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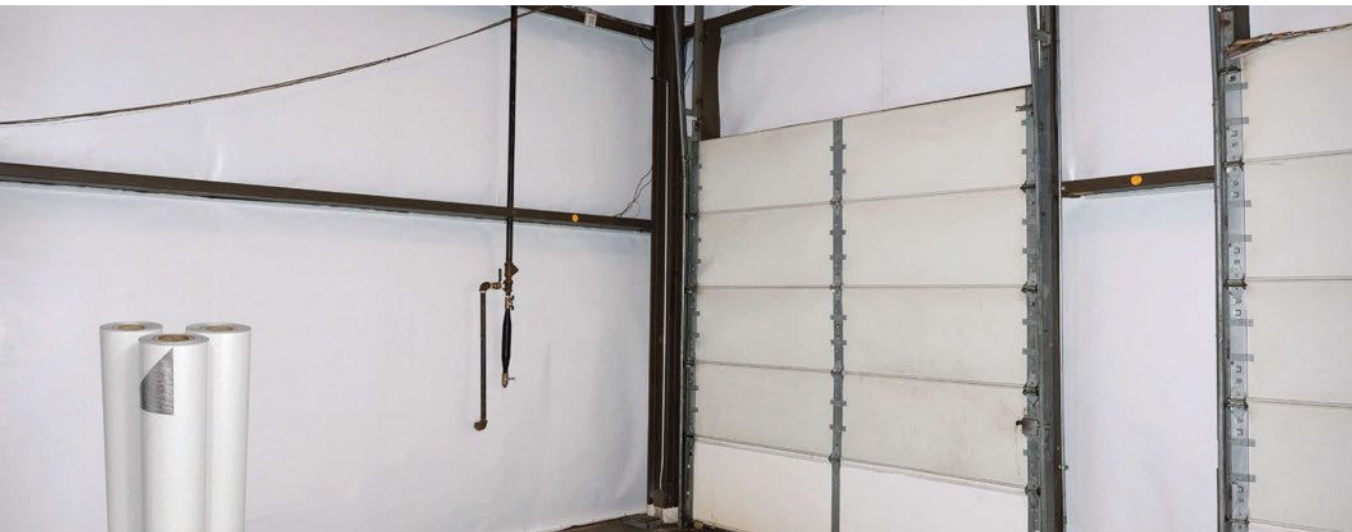
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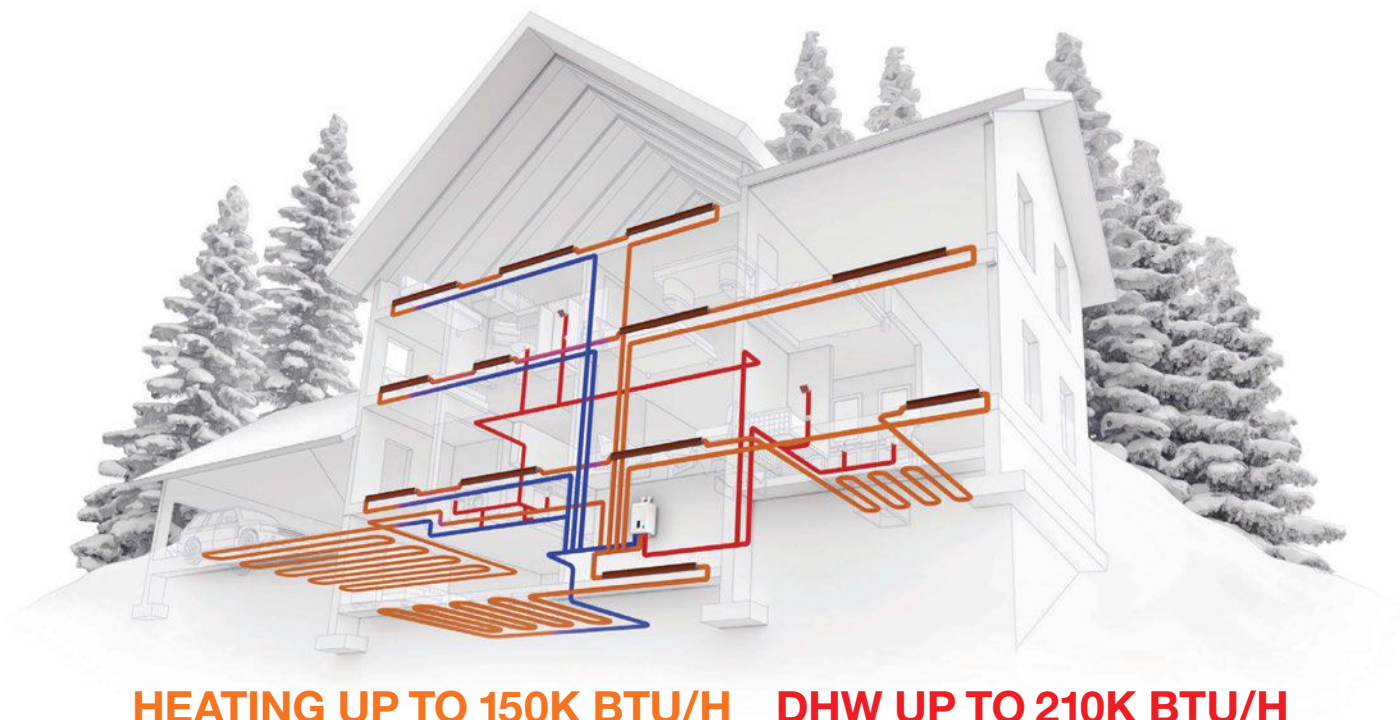
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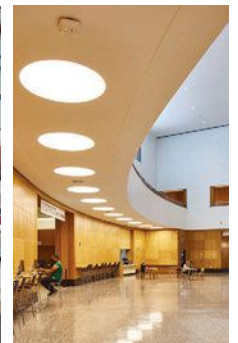
INSIDE THIS ISSUE

SEPTEMBER-OCTOBER 2021 // VOL 12 // ISSUE 5

➔ feature projects

ONE GIANT LEAP

The Apollo Mission Control Center in Houston is accurately restored to July 20, 1969, the date Apollo 11 landed on the moon.



32

PERUSE EDUCATIONAL FACILITIES FROM ACROSS THE COUNTRY:

- Fotografiska New York
- MuseumLab, Pittsburgh
- Skydeck, Willis Tower, Chicago
- Georgia Aquarium, Atlanta
- The Powerhouse, Beloit College, Beloit, Wis.
- Wings Over the Rockies Air & Space Museum, Denver
- Central Georgia Technical College, Warner Robins, Ga.
- Edmund Hatch Bennett Elementary School, Taunton, Mass.
- Central Library, Brooklyn Public Library
- The Gordy, Houston



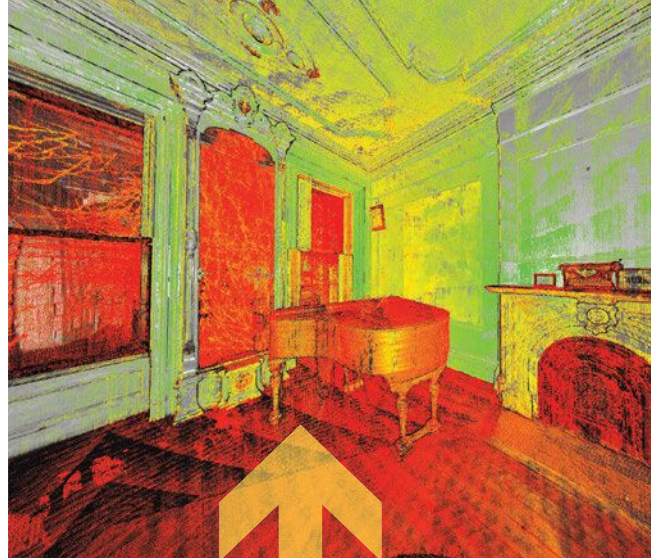
← cover

COVER PHOTO: NASA JOHNSON SPACE CENTER

retrofit

INSIDE THIS ISSUE

SEPTEMBER-OCTOBER 2021 // VOL 12 // ISSUE 5



Business

18

EDUCATIONAL FACILITY RENOVATION

Practical guidance to increase long-term sustainability while reducing anxiety.

Component

46

SAFETY FIRST

LEED unveils nine Safety First credits, health-centric tools for heading back inside buildings during COVID-19.

Transformation

50

REMAKING 'THE FORTRESS'

A dungeon-like dormitory on Duke University's campus is revamped to promote academic success and overall wellness.

Transformation

56

MORE FROM LESS

A design team is challenged to create a daylit middle and high school for about 1,700 students within a former Lowe's Home Improvement building.



Transformation

62

WHAT'S NEW CAN BE OLD

The Lawrenceville School's Abbott Dining Hall was a 1960s addition to a historic building that now better embraces the school's heritage and tradition.

Historic

66

PRESERVATION OF AFRICAN AMERICAN HISTORIC SITES

Architecture students from historically Black colleges and universities complete a historic preservation fellowship, using digital technology to study a cultural site.

Trend Alert

70

DAUNTING BUT DOABLE

Climate change is a big challenge, and many believe decarbonizing buildings is an important solution.



COLUMN

12 POINT OF VIEW // *retrofit*'s staff members not only have an affinity for space, a couple of them also share names with famous astronauts.

DEPARTMENTS

75 PRODUCTS // View a roundup of the latest materials and systems for the industry.

82 INSPIRATION // An 87-year-old fast-food icon, known as the Milk Bottle, is refurbished to once again serve ice cream.

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AN AFFINITY FOR SPACE

On July 20, 1969, five-year-old John Glenn Riester was playing outside when his parents called him in to watch Apollo 11 land on the moon. He says everyone gathered around the family's television set and watched the historic landing in silence. Even at his young age, John, now **retrofit's** publisher, recognized the significance of the moment. Maybe that was because he had been named after John Glenn, the third American in space and the first American to orbit the Earth; Glenn circled Earth three times in 1962. John Glenn was John Riester's mother's hero and, therefore, John had a natural interest in space travel because of his namesake.

I, too, always was curious about space. I can remember wanting to be an astronomer at a very young age. I wanted to study the moon, stars, planets, galaxies and all of space's mysteries—with my feet firmly planted on the ground. I was nine years old when the Challenger was engulfed by fire over Cape Canaveral. That moment left a lasting impression on me (and guaranteed I will not be signing up for any space tours with Blue Origin or Virgin Galactic).

However, I am in awe of the men and women who are brave enough to launch into space. There's one astronaut, in particular, I've been following the past few years. Maybe you've heard of her: Astronaut Christina Koch participated in the first all-female spacewalk in October 2019 and, when she returned to Earth in February 2020, she had broken a record for the longest single spaceflight by a woman (328 days in space). I'm thrilled someone with my name is doing extraordinary things in space!

In this issue, John and I merged our love of space with our chosen profession of magazine publishing with **retrofit's** "Cover Story", page 22, about the restoration of the Apollo Mission Control Center in Houston. It was in this small room—roughly 44 by 58 feet—that young mission controllers oversaw the Apollo program, most famously landing Apollo 11 on the moon.

I was giddy with excitement as I called into a NASA conference line to speak about the restoration with Sandra J. Tetley, Johnson Space Center's historic preservation officer, and Adam Graves, historic preservation lead for the Apollo Mission Control Center restoration via his company, GRAVitate LLC. I could have spoken to the pair all day; it was a fascinating discussion! I told Sandra and Adam I would've preferred to chat with them in person, during a tour of the restored Apollo Mission Control Center. They invited me to Johnson Space Center to walk through the restored mission control center with them, and I'm already planning a trip this fall.

As if going to see the restored Apollo Mission Control Center wasn't exciting enough, because of this story in **retrofit**, Astronaut Christina Koch, who is based at Johnson Space Center, now knows about me and offered to take a photo with me in the Apollo Mission Control Center when I visit. Tell me that's not the coolest thing in the galaxy?!

CHRISTINA KOCH

Associate Publisher/Editorial Director
retrofit

TAKE A PEEK INSIDE OUR EDITOR'S HOUSE

Like millions of Americans stuck at home during COVID-19, Editorial Director Christina Koch and her husband were motivated to improve their home. Read about their kitchen remodel, which began in November 2020 and hopefully—by the time this issue reaches you—is complete. Read the blog series at www.retrofitmagazine.com/category/blog.



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Peter Rust, AIA, is an architect and associate at HMFH Architects with 17 years of experience. His expertise focuses on the design of highly complex, public and private educational renovation projects. As such, he shares some practical guidance to increase long-term sustainability while reducing anxiety during educational facility renovations in "Business", page 18.



Mahesh Ramanujam is the president and CEO of the U.S. Green Building Council, Green Business Certification Inc. and Arc. Ramanujam writes in "Component", page 46, about LEED's nine new Safety First credits, which were specifically created to assist with re-entry into buildings during COVID-19.



Chris Brasier (left), FAIA, LEED AP, and **Shann Rushing**, AIA, LEED AP BD+C, co-wrote "Transformation," page 50, about Edens Quad on Duke University's campus. Once the least desirable dormitory on campus, the buildings have been revamped to promote academic success and overall wellness. Brasier

leads Clark Nexsen's Higher Education practice and serves as a design director within the firm. Rushing is a principal at Clark Nexsen who has focused his career on the design, management, and construction of higher-education and civic projects.



Ethan Levine (left), AIA, LEED AP, is co-owner and an architect at Manuel Zeitlin Architects, and **Ana Smetana**, Assoc. AIA, is co-owner and a designer at the firm. The pair demonstrate how more was created with less when a former big-box store was retrofitted into a middle and high school for 1,700 students

in Nashville, Tenn. Read about the challenging project in "Transformation", page 56.



Often, the goal of a retrofit is turning an old building new again, but in the case of Abbott Dining Hall at The Lawrenceville School in New Jersey, school representatives asked Voith & Mactavish Architects (VMA) LLP to make a 1960s addition to an 1891 dormitory look more like it belongs in the historic campus core. **Daniela Holt Voith**, FAIA, LEED AP BD+C, IIDA, founding partner and director of design for VMA, tells the story of Abbott Dining Hall's "Transformation", page 62.



Ed Cafasso is the owner of Bending Light Communications, a public relations consultancy whose clients include companies in the real-estate-development and -management fields. In "Historic", page 66, Cafasso writes about three architecture students from historically Black colleges and universities who participated in a Digital Documentation Fellowship presented by Existing Conditions, the National Trust for Historic Preservation (NTHP) and National Park Service's Historic American Buildings Survey. The students' project, which is competing for the 2021 Leicester B. Holland Prize, documents one of more than 150 African American historic sites in which NTHP's African American Cultural Heritage Action Fund has invested.



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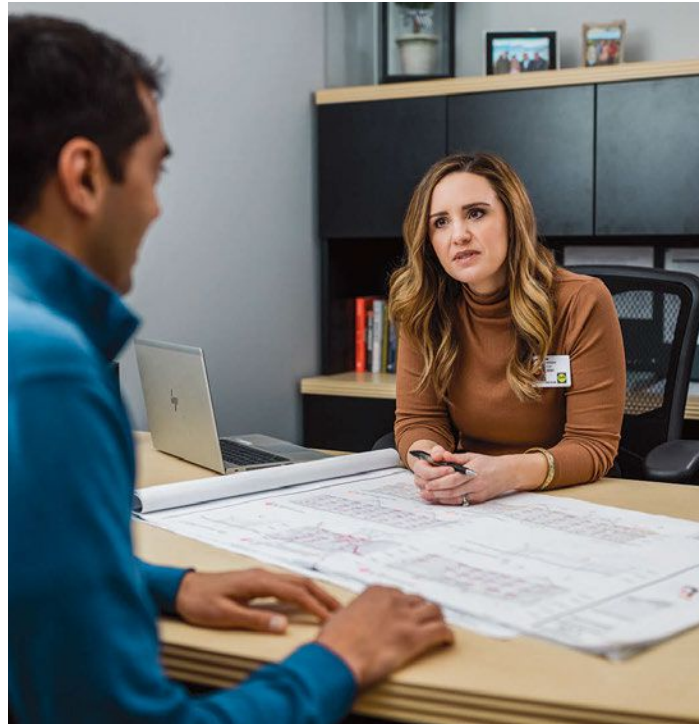
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EDUCATIONAL FACILITY RENOVATION



PHOTO: ED WONSEK

WRITTEN BY | PETER RUST, AIA

Practical Guidance to Increase Long-term Sustainability while Reducing Anxiety

Representatives of academic institutions or school districts planning for the future of their facilities are faced with the question of replacement versus new construction. Long-term sustainability should be paramount in these decisions—but understanding what sustainability means for the long-term can be challenging.

An aging school building may be a time-tested thread in the social fabric of a community but the extent and complexity of a renovation, including cost, adaptability, embodied carbon, operational efficiency and logistical issues, together with community and historic considerations, are all critical components in considering a building's value and long-term sustainability. Systemically analyzing each of these issues is critical to lowering risk and increasing the value of any building or campus.

The following are three key areas of investigation to help make renovation decisions:

← After evaluating the existing Florida Ruffin Ridley School building, HMFH Architects used a combination of renovation and new construction to meet the needs of Brookline, Mass. The historically significant and beloved 1913 building, where John F. Kennedy attended grade school, was renovated. By adding new academic wings to replace two additions built in 1954 and 1974, the design created a single, unified 21st century school.

1. Understand Your Student and Staff Needs and the Adaptability of Your Facility

It is difficult to cite any facet of teaching and learning today resembling methods in place 50 years ago. Pressing issues, such as social and emotional health, equity, digital and remote teaching, and project-based learning were not part of the discussion when many existing school buildings were constructed. Understanding these issues and assessing your current needs is the critical first step in determining if an existing building can be adapted.

Not all existing buildings are able to accommodate multiple levels of programmatic change. However, if the character and form of your existing building allows for adaptation, there's a good chance that it can meet your needs today and into the future.

A helpful comparison involves two buildings that were candidates for renovation into new educational spaces. The first was the 60-year-old Chapman School in Weymouth, Mass.; the second was a 100-year-old former industrial building in Boston.

A close review by HMFH Architects revealed the century-old industrial space to be more easily adapted into a school than transforming the Chapman School. The newer Chapman School suffered from fatal flaws. It was built primarily with concrete, which offers little flexibility for adding insulation or creating the contemporary spaces that the new program demanded. The floor-to-floor heights were too low to allow for new mechanical equipment. Further, it was built on several partial floor levels, which limited accessibility options. Unfortunately, insurmountable cost and constructability issues meant that new construction was ultimately necessary to meet the needs of the school district and its students.

The former industrial building, which is now the Boston Renaissance Charter Public School, had tall floor-to-floor heights, allowing ample space for mechanical systems and abundant daylight. Its simple rectangular form and large



PHOTO: COURTESY HMFH ARCHITECTS



PHOTO: ANTON GRASSL

↑ Surprisingly, a century-old industrial building proved to be a strong candidate for adaptation while providing embodied-carbon sustainability benefits. It was renovated into dynamic learning and social spaces for the Boston Renaissance Charter Public School.

expanses of internal open space were easy to reconfigure to meet program needs. Each of these factors contributed to a straightforward and cost-effective renovation.

2. Evaluate Existing Conditions and Develop Budgets

Existing buildings conceal many secrets. Hidden problems can elevate the risk of additional costs arising during construction. This uncertainty is compounded in buildings previously renovated, where subpar design or construction increases the unknowns. To mitigate these risks, you must understand the current state of your building as accurately as possible.



↑ Built in the 1960s, the Chapman School presented multiple obstacles to a successful renovation. Structural issues, low floor-to-floor heights and accessibility barriers were some of the reasons the district opted to build a new middle school in Weymouth, Mass.

Review of the original plans and any as-built drawings helps reveal problems and opportunities. Such documents will not always reflect what was built or previously renovated but they are still helpful. To understand concealed conditions, you may need to investigate through selective demolition—opening up walls and ceilings, for example—to identify hidden problems and confirm conditions of existing materials and building systems.

Bringing consultants on board to help evaluate an existing structure is very useful: An exterior envelope consultant can determine the envelope's condition and identify opportunities for increased energy efficiency. A structural engineer can determine the condition of the structure and advise about any building code or programmatic adaptations that may require structural modifications. Mechanical, electrical and plumbing engineers can be invaluable in assessing the condition of a building's existing systems and recommending more efficient options. Such investigations will help determine the potential long-term sustainability of a building.

Once you establish a baseline of existing conditions, a preliminary budget for renovation can be compared to a budget for comparable new construction. It is key to also compare the operational costs of renovated and new options.

3. Define Sustainability, Carbon Reduction, Energy Performance

According to the U.S. Energy Administration, nearly 50 percent of greenhouse gas (GHG) emissions in the U.S. come from the operation, renovation and construction of buildings. We have an obligation to reduce GHG emissions with an integrated, purposeful approach that protects our present and future. The need to reduce carbon emissions to confront the challenge of climate change is urgent. (Editor's Note: Read about the push to decarbonize buildings in "Trend Alert", page 70.)

GREENHOUSE GAS (GHG) emissions are produced from the release of carbon dioxide (CO₂) into the atmosphere. Embodied carbon describes GHG emissions from materials and construction activity. Operating carbon describes emissions from building operations—its heating, cooling, lighting and maintenance operations.

A strategic renovation and reuse of an aging building can reduce overall GHG emissions compared with building new. This strategy relies on saving energy already “embodied” in the existing building through reusing, rather than newly constructing, its most carbon-intensive components. Steel, concrete and brick are particularly energy and carbon intensive because of the resources used to manufacture them. When we reuse the structure and building envelope rather than replace it, the topline reduction in carbon emissions is a hard-to-ignore achievement.

“Our analysis on embodied carbon in buildings reveals that 80 percent of the embodied carbon factor is in the building structure and enclosure,” says Chris Schaffner, P.E., LEED Fellow, WELL AP, the founder and CEO of The Green Engineer, a sustainable design consulting firm based in Concord, Mass.

Schaffner suggests taking the extra step of examining the “net present value” of carbon reduction on renovation projects. “It’s important to know not only the comparison of embodied carbon impacts for new construction versus renovation, but to also consider when they occur,” he says. “Reductions created now and elimination of carbon emissions released today provide a much greater impact than waiting for a 10- to 20-year timeline of system improvements within the building.”

To create maximum energy efficiency and low operating carbon emissions, HMFH Architects recommends a deep retrofit strategy on school renovations. This includes replacing mechanical, electrical, and lighting systems and maximizing the efficiency of these systems. This strategy also includes improving the building envelope’s performance to reduce energy demand.

HMFH Architects’ renovation of Gilbert Hall on the campus of Bristol County Agricultural High School in Dighton, Mass., employed such a strategy and illustrates the ideal scenario for renovation. The firm’s projections showed that restoring the building was less expensive than new construction.

By reusing, rather than rebuilding the concrete, wood and masonry structure, the design team was able to take advantage of the existing building’s attributes, such as abundant natural light, views to the outdoors and the building’s embodied carbon. At the same time, HMFH Architects significantly reduced operational carbon with new systems and a tighter building envelope. Each of these aspects contributed to stronger overall sustainability performance.

Renovating for Long-term Sustainability

Recent events are a formidable reminder that we are seeing the increasing impacts of a climate crisis stemming from our reliance on fossil fuels—a reality that demands long-term sustainable thinking. Although a new building may provide a greater level of operational energy efficiency than an existing building, this metric can be offset by taking advantage of the embodied carbon present in an existing



PHOTO AND RENDERING: COURTESY HMFH ARCHITECTS

↑ Reuse of the concrete, wood and masonry structure of Gilbert Hall, an academic building at Bristol County Agricultural High School, ensured the building’s long-term use and provided sustainability benefits. The building’s flexibility allowed for the design of new interior spaces and introduction of a new public entrance connected to a new pedestrian zone.

structure. The urgent need to reduce carbon emissions in the short-term puts greater value on the immediate carbon savings of renovations.

Existing buildings can be as flexible and resilient as new buildings, and they often meet the needs of successive generations just as well as new buildings. Long-term sustainability is the goal. Planning for it when working with existing buildings requires that each of the aforementioned factors is carefully considered.

Before tearing down a building you already have, it is always worth a holistic exploration of the renovation options. Even though it may involve more complexity, the potential benefits of renovation—today and for many years into the future—will impact each of us and help protect generations to come. 

ONE GIANT LEAP

The Apollo Mission Control Center in Houston Is Accurately Restored to July 20, 1969, the Date Apollo 11 Landed on the Moon

WRITTEN BY | CHRISTINA KOCH



PHOTOS: NASA, JOHNSON SPACE CENTER

It has been estimated more than 500 million people across the world watched as Apollo 11 landed on the moon July 20, 1969. As Neil Armstrong climbed down Apollo 11's ladder onto what he described as a fine powder on the moon's surface, he famously said, **"It's one small step for man, one giant leap for mankind."**



Helping direct Armstrong and his co-astronauts (Edwin "Buzz" Aldrin and Michael Collins) to the moon were the flight controllers of the Apollo Mission Control Center in Building 30 of NASA Johnson Space Center (JSC) in Houston. At an average age of just 28, these young men—and a few women who worked on Apollo and were in the center to help—didn't have time to celebrate their great feat of successfully landing astronauts on the moon. Instead, they feverishly worked to ensure the moon landing was safe and they could return Apollo 11 and its crew home. (In fact, then President Richard Nixon had prepared a speech in the event Armstrong, Aldrin and Collins could not be brought back to Earth.)

In September 2001, in an interview for JSC's Oral History Project, Armstrong praised the "culmination of the work of 300,000 or 400,000 people over a decade" that made Apollo 11's mission successful. He also noted, "We had great respect [for] the guys down there, the guys and gals in mission control."

In an ultimate show of that respect for Apollo 11's flight controllers, the Apollo Mission Control Center recently was accurately restored to the way it looked on July 20, 1969, from the ceiling tiles to the carpet,

the controllers' consoles, and even coffee cups and ashtrays. An extremely dedicated team of unique collaborators spent years researching and restoring the control center, making it historically accurate to the day of the first lunar landing, so visitors can experience the magnitude of that important day in history. You could say the restoration team took its mission as seriously as the flight controllers considered their mission to the moon.

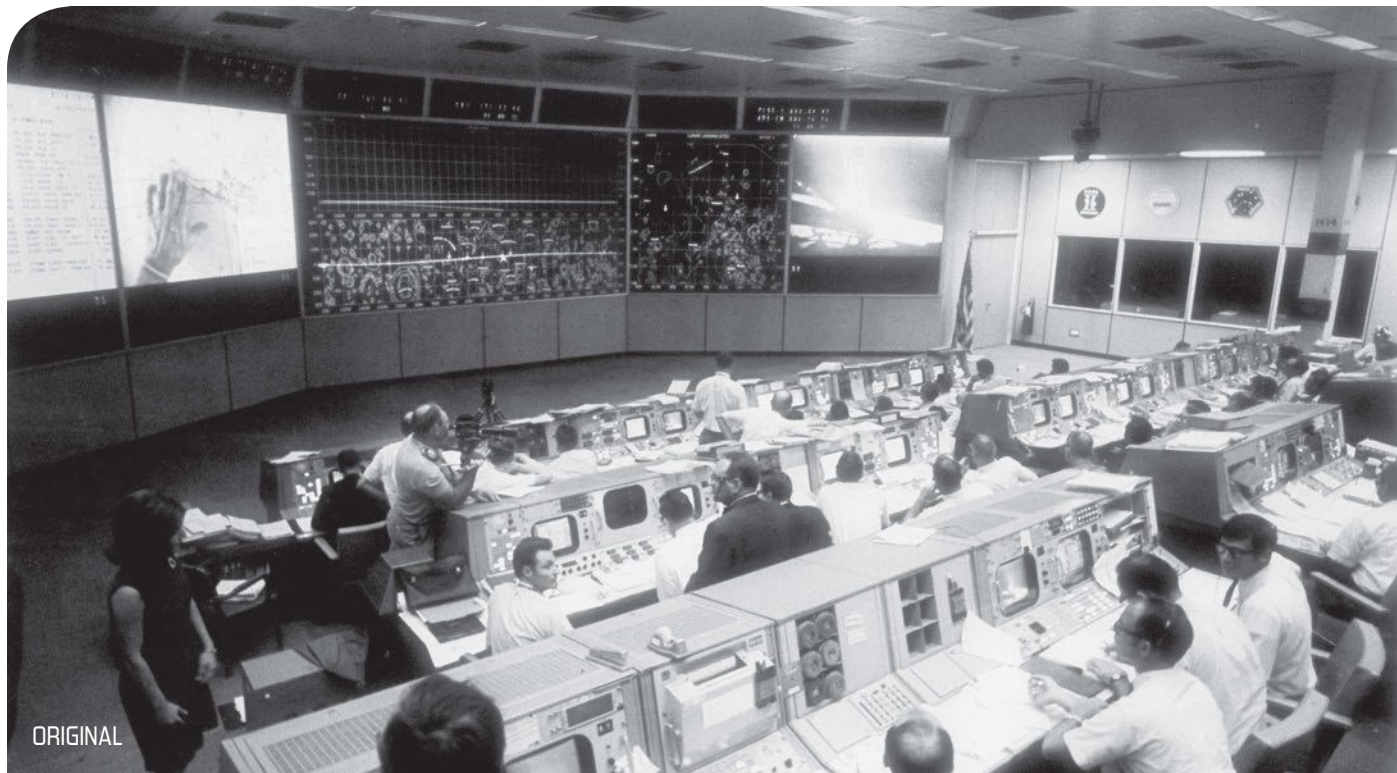
FLIGHT CONTROLLERS TO THE RESCUE

Deemed a historic district, JSC has 81 buildings eligible for listing on the National Register of Historic Places. Building 30, which houses the Apollo Mission Control Center, is a National Historic Landmark. The room also served as the Flight Control Room for the Shuttle Program from 1981-92 until a new control room was built. At that time, JSC had an agreement with the Texas Historic Commission to leave the Apollo Mission Control Center in a state that it eventually could be restored for tours.

"Ours is actually the third attempt to restore it and, by that time, it was in real disrepair. It was dirty; it was just bad," explains Sandra J. Tetley, JSC's historic

The Apollo Mission Control Center in Building 30 at Johnson Space Center in Houston is where NASA monitored nine Gemini and all Apollo lunar missions, as well as the Shuttle Program until 1992. This photo shows the flight director's console during the first day of the Apollo 10 lunar orbit mission, May 19, 1969.





ORIGINAL



RESTORATION

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Mission Control
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The vision to restore the control center exactly as it was in the 1960s when it had its greatest historical significance almost didn't happen. The Apollo-era flight controllers not only fought the political battles, they also participated in the restoration.

“THERE WERE SO MANY DISCUSSIONS LIKE THAT: DO WE KEEP SOMETHING EXACTLY HOW IT IS EVEN THOUGH IT LOOKS WORN AND USED, DO WE CLEAN IT, OR DO WE COMPLETELY REPLACE IT?”

— Adam Graves, historic preservation lead for the Apollo Mission Control Center, GRAVitate LLC

preservation officer. “Space Center Houston, which is our visitor center, had some random things on the screens, but it was basically dead. I wanted to at least have some sort of experience for visitors when they came in.”

In 2013, Tetley applied for a \$5,000 grant with the National Park Service (NPS) via its Heritage Partnership Program to put together a moon landing experience for visitors. The NPS district director visited the site and was so shocked by the control center’s state of disrepair, he offered \$20,000 to do a historic furnishings report, which is a very detailed report of minute details of what it would take to bring the room back to Apollo-era conditions.

Once the historic furnishings report was completed, NPS hosted a workshop about next steps. There were a lot of stakeholders in that meeting, including the JSC public affairs team; the JSC history office; mission operations support; the flight operations office; and Ed Fendell, a flight controller from the Apollo 11 mission who was responsible for all data, voice and video communications. Each stakeholder had different ideas about what the restored control center should look like and who should be in charge of its restoration.

“I think a lot of people had in mind what is at Kennedy Space Center,” explains Adam Graves, historic preservation lead for the Apollo Mission Control Center restoration via his company, GRAVitate LLC. “At Kennedy, you can sit in chairs that vibrate, so I think people wanted to create something more interactive with holograms and a big show, talking about the future.”

Meanwhile Tetley and Graves had a vision to restore the control center exactly as it was in the 1960s when it had its greatest historical significance and already was a VIP experience for the family members and guests who were allowed to watch the moon landing with the controllers from the adjacent viewing area.

Although the need to restore the Apollo Mission Control Center was clear, no one wanted to pay for it and there were few in favor of it being accurately restored to the Apollo era. Therefore, the project stalled for at least a year.

“Gene Kranz [who served as NASA’s chief flight director for Apollo 11 and other Apollo

and Gemini missions] wrote what we call a nuclear letter,” Tetley recalls. “That letter went to congressmen, it went to the head of the park service, to our NASA administrator, to the *Houston Chronicle*, to the Texas Historic Commission, everybody on Earth, saying that this needed to be done because this was one of the most historic places on Earth. I heard secondhand, so I can’t actually corroborate this, but what I understood was NASA headquarters called our center director and said ‘you all need to work on this.’”

Kranz and Fendell were integral to the restoration—not only fighting the political battles, but also recruiting other flight controllers to participate in the restoration. “Very early in the process we pulled in as many flight controllers as we could and interviewed them at their consoles,” Graves recalls. “We asked them about lighting in the room and what buttons they interacted with and heard their stories. Quite a number of them were involved.”

CONSOLE SPECIALISTS

Even before funding was approved for the restoration in 2017, Graves and Ayuda, the project manager, began assembling the team of unique and dedicated specialists who could help return the Apollo Mission Control Center to its glory days. The technical component of the restoration—consoles, in particular—required the most creativity to locate restoration specialists. “I didn’t get very far in the historic preservation world while looking for who might restore the consoles and screens and other technology in the room. I mostly found hobbyists that fix old cars and things like that,” Graves recalls. “The ‘Apollo 13’ movie built a whole set that looks very similar to the mission control room, so I looked at all the credits at the end of the movie and found the production designer, Michael Corenblith. I literally messaged him through Facebook and he responded very quickly. He was really excited about the restoration.”

Corenblith suggested Graves contact Cosmosphere in Hutchinson, Kan. Cosmosphere is a space museum that showcases space history, as well as features a planetarium and interactive rocket laboratory. Cosmosphere also has a division known as SpaceWorks that builds and

RETROFIT TEAM

CLIENT // NASA Johnson Space Center, www.nasa.gov/johnson

PRESERVATION AND TECHNICAL PROJECT MANAGER // GRAVitate LLC, www.gravitate-us.com

■ Adam Graves

ARCHITECTURAL DESIGN AND RESTORATION STAGING // Stern and Bucek Architects, www.sternbucek.com

■ David Bucek, FAIA, restoration architect

■ Jordan Shelton, project manager/lead designer

■ Delaney Harris-Finch, preservation specialist

PAINT/FINISH ANALYSIS AND RESTORATION // SOURCE, www.sourcehistory.com

■ Jhonny Langer

CONSOLE RESTORATION // Cosmosphere/SpaceWorks, www.cosmo.org

■ Jim Remar

■ Jack Graber

AUDIO AND VIDEO HARDWARE DESIGN // The Audio Video Guys, theaudiovideoguys.com

■ Dawson Kaiser

VISITOR EXPERIENCE AUDIO AND VIDEO // Ben Feist, Tyler Strahl and Stephen Slater

PROJECT MANAGEMENT // Ayuda, www.ayudacompanies.com

■ Sonya Yungeberg

■ Jennie Keys

SEAT FABRIC REPRODUCTION // Mary Welch Weaving

TEXTILE RESTORATION // Textile Preservation Services of Texas

■ Melanie Sanford



↑ The flight controllers smoked so much they used cigar ashtrays in the Apollo Mission Control Center. During the restoration, the flight controllers admitted there were times they couldn't see the front screens because of all the cigarette smoke in the room.

↓ SpaceWorks configured the consoles to Apollo 15 era because the flight controllers felt very strongly that was the height of the technological advancements of the Apollo program. The consoles and screens in the restored center show the same images as on July 20, 1969, even down to what buttons are lit and flashing.

restores space paraphernalia not only for the museum, but for movies, like "Apollo 13". "I called them and they jumped all over the console restoration," Graves says. "They actually knew quite a bit about the consoles; they restored lots of consoles for different movies and actually bought a number of them back in the day, so they had a warehouse full of parts."

The original Apollo consoles also had been used by the shuttle program; their modules simply were removed and upgraded as technology changed or as missions required. "We had all of those consoles, plus when shuttle command was closing down, they started moving things to a warehouse," Tetley explains. "The warehouse was filled with other consoles and modules. That was really a blessing. It pays to hoard!"

SpaceWorks configured the consoles to Apollo 15 era because the flight controllers felt very strongly that was the height of the technological advancements of the Apollo program. The SpaceWorks team was able to refer to the historic furnishings report for most of the detail it needed but Graves played an integral part in this process, as well. "What was actually shown on the screens and on the consoles and which buttons were lit up and flashing, ultimately, that was my responsibility to make sure all was correct and accurate," Graves says.

EVERY DETAIL MATTERS

While Cosmosphere's SpaceWorks team restored consoles, Graves and Tetley managed every other portion of the restoration, from

leading the Stern and Bucek Architects team to re-create original carpet, wallpaper and ceiling tiles to developing the storytelling and visitor experience.

When it came to materials in the Apollo Mission Control Center, Tetley and Graves were adamant the restoration be as true to the original as possible. "We knew that the ceiling tiles had changed. The wallpaper had changed. The room had been re-carpeted from Apollo to shuttle, but we were really trying to get it back to original," Tetley recalls. "We hired Jhonny Langer, who is a finishes expert. We were over in the lobby, and there were three original phone booths, and Jhonny was looking at the ceiling tile in them. He said it looked like original tile, so we pulled down a piece and started comparing it around the building and, sure enough, it was of that era and it was of that type."

To recreate the original ceiling tiles, the restoration team found a base ceiling tile that contained no holes. They then created a computer-generated hole pattern based off the original tiles and literally hand-stamped the pattern with stick pins and small nails into the base ceiling tile. "We had over 500 tiles, and it took about an hour each!" Tetley remembers.

The original ceiling tile grid was still in place and had yellowed over the years from age and nicotine (flight controllers were allowed to smoke in the mission control center). "That was one of the debates," Tetley says. "Do we want to go back to the

(continues on page 28)



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APOLLO 11 TEAM WHO HELPED WITH THE RESTORATION



Gene Kranz served as NASA's chief flight director for Apollo 11 and other Apollo and Gemini missions.

Gene Kranz	James Covington
Ed Fendell	Dennis Webb
Spencer Gardner	Douglas Spencer
William "Bill" Reeves	Pearmain
Jack Knight	George Ojalehto
Glynn Lunney	Jonny Ferguson
Gary Watros	Thomas Hanchett
Ann Doris	Mark Liberty
Bruce McCoy	Larry Keyser

bright white that it probably was or do we want to leave this patinated grid? We chose to leave the grid as is and just clean it, so it looks like the day the Apollo controllers walked out."

"There were so many discussions like that," Graves points out. "Do we keep something exactly how it is even though it looks worn and used, do we clean it, or do we completely replace it? No one is probably looking at what the ceiling tile grid looks like, but we talked about it for a week or two to determine what we were going to do with it."

Tetley and Graves say they leaned toward a "smoky vibe" every chance they could, and that includes the ultimate color of the restored carpet, as well. When the team removed the consoles from the room, some of the original Apollo carpet was under the consoles. The shuttle program had simply re-carpeted around the consoles. "We had these really nice samples of the carpet," Graves remembers. "But, again, we were dealing with different color samples: We had the original color under the consoles and we had the carpet that was

nicotine-stained. We went back and forth on color for quite a while and ultimately decided on ensuring it looked like it was nicotine-stained."

In addition, the original carpet had been woven, which no longer is how carpet is made and would've been expensive to re-create. The Apollo Mission Control Center contained carpet squares on 28- by 28-inch removable floor panels—not a size manufactured anymore. "We went back to the original carpet manufacturer and they created a tufted pattern, where they take needles and put it in the backing," Tetley says. "They were able to twist the yarn in such a way and then tuft it so that it looked like what we needed."

The carpet installer then rolled the broadloom carpet out in the control center and cut it into the original 28- by 28-inch squares so it would have the authentic "checkerboard" pattern on the floor.

Meanwhile, Langer had discovered a fire extinguisher had been removed from a wall in the control center and original wallpaper was under that fire extinguisher.

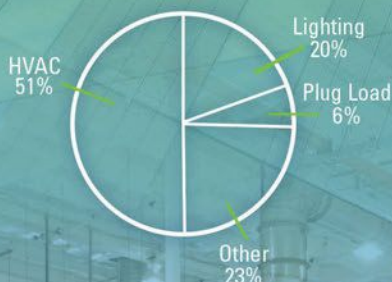
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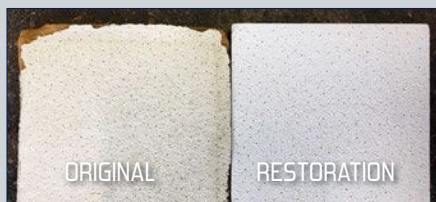
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BASE CEILING TILE // Armstrong Ceiling & Wall Solutions, www.armstrongceilings.com

To recreate the original ceiling tiles, the restoration team used a base ceiling tile from Armstrong that contained no holes. They then created a computer-generated hole pattern based off the original tiles and literally hand-stamped the pattern with stick pins and small nails into the base ceiling tile.



APOLLO-ERA WALLPAPER //

MANUFACTURER: Victrex
PATTERN: Boucle
COLOR: Limed White

RESTORATION WALLPAPER //

MANUFACTURER: Koroseal, koroseal.com
PATTERN: Boucle
COLOR: Custom-color-matched to existing Apollo-era wallpaper.

Note: Koroseal purchased Victrex. The original steel rollers were still available and used to create the replacement wallpaper.



APOLLO-ERA CARPET //

MANUFACTURER: Bigelow Co.
PATTERN: 2097
COLOR: 15427

The original carpet was a woven carpet created using traditional looms where yarn is woven around warps (vertical fibers) and locked in place with horizontal strands (welt).

RESTORATION CARPET //

MANUFACTURER: Mohawk Group, www.mohawkgroup.com
STYLE: SS Slough
COLOR: Custom-color match
APPROVED SAMPLE NO.: 50345-M9224

The replacement carpet was produced in broadloom format and trimmed to fit the 28- by 28-inch removable floor panels. The replacement carpet uses custom yarn dyed thread twisted into a single barber pole yarn, which was run through a tufting machine.

Note: Mohawk Industries Inc. purchased the Karastan Bigelow Co. in 1993.



APOLLO-ERA FABRIC //

for Steelcase Curved-Back Executive Swivel Chair #1288
Steelcase Elastic Vinyl #5966 Optical Grey
SEAT FABRIC: Nyloweave #5559 Grey

RESTORATION FABRIC //

MANUFACTURER: Mosehart-Schleeter Naugasoft #PR-37 Feather from Mosehart-Schleeter, www.m-sfabrics.com
SEAT FABRIC: Custom Weave by Mary Welch
WARP: Venne Mercerized 20/2 cotton, Color 7-7099 Light Grey
WEFT: Borgs Vavgamer AB TUNA Wool 6/2 Color 3762 Light brown, Borgs Vavgamer AB TUNA Wool 6/2 Color 3085 Light Grey, Borgs Vavgamer AB Wool 20/2 MORA Color 2029 Black



COFFEE POT //

Regal 7016 Coffee Urn, aka "Regal Rocket," found on eBay, www.ebay.com
The 40-cup electric coffee percolator features tapered walnut tripod legs and a tapered canister.



CONSOLES

The consoles were cleaned but not touched-up or repainted. However, evidence of prior repainting was evident. Generally, the top portions of the consoles are painted a light blue-green and the bottom portions are painted a darker green. The original console paint colors were likely selected from the official list of "Federal Standard Colors." The first generation of paint was still intact on the rolling cabinets under the consoles and was a match to Sherwin Williams SW6193, Privilege Green, www.sherwin-williams.com.

"We were able to review the original building drawings and determine the company that made the wallpaper," Tetley states. "That manufacturer had been bought by another company but they actually found the original roller that made the wallpaper in their warehouse."

"We found larger pieces of that historic wallpaper still on the wall behind some items and we left those pieces and blended them into the new wallpaper," Graves adds. "Visitors can see a tiny bit of contrast between the old and new. That is something we really wanted to highlight—there is still historic wallpaper here and look at how great this match is!"

The flight controllers' chairs demonstrate the high level of dedication to authenticity the team sought. The chairs feature a coated fabric with a woven seat. The team was able to find a matching coated fabric but couldn't find anything to match the original seat. "David Bucek [principal of Stern and Bucek Architects] had a friend whose wife was part of the Contemporary Handweavers of Houston group, so they asked her if she could work on this for us," Tetley relates. "She actually took the

time—and it took several tries—but she was able to replicate the fabric. Then she hand-wove all the fabric for all of the flight controllers' seats."

Even the most personal of details was not overlooked during the transformation of the Apollo Mission Control Center. For example, while the team was removing consoles and carpet, they found cigarette butts and decided to keep them. They then placed the correct number of cigarette butts into ashtrays as had appeared in photos and videos from the day of the moon landing. What the team couldn't find in the room, they made up for with "blanks" cigarettes, the kind in which the wrapping can be filled.

The team also had an "Apollo drive" onsite, in which they asked JSC for Apollo-era items. "We got chairs, coat racks, pens and all kinds of stuff for the room," Tetley says. "We also did a lot of salvaging. Adam and I walked around a lot of buildings and even stole trash cans because we needed a particular-looking trash can."

HOUSTON, WE'VE HAD A RESTORATION HERE

The team achieved its goal to open the

Apollo Mission Control Center in July 2019, in time for the 50th anniversary of the moon landing. "We had the controllers who actually were in the room, at their consoles at the exact time of landing, 50 years later," Tetley recalls.

"I played the actual flight controller loops, so they could all hear themselves talking during the touchdown," Graves remembers. "It was a pretty special moment for those guys."

Tetley notes the highlight of the project for her was the moment the flight controllers came in and saw the restoration. "After working with them for years to make sure it was right and accurate and for them to come in and get teary-eyed because, literally, it takes them back in time, that is the most rewarding part to me," she says. "We held firm on the historic accuracy of this room, so that was a really proud moment for me."

"These guys are national heroes and we completed something really nice for them that commemorates the work that they did," Graves adds. "We got to do something special for people who changed our world. It's a pretty big deal." 



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FOTOGRAFISKA NEW YORK



PHOTOS: DAVID SUNDBERG/ESTO unless otherwise noted

» RETROFIT TEAM

ARCHITECT AND INTERIOR DESIGNER:

CetraRuddy, cetraruddy.com

RESTAURANT DESIGNER: Roman and Williams,

www.romanandwilliams.com

LIGHTING CONSULTANT: Kugler Ning

Lighting Design, kuglarning.com

ACOUSTICAL AND AUDIOVISUAL

CONSULTANT: 6Sides, www.6sides.net

RESTORATION CONSULTANT: Higgins Quasebarth

& Partners LLC, www.hqpreservation.com

STRUCTURAL ENGINEER: Gilsanz Murray Steficek,

www.gmsllp.com

MEP ENGINEER: MGE/MG Engineering,

www.mgedpc.net

GENERAL CONTRACTOR: Tri-Star Construction,

tristarconstruction.com

WOODWORK: Gala Architectural Woodworking,

www.galaww.com

GLASSWORK AND METALWORK: Certified Metal &

Glass Corp., www.certifiedmetalglass.com

» MATERIALS

The following is a sampling of materials used in the project:

EXTERIOR LIGHTING: ACDC, www.acdclighting.com

TRACK LIGHTING: ETC, www.etcconnect.com

GALLERY FLOORING: BOLON, www.bolon.com

OAK FLOORING: Admonter, admonter.com

WALL VINYL: Duggal, duggal.com

METAL LAMINATE: Octopus Products,

www.octopusproducts.com

COLUMN COVERS: Rimex, www.rimexmetals.com

CUSTOM SIGNAGE: Sign Design Group of NY,

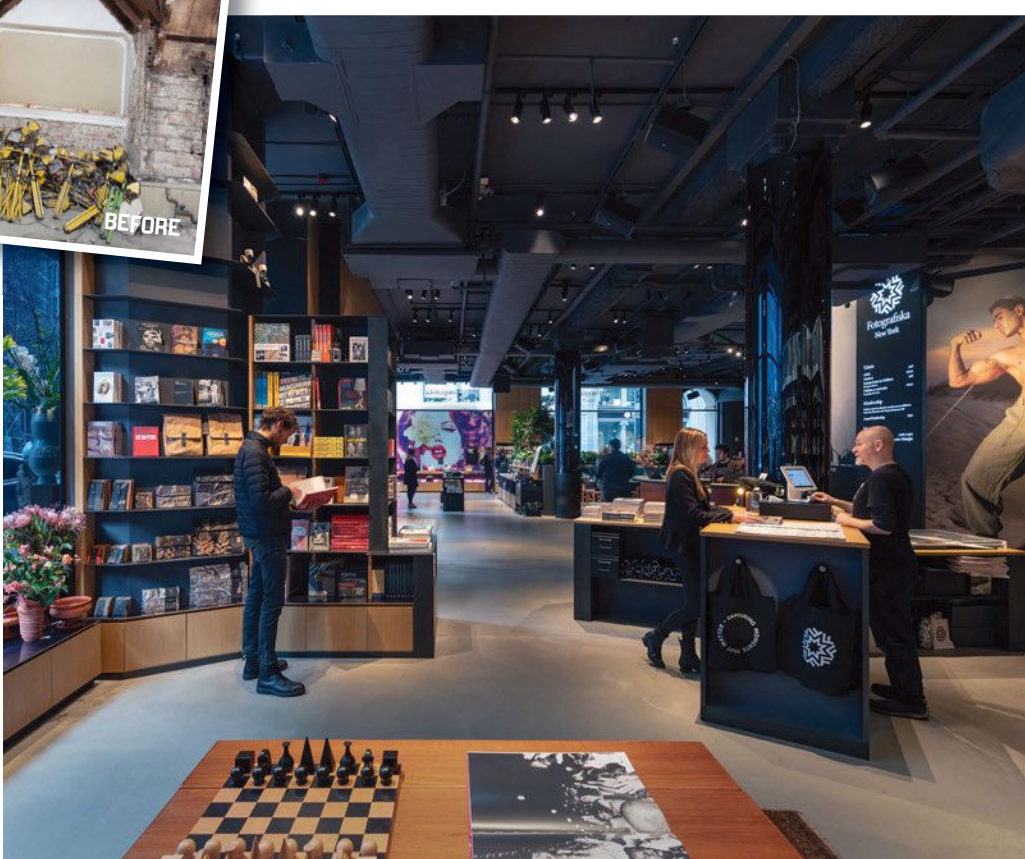
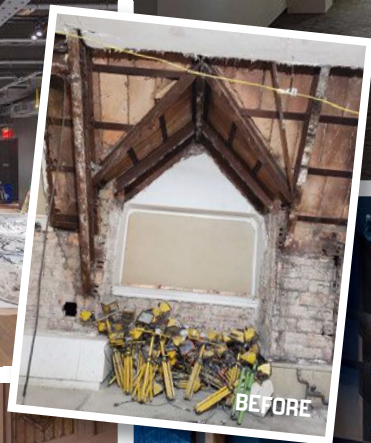
sdgny.com

GLASS DOORS: Technical Glass Products,

www.fireglass.com

CUSTOM STOREFRONT SYSTEM: Certified Metal

& Glass Corp., www.certifiedmetalglass.com



EXTERIOR DOORS: C.R. Laurence Co. Inc.,
www.crlaurence.com

► THE RETROFIT

As the first U.S. location for international photography organization Fotografiska, Fotografiska New York reinvigorates a historic landmark former church mission building at 281 Park Avenue South in Manhattan, inviting visitors into the 40,655-square-foot cultural venue with world-class photography exhibitions, restaurants and culturally eclectic event programming. The project, which debuted in December 2019, offers

a welcoming visitor experience, three floors of new exhibition space, and a versatile event venue on the top floor with vaulted ceilings and skylights.

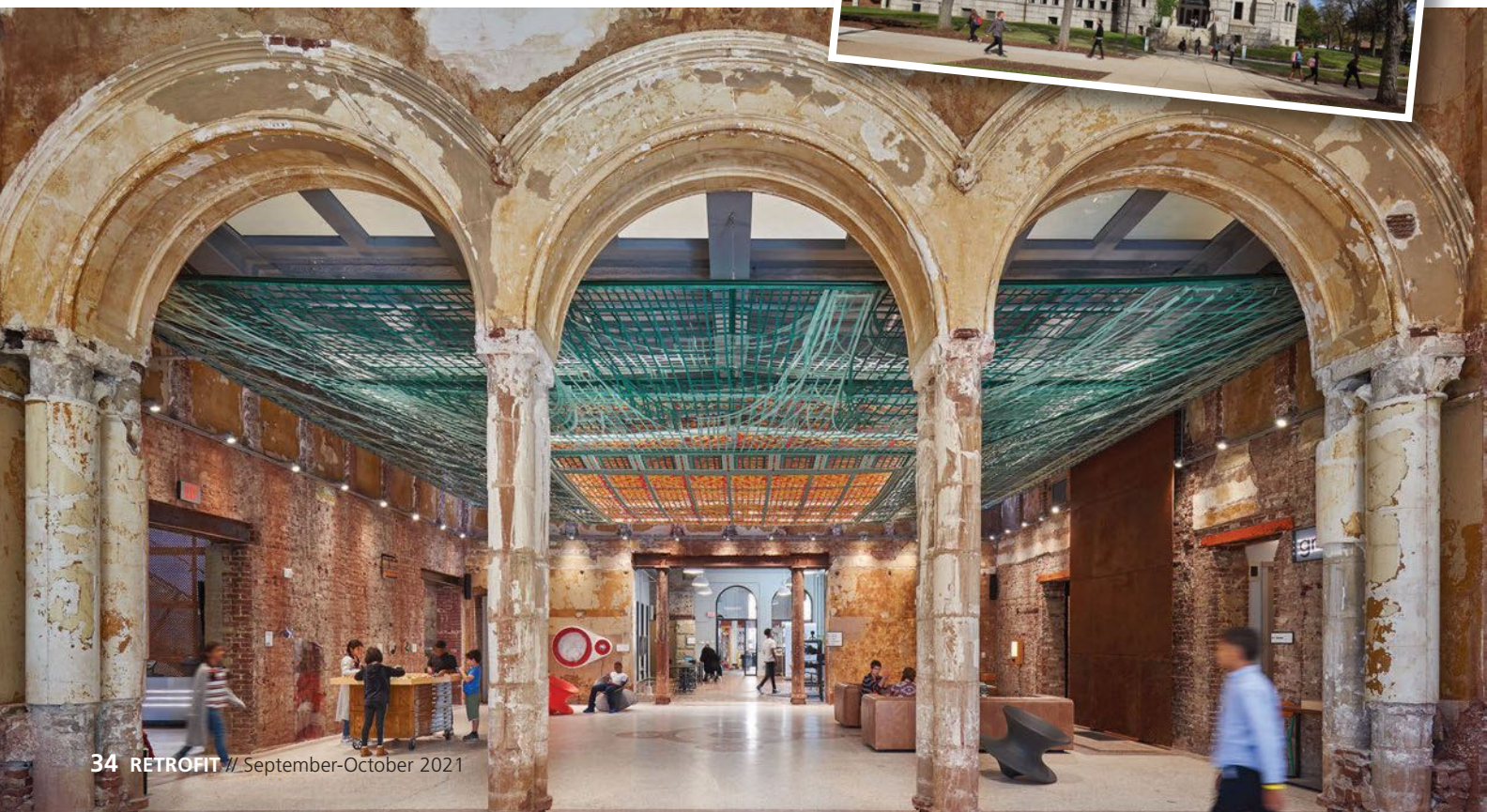
"Fotografiska New York encapsulates our approach to historic adaptive reuse, which is about respecting the original building and helping people find joy in its authenticity and new purpose," says CetraRuddy Principal Theresa M. Genovese, AIA. "We stabilized the original structure and created innovative, flexible gallery spaces inside while minimally impacting the building's character and finding exciting ways to let that character shine through. We're proud of

newly foregrounded historic elements, such as an original stained-glass window long hidden behind mechanical equipment and now center stage in one of Fotografiska's restaurant spaces."

Fotografiska New York recently won a 30th annual Lucy G. Moses Preservation Award from the New York Landmarks Conservancy. The awards are given to "projects that demonstrate excellence in the restoration, preservation, or adaptive use of historic buildings, streetscapes, and landscapes that preserve commercial, residential, institutional, religious, and public buildings."

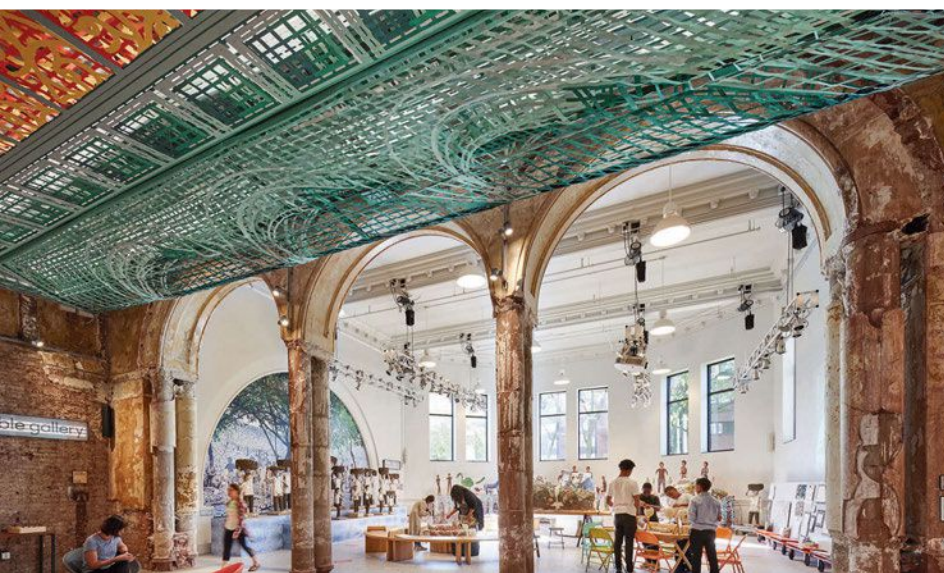
EDUCATION

MUSEUMLAB | Pittsburgh





PHOTOS: ERIC STAUDENMAIER



» RETROFIT TEAM

ARCHITECT: Koning Eizenberg Architecture, www.kearch.com
 ARCHITECT OF RECORD: Perfido, Weiskopf, Wagstaff + Goettel, pwwgarch.com
 LIGHTING DESIGNER: Lam Partners Inc., www.lampartners.com
 ENGINEER: Iams Consulting LLC, www.iamsconsulting.com
 LIGHTING REPRESENTATIVE: LaFace & McGovern Associates Inc., www.laface-mcgvorn.com

» MATERIALS

This children's museum is located within the historic Carnegie Free Library, built in 1886.

Spectrum Lighting was brought in to assist with this project by Tim Leonard at LaFace & McGovern Associates in coordination with Koning Eizenberg Architecture. Much of the original architecture remains intact, including columns, arches, flooring and brick. It was important for Spectrum Lighting to add contemporary lighting designs that enhanced the rugged yet ornate original architecture.

The electrical engineers at Iams Consulting and lighting designers at Lam Partners requested HK Xicato 98CRI LED modules for all track lighting. Spectrum's Euro Series track fixtures, STT3XT and STT4XT, met all criteria with multiple HK options, 83 and 89 CRI, and Quick Twist optics for field adjustment. These track fixtures were primarily used in the Grable Gallery, which features an architectural rope-climbing structure designed for children.

In the Studio Lab, Make Lab and Manchester Academic Charter School classroom, ALDDH22 high bays were utilized. "We chose these high bays because of the clean, smooth lines on the housing, and they wanted an industrial feel in that high open ceiling area—again Spectrum fit the bill with the many options available for those product lines," Leonard says. Spectrum Lighting's aluminum Lumen Max high bays have a contemporary design with a retention ring that absorbs shock and impacts, suitable for environments with high activity.

Spectrum Lighting's Schoolhouse Shade has a classic RLM look and was utilized in the open-space foyer. These were pendant-mounted for stability. The products provide modern illuminated LED lighting with a vintage style. Meanwhile, the SJ1GV, part of Spectrum Lighting's RLM Subway Line series, was utilized in the Chromatic Passage for an industrial feel against exposed brick walls.

Spectrum Lighting's products were chosen not only for their functionality and appearance but also for their price point. Leonard adds, "Having a very competitive price helped to get the budget in line and make the overall project a success."

LIGHTING MANUFACTURER: Spectrum Lighting, www.speclight.com



SKYDECK, WILLIS TOWER | Chicago



PHOTOS: DAVE BURK | SOM



» RETROFIT TEAM

ARCHITECT; INTERIOR DESIGNER; AND STRUCTURAL, MECHANICAL, ELECTRICAL AND PLUMBING ENGINEER: SOM, www.som.com
EXHIBIT DESIGNERS: Thinc Design, www.thincdesign.com, and Chicago Scenic Studios, www.chicagoscenic.com
GENERAL CONTRACTOR: Clark Construction Group, www.clarkconstruction.com
CONSTRUCTION AND DEVELOPMENT CONSULTANT: RL Edward Partners, rlepartners.com

» MATERIALS

The following is a sampling of materials used in the project:
POLISHED CONCRETE FLOORING: Level Top PC-AGG from Euclid Chemical, www.euclidchemical.com
DECORATIVE CARPET TILE: Lapidus collection, COR174 Flint, from Milliken, milliken.com
GREY AND BLACK PAINT FINISHES: Benjamin Moore, www.benjaminmoore.com
VINYL TILE STAIR TREADS AT OBSERVATORY PERIMETER: #19 from Roppe, roppe.com
BLACK ANODIZED ALUMINUM AND GLAZED WALL AIRLOCK SYSTEM: Series 402 2- by 4 1/2-inch by EFCO, www.efcocrp.com
BLACK ANODIZED ALUMINUM FINISHES: Linetec, linetec.com
BLACK ACRYLIC RESIN LAMINATE PANELS: FENIX Nero Ingo 0720, www.fenixforinteriors-na.com

» THE RETROFIT

Completed in 1973—and for 25 years the tallest building in the world—the 110-story Willis Tower has marked a major milestone in its transformation with the completion of a new Skydeck experience. The renovation is the latest in SOM's 50-year stewardship of Willis Tower, which includes the design of the tower itself and the 2009 addition of the Ledge at the Skydeck, a series of glass-enclosed balconies that offer visitors the opportunity to experience the city from 103 stories above ground.

Exemplifying SOM's belief that a building's structure should inform its design, the Skydeck returns to the original vision for the building, foregrounding the tower's iconic views while showcasing its pioneering structural design through minimal design gestures and subtle finishes.

"Skydeck has always been the best way for locals and visitors to see all of Chicago, and now we have dramatically expanded and elevated the experience beyond what anyone has seen before. The new Skydeck experience celebrates hometown traditions and Chicago's storied history with incredible views that you can't find anywhere else," says David Moore, senior vice president, portfolio director for EQ Office, the tower's operator.

Upon entering, guests are guided through an interactive exhibition that explores how architecture has shaped Chicago's history and identity, complete with bronze models of the city's most influential buildings. A fly-through video by Squint/Opera provides an immersive tour of the skyline.

An elevator ride to the 103rd floor reveals the transformed observation deck. Interior enhancements, improved lighting and building-technology upgrades allow for greatly expanded views across the city while new interactive screens encourage visitors to learn more about Chicago's historic architecture.

"Willis Tower is synonymous with Chicago's skyline. Envisioned in our studios more than 50 years ago, its design continues to inspire us today. In creating the new Skydeck, we wanted to honor the structural clarity and simplicity of the tower's original design approach," explains Scott Duncan, SOM design partner. "We wanted to create a quiet backdrop for people to be fully immersed in the city's skyline and allow the view to speak for itself." As part of the renovation, the U.S. Green Building Council awarded Willis Tower LEED Platinum certification.



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Responsible building owners know that regular preventative maintenance is a crucial part of owning a building. The rooftop endures more abuse from the elements than any other part of a building's exterior, so routine preventive maintenance is critical in prolonging the roof's service life and saving money for building owners. When a roof system is maintained properly, it performs better, lasts longer, and provides more reliable protection of a building and its occupants.

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- » Recommended next steps

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GEORGIA AQUARIUM

Atlanta

PHOTOS: MÓZ

» RETROFIT TEAM

ARCHITECT: PGAV Destinations,
pgavdestinations.com
GENERAL CONTRACTOR: Brasfield &
Gorrie, www.brasfieldgorrie.com
COLUMN INSTALLER: MillerClapperton,
millerclapperton.com

» MATERIALS

After a two-year renovation, Georgia Aquarium's new shark gallery is open. Setting the tone for the new exhibition are nine of Móz's Engraved columns, which support a sweeping overhang at the entrance, immersing visitors within the underwater experience. Specified by PGAV Destinations, the Current-patterned columns are reminiscent of sea kelp with their wavy engraved texture and glisten like sunlight reflecting off the ocean.

Designed to accommodate Georgia Aquarium's 2 million visitors per year, the columns are built to withstand high-traffic and heavy-duty cleaners, especially as more Americans resume indoor activities over the next year. Rolled from 0.090-inch solid-core aluminum and spanning more than 14-feet high, the columns were uniquely crafted for the underwater theme. Móz created a custom Aqua Blue Gloss to imitate the columns' aquatic surroundings, complete with etched silver pinstripes and a hand-grain finish.

Produced in Móz's Oakland, Calif., factory, each column arrived ready for installation, saving precious time in the field.

COLUMN MANUFACTURER: Móz,
mozdesigns.com





PHOTOS: TOM HARRIS

THE POWERHOUSE, BELOIT COLLEGE | Beloit, Wis.

» RETROFIT TEAM

ARCHITECT: Studio Gang, studiogang.com
ASSOCIATE ARCHITECT; LEED CONSULTANT;
COMMISSIONING CONSULTANT; AND
ELECTRICAL, PLUMBING, FIRE PROTECTION
AND STRUCTURAL ENGINEER: Angus-Young
Associates, www.angusyoung.com
CONSTRUCTION MANAGER: Corporate
Contractors Inc., www.cciwi.com
POLYCARBONATE WALL SYSTEM INSTALLER:
Richard Dembski Construction, (412) 464-0415

» MATERIALS

EXTECH's involvement with Beloit College's Powerhouse project began during Studio Gang's schematic design phase in March 2017. This early and ongoing involvement increases the likelihood of success for the project because incremental design decisions are immediately communicated, monitored and

evaluated by the manufacturer.

EXTECH's LIGHTWALL 3440 interlocking wall system was customized to meet the field house's specific goals. The system features continuous, 45-foot-tall, impact-resistant, translucent walls that are unbroken by vertical or horizontal framing; vertical, frameless, all-polycarbonate corners forming a sawtooth pattern that continue the rhythm of the vertical fenestrations of the brick power station; overhead door cladding that blends seamlessly with the façade; and a mounting system that minimizes shadowing of the supporting horizontal steel structure.

Beyond aesthetic goals, The Powerhouse had numerous performance-based requirements. As a sports field house that includes baseball practice, impact resistance was a primary motive for the use of polycarbonate. The polycarbonate also had to meet ASTM E-84 Class A flame/smoke, as well as CC-1 flame spread.

The LIGHTWALL system's aluminum framing was finished in a Class I clear anodize. This no-VOC, low-emission finish supports healthy indoor air quality. Its durability also means it requires minimal maintenance, reducing the need for repair, replacement and associated labor to care for it. At the end of its lifespan on the building, it can be locally recycled.

Approximately 250 polycarbonate panels with aluminum perimeter framing enclose the 142-foot-long by 123-foot-wide by 45-foot-tall field house. Each panel is 19.68-inches wide by 1 1/2-inches thick.

Because of the Powerhouse's close proximity to the riverfront, the field crew worked off swing-stages suspended from the roof to install each panel. The EXTECH

system is tied back to the steel structure. Bent steel clips hold the translucent panels proud of the steel, which allows the interior light to bypass the supporting girt to minimize shadowing and provide a more uniform surface glow. At night, the soft glow of the illuminated Powerhouse serves as a beacon to students. During the day, the translucent building envelope maximizes and diffuses the natural lighting, providing a comfortable interior experience.

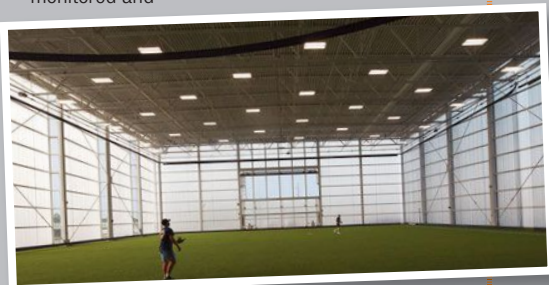
POLYCARBONATE WALL SYSTEM
MANUFACTURER: EXTECH/Exterior Technologies Inc., extechinc.com

» THE RETROFIT

The former Blackhawk Generating Station, a decommissioned coal-burning power plant located along Wisconsin's Rock River, was composed of three buildings constructed mostly of brick and concrete from 1908 to 1949. Studio Gang reimagined the structure as a unified, 120,000-square-foot student union and recreation center.

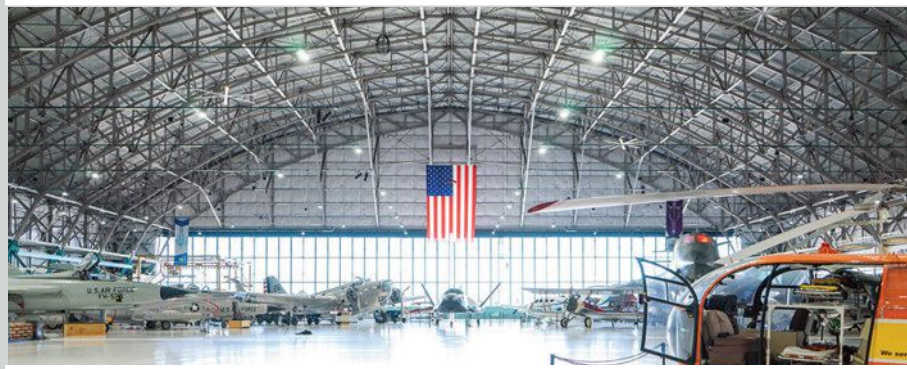
Inside, The Powerhouse features a 10,000-square-foot fitness center and 17,000-square-foot recreational gym, including a three-lane track and eight-lane competition pool, as well as spaces for conversation, collaboration and study. Additional amenities include a coffee shop, student lounges, club rooms, conference center and a lecture hall/theater. The field house opens to a town park, and a public walkway connects the building to the river, campus and community.

The \$38 million renovated building opened for the 2020-21 academic year, following protective practices with respect to the pandemic.





PHOTOS: S-5!



WINGS OVER THE ROCKIES AIR & SPACE MUSEUM | Denver

►► RETROFIT TEAM

ARCHITECT: AH Architecture, (720) 932-8604
ROOFING CONTRACTOR: Colorado Custom Metal Inc., (303) 920-0169
CRANE OPERATOR: Winslow Crane Service Co., winslowcrane.com

►► MATERIALS

The existing 20-gauge corrugated metal roof on this large airplane hangar had reached the end of its useful life—but had performed well since it was installed in 1938.

Colorado Custom Metal proposed leaving the existing corrugated metal roof in place and retrofitting it with a new lightweight roof system. This approach would allow the museum to remain open while the new roof system was constructed.

Mill-finished Galvalume material was selected for the standing-seam panels to preserve the look of the old hangar and meet the criteria of Denver's Historical Landmark Preservation Commission. Colorado Custom Metal fabricated 25,000 linear feet of 6-inch-high Z Purlins from 16-gauge GI steel in the firm's metal shop. Installers attached the Z Purlins through the existing corrugated deck and into the main frame of the building, which transferred the load of the new

roof system and raised the new fastening point 6 inches higher.

Next, the crew laid 6 inches of new insulation nested tightly between the newly secured Z Purlins; the crew used two layers of 3-inch foil-faced isocyanate insulation board, providing the building with an added R-value of 38. Finally, installers enclosed the insulation and Z Purlins with a high-temperature ice and water shield membrane.

Colorado Custom Metal manufactured the 308-foot-long panels in four separate lengths. The crew designed a custom expansion joint end-lap-detail to attach the panels together, making them span the full length of the barrel.

Winslow Crane Service hoisted the panels and New Tech Machinery's panel forming machine up to the roof level, suspending it a few inches off the roof deck where 92,400 square feet of roofing panel was manufactured, utilizing the 18-inch-wide, 1 3/4-inch snap-seam profile. The panels were curved around the radius of the barrel as each one was installed.

Fabral supplied the 24-inch-wide, 24-gauge, satin-finished Galvalume roofing coils to make the standing-seam panels, as well as more than 300 flat sheets to custom-fabricate the flashings, trim and components for the project.

Once the new roof was installed, the project consultant observed heavy snow sliding off the new satin-finished metal roof panels in greater volume than the pre-existing corrugated roof panels. To control rooftop avalanche conditions, S-5! designed and engineered the ColorGard snow-retention system. Manufactured from high-tensile, certified aluminum and tested for load-to-failure results, ColorGard reduces the risks associated with rooftop avalanches and complements the look of the roof. ColorGard also is designed to last the life of the roof.

BASE-METAL SUPPLIER: Fabral, fabral.com

ROLLFORMING: New Tech Machinery, newtechmachinery.com

SNOW-RETENTION MANUFACTURER: S-5!, s-5.com

►► THE RETROFIT

Transferred from the U.S. Air Force to a group of volunteers in 1994, Wings Over the Rockies Air & Space Museum is located in Hangar 1 of the former Lowry Air Force Base. The museum boasts more than 182,000 square feet of iconic aircraft, space vehicles, artifacts, military uniforms and more. Visitors can experience flight simulators, discover various educational programs and participate in dozens of museum-sponsored events.

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PHOTOS: MCELROY METAL

CENTRAL GEORGIA TECHNICAL COLLEGE

Warner Robins, Ga.

► RETROFIT TEAM

ROOF CONSULTANT: Edifice Consulting Inc., (478) 954-3971

ARCHITECT: Azar + Walsh Architects, www.azarwalsh.com

ROOFING CONTRACTOR: McCallum Metal Works, (478) 935-2482

► MATERIALS

Aging roofing and poor details on four adjacent campus buildings were beyond another temporary repair job. Most of the roofing—a mix of modified bitumen with aluminum coating and some existing metal sections—was simply old and had weathered to the end of its useful life. After approximately 10 years of patching the problems, the college wanted a permanent solution and elected to recover the existing roofing with 238T symmetrical standing-seam panels from McElroy Metal.

"The system chosen was in our client's best

interest in this particular application because the shape and slope of the building made continuous-run panels practical and cost-effective," says Jody Usry of Edifice Consulting Inc. "It could also be installed over existing sections covered with modified bitumen and sections already covered with metal roofing."

Usry says the existing roof system, because of age and workmanship, was substantially under-attached to the cementitious wood fiberboard decking. The metal option, unlike other systems, made it practical to leave the poorly attached roof systems in place and attach exclusively to the steel framing, which reduced expense, construction time and risk exposure.

"The slope of the roof made it visible from grade and the metal roof improved the aesthetics of the campus, giving a fresher and more modern look to an otherwise rather dated complex," Usry says. "The symmetrical panels allow for the practical modification of the roof planes for changes in projections in the future and isolated repairs in the event of damage. Also, the high amount of wall surface integrated into the overall facility made an all-inclusive system of roof and wall panels from a single source practical and attractive. The system chosen facilitated the detailing of the deteriorated masonry parapet walls between the sections."

The peak of one slope of roofing ran higher than the other, which created a wall with windows and ventilation facing the slope that didn't run



as high.

"It wasn't an easy job for anyone involved with the project," says Kevin Walsh, principal and project manager, Azar + Walsh Architects. "The school started with a budget of about half of what they ended up spending. Once they saw what we wanted to do, they decided to find the money and do the job right. School was in session, so everyone had to work around that."

Working around classes and students, McCallum Metal Works installed 77,000 square feet of McElroy Metal's 238T symmetrical standing-seam metal roofing over Roof Hugger sub-purlins and 7,800 square feet of McElroy's Wave panel. The panels were finished in Sherwin-Williams' Fluoropon PVDF Medium Bronze.

METAL ROOFING MANUFACTURER: McElroy Metal, www.mcelroymetal.com

SUB-PURLINS MANUFACTURER: Roof Hugger, roofhugger.com

COATING MANUFACTURER: Sherwin-Williams, industrial.sherwin-williams.com



EDMUND HATCH BENNETT ELEMENTARY SCHOOL | Taunton, Mass.



PHOTOS: MARLEY ENGINEERED PRODUCTS



► RETROFIT TEAM

HVAC INSTALLER: Equipment Direct Sales Inc., equipmentdirectsales.com
MANUFACTURER'S REP: Goodyear HVAC, www.goodyearelectricsales.org

► MATERIALS

Constructed in the 1960s, the K-4 school has undergone various upgrades and renovations over the years. However, an aging heating system, including wall unit heaters and cabinet heaters that were original to the building, was in desperate need of replacement.

"Staff at Edmund Hatch sought assistance in optimizing their supplemental heating system," explains Matt Goodrich, sales representative with Goodyear HVAC.

"We knew the upgraded heating equipment was essential not only to improve air quality, but also to provide more efficient heating for the school," explains Brenda Moynihan, MCPPO, assistant superintendent for Finance & Operations of Taunton Public Schools.

Upon review of the current equipment, Goodrich recommended two of the latest energy-efficient technologies from Marley Engineered Products: the CU900 Series Custom Cabinet Unit Heater (CUH), which delivers supplemental comfort heat and is easy to install and

maintain, and the Qmark Architectural Heavy-Duty Wall (AHW) Heater Series that features a contemporary design and powerful output to heat any room or open area.

Installers with Equipment Direct Sales faced challenges along the way. The size of the wall openings for the wall heaters was one concern; there wasn't an available budget to demo the concrete openings to fit in a similar-size unit with the original output. However, by utilizing the latest AHW series, the contractors could drop a unit size and still maintain the original heating performance, making the installation much easier.

For the CUH replacement, the installation team matched the dimensions of the original units almost exactly, which resulted in a reduced installation cost.

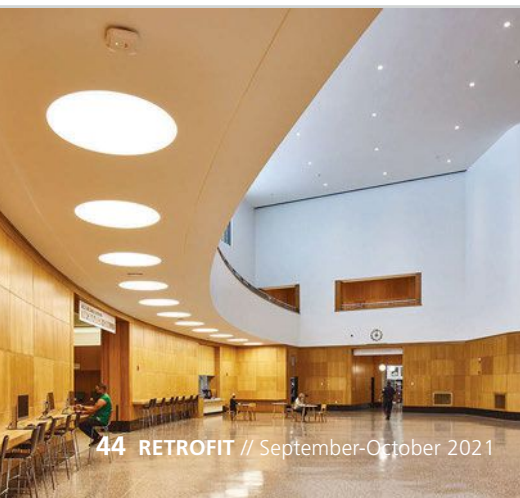
By replacing the original wall and cabinet heaters with modern, energy-efficient heaters, the school is running less units while maintaining a comfortable environment and realizing utility savings. In addition, new units and filters aid in filtering and eliminating bacteria and other airborne contaminants.

CABINET AND WALL HEATER
MANUFACTURER:
Marley Engineered Products,
www.marleymep.com



CENTRAL LIBRARY, BROOKLYN PUBLIC LIBRARY

PHOTOS: GREGG RICHARDS



► RETROFIT TEAM

ARCHITECT: Toshiko Mori Architect, tmarch.com
GENERAL CONTRACTOR: Gilbane,
www.gilbaneco.com

► MATERIALS

Phase one of the revitalization restored the library's lobby to its original grandeur, including restoration and refurbishment of the historic oak wood paneling, newly poured terrazzo flooring and installation of new lighting.

Additional improvements included refinishing the wood paneling and new terrazzo tile on the second floor; upgrading all six elevators; replacing the fire-alarm system; upgrading and installing HVAC units for the new spaces; and new public restrooms, including two all-gender bathrooms. In addition, the plaza was outfitted with new limestone and lighting.

► THE RETROFIT

As New York begins to reopen, Brooklyn Public Library is unveiling the first phase of its Central Library revitalization, restoring a majestic landmark while creating new, inspiring and innovative spaces to serve the next generation of library patrons.

"The most extensive renovation in Central's history honors its past and looks with great excitement toward its future," says Linda E. Johnson, president and CEO of Brooklyn Public Library (BPL). "With the help of Toshiko Mori and so many generous partners, we've efficiently and artfully reclaimed significantly more space for the public, where millions of patrons will soon be able to browse books, log onto computers, refine their resumes, register to vote and much more. This building embodies BPL's mission: Its soaring architecture belongs to absolutely everyone, and inside it they'll find the resources they need to participate in and advance our democracy."

With more than 1.3 million visits per year,

Central Library is among the busiest buildings in the borough. Phase one of the multi-phase redevelopment returned space formerly used for administrative needs back to the public and created four new spaces for the public to enjoy:

- The Civic Commons is home to Central Library's Passport Services Center, IDNYC office, a rotating community partner office and a computer lab. Waiting patrons will find a common reception area offering plentiful seating and free WiFi.

- The Major Owens Welcome Center provides a first point of access for Brooklynites as they enter the branch through the library's famous gilded entryway, framed by 15 bronze sculptures of famous characters and authors from American literature. The welcome center processes check-outs and returns and directs patrons to services throughout the branch, just as the library did when the building first opened 80 years ago.

- In the New & Noteworthy book gallery, just off the grand lobby, patrons can find the latest fiction and nonfiction titles, from best sellers to lesser-known books thoughtfully curated by librarians.

- A new and greatly enlarged Business and Career Center, is a specially reserved space for job seekers and small business owners. Trained business librarians are on hand to help with everything from resume review to navigation of local, state and federal government aid programs.

The Central Library renovation project has been supported with funding from Mayor Bill de Blasio, Borough President Eric Adams, the New York State Assembly, New York City Regional Economic Development Council, Empire State Development New York City, New York State Department of Education, New York City Council Brooklyn Delegation, and Susan and David Marcinek. Additional funding for the Central Library renovation project provided by Jay L. and Robin K. Lewis, Miriam Katowitz, Brian O'Neil and the Estate of Doris M. Ohlsen.

THE GORDY | Houston

►► RETROFIT TEAM

ARCHITECT: Gensler, www.gensler.com

AUDITORIA, ACOUSTICS AND STAGE LIGHTING DESIGNER, AND AUDIO-VISUAL AND STAGE ENGINEER: Charcoalblue, www.charcoalblue.com

►► MATERIALS

With the potential of three shows performing simultaneously, acoustical performance concerned the architects. They specified seven acoustical smoke vents from BILCO to limit noise from exterior sources. The vents also help firefighters bring a blaze under control by removing smoke, heat and gases from a burning building.

ACOUSTICAL SMOKE VENTS MANUFACTURER: BILCO, www.bilco.com

►► THE RETROFIT

The Gordy brings state-of-the-art theater technology to three new stages in a 66,850-square-foot building. The \$35.8 million renovation of a former warehouse is the new home for Stages, a local non-profit repertory company that produces year-round shows and educational and community outreach programs. Stages previously operated out of a two-theater facility in a converted engraving factory with a separate building onsite for scenic construction and storage.

The Gordy encompasses a new building connected to the converted warehouse that together house three new theaters—the 251-seat Sterling Stage, the 220-seat Lester and Sue Smith Arena Stage, and the 125-seat Rochelle and Max Levit Stage. The Gordy also boasts two rehearsal rooms, a scene shop, double-height lobby, administrative workspace and function-specific production facilities. A 300-space parking structure is linked to the theater building by a covered walkway.



PHOTOS: 2021 RECORDED SHADOWS



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SAFETY FIRST

LEED UNVEILS NINE SAFETY CREDITS, HEALTH-CENTRIC TOOLS FOR HEADING BACK INSIDE

THE LEED GOLD BANK OF AMERICA PLAZA, AN EXISTING BUILDING RECERTIFICATION PROJECT IN DALLAS, OWNED BY METROPOLIS INVESTMENT HOLDINGS, WAS ONE OF THE FIRST BUILDINGS TO PURSUE A **LEED SAFETY FIRST CREDIT**.

PHOTOS: COURTESY U.S. GREEN BUILDING COUNCIL

As countries around the world continue to face tragic outbreaks of coronavirus, the United States is transitioning deeper into post-pandemic life despite the emergence of variants, thanks largely due to strong and increasing vaccination rates in the country. A majority of businesses plan to have employees back in the office in some capacity by fall this year (www.thelassallenetwork.com/resources/2021-office-re-entry-index) with many companies already doing so, and students will return to schools and campuses in droves. Americans are eager to leave their homes, as indicated by domestic leisure travel being fully recovered to 2019 levels (www.nytimes.com/2021/07/14/business/delta-profit-pandemic.html). Plenty more are going out for food and drinks; in some states, restaurant traffic has already surpassed pre-pandemic levels (www.washingtonpost.com/business/2021/05/20/restaurants-dining-out-pandemic/).

But as people head back indoors, they understandably want to know with greater certainty that these spaces are adequately prepared to handle re-entry. Is the office's air-filtration system enough? Have schools and universities introduced infection-control monitoring procedures? Are retailers still deep cleaning their stores?

After months of social distancing and endless Zoom meetings, a simple "trust us" from building managers is not enough. No wonder that a recent CNBC survey of top business executives found that 84 percent consider employee health and wellness to be the key factor in a post-pandemic work model (www.cnbc.com/2021/06/26/heres-what-the-return-to-the-office-will-look-like-this-fall.html).

Fortunately, the U.S. Green Building Council (USGBC) developed nine LEED Safety First credits (www.usgbc.org/about/building-re-entry-resources) specifically to assist with re-entry during COVID-19. These credits—powered by Leadership in Energy and Environmental Design, a global rating system for sustainability—outline sustainable best practices for workplace re-occupancy, managing indoor air quality, cleaning and disinfecting spaces, building

WRITTEN BY | MAHESH RAMANUJAM

water-system recommissioning, HVAC and plumbing operations, pandemic planning and social equity in pandemic planning.

