Civil and Environmental Engineering @ RPI

Oh, the Places you will Go!
You have brains in your head. - Dr. Seuss

This issue of the newsletter takes you along with our students on their internships and study abroad experiences.

**Sarah Miller—Palmyra Atoll**

After graduating this May with a B.S. in Environmental Engineering, I was offered a volunteer intern position with The Nature Conservancy (TNC), the internationally-based organization dedicated to protecting and preserving the planet. Its Honolulu, Hawaii office was piloting a new volunteer program with the small research island owned by TNC: the Palmyra Atoll. Roughly 1000 miles south of Hawaii, Palmyra is located 5 degrees north of the equator and is a US minor outlying island, functioning as a wildlife refuge and research station. Despite the fact that the entire atoll was leveled and the lagoon was dredged when the island was under US military control in WW2, the efforts made by TNC and the US Fish and Wildlife Service have brought the island and surrounding reef back to near pristine conditions. In order to keep the reef and wildlife controlled, visitors and staff are asked to follow strict quarantining procedures.

I arrived on Cooper Island, the research station on the atoll, in late July with my measly 30 pounds of gear to last me three months. The accommodations were considerably nicer than most remote field stations and included a shower house, a toilet block, 2-bed cabins, and a galley staffed by two chefs trained at the Culinary Institute of America. I was first asked to collaborate with a fellow civil engineer volunteer from Northeastern University by surveying and repairing some soft spots in our crushed coral runway. We worked together to design and implement a plan to fix a small test patch and...
learned to use heavy machinery and construction materials on the island to complete our project. We had to excavate a crushed coral mine and design our patch to accommodate our small amount of cement available. We also had to use a great deal of surveying equipment to make sure that our final grade included a suitable crown to facilitate rainwater runoff.

After we completed our patch, I turned to my individual project, which was to remediate the septic treatment wetland. The wetland was built in 2004 to accommodate a population of 10 people and has not been updated or repaired since then. My challenge was to identify any parts of the system that were failing or needed replacement and to investigate the use of coral aggregate as a viable treatment material, avoiding the need for quarantining new materials. To accomplish this, I set up various test columns to determine the treatment ability of different types of local sand. With a material high in calcium carbonate, I was able to manipulate the pH of the system to facilitate more effective treatment. After determining the optimal oxic zone depth and infill/loading rate, I was able to provide some preliminary designs for a possible future system that could accommodate up to 40 or 50 island residents.

All staff was asked to work 6 days a week in the ever-constant muggy, sunny climate, and our day off could be spent exploring outer refuge islands, snorkeling around the most beautiful spots on the reef or in the lagoon, helping visiting research teams complete a transect, go fishing to tag bonefish populations, or to just rest and enjoy a movie or book from the extensive lending library. We adopted a red-footed Booby bird named Rayn who would visit almost every day and beg to be petted, and we would feed manta rays at night with a large light to attract plankton. I can honestly say that viewing a near pristine reef ecosystem and observing the tenacity with which all the researchers were working has renewed my love of the ocean and the critical need for water treatment. Late in my rotation, we had the supreme pleasure of hosting a donor trip for Her Deepness, Sylvia Earle, the world-renowned marine biologist. She is incredibly inspiring and spunky and brought a great new energy to the island for the few days that she was visiting. This experience has been eye-opening and made me grateful for the engineering education that I received at RPI.

**Lauren Stenroos—Clifton Park, NY**

This past summer, I worked as an Engineering Intern at Ryan Biggs | Clark Davis in Clifton Park, NY. RB|CD is a consulting firm, specializing in structural and civil engineering, repair and restoration, inspection and testing, and surveying. I first heard of Ryan Biggs through several of the professors here at RPI, so I started to research what types of projects they worked on. When I found that a majority of their work focuses in structural engineering I decided to apply. Another aspect that I found unique was that they are WBE certified, which stands for Woman Business Enterprise. This means that women have majority ownership of the company.

