The new Cornell facility is one-third the size of a football field and uses hydraulic presses to apply hundreds of thousands of pounds of force on pipelines buried in many tons of sand. It is one of 15 national state-of-the-art testing labs in the NEES network. The NEES project also uses the facility for up-and down-link connections to the other 14 national facilities that compose this innovative experimental consortium. Cornell's particular NEES focus is on "lifelines" (buried and above-ground pipes and other utilities), under the direction of Professors Tom O'Rourke and Harry Stewart.

This facility is the first to be completed in our comprehensive capital project to modernize our laboratories. The completion of this project is very important to the future of the School, and with the support of our alumni and friends, it will soon become a reality. *Photograph by Charles Harrington*

# Students Help Underprivileged Communities through Engineers for a Sustainable World

Engineers from across the country chose to spend the summer of 2004 volunteering on international development projects in some of the world's poorest countries. Through Engineers for a Sustainable World (ESW), professional and student engineers are working on projects to bring clean water, alternative energies, and IT skills to the poorest regions of the world.

As the summer heat makes its way across the United States and across much of the world, our appreciation of a clean, cold glass of water grows. However, we often forget that more than 1.2 billion people in the world lack access to safe drinking water. It takes dedicated organizations and individuals to take the initiative to seek sustainable solutions to the world's water problems. Dale Meck, a 2004 graduate from CEE at Cornell, and Jeff Dahm, a senior at the University of Texas at Austin, are two such civil engineering students.

Meck and Dahm volunteered in Honduras last summer through an ESW volunteer assignment. Before Hurricane Mitch struck Honduras in 1998, much of the rural population was without access to clean water. The hurricane damaged over 1,600 of the existing piped water systems, leaving an even greater number of people without water.

Working with the locally based nongovernmental organization Agua Para el Pueblo (APP), Meck and Dahm helped design a water distribution system between three rural communities (Moscarron, Penas II, and Tamarindo); upon completion, their project will allow year-round provision of clean water to the residents of those locales.

Volunteer projects are facilitated by the group Engineers for a Sustainable World, formed just over two years ago at Cornell. ESW now has a network of more than 1,500 professionals and students worldwide, working to reduce poverty and improve global sustainability. ESW's community development approach focuses on building multisector partnerships to create lasting, widespread improvements. They work with on-the-ground partners, such as APP, to develop and employ solutions that are locally appropriate and environmentally, socially, and economically sustainable.

Meck and Dahm explain what they desire to gain from this experience: "We will consider our internship successful if we are able to coordinate future collaboration with APP, our ability to speak Spanish improves, and we gain valuable volunteer and engineering experience." From further acquisition of the Spanish language, to the initiation of an APP web site, from gaining experience in engineering as well as volunteering, Meck and Dahm have already grown both academically and personally; their potential as leaders and their demonstrated dedication to this initiative ensure that they will continue to grow through their dually technological and physical work in Honduras.

**ESW volunteer Dale Meck '04 working on a new water system in Honduras**

These volunteers and hundreds of other engineers gathered in Stanford, Calif., for the ESW National Conference in September 2004. "Solutions for a Shrinking Planet" featured over 75 speakers; the conference highlights included keynote addresses by William McDonough (author of *Cradle to Cradle* and *TIME* magazine's Hero for the Planet), Jeffrey Sachs (UN Special Advisor on the Millennium Development Goals), Barbara Waugh (Co-Founder of Hewlett Packard's World e-inclusion initiative), and Martin Fisher (Founder and President, ApproTEC). Through lectures, hands-on workshops on appropriate technologies, a career fair, and the general uniting of social entrepreneurs, the ESW national conference sought to achieve an increased understanding of sustainability through the formation of local, national, and international partnerships.

For further information about Engineers for a Sustainable World, visit their web site at www.esustainableworld.org.

# Obituaries

## ALUMNI

### JUAN PASTOR

Juan Pastor ME '78, PhD '86 passed away on December 1, 2004, after having suffered a heart attack a week earlier. He was 54.

While earning his PhD, Pastor worked on high-strength concrete research with Art Nilson and Floyd Slate.