As states, cities and communities of all sizes continue to reopen their economies, the LEED Safety First credits serve as data-based tools for a safe, successful and sustained re-entry. These credits can be used by LEED projects that are certified or are undergoing certification, and the credits will continue to be updated to reflect the latest public-health developments and interpretations. (If a project team wants to certify with only these Safety First credits, contact GBCI.)

For example, the "Managing Indoor Air Quality During COVID-19" credit builds on existing indoor air quality requirements and credits in LEED so that building teams ensure indoor air quality systems are operating as designed and determine temporary adjustments to ventilation that may minimize the spread of disease.

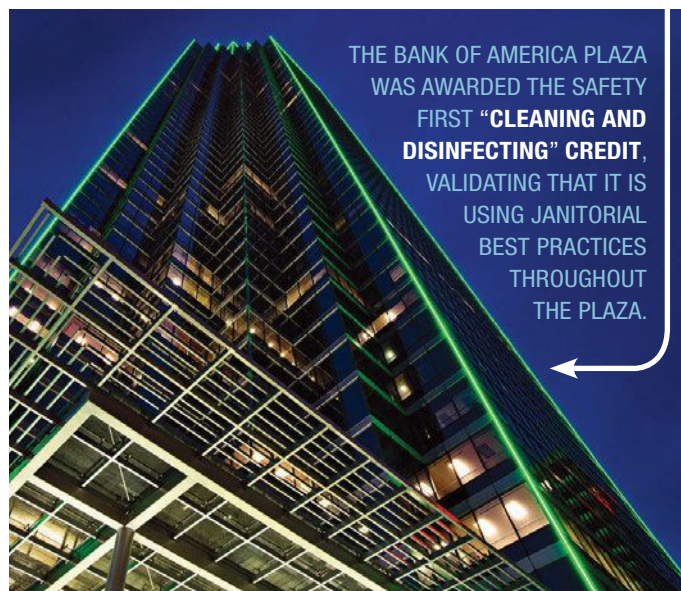
Meanwhile, the "Pandemic Planning" credit helps cities and communities prepare for, control and mitigate the spread of disease during a pandemic. The plan, which includes a task force of diverse backgrounds, must identify risks and vulnerabilities to health by outlining historical, geographical, epidemiological and other factors; evaluate health-care system readiness, domestic response, incident management and other existing policies and procedures; and include education and training.

As the global certification body for LEED, Green Business Certification Inc. (GBCI) awarded Safety First pilot credits to 80 projects in just under a year with another

close to 400 additional credits currently being pursued. This way, when people are ready to go back inside at their workplace, schools, childcare centers, restaurants or favorite retailers, they can have confidence that steps have been taken to welcome them safely indoors. The same trust and confidence that come with LEED can be relied upon with the LEED Safety First credits for building re-entry.

Building Examples

The LEED Gold Bank of America Plaza, an existing building recertification project in Dallas, owned by Metropolis Investment Holdings, was one of the first buildings to pursue a LEED Safety First credit. The Bank



THE BANK OF AMERICA PLAZA WAS AWARDED THE SAFETY FIRST "CLEANING AND DISINFECTING" CREDIT, VALIDATING THAT IT IS USING JANITORIAL BEST PRACTICES THROUGHOUT THE PLAZA.

of America Plaza was awarded the Safety First "Cleaning and Disinfecting" credit, validating that it is using janitorial best practices throughout the plaza.

Other properties owned by Metropolis Investment Holdings that received Safety First credits include NBC Tower in Chicago, Pennzoil Place in Houston and One Liberty Place in Houston. Metropolis Investment Holdings' 345 California property in San Francisco also received a Safety First credit as part of its recent Platinum recertification.

Returning students will also benefit as numerous schools and university facilities have received Safety First credit

NINE LEED SAFETY FIRST CREDITS

CLEANING AND DISINFECTING	Facilitates policy and procedures for green cleaning best practices that support a healthy indoor environment and worker safety.
RE-ENTER YOUR WORKSPACE	Provides a tool to assess and plan for re-entry, as well as to measure progress once a space is occupied. Identifies sustainable requirements in building operations and human behavior that take precautions against the spread of COVID-19.
BUILDING WATER SYSTEM RECOMMISSIONING	Helps reduce the risk that building occupants are exposed to degraded water quality, especially after building closures of weeks or months.
MANAGING INDOOR AIR QUALITY DURING COVID-19	Ensures indoor air quality systems are operating as designed and determines what temporary adjustments to ventilation are needed to minimize the spread of disease.
DESIGN FOR INDOOR AIR QUALITY AND INFECTION CONTROL	Promotes prevention of airborne transmission of SARS-CoV-2 and/or other airborne diseases with specific attention to ventilation and filtration.
MAINTENANCE OF HVAC SYSTEMS DURING COVID-19	Supports ongoing inspection and maintenance of commercial HVAC systems to address indoor air quality issues.
PANDEMIC PLANNING	Helps cities and communities prepare for, control and mitigate the spread of disease during a pandemic.
SOCIAL EQUITY IN PANDEMIC PLANNING	Systematically considers equity implications across all phases of pandemic planning, including for low-income, vulnerable or at-risk groups.
ARC RE-ENTRY	Provides tools to benchmark infection-control policies and procedures, collect occupant experiences and track indoor air quality.

certifications—from the UC Davis Shields Library and UC Santa Cruz Silicon Valley's Baskin School of Engineering in California to the Purchase New Student Residence Hall in New York, Franklin & Marshall College's Visual Arts building in Pennsylvania, and Wheeling High School in Illinois.

In addition, The Chelsea at Greenburgh, a 90,000-square-foot new construction senior living community in Westchester County, N.Y., achieved LEED certification in early 2021 and incorporated the Safety First "Cleaning and Disinfecting" credit to ensure best practices were put into place to protect its residents and staff alike.

Projects like these are relying on the data and trusted frameworks behind the Safety First credits to permit safe re-entry that gives occupants confidence and helps rebuild local economies. As resuming daily life becomes a greater reality, GBCI aspires that every project worldwide will take advantage of these frameworks to protect their occupants in a post-pandemic world.

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The Future of Buildings

Indeed, re-entry is revealing a broader shift in the focus of the built community. Even as more Americans and citizens around the world continue to head back indoors, health and wellness are going to remain in the spotlight, well beyond the current pandemic.

Shortly after the pandemic halted much of America, USGBC doubled down on its commitment to making green buildings part of a lasting, human health-centric solution. According to a 2021 survey of our built community (www.usgbc.org/articles/takeaways-usgbc-and-gbci-community-survey), eight in 10 respondents (81 percent)—representing 50 countries—said they would like to see this continue post-pandemic. In fact, the top issues ranked by the green-building community for how USGBC and GBCI can help going forward were indoor air quality and individuals' health and wellbeing.

Although LEED remains USGBC and GBCI's core program, nearly seven in 10 (68 percent) of our market respondents told USGBC and GBCI that the organizations should continue to evolve their portfolio. GBCI has grown to include a suite of nearly 10 certification programs and 15 professional credentials and certificates covering almost every facet of the sustainability industry—from green buildings and sustainable landscape development to zero-waste performance and resilient design to power grids and infrastructure. Each of these programs allows GBCI to help communities meet and exceed sustainability goals and enable the adoption of next-generation practices while emphasizing health and wellness.

At USGBC and GBCI, we believe that healthy people in healthy places is the fastest way to build a healthy economy. After all, consumers have stockpiled trillions of dollars of cash since the pandemic began and are ready to pump it into the global economy if they can feel safe and healthy while doing it (financialpost.com/financial-times/global-savers-5-4-trillion-stockpile-offers-hope-for-post-covid-spending). The world doesn't have to choose between public health and a healthy economy; the future will require both.

As the U.S. and countries around the world enter a new phase, how we look at the buildings and infrastructure around

us will never be the same. Their design, construction, operation and maintenance are more important now—coming out of the pandemic—than ever. Whether you are a student heading back to college this semester, an employee going back to the office, a foodie eating at your favorite restaurant or a professional in the green building industry, you'll want to know that your health and wellness are protected.

New tools like the LEED Safety First

credits that help ensure and communicate safety are key to getting the country and rest of the globe back up and running. Looking beyond the coronavirus, we must put in place trusted data-backed frameworks to ensure that our infrastructure is prepared for future global challenges. Crises tend to spur innovation—and now, coming out of this pandemic, we can interact indoors more safely and healthily than before. 

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REMAKING 'THE FORTRESS'

WRITTEN BY | CHRIS BRASIER, FAIA, LEED AP, AND SHANN RUSHING, AIA, LEED AP BD+C

A Dungeon-like Dormitory Is Revamped to Promote Academic Success and Overall Wellness

PHOTOS: MARK HERBOTH PHOTOGRAPHY, WWW.MARKHERBOTH.COM, unless otherwise noted

Students used to describe Edens Quad as dark and dungeon-like. Considered the least desirable Duke University campus housing, the complex was also criticized as being disconnected from the rest of campus with “nothing special” for residents. Edens Quad was constructed in the mid-1960s out of Hillsborough stone embedded in cast-in-place concrete. Although located in

a picturesque part of West Campus, the tall narrow windows and hard-to-find entry doors made the residence hall feel uninviting. In fact, students sometimes referred to the complex as “the fortress.”

Though the project had a relatively modest budget, the goals were ambitious. The university challenged the design team at Clark Nexsen to create more community spaces, increase daylighting into the exist-

ing spaces and provide a positive overall environment for the students. Through a series of design strategies, the renovation of Edens Quad successfully transformed one of the least desirable places to live on campus into a sought-after housing choice for Duke students.

“From the start, we were very focused on creating concepts that contribute positively to students’ wellbeing on campus.



The contrast between the buildings before and what they offer now—with all the added transparency and openness—has made a world of difference not just to students and residents, but to staff as well,” says Deb LoBiondo, interim dean for Residence Life at Duke University, Durham, N.C.

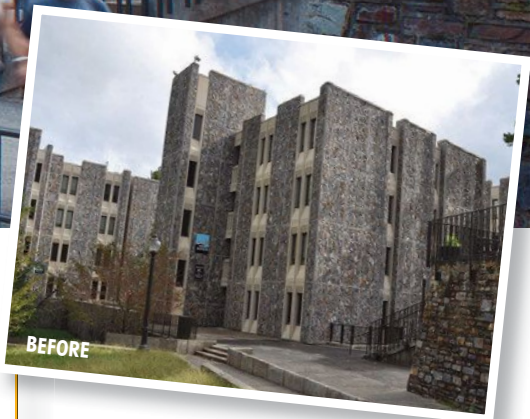
A Community Gateway

Located on the edge of West Campus, the

existing footprint of Edens Quad lacked a direct entry point, and getting to and from the area was cumbersome.

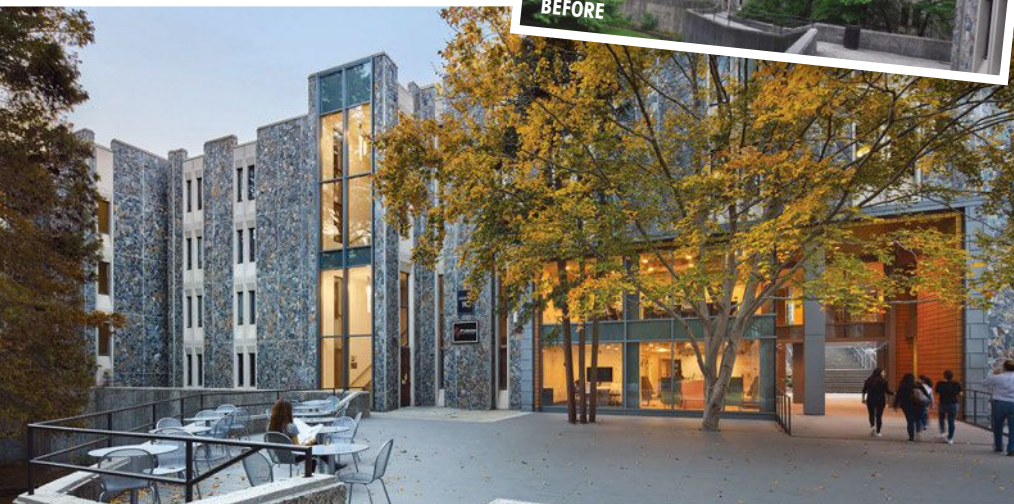
LoBiondo explains: “There were a lot of barriers. For example, a stairway from the adjacent building led to a dead-end wall at Edens. Students were inconvenienced by several exterior stairways, a parking lot and a stream running through the site.”

One of the breakthroughs in the project



NEW ENTRY/THRESHOLD

A study and gaming pavilion provides a sense of arrival and a direct entry into Edens Quad on axis with the upper campus pedestrian path.



A combination of **NEW INDOOR AND OUTDOOR** shared spaces provide a sense of community and draw students from beyond Edens Quad.

—no pun intended—was the idea to insert a large pedestrian pathway through the structure of one of the buildings. Puncturing one of the “fortress” walls and extending the structure connected the existing campus axis into the complex’s interior quad. The reconfigured entry created a new threshold with a direct connection between the upper quads that has greatly increased campus connectivity. The gateway leads to an upgraded outdoor terrace that has contributed to building a sense of community for residents and activated the outdoor areas between the residence halls.

The design required demolishing portions of the existing first and second floor slab system. As a result, the residential hall was expanded and opened up, using structural steel framing to create the new entry portal. The expansion also led to improved accessibility; it created space for an elevator to be installed.

Shared Amenities

The addition also supported the strategy of creating shared amenity spaces for the complex. The existing cluster of buildings were disjointed and had small, insular amenity spaces. Repurposing these small spaces into new bedrooms helped maintain the original bed count. The shared amenities were relocated in two strategic places: the first being the study/gaming pavilion located at the main quad threshold and the second being the multipurpose room located adjacent to the quad lawn. For an added sense of connectivity, commons rooms were placed at the main entry of each dorm to provide shared living space that can accommodate entertainment, study, gathering, dining and social functions for residents.

Promoting Wellness

Having access to outdoor spaces and supportive resources plays a major role in promoting positive mental health, academic success and overall wellness in students. The design team wanted to capitalize on Edens Quad’s beautiful, tree-lined location on campus to make it a place where students want to be. To achieve this vision, the team carried out several design interventions that prioritize student wellness



COMMONS SPACE was created at the entry of each residence hall for entertainment, study, gathering, dining and social functions for the immediate residents of that hall.

and offer supportive resources for staying healthy—mentally and physically.

To create an indoor/outdoor connection, the multipurpose space adjacent to the quad lawn was extended and outfitted with a retractable wall that opens up to an outdoor space for flexibility and open-air exercise activities. This also provides programs with an alternative outdoor option and access to green space with a variety of seating options for dining, socializing and studying.

LoBiondo comments: “The two-way bump-out where we created the group fitness room has been an amazing asset for us. We collaborated with Duke Recreation to have eight classes a week, including kickboxing, barre and yoga, that were taught—pre-COVID, of course—out of that space.”

Since the project was completed, Duke Housing decided to convert two of the first-

level study areas into office spaces for the residence coordinator and academic guide. They credited the flexibility of the layout with making this possible. The proximity of these new offices fosters a partnership between residence life and academic affairs by giving students a direct, onsite support system.

Addressing Challenges

Connecting the steel framing to the existing cast-in-place concrete frame for the addition posed a challenge for the team. The process required careful analysis of the existing concrete beams and columns at these locations. Using the original construction drawings, each slab, joist, girder, column and foundation was evaluated to determine its ability to support the proposed loads. The design team used this information to develop location-specific

repairs that prevented any negative impact to the architecture of the existing buildings.

To create the new pedestrian pathway leading to the entryway pavilion, the stream running through the site needed to be bridged. The solution was to cover the low-lying stream area with a deck comprised of composite deck boards supported by sawn lumber joists and a structural-steel girder and post frame. The layout of this steel frame and its foundations were carefully coordinated to maintain the tranquil feel of the space and preserve the existing trees and stream bed.

To minimize disruptions for students and the university, it was crucial for all demolition and construction to be completed within the narrow window of summer break. This compressed schedule was achieved through intensive and ongoing coordination between the engineering



STUDY AND GAMING PAVILION: Open study space (left) allows student to study individually or in groups. The virtual reality cave is shown above.

>> RETROFIT TEAM

ARCHITECT; INTERIOR DESIGNER; AND CIVIL, ELECTRICAL, FIRE PROTECTION, MECHANICAL/PLUMBING AND STRUCTURAL ENGINEER
// Clark Nexsen, www.clarknexsen.com

LANDSCAPE ARCHITECT // Surface 678,
www.surface678.com

GENERAL CONTRACTOR // Shelco,
www.shelcollc.com

>> MATERIALS

ALUMINUM STOREFRONT WINDOWS AND DOORS // Kawneer, www.kawneer.com

EXTERIOR PHENOLIC PANELS // Meteon from Trespa, www.trespa.com

CARPET TILES // Code Series from Tarkett, www.tarkett.com

OPEN STUDY SPACE FURNITURE // Parson Bar Table from Nevins, www.nevins.co; Brooks Barstool from Stylex, www.stylexseating.com; and Visor Lounge Chair from Encore Seating, www.encoreseating.com

GROUP GAMING ROOM FURNITURE // Chiara Lounge Chairs from Bernhardt Design, www.bernhardtdesign.com, and Collective Motion Seating from Jofco by Jasper Group, www.jaspergroup.us.com

EXTERIOR ZINC CLADDING // VMZinc, www.vmzinc-us.com

MULTIPURPOSE ROOM OPERABLE GLASS PARTITION SYSTEM // NanaWall, www.nanawall.com

PENDANT LIGHTING // S2530 Series from Scott Architectural Lighting, www.scottarchlighting.com

team and contractor before and during design.

Modernizing Materials

Built in the mid-1960s, the existing set of buildings that make up Edens Quad was constructed of cast-in-place concrete, precast concrete wall panels with Hillsborough stone and storefront glazing. To give these outdated structures a modern revitalization, the team utilized a combination of steel for the structure, phenolic liner panels, curtainwall glazing and wood wall panels on the interior. In each case, the stone-clad precast wall panels in commons spaces were removed and replaced with new glass curtainwall.

Inside, wood-lined walls mixed with the glass curtainwall convey a sense of warmth for students. This overall blend of traditional stone and contemporary glass and steel creates an eye-catching juxtaposition between old and new.

Lighting and Lanterns

By upgrading finishes and replacing exterior cladding with large glass storefront systems and drop fixtures from the ceiling, the buildings were transformed and now provide more natural light and transparency. The new windows and fixtures also establish an important visual connection between the student commons spaces and the exterior quad activity. Daylight fills these spaces during the day while indoor light spills out into the quad after dark,

allowing programs and activities to be seen from outside.

The commons rooms were conceived as “lanterns” throughout the quad to provide added transparency and illuminate the interior spaces during the evening hours. These lanterns have also become a new visual identity for the complex because they are visible from neighboring residential halls.

An Evolving Campus

“Residential and social life at Duke is the subject of continuous study and adjustment,” comments Steve Nowicki, former vice provost and dean of undergraduate education. “Much as the educational experience has evolved, so too have living patterns and the way students connect with each other and their communities.”

So how were the renovations received by students?

“The renovations are really awesome,” says Zarina Bentum, an Edens Quad residence assistant. She called the plans well thought out and elegantly done, adding, “The changes really resolve the complaints students raised.”

LoBiondo notes that Edens Quad now sees a lot more regular foot traffic. With the added amenities and the outdoor gathering spaces, students are drawn to this part of campus. Edens Quad has become an appealing destination that is connected to and engaged with the greater campus at Duke University. 

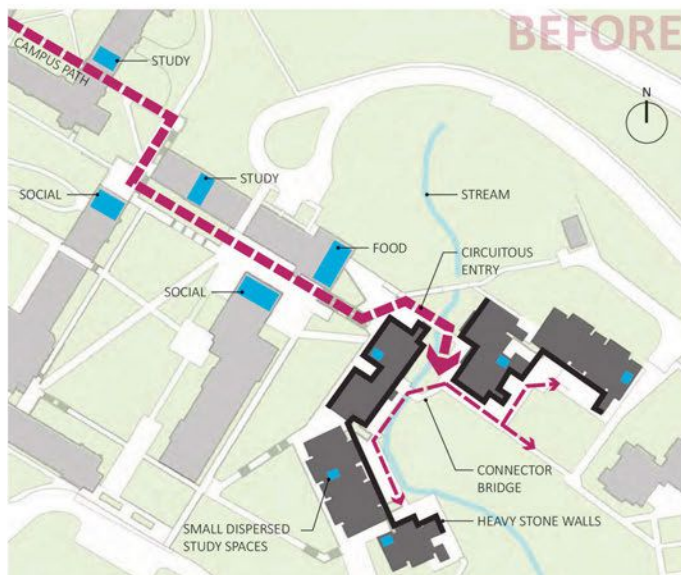


IMAGE: CLARK NEXSEN

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MORE FROM LESS

A Design Team Is Challenged to Create a Daylit Middle and High School for about 1,700 Students within a Former Lowe's Home Improvement Building

WRITTEN BY | ETHAN LEVINE, AIA, LEED AP, AND ANA SMETANA, ASSOC. AIA

Valor Collegiate Academies is a Nashville, Tenn.-based Charter School that serves grades five through 12 in three distinct schools located on a single campus in southeast Nashville. Valor representatives approached Manuel Zeitlin Architects (MZA) in 2013 during the initial planning for

the first school, Valor Flagship Academy Middle. MZA helped school representatives develop this first space, an adaptive-reuse interior retrofit of a 20,000-square-foot former Social Security office building. The school opened in the fall of 2014. The following year MZA designed an addition that doubled the building's original footprint.

