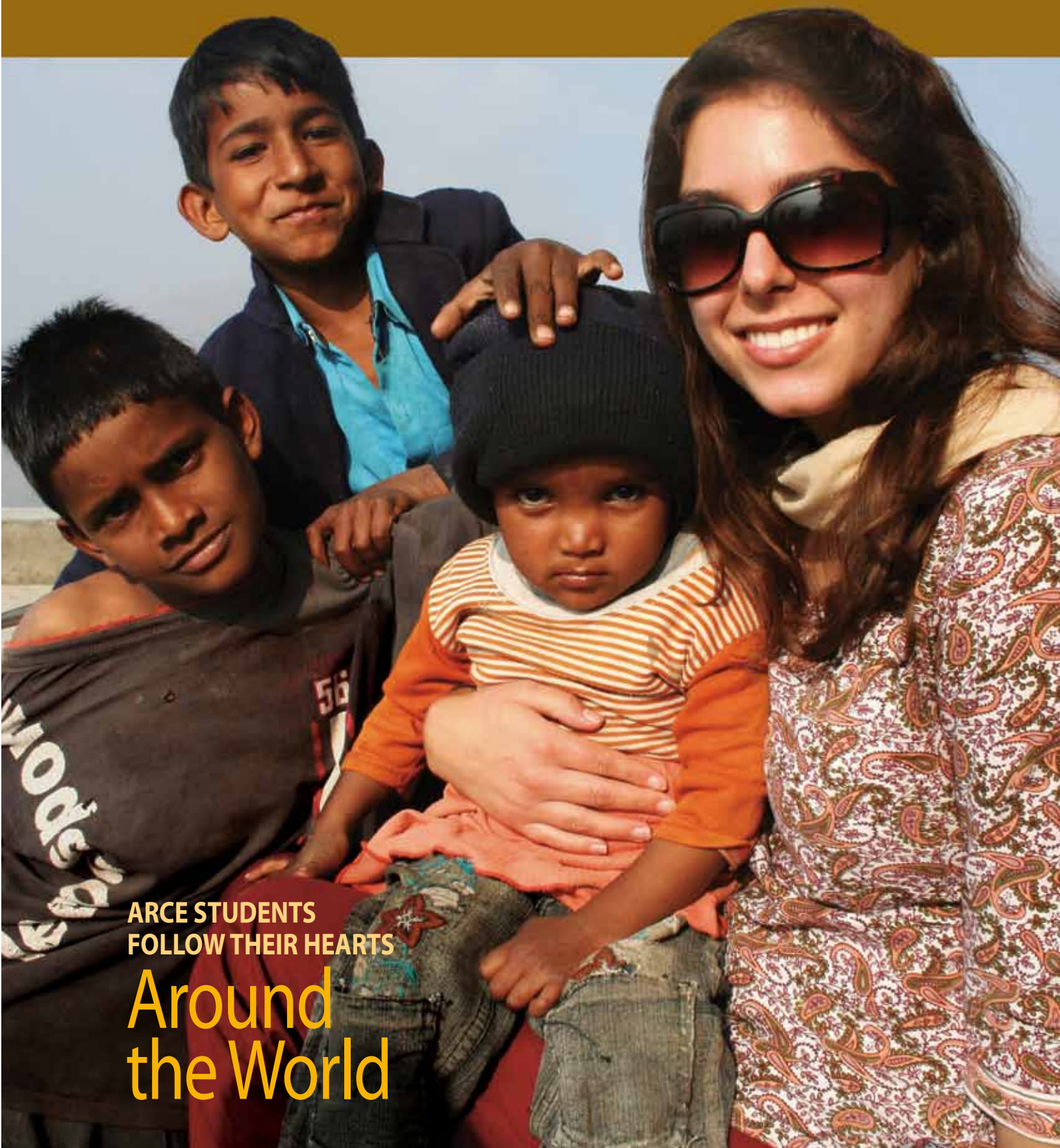


CAL POLY
SAN LUIS OBISPO

ARCE

ARCHITECTURAL ENGINEERING DEPARTMENT COLLEGE OF ARCHITECTURE AND ENVIRONMENTAL DESIGN SPRING 2012



ARCE STUDENTS
FOLLOW THEIR HEARTS

Around
the World

Appreciating Our Students

Their energy proves boundless in academic, social activities

I hope that this newsletter will illustrate why I am so proud of the students who graduate from the ARCE program. A theme in this issue is students making a difference in the undeveloped world. You will read about Kevin Chen in Uganda, Diana Durany in India, and a host of students assisting recovery efforts in Haiti.

Despite the rigors of academics in the extraordinarily difficult ARCE program, the students continue to support Open House, conduct Structural Forum, host a weekly guest speaker series, plan field trips, participate in national competitions, execute creative senior projects, and have a lot of fun. They are simply the best.

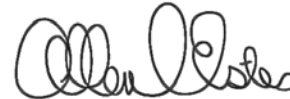
While teaching remains our top priority, the faculty are pursuing innovative research projects that support their own professional development and enhance their classroom teaching. This issue explains what they are doing with a consistent theme of protecting society in a highly seismic environment.

The austerity of budget cuts are at least partially offset by the generosity of parents, alumni and industry partners. This edition

of the newsletter is sponsored by the Fluor Corp., which has helped lead the way in this effort. I remain very grateful for our sponsored laboratories (CSI, Hilti, Verco, Simpson, Haselton, Berridge and Degenkolb) that have allowed us to upgrade our deteriorating facilities.

There is still more to do and a great need to be filled, but I certainly appreciate the positive feedback and good attendance we get at Parents Weekend, ARCE social gatherings, the SEAOC conference, and other outreach efforts that are featured in this issue.

Finally, I want to thank Tom Jones who has served as the college dean for the past nine years. He will be stepping down after this year, and I am very grateful for all he has done for this department. He was particularly courageous in making the case for additional funding, and he left the college far better than he found it. We will miss him.



ALLEN C. ESTES, DEPARTMENT HEAD

Dean's Message

Looking back fondly, and now moving on

All good things must come to an end, and after nine years the time has come to turn the leadership of this college over to someone else's capable hands. It has been my privilege to oversee five unique disciplines and watch the interdisciplinary collaboration grow over the last decade.

It has been particularly interesting having one of the nation's most rigorous engineering programs as part of an architecture college. Nobody else has that, and I think that we have taken great advantage of this opportunity. I want to personally thank the students, faculty, staff, alumni, parents and industry partners that have

so fervently supported this outstanding ARCE program.

There is still much work to be done. I am confident that you all will stay involved and will continue to contribute in the critical areas of student recruitment, contemporary issues in high-performance environments, integrated knowledge and tools, professional practice and methods, technical competence, collaborative process, community engagement, external partnerships, teaching and research innovation, and resource stability.

My best wishes and thanks to you all.



R. THOMAS JONES, AIA

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On the Cover

Recent ARCE alumna Diana Durany – shown in a village near Mussoorie, India, with local children – continued to Learn by Doing as she worked overseas. Read about Diana and the experiences of other ARCE alums working abroad starting on page 18.



As an assistant to Professor John Lawson in his research project, ARCE graduate student Caroline Yarber prepares to test a wood glulam beam.

Faculty News

RESEARCHING SHAKE, RATTLE & ROLL

EARTHQUAKES
DOMINATE
ARCE FACULTY
PROJECTS

Scientists might not be able to predict the next big earthquake, but leading research by some of Cal Poly's architectural engineering professors might just result in saving lives, if and when the next "big one" occurs. The destruction and loss of life that a major temblor can cause can be mitigated to a large extent by designing and constructing buildings that are better able to withstand such a seismic event. Here we take a look at some of the research in progress.