-Contributed by Sarah Miller
All the employees were very welcoming and helpful to me when I first started. As time went by and I was learning new things, the employees not only helped me to get the job done, but also taught me along the way. They were also a lot of fun to be around. We celebrated office birthdays with bagels, and we also had a barbecue at the end of the summer when the other intern and myself left.

As an intern I gained experience working with many different building materials such as steel, concrete, timber, aluminum, and cold-formed metal framing. I was also able to analyze structural systems by using hand calculations and computer programs. I believe I was well prepared by RPI to complete those tasks, especially by taking Introduction to Structural Engineering, Steel Design, Concrete Design, and Matrix Structural Analysis.

I applied to the firm by sending my resume and cover letter to the point of contact on the Ryan Biggs | Clarke Davis career’s page for any of those interested! I had a great experience and would love to return full time if the position is available!

-Siena Shilale—Italy

Studying abroad was the best decision I made in college. I went to Florence, Italy in January of 2016, which was such an incredible way to start off the New Year! I went on a non-affiliated program at Syracuse University, Florence. This allowed me to study both Engineering and Architecture while I was there, taking only one dynamics course and the rest Italian and Mediterranean Architecture courses. I was able to complete my architecture minor, and Italy was definitely the place for that! I specifically wanted to go to Italy because my family is from there and I wanted to learn and understand the culture I came from. My great grandmother was from Bari, a town in southern Italy, and came to NYC in 1908.

Study abroad was an incredible learning experience because I didn’t live the same lifestyle as in America, and spoke a different language as well. My roommate in Italy didn’t speak any Italian and the host family we lived with spoke very little English. Thankfully I knew how to speak both and was able to translate back and forth! I lived with a host family in Florence, who made me home cooked Italian meals every night. My American family even came to visit me and we had an unforgettable combined family dinner in a typical Italian style!

This was a once in a lifetime experience, studying in a different country and traveling the world with new friends. It’s crazy how fast the 4 months went by. Seven countries (I was also able to visit Czech Republic, Netherlands, Hungary, Switzerland, France, and Spain) and 27 cities later, I’ve learned so much from this experience and made so many amazing friends and memories that I’ll never forget.

-Contributed by Siena Shilale
Devan Naik—New York City, NY

Last summer I worked for Judlau Contracting as a field intern on their South Ferry Complex Rehabilitation project. The South Ferry Subway Station was completely ruined after Hurricane Sandy and so it required a full restoration and new technology to withstand another storm like Sandy. Some of the changes in the design included large flood doors at each entrance to ensure that no water could enter the station in the event of a flood. I worked with the Mechanical Electrical and Plumbing (MEP) team to process submittals and RFI’s, write daily reports, and provide assistance in commissioning. From this experience I was able to learn how to coordinate with different subcontractors in order to finish work efficiently. I was also able to learn how to deal with a client, which was the Metropolitan Transportation Authority (MTA) for this particular project. Working in the field can at many times be chaotic with many different people. It was important for me to learn how to communicate with different personalities so that the job could be completed safely and efficiently.

-Contributed by Devan Naik

Nicholas Daniels—Plattsburgh, NY

My summer internship was at AES Northeast, Located in Plattsburgh, NY. I heard about my internship through my local connections. I had a wide range of tasks throughout the summer. My big project I had was a hydrologic evaluation of a bridge downstream of a dam that had been recently removed, and I had to determine if the bridge would flood during a specific rainfall event. Other tasks throughout the summer involved AutoCAD drawings, cost estimates, permitting assistance, and some structural calculations.

An important thing that I learned as an intern was the bidding process and how contracts work for a job. Being around different jobs throughout the summer gave me some experience about how contractors bid for jobs and how contracts differ depending on the job. Another thing that I learned how to do was site grading, both by hand and on Civil 3D.

RPI definitely prepared me for my internship. I was able to understand a majority of my jobs without much difficulty, and the concepts that I learned at RPI were directly applied during my internship.

