

Spring 2015

Volume 2, Issue 1

The Cable

The Newsletter of the Civil Engineering Program at Stony Brook University

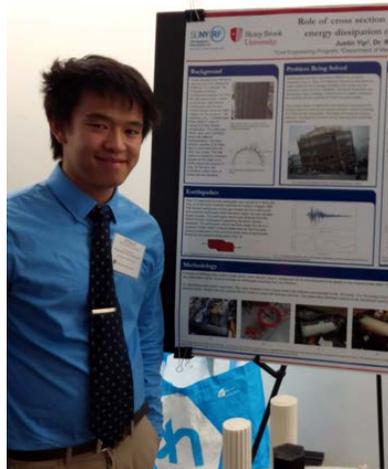
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Justin Yip presents his work at the STEM Summer Internships Research Symposium & Closing Ceremony



Justin Yip, an undergraduate researcher in Dr. Giles' Sustainability and Health of Urban Infrastructure Laboratory, participated in the SUNY Explorations in STEM program. Sponsored by the SUNY-Research Foundation, the Explorations in STEM program supported research projects of freshman or sophomore students in the STEM fields. Part of the program included weekly seminars that focused on how to conduct responsible research and then present that work to both the scientific community and the public at large. One workshop was held at the Alan Alda Center for Communicating Science.

On August 1, 2014 Justin presented a poster entitled "Role of cross section shape on the seismic energy dissipation of rocking columns" at the STEM Summer Internships Research Symposium and Closing Ceremony. Twenty-seven other students from many departments across the university also presented their work. Justin was one of only two participants from engineering disciplines and made quite an impression with the 3D printed and plaster columns that he brought to display.

ASCE News

During the fall 2014 term, ASCE hosted Mr. Timothy Quinn as a guest speaker to discuss "Career Paths in Civil Engineering". The group also started collecting material for the concrete canoe and most excitingly of all, ASCE received its chapter certificate in November. At the end of the spring 2014 term, students elected all the officers for 2014-2015 year, which also included the newly created Historian and Fundraising Chair positions. The executive board for 2014-2015 includes:

- Morgan DiCarlo, President
- Marie Baietto, Vice President
- Kevin Yee, Treasurer
- Nicole Yoo, Secretary
- Eric Steiger, Historian
- Nelsy Badia, Fundraising Chair



Above – ASCE e-board holding the chapter's certificate with Dr. Walker, advisor to ASCE. Below – ASCE members with Dr. Giles at CEAS BBQ, fall 2014

Please join us! ASCE meetings are a great place to learn about civil engineering and begin networking for your career. Follow meeting announcements on the chapter's website or by liking their Facebook page! (Search for American Society of Civil Engineers- Stony Brook Chapter)

<http://stonybrook.collegiatelink.net/organization/ASCE>



Stony Brook University

A note from the Director

Harold Walker, Ph.D., P.E.



“Be engaged in the political process to help improve our nation’s infrastructure.”

According to ASCE, **trillions** of dollars are needed over the next 5 years to improve America’s infrastructure. In the state of New York, over 42% of bridges are “structurally deficient or functionally obsolete” and 42% of roads are in “poor or mediocre” condition. Over \$29 billion is needed to meet basic wastewater infrastructure needs in New York over the next 20 years and an additional \$27 billion is needed to update drinking water infrastructure.

To improve infrastructure, we need sound infrastructure policy, creative new solutions to ensure sustainability and resilience, and leaders with a strong vision and roadmap for achieving these goals. As recognized experts in the area of infrastructure, the profession of civil engineering is well-suited to educate the public, elected officials, and other policy makers regarding the current state of infrastructure and possible solutions. Civil Engineers, however, are largely absent from public policy discussions. There are few engineers, especially civil engineers, in elected office. In the 113th Congress, for example, only five members of the House of Representatives are engineers by training and only one member of the Senate is an engineer.

Fortunately, there are a number of ways Civil Engineers can get involved in the public policy domain. Reach out to your legislators, at the local, state and federal levels, and let them know your thoughts on critical issues affecting our infrastructure. The ASCE website is an excellent resource to find out more information about key policy questions affecting the built environment and how you can get involved. A critical issue in the next Congress will be how to fix the Federal Highway Trust Fund. The Trust Fund is about to “go over the fiscal cliff” according to ASCE, and we need our legislators to support long-term solutions for funding the maintenance and improvement of our highways.

Closer to home, I was fortunate to take part in one of three public meetings organized by the Governor’s office and the NYS Department of Environmental Conservation looking at the need for improved wastewater infrastructure on Long Island. As a result of these public meetings, the Governor announced a number of initiatives to improve wastewater infrastructure on Long Island, including \$383 million to expand sewer service in Suffolk County, \$90 million to upgrade the Bay Park Sewage Treatment Plant, and \$2 million in seed funding to establish the NYS Center for Clean Water Technology here at Stony Brook University. Read more about the mission and goal of this new Center in this addition of *The Cable*.

I am also pleased to announce our most recent faculty hires; Jie Yu, M. Anil Yazici, and Sherif Abdelaziz. Dr. Yu is our second hire in the area of “coastal engineering” and is part of the Provost’s Interdisciplinary Cluster Hiring Initiative. Dr. Yu received her Ph.D. from MIT and comes to us most recently from North Carolina State University. Dr. Yazici is our first hire in “transportation engineering.” Dr. Yazici obtained his Ph.D. from Rutgers and recently was a Post-Doc at the University Transportation Research Center (UTRC) at CUNY. Dr. Abdelaziz earned his Ph.D. at Virginia Tech and is an expert in the “geotechnical engineering” area. We are delighted to have Drs. Yu, Yazici, and Abdelaziz as part of our Civil Engineering family. You can learn more about all our new faculty in this addition of *The Cable*, as well.

As our program grows, so too should our influence on important policy questions at the local, state, and federal level. I encourage our faculty, staff, and students to be engaged with the political process and be part of the solution to improving our nation’s infrastructure. Go Seawolves!



Governor Cuomo announces establishment of the NYS Center for Clean Water Technology at Stony Brook University. Photo Credit: www.governor.ny.gov/news/

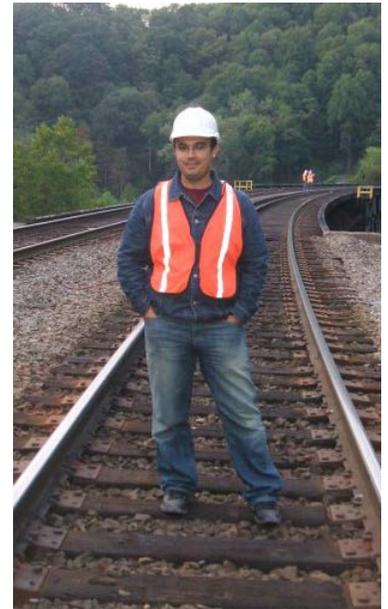
New CIV faculty member, Dr. Sherif Abdelaziz

According to the 2013 report card, America's infrastructure is in poor condition averaging D+. If ignored, this translates into more accidents on roadways, more bridge, dam, and levee failures and also a shortage of energy. To reduce these risks, we need to improve our infrastructure. By 2020, improvements will require a total of \$3.6 trillion of tax money, averaging \$514 billion annually. This annual investment overloads the already burdened federal and state budgets. Therefore, to improve the performance of highways, bridges and other public-use structures, federal and local governments base their infrastructure enhancement projects on sustainable

techniques.

Concentrating on sustainable engineering, Dr. Abdelaziz focuses his research on the behavior of soils and geotechnical structures subjected to simultaneous structural loads and temperature changes, known as thermal geotechnics. Thermal Geotechnics has several sustainable applications such as (1) reducing energy demands via utilizing pile foundations as geothermal heat exchangers, (2) limiting soft soil failures by subjecting them to temperature changes, and (3) deicing of highway pavements using geothermal energy. These applications are Dr. Abdelaziz's main research interests.

Dr. Abdelaziz earned his bachelor's degree with honors in civil engineering from Cairo University in Egypt in 2004. He pursued his graduate studies at Virginia Tech where he investigated various sustainability applications and received both his doctoral and master degrees in civil engineering in 2013 and 2008, respectively. Shortly after completing his Ph.D., Dr. Abdelaziz joined CH2M HILL as a geotechnical and energy foundation specialist, an experience that enriched Dr. Abdelaziz's knowledge about various sustainable approaches to improve America's infrastructure.



Dr. Abdelaziz

"I became a civil engineer because I was always inspired by the great pyramid as one of the most sustainable structures on earth. I hope to contribute to the sustainability of U.S. infrastructure through my research in thermal geotechnics."

New CIV faculty member, Dr. Anil Yazici



Dr. Yazici

"Transportation is a truly interdisciplinary field. One needs a keen knowledge and understanding of many different disciplines - besides engineering fundamentals - to dissect it: human behavior, economics and applied mathematics are just a few disciplines."

Transportation is such a big part of our daily lives and activities that its otherwise rigorous dynamics can feel very intuitive in a practical sense. Such intuition is sometimes spot-on, other times misleading. This is the fun part of the transportation field for me; students (or the public in general) already have an overall feeling about most issues and possibly have thought of potential and sometimes unorthodox remedies. My job is to equip the students with necessary analytic tools to harness this intuition which can provide creative and sound solutions.

Before coming to Stony Brook, Dr. Yazici was a post-doctoral research associate at University Transportation Research Center and taught at The

City College of New York. His research interests are probabilistic analysis of transportation networks, urban data analytics, emergency evacuation management, and intelligent transportation systems. He has worked on numerous emergency evacuation and traffic incident management projects for New Jersey and New York. His recent research focuses on urban data science, smart cities, and use of new media technologies in transportation. Dr. Yazici received his B.S. and M.S. degrees in Civil Engineering from Bogazici University, Istanbul, Turkey, and his M.S. in Operations Research and Ph.D. in Civil and Environmental Engineering from Rutgers University, New Jersey.

Dr. Giles Participates in Summer Institute on Undergraduate STEM Education hosted by Stony Brook University

In July 2014, Dr. Giles attended the Stony Brook Summer Institute on Undergraduate STEM Education sponsored by the Center for Science and Mathematics Education (CESAME), the Teaching, Learning & Technology (TLT) Faculty Center, and the Undergraduate Biology Program. The four-day seminar focused on ways to improve STEM education through active learning and scientific teaching. As part of the seminar, the participants were divided into groups and tasked with preparing a teaching "tidbit" that incorporated

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Dr. Yu

Dr. Yu is a 2009 recipient of the prestigious National Science Foundation (NSF) CAREER Award for developing research and education in Coastal Dynamics and Environmental Fluid Mechanics.

New CIV Faculty Member, Dr. Jie Yu

Dr. Yu's research is in the area of environmental fluid dynamics, with particular interests in ocean waves, coastal currents and morphodynamics, and hydrodynamic instabilities. Though focused on theoretical basic research, much of her work is motivated by applications and problems of coastal engineering and oceanographic interests. Dr. Yu focuses on carefully formulated theoretical studies of complex fluid phenomena in simplified settings, developing better knowledge and understanding on issues relevant to sustainability, specifically climate and energy in natural environments. Some of

Dr. Yu's ongoing research areas include wave propagation over variable topographies and in variable media; terrain-following boundary layer flows; multi-scale dynamics of wave-current-sediment morphology interaction in nearshore waters; mixing and coherent structure of flows through vegetation in wetlands; wave-structure interactions; rectification of oscillating motions, peristaltic transport and micropumping.

Dr. Jie Yu received her PhD in Civil and Environmental Engineering at MIT, with research focus on water waves, coastal sediments and seabed mechanics.

She also holds a M.S. degree in Computational and Applied Mathematics from Florida State University, and a B.S. degree in Mechanical Engineering from University of Sciences and Technology of China. Prior to joining the faculty at Stony Brook, Dr. Yu was an Assistant Professor from 2007 to 2014 in the Department of Civil, Construction and Environmental Engineering at North Carolina State University, and University Lecturer from 2004 to 2007 in School of Mechanical, Aerospace and Civil Engineering at the University of Manchester, United Kingdom.

Meet Your Classmate!

Gabriela Saenz



Gabriela wanted to explore other areas of Civil Engineering for her summer internship, and her time at PW Grosser Consulting Company gave her an opportunity to focus on environmental issues.

Gabriela Saenz, class of 2016, interned for PW Grosser Consulting for the summer last year. We caught up with Gabriela recently to ask her about her experiences:

TC: How did you get your internship at PW Grosser Consulting? *I first heard of PW Grosser from an email Dr. Walker sent about them looking for summer interns. I planned to visit them at the STEM Job and Internship fair in February but they couldn't make it because of the snow. So, I emailed them my resume and told them Dr. Walker had told me about the opportunity. A few weeks later I got a call telling me I was in. No interview or anything, so it was pretty cool.*

TC: What was the most interesting thing you did at

PW Grosser last summer?

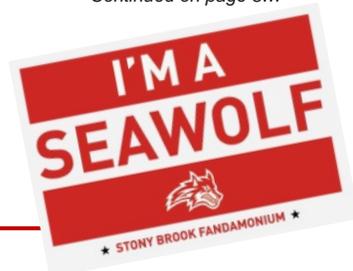
One of the most interesting things about this summer was Geothermal Systems. These systems use the fairly constant temperature of groundwater to heat or cool a building, depending on the season. They're very efficient and more economical than traditional heating and cooling systems. I'd heard of them before, but seeing them and working on individual projects really helped me to develop a deeper understanding of how they work.

TC: How did your summer internship relate to Civil Engineering?

PW Grosser is an Environmental Engineering firm. Even though I've always been more interested in Structural Engineering, I wanted to familiarize myself with another branch of Civil during my internship. I was a little

disappointed at first because I spent days working on huge (and kind of boring) Excel files. I didn't see the engineering in them. But once I actually looked into the projects behind the Excel files and talked to some of the people in charge of them, I realized what a tremendous impact Environmental Engineering has on the world around us! One particular project was trying to bring sewer systems to the town of Islip. Most people take these systems for granted, not realizing that without them, LI aquifers would remain contaminated with Nitrate. This definitely sparked my interest towards Environmental.

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Local Companies Donate to the New CE Materials Lab

The Civil Engineering Department proudly offered their new Civil Engineering Materials Lab for the first time in the fall 2014 semester. In this course, civil engineering majors in their junior year learned about the material properties of concrete, asphalt, steel, and wood through inquiry-based laboratory experiments. To support the development of this new dynamic lab, several local companies made generous contributions.

The Concrete Bowling Ball Competition was a student-centered laboratory project in the Civil Engineering Materials Lab that benefited from the support of two different local companies. One company, Grace Construction Products, kindly donated a variety of

concrete additives that the students used to modify their concrete mixtures. Traditional concrete mixtures are comprised of cement, water, coarse aggregate (rocks), and fine aggregate (sand). Thanks to Grace Construction Products, students had the option to add fibers of polyethylene and polypropylene to increase the flexural strength of the concrete. They could also add superplasticizer to decrease the water content in their concrete batches. Ultimately, students used their modified concrete mixtures to cast strong, environmentally friendly concrete bowling balls. More traditional test samples were also cast to test the compressive and flexural strength of the student's mix designs.