Assessing the earthquake safety of 'big box' stores

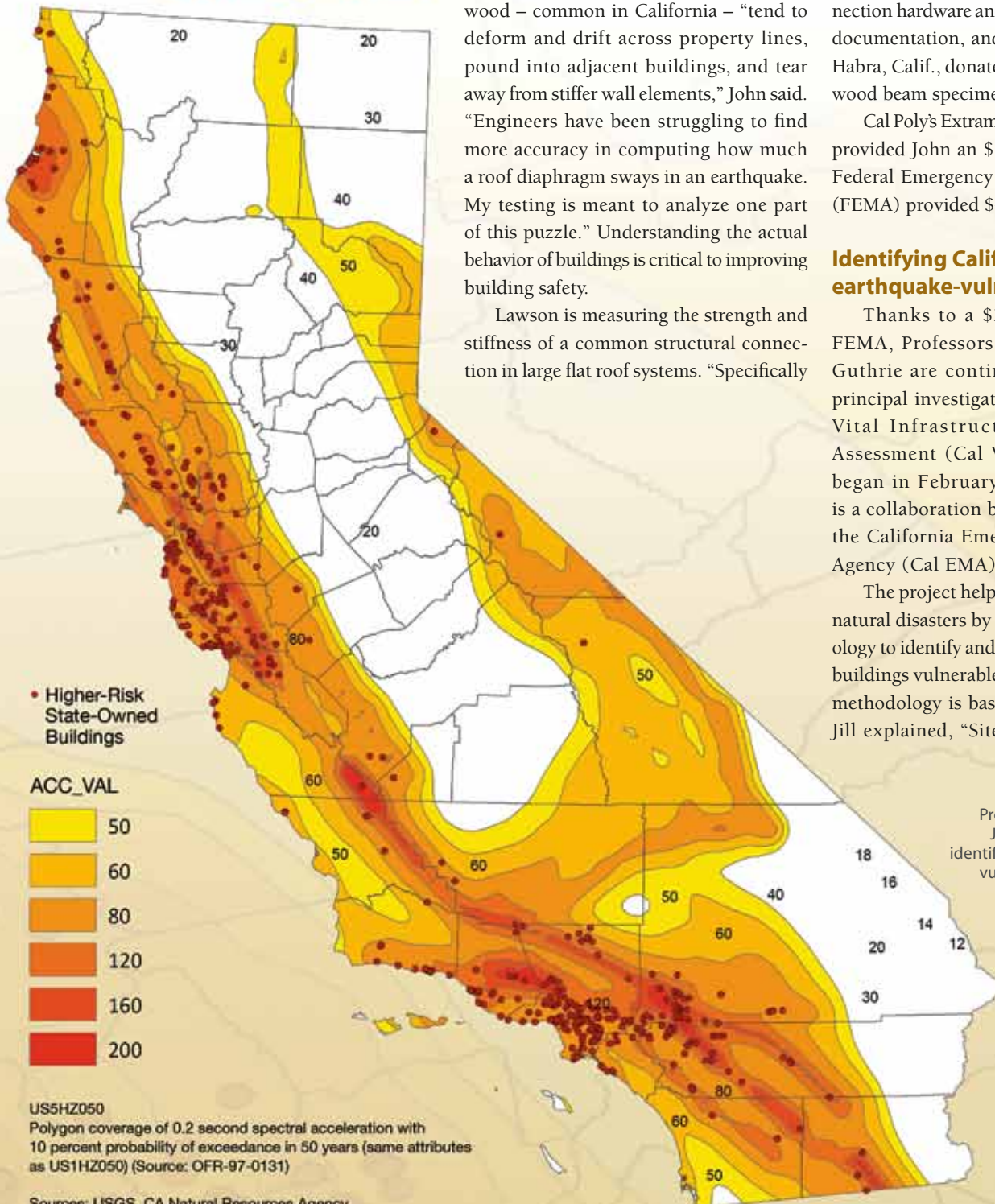
Professor John Lawson and graduate student Caroline Yarber are working to improve the earthquake safety of warehouses and "big box" retailers, like Costco and Home Depot.

"Earthquake design of buildings is traditionally based on the flexibility or stiffness of the vertical walls or columns,"

John explained. "Typically, the stiffer the building, the more earthquake force it suffers." But John theorizes that in some buildings, the large flexible roof diaphragm may be more important than walls and columns in predicting seismic loading and performance.

Big box stores are built with short, stiff concrete or masonry walls. Conversely the stores' large flat horizontal roof diaphragms

Quake Hazard – 0.2 sec 10% in 50 years



are flexible. “These two different stiffnesses in the same building cause it to behave differently than the building code assumes it will in a large earthquake,” John said. “The building code ignores the diaphragm’s response.”

Additionally in an earthquake, roof diaphragms made of bare metal deck or wood – common in California – “tend to deform and drift across property lines, pound into adjacent buildings, and tear away from stiffer wall elements,” John said. “Engineers have been struggling to find more accuracy in computing how much a roof diaphragm sways in an earthquake. My testing is meant to analyze one part of this puzzle.” Understanding the actual behavior of buildings is critical to improving building safety.

Lawson is measuring the strength and stiffness of a common structural connection in large flat roof systems. “Specifically

we are looking at the Simpson Strong-Tie connection hardware used to connect roof beams to resist earthquake loads,” John said. “I theorize these connections play an important role in the overall stiffness of the roof diaphragm, affecting seismic performance.”

Simpson Strong-Tie donated the connection hardware and provided past testing documentation, and Beven Herron of La Habra, Calif., donated 12 glued-laminated wood beam specimens for testing.

Cal Poly’s Extramural Funding Initiative provided John an \$11,000 grant, and the Federal Emergency Management Agency (FEMA) provided \$4,000.

Identifying California’s earthquake-vulnerable buildings

Thanks to a \$300,000 grant from FEMA, Professors Jill Nelson and Jim Guthrie are continuing their work as principal investigators on the California Vital Infrastructure Vulnerability Assessment (Cal VIVA I) project that began in February 2011. This project is a collaboration between Cal Poly and the California Emergency Management Agency (Cal EMA).

The project helps Cal EMA prepare for natural disasters by developing a methodology to identify and prioritize state-owned buildings vulnerable to earthquakes. “The methodology is based on three triggers,” Jill explained, “Site seismicity, building

vulnerability, and the criticality of the functions housed in the building.”

The methodology is being tested on four state agencies: Caltrans, the Department of Water Resources, California Highway Patrol, and the California Department of Forestry and Fire Protection.

ARCE faculty and students have performed site visits on 17 buildings with more planned for spring 2012. Jill and Jim plan to prepare a report this year that documents the process and the seismic assessments, as well as develop long-term planning goals for the state.

The grant includes funding for faculty and ARCE graduate students to assist with the building investigations and related studies. In addition, key elements of the grant, such as seismic evaluation, upgrade processes, and public policy decision making, are being brought to the classroom, reinforcing Cal Poly’s Learn by Doing philosophy.

Haiti: Mwangi’s year in review

Professor James Mwangi is back after a year’s sabbatical in Haiti, where he helped rebuild the nation devastated by an earthquake in January 2010.

He reports that a new dimension in rebuilding efforts has emerged known as owner-driven home repairs. Instead of a nongovernmental organization (NGO) fully funding home repairs, owners must come up with a percentage of the cost to rebuild. Then an NGO provides technical support and funds to rebuild a stronger, safer home.

James also helped lay the groundwork for a hazard reduction center at the State University of Haiti to serve as a clearing-house to ensure building codes are in place and enforced. With Cal Poly and Virginia Tech leading the charge, seven universities and some leading national building research organizations have committed to creating the center.

James was also heartened by a Canadian International Development Agency project. With a \$1.4 million grant funded through the Mennonite Central Committee (MCC), work is under way to build a planned



village that will offer Haitian citizens decentralized services. Everything in Haiti is centralized in Port-au-Prince – from finances and politics to education and health care. It’s where people go for all manner of business. This resulted in extreme overcrowding – a major reason so many died in the earthquake.

The MCC aims to decentralize services so people won’t have to come to the capital for everything. “We secured land outside Port-au-Prince and planned an entire sustainable village with homes for 500 families,” James said.

continued on page 6

Students and faculty meet up in Port-au-Prince (top, from left): Josue Urrutia, ARCE Professor James Mwangi, State University of Haiti Professor Jaddote Janin, Ben Biddick and Anna Smith

The design of a proposed building for the new village near Port-au-Prince was developed by local Haitian engineers under Professor Mwangi’s guidance (above).



Sustainable earthquake-resistant construction

Professor Peter Laursen continues to investigate how well interlocking compressed earth block (CEB) masonry walls hold up in earthquakes and strong wind conditions.

He is focusing on how slender one-story-high CEB walls behave under face loading. “We are using blocks made with a hand-operated block press, resulting in a low-cost, environmentally sustainable construction material made primarily of indigenous soil mixed with minimal cement for stabilization,” Peter said.

“The process involves stacking dry CEBs without mortar joints, much like LEGOs,” he continued. Reinforcement bars are inserted in the cavities and grouted. “This is easily accomplished using local unskilled labor.”

