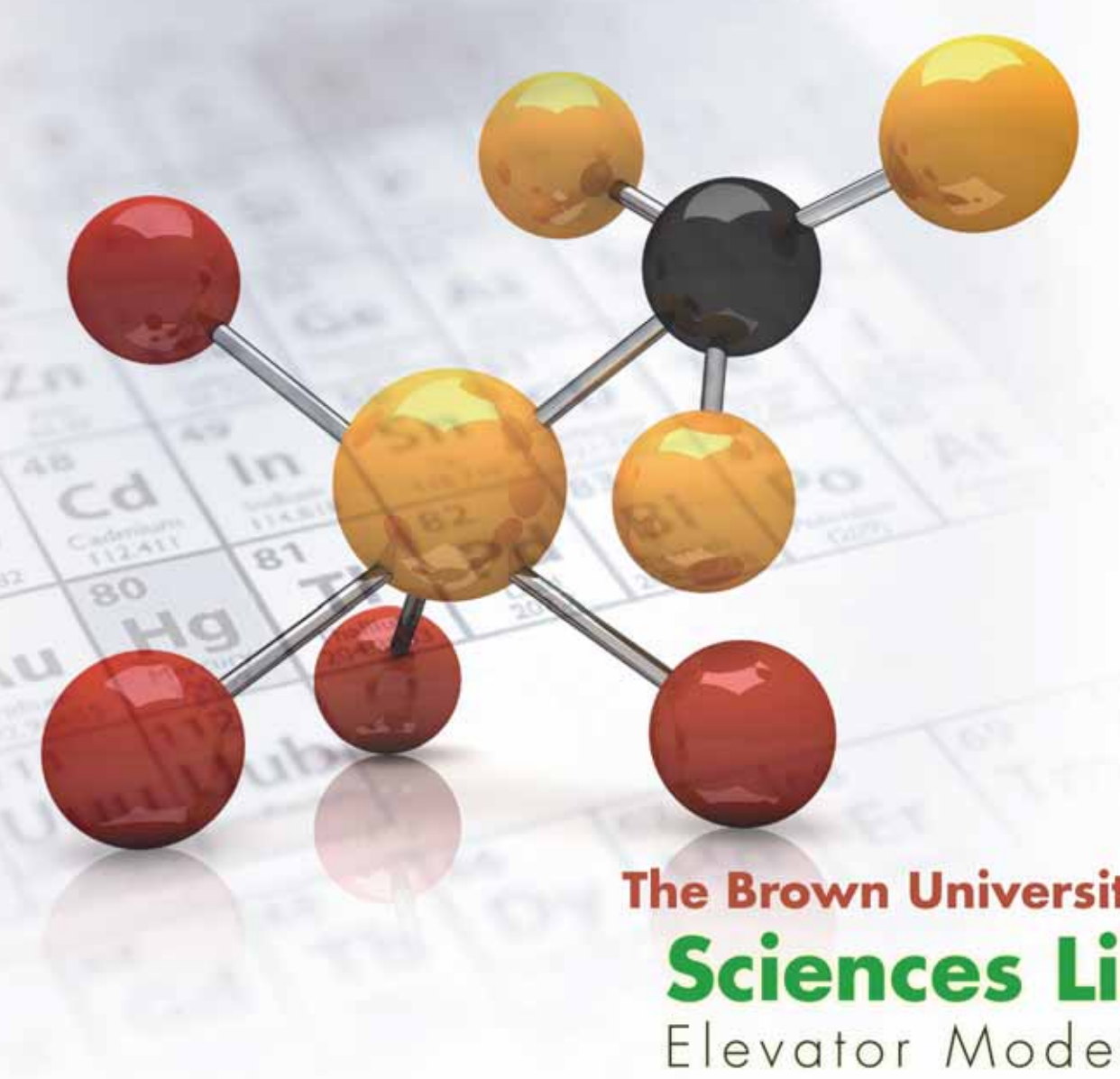

# The Brown University Sciences Library Elevator Modernization

*by Marc Mainville*

Day or night, the building bustles with activity – students and faculty working, meeting and conducting research in the 16-story building rising high above the other buildings on College Hill in Providence, Rhode Island. Though it may not look like the ivy-covered brick buildings more closely associated with Brown University, this modern and imposing structure is one of the nerve centers on the prestigious campus. Welcome to the Sciences Library, known simply as the "Sci-Li" within the Brown community. The Sci-Li houses the Susan P. & Richard A. Friedman Study Center, with 24-hour-a-day study space, several floors of books, periodicals and other reference materials, and the college's media service center. At peak times during the year, most notably during exam periods, more than 3,000 students and faculty make use of the building on any given day. Slower periods still draw hundreds of students and staff on a daily basis.

Transporting these students to the upper floors are three elevators in a bank, with a fourth set aside for the faculty and staff. The three main elevators serve 14 floors above ground and one below ground, while the staff elevator makes an additional stop at the sub-basement level. As the 2006 academic year wound down, it

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became increasingly apparent that the original Otis gearless-traction machines installed in the building in 1969 were outdated, wearing down and becoming less reliable. Problems included leveling issues.

Brown also had recently announced a commitment to "greening" its campus, a trend that is becoming more and more prevalent in the face of skyrocketing energy prices and growing concern about the environment. The existing elevators were not energy efficient due to their old-style generator field controls, inefficient dispatching issues and other operational inefficiencies.