Pastor was a prominent person in Central and South America in the world of concrete. He built up the concrete and structures laboratory at the University of Costa Rica to the point that it was a world-class facility that attracted substantial financial support from the international arena. Pastor was very active in ACI and ASCE, playing critical roles in forming the Costa Rica chapters of both organizations and stimulating their growth through his dedication and hard work. He was a prominent person in the Costa Rica banana business, taking over a large family plantation from his grandfather.

Pastor and his wife, Amalia, had four children. The eldest, Amalia, is now a doctor in Atlanta, Georgia, and his son Juan is a student at NYU.

## FACULTY

### DONALD J. BELCHER

Donald J. Belcher, professor emeritus, died February 8, 2005, in Papa'loa, Hawaii, three days short of his 94th birthday.

Belcher, the foremost pioneer in the field of remote sensing, joined CEE in 1946. He founded and directed the Center for Aerial Photographic Studies until he retired in 1976. He was credited with locating the site for Brasilia, Brazil's capital city, and identifying the unique terrain appropriate for the world's largest radio telescope at Arecibo, Puerto Rico (still administered for the NSF by Cornell). He helped interpret surface conditions on Mars and the moon, and his computer-based system for land use and natural resource inventories was adopted by New York State, Puerto Rico, South Africa, Australia, and Venezuela.

During World War II, Belcher was a civilian consultant who worked to improve the military's intelligence of battlefield conditions, especially landing beaches for the campaign led by General MacArthur. Later, using his skills in interpreting aerial photographs, he helped locate landmines in Western Europe and consulted with U.S. military and civilian agencies and foreign governments. Belcher earned his PhD from Purdue University in 1946.

In October 2000, the Donald J. Belcher Master of Engineering Fellowship for graduate students in Civil and Environmental Engineering was established at the initiative of one of his former graduate students. At that time, a luncheon was held to celebrate the launching of the fellowship endowment and to honor Belcher for his outstanding career as he approached his 90th birthday on February 11, 2001. Donations to this endowment are still being accepted through the School of CEE.

Belcher was world-renowned in his field of expertise where his legacy still lives. He is predeceased by his wife, Nancy Foote Belcher, and a daughter, Helen Belcher. He is survived by two daughters, Marilyn Whisman and Candace Brann; three sons, Mathew, Mark, and Neil Belcher; eight grandchildren; and eight great-grandchildren.

### CHARLES DONALD GATES

Charles Donald Gates, professor emeritus, died July 6, 2004, in Williamsburg, Va. He was 89.

He joined the CEE faculty in 1947, where over the course of his career he was a professor of environmental engineering, chairman of water resources engineering, chairman of environmental engineering, and director of the Center for Environmental Research. He retired in 1980.

Gates earned a baccalaureate degree at Williams College and a master of science degree at Harvard University. He spent four years on active duty at the Army Chemical Center in Maryland, where he did research and development work in the detection and removal of toxic agents from water. His special field of research was water quality engineering. Gates received a presidential citation in 1971 for his "efforts to combat water pollution on Cayuga Lake." He was commended for giving of his time and talent as a member and vice chairman of the Cayuga Lake Basin Planning and Management Board. As a board member, the citation said, Gates had "guided the planning for the future development of Cayuga Lake."

Gates was active in Ithaca community water and wastewater planning and management as a member of the Tompkins County Water Supply Committee and as chairman of the Greater Ithaca Sewerage Study Committee. He worked or consulted with the New York State Department of Health, the United States Public Health Service, the Federal Water Quality Administration and the Tennessee Valley Authority.

Gates is survived by his wife, Shirley; three daughters, Nancy Gates, Karen Konefal '74, and Betsy Dahlke '81; and five grandchildren.

# Student, Alumni, and Faculty News

## STUDENT AWARDS

**Joanne Chan '05** is the first-place winner in the New England district competition for the 2004–2005 Chi Epsilon District Scholarship.

**Lindsey Ehinger '05** is a recipient of the 2004–2005 Clark Construction Group, Inc. Prize. She also is the recipient (from the College of Engineering) of the Frank and Rosa Rhodes Scholarship for the 2004–2005 academic year.