The research is a collaboration with civil engineering Professors Dan Jansen and Bing Qu. ARCE graduate student Nicholas Herskedal built and tested three four-foot-tall cantilever walls and two eight-foot-tall, full-scale walls in a campus lab. “Under simulated seismic loading, we confirmed that a dry-stacked CEB wall is incredibly flexible when bending out of its plane. So flexible that the wall might



buckle under modest axial load before achieving its bending strength,” Peter said.

To mitigate the excessive flexibility, Nick stiffened a second full-scale wall with a column embedded in the wall panel. “The test showed the concept to be promising with the wall greatly stiffened in comparison to the plain walls,” Peter said.

Peter is expanding on the research with an \$11,000 grant from Cal Poly’s Extramural Funding Initiative. He is now

Graduate student Nick Herskedal tests the flexibility of an 8-foot-tall wall he built in the High Bay Lab as part of Professor Peter Laursen’s research.

looking at using CEB as masonry infill in reinforced concrete frames, also called confined masonry construction, which is very popular in large parts of the world, from South America to the Middle East and China.



Professor Cole McDaniel sets up the UL-FVT equipment for a building shake test (left).

Professor Graham Archer explains the UL-FVT to UC San Diego doctoral students (above).

Professors McDaniel and Archer continue to shake things up

Professors Cole McDaniel and Graham Archer traveled to UC San Diego as part of their research sponsored by the National Science Foundation-Network for Earthquake Engineering Simulation Research. They are investigating the feasibility of extremely low amplitude forced vibration testing to determine the structural dynamic properties of low-rise buildings.

Toward that end, they are using a very small, 30-pound shaker to excite a full-scale, five-story reinforced concrete building test specimen constructed on UC San Diego's outdoor shake table as part of a multi-million dollar NSF research project. This high-performance outdoor shake table is the world's first outdoor shake table and is the largest in the U.S.

The results of the ultra-low forced vibration testing (UL-FVT), namely, the natural frequencies, mode shapes, and



The full-scale, five-story reinforced concrete building test specimen at UC San Diego

damping ratios, will be compared to the shake table test results. Comparisons will be made at multiple stages of the testing.

"This research is potentially transformative in that it will define the limits and applicability of the UL-FVT," Cole said.

The first phase focused on testing the five-story building prior to earthquake simulation on the shake table. In an eight-hour period, Cole and Graham successfully captured the building's dynamic characteristics. These compared well to analytical predictions made by ARCE undergraduate student Zhi Long Liu and two UC San Diego doctoral students.

"These preliminary results are very promising," Graham said. "The true test will come when these results can be compared to those obtained by exciting the building with earthquake ground motions through the massive shake table."

The next phases of the UL-FVT research involve retesting the structure after it is damaged in the earthquake simulations. It is hoped that the location and extent of the damage will be detected in subsequent UL-FVT studies.

Taking a 'DIP' at Degenkolb – Again

Professor Abe Lynn returns to industry for a year

Professor Abe Lynn (ARCE '86) is noticeably absent from campus this year, but when he returns, he will be even better equipped to teach and motivate his students.

Thanks to a California State University program known as Difference in Pay (DIP) Leave, eligible professors may take time off to work with industry. This marks Abe's fourth DIP stint at Degenkolb Engineers in Oakland.

These industry experiences are critical to staying on top of the latest advances in professional practice. "The cutting edge of structural engineering is constantly changing, frequently with every large earthquake," Abe said. "Degenkolb's work is right on that edge, and its personnel are frequently on many of the committees that develop our current building codes. It's invaluable to bring that into the classroom and my research." He teaches a number of courses, such as Reinforced Concrete and Seismic Design and Analysis, that are directly related to practice.

Department Head Al Estes is a proponent of the opportunity. "Considering the industry focus of the program and inclusion of practitioners on the faculty, it is important for faculty members to stay



Professor Abe Lynn

current with the industry we serve," Al stated. "Working side by side with many of our former students is a great way to maintain our partnership with industry and stay connected with those who hire our graduates."

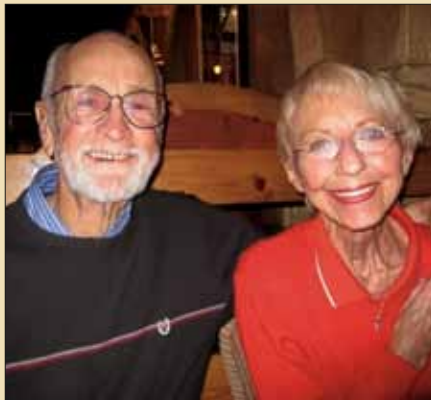
Abe is a 1986 Cal Poly ARCE graduate. He worked for four years before deciding he wanted to teach. After earning a master's and Ph.D. from UC Berkeley, he returned to Cal Poly to teach.

And after 16 years, Abe is the longest serving member of the faculty. The popular

professor still loves what he does. "Cal Poly students are some of the brightest and most motivated I've met; they are a pleasure to teach," he said.

Returning to industry as an engineer for a year is a boon to Abe and his students. "If you can teach your subject with a detailed understanding of how it fits into the bigger picture and are able to cite meaningful examples, you have more power to motivate your students to want to learn," Abe remarked. "Working in industry helps me provide context. Students want to feel that what they are learning has real meaning and application, and these experiences with Degenkolb help me provide that."

The experience also helps perpetuate Cal Poly's Learn by Doing methodology. "In the short term, Learn by Doing creates graduates who can hit the ground running. It's one reason our graduates are so sought after," Abe said. "A strong theoretical background is also necessary for long-term success. Inevitably you'll run into a problem that doesn't follow what was taught in the textbooks and the codes, and you have to have a good theoretical foundation to work your way through the problem. It's the structural engineer who is as adept at dealing with the difficult problems – as well as the everyday issues – who is ultimately successful."



Dell and Donna Nickell

In Memoriam

Professor Emeritus Dell Orey Nickell (1923-2012)

Dell Orey Nickell, 89, architectural engineering professor emeritus, died in February in Arizona. Dell is survived by his wife, Donna Nickell, and stepchildren.

Dell came to San Luis Obispo to serve as deputy county engineer. In 1965 he joined the Architectural Engineering Department and taught Soil Mechanics and Foundation Engineering until he retired in 1980. He served as acting department head

in 1979 and is credited by emeritus faculty member John Edmisten with guiding the department through a very difficult period.

Emeritus faculty member Sat Rihal is saddened by the loss of his dear friend and recalls Dell as "one of the warmest and finest human beings" he has ever met. "Dell will always be remembered for being such a dear friend, wonderful colleague and a great teacher," Sat said.

President Jeffrey D. Armstrong (below) addressed a full house of students and their parents (right)



A Growing Tradition

Second Parents Reception draws an even bigger crowd

ARCE had an excellent turnout for its second annual Parents Reception, held Oct. 29 during the university's Parents' Weekend. Cal Poly President Jeffrey D. Armstrong and CAED Dean R. Thomas Jones welcomed the group of about 200 faculty members, students and their parents.

The event, held in the courtyard behind the ARCE Building, included a barbecue sponsored by the student chapter of the SEAOC/AEI. The college photographer took family photos, which all attendees received with a thank you note for attending.

The formal program included student presentations on chapter activities and the recent trip to Haiti. Professors Ed Saliklis on guitar and John Lawson, bass, got some laughs when they performed their original tune, "ARCE Blues." (See it at: www.youtube.com/watch?v=W_fV2Y1dFSA.)

Guests also saw a Learn by Doing time-lapse video created by Professor Emeritus Jake Feldman as part of his Large-Scale Structures course for architecture and construction students. (See it at <http://www.youtube.com/watch?v=zfLQi9OLDK0&feature=youtu.be>.)

Finally, the parents participated in a question-and-answer session with



The Wali family (left)
Zachary Sidnam at the barbecue (below)



Department Head Al Estes. "It was terrific to see so many ARCE parents in attendance," Al said. "Parents obviously have a vested interest in the success of this program, and I look forward to their support and involvement."

"We look forward to an even bigger crowd at next October's reception."



Structural Forum 2012

Rebuild & Reuse

This year's Structural Forum attracted more companies overall – 29 this year versus 24 last – and more companies from outside California than in previous years. According to Structural Forum Chair Kyle Welsh, “It seemed more positive than in past years” – an indication that things might be looking up in the structural engineering industry.

This year's theme, “Rebuild and Reuse,” reflected Kyle's interest in retrofitting and also brought back more technical speakers and topics to the event, held Feb. 18.