Brown, like many environmentally conscious institutions, is attempting to incorporate environmental awareness in all its facilities projects. According to Brown's facilities management website, "Projects are expected to commit to a high level of environmentally responsible design. Environmentally responsible design encourages the design team to incorporate the best elements of sustainable, high performance, and energy efficient design and construction practices. The goal is to reduce operating costs, improve the health and productivity of the occupants, and minimize negative environmental impacts over the life of the building."

With all these factors in play, the Sciences Library Elevator Modernization Project was launched.

As Brown's elevator service company, Atlantic Elevator South Co., Inc. of Seekonk, Massachusetts was selected for this project. The decades-old, family-owned business began the project by conducting a thorough study of the viability of the existing equipment. All four gearless machines were comparatively analyzed by Delta Electro Power of Cranston, Rhode Island and found to be susceptible to future insulation failures, coupled with potential grounding issues. When faced with the condition of the existing machines, Atlantic decided this would be the perfect project to introduce the region to some of the newest elevator technology on the market: gearless AC technology.

While it may seem unusual for a small regional business to lead the charge in new technology, Jon Driscoll, operations manager of Atlantic Elevator South,

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*The Brown Sciences Library – Susan P. & Richard A. Friedman Study Center*


*Left: Lobby level view of three-car group*

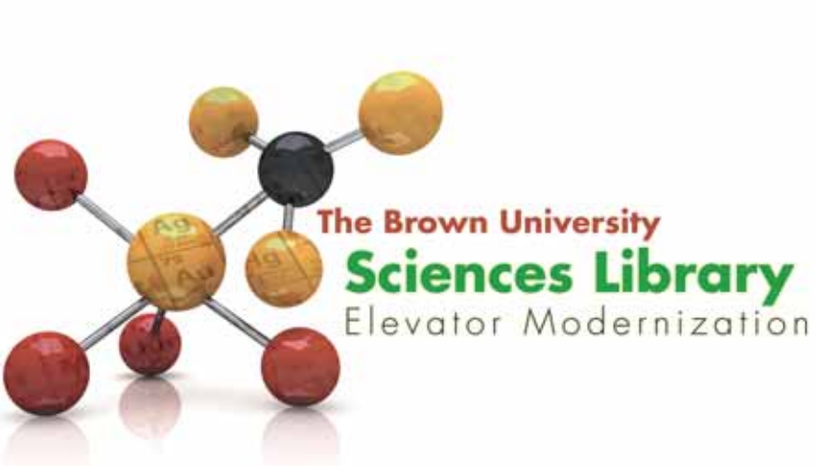
*Above: CE Electronics Elite Position Indicator System*

The old equipment before modernization

*Top: Old selector*

*Middle: Old DC gearless machine*

*Bottom: Otis 6970 Door operators (before retrofit)*

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doesn't see it that way. "Small doesn't mean behind the times," he said. "In fact, smaller companies with a track record of strong customer and vendor relationships are often best positioned to lead the way with new technology."