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Stony Brook University Awarded Center for Clean Water Technology

On October 28, 2014, Governor Cuomo announced initial seed funding of \$2 million for the establishment of the New York State (NYS) Center for Clean Water Technology. The mission of the Center is to "research, develop and commercialize the next generation of technology to remove nitrogen from septic system and cesspool effluent." Stony Brook University is a partner with the NYS DEC, Suffolk County and the Town of Southampton on this effort. Southampton Town Supervisor Anna Throne-Holst has been a strong proponent of the effort and said, "Healthy natural wetland habitats are crucial barriers against the coastal erosion and infrastructure devastation of major storms - keeping them healthy is essential. Reducing harmful

nitrogen pollution is one of the best ways to do that, and by establishing the Center for Clean Water Technology at Stony Brook University, we can develop better technology to remove this pollution more effectively and efficiently." Jamie Rubin, Executive Director of the Governor's Office of Storm Recovery, said, "As we continue to work toward a stronger, more resilient State, we must seek out innovative solutions that protect our most critically important resources. Through the Center for Clean Water Technology and our emphasis on community planning processes we will come back better than ever before." The Center is a joint effort of the Civil Engineering Program and the School of Marine and Atmospheric Science.

Towards Sustainability

by Dr. Juhyuk Moon

With over 6 billion tons used across the world annually, concrete is one of the most ubiquitous industrial products on earth. However, the production of conventional Portland cement concrete is a hugely energy-intensive operation resulting in the generation of large amounts of greenhouse gas. Portland cement production requires the heating of limestone in large kilns at temperatures of more than 1400°C for hours to form its active ingredient; the equivalent of approximately 0.83 MWh power/ton of concrete is required so about 2.5 million MWh are consumed to produce the annual supply of Portland cement in New York state. This is equivalent to a 285 MW power plant operating 24/7 all year. Because of the fossil fuel burned to power the kilns

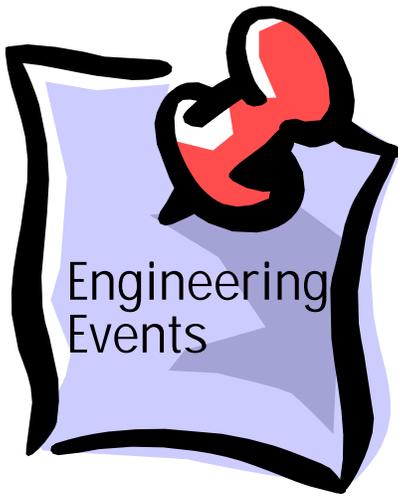
which generates carbon dioxide (CO₂) and other greenhouse gases, plus the conversion of limestone to calcium oxide plus CO₂ in the production of the cement powder itself, the process generates about 1 ton of carbon dioxide equivalent (CO₂) per ton of cement. For NYS, that equates to about 3 million tons of GHG each year.

Reducing energy consumption for concrete production, while at the same time reducing the concrete industry's carbon footprint in NYS and the U.S. in general, is a daunting challenge. Currently, SBU is facing this challenge by developing sustainable construction materials. One example is sulfur polymer cement which is being

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Revolutionary sulfur polymer cement can be made from 100% industrial by-products: Sulfur stockpile (left-top), fly ash from coal power plant (right-top). Its possible application will be civil infrastructure of water pipe (left-bottom) and road (right-bottom)



13th Annual Engineering Ball, April 19
 Tickets cost approximately \$40, event will be held in the evening. Please check [CEAS's events page for more information.](#)

Roth Regatta, April 24
 Competition will take place during Campus Life Time at Roth Pond, trophies will be awarded! ASCE SBU boat did very well last year, come and cheer them on again!

MET Region ASCE Student Conference & Concrete Canoe Competition, April 24 - 26
 Conference – Rutgers, Concrete Canoe Race – Cooks Pond, Denville, NJ (Fairleigh Dickinson University hosting)

Towards Sustainability cont'd.

developed at SBU and Brookhaven National Lab.

The sulfur polymer cement is an environmentally friendly alternative produced from recycled by-product materials including sulfur and organic modifier from the oil and gas industry and fly ash from the coal-fired power plants or waste-to-energy facilities, plus ordinary construction-grade sand. Since the sulfur polymer cement does not use any Portland cement, it requires far less energy to manufacture and its potential to lower greenhouse gas levels/ton

of concrete used is far greater than other alternatives.