**Andrea Hektor '05** is a recipient of the 2004–2005 Clark Construction Group, Inc. Prize

Ehinger and Hektor were chosen for the Clark award because they are top civil engineering students who have shown interest and aptitude in construction. They also excelled in CEE 595: Construction Planning and Operations, maintain a high overall grade point average, and portray outstanding leadership skills.

## ASCE NEWS

**< Tim Bond, ASCE Advisor,** was selected to receive the ASCE 2004 Faculty Advisor Certificate of Commendation. He was chosen based on his outstanding work and dedication as faculty advisor to the chapter.

## ALUMNI NEWS AND RECOGNITION

**Ken E. Arnold '64,** chairman and chief operating officer, Paragon Engineering Services, Houston, has been elected to the National Academy of Engineering for his contributions to the safety, design, and standardization of hydrocarbon production.

**Leslie Banks-Sills,** adjunct professor in CEE and professor in the Department of Solid Mechanics, Materials, and Systems at Tel Aviv University, Israel, was named an Honorary Fellow of the International Congress on Fracture. There are 48 living Fellows; by rule there is a maximum of 50.

**Harry Bovay, Jr. '36** was honored at a dinner gala in October, where he received a Frank H. T. Rhodes Exemplary Service Award. The next morning he toured the Civil Infrastructure Laboratory Complex, seeing demonstrations of some of the electronic-classroom capabilities of the newly completed White Teaching Facility. Bovay has donated a $1 million gift toward CEE's ongoing renovation campaign, in the hope that his example of generosity and commitment to the School will set an example to other alumni.

**< Nicholas J. Carino '69, MS '71, PhD '74** received the 2004 SES/ASTM international Robert J. Painter Award given by the Standards Engineering Society and ASTM international. He received the award in recognition of meritorious service and outstanding leadership in the field of concrete and concrete aggregates and for exceptional contributions to the standards development process.

**John DeWolf ME '67, PhD '73** is a professor at the University of Connecticut in the Department of Civil and Environmental Engineering where he received the C. R. Klewin, Inc. Award for Excellence in Teaching. DeWolf, whose career at UConn spans more than three decades, is a member of the Connecticut Academy of Science and Engineering and co-author (with F. P. Beer and E. R. Johnston) of the third edition of *Mechanics of Materials,* McGraw-Hill.

**Ian Friedland '77** was recently promoted to the position of technical director, Bridge and Structures R&D with the Federal Highway Administration of the U.S. Department of Transportation. In this new role, he now manages all structures laboratories, programs, staff, and subcontractors working for the Highway Administration on research and development activities related to highway bridges, hydraulic structures, geotechnical constructions, and ancillary structures.

**Hamilton Garnsey '68, ME '69** was named a Leadership in Energy and Environmental Design accredited professional by the U.S. Green Building Council. He works for Beardsley Design Associates Architecture, Engineering, and Landscape Architecture, P.C. in Auburn, N.Y.

**< William P. Henry PE, '63** assumed the presidency of the American Society of Civil Engineers on October 23, 2004, in Baltimore at its annual meeting. Henry was also the guest speaker at the School's ASCE View of the Lake Dinner held on April 29, 2004.

**Keith Kesner MS '98, PhD '03** is a recipient of the 2005 ACI Young Member Award for Professional Achievement. This award recognizes the contributions of younger members of the Institute.

**Nicholas T. Makes '75, MEng '76** was named senior vice president, director of national sales for Turner Construction. Turner is a leading general builder in the United States, ranking first or second in the major segments of the building construction field.

**Jeffrey A. Olmstead '04** is an airport engineer for Passero Associates.

**Robert A. Olmsted '46** was the recipient of the 2004 Civil Engineering History and Heritage Award from ASCE. It was presented to him at ASCE's fall conference. This award, endowed by Trent R. and Phoebe L. Dames, recognizes those persons who through writing, research, or other efforts have made outstanding contributions to a better knowledge of, or appreciation for, the history and heritage of civil engineering.

**E. Timothy Oppelt '69, MS '72** has been named acting assistant administrator of the Office of Research and Development at the Environmental Protection Agency. Oppelt has worked at EPA for 34 years, conducting research and directing national pollution control technology programs. Oppelt's career exemplifies the use of research that leads to important practical applications. Following the Sept. 11 attacks, Oppelt formed EPA's National Homeland Security Research Center (NHSRC). This highly specialized laboratory has developed technologies and guidance to prevent and mitigate possible chemical or biological threats to buildings and drinking water infrastructure. To accomplish this, Oppelt coordinated the work of NHSRC with 18 other research groups in the departments of Homeland Security, Defense, Energy, and Health and Human Services.

**Warren Rockwell '52** has written a book along with his wife, Sally, entitled *Moments Foreign: A Memoir of an Expatriate Family*, which tells about places they lived and the first overseas engineering assignment undertaken by Warren.

**< Saw-Teen See '77, MEC '78,** a member of the CEE Advisory Council, received Honorary Member status in ASCE for her innovative contributions to the field of structural engineering through the design of many of the world's signature buildings and for her leadership as managing partner of one of the premier structural engineering firms in the world.

**Saravan Sutharshana PE, PhD '86** is a founder and a director of Angeles Crest Engineering, Inc. Prior to joining ACEI, he was a member of the technical staff at the Jet Propulsion Laboratory in Pasadena, Calif. His expertise encompasses spacecraft stress and dynamic analyses, pressure vessel design, and fracture control. He has made major contributions to the development and application of probabilistic methods in engineering design and analysis. Sutharshana played a leading role in the development and implementation of Space Shuttle Payload Fracture Control requirements. He has worked in the automobile industry on fatigue and fracture of vehicle structures.

**Peter J. Verna Jr. '46, MS '48** is president of Verna Engineering P.C. located in Charlotte, N.C., and was the recipient of the "Titan of the Industry" award from the Precast/Prestressed Concrete Institute at its 50th anniversary convention in Atlanta in October 2004. Verna, developer of The Park Condominium residential highrise, is recognized as one of the South's foremost structural engineers.

**Aaron White PE, '96, ME '97** is a senior engineer in Walter P. Moore's Tampa, Florida, office and was chosen as the 2004 recipient of the Javier F. Horvilleur Outstanding Young Engineer Award. The award is presented annually to one young structural engineer at Walter P. Moore to recognize excellence, outstanding client service, and business acumen. He joined the firm in 1997 and has been instrumental in several of the firm's major projects.

**Johann Zimmermann '78** an ASCE member and professional engineer, gave a talk on the reconstruction of a micro-hydroelectric dam in Mozambique and post-hurricane and earthquake reconstruction in Central America combined with water projects and some rural infrastructure, in CEE's McManus Conference Center on March 9, 2005.

## CEE FACULTY HONORS, AWARDS, AND RECOGNITION:

Three CEE faculty members—**Professors Paul Carr and Rachel Davidson and Sr. Lecturer Monroe Weber-Shirk**—were named by the College of Engineering as recipients of Outstanding Teaching Awards for 2003–2004. No other department/school had more recipients.

**Mircea Grigoriu** was awarded in October, 2004, the honorary title of *Doctor Honoris Causa* by the Technical University of Bucharest, Romania, his alma mater.

**Ken Hover** has been named recipient of a prestigious award from the American Concrete Institute, the Robert E. Philleo Award of the Concrete Research Council. The award was established in 1992 and is given in recognition of a person, persons, or an organization for outstanding research in the concrete materials field, or for outstanding contributions to the advancement of concrete technology through application of the results of concrete materials research.

**Fred Kulhawy** was the guest speaker at three separate distinguished lectures: the Beyer Distinguished Lecture at the University of Houston on November 12, 2004; the 30th Martin S. Kapp Lecture at the ASCE Metropolitan Section of the Geotechnical Group in New York City held on December 7, 2004; and the first H. C. Nutting Annual Lecture held in Cincinnati on February 18, 2005.

**Philip Liu** received the 2004 International Coastal Engineering Award at the 29th International Conference for Coastal Engineering in Lisbon. The award was established to provide international recognition for outstanding leadership and development in the field of coastal engineering. Liu received the award "in recognition of his outstanding achievements and contribution to the advancement of coastal engineering through research, education, engineering practice, and professional leadership." Liu also received a best-paper award from Taiwan's Chinese Society of Mechanics for a paper coauthored with former PhD student, Hsiao, S.-C., in the *Journal of Mechanics,* A, 19(2), 279-297 entitled, "Oscillatory Flows over a Permeable Wavy Boundary."

**Pete Loucks** delivered the third annual D.R.F. Harleman Honorary Lecture in Environmental Fluid Mechanics on November 5, 2004, at Penn State's University Park campus. His talk, "The Great Man-Made River in Libya: Does It Make Sense?" was based on a paper he coauthored about his involvement subsequent to the construction of a massive project known as the GMRP.

Also in 2004, Loucks was elected a Fellow in the American Geophysical Union for his sustained and significant contributions to the development and implementation of systems approaches and models for planning and managing water resource systems.

**Tom O'Rourke** has been selected for the 2005 Ralph B. Peck Award from the Geo-Institute of ASCE. The Peck award recognizes his work in "elucidating the effects of construction activities on ground movements associated with braced excavations." O'Rourke also has received the Alumni Award for Distinguished Service from the University of Illinois College of Engineering at its commencement this April.

**Christine Shoemaker** has received several recognitions this past year: she was elected a Fellow in the INFORMS (Institute for Operations Research and Management Science), the professional society for the Operations Research field. About 1.5 percent of the members of INFORMS are Fellows, including two other Cornell faculty members. Shoemaker also is the 2004 "Feng Distinguished Lecturer" for the Civil and Environmental Engineering Department at the University of Massachusetts. Her lecture was titled, "Water Resource Analysis and Information Technology: the Roles of Optimization and Function Approximation." She also was selected as the 2004 "Dale Meredith Lecturer in Water Resources" at SUNY Buffalo, which was designated as an official event for the Inauguration of the new university president.

**Jery Stedinger** has received a major international award, The Prince Sultan Bin Abdulaziz International Prize for Water. The prize was awarded to Professor Stedinger during a ceremony at King Saud University in Riyadh, Saudi Arabia, on December 5, 2004, honoring his work in "Effective Flood-Control Methods."

## CONTACT CEE WITH YOUR NEWS:

We would like to hear from you about your accomplishments, awards, and activities so we can tell faculty, students, and other alumni about them. Please send your news to ceeinfo@cornell.edu, or contact us:

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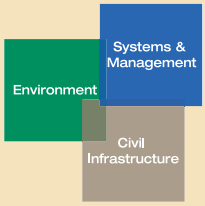

UPCOMING EVENTS

# Reunion 2005: June 9–12

***Friday, June 10***

**Faculty Presentation:** "The Sumatra Tsunami: The Science Behind the Headlines," a talk by Professor Phil Liu, 1:15–2:15 p.m. in G10 Biotech Building. Prof. Liu will share his research work devoted to the study of tsunamis as well as the information gained firsthand while leading an NSF–sponsored delegation of scientists on a fact-finding trip to Sri Lanka in January. The presentation will include animation of the tsunami based on Liu's numerical model and photographs and video footage taken on location in Sri Lanka. Liu's research relates to developing a better understanding of tsunamis and improving predictive capabilities, as well as applying his findings to developing tsunami warning systems.

***Saturday, June 11***

**Alumni Breakfast Buffet:** Plan to attend this year's CEE alumni breakfast—especially if it's your reunion year. The breakfast will be held from 7:30 to 9:30 a.m. in McManus Conference Center, Hollister Hall.

**Lab Tour:** Accompany CEE director Jim Gossett on a tour of the Civil Infrastructure Lab Complex Renovations-in-Progress. Meet inside the front entrance of Thurston Hall at 9:30 a.m. The tour will last about a half hour.


**Dirk Kestner '99 and Adam Slivers '99**

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