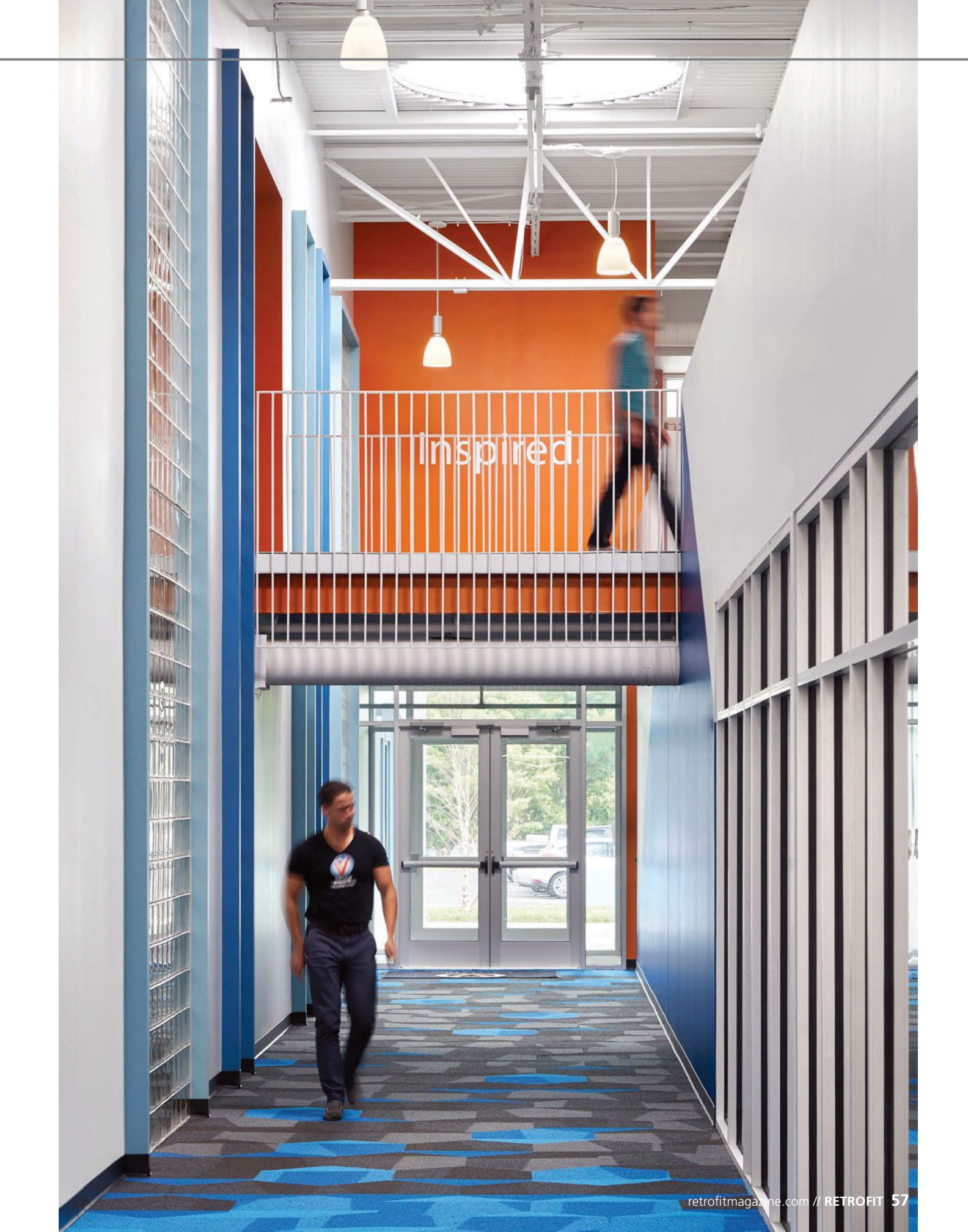
This addition offered an opportunity to depart from the existing brick "strip mall" aesthetic and create a fresh, contemporary building filled with natural light and open, flexible educational spaces.

During the development of the initial flagship project, school founder Todd Dickson shared his vision of serving both



PHOTOS: NICK MCGINN, MCGINNPHOTOGRAPHY.COM, unless otherwise noted

TO EFFECTIVELY DOUBLE THE USABLE AREA WITHIN THE EXISTING FOOTPRINT, THE DESIGN TEAM ADDED A SECOND FLOOR INTO THE BUILDING ENVELOPE. THIS MOVE YIELDED COMMON SPACES THAT PROMOTE COLLABORATION AMONG STUDENTS AND FACULTY.



Inspired.



THE NEW MIDDLE- AND HIGH-SCHOOL BUILDINGS WERE ULTIMATELY CONCEIVED AS THREE 2-STORY CLASSROOM WINGS, EQUAL IN SIZE, FLANKED BY TWO NEW EXTERIOR COURTYARDS (MIDDLE SCHOOL) AND A LARGE CENTRAL INTERIOR COURTYARD ATRIUM (HIGH SCHOOL).



middle and high school students on a single campus. In metro Nashville, the goal of a contiguous, multi-school campus can be hard to achieve because of the limited availability of large, affordable project sites. However, the Flagship Academy Middle site was part of a former commercial campus development. This all too familiar piece of the development landscape is found in many suburban cities in the U.S. The typology: a sea of asphalt punctuated by small, medium and large masonry boxes. These low-density commercial developments often pop up a stone's throw from an urban city-center to support the outer ring of the expanding metro area. Fast forward a decade or two and these sites often lay vacant, a remnant of a development pattern from years past. Viewed through the right lens, however, these sites are ripe with opportunity for adaptive reuse.

With an eye for expanding the educational campus to include an additional middle school and a high school, Valor representatives looked two doors down from the initial Flagship Academy Middle

to a vacant 100,000-square-foot former Lowe's home-improvement building. While the design team initially surmised that, with some creativity, both the additional middle and high schools could easily be nested within this "big box" building, the near-term programmatic needs of the client required MZA's team to reframe its thinking.

The projected enrollment of the new middle school was 500 students, calling for a program area of a little more than 40,000 square feet. The future high school, to open two to four years later, would have an enrollment of 1,000-1,200 students, needing approximately 100,000 square feet. The resultant math called on the design team to find a way to fit 150,000 square feet of program into a 100,000-square-foot box. A familiar saying not appropriate for a young audience comes to mind!

In addition to the raw numbers challenge, MZA also had to solve a daylighting problem. An existing floor plate of this size has a relatively low exterior wall-to-interior-space ratio while the majority of



the project program (in this case, classrooms) called for daylighting. With regard to square footage and access to natural daylight, MZA literally had to create more of everything with less.

Problem Solving

MZA's concept was an exercise in surgical subtraction. The novel design approach bifurcates the existing building by carving a 10,000-square-foot courtyard out of the interior. This displacement of interior space would help to break down the original building massing and define a distinct spatial identity for each of the schools. The slice resulted in new exterior walls for both the middle- and high-school buildings, allowing sunlight to penetrate the center of the former Lowe's and creating opportunities for daylighting in classrooms that previously did not exist.

Although this approach would begin to solve the daylighting problem, it also exacerbated the issue of limited square footage. Having studied the existing structural system, the design team understood that it would be possible to add a second floor into the existing building envelope, effectively doubling the usable area within the existing footprint. In theory, this move would yield an abundance of newly avail-

able floor area supporting another crucial program requirement: the need for open common spaces to promote collaboration among students and faculty.

With a solid concept in place, MZA's team set its sights on addressing the technical challenges. The most significant of these was the available clear space below the existing roof structure. While most of the roof framing provided 25-foot clearance, the existing long-span truss girders were much larger, leaving a low point at approximately 19 feet above the existing slab. Given these existing conditions coupled with the structure added to support a new second story, the new floor-to-floor dimension would max out at 11 feet. For those familiar with the heaping bowl of spaghetti that is structural, mechanical, plumbing and electrical coordination, you will understand that an 11-foot floor-to-floor is very tight. The design team was determined to create first-floor spaces that felt open and airy. Simply covering the spaghetti with an 8-foot lay-in ceiling throughout would not be acceptable. All design team members would need to coordinate closely to avoid unexpected conflicts in the field that could lead to unfavorably low ceilings.

The new middle- and high-school

buildings were ultimately conceived as three 2-story classroom wings, equal in size, flanked by two new exterior courtyards (middle school) and a large central interior courtyard atrium (high school), daylit by round skylights, ranging from 4 to 8 feet in diameter.

A new gym, set back and accessed by way of its own courtyard, required a long-span roof and other design elements, ultimately necessitating ground-up construction. Two of the four existing perimeter walls were reused in place and the former Lowe's delivery bay was repurposed as the weight-training area. Roll-up bay doors were replaced with glazed overhead doors providing daylight and access to a new outdoor training terrace.

Works Well with Others

The general contractor, D.F. Chase Inc., provided design-assist services from early in the schematic design process and delivered the project under a Guaranteed Maximum Price contract. The architectural and structural engineering teams collaborated closely with mechanical, plumbing and electrical consultants, which provided their services through the general contractor on a design-build basis.

This project delivery method allowed for

» RETROFIT TEAM

ARCHITECT // Manuel Zeitlin Architects LLC, www.mzarch.com
■ Ethan Levine, AIA, project architect
■ Ana Smetana, Assoc. AIA, architectural designer

GENERAL CONTRACTOR // DF Chase Inc., dfchase.com

VALOR HIGH SCHOOL
■ Chris Scheide, project manager
■ Bryan Betty, superintendent

MIDDLE SCHOOL
■ Daniel Freeman and Ben Millen, project managers
■ Mike Towns, superintendent

INTERIOR DESIGN // Brand Interior Design LLC, www.brandinteriordesign.com
■ Malee Cherry, IIDA

CIVIL ENGINEER // Barge Cauthen & Associates, bargecauthen.com
■ John Gore, P.E.

LANDSCAPE ARCHITECT // Daigh Rick Landscape Architects, daighrick.com
■ Anne Daigh, LA
■ Sari Barton, Landscape Designer

STRUCTURAL ENGINEER // EMC Structural Engineers P.C., emcnashville.com
■ Dan Borsos, P.E.

MECHANICAL AND PLUMBING ENGINEER
// Quest Design Group, www.questdg.com
■ Nick Perry, P.E.
■ Tim Pombo, P.E.
■ Mancell Daniels, P.E.

ELECTRICAL ENGINEER // CO Christian & Sons Co. Inc., www.cochristian.com
■ Oakley Christian III, P.E.

ROOFING CONTRACTOR // Village Roofing Co., villageroofing.us

» MATERIALS

INSULATED METAL PANELS // Kingspan, www.kingspan.com

STOREFRONT // Evans Glass Co., www.evansglasscompany.com

STEEL // Cooper Steel, www.coopersteel.com

SKYLIGHTS // AiA Industries, dalyteusa.com

TPO ROOF // Mule-Hide Products Co. Inc., www.mulehide.com

GLAZED OVERHEAD DOORS // Haas Door, www.haasdoor.com

VRF SYSTEM // Mitsubishi Electric Trane HVAC US, mitsubishicomfort.com

INTERIOR AND EXTERIOR LIGHTING // Design Light, www.designlight.net

GLASS BLOCK // GBA Architectural Products, www.gbaproducts.com

CARPET TILE AND LUXURY VINYL TILE // Shaw Contract, www.shawcontract.com



PHOTOS: COURTESY JLL NASHVILLE



THE MIDDLE SCHOOL, KNOWN AS VALOR VOYAGER ACADEMY, HAS ITS OWN DISTINCT SPATIAL IDENTITY. APPROXIMATELY 500 STUDENTS OCCUPY A PROGRAM AREA OF A LITTLE MORE THAN 40,000 SQUARE FEET.

real-time constructability and cost analysis, making it possible to truly design to the budget while keeping design intent at the center of the process. One such decision was specifying a special long-span composite concrete deck to minimize the number of steel beams supporting the new second floor. Another decision, implementing a VRF system to serve the first floor, minimized overhead air-conditioning duct runs and improved energy performance.

A compressed construction schedule also meant that interior finishing had to begin as soon as possible and be executed efficiently. Newly created exterior walls were clad in an insulated metal panel system that also served as the interior fin-

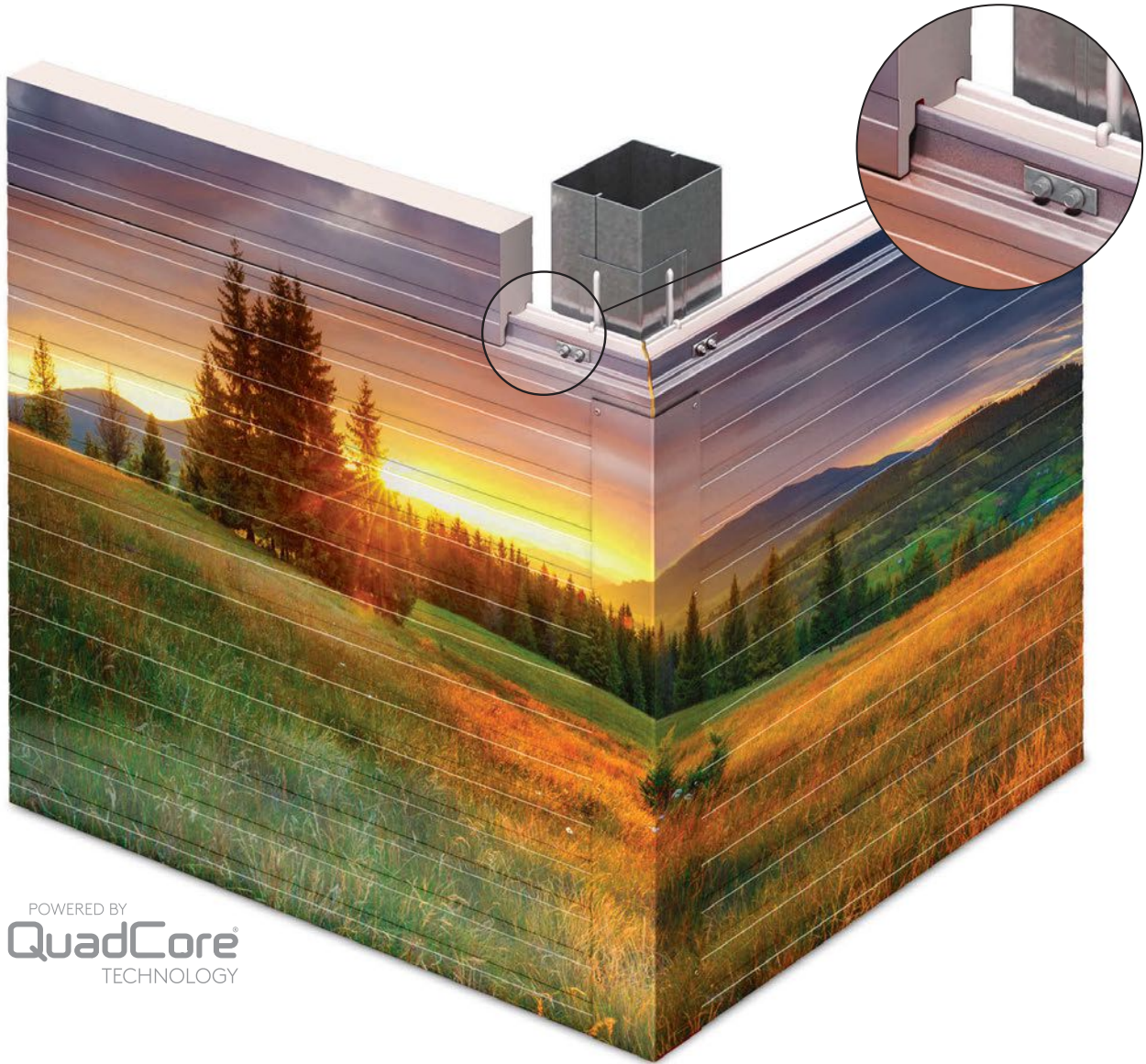
ish. This approach saved time and money by assigning a single trade—the roofing subcontractor—to install and finish the exterior and interior sides of the building envelope.

The overall design of the campus was an exercise in precision, ingenuity, efficiency and great care for the end-users—the teachers and students. When all was said and done, the completed campus offers a bright and airy educational environment whose design is organized around open, flexible communal spaces. The architecture is a successful articulation of the school's ethos, reinforcing the mentoring and mindfulness work, which is at the core of the Valor educational model. 

ABOUT MANUEL ZEITLIN ARCHITECTS

Manuel Zeitlin Architects (MZA) is an employee-owned architectural and interior design firm based in Nashville, Tenn., celebrating 40 years of practice. The firm has an intentionally diverse portfolio and focuses on projects that enrich the lives of the people who live, play, work and learn in them. MZA employees believe that challenging and unconventional projects enhance the practice, inviting the team to push its design-thinking and execution.

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WHAT'S NEW CAN BE OLD

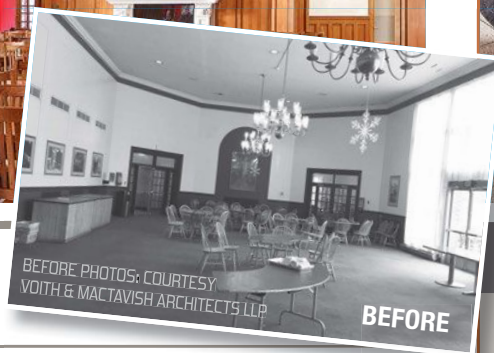
**The Lawrenceville School's Abbott Dining Hall
Embraces the School's Heritage and Tradition**

WRITTEN BY | DANIELA HOLT VOITH, FAIA, LEED AP BD+C, IIDA

PHOTOS: JEFFREY TOTARO unless otherwise noted



ABBOTT DINING HALL, with its modernist brick-and-glass design, felt out-of-place among the beloved Queen Anne and Romanesque Revival structures nearby.



Often, the goal of a retrofit is turning an old building new again—turning a disused warehouse into loft apartments, for example, or a historic library into a multi-use community learning space. The core challenge of these projects is preserving a sense of history while designing contemporary interventions that support innovative programs, attract new user groups and make the building feel of-its-moment.

However, when The Lawrenceville School—one of the nation's most historic and renowned boarding schools—approached Voith & Mactavish Architects (VMA) LLP to retrofit Abbott Dining Hall, school representatives had something entirely different in mind. Rather than make old new again, they wanted to remake a relatively recent building on campus into one that embraced the school's heritage and tradition—all while equipping it for a growing student body.

Embracing Tradition

Abbott Dining Hall was a 1960s addition to a dormitory designed by Peabody & Stearns in the historic campus core. This core of Lawrence-

ville's campus is a landmarked district in Mercer County, N.J., designed in the 1890s by landscape architect Frederick Law Olmstead and architect Peabody & Stearns. Abbott Dining Hall, with its modernist brick-and-glass design, felt out-of-place among the beloved Queen Anne and Romanesque Revival structures nearby.

Adding to the frustration was the design of the main dining hall. The Lawrenceville School follows the traditional British house system: students in a given class reside together for their first and fourth (final) years but live with other members of their assigned house for their second and third years. Abbott Dining Hall is reserved for Fifth Form students (in their final year of school), but the interior was bland, uninspiring and unrepresentative of the traditions of the campus—undercutting it as a setting for students' last memories of their classmates and Lawrenceville as an institution.

Add to these aesthetic challenges a practical one: Abbott Dining Hall's outdated systems and equipment could not keep up with growing operational demands, making it difficult to feed the growing student body.



Retrofit Team

ARCHITECT // Voith & Mactavish Architects LLP, voithandmactavish.com

LANDSCAPE // John Kochis Landscaping, (609) 737-8693

BRICK AND MASONRY // Gladstone Stoneworks, (908) 234-1514

ELECTRICAL // Bauer Electric Inc., (609) 587-6322

PLUMBING // Leacy's Plumbing & Heating LLC, (908) 963-8603

MECHANICAL // D.J. Wagner Heating and Air Conditioning Inc., djwagner.com

STEEL // The Chowns Group, www.echowns.com

CUSTOM MILLWORK // Lititz Planing Mill Co., www.lititzplaningmillco.com

CUSTOM TERRAZZO // Yorie Tile & Terrazzo Inc., www.yorie-inc.com

ROOFING CONTRACTOR // Bregenzer Brothers Co. Inc., bregenzerbrothers.com



Materials

TRUSS FRAMING // MiTek, aegismetalframing.com

SLATE // Buckingham Slate, www.buckinghamslate.com

TILE FLOORING // Stoneline Design, (888) 504-8264

WOOD FLOORING // Authentic Reclaimed, www.authenticreclaimedfloors.com

ACOUSTIC WALLS AND CEILING // BASWA Acoustic, www.baswana.com

WINDOWS AND DOORS // Marvin, www.marvin.com

BRICK // Redland Brick, www.glengery.com

CUSTOM DINING CHAIRS // Eustis Chair, www.eustischair.com

DINING TABLES // Thos. Moser, www.thosmoser.com

FIREPLACES // Acucraft Fireplace Systems, www.acucraft.com

CUSTOM FIREPLACE CARVINGS // Vickery Stone Co., www.vickerystone.com

HOUSE FLAGS // Humphrys Flag Co., humphrysflag.com

ELEVATOR // MEI, www.meiusa.com

STAINED GLASS // Kokomo Opalescent Glass, kog.com

VMA's challenges were three-fold: First, re-envision the 1960s hall as part of The Lawrenceville School's historic campus. Second, carry the heritage and traditions of the school through the interiors to create a signature place where Fifth Form students could enjoy their final year together. Third, introduce innovative systems and optimize the layout to turn the underperforming building into a state-of-the-art dining facility.

To enhance the character and presence of Abbott Dining Hall on campus, VMA turned to the historic building it is attached to: Upper Dorm designed by Peabody & Stearns in 1891. That building is a handsome red-brick hall defined by its stately procession of round arches and bold projecting bays. These historic features now are carried across Abbott Dining Hall's primary façade, which had been an unremarkable glazed curtainwall without distinguishing features. This side is now reimagined in masonry and accentuated with arched windows, inlaid brick medallions and jack arches, visually linking Abbott Dining Hall with the historic Fifth Form residence hall for the first time.