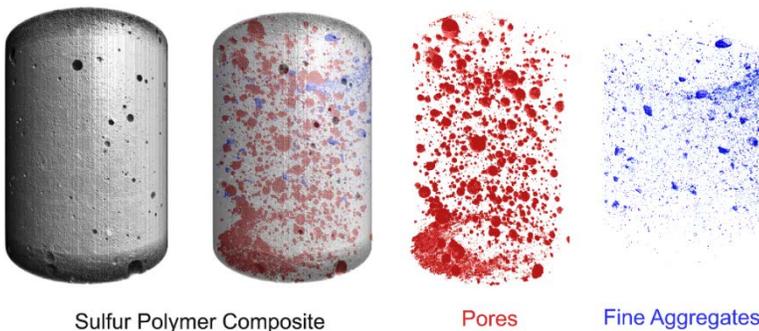
If successfully developed, the sulfur polymer cement will have a number of anticipated benefits in place of Portland cement concrete including:

- A) up to 92% less energy for sulfur polymer cement production compared to production of Portland cement concrete;
- B) Up to 94% less greenhouse gas from a reduction of more than 2.8 million tons of CO₂ compared with the US annual Portland cement concrete usage;

- C) Up to 50% greater strength, a much lower permeability, and greater resistance to harsh chemical environments than conventional concrete; and
- D) Use of by-product sulfur, organic modifier, and fly ash for sulfur polymer cement production, all of which are currently causing environmental issues worldwide.

Various research is being conducted in both SBU and BNL, specifically an investigation into 3D pore network in concrete. Pore

network system including pore size distribution is the key factor to determine long-term durability of construction material. Micro-computed tomography is the most accurate method to “see” internal pore network. Along with this, many other interesting research of X-ray diffraction and Scanning Electron Microscope are currently being conducted in Jay Moon’s lab in order to prove superior material performance of newly developed sustainable sulfur polymer cement.

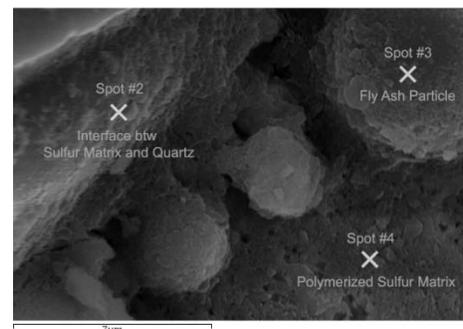
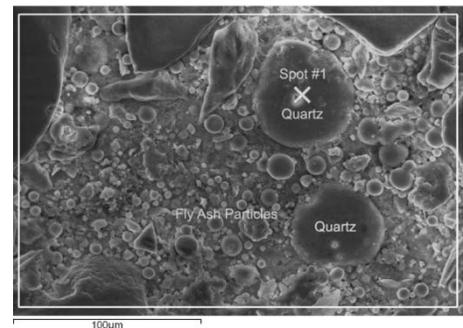


Sulfur Polymer Composite

Pores

Fine Aggregates

Above - 3D internal structure of Sulfur Polymer Cement, Right - Microstructure of Sulfur Polymer Cement



Local Companies Donate... cont'd.



(above) Anthony Cundari bowls for the winning team in the 1st Concrete Bowling Ball Competition, CE Materials Lab fall 2014

For the lab's 1st Annual Concrete Bowling Ball Competition, AMF Commack Vet Lanes generously supplied two sets of official bowling pins. With their help, students were able to put their concrete bowling balls to the test!

Another valuable experiment students conducted was the fabrication and testing of four different rebar reinforced concrete beams. First, students built the wooden beam molds, assembled the rebar cages, mixed the concrete, and then cast the five foot long reinforced concrete beams. Culminating a semester's worth of work, it was finally time to test the flexural strength of the beams! To do this, a 3-Point Bending Test was performed. During a 3-Point Bending Test there is contact with the beam in only three places- two support points under the beam at the ends and one loading point in the center on the top. Knowing it would take thousands of pounds to break each beam, an extra strong support system was needed under the beam. This is where Mid-Island Steel in Medford, NY stepped in. Mid-Island steel not only donated a 5 ft. long, W8x67 I-beam, they even helped deliver the 335lb I-beam to the Civil Engineering Lab! In the end, this I-beam helped support the concrete beams during testing, and easily withstood the 13,000lbs of force needed to break the strongest reinforced concrete beam!