My company had a very relaxed and laid back work style, which was comforting for my first time in an office environment. There was no set schedule, as long as I completed my work, and came to work on time, my supervisor didn’t really mind when I took lunch break or when I spent free time learning other programs. It was nice knowing that my supervisor wasn’t looking over my shoulder every second and I was trusted to complete the tasks at hand.

If I could, I would definitely return to my summer internship for a full-time position. I felt very comfortable working there and the projects that they have coming up seem very interesting and I would enjoy being a part of it.

-Contributed by Nicholas Daniels
Hilary Fiorentino—Sydney, Australia

I was in Australia for five months. I went to University of New South Wales (UNSW) in Sydney, and I chose Australia because it was an English speaking country, no language barrier. I was choosing between Australia and England, and I thought Australia was a country that I otherwise wouldn't get the opportunity to live in for such a long period of time. Plus I would be based right in Sydney with much to see.

Having the opportunity to study in a different country will prove invaluable to my life. Being able to study transportation engineering of a city system that I could experience in real-time was unique. Being taught soil mechanics by people who come from all different parts of the world was unifying, because the fundamentals are all the same. My passion for the civil program I am in only intensified, as I got a glimpse into what other aspects of my future career are available, and the possibility of travel became so much more real.

It didn’t seem to sink in that I was in Sydney, Australia until my fingers grazed the side of the Opera House, feeling the rough texture of the shell-like exterior that you can’t see from a textbook. As a civil engineer, maybe the only thing that could get me just as excited, if not more so than the Opera House, was what stood behind it. The Sydney Harbour Bridge was just across the way, on the other side of Circular Quay, standing tall and mighty as the gateway to the pulsing city.

The lessons I would learn would not come from any type of class, but something that can only come from what is always talked about – being plunged into experience. A piece of my heart and a piece of my soul rests in Sydney, and this is not because of standing on the concrete foundation of the Opera House steps, or the steel beams of the Sydney Harbor Bridge. I found friends from all walks of life, had once in a life time experiences, and enjoyed not only the culture of Australia, but also the cultures of all the new friends that were brought together in this program.

-Contributed by Hilary Fiorentino
Hayley Frank—NYC and Denmark

This past summer, I worked at ARUP’s New York City office as a Civil Intern in the Infrastructure Group. (ARUP was founded in 1946 and was recognized internationally with its structural design of the Sydney Opera House.) As an intern, my tasks shifted according to the workload of those on my team. Many coworkers working on different projects sought my aid, which allowed me to work on a large variety of projects. For one residential site, I performed cut/fill estimations to accommodate plans for utilities, rain gardens, and lily pads in order to increase storm water resiliency, as well as created a plan set for the approval of the FDNY. As part of a project for a public park, I performed the alignment for a deployable flood barrier and produced sketches including proposed and existing elevations. I conducted photo surveys of subway stations, integrating the use of a panoramic ball camera and GIS applications to produce 360° virtual tours for potential contractors. The breadth of my work as an intern allowed me to utilize and further develop the technical skills I’ve gained at RPI, while giving me exposure on what kind of projects ARUP works on and how they approach them.

My experiences with the company were overwhelmingly positive, exposing me to a friendly and collaborative work environment. ARUP fosters a feeling of community in the workplace through events such as their company picnic, intern outings, and Friday happy hours. My experiences studying abroad in Denmark* also strengthened my interest in ARUP’s large international presence. Employees are offered opportunities for assignments abroad with other offices throughout the world. During my internship, I strengthened many technical skills, especially in drafting. It also helped me shape my long term career goals, and helped me realize that I want to apply my degree to a career involving site planning and hydrology. I hope to return to ARUP this summer as an intern, and to continue as a full time employee after finishing my Masters.