A new tower-like entry vestibule features a beautifully executed complex curved eyebrow arch, helping to frame an outdoor dining area that overlooks the historic circle designed by Olmstead. The large awning, clerestory windows and dormer windows fill the deep interiors with natural light, enhancing the dining experience. The U-shaped footprint maintains that of the original building for the most part, save for a few exceptions necessary to accommodate the expanded dining program.

A Sense of Belonging

A significant challenge to the transformation was replacing the dining room's original flat roof with a new slate shingle-clad pitched roof that further links the building to its context and makes the hall feel more expansive.

To overcome this, the redesign uses contemporary techniques to achieve a style that honors the historic surroundings. The new pitched roof is supported by glued-laminated beam trusses. Additional steel columns build upon the existing steel skeleton, and a unifying perimeter wrapping beam provides the necessary support to accommodate the hefty glulam structural roof trusses. The additional height, shape and materiality of the roof—combined with the grandeur of the primary façade—creates the impression that the dining hall shares the pedigree of its neighboring buildings. The new roof transforms the main dining hall from an unremarkable space into one defined by its soaring

ceilings and exposed wooden beams.

As much attention was applied to the interior details. The trusses are exposed to the interiors, and custom-designed iron chandeliers hang from the ceiling, creating a dramatic long-span dining space that recalls the grandeur of a Romanesque hall. Oversized fireplaces anchor the hall at each end as visual centerpieces, raised above the floor on a plinth to enhance their visibility from all corners. The fireplaces are carved with figures referencing other school buildings important to the school's lore—emblazoned with an "L" for Lawrenceville and a large "V" that references the Fifth Form.

Nods to traditions like these are scattered throughout the hall, some more apparent than others. A large "L" marks the center terrazzo floor and is complemented by smaller inlaid brass medallions offering more enigmatic references to the school's heritage—like a strawberry, an ear of corn and even a turtle. The result is a place rich with meaning that inspires a sense of belonging among Fifth Form students.

The interior design also maximizes

flexibility and comfort to meet the needs of the growing student body. The hall features white-oak furniture and booth seating that accommodate dining and events. A redesigned kitchen and back-of-house spaces enhance operational capacity. The redesigned kitchen and servery make for more efficient circulation and optimize workflows, enhancing catering operations.

The high-volume, dormers, upper windows, and the light color at the ceiling and upper walls provide ample daylighting into the space throughout the day. Deep niches along the western wall help block the glaring afternoon sun. Seating alcoves are accented with stained glass inspired by the colors of the hanging house flags, further tying the dining hall to school tradition. Dispersed food and beverage stations throughout the reconfigured servery allow for better circulation, access and sightlines to the food-service stations.

History and tradition also influenced the design approach to the three private dining rooms that support the main hall. A rich shade of red, the school color, was incorporated throughout the interior

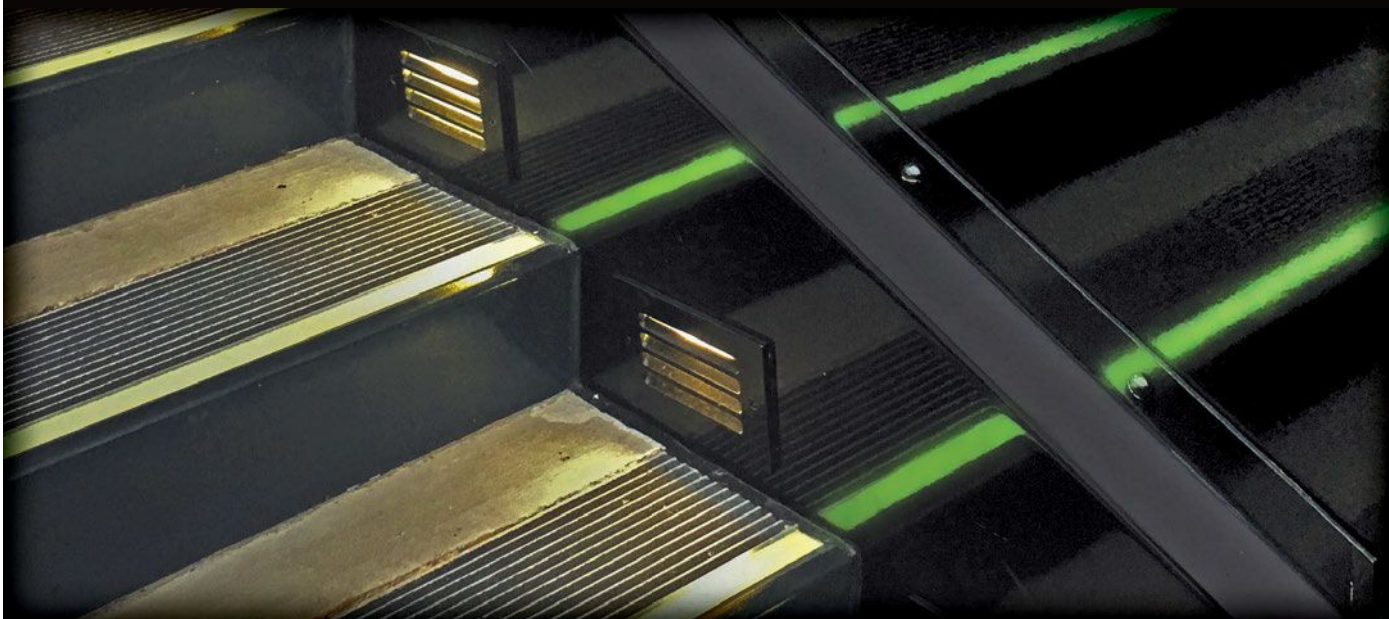
design. In the Stephan Room, a flexible reconfigurable space, the walls were finished with custom wallpaper created from photographs of the surrounding campus landscape. Everywhere they look, students are reminded of The Lawrenceville School heritage and their connection to the school. The side dining rooms can also serve as spaces for breakout dining or advisee lunches, alumni meals and overflow capacity for other special events. A new cupola at the south entrance creates a sense of arrival and washes the corridor with natural light throughout the day.

Place of Pride

The redesigned Abbott Dining Hall is now a centerpiece of The Lawrenceville School's historic campus and a place of pride for Fifth Form students. Applying innovation to the context of tradition, the design takes novel architectural approaches—like glued-laminated timber, laser-cut details and state-of-the-art space planning principles—to deliver a building that works like new and belongs more than ever before to its history. 

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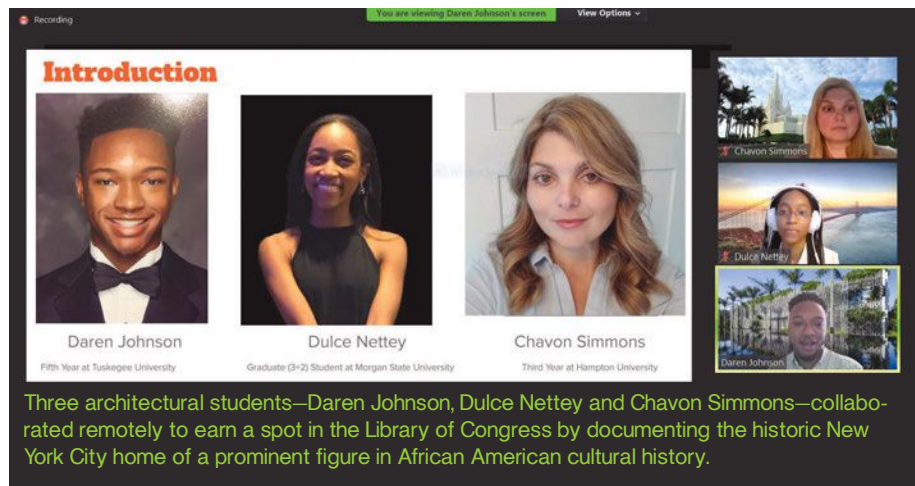
PRESERVATION OF AFRICAN AMERICAN HISTORIC SITES

WRITTEN BY | ED CAFASSO

Armed with the rich data generated by cutting-edge 3D laser scanning technology and supported by the coaching of expert preservationists, three architectural students collaborated remotely to earn a spot in the Library of Congress by documenting the historic New York City home of a prominent figure in African American cultural history.

With support from Capitol One, the National Park Service and the African American Cultural Heritage Action Fund, the students, all of whom attend historically Black colleges and universities, virtually participated this summer in an intensive Digital Documentation Fellowship presented by the National Trust for Historic Preservation (NTHP); Existing Conditions, which comprehensively documents buildings with laser scanning and BIM; and the National Park Service's Historic American Buildings Survey (HABS).

Point cloud data accumulated by Existing Conditions during a comprehensive scan of the interior and exterior of the historic brownstone played a key role in the virtual, six-week fellowship in which the students networked with preservationists, learned historic preservation fundamentals, and applied documentation standards set by HABS and the Secretary of the Interior to create and submit an entry for the 2021 Leicester B. Holland Prize.



"You can think of us as the eyes in the field for architects, owners, preservationists and many more professionals," says Existing Conditions President Jared Curtis. "We create a digital version of the built environment and from there deliver any type of drawing, model, or dataset that the client requires to add value and reduce risk in their work."

The unique educational experience originated from a meeting between Curtis and Brent Leggs, executive director of NTHP's African American Cultural Heritage Action Fund, to discuss ways that Existing Conditions could help the National Trust. From there, NTHP invited the company to become a pro bono partner in an

effort by NTHP and MASS Design Group to create a visioning report that will guide the future of the 4-story building, which cannot be identified due to privacy restrictions.

The location is one of more than 150 historic sites in which the African American Cultural Heritage Action Fund has invested to "showcase the full contributions of African Americans to our nation and to harness the power of preservation as a tool for equity and racial justice," Leggs remarks.

A privately funded non-profit organization, NTHP launched its African American Cultural Heritage Action Fund in November 2017, mounting an ambitious, multimillion, multiyear campaign to preserve and protect places that have been overlooked in

Architecture Students Complete a Historic Preservation Fellowship, Using Digital Technology to Study a Cultural Site

American history and represent centuries of African American activism, achievement and resilience. The preservation effort is the largest ever undertaken in support of African American historic sites.

In the case of the New York City assignment, Existing Conditions scanned the nearly 3,000-square-foot structure, using the same digital reality capture technologies fueling advancements in robotics, self-driving vehicles, drones and motion picture entertainment. The effort captured as much historic detail as possible, focusing on the interior architectural floor plans, exterior elevations and interior reflected ceiling plans. Fellowship students were then taught how to manipulate the resulting point cloud data using the latest design software.

"It was a real learning opportunity for me," explains Chavon Simmons, 31, a student at Hampton University, Hampton, Va. "What I found most interesting was that I was able to create drawings of a building that I have never seen or stepped into and I was able to produce drawings of a caliber as if I was there."

She notes that digital capture technology has the potential to make historic structures more accessible to the handicapped, as well as to recreate historic buildings in their entirety in the event of an accidental loss or natural disaster.

Dulce Nettey, 22, a participant from Morgan State University in Baltimore, says she found the technological aspects of the fellowship to be "fascinating," particularly when combined with the need to learn more about the human experience inside the home. "The history portion really pushed us to figure out how to tell the story, to figure out how it all connects," Nettey says.

Daren Johnson, 22, a student at Tuskegee University in Alabama, adds the intensive nature of the fellowship posed a time-management challenge for all three participants, placing them in a real-world environment that allowed them to push themselves professionally.

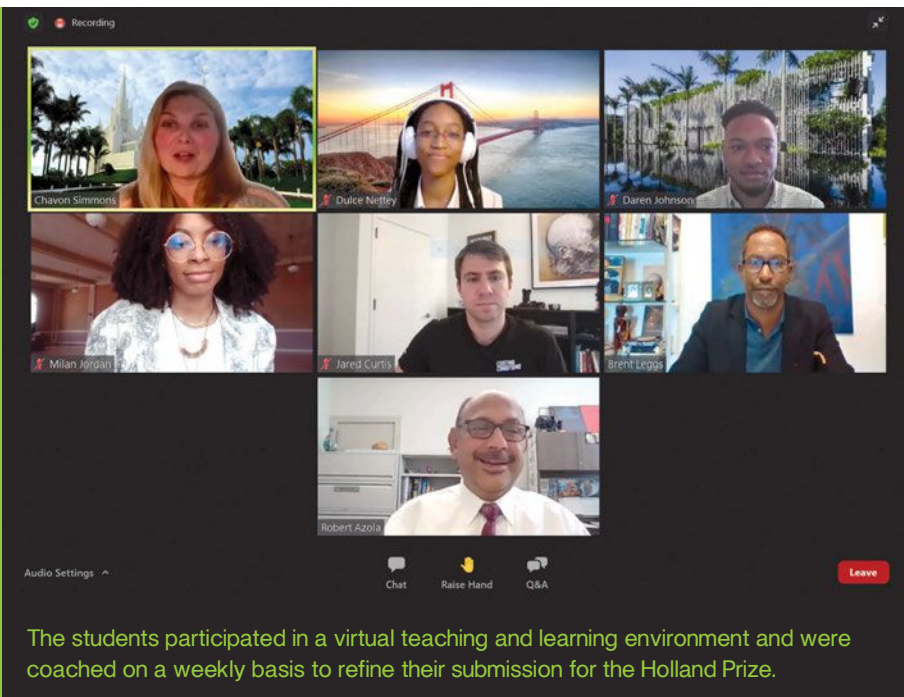
Because of the pandemic, the trio met virtually each Thursday for a full day of learning, sessions, workshops and presentations. Dr. Kwesi Daniels, head of the Architecture Department at Tuskegee University;



The students' work will help create a visioning report that will guide the future of the 4-story building, which cannot be identified due to privacy restrictions.



The room in which the cultural figure spent most of his creative time, often sitting by the window to draw inspiration from the street life outside, was of particular interest to the students.



Professor Dale Glenwood Green at Morgan State University; and Assistant Professor Ronald Kloser at Hampton University helped shape the curriculum of the fellowship. Student attendance was mandatory for all programming and events.

Johnson was surprised to learn that the same digital technology used in popular action movies could be applied in architectural, preservation and development projects. "A lot of the documentation things we learned, like the standards and the reason for the documentation of certain properties, were very eye-opening," he states.

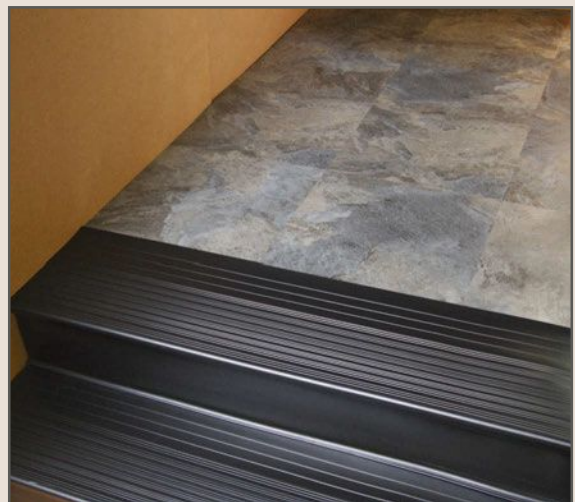
Architect Robert Arzola, a longtime architect for HABS, coached the students on a weekly basis to refine their submission for the Holland Prize. The annual competition recognizes the best single sheet, measured drawing of a historic building, site or structure prepared to the standards of HABS, the Historic American Engineering Record (HAER) or Historic American Landscapes Survey (HALS). All drawings accepted for the competition are added

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to the permanent HABS, HAER and HALS Collection in the Prints and Photographs Division of the Library of Congress.

Arzola hopes the fellowship helped the students grow personally and professionally, adding that he appreciated their particular focus on the room where the cultural figure spent most of his creative time, often sitting by the window to draw inspiration from the street life outside. "It's going to look great in your portfolio and on your resume that you participated in this program and worked on such an unusual home during COVID," Arzola told the students after their final presentation.

For Curtis and the fully distributed workforce at Existing Conditions, the virtual teaching and learning environment was a natural fit. "Our collective hope is that programs like this can be part of a broader movement toward inclusivity and diversity in the world of preservation," Curtis says. "The next generation of architects, planners, and preservationists should know there are teams and tools available to empower them with the confidence to make smart decisions based on accurate data."

"Representation of buildings and cities has long been at the core of architectural education and practice. Students generally study drawings of buildings, so we are simply another step in that evolutionary process," Curtis adds. "All architects should know that pinpoint accuracy is achievable and that accurate building documentation can not only eliminate unnecessary risks for them as professionals, but also unlock design opportunities that may otherwise go unrealized."

Milan Jordan, director of the National Trust's HOPE Crew program, an acronym that stands for Hands-On Preservation Experience, directed the effort and says the fellowship was a first-time pilot that may be adapted for students in semesters to come. "Coming to HOPE Crew with a background in architecture allowed us all to work together to find the right alignment of programming to build on the students architectural curriculum," she says. "With every deadline we gave these students and every challenge they faced, they knocked it out of the park." 

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DAUNTING BUT DOABLE

PHOTO: NICOELNINO

CLIMATE CHANGE IS A BIG CHALLENGE, AND MANY BELIEVE DECARBONIZING BUILDINGS IS AN IMPORTANT SOLUTION

WRITTEN BY | **ALLAN BARRY**

In the past few decades, climate change has grown to become a major driver in how we approach the design, construction and operation of buildings. A sustainability movement, propelled forward by certification programs, like LEED, Passive House and the Living Building Challenge, drove manufacturers to innovate more environmentally friendly products and inspired architects and engineers to optimize their designs.

Although progress has been made, the specter of climate change has not subsided. If anything, the threat has grown, the stakes are higher and the time left to act is short. The world just experienced an unusually hot summer, even as the standard of “hot summers” continues to rise. According to the Copernicus Climate Change Service, an agency supported by the European Union, June 2021 was the hottest June on record in North America and the fourth hottest worldwide.

Led by groups, like the American Institute of Architects, the building industry is responding to the severity of the situation, and sustainability has become a greater focus than ever before. The concept of sustainability covers a wide array of strategies and is defined by different people in different ways. Is a sustainable building one that’s built from environmentally friendly materials? Is it one that is energy efficient? Is it a space that is healthy for occupants? It can be all these things and more.

To deal with the core issue at the heart of climate change—the vast accumulation of greenhouse gases (GHGs) in the atmosphere—many designers and building professionals have begun to pursue what’s known as the decarbonization of buildings. It’s the next frontier in the fight against climate change.

“The building and construction industry is responsible for nearly 40 percent of global greenhouse gas emissions,” explains Stacy Smedley, executive director of Building Transparency, a non-profit based in Washington state whose mission is to provide the open-access data and tools



necessary to enable broad and swift action addressing embodied carbon’s role in climate change. “It’s critical that we begin to decarbonize the sector by focusing on reducing the two emission types associated with our built spaces: operational carbon and embodied carbon.”

Decarbonization: Why and What

Where it relates to climate change, it’s pretty clear that less carbon is what we want, but what exactly does decarbonization mean? How can greenhouse gases be minimized or removed from the building equation? There are several thoughts and approaches, some focused on operation, others on materials.

“Operational carbon is defined as the greenhouse gases emitted during the use of a building,” Smedley continues. “Embodied carbon encompasses the carbon footprint of construction materials and considers all GHGs emitted

throughout a product’s supply chain, manufacture, installation, use, replacement and end-of-life disposal. It’s critical that we reduce both emission types to decarbonize our buildings in our collective fight against climate change.”

“Decarbonizing means reducing the carbon used or embodied in the systems, construction and materials in a building,” adds Katy Flammia, design director of Hudson, N.Y.-based design firm Spacesmith. “This means making decisions from the start of the project to reduce the carbon the project will use. For example, reuse or adapt a building rather than tear it down and start new. Or consider clean energy choices and select materials with a lower carbon footprint.”

“To decarbonize buildings is generally defined as eliminating the direct emissions associated with the building,” says John Sheff, director of public and industry affairs for Danfoss North America. “Direct emissions are those produced

 Spacesmith designed the LEED Silver-certified NYPD Auto Pound Operations Building, which is run by the Property Clerk Division. The design is clean and direct, utilizing an aluminum composite panel cladding system, low-e glazing and a PVC roof membrane.



Spacesmith was responsible for the styling of seven model apartments at 10 Halletts Point. The development is focused on energy and water conservation, indoor air quality and more green-living characteristics.



10 Halletts Point is a two-tower mixed-use residential development on the waterfront of Queens, N.Y. Working closely with The Durst Organization and prime shell and core architects Dattner Architects, Spacesmith designed the public areas, including attended lobby, concierge desk, outdoor terraces, mail area, fitness center with yoga studio, resident lounge/party room, children's playroom and the leasing office.

onsite at the building, as opposed to indirect emissions, which are produced upstream of the building by the power plant supplying the building's electricity. In practice, decarbonizing buildings generally means electrifying its HVAC equipment, since they typically use fossil fuels. This could mean replacing gas-fired water heaters with electric ones or switching out boilers for heat pumps."

"Some considerations may seem straightforward, like whether residential units will have natural gas or electric ranges, but decarbonization is a broad and holistic approach," adds Jim Podesky, senior project manager with The Architectural Team, Chelsea, Mass. "It can also mean providing more electric car-charging stations or designing to reduce car trips altogether by offering more bicycle parking. A comprehensive approach will always consider long-term impacts and ongoing usage. Building systems that will be in use for years or decades have the potential to consume a lot of energy, so it's critical to focus on heating, air conditioning, hot water, ventilation and lighting systems."

"Decarbonization effectively builds on more traditional ideas of sustainability and green building," Sheff adds. "Traditional green building tended to think of each part of a building—HVAC, lighting, exterior, water management—as a distinct system. Decarbonization takes those components and allows the building designers and operators to incorporate them into a single system."