Three industry experts spoke during the morning session, held in the Rotunda in the Business Building on campus: Mason

Walters (ARCE '78), a principal at Forell/Elssesser Engineers, spoke on the Utah State Capitol Retrofit project; David Mar, principal of Tipping Mar, gave a presentation on UC Berkeley's Greek Theatre retrofit project; and Yoram Eilon, vice president of WSP Cantor Seinuk in New York, talked about One World Trade Center, the lead building of the new World Trade Center complex.

Mark Sarkisian, director of seismic and structural engineering in the San Francisco office of Skidmore, Owings & Merrill, delivered the keynote address at the evening banquet, held at the Embassy Suites Hotel. He addressed about 200 people – 140 of

Gathering for the forum (from left): Professor John Lawson, SEAOC President Laura Rice, forum Chair Kyle Welsh, speaker Mason Walters, Department Head Al Estes, speakers Mark Sarkisian and Yoram Eilon, SEAOC Vice President Lisa Henry, and speaker David Mar.

them students – on new ways to look at engineering design – ways that incorporate nature into the design.

A highlight for Kyle was the Friday night before the forum. He and students Lisa Henry, Laura Rice and Chelsie Taylor; faculty members John Lawson, Al Estes, Abe Lynn, Graham Archer, Ed Saliklis; and Administrative Support Coordinator Christine Cobb sat down to an informal dinner with the speakers.

“All the speakers were extremely nice, down-to-earth and personable,” Kyle said. “I learned a lot.”

It was the start to a very successful 22nd annual Structural Forum.

Thank You, Partners | ARCE extends a warm thank you to these companies for their participation in the 2012 forum:

ATI Architects and Engineers, Danville
Brooks Ransom & Associates, Fresno
Buehler & Buehler S.E. Inc., Sacramento
Crosby Group, Redwood City
Degenkolb Engineers, Oakland
DES Architects + Engineers Inc., Redwood City
Englekirk Structural Engineers, Los Angeles
Ficcadenti & Waggoner Consulting Structural Engineers, Irvine
Fluor Corp., Aliso Viejo

Forell/Elssesser Engineers Inc., San Francisco
Hilti, Tulsa, Okla.
Holmes Culley/Holmes Fire, San Francisco
John A. Martin & Associates, Los Angeles
KPFF Consulting Engineers, Los Angeles
Lionakis, Sacramento
MHP Structural Engineers, Long Beach
Miyamoto International, Santa Ana
Paradigm Structural Engineers, San Francisco
Peoples Associates Structural Engineers, Milpitas

Rinne & Peterson Structural Engineers, Palo Alto
Rutherford + Chekene, San Francisco
Simpson Gumpertz & Heger Inc., San Francisco
Simpson Strong-Tie, Riverside
Taylor & Syfan Consulting Engineers Inc., Pasadena and San Luis Obispo
Verco Decking Inc., Fremont
Wiss, Janney, Elstner Associates Inc., Emeryville
ZFA Structural Engineers, Santa Rosa

Out OF THIS World

ARCE kicks up its heels at alumni reception in Vegas during SEAOC Convention

ARCE students Niko Gomes, Lisa Henry, Laura Rice and Kyle Welsh attended the annual Structural Engineers Association of California (SEAOC) Convention in Las Vegas, Nev., in September 2011. The event is the biggest gathering of structural engineers, said Department Head Al Estes, who, along with faculty advisor John Lawson, accompanied the students.

The students, all officers in the student chapter of SEAOC, attended technical sessions, social events, and the ARCE alumni reception. "We went to three lectures a day, each choosing our own interest," said Laura, SEAOC president. "This convention was great. What we learned is not taught in the classroom. These are advanced topics, and having exposure to them now is really an advantage."

The students also attended the 80th birthday reception of UC Berkeley Professor Emeritus Ed Wilson, hosted by Ashraf Habibullah and Computer and Structures Inc., which included a performance of Cirque du Soleil's "O" at the Bellagio.

Approximately 45 alumni and friends of the ARCE program attended the annual alumni reception hosted by the ARCE Department at J.C. Wooloughan's Irish Pub in the J.W. Marriott Resort, where the conference was held. Al spoke about the ARCE program and held the door-prize drawing. Alan Hanson from Simpson Strong-

Tie won the grand prize gift basket. The department thanks Jerry Lohr for donating J. Lohr wine to support the reception.

ARCE is also grateful to Bill (ARCE '78) and Melissa Warren of SESOL Inc., Jim Malley of Degenkolb Engineers,

Jim Amundson (ARCE '82) of Hope Engineering, and Larry Kaprelian (ARCE '79) of KNA Consulting Engineers for their financial gifts, allowing the students to attend. Funds from the Fluor Student Leadership program also assisted.



Dancing at the SEAOC Convention Banquet (top, from left): Niko Gomes, John Lawson, Lisa Henry and Kyle Welsh

Alums catching up (above): Allison Hellner ('07), Gordy Wray ('02) and Adam Azofeifa ('08)
Alan Hanson won the door prize (left).

Learn by Building

Students win big with design of world's largest portable telescope base

Three ARCE seniors put their structural engineering knowledge to use in an entirely new direction: building the base for the world's largest portable amateur telescope. They didn't know when they started that they would be creating not only a beautiful work of art but also a groundbreaking scientific tool as well.

And the finished product also resulted in a \$3,000 windfall and a first-place win for students Laura Rice, Mike Vickery and Mounir el Koussa in the ApplePly design competition.



The three collaborated on the project with Russell Genet as part of the Alt-Az Telescope Initiative, which aims to develop a new class of low-cost, lightweight research telescopes and spur growth in scientific research programs. Russell is a Cal Poly research scholar in residence and director of the observatory in Santa Margarita, Calif.

With support from the CYS-Eugene Cole Scholarship, the students designed, built and analyzed the telescope as their senior projects. "Essentially we built the structure that the mirror and instruments sit on," explained Laura. They built the structure using ApplePly, a premium quality hardwood plywood known for its attractive edge, strength and solid hardwood core. The base had strict deflection tolerances, and the students used the CNC router to cut wooden trusses that provided most of the structural support.

The telescope can go up and down and from side to side. "It's a large telescope structure that amateurs could recreate affordably – well under \$1,000," said Laura, who presented it at the Alt-Az Telescope Initiative Convention in Hawaii in December 2011. "You can buy large telescopes, but they cost upwards of \$200,000."

Rather than producing an image as most telescopes do, this "light bucket" telescope concentrates light onto a fairly small point for use in scientific measurements such as photometry and spectroscopy. It is strictly a specialized "science" telescope and is not even equipped with an eyepiece.

The project provided the students with a great Learn by Doing opportunity.

"It was a great senior project," Laura stated. "We in architectural engineering analyze buildings, not telescopes. This was new. It was exciting to take what we learned in our major and apply it to this entirely new type of structure. And it was interesting to see the similarities in designing this and designing buildings."

Students (from left) Mike Vickery and Mounir el Koussa with research scholar Russell Genet and the award-winning telescope base (left)

Student Laura Rice (above)



ARCE Scholarship Award Winners

Recognizing Excellence

Following is a complete list (in alphabetical order) of ARCE scholarship award winners.

College of Architecture and Environmental Design Awards and Scholarships



Zhi Long Liu

Sinhui Chang | Carson Starkey Memorial Scholarship

Lisa Henry | CAED Jamba Juice Scholarship

Professor Abe Lynn | Wesley Ward Teaching Award

Pablo Ramos | Robin L. Rossi Award

Pablo Ramos and Daniel Samson | Herbert E. Collins Scholarships

Jillian Weinberg-Huyette | Forell/Elssesser Engineers Scholarship

Architectural Engineering Department Awards and Scholarships

David Martin | Academic Excellence – BS

Garrett Hagen | Academic Excellence – MS

Brian Planas, Emily Carlip, Cailen Ball | Department Service

Nicholas Marrs | CYS/Eugene Cole Senior Project Award

Julie Bolander and Laura Rice | Structural Engineers Association of Northern California Scholarships

Sinhui Chang | Hans Mager Scholarship

Garrett Hagen | KPFF Consulting Engineers Scholarship

Lisa Henry | Fluor Upper Division Scholarship

Jesse Hoyer | Fluor Lower Division Scholarship

Zhi Long Liu and Shawna Peterson | Riddle Scholarships

Zhi Long Liu | John A. Martin and Associates Scholarship

Zhi Long Liu | Degenkolb Engineers Scholarship and Internship

Zhi Long Liu | Structural Engineers Association of Southern California Scholarship

Daniel Samson | Paul A. Fratessa Memorial Endowment

Kevin Sepulveda | Emanuele Barelli Structural Engineer Scholarship

Michael Vickery | Simpson Gumpertz & Heger Inc. Scholarship

Yvonne and John Edmiston presented the Hans Mager Scholarship to Sinhui Chang.



