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Panchachon Phommueang

FEATURES
COLLABORATIVE LEARNING

36 Education
ELEVATING EDUCATION
Education@USGBC is giving green building professionals wider and faster access to courses that help them expand their knowledge and maintain their LEED credentials.

46 Health
HEALTHY PARTNERSHIP
Green Health Partnership aims to apply the market transformation principles of the green building movement to make health promotion standard within the built environment.

56 connectivity
SEAMLESS INTEGRATION
Touting 27 acres of transit-oriented space, the Blairs Master Plan in downtown Silver Spring may be the future of sustainable urban design.
**LEED On**

7  LETTER FROM OUR LEADERS  
Mayor Kasim Reed  
Mayor of Atlanta, Georgia

**LEED Impact Categories**

10  building performance  
The public schools of Lake Mills are becoming high-performance centers of learning.

16  community  
Green design features add a layer of learning to three acclaimed cultural institutions.

28  ecosystems  
Biologist and author Janine Benyus shares sustainable, nature-inspired solutions to some of the challenges facing today’s green building professionals.

32  green economy  
How parking garages are becoming the newest city parks.

**Departments**

64  community  
Ron Rambo brings a unique approach to green living.

72  professional pulse  
Q & A with Jennifer Seydel, executive director of the Green Schools National Network
While the world watched, One World Trade Center grew in both height and symbolism, its 1,776-foot crystalline form bringing unmatched views back to Lower Manhattan. A redundant structural steel frame, the result of creative collaboration between Skidmore, Owings & Merrill and WSP Cantor Seinuk, ensures that its safety is as substantial as its stature. Read more about it in Metals in Construction online.

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LEED ON,
Mayor Kasim Reed
JEFF HARDER is a journalist who has written for Triathlete Magazine, the Boston Globe Magazine, Cape Cod Life magazine, New Old House magazine, HowStuffWorks.com, and Eating Well among others. He is a creative writing instructor at the University of Massachusetts.

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About 35 miles east of Wisconsin’s state capital is Lake Mills—quintessential suburbia with a gazebo-adorned town center, a weekly farmer’s market, and the rural neighborliness of Anytown, USA. But until recently, its Eisenhower-era Prospect Elementary School was an eye-sore in the community: a rambling collection of brick buildings with boarded-up windows, lights casting a headache-inducing yellow, buckets to capture rain pouring through a leaky roof, and mildew growing in storage rooms. “Every classroom I walked into smelled damp and stale,” says Theresa Lehman, a Leadership in Energy and Environmental Design (LEED) AP, a LEED Fellow, LEED faculty member, and director of sustainable services for Wisconsin’s Miron Construction—the firm responsible for building a new school for the community. Bad air quality and poor ventilation led to increases in allergies and absences among students and staff, and lack of daylight and poor acoustics made it a difficult place to teach and learn.

But strolling through the new 93,284-sq-ft LEED Platinum Lake Mills Elementary School (formerly Prospect Elementary), which opened in 2014, that cold and crumbling institutional setting seems like a distant memory. Windows bathe the interior in natural light. Interconnected classrooms with sliding partitions, reading nooks, and spacious hallways create an environment for kindergarteners through fourth graders that is centered on collaboration, engagement, and safety. A 10-kw photovoltaic system, vegetated roof, solar thermal hot water system, and other sustainability features contribute to saving the school district more than $91,000 in operating costs annually. Perhaps even more importantly, the new school has made a significant improvement to the health and well-being of the staff and students, resulting in fewer absences, fewer illnesses, and improved test scores, along with giving students a school worthy of community pride.
Certified LEED Platinum under the BD+C rating system, Lake Mills Elementary School was one of 120 projects that piloted the LEED v4 beta program. The $18.7 million school has become a point of pride throughout the 5,700-resident community, joining the renovated and expanