On My Mind

Where do Purdue civil engineers fit into the big picture of globalization? In this issue of Civil Engineering Impact, we are offering a few answers to that question. One of our alumni is the lead engineer for Russia’s tallest building. Another is the president of an up-and-coming university in China. One faculty member is working with researchers at a university in Denmark on new sustainable construction materials. Two more are just beginning to collaborate on the global challenge of how to manage megacities—expanding cities with greater than 10 million people. In addition, our students are gaining valuable experience through research collaborations in Puerto Rico and by preparing “mock proposals” to the World Bank on how to deliver clean drinking water to impoverished cities. The table of contents to your right will guide you to all these stories.

Overall, it’s a great time to be a Purdue civil engineer. Graduating students are in high demand and our researchers continue to make significant breakthroughs. I hope you’ll take the time to read about their impact.

M. Katherine Banks
Head, School of Civil Engineering

Civil Correspondence

The picture of Professor Springer standing by the big brass bell at Ross Camp brought back many memories for one former Ross Camper. She writes,

Every morning Professor Springer would ring his hand bell to awaken the campers. Many of the students felt he needed a bigger bell. Plans were made to heist an old brass bell from the engine graveyard of the Monon Railroad. Several nights later in the wee hours of the morning a bell rang and rang to the delight of the campers. The next morning the professors were busy contacting the officers of the Monon Railroad about the theft of the bell. In the end the railroad let Ross Camp keep the bell.

Kathleen “Suds” Lux Hill
BSCE ’42

Professor Springer at Ross Camp.
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CHECK IT OUT
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Robert Bowen (BSCE ’62) received an honorary doctorate from Purdue in graduation ceremonies on May 12, 2007. A longtime friend of Purdue and the School of Civil Engineering, in particular, Bowen has distinguished himself in the construction industry as the founder and owner of Bowen Engineering Corp., a multi-market company specializing in water and wastewater treatment plants and energy utility construction.
Julio Martinez has a vision. When the associate professor of civil engineering began setting up his lab late last semester, he knew that he had the tools to help revolutionize the construction industry. Through the use of computer animations and simulation software, Martinez hopes the technology will help anticipate and solve problems even before companies break ground on sites.

This groundbreaking research is associated with the College of Engineering’s Intelligent Infrastructure Systems signature area, which enticed Martinez to Purdue. A National Science Foundation CAREER and ITR award winner, Martinez has spent his career looking to improve the representation capabilities of simulation systems. Along the way he often crossed paths with Dan Halpin, Purdue’s former head of construction engineering and management. “Dan is essentially the founder of research simulation in construction,” Martinez says. “I also knew most of the faculty in the construction program, so I thought it would be pleasant to work with them.”

Now Martinez hopes to propel the legacy of Purdue’s tradition in construction technology. The challenge may be getting the buy-in from everyday professionals. “There are companies that use this technology,” he says. “They are very forward-looking, but still limited in their ability to take advantage of it due to the unavailability of tools like the ones we are designing.”

He believes widespread use of the simulation software—beyond the industry elite—would translate to lower costs for construction site owners, as well as better and safer practices for all. “We can show the impact of their decisions through simulations so they can better understand the consequences of those decisions.”

In what looks like a highly sophisticated video game, contractors can move throughout a virtual construction site, running through the routines of standard operations. As Martinez improves upon the interactivity of the system, he increases the realities of cause-and-effect scenarios. In a model for the delivery of concrete for piers in the construction of the Chiapas Bridge in Mexico, for example, it is easy to see how builders can figure out the most efficient delivery methods. “When you have prefabricate parts and then ship them out to sea for assembly, you want to know ahead of time how to best utilize the extremely expensive resources you are going to use.”

Through the technology, smarter plans lead to more efficient operations. And it’s this intelligent approach to infrastructure systems that keeps Martinez motivated as he settles into his new surroundings. An avid baseball fan, the Dominican Republic native admits that the close proximity of the Cubs and the White Sox also influenced his Purdue arrival. “The nearest Major League team to Blacksburg, Virginia, was five hours away in Baltimore,” he says. Now in about two hours time to Chicago, Martinez—with visions of construction dancing in his head—can take in the occasional ball game closer to home.