Attending the SEAONC awards dinner (from left): Katie Stanke, Julie Bolander, Department Head Al Estes, Meg Witt and Laura Rice

On the Go

ARCE students win major SEAOC scholarships in Northern and Southern California

The Structural Engineers Association of Northern California (SEAONC) annually presents three \$5,000 scholarships to deserving students from universities in the region. ARCE Department Head Al Estes was on hand at the SEAONC awards dinner in San Francisco in May. For the second consecutive year, two of the three scholarships were awarded to Cal Poly ARCE students: seniors Julie Bolander and Laura Rice. Both are graduating in June and have been accepted into the master's program at UC San Diego for the fall.

Al, along with Advancement Director Allie Jones and students Zhi Long Liu, Alex Daddow, Eliza Alcantara, Felipe Alfaro and Lauren Litweiler, attended the annual Structural Engineers Association of Southern California (SEAOSC) Job Fair and scholarship presentation in February in Monterey Park. Nine scholarships of varying amounts were presented to students from nine Southern California universities. The largest, the \$2,000 Kenneth Narver and Margaret Narver Blair Scholarship, went to Zhi Long Liu.



EXPANS OPPORTUNITI

SEAOC/AEI chapter offers rich experiences outside the classroom

Despite rigorous academic schedules, students in Cal Poly's chapter of the Structural Engineers Association of California/Architectural Engineering Institute (SEAOC/AEI) still find time for fun. Like the annual pumpkin carving contest, in which 40 students competed for prizes. Students again prepared a Thanksgiving dinner with all the typical holiday fare. Fourteen students spent eight hours preparing the feast for approximately 90 students.

On the Road Again

In November, more than 30 students traveled with faculty advisor John Lawson to Northern California to visit construction sites, engineering firms, and a research/testing facility. Simpson Strong-Tie provided lunch and gave a private tour

of its research, testing and manufacturing facility in Stockton. In San Francisco, students visited Forell/Elsesser Engineers Inc. and Rutherford & Chekene, where they caught up with ARCE alumni now working at the firms.

At UC Berkeley, students toured the structural retrofit of Memorial Stadium, designed to withstand a 6-foot earthquake fault rupture directly beneath it. In San Francisco, students visited the UC San Francisco Hospital project, which uses special buckle-restrained braced frames to minimize structural damage during an earthquake.

John accompanied 19 students to Southern California in May to visit the Los Angeles office of Thornton Tomasetti and the Orange County offices of Miyamoto International and KPFF Consulting Engineers. Tomasetti gave the students a tour of the Rose Bowl renovation, including structural steel framing for the new press box, private suites and scoreboard. ARCE alum Nick Murphy of KPFF arranged a



Leslie Edwards and Connor Hanlon review plans with KPFF's Bill Thorpe (above) on their L.A. field trip.

Forell/Elsesser Associate Chris Petteys (above, left) addressed students visiting the San Francisco firm in the spring.



ARCE students (above) visited a stadium retrofit at UC Berkeley during an industry trip to the San Francisco Bay Area.

Professor John Lawson and students visited the Brooklyn Bridge, among other sites, on their New York trip over spring break (left).



tour of the seven-story steel frame Torrance Memorial Medical Center under construction and a virtual fly-through tour of the structural and HVAC systems by McCarthy Construction, the general contractor for the hospital.

John also accompanied four students to Portland, Ore., where they attended the ASCE Workshop for Student Chapter Leaders in January. The two-day workshop provides prospective SEAOC/AEI student officers with the tools necessary to run a successful club. Juniors Andrew Jimenez, Beth Schlacks, Shawna Peterson, and sophomore Ricky Stewart networked with students and civil engineers from across the western U.S.

During spring break, John traveled to New York with students Alton Dehaan, Leslie Edwards, Garrett Hagen, Lisa Henry, Megan Navarro, Nick Pajak, Laura Rice, Emiel Schaap, Katie Schwall, Kyle Welsh and Naomi Wentworth. They toured Ellis Island, the Statue of Liberty, Grand Central Station, Times Square, Central

SEAOC/AEI student leaders at the ASCE Workshop for Student Chapter Leaders in Portland, Ore. From left: Professor John Lawson, Andrew Jimenez, Ricky Stewart, Shawna Peterson and Beth Schlacks

Park, the Brooklyn Bridge and 9/11 Memorial. They also visited the offices of Arup, a multidisciplinary firm of designers, planners, engineers, consultants and technical specialists; Wiss Janney Elstner Associates Inc., a group of structural engineers, architects and materials scientists; and Thornton Tomasetti, an international engineering company.

"The firms were very gracious, providing not only office tours and presentations of their notable work in progress, but also special access to some of the city's most exciting buildings and construction sites," John said. He extends thanks to the following firms for providing additional financial support to make the trip possible: MHP Structural Engineers; Star Seismic; Simpson, Gumpertz and Heger Inc.; CYS Structural Engineers; Hope Engineering; ZFA Structural Engineers; Computers and Structures Inc.; Barrish Pelham and Associates; Simpson Strong-Tie; and Lionakis.

Yoram Eilon, vice president of structural engineering firm WSP Cantor Seinuk, gave the students a tour of Hearst Tower. WSP Cantor Seinuk's office is the engineer of record on four of the five new World Trade Center Towers. Students were also treated to a bird's-eye view of the World Trade Center site from Silverstein Properties, the company developing commercial office space at the World Trade Center.

At Arup, students saw the unique world of building envelop expertise and the importance it plays in iconic structures. Arup also gave a tour of the spectacular Fulton Transit Center under construction adjacent to the World Trade Center site.

Wiss Janney Elstner introduced the students to the importance of building restoration and forensics in East Coast structures and led a tour of the restored New York City Public Library.



Thornton Tomasetti provided rare access to the CitiCorp Building's tuned-mass damper and private observation deck. After a presentation of Thornton Tomasetti's custom 3-D software capabilities, the group toured Brooklyn's new Barclay Stadium.

In New York, student Kyle Welsh (above, left) visits the Fulton Transit Center, adjacent to the new World Trade Center.

Speaking Volumes

SEAOC/AEI's weekly series broadens students' outlook

A highlight of SEAOC/AEI activities is the weekly speaker series, and 2011-12 was no exception. Club President Laura Rice enlisted a diverse group of presenters "to show there are things to do besides working in an office as a structural engineer. This is not a one-size-fits-all discipline," she said.

The speakers and topics included:

Caelen Ball, senior, and **Kim Bowen** (ARCE '11): "Structural Engineering Students for Haiti's Inaugural Trip to Haiti"

Steven Provenghi, Mackintosh & Mackintosh Inc.: "Bowstring Trusses"

Al Estes, ARCE department head: "State of the Department"

Michelle Kam-Biron, Woodworks, and **Grace Kang**, Forell/Elsesser: "Engineering From two Perspectives"

Florian Barth, past president of American Concrete Institute: "Sustainable Concrete"

Kim Robinson, Star Seismic: "Buckling Restrained Brace Frames"

Mark Haselton, Continental Concrete: "Large-scale Concrete Structures"

Carole Moore, Cal Poly Career Services: "Interview Preparation"

Jan Douglas, KPFF: "Integrated Project Design"

Professor **Craig Baltimore**: "Earthquake Swarm"

Joe La Brie, Make it Right: "How to be More as an Engineer" and "Opportunities Through SEAOC"

Steve Hicks, San Luis Obispo Plan Checker: "Challenges Engineers Face when Submitting City Construction Documents"

Daniel Bastiao, Rutherford & Chekene: "San Francisco Pier Retrofit for New Exploratorium"

Rachel Martin, Simpson Strong-Tie: "Being a Branch Engineer"

Butch Boswell, Butch's Guitar and Repair: "How Engineering Can Lead to Different Paths"

Amber Freund, RISA: "Project Modeling and Engineering at RISA."



Above, left: Geoff Neumayr (ARCE '84) and Maya Sneller Stone (ARCE '98)



Above, right: Melissa Vickery (ARCE '07) and Kyle Glen (ARCE '09)

Below, from left: Jonas Houston (ARCE '10), Walt Busch (ARCE '10), Reese Relatores (ARCE '11), Grace Rose (ARCE '10), Alese Ashuckian (ARCE '11), Selinda Martinez (ARCE '10) and Emmett Seymour (ARCE '10)



BAY AREA BASH

ARCE alumni and friends catch up, dine German style

The ARCE Department hosted a get-together of almost 100 alumni and friends at Schroeder's German Restaurant in San Francisco in March.