(right) A 60,000lbf capacity Universal Testing Machine (UTM) was used to break the reinforced concrete beams.

Our UTM was purchased with funds awarded through a High Needs Program grant awarded by SUNY in 2013.

Lastly, students in the Civil Engineering Materials Lab had the unique opportunity to collect hot asphalt samples from an asphalt truck. Parkline Asphalt Maintenance, Inc. generously offered their time and resources by bringing an asphalt truck to campus so students could collect and test hot asphalt samples. As students made their Marshall Stability Test samples, they learned about the mechanics of the asphalt truck, state and local asphalt regulations for different paving situations and minute details regarding asphalt through a Q&A session with the asphalt technician. A truly hands-on lab experience, students even had the opportunity to look inside the asphalt hot box.

The Civil Engineering Program is deeply grateful to the local companies that offered their support and expertise to our Civil Engineering Materials Lab course this fall, and we look forward to working with area businesses in the future. Thank you for helping us make this first lab course such a success!

Yuanchun Lu scooping out hot asphalt to prepare Marshall Stability Test samples.



Climbing up onto the truck to see asphalt in the hot asphalt box.





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<http://me.eng.sunysb.edu/>

Dr. Giles Participates... cont'd.



the techniques taught in the seminars. Dr. Giles participated in a group with biology professors from Stony Brook, Suffolk Community College, and SUNY Old Westbury and a Stony Brook professor of marine science. Giles' group developed a tidbit that taught how constructed wetlands can be used to treat wastewater while providing

a habitat for a diverse number of animals.

The Summer Institute was featured on Stony Brook University Happenings online newsletter. You can read the article [here](#).

Meet Your Classmate! cont'd.

TC: What is the biggest thing you learned this summer during your internship? *Something useful that I learned this summer was how to survey land. I went out to a few sites with PW Grosser employees and they taught me how to set up the instruments, level them, take measurements, and how to do a lot of the calculations involved. They even had me play around on AutoCAD and set up the elevations for them. Everyone at the office was always happy to help and guide me on my journey towards becoming a Civil Engineer. I was excited be able to use what I learned in my Land Surveying lab last semester*

TC: What advice would you give other Civil Engineering students looking for internships? *Start looking for internships as soon as possible!! They allow you to gain practical experience in the field and get a feel for what you like and what you don't like. My boyfriend's sister graduated as a Civil Engineer 5 years ago, passed the FE, got her masters in Structural Engineering and she's still having a hard time finding a job. No company wants to hire her because she's never had an internship! That should speak to how invaluable the experience you gain from an internship is. I learned so much about Civil Engineering this summer and I'm looking forward to continue learning this semester and next summer. Good luck guys, you got this.*



Gabby & her classmates making an asphalt sample for the Marshall Stability Test in CIV Materials Lab, fall 2014

Giving to the Civil Engineering Program

Stony Brook University's Civil Engineering Program graciously accepts endowments and financial gifts. Regardless of the amount, each and every contribution we receive is important to the future of Stony Brook University and in particular, Civil Engineering's mission of teaching, research, and service to society. Whether your

passion is student scholarships, helping us build our laboratories, or supporting faculty research, a gift to Stony Brook is a meaningful investment in creating a better future. To learn more, please contact the director of the program, Dr. Harold Walker, by phone 631-632-8315 or by email: harold.walker@stonybrook.edu



Every gift matters.



Besides establishing student scholarships and research opportunities, one thing we would especially like is a 'Zalk Steel Sculpture'. Both artistic and educational, the sculpture displays in full scale the most common methods to connect steel in building construction. We would love your support in helping us with this project! If interested, please contact Dr. Walker, 631-632-8315 or harold.walker@stonybrook.edu

Photo courtesy of [University of Wisconsin-Madison](#)