Because the technology was so new, Atlantic wanted to work with suppliers with strong support, sophisticated engineering and proven track records. Atlantic also believed it would be essential that the various suppliers be able to combine their efforts and equipment. After consulting with a variety of manufacturers, and with input from consultant Noel Herschell of Lerch Bates and Associates, Inc., Atlantic decided to move the projects forward with GAL Manufacturing GALaxy controllers, Magnetek drives, and Imperial Electric permanent-magnet AC machines.

Additional energy cost savings will also be realized by GAL's utilization of Yaskawa regenerative drive units as provided by Magnetek. Regenerative units were found to provide an energy savings of up to 50% while being tested at the Hollister Whitney test tower.

Magnetek provided the HPV 900 PM drives and energy-saving regenerative modules used in Atlantic's gearless AC systems. The addition of the


*Above: New Imperial Electronic permanent-magnet 500 Series machine*


*Right: Magnetek Drive adjustments being made by Atlantic adjuster Eugene Carroll.*

*Car top view*

*New stainless-steel cab interior*

regenerative modules creates a system that recaptures the energy generated during the ride cycle, helping to fulfill Brown's commitment to greening its campus.

The HPV 900 PM is specifically engineered for high overload capacity and high operating temperatures. It also has closed-loop vector control with accurate starting and stopping. The HPV 900 PM, an offshoot of Magnetek's existing HPV 900 line, also uses software that allows for easy setup. "Brown University's modernization project was a perfect application for our drive's high-performance design," said Magnetek Elevator Applications Engineer Heide Hongsermeier, who worked on the drives on site. The drive is designed with long-life components, including bus capacitors, that offer a higher voltage rating and diode bridges that have 2.5 times the current capability over other industrial drives.

Permanent magnet AC gearless machines bring the future to the present. Gary Ward, vice president of Sales and Marketing for Imperial Electric, explained:

> *"These small, but very powerful, gearless AC machines are revolutionary for the elevator industry. Machine rooms stay cleaner with the new machines [which do not have] carbon brushes like the older DC gearless machines. Atlantic Elevator chose the Imperial Electric Frame 500 Series machines for their compact size, durability, long life and low maintenance machine features. These high speed machines are designed for heavy use buildings like those at Brown University."*

In the end, nearly everything but the cabs was replaced, and even they saw some changes, with new down lights and textured, stainless-steel walls installed in the cars to freshen their appearance. User friendliness would also be improved as Brown elected to have Atlantic install a video lobby monitor, provided by CE Electronics.