*Contributed by Hayley Frank

*Hayley studied at the Technical University of Denmark (DTU) last semester, which has an established exchange program with RPI. She took courses at both the Ballerup and the Lyngby campuses, (both are towns outside of Copenhagen). She took a masters course at Lyngby because only masters courses are offered in English. Students who attend the Ballerup campus are part of a 3.5 year study plan with the emphasis on more of a practical education. Classes involved more in class group exercises and less lectures, and often included field trips. DTU has an extremely large exchange program, Haley found it great to be involved in such a multicultural environment.
Field Trips—Hands on Learning. Students not only travel abroad but often participate in field trips to observe civil and environmental engineering projects in progress. Students recently visited the Tappan Zee Bridge in Tarrytown, NY (lower Hudson Valley). Professor Gorby’s students have visited Radix Sustainable Ecological Center in Albany and Brown’s Breweries (Troy & Hoosick Falls locations). The trip to Brown’s has led to a current internship for one of the students.

Excursion to Tappan Zee Bridge

The New NY Bridge (Tappan Zee Bridge) is out of the water. For the past few years, field trips have been held to view construction progress on this iconic cable-stayed bridge across the Hudson River. On a previous trip (October 2014), the bridge was barely poking out of the water. More recently (November 2016), students were able to see the main span towers, piers of the approach spans, and bridge decking. In addition, a few of the cable stays were in place. As part of an independent study course on bridge design, Professor Symans worked with Mr. Andrew O’Rourke, Public Outreach Administrator of the NY Thruway, to organize the trip. This year, students attended along with structural engineering professor Michael O’Rourke. The field trip began with a presentation by Mr. Wai Cheung, Safety, Security and Operations Manager for the NY Thruway. Mr. Cheung, an RPI alumnus, gave an excellent presentation on the design and construction of the bridge, at times referring students to the actual bridge that was viewable from the windows of the conference room. A few notable aspects of the new bridge include its design for a 100-year service life (no major maintenance required in that time), a structural health monitoring system that continuously monitors its behavior, and a seismic isolation system that provides a high level of protection for an earthquake with a 2500-year return period. After the presentation, Mr. Andrew O’Rourke took students to the Tarrytown River Walk, a dedicated location on the bank of the Hudson River, for viewing the bridge construction.

—Contributed by Michael Symans
Engineering—The Future and the Past. The earliest civil engineer known by name is Imhotep. He is believed to have designed and supervised the construction of the Pyramid of Djoser in Egypt around 2630-2611 B.C. Excavations in early Egyptian Civilizations have found environmental engineering arrangements for collecting rainfall and also the disposal of sewage dating from 3400-2450 B.C. The field of civil and environmental engineering is changing daily. Future engineers will need to meet the needs of a changing society with improved “smart” buildings, the conservation and use of resources, as well as how they are effectively distributed throughout the world.

“I think I want to be an engineer when I grow up.”

Fifth-graders from John McNamara’s class at Boght Hills School visited RPI and learned about the exciting work being done by civil engineers to protect our nation’s infrastructure from natural disasters and aging effects. Lauren Stenroos, a co-terminal student in CEE, engaged the students in a discussion about forces acting on structures. Then they put what they learned to practice—designing/building structures out of spaghetti and marshmallows and putting them to the test of an ‘earthquake loading’ on a shaketable. The students toured the geotechnical centrifuge and wind tunnel labs, and performed a corrosion experiment. Comments on their time spent at RPI included, “I think I want to be an engineer when I grow up,” and also, “marshmallows are delicious!”

Passing of a generous RPI supporter and international engineer—Clay Patrick Bedford, Jr.

Clay Patrick Bedford, 1929-2016, a 1950 graduate of RPI, was familiar with civil engineering his entire life. His father, Clay Sr., was a leader in the construction industry enabling Clay Jr. (Pat) to witness some of the greatest engineering feats of the first half of the 20th century, including the Hoover Dam. His career in construction management with Kaiser Engineers led him to oversee many projects, some of which included iron ore mines in California, Hell Hole Dam in the High Sierras, and part of the subway system in Montreal, Canada. He then became president of Fluor Constructors International where he oversaw projects in the Netherlands, the United Kingdom, and Saudi Arabia, to name just a few places.

RPI students are the beneficiaries of the Bedford Architecture/Engineering initiatives. The Studio, Seminar, and Traveling Workshop offer students the opportunity to study and participate in projects that address the complexity and rising expectations of building performance and design both locally and abroad.