Professor Abe Lynn, on a year's sabbatical at Degenkolb Engineers in Oakland, was helpful in getting the word out to those in the Bay Area. Department Head Al Estes and Administrative Coordinator Christine Cobb traveled from Cal Poly to join the event.

To see more photos, visit the ARCE Facebook page at <http://www.facebook.com/pages/Cal-Poly-ARCE/86219053434>.

Finding Her Way in INDIA

Internship is lifeline for Diana Durany



In 2007 fresh-faced 18-year-old Diana Durany left her family and the familiar confines of Crowley, Texas – population 7,000 – for sunny San Luis Obispo, Calif., where she would begin a new chapter as a Cal Poly architectural engineering freshman.

A devout Christian with a bold spirit, Diana thought coming to Cal Poly would be a fun adventure. And it was – for a while. But sometime during her senior year, the dark-haired beauty's grades began to slip. "I was burnt out from school, and a lot of things were going on with my family," Diana recalled. "I also didn't see how the courses I was taking could do any good or how I could make a difference in the world with my degree."

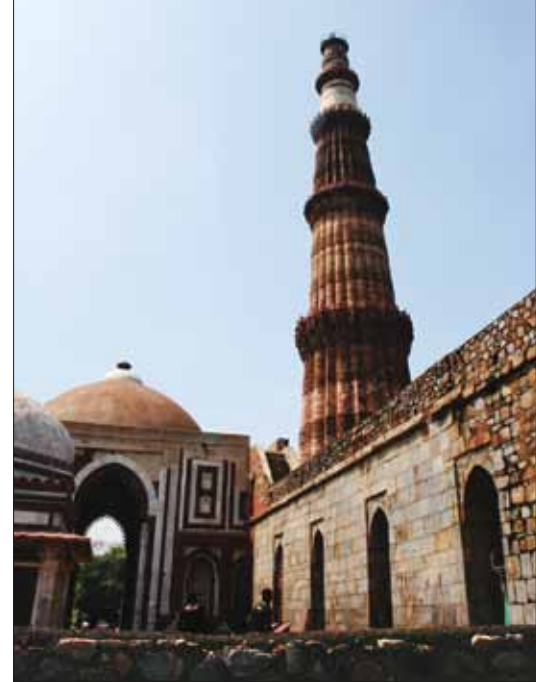
After being academically disqualified following spring quarter 2011, Diana felt "absolutely defeated. Things didn't work out how I had planned," she said. "Turns out God had other plans for me!"

At about the same time Diana learned she had been disqualified, she heard that Engineering Ministries International (EMI), a nonprofit Christian design organization, had an urgent need for an intern in India. "That prompted me to turn my disqualification around," she said.

In mid-August, after a weeklong orientation session in Colorado Springs, Colo., she embarked on a 34-hour journey that included a 14 1/2-hour flight from Denver to Delhi, an overnight train ride to Dehradun, and finally an hour-and-a-half taxi ride up a mountain to Mussoorie. Perched at the foothills of the Himalayas in northern India, this would be home for the next four months.

Diana traveled to Bhopal in central India for two weeks to meet the clients she was serving and to survey the 5.25-acre site EMI is developing as a place for pastors to be trained. The project consists of classrooms, workshops, dormitories, staff housing, a kitchen and dining area, a guard house, and a primary school to benefit the community.

Back in Mussoorie, Diana worked with AutoCAD, SketchUp and Excel to crunch numbers, figure cost estimates, and determine the size of columns and beams.



The Qutub Minar, a historic monument in Delhi (above)

Diana models a tailor-made sari (left).

She followed a pretty typical workday, except Diana and her roommate, Brenna, had a cook who brought them lunch and fixed their dinner. "The cook is paid so little, by American standards, yet in India she is able to support herself and her four children," Diana said.

Weekends were spent taking little adventures with Brenna and two male interns who lived "down the mountain." They would go on a picnic or visit the town bazaar. "Mussoorie was a lot like San Luis Obispo, sort of a village-town, a perfect hybrid," Diana said.

Most days Diana wore traditional Indian attire known as a Punjabi suit. "It consists of a long shirt, almost to the knees, with slits up the sides," she described. "And big, puffy Aladdin-style pants, and a long scarf, called a dupatta. They are comfortable, beautiful and colorful." And tailor made for less than \$15.

"First you pick out your fabric, and then you go to the tailor to get it custom made," she said. "I bought beautiful fabric with intricate beading and complicated embroidery for less than \$10. It cost \$3 to get an outfit tailor made."

Many in India live in poverty, and that molds the people. "In America time is money, and we tend to value material things," Diana said. "People living in poverty either



Gangar Village residents enjoy a “photo op” with Diana and her hiking group as they pass through on a Himalayan trek (above).

The view from Diana’s hotel in Rishikesh included construction with clever scaffolding, a common technique in the large cities (right).

don’t realize it or don’t care. They have a roof over their head. It doesn’t matter what the roof is made of, it is doing its job of keeping the elements out. They might only have rice to eat, yet they are grateful they are not going hungry.”

“One culture is not better than the other,” she continued, “but I fit in there. In India, they care about their relationships with people. I thrived there.”

And she is thriving now in San Luis Obispo. Back on track, Diana graduated in June 2012 and envisions working for a nonprofit agency, serving people.

The internship was invaluable, giving her a new sense of purpose. “I wanted to serve my God in this way. My internship changed my view of the courses I took and gave me valuable work experience.”



Out of AFRICA... and Back Again



Alum Kevin Chen lands two internships in Uganda

Recent grad Kevin Chen (ARCE '11) did encounter lions and elephants and impalas and hippos during his three-month internship last year in Uganda, East Africa. During a weekend safari at Queen Elizabeth National Park near Kasese, that is.

Much to Kevin's surprise, he was able to maintain a mostly carefree Western lifestyle in Kampala, Uganda's capital and largest city. "When I knew I was going to Africa, I had visions of living in a mud hut and rarely showering," Kevin smiled. But he and three other male interns lived in an apartment with running warm water, fairly reliable electricity, and "normal plumbing."

Kevin surveys a ditch at the Kajjansi airfield for Mission Aviation Fellowship (left).

Five interns with their goat (below)



Kevin's sojourn began after applying for an internship with Engineering Ministries International (EMI), a nonprofit Christian development organization comprised of architects, engineers and design professionals who donate their time to help impoverished people around the world.

He had heard about the work EMI was doing in developing countries and it struck a chord. Throughout his undergraduate years, he had an ambition to help others. "With education, there is so much good that can be done in developing countries," Kevin said. "Reading about the devastation caused by earthquakes in China and Haiti ... a lot of that could be prevented."

His internship lasted from early September until early December 2011. He worked in an office next to his apartment just outside of Kampala, on the shores of Lake Victoria. "Kampala is a fairly big city," Kevin stated. It was built for about 50,000 people, but now it is populated by more than a million. "The city is bursting at the seams. There's heavy traffic and people are everywhere. It's bustling with business."

His work days were fairly routine, performing structural calculations and working with staff architects to solve design problems. He assisted on two projects: a new EMI office building and a four-story university in Kenya.

"It was a great experience," Kevin said. "They let the interns do a significant amount of work. They trusted us. My supervisor, Phil Greene, is a 2005 ARCE alum, and he knew what I was capable of."

After work, the interns would gather for dinner. With a tight food budget of just \$70 a month per intern, dinner was usually a home-cooked meal. The group got pretty creative in the kitchen. "Instead of buying prepared spaghetti sauce for pasta, we bought tomatoes and cooked them to make sauce," Kevin remarked. "The first time I made beans was interesting. I didn't



know beans took six hours to cook. Once prepared, we ate them for days!"

Kevin admires the Ugandan people for their optimism, strength and joy. But still he experienced a little culture shock.

Americans generally mean what they say. "We tend to be direct, up front," Kevin said. "In Uganda, the people are very relational. For example, they might make an appointment for 2 p.m., but if they run into someone they know, they think nothing of stopping to talk for an hour or so. They could show up for that 2 p.m. appointment anytime between 3 and 7 p.m."

He also wasn't thrilled about being singled out as a foreigner. "When they saw us coming, they would shout, "Mzungu!" Foreigner. "It took some getting used to." But those behavioral differences were insignificant to Kevin, who returned to Kampala in January 2012 for another six-month

Kevin makes friends in Kampala's Bukasa district (above).

Cook Stella teaches samosa making (right).

internship before heading to grad school at Stanford.

Kevin credits his first internship with helping him figure out what he wants to study in grad school. "I want to learn to design in developing countries. I want to create an economical solution to build structures that are also strong and safe."

And he credits Cal Poly's Learn by Doing for giving him the tools he needed to get the job done. "Everything I did while I was there, I learned as an undergraduate," Kevin said. "I arrived at all the calculations using the same methods I learned at Cal Poly. I didn't learn a new way of design, but I did learn more about construction ... about what happens after the engineering."



Building A Better Future in Haiti



Students pack their skills to help out in country's earthquake-torn areas

When the magnitude 7.0 earthquake hit Haiti in January 2010, killing about 316,000 people – most from structural failure of buildings – several Cal Poly ARCE students were moved to action. “Our collegiate careers are focused on preventing loss of life from earthquakes and other ‘acts of God,’” said recent grad Emily Carlip (ARCE ’11).

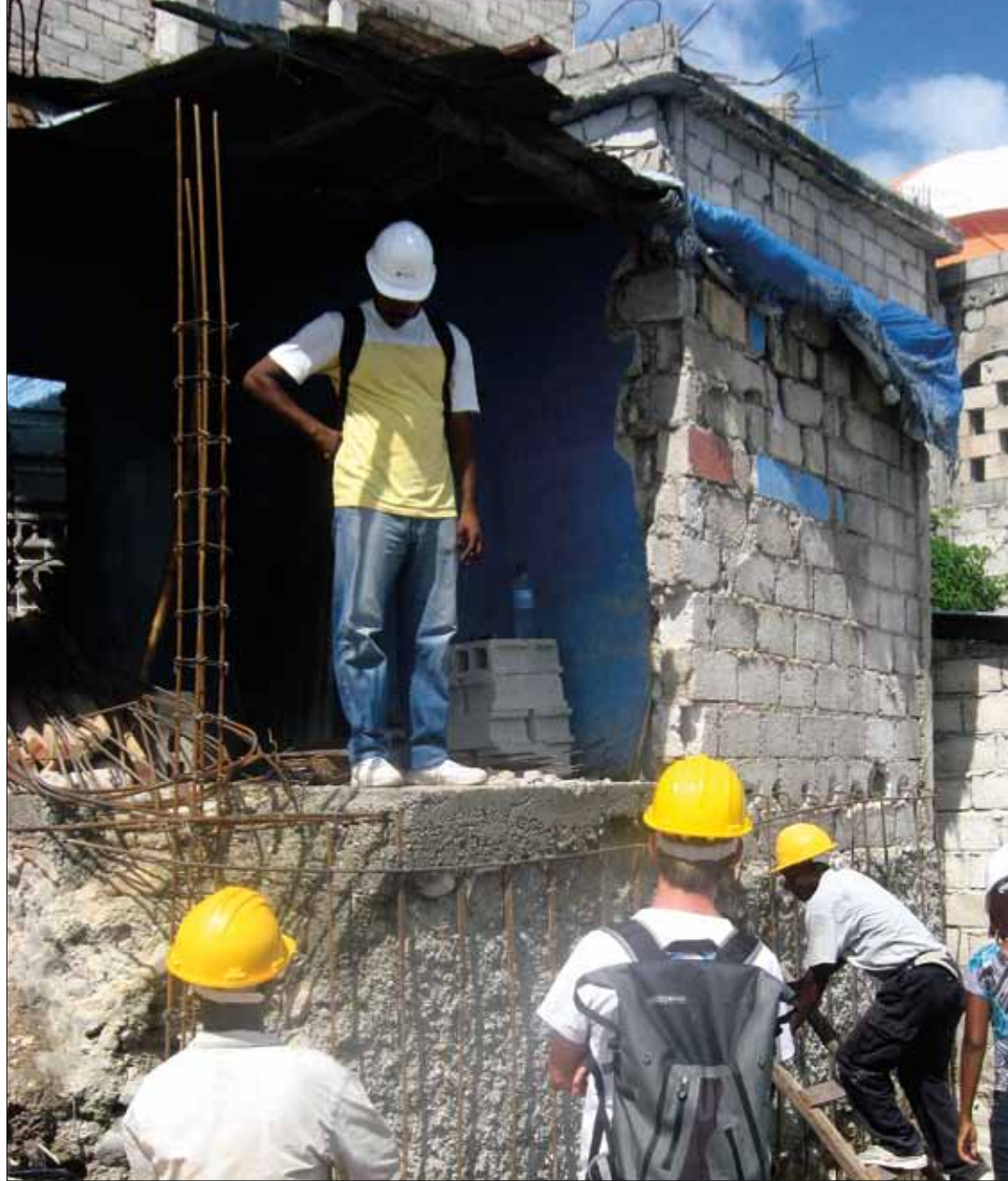
The first to go – in summer 2010 – were Anna Smith (ARCE ’11) and Ben Biddick (ARCH ’11), who were offered three-month internships with Build Change, an organization that aims to reduce deaths and injuries caused by earthquakes in seismically active developing countries. “The internship was the perfect mix of engineering and humanitarian work,” Anna said.

From Cal Poly to Haiti (above, from left): Ben Biddick, Professor James Mwangi, Anna Smith and a Haitian local.

Kim Bowen (top, center) works with a demolition team on a damaged building.

Anna Smith helped to make and build with cement blocks (below).

A retrofit in progress (right)



As Ben put it, “What occurred in Haiti was not a natural disaster; it was man-made. A 7.0 earthquake should never kill more than a quarter of a million people. Fortunately engineers and architects are implementing better building practices, and I was able to use some of the knowledge I had learned in my ARCE classes.”

Build Change helped revitalize neighborhoods, retrofit existing homes, and rebuild homes that were destroyed. “Our goal that summer was to get displaced families out of tents and into homes that were better equipped to handle earthquakes,” Ben stated.

Working with local engineers, Ben evaluated houses, identified deficiencies, and developed retrofit schemes. “The project

was in its infancy, and we were trying to figure out the most efficient way to run it ... how to quickly and accurately price each retrofit and determine the materials needed,” Ben explained. By combining computer skills he learned at Cal Poly with pricing techniques he learned from local engineers, Ben created an Excel spreadsheet to keep everyone on track. “Last I heard, they were still using it,” he said.

In addition to helping with the retrofit program, evaluating damaged homes, and aiding in developing appropriate designs, Anna was also assigned to block making, a program sponsored by Save the Children. “We trained nine Port-au-Prince block makers in better practices and testing samples,” Anna stated.

Anna taught them how to properly mix concrete. “They didn’t have a mixer,” Anna explained. “They did it all by hand. Once they proved they were following Build Change guidelines, Save the Children awarded them a block-making machine valued at \$8,000 U.S. dollars.”

Anna and Ben say the media tend to paint a bleak picture of Haiti. “Sure there are problems, but there are positive things going on as well,” Ben said. “Out of necessity, Haitians have learned to do a lot with a little, and there is evidence of that resourcefulness everywhere.

“Fresh water is a valuable resource,” Ben continued. “Many homes are equipped with a reservoir that collects rainwater from the roof and sends it to

an underground reservoir. They are way ahead of the United States when it comes to water conservation.”

Anna and Ben are both back in Haiti, continuing reconstruction work. Ben has a job with Build Change and Anna with Miyamoto International. “It was the perfect opportunity to go back and help,” Anna said. “Haiti felt like home to me. I can’t explain it; I belong there.”

Back on Campus

Meanwhile students Emily Carlip, Stefanie “Rae” Arizabal, Alese Ashuckian, Caelen Ball, Kim Bowen, Kevin Chen, Jose Chig, Laura Rice and Joe Rice (no relation) formed Structural Engineering Students for Haiti (SESH) and spent the next year planning a spring break trip there.

The much-anticipated day arrived. Laura was waiting for a ride to the airport when she got the call. The trip was cancelled. The volatile political situation in Haiti made the trip too dangerous.

Disappointed but not defeated, SESH began planning another trip. “We had to start over,” Laura said. “We had to find another nongovernmental organization (NGO) to sponsor us. We had to raise all new funds.” When it seemed hopeless, Kim contacted Herby Lissade, founder of Haiti Engineering (HE), who made the trip possible.

Soon after June commencement 2011, SESH traveled to Léogâne, a town about 20 miles from Port-au-Prince. Léogâne was at the epicenter of the earthquake, and up to 90 percent of its buildings had been damaged. “A lot of reconstruction was taking place, and many homes had been re-inhabited,” Laura said.

The students on the trip were accompanied by Ken O’Dell, a partner at MHP Structural Engineers in Long Beach and a longtime member of both the ARCE Advisory Board and the CAED Dean’s Leadership Council.

SESH focused on rebuilding the home of a local school teacher. The project was used to teach local contractors better building techniques. The home was typical Haitian masonry construction. Using



As members of Structural Engineering Students for Haiti (SESH), Jose Chig investigates the roof to wall connection for stability (above), and Emily Carlip documents ideas for a retrofit scheme (left).

techniques learned in Seismic Analysis and Masonry classes, SESH determined the house was viable by Haitian standards. A primary wall needed to be fixed, providing the physical “blackboard” for teaching local contractors building techniques.

It was Learn by Doing all the way. “In America, we have cement mixers,” Rae

said. “In Haiti, it’s done by hand. They tend to add too much water because it’s easier to mix, but that weakens the concrete. We taught them correct proportions.”

Many SESH members have graduated but Caelen and Kim continue. “SESH is about sharing knowledge to build a better future,” Caelen said.

Helping Hands

Barths establish ARCE Parents Learn by Doing Fund

Florian and Lori Barth, parents of ARCE student Florian Barth, have established the ARCE Parents Learn by Doing Fund to enhance the educational experience of students.

"Parents have a vested interest in enhancing the education of their sons and daughters and seeing the department succeed," said Al Estes, ARCE department head.

The Barth family has established the fund to encourage other parents to collectively match this gift. Florian and Lori have agreed to fund the gift in increments of \$10,000, up to a total of \$50,000. For

every \$10,000 that ARCE parents match, Florian and Lori will provide another installment until the gift is complete.

Al is very grateful to the Barth family for this generous gift and accepts the challenge to double the money. "I am confident that as I report back on how these funds are used, more parents will see the value and be inspired to contribute," he said.

The funds will be used to bring physical demonstrations into the classroom, support hands-on learning experiences, and foster activities for students to connect their education to the design industry and the real world.



ARCE parents Lori and Florian Barth



Meet ARCE's Advisory Board

The ARCE Advisory Board meets twice per year. Board members at the spring 2012 meeting included (from left): College Dean Tom Jones, Rob Gayle (Berkeley), Department Head Al Estes, Joseph LaBrie (MakeltRight), Michelle Kam Biron (Woodworks), Geoff Neumayr (San Francisco International Airport), Grace Kang (Forell/Elsesser), Art Ross (CYS), Steve Schiller (JAMA), David Lambert (Arup), Ken O'Dell (MHP), Steve Pelham (Barrish-Pelham), Ron Hamburger (SGH), Maryann Phipps (Estructure), Rick Ransom (Brooks and Ransom) and Paul Kovach (WJE). Not pictured: Jorn Halle (Degenkolb), Joshua Moody and Luvelyn Benitez (Hope), Hayley Soderlund (X-L Construction), Mike Botwin (Emeritus faculty) and Ricardo Arevalo (Simpson Strong-Tie).

When Swiss immigrant John Simon Fluor Sr. started Fluor Construction Co. in 1912, he had no way of knowing the company would grow over the next 100 years into a \$23 billion international corporation. Fluor is among an elite group of publicly held companies to reach its 100-year milestone.

Now with about 45,000 staff members in more than 50 offices worldwide, Fluor Corp., headquartered in Irving, Texas, is one of the world's largest engineering and construction companies offering innovative solutions for complex projects in such industries as chemicals and petrochemicals, commercial and institutional, government services, life sciences, manufacturing, mining, oil and gas, power, renewable energy, telecommunications, and transportation infrastructure.

"There isn't much we don't design and build. A power plant today, a freeway tomorrow; we have the ability to cross numerous industries," said Mike Milazzo, vice president and general manager of Fluor's Southern California offices in Aliso Viejo, Irvine and Long Beach. Mike is also executive sponsor of Fluor's partnership with Cal Poly.

Fluor Corp. Flourishes

GLOBAL GIANT CELEBRATES 100 YEARS

"We expect the company to grow – perhaps even double in size – as it helps meet the world's rising demand for global energy," Mike said. "Fluor has a strong focus on regional markets, especially in China. We have high targets for growth in the next five years."

To what does Fluor attribute its remarkable success? One factor is the company's commitment to providing educational opportunities for all employees – not just engineers – to continue their education. Through Fluor University, employees have access to a range of courses, including project management, sales, strategic planning, communications, team build-

ing, computer skills, time management, finance, diversity and ethics.

Fluor is an exciting company to work for, according to Mike. "Employees can transfer from one business line to another. They might start in oil and gas, move to power, and then to mining. As employees move around, they gain expertise in diverse industries and avoid stagnation. There's longevity here."

Indeed. Hundreds of employees have spent their entire careers at Fluor, a

An oil refinery heavy oil upgrading project in the Midwest



number of them spanning 35 to 45 years. Generations of families have worked there: fathers, mothers, sons and daughters, even grandchildren.

Clients worldwide benefit from Fluor's flexibility, adaptability and global reach. The company's global resources and decades-long presence in Europe, Asia, Africa and the Americas allow it to react swiftly and deploy its people quickly wherever they are needed.

Fluor's stellar reputation as safe, reliable and dependable is enhanced by its ability to execute "megaprojects" around the world. Few companies can make that claim. It has the flexibility to meet global needs. Whatever occurs economically or politically, Fluor can react quickly to changing trends.

Through Knowledge OnLinesm, a service mark of Fluor Corp., employees also have

the ability to instantly access knowledge and expertise to solve problems that might arise anywhere in the world. An engineer who encounters a problem on a project in California might find help from a Fluor engineer in Canada or India.

Fluor's community involvement also helps bring people together. The company promotes economic development in some of the poorest regions of the world. By hiring and training local residents to work on projects, Fluor helps provide revenue to local economies.

The Fluor Foundation has a long history of giving. Since its inception in 1952, the foundation, along with Fluor Corp., has contributed more than \$145 million to projects around the world. Fluor and its employees support more than 75 United Way agencies and 800 health and human services organizations.

Fluor was recently recognized as one of the World's Most Ethical Companies by the Ethisphere Institute, an international think-tank devoted to creating, advancing and sharing best practices in business ethics, corporate social responsibility, anti-corruption and sustainability.

Above all, Fluor recognizes excellence. The company has hired 23 full-time new Cal Poly graduates – nine from the ARCE Department – and eight interns since 2005. "Fluor managers know Cal Poly students are ready to work from day one with all the hands-on experience they gained from the Cal Poly philosophy of Learn by Doing. We get high-caliber, new-grad hires from Cal Poly, and that is why these candidates are requested," said Fluor college relations manager Laura Huerth.

ARCE Department Head Al Estes is particularly appreciative of Fluor and the generosity it has shown. "In addition to hiring our graduates, Fluor has provided scholarships, attended our Structural Forum, provided students with their ACI concrete codes, and contributed to the student leadership fund," Al said. "Student attendance at workshops, national conferences, and competitions has been made possible by our friends at Fluor."

Mike said Fluor should be considered a top choice for graduates wanting a career in engineering, procurement and construction. "Fluor offers it all, he said, "Stability, global opportunities, tremendous career growth and advancement potential."



Previously profiled industry partners:

*John A. Martin & Associates
Barrish Pelham & Associates, Inc.
Degenkolb Engineers
KPFF*

The San Francisco-Oakland Self-Anchored Suspension (SAS) Bay Bridge (above) included the installation of an 1,800-foot-long SAS span.

Mike Milazzo presents a check that supports student activities to newly elected SEAOC Student President Alex Daddow (left).



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BERRIDGE LAB FACELIFT

The Berridge Manufacturing Laboratory underwent a substantial facelift in July. In addition to sponsoring what was previously the Materials Testing Laboratory, Jack Berridge (ARCE '59) donated the labor and Berridge Manufacturing wall siding products to adorn the bare concrete walls. The wall segments introduce architectural engineering, construction management and architecture students to the Berridge product line and enhance the classroom's aesthetic appeal. The sponsorship also covers the cost of new furniture, carpet, a projector system, white boards and lab supplies. ARCE is grateful to Jack Berridge and his generous support.

Scott Bailes (left) and Tim Vincent tackle the lab renovation.