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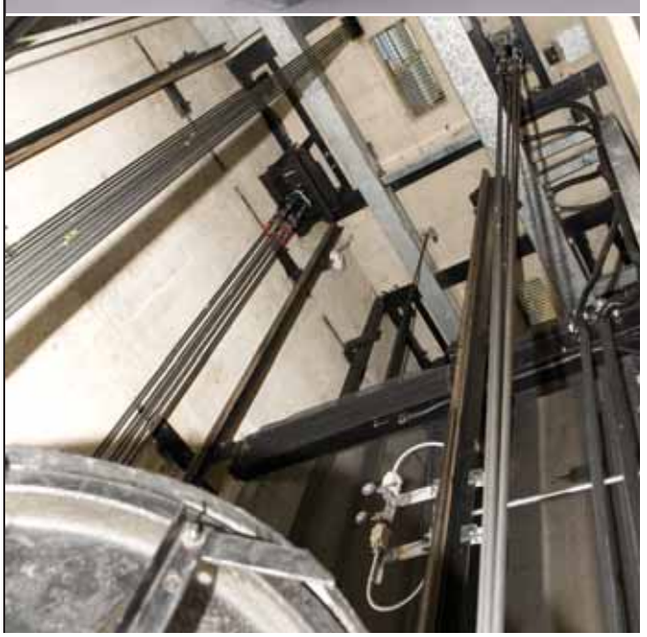
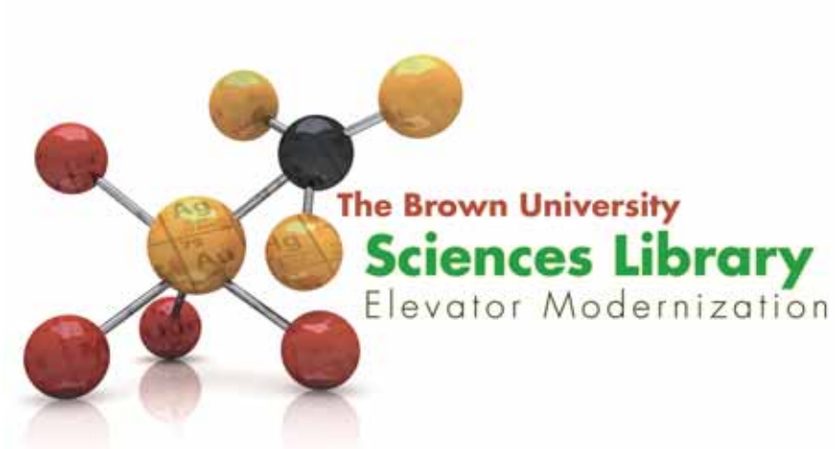


*Photos at right, top to bottom:*

- *Machine room view of three-car group*
- *Field inspection of new machine by Atlantic's Christopher Oliver and Carroll*
- *GALaxy controllers*
- *Hoistway view from car top*

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This incorporated position indicators and the ability to relay pertinent information to building personnel and students, including messages and safety alerts.

This job was one of the largest elevator modernization projects undertaken by Atlantic. It began in late December 2006 and wrapped up on time and on budget approximately one year later. Two full-time Atlantic Elevator South technicians were on site daily to perform the work, and other Atlantic employees and contractors were in and out of the building over the course of the project.

"We are a very demanding client," noted Brown University Project Manager Jeffrey Parker. "There is little room for error, and the guys at Atlantic did some ingenious things to ensure this project was done right and in a way that was as least disruptive as possible."

After deciding on the appropriate partners, Atlantic then turned their attention to a detailed plan and schedule for the modernization project. Meetings were held with Parker, Brown Business Services Manager Barbara Shulz, Consultant Noel Herschell and the university's electrical engineers in order to closely coordinate and formulate a strategy that would work in such a busy building with minimal disruption to its operation. These meetings continued throughout the course of the project to ensure that Atlantic followed the strict timeline and met milestones of each phase of the work.

*"...the first concern was ongoing availability of elevators, even during the upgrade project. Brown personnel stressed the importance of taking only one elevator at a time out of service during the modernization work."*

Since the Sci-Li is so vital to the operation of the university, the first concern was ongoing availability of elevators, even during the upgrade project. Brown personnel stressed the importance of taking only one elevator at a time out of service during the modernization work. "At all times during this project, at least two of the four elevators were open for use, and in most instances, three of the four were available," added Driscoll.

In order to get a head start on the project, Atlantic installed Pearlweave safety netting between the cars. This allowed the team

*Bottom left: Original DC gearless armature*

*Bottom right: Factory training for Atlantic personnel (l-r) Jon Driscoll, Carroll and Oliver at GAL Manufacturing headquarters*


to work safely on one car while in close proximity to the other elevators. Taking advantage of early mornings and late nights, the team from Atlantic was also able to avoid major distractions when hauling gear and components in and out of the building. "Because of our location, I couldn't offer them parking for the delivery trucks," noted Parker.

Another obstacle was noise, which isn't exactly welcome in a library. All around the building are signs indicating the appropriate decibel sound levels, and while it would have been impossible to conduct this project without any noise complaints, Parker noted that Atlantic mitigated the noise for the project to the "lowest conceivable levels."

While Atlantic was waiting for the delivery of major components, they used the available time to refurbish the existing Otis door equipment on all four elevators, including the rollers, door locks and related hardware. The new door parts were supplied by Unitec. Atlantic also examined the Otis Model 6970 door operators. They were found to be in excellent mechanical condition, so the decision was made to retain the operators but replace the electrical controls to these units with IPC closed loop operation kits.

The modernization work began with the staff service elevator, a simplex car that serves 15 floors of the building. With much of the work occurring inside the hoistway or within the machine room above the hoistway, far away from the working students and faculty, Atlantic began dismantling the old machine and controller and delivered the new machine room equipment through access holes in the machine room floor and secondary floor levels. After the installation of the new wiring, controller, machine and Innovation Industries fixtures, Atlantic began the adjusting process. Along with the lead

*Continued*

*Top left: Making final adjustments*

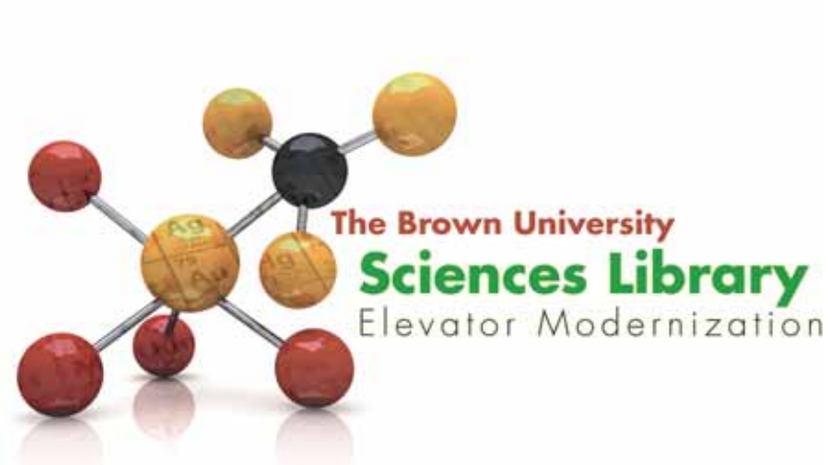
*Top right: Changing parameters on GALaxy controller*

*Bottom right: Cramped conditions in original machine room layout*

*Lobby panel next to three-car group*

*"Even while all three elevators are moving, two people can hold a conversation in the elevator machine room without having to scream at one another,"*

*– Jeffery Parker*
*Brown University Project Manager*

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adjuster, mechanic and helper, GAL and Magnetek engineers were on site to offer assistance. With their help, and working through minor control issues, Atlantic had the elevator up and running at high speed, 500 fpm, after the first day. From start to finish, the modernization of the service elevator was completed in approximately 12 weeks.