"While historically green-building initiatives and standards might focus on energy, waste and water reductions or operational carbon emissions,

decarbonization takes these traditional ideas a step further by including embodied carbon and low-carbon procurement requirements to incentivize carbon reduction across a building's value chain," Smedley says.

Optimize

A significant amount of a building's energy footprint comes from heating and cooling, so HVAC is a major part of the equation for any building looking to reduce its overall carbon impact. As a large contributor to the energy load of a building, the smallest improvements with HVAC can have a substantial impact.

"In most buildings you can get 20 percent reduction by optimizing the controls, operations, maintenance and behavioral elements," explains Ian Booth, partner with Buro Happold in New York. "It is not uncommon to see HVAC systems that are 20, 30 or sometimes even 40 percent overdesigned. This results in increased overall energy consumption and drastically reduces comfort. I am an advocate of correctly sizing the systems to ensure maximum comfort and efficiency—and agreeing the design criteria with the clients to avoid oversizing systems for extreme weather events. Part of the journey for us is working to make the systems we design as lean and efficient as possible."

"The best things you can do are to reuse what you can and create buildings that don't require a lot of energy use," Flammia says. "Have an insulated envelope, high-efficiency windows, lighting, heat pumps, and details that reduce thermal bridging and air leaks. These strategies are far superior to building conventionally

and buying carbon offsets or having a huge solar field.”

“Simply replacing fossil fuel-powered equipment with electric components will only go so far toward reducing overall emissions,” Sheff says. “Adding more load to an electric grid that burns coal or natural gas to produce its power is not the ideal solution. Electric components must be added to an existing strategy to make the building as efficient and responsive as possible. Adding variable speed technology to pumps, fans and compressors and using controls technology to operate that system at peak efficiency is key to optimizing a decarbonized building and reducing upstream emissions, as well.”

For many examining the concept of decarbonizing buildings, the key is electric—specifically electric power that is generated by renewables, like wind and solar. A move away from sources that burn fossil fuels and toward renewable electricity could change the game in the fight against climate change.

“The biggest trend lately has been to go fully electric as an energy source for heating and cooling in buildings,” Podesky says. “This is often done with variable refrigerant flow heat pumps. We are taking this approach on most of our building projects in Boston, where the city is pushing electrification. In one particular project, the one system in the building that is not electric is the domestic hot-water system, which is natural-gas fired. For larger multifamily developments, the technology isn’t there yet for large electric water heaters with short recovery times. Also, the operating cost for electric



The Architectural Team’s approach for the Anne M. Lynch Homes at Old Colony draws on staples of Passive House design, including robust, heavily insulated walls and high-performance windows, along with passive solar design and an emphasis on compact, simple geometries to reduce thermal bridges. A highly efficient HVAC split system further ensures a healthy and comfortable indoor environment for tenants.

systems would be higher than gas at current utility rates.”

“It’s important to optimize and always question,” Booth says. “I question my own engineers and clients about HVAC. Do you need that much? Are we oversizing that? The usual approach is to oversize and say we’re better safe than sorry. That needs to change. I think it’s important to ask at every level, ‘Is this the right solution?’”

Challenges

With the push to decarbonize the built environment, the momentum is not infinite and there are headwinds. The main one is economics. Although sustainable strategies can often deliver excellent return on investment, there are costs and, in the end, budget is still king in much of the design and construction industry. But as most climate scientists will agree, the situation doesn’t



give us enough time to let the dollar be the driver. Action is needed now, along with some faith in the long-range economics.

“Initial cost is still a huge barrier to decarbonizing buildings,” Sheff says. “The paybacks on these projects are often quick, but their upfront cost can be significant. Even in new construction, where the best decarbonized designs are available, gas-fired equipment

Flat 9 at Whittier is the first of three phases to redevelop the Whittier Street Apartments site in Roxbury, Mass. The Architectural Team is transforming a 1950s public-housing block into a mixed-income, mixed-use community with onsite resident services, including health-care enrollment and food distribution.

“Delving into building data is low-hanging fruit in terms of capital spend, but it does take time and smarts. Once you’ve optimized the building as far as you can, you may notice systems fighting with each other and being counterproductive. For example, you wouldn’t believe how many buildings are heating and cooling simultaneously.”

—Ian Booth, partner,
Buro Happold

is still chosen because of upfront costs, especially in markets where policies are not in place to incentivize decarbonization.”

“Retrofitting HVAC systems in older buildings can be challenging, and first costs can sometimes be a drawback,” Flammia says. “Over time, though, most of the interventions will save money and work toward a safer, healthy environment.”

Initial investment is one hurdle, but another challenge comes from ongoing operation and the fact that our current balance of policy and power generally rewards doing things the way they’ve been done for years.

“Current utilities pricing does not incentivize decarbonization at a large enough scale,” Podesky notes. “As the

hot-water system example demonstrates, in many cases natural gas is currently less expensive than electricity. That drives development decisions and ultimately influences how much the building team will focus on decarbonization. But as energy codes become more stringent, building envelopes are getting tighter and better insulated, so heating and cooling systems can be smaller as a result. Hopefully this will combine with technological advances to bring electrical costs more in line with natural gas.”

“Whilst many retrofit solutions cannot be justified on an economic basis purely in terms of energy savings, when you consider the avoided maintenance costs and end-of-life replacement costs in the analysis, there is a strong business case for these systems even considering that gas is currently a third of the cost of electricity,” Booth adds. “In most cases we are very much advocates for optimizing the existing systems before replacement at the end of life or during major refurbishments. We also recommend deferring major equipment replacement until an audit has been carried out (chiller and boiler replacement) to avoid missing an opportunity to switch to a low-carbon solution for little to no additional investment cost.”

Opportunities

In the end, there is great potential for long-term savings on buildings that pursue a path of decarbonization. Market forces, as well as new and evolving technologies continue to shorten the

payback periods and make designing a less impactful building easier and more attractive. Improved sensors and building data also give engineers and building operators the tools to make vast improvements in building performance.

“Delving into building data is low-hanging fruit in terms of capital spend, but it does take time and smarts,” Booth says. “Once you’ve optimized the building as far as you can, you may notice systems fighting with each other and being counterproductive. For example, you wouldn’t believe how many buildings are heating and cooling simultaneously. We see a huge opportunity with retrofits.”

“Heat pumps are emerging as the No. 1 technology for replacing gas-fired boilers in buildings,” Sheff says. “Not only do heat pumps reduce emissions, they also lend themselves to variable speed technology, allowing the building’s HVAC system to ramp up and down to meet demand. When this happens, the building is capable of transitioning from an efficient building to a high-performance building.”

“There are amazing new products and research going on in many areas,” Flammia says. “One is a building material made from mushrooms. There are concrete innovations that use fly ash, instead of cement. There are experimental 3D printed buildings made from Hempcrete, which is made of hemp. This is a time that is requiring innovation and a wholesale rethinking of the industry, how we make things and what we value. It is daunting, but it is doable.”



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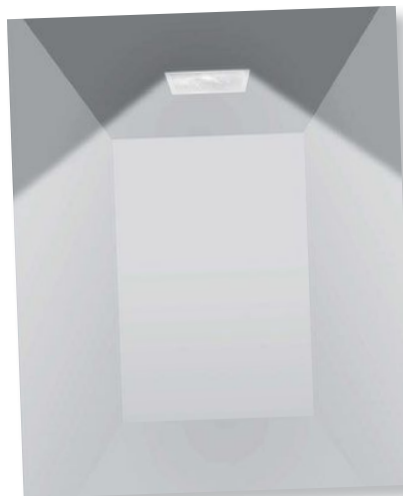
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www.eurekalighting.com/products/family/cycle



↓ DOWNLIGHT NOW OFFERS TUNABLE WHITE SOLUTION



Intense Lighting, a Leviton company, has updated its MX downlighting with a Tunable White solution, making tailored illumination more accessible for any budget. Now available with greater configurability, higher output and increased efficiencies, MX Tunable White provides subtle illumination at 90 CRI with a color range of 2700K to 6500K. Dimming options have been expanded to include 0-10V, DALI, DMX and EldoLED to 0.1 percent. MX with Tunable White is available in downlights, adjustables and wall washers. Custom, high-performance TIR optics, ranging from 14 to 45 degrees, deliver quality light precisely where needed.

intenselighting.com/en/products/new-product

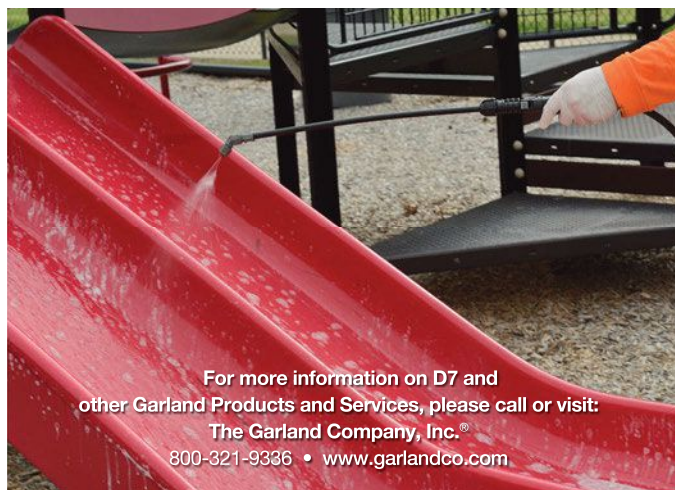
↗ MONITOR AND ADJUST LIGHTING FOR A UNIT OR PORTFOLIO FROM A SINGLE APPLICATION

GE Current, a Daintree company, has introduced Daintree Controls Software (DCS). Built to meet the needs of today and tomorrow, this web-based application empowers users to monitor, troubleshoot and report on the energy performance of indoor, outdoor and industrial spaces from a single application. Building managers can adjust scheduling or lighting parameters based on hours of operation, seasonality, evolving energy codes or business energy requirements. With real-time visibility of what's happening in specific zones, managers can identify issues when they arise, preventing costly oversights. The software can be seamlessly integrated into other building management systems to gain a centralized and holistic view of building performance.

www.gecurrent.com



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↑ SEATING IS AVAILABLE WITH DIVIDER PANEL

Integra Inc. has introduced a divider panel for its popular Coffee House Collection. Available on all straight or curved high back units, the divider panel provides an added level of privacy, separation and acoustics for seating within lounge areas and other commercial interior spaces. The divider panels have an option for stainless-steel stand-offs, which create a space between the seat and back unit and the panels for easy cleaning. When the clean-out seat option is specified, the result is an all-sides clean-out feature that makes it easy to wipe off and sanitize all around the unit. Featuring a dimension of 2 by 26 by 45 inches, the panels are available in a variety of vinyl or fabric options. The panels can also be retrofitted to any high back Coffee House units currently in the marketplace.

integraseating.com/product/hbch-divider-panel

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← TEMPORARY MODULAR WALL IS SUITED FOR OCCUPIED RENOVATIONS

STARC Systems, a manufacturer of temporary modular wall containment solutions used for occupied renovations and infection isolation, has unveiled Fire-blockWall, a modular reusable one-hour fire-rated temporary containment system. Two laborers can install a 10- by 15-foot corner room in 90 minutes, which is an estimated four times faster than traditional drywall, plus no taping, mudding, sanding, painting or cleanup is required. It is designed to meet NFPA 101 or IBC code and provides an STC rating of 40. The containment system exceeds ICRA Class IV (infection control), ASTM E119 and ASTM E84 requirements. The reusable walls include a negative air panel to discharge air, keeping dangerous dust off the ground, and the damper automatically closes when temperatures exceed 165 F.

www.starcsystems.com

→ SURVEILLANCE CAMERAS PROVIDE COLOR IMAGES IN ZERO-LIGHT CONDITIONS

Hikvision, a manufacturer and supplier of security solutions, offers professional video surveillance cameras with ColorVu imaging technology. Available in PT (pan, tilt), turret and bullet indoor and outdoor configurations, Hikvision ColorVu cameras provide vivid, high-resolution color images in virtually any lighting condition, including zero-light environments, by incorporating a combination of high-performance imaging sensors, advanced lenses, a large iris and onboard supplemental lighting. Hikvision ColorVu cameras also feature self-adapting 3D Digital Noise Reduction to ensure high-quality, full-motion video and imaging for a wide variety of applications. Hikvision ColorVu cameras are available in 2 and 4 MP resolution with H.265+ video compression technology to conserve bandwidth and storage.

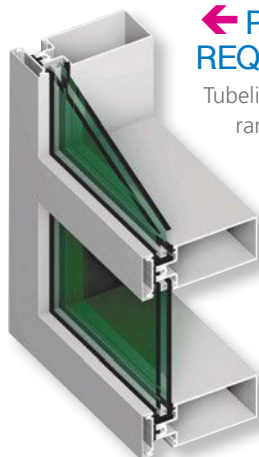
us.hikvision.com/en/products/cameras/network-camera/performance-series/colorvu



↓ PORTABLE LIGHTWEIGHT CHAIRS ARE OFFERED IN NEW COLORS

Allseating has expanded the finishes for its Tuck Collection, a family of seating that is lightweight, versatile and portable, with sturdy frames that can withstand high-density use. The five new colors—Birch, a light gray; Citrus, a true yellow; Indigo, brighter, traditional blue; Pine, a green that reflects nature; and Pottery, a warm gray—join the previous six existing color options—Cotton, Currant, Haze, Midnight, Onyx and Smoke. Each new hue was inspired by customer requests and the latest color trends on the market. The new colors also are available as a painted frame to match the polypropylene back.

www.allseating.com



← PRODUCT FAMILY MEETS BLAST REQUIREMENTS FOR DOD, GSA AND VA

Tubelite Inc. has expanded its ForceFront Blast product family to include a full range of high-security curtainwall, storefront and entrance door systems for low- and mid-rise government, health-care, educational and commercial building projects. The systems are engineered to comply with the blast hazard-mitigating requirements of the U.S. Department of Defense, General Services Administration and Veterans Affairs. Tubelite provides its clients with engineering and estimating support services to deliver projects' required performance with competitive pricing. All of Tubelite's ForceFront systems can be finished in 19 standard paint colors, 10 anodize finishes, plus custom color coatings. At the end of their use on a building, the aluminum from Tubelite ForceFront Blast products can be recycled.

www.tubeliteinc.com

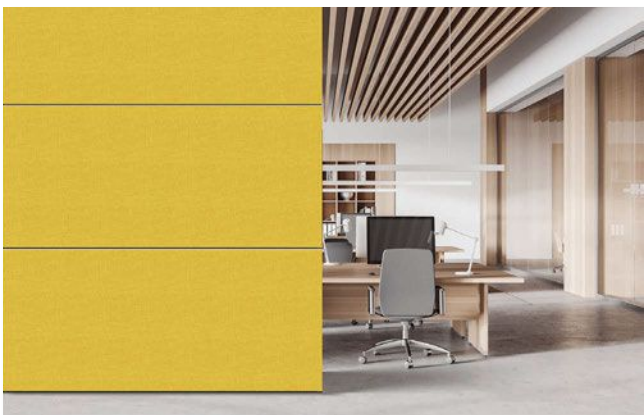


↑ ENGINEERED HARDWOOD IS INSPIRED BY EUROPE'S OLD-GROWTH FORESTS

Mullican Hardwood Flooring has released three series of Castillian engineered hardwood flooring products—Castillian Cottage, Castillian Estate and Castillian Premier—inspired by the old-growth forests of Europe. The series are a modern take on the classic beauty of the hardwood floors found in castles, cottages and manors across the European continent. Made with genuine European white oak lumber, the products are available in three different widths; 10 signature colors; and all include a wire-brushed aluminum oxide finish, which provides a satin look with a 50-year finish warranty.

www.mullicanflooring.com

↓ SOUND-BLOCKING PANELS ENSURE CONVERSATIONS REMAIN CONFIDENTIAL



Lamvin has launched Sonic Sound Block Panels, which were created to ensure privacy and mitigate the likelihood of confidential conversations being overheard. Sonic Sound Block Panels are constructed using 1-pound-per-square-foot non-reinforced mass-loaded vinyl barrier between two layers of fiberglass board. They boast a 29 STC rating. The color and fabric options, as well as the various mounting options, make the panels a versatile addition to commercial spaces. Weighing 2 1/2 pounds per square foot, Sonic Sound Block Panels must be installed from floor-to-ceiling. Four edge shapes are offered: beveled, mitered, radiused and squared. Once in-place, floor molding can be reinstalled, for a polished finish. Sonic Sound Block Panels have been fire-rated via ASTM E84.

lamvin.com

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Arriscraft Page 55
www.arriscraft.com



Belimo Page 11
www.belimo.us



Carlisle Syntec Systems Page 37
www.carlislesyntec.com

DORLEN PRODUCTS INC.

Dorlen Products Inc. Page 79
www.waternalert.com



Dynamic Air Quality Page 28
www.dynamicaqs.com



Flex-Ability Concepts Page 69
www.flexabilityconcepts.com
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The Garland Co. Inc. Page 77
www.garlandco.com



General Glass Page 13
www.generalglass.com



Greenheck Page 15
www.greenheck.com



GSSI Page 4
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Hanover Architectural Products Page 10
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IMETCO Page 77
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www.defenselite.com



IOTA Page 69
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KALWALL

Kalwall Page 31
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Kingspan Panels Page 61
quadcore.kingspanpanels.us/horizon



Lamtec Corp. Page 3
www.lamtec.com



Magnatag Page 74
www.whitewalls.com



Major Industries Page 48
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Mitsubishi Electric Page 27
www.mitsubishipro.com



ModernFold Page 9
www.modernfold.com



Modular Arts Page 14
www.modulararts.com



Musson Rubber Page 68
www.mussonrubber.com



NanaWall Page 84
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Navien Page 5
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Pabco Gypsum Page 83
www.pabco gypsum.com



Pella Corp. Pages 16-17
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www.pac-clad.com
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S-5! Page 41
www.S-5.com



Schweiss Page 79
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Sylvania Page 49
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WOOSTER PRODUCTS

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- 02 ☐ Architect
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06 ☐ Remodeler
10 ☐ Other

WHAT TYPE OF FIRM?

- 02 ☐ Construction
03 ☐ Architectural
04 ☐ Government
05 ☐ Remodeling
10 ☐ Other

HOW MANY EMPLOYEES IN YOUR FIRM?

- 01 ☐ 1-10
02 ☐ 11-20
03 ☐ 21-30
04 ☐ 31-50
05 ☐ 51-75
06 ☐ 76 or more

FIRM'S ANNUAL DOLLAR VOLUME:

- 01 ☐ Less than 1 million
02 ☐ 1-2 million
03 ☐ 2-4 million
04 ☐ 4 million plus

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- 235 ☐ Building Controls
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237 ☐ Retrofit Walls
238 ☐ Insulation
239 ☐ Mechanical Systems, HVAC
240 ☐ Electrical/Lighting
241 ☐ Flooring
242 ☐ Water Management
243 ☐ Solar
244 ☐ Windows/Doors
245 ☐ Clips/Attachments
246 ☐ Fasteners
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THE MILK BOTTLE

An 87-year-old Fast-food Icon Is Refurbished to Once Again Serve Ice Cream



PHOTOS: SOUTH COAST IMPROVEMENT CO.

Boston Children's Museum recently renovated the façade and infrastructure of its iconic Milk Bottle. The Milk Bottle was built in 1934 by Arthur Gagner of Taunton, Mass., to dispense the home-made ice cream he produced. Standing 40-feet tall and weighing 15,000 pounds, the Milk Bottle was one of America's first fast-food drive-in restaurants and an authentic example of the Coney Island style of architecture. If real, it could hold 58,620 gallons of milk.

The Milk Bottle stood as a landmark on Route 44 in Taunton until it was abandoned in 1967. It was left in disrepair for years until HP Hood, a Massachusetts-based dairy company, purchased the deteriorating structure, refurbished it and donated it to Boston Children's Museum.

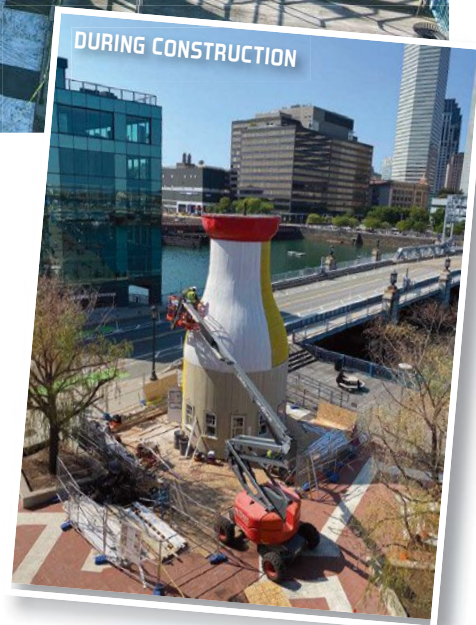
"[The Milk Bottle] has been a meeting place and beloved landmark outside Boston Children's Museum for 43 years," says Carole Charnow, the museum's president

and CEO. "We are grateful that HP Hood is our partner and greatly value our long-term relationship with them." Funds for the most recent renovation project were donated by HP Hood's owners as a gift to the Boston Children's Museum.

South Coast Improvement Co. served as general contractor, and Wessling Architects was chosen as the architect on the project. Work began in August 2020 and was completed in October 2020.

"The challenge with this restoration was to maintain the historic character of this iconic structure while replacing constantly deteriorating exterior materials with more durable options for this waterfront location," says Scott Winkler, associate at Wessling Architects.

Work done on the bottle included stripping the exterior to the frame and installing new insulation, sheathing, siding, windows and doors. The interior received new plumbing, HVAC and electrical, as well as a



makeover so the facility can be operational again.

The Boston Children's Museum recently received the 2021 Mayor Thomas M. Menino Legacy Award by Preservation Massachusetts for the renovation of the historic Milk Bottle. [F](#)



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