William Meiners
Promotions

In April 2007, Purdue’s Board of Trustees approved faculty promotions, which included the following civil engineering professors:

- **Makarand Hastak**, professor and head of the Division of Construction Engineering and Management
- **Inez Hua**, professor and interim head of the Division of Environmental and Ecological Engineering
- **Dennis Lyn**, professor in the Hydraulic and Hydrologic Engineering area
- **Andrew Tarko**, professor and director of the Center for the Advancement of Transportation Safety
- **Jason Weiss**, professor in the Materials area and assistant head of research
- **Judy Liu**, associate professor in the Structural Engineering area
- **Marika Santagata**, associate professor in the Geotechnical Engineering area

Awards

**James Bethel, Edward Mikhail, and Jie Shan** received, along with their students, the Talbert Abrams Grand Award for their 2006 journal paper, published in *Photogrammetric Engineering and Remote Sensing*.

**Darcy Bullock** was named the 2006 Faculty Scholar. The University Faculty Scholars Program recognizes outstanding faculty colleagues who are on an accelerated path for academic distinction.

Bullock, along with **Srinivas Peeta** and **Anuj Sharma**, a graduate student, received the 2007 Best Paper Award from the Traffic Signal Systems Committee of the Transportation Research Board.

**Jack Delleur**, a professor emeritus, received the 2007 Ray K. Linsley Award, which recognizes individuals who have made outstanding contributions in surface-water hydrology.

**Samuel Labi**, along with alum **Chuanxin Fang** (PhD ’03), received the Concrete Materials Section Bryant Mather Award from the Transportation Research Board of the National Academies.

**Douglas Sutton** was awarded the Purdue College of Engineering Faculty Advising Excellence Award.

**Jason Weiss** received the 2007 Transportation Research Boards Fred Burggraf Paper Award, along with the 2007 ACI Young Member Award for Professional Achievement.

Marika Santagata, of the Geotechnical Engineering group, was awarded the CAREER award, the National Science Foundation’s most prestigious honor for young researchers. She’ll utilize this five-year grant to conduct work on the rheological behavior and performance of Na-montmorillonite-based fluids employed in trenchless technology (microtunneling, pipe-jacking, and horizontal directional drilling). These fluids play a critical role in the construction and rehabilitation of underground utility infrastructures, the total length of which is estimated to exceed 20 million miles in the United States alone.
Achievements

Robert Connor chaired the First International Conference on Fatigue and Fracture in Infrastructure last August in Philadelphia.

Vincent Drnevich was recognized at Purdue for his U.S. patent issued in May 2006 for “Method and Apparatus for Measuring Density and Water Content of Soil.”

Fred Mannering was interviewed on “Good Morning America” about his research concerning how humans naturally react when driving cars that are made with safety airbags, antilock brakes, and electronic stability packages.

Rodrigo Salgado’s book, The Engineering of Foundations, was published by McGraw-Hill, providing readers with a modern text that incorporates theory with real-world practices.

Appointments

Srinivas Peeta was appointed the chair of the Committee on Transportation Network Modeling by the Transportation Research Board of the National Academies.

Kumares Sinha, the Olson Distinguished Professor of Civil Engineering, was appointed to serve on a blue ribbon panel of experts for the National Surface Transportation Policy and Revenue Commission created by Congress.

Makarand Hastak became Head of Construction Engineering and Management in January 2007. Last summer he joined the National Association of Home Builders Research Center as a scholar-in-residence to evaluate and compare centralized and decentralized approaches for residential wastewater treatment. Here, he’s shown receiving the Roy E. and Myrna Wansik Research Award from Kathy Banks.

Julio Ramirez will lead Purdue’s team on the National Science Foundation’s NEES Grand Challenge. The $3.6 million grant was awarded to 10 multidisciplinary and multi-institutional research teams for a five-year study to mitigate the collapse risk of older nonductile concrete buildings during earthquakes. Ramirez has been elected to serve on the board of directors of NEES, Inc. and also has been named chair of the National Technical Committee on Concrete and Masonry Structures of the ASCE/SEI.
Managing

How civil engineers, rallying around a system-of-systems approach, can help the
Where does Paris end? If 10 million people from surrounding slums descend upon Mexico City daily, do you account for their numbers in the city’s growing population index? How can environmental engineers possibly deliver enough clean drinking water to the multimillions in Calcutta, India, and Kinshasa, Republic of Congo? Would you be willing to drive a rented car through the chaotic streets of Mumbai, India, all the while dodging massive amounts of pedestrians and street vendors? These are just a few of the questions that think tankers and deep thinkers—from the Central Intelligence Agency to the United Nations—are asking as the world’s population becomes more and more urbanized. They’ve got megacities on their minds.

Megacity isn’t a word you’ll find in the dictionary, though it could be on Webster’s radar. If you Google the term, or track it down through Wikipedia, you may find mega-city hyphenated, or as two words, or even mashed together with odd capitalization: MegaCity. Nevertheless, a megacity is generally defined as a metropolitan area with a population in excess of 10 million people. In the U.S., New Yorkers and Los Angelinos can boast mega-city addresses; Houstonians can soon do so. According to a United Nations report, entitled World Urbanization Prospects: The 2005 Revision, “In 2005, urban dwellers numbered 3.2 billion people, 49 percent of humankind.” And by 2030, that urban population is likely to expand to 4.9 billion folks, accounting for 60 percent of the inhabitants on the globe.

continued on next page
In his visit last summer to Mexico City, Larry Nies, an associate professor of civil engineering, learned more about the challenges of a megacity.

For Purdue people like Larry Nies, an associate professor of civil engineering, the megacity phenomenon represents a huge opportunity to deliver resources to people in a very efficient manner. An environmental engineer with an interest in sustainability, Nies also envisions a project that ranges over all the areas within civil engineering, “It provides us with something we can rally around and do together,” he says. “From human to social infrastructures, civil engineering is right in the middle.”

A city’s system of systems

One need only look to disasters to see the chaos that can come from a city disrupted. “Cities are the best single example of a system of systems,” Nies says. “You have transportation systems, energy and water distribution systems, along with communication, healthcare, education, and government systems of all levels, to name a few.”

With virtually no shortage of individual systems operating at the heart of a city at all hours, their interaction becomes critical. And that’s the approach to bring to the megacity project, Nies says. The emerging discipline of System of Systems (SoS), which is also a signature area of the College of Engineering, stems from a philosophy of looking at problems more holistically.

Srinivas Peeta, a professor of civil engineering, brings a holistic vision to all of his research projects. Late last year he was named director of NEXTRANS by the U.S. Department of Transportation. Based in Purdue’s Discovery Park, NEXTRANS is a center that hopes to improve transportation efficiency and safety, better coordinate commercial freight shipping to strengthen the regional economy, and upgrade the highways and infrastructure of the future. And he’s also buying into the vision of Nies.

“Megacities are, in some ways, futuristic,” Peeta says. “Given the challenges that will come due to scale, we will not be able to do an effective job unless we explicitly recognize that these are systems that can operate independently, but would need to be looked at through their interdependencies and linkages in order to design them robustly to handle the scale issues.”

Peeta sees it as a capital budgeting issue, or determining how much to allocate each of the components of the infrastructure system. In a city with all of its networks in place, it becomes an efficiency problem. “If I am going to have my city improved in a manner that is controllable from the perspective of efficient functioning,” Peeta says, “this becomes a system-of-systems problem.”
Mid-Century Energy

Students in Nies’ “Sustainability” class are making energy forecasts for the U.S. in 2050.

Through educated guesses and extrapolated figures, students from Larry Nies’ “Environmental Engineering Sustainability” class tried to predict how the U.S. will handle its energy needs in the year 2050. While the right answer could be anyone’s best guess, the class of 66 students divided up into 13 groups to make their various pitches. Their presented findings—judged by a handful of professors and sustainability experts—took place at a poster session in early March.

One group of five, led by Jessica Moore, a chemical engineering senior, and Emily Raderer, a senior in agricultural and biological engineering, proposed the radical idea of doing away with oil entirely. A notion, they say, their professor said was an extremely ambitious strategy. “I think we were the only group that attempted to use nearly all renewable energies,” Raderer says.

By replacing oil with an energy assortment from solar, wind, tidal, geothermal, hydroelectric, and a proposal for biofuels on all automobiles, the group received an “A” for their efforts from their cautionary teacher. Of the expert judges on hand at the poster session, however, none represented the big oil companies.

Through a divide-and-conquer approach, the students researched the various energy sources, determining how much they could get from each. It provided all with an opportunity to explore new technologies, while weighing facts and figures on the 43-year forecast. “We looked at other countries, such as France and China, to see what was possible,” Moore says. “And with the U.S. government’s heavy emphasis on biofuels right now, we figured that’s something that would grow steadily.”

For these two seniors taking an elective course in civil engineering, the sustainability project provided a clearer perspective over rote memorization of the facts and figures. And while Raderer heads to Europe this summer to work on water-quality issues for the German government, and Moore starts at Unilever in a consumer product testing division, the experience gained as team leaders in an energy project should serve them well in the workplace. ■ W.M.
Students in a “Global Sustainable Engineering” class designed water-delivery systems for cities like São Paulo and wrote mock proposals to the World Bank.

access to education, improved healthcare, and decreased fertility rates.

As Nies pitches the idea to colleagues within Civil Engineering and elsewhere on campus, he’s conscious of the timing. “The vulnerabilities necessitate us addressing the megacity issues because if we don’t and something goes wrong, it’s going to be a huge disaster,” he says.

From a risk-avoidance perspective, Nies says, it’s a no-brainer. And from a possibilities perspective, it’s a project that could have some real legs—affecting millions more.

**Next-generation engineers**

For the civil engineers of 2030—some of them perhaps the children of students taking Nies’ “Global Sustainable Engineering” class—the focus on the ultra-efficiency of the world’s megacities could be the driving force of careers. Just back from Spring Break in 2007, students worked on their megacities projects. “Last year they designed water systems for São Paulo and Lagos,” Nies says. “I added some different cities this year.”

After doing the engineering work of identifying the water resources of the regions, figuring out how many people there are, how much water can be delivered to each person, and by what means, the students wrote mock proposals to the World Bank. “They’re framing up the problem and asking for money,” Nies says. “What’s scary is they find out how difficult it is to do.” Scary, indeed. It’s perhaps as frightening as the prospect of megacities spreading at such a pace throughout the world that they look like connected amoebas from space. But as difficult as it may be to declare an end to Paris, an interdisciplinary effort led by civil engineers could certainly have the City of Light running on all cylinders. ■ *William Meiners*
Changing Skylines

A young alumna is taking her career and an international high-rise to profound heights.

All roads do not necessarily lead to Rome. In fact, Carrie Warner’s road has led her to Moscow, where she is helping design the tallest building in Europe.

Warner, who earned her bachelor’s degree in structural engineering from Purdue (BSCE ’95) and her master’s degree in architecture from the University of Illinois, has been intrigued by the possibilities of structures since childhood. “I remember seeing my aunt’s ‘new’ house, a dilapidated Victorian with dangling bare light bulbs and rickety stairs,” she recalls. “The next time I saw it, one year later, she had transformed it into this magnificent place, with all the old stained glass restored and everything.” That’s what did it for Warner. She fell in love with what a person of vision and know-how could do with a building.

Warner’s father, Denny Warner (BSAE ’73 and MSME ’76), encouraged her toward Purdue, and so she first learned about the nuts and bolts of buildings from an engineering perspective. As a Boilermaker she cultivated other interests as well. She was active in the Purdue Engineering Student Council, Mortar Board, and became her sorority’s president, flexing her social and leadership muscles.

As a graduate student studying architecture, Warner interned with Chicago firms specializing in restoration. “I went into architecture with restoration aspirations,” nods Warner, who satisfied those old dreams. Her professional credits include refurbishing the Auditorium Theatre in Chicago, that jewel of Louis Sullivan’s.

But then Warner found her true calling, taking on big projects with the Chicago firm of Halvorson and Partners. It was with this small group of structural engineers that she started raising her sites—way, way up. “I became more and more interested in new creation,” admits Warner. High-rises in particular, because of the scope of the challenges they present, provide Warner with the greatest opportunity to contribute. “I like to be in close collaboration with the architects,” she explains. “That’s when it’s great—when we bounce things back and forth and get a structure both technically sound and creatively satisfying.”

Warner clearly thrives on dynamic interpersonal give-and-take, the kind so critical to the success of massive projects like the Moscow City Tower. She is working with a stellar international team, led by London-based Foster + Partners, with architects and engineers from Russia, England, Germany, Australia, Kazakhstan, and China. The experience has taught her a lot, such as cultural quirks in building practice. Differences in codes for stair height and depth, for instance, require compromise solutions (“or else we’d end up with ridiculously large staircases!” laughs Warner). She is also getting used to different communication norms. “Russian engineers, for instance, tend to be really blunt,” she notes delicately, “and loud.” She has learned to appreciate these differences as cultural instead of personal, and she has even polished up a positive trait for herself: She has learned to speak more directly.

That’s a plus when you are a woman changing the skylines of cities around the world. Warner has an observation for aspiring women engineers: “We women sometimes over-apologize and undersell what we know.” She points out that structural engineers need to be absolutely right, but that there are often multiple correct solutions. So, she urges her female colleagues, “Be confident about your ideas.”

Construction will begin on the Moscow City Tower in June 2007 and will take two years to complete. “It has been the project of a lifetime for me,” notes Warner. When she hands off her last plans, she’ll be free to get back to another project that might take awhile, too. A newlywed, she and her husband will get busy renovating their new old home. ■ Gina P. Vozenilek
Serving Up Agua Pura

Located on Puerto Rico’s western coast, the village of Humatas de Añasco is lush, dense, and green—not rainforest habitat, strictly speaking, but close to it. Yet this community of 750, which sees rain every day, has had trouble securing a reliable supply of water. It’s at the end of the supply line, and problems upstream can mean no water for the village’s 186 households for three or four months at a time.

Last fall, the University of Puerto Rico at Mayaguez’s (UPRM) University Institute for Community Development set out to assist Humatas in developing a water system that the townspeople could control independently of the central system. Luisa Seijo-Maldonado, director of the institute (which is affiliated with Engineering Projects in Community Service, or EPICS, the service-learning program that originated at Purdue), worked with Efrain O’Neill-Carrillo, a UPRM professor of electrical and computer engineering, and Purdue's Dan Hirleman, professor and William E. and Florence E. Perry Head of Mechanical Engineering, to assemble and help the team. In doing so, the group enlisted the help of a pair of Purdue civil engineering students—Josh Messmer and Matt Carroll.

For Messmer and Carroll, the experience wound up being the biggest technological and cultural adventure of their academic careers. “I jumped at the opportunity as soon as it presented itself,” Messmer says. “I really love to help people and I know engineering missions are something I may do in the future.”

Dustin Armer and Greg Mattes, both mechanical engineering seniors, participated as well. Larry Nies, an associate professor of civil engineering, and Bryan Hubbard, the industrial relations director for the School of Civil Engineering, offered technical support.

The group made their first visit during Labor Day. The goal: to understand and define the problem, meet the rest of the team, and visit the community.

One of the biggest challenges the team faced was their inability to communicate with the residents. Messmer, who only knew a few basic phrases, later realized what an asset speaking Spanish would have been. “The first trip was a real trial by fire,” he says. “We had to rely on the Puerto Rican professors and students who spoke English. We all learned some patience and humility that first day.”

The cross-cultural team spent the next semester designing a water-delivery system consisting of a well (already in place), a pump, a concrete tank, and pipes for connecting system components and distributing the water to the community. The team examined how changing the independent variables of the system—like the pipe diameter, the pipe material, and the tank-depletion rate—affect cost and functionality. From there, they created a computer model to integrate the technical analysis for each of the project’s subsystems.

Messmer worked specifically on laying out the piping in the AutoCAD and estimating the cost of pricing for the piping to run from the pump to the water tank. Messmer and the rest of the team participated in biweekly teleconferences from Purdue after returning to Indiana.

While still working through the various communication issues, the team came up with a couple of water-delivery options to present to the community and its leader, Don José. The Purdue group made a second trip to Puerto Rico a week after Thanksgiving to finalize recommendations with the rest of the team and join in the presentation.

By that time, the community had already raised $15,000 for piping for the project. The EPICS team’s options range from $65,000 to $73,000 for capital costs. The citizens of Humatas are still deciding which option to choose, but regardless of their decision, they are moving in the right direction.

However, the residents of this tiny village are not the only ones benefiting from this experience. “This was an amazing opportunity,” says Messmer. “I learned so much, including flexibility when working with others and creativity when coming up with answers. I realize now that when solving a problem the solutions are only confined to the lengths of my imagination.”

Lisa Hunt Tally and Kristen Senior
Caught in a late-summer downpour are members of a Purdue-Puerto Rican collaboration, including mechanical engineering’s Dan Hirleman (glasses, far left), Bryan Hubbard (center, black shirt) and civil engineering students Matt Carroll (hands on knees), and Josh Messmer (gray shirt). The Purdue contingent traveled to Puerto Rico over Labor Day weekend 2006 before collaborating long distance on a water-delivery system, which they delivered a week after Thanksgiving.
More durable concrete and students who are better prepared to work in the global marketplace are two of the benefits of collaboration between civil engineering researchers at Purdue and the Technical University of Denmark (DTU).

Though physically separated by thousands of miles, Purdue’s Jason Weiss, a professor of civil engineering and the assistant head of research, and Professor Mette Geiker of DTU have spent the last four years studying how cracking can accelerate the deterioration of concrete. An exchange of ideas from researchers around the globe about their work in concrete can only improve the field, they say.

In addition to their ongoing research, Weiss and Geiker are focusing on an educational exchange that will improve the way students learn about their field. Brad Pease (BSCE ’03, MSCE ’05) is now co-supervised by Weiss and Geiker in the doctoral program at DTU. The two colleagues are also developing a curriculum on new construction materials for increased productivity that will be used at both universities. The course incorporates aspects of problem-based learning as well as computer simulation, computer animation, and videos of field practices.

Much of the work can be done in real time across continents on computers, but Geiker, who spent 10 days at Purdue this spring, says nothing replaces old-fashioned personal contact and being able to pass papers and diagrams back and forth across a desk. No matter the contact, exposure to different global working environments is essential for the growth of both researchers and the field.

“Forty or 50 years ago, it was expected that students would leave Purdue and work in Indiana or the Midwest and spend their career in one place,” Weiss says. “Now it’s common for students to complete their studies and immediately begin working anywhere in the world. The biggest companies do not focus solely on the United States and contractors are no longer situated in one geographic location. They design and travel worldwide and expect their workers to do that, too.”

PhD students at DTU are required to spend time abroad as part of their education; students at Purdue are encouraged to do so.

“The experience gives you a different level of insight into how other countries and researchers have approached a problem,” Weiss says. “It’s very different to spend a week seeing how people work than it is to hear about it during a 20-minute presentation at an international conference.”

The collaboration between Weiss and Geiker has its roots in the Center for Advanced Cement-Based Materials (ACBM), which was originally funded by the National Science Foundation in 1988. Purdue was among the five partners in the center, which included Northwestern, Illinois, Michigan, and the National Institute of Standards and Technology. The center began a research and doctoral teaching exchange with DTU in the late 1990s, which landed Weiss in Denmark in 2003.

Of the 30 or so master’s and doctoral students who Weiss has supervised since arriving at Purdue in 1999, only three are in jobs that do not require international contact. The rest are either working internationally or occasionally travel overseas. Even for those whose jobs have a domestic focus, the benefits of international contact are infinite, according to Geiker.

“Even though you work domestically, you benefit from having seen other places and having realized that things can be done differently and still work,” Geiker says. Weiss nods his head, adding, “The more opportunities in life you have, the more ideas there are to be implemented.”

Linda Thomas Terhune
**CE’s Distinguished Engineering Alum**

Alumnus honored for his distinguished career in government and higher education and for his outstanding contributions to the people of Taiwan.

As a child growing up in Taipei, Taiwan, C. J. Chang had one dream, he says: “to become a civil engineer and to be able to design and construct large transportation infrastructures.” Chang dedicated himself to that goal, graduating from Taiwan’s National Cheng Kung University in 1973 and California State University in 1976 with bachelor’s and master’s degrees, respectively, in civil engineering.

He chose Purdue for his doctoral work. Here, he studied with Harold Michael, head of the transportation area and, Chang recalls, “the most decent and highly respected professor I have ever met.” Professors Robert Miles and Kumar Sinha were thesis advisors, providing valuable guidance and an indelible model of scholarship and hard work. “I was an ambitious student,” Chang says. “How to strengthen my personal capabilities and make myself a well-equipped professional were the issues I thought most about.” He completed his coursework and dissertation in only two and a half years—a tremendous challenge—but nevertheless made time to be involved in the Chinese Student Association and Chi Epsilon, the national civil engineering honor society. “My Purdue education,” he says now, “enabled me to equip myself and make myself a qualified and capable engineer.”

**Transportation in Taiwan**

PhD in hand, Chang taught at Marquette University for two years and then returned to Taiwan, serving as the director of the Graduate Institute of Traffic and Transportation Students at National Chiao Tung University. In 1987 he joined Taiwan’s Ministry of Transportation and Communications (MOTC), where he emerged as a major force in the country’s transportation sector. Serving as director general of the Institute of Transportation, a unit devoted to research and planning, Chang advanced in 1995 to the rank of vice minister, the ministry’s highest civilian position, overseeing not only land, maritime, and air transportation but also post, telecommunications, meteorology, and tourism affairs under MOTC jurisdiction.

“I was involved in almost all the major national transportation infrastructure development projects for the past 20 years,” he says, including a comprehensive multimodal transportation plan for Taiwan involving road, rail, air, sea, and metropolitan transportation systems.

Chang was also responsible for planning and implementing a high-speed railroad system, as well as developing plans for freeway network development, urban mass rapid transit development, nationwide harbor development, and nationwide airport development, which included transforming the CKS International Airport into a hub for the Asia Pacific region. From improved bus service and taxi operations in Taipei to computerized traffic control systems through Taiwan, virtually every Taiwanese citizen has experienced the benefits of Chang’s work.

Recognizing his profound impact on the country’s quality of life and economic well-being, the Taiwanese government awarded Chang the Gold Medal of Professional Excellence in Transportation on his retirement from government service in 2005.

**At the Helm of Chung Hua University**

His civil engineering dream realized, Chang has taken on another far-reaching responsibility: the leadership of Chung Hua University.

Founded in 1990 in Hsinchu, Taiwan, the university is one of the country’s youngest and most rapidly growing educational institutions, now enrolling some 10,000 students. Chang assumed the presidency in 2005, overseeing colleges of Engineering, Information Science, Management, Architecture and Planning, Humanities and Social Sciences, and Tourism.

“My greatest challenge now is to make this university one of the best in my country,” Chang says. “I am confident that within three to five years, this goal will be achieved.”

International collaboration is a major emphasis. “In this era of the global village,” Chang says, “we have a comprehensive plan as well as pragmatic approaches for expanding and strengthening collaborations with other countries to facilitate our academic research and objectives.”

More broadly, Chang urges all institutions of higher education, including engineering schools at Purdue and elsewhere, to establish more student exchange programs. “It’s important for college students to have the chance to learn about the world by visiting and studying in other countries,” he says. “All students in this age need to have an international perspective and broad vision to cope with our changing world and the globalization of the world economy.”

——— L.T.T.
Congratulations to recipients of the 2006 Civil Engineering Alumni Achievement Awards presented in February of this year.

Dennis Drag (BSCE ‘66) began his engineering career working on such noteworthy projects as the Saturn launch vehicle for the Apollo Moon Program and the first standardized nuclear power plant in the United States. He is now the associate vice president at Moffatt & Nichol where he is responsible for the firm’s infrastructure design and construction activities. Throughout his career he has managed the design and construction of unique mega-projects, including the John Wayne Airport in Orange County, California, and the Pike Commercial Development in Long Beach.

Jim Fletcher (BSCE ‘67, MSCE ‘68) grew up in the small farming community of Washington Court House, Ohio, until a national civil engineering scholarship provided by ARMC Steel brought him to West Lafayette. Fletcher’s professional career has included various assignments in the design and construction of structural and mechanical facilities for federal, state, local, and private clients in North America, Europe, and Asia. In 1981 he founded Jenlynn International, an internationally renowned engineering design firm specializing in cable transportation systems. He has supported his professional organizations with major contributions in the development of national standards for transit. Currently, he is leading the efforts in the development of safety standards for propulsion and braking.

Growing up in upstate New York Jane Gallagher (MSCE ‘81) had no idea that one day through the integration of biology, chemistry, and engineering principles she would be tackling some of the most pressing health and environmental issues of our time. As a research scientist at the U.S. Environmental Protection Agency, her
work focuses on the validation of biomarkers of human exposure, effect, and susceptibility. Gallagher recently received agency funding for one of the largest children’s multidisciplinary studies to assess the interplay of environmental and genetic factors on the development and exacerbation of childhood asthma.

John Koch (BSCE ’50) knew he wanted to be a structural engineer by the time he was 13. By 16, he was working as an apprentice draftsman and model maker at Evansville’s International Steel Company. Although in 1941 his studies at Purdue were interrupted when he was called to war by the U.S. Army Air Force, he eventually returned and completed his degree. He started work as a design engineer with Swift and Company in the Chicago Stock Yard office and has since worked as a structural engineer for both F. H. McGraw & Co. and the International Steel Company. In 1988, he started John F. W. Koch and Associates Consulting Engineering Inc. before becoming a senior consultant with Hodge Design Associates.

Joan Miller (BSCE ’79) was drawn to civil engineering because she was enamored with taking a project from concept through to design, construction, and completion. Over the years, Joan has held roles in project and program management, operational and strategic planning, and business development in a variety of business areas, including environmental, energy, nuclear, communications, and facility construction. She currently is the senior vice president for client development and marketing for the industrial client group at CH2M-HILL. Throughout her career, Miller has been a trailblazer in creating a more inclusive corporate culture that actively supports the attraction, development, and retention of women in the field of engineering.

Jude Rake (BSCE ’81) has been a business builder throughout his career, from well-known consumer packaged goods companies to smaller privately held companies. He has managed some of the most notable brands and marketing teams at corporations such as S. C. Johnson, Pepsi-Cola, and the Clorox Company. He served as chief operating officer of consumer imaging for the Eastman Kodak Company, and for the past three years he led a turnaround as president and chief operating officer at Fellowes, a worldwide leader in paper shredding and records storage. He was recently recruited by Recycled Paper Greetings to be its new CEO.

From a very young age, Dan Stoppenhagen (BSCE ’85) was encouraged to make the most of his natural abilities in mathematics and science. This encouragement led him to Purdue where he quickly developed a strong interest in civil engineering. Stoppenhagen’s career began at Fluor as a project structural engineer, designing complex structures and foundations for onshore and offshore oil and gas projects. He quickly advanced to lead structural engineer where he eventually led Fluor’s Offshore and Marine Structures Engineering Department. He is now responsible for transportation and infrastructure business development for the central region of the United States and Latin America.

Class Notes

Bowen Engineering (Robert Bowen, BSCE ’62) received the BKD Build Indiana Industrial/Utility award for its recently completed Cenergy Gibson Station FGD project in Owensville, Indiana.

Bob Krzeminski (BSCE ’70, MSCE ’76) has been inducted into the ITS Florida Honor Roll by the Intelligent Transportation Society of Florida in recognition for his distinguished career in transportation and substantial contribution to the intelligent transportation systems industry in Florida.

Kentton Grant (BSCE ’81) has been promoted to vice president of finance and rates for UniSource Energy Services. He will be responsible for corporate financing activities, financial planning, and rate case preparation for TEP and its sister utilities, UNS Electric and UNS Gas, which do business under the name of UniSource Energy Services.

Carlos Santamaria (PhD ’87), the Goizueta Foundation Faculty Chair and Professor of Civil Engineering at Georgia Institute of Technology, was inducted into the Argentina National Academy of Engineering in November 2006.

Jeff Hagerman (BSCEM ’93), president of GDH and executive vice president of Hagerman Construction, was named to Indy’s Best & Brightest Under 40 list at a luncheon benefiting Junior Achievement of Central Indiana.

Carrie Warner (BSCE ’95) has been named in the top 40 under 40 list of Crain’s Chicago Business. Warner is a senior project engineer at Halvorson & Partners in Chicago, Illinois, currently working on the Moscow City Tower (see story on page 11).

We are always interested in featuring recent news about our alumni. To have your accomplishments included in this magazine and share them with fellow alumni, please e-mail information on awards/honors/recognition, promotions, and related matters to Cindy Lawley (lawley@purdue.edu). Please be sure to include the year(s) and Purdue degree(s) you have received.
Golden Gate Anniversary and Admission

On May 27, 2007, the Golden Gate Bridge, Highway, and Transportation District celebrated the 70th anniversary of the opening of the world’s most famous bridge. And while the Bridge District is never likely to sound any trumpets at the mention of the name Charles Ellis, at least its leaders are finally coming around to the truth that Ellis, not Joseph Strauss as longtime pitched, was the bridge’s true designer.

Any civil engineering alum familiar with Purdue’s connection to the Golden Gate would know of Ellis, a civil engineering professor from 1934 to 1946. For the unfamiliar, the long, controversial story cut short, is that Strauss fired Ellis (near Christmas 1931) not too long after his employee’s design had been overwhelmingly approved by the board of directors. Strauss, a designer of draw bridges, simply didn’t have the engineering chops to undertake the spanning of the Golden Gate. What was long known within the inner circles of civil engineering came to light around the time of the bridge’s 50th anniversary with the publication of John van der Zee’s *The Gate: The True Story of the Design and Construction of the Golden Gate Bridge*.

Van der Zee, armed with original source material: official reports, memos, and letters written by the people who were there at the time, proposed that Strauss railroaded Ellis. A mathematical genius whose “design involved 10½ volumes of pre-computer higher mathematics, all done by one guy with a circular slide rule and a hand-crank adding machine,” Ellis was dismissed before construction began. Van der Zee likened the treatment to “what happened to the Bolsheviks under Stalin. Ellis became a non-person,” he says. “The dozen copies of the engineer’s report, which credited Ellis with overseeing the design, were recalled by Strauss and have since disappeared. All mention of Ellis vanished from bridge promotional and historical material.”

After van der Zee’s book was published, Lewis McCammon (BSCE ’41, MSCE ’48, PhD ’51) came forward with more golden proof—all of his former professor’s papers, including letters, telegrams, and engineering drawings with Ellis’s signature on every page. Along with Fred Apsey (BSCE ’41), another Ellis student, van der Zee and McCammon campaigned for years for some recognition at the San Francisco site, which has a 27½ foot bronze statute of the diminutive Strauss.

Denied by the Bridge District in 1993, even after an investigation by the American Society of Civil Engineers concluded that Ellis was due proper credit, van der Zee says they vowed to keep the argument at the level of history and scholarship. Two PBS videos followed suit, along with written testimony from historians and writers like Henry Petroski and Kevin Starr, all speaking to the absolutely crucial design that Ellis provided.

Ellis, the soft-spoken, refined professor who translated Greek myths in his spare time, never really protested the omission. “But if anyone brought it up,” Apsey says, “he said, ‘I designed every stick of steel on that bridge.’ ”

And it’s a truth worth spreading. “Now,” says van der Zee, “no serious person, journalist, engineer, or historian is going to write about the Golden Gate Bridge and ignore Ellis’s role in it.”

W.M.
This image of Earth’s city lights was created with data from the Defense Meteorological Satellite program Operational Linescan System, which NASA uses to map urbanization. The brightest spots are the most urbanized but not necessarily the most populated. (Compare Western Europe to China and India, for example.) See “Prime Numbers” on page 10 (college side) for a numerical quick look at our world.