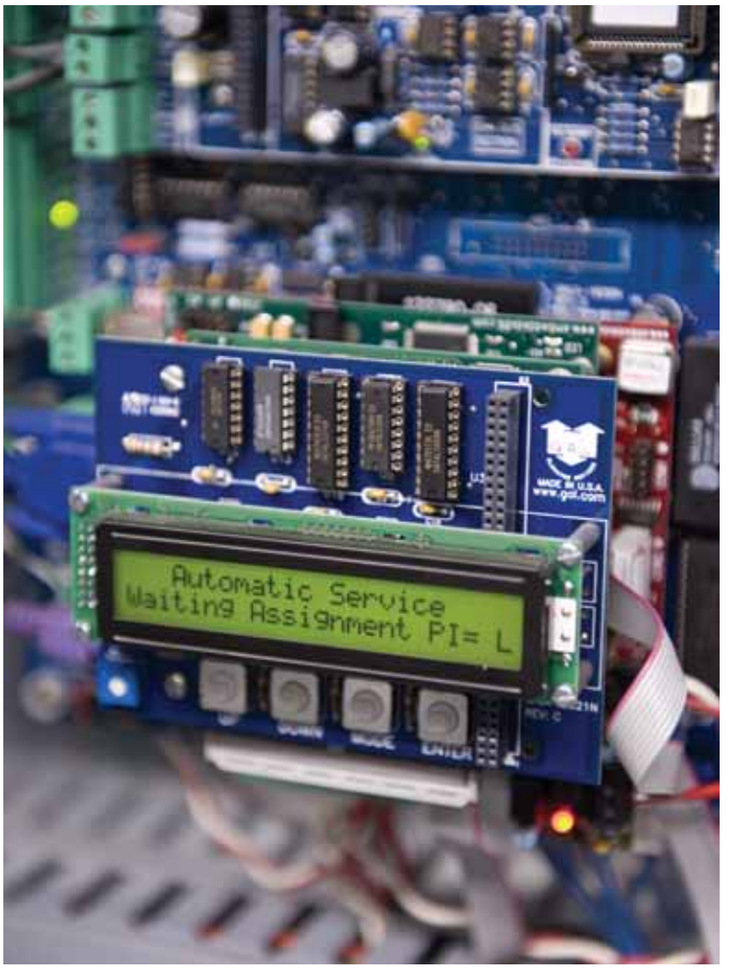
After the service car was completed, work began in earnest on the three-car group. At that point, Atlantic faced the challenge of separating the cars during the modernization process, coupled with space constraints in the existing elevator machine room. To solve the space issue, Atlantic moved the new controllers to a level above the existing machines in areas that previously housed only the motor generator sets. This allowed them to leave the existing controllers and selectors with their connected wiring in place so each elevator did not have to be disconnected from the group operation. Atlantic, in essence, modernized around the existing equipment, allowing them the room to maneuver the old gearless machines out of the area and hoist the new AC machines into place. Because the controllers were remote, one level above the machines, closed circuit cameras and monitors were installed to allow Atlantic's technicians to see the machines operate while servicing and adjusting the controllers. As each elevator was completed, a field engineer from GAL was also on site to assist Atlantic with adjusting this new technology. The final phase of the project involved the removal and disposal of the old controllers and selectors.

*Intergrated Display Systems, Inc. (Liftnet)*

Comments from the campus were positive.

"The first time I rode in the elevator after they were renovated, I barely noticed I was moving. The doors opened seconds later and there I was, 10 stories above where I started!" stated Brown graduate student Allison Kerbel. "They don't jump, they aren't loud and they're cleaner than I ever remember them."

*Closed-circuit monitoring of machines from new controller location*



*GALaxy adjustment display board*

Parker added:

*"The customer satisfaction with the new elevator system is immeasurable. It was the personal touch that a relatively small contractor like Atlantic can provide that helped secure this project for them, and they didn't disappoint. They cleaned up after themselves and, in some cases, even cleaned up after messes that they didn't make. They fixed little problems we had without any fuss and, in many cases, before we even approached them with our concerns. The work they did at no additional cost may seem small, but for me and the university, it was priceless."*

The new elevator components have fewer moving parts than the old, resulting in less opportunity for malfunctions and fewer points in the system that require general maintenance. The improvements also resulted in much quieter operation. "Even while all three elevators are moving, two people can hold a conversation in the elevator machine room without having to scream at one another," said Parker.

The new control systems provide efficiency of movement, time and energy. The microprocessors can learn the trends of the elevator traffic and determine the best floor at which to position itself to respond quickly and efficiently to a call. The new controllers also allow for quicker diagnosis of problems and, in many cases, can self-diagnose the problem and point maintenance crews in the right direction immediately.

For Atlantic Elevator South, the project highlighted the company's desire to prove the effectiveness of the small independent elevator contractors of the world.

Driscoll explained:

*"It was important for us to show that our clients, even when they have a relatively large and complicated job, can trust a smaller, independent company like ours to do the work. This project represented over a year of hard work by the people that make this company as successful as it is, and now we know that our hard work and expertise can bring the benefits of these state-of-the-art systems to our clients. As green technology increasingly becomes integral to how organizations do business, the Sci-Li elevator project will stand as a ready example of a project that was on time, on budget, modern and green."*

*"The first time I rode in the elevator after they were renovated, I barely noticed I was moving. The doors opened seconds later and there I was, 10 stories above where I started!"*

*– Allison Kerbel,*
*Brown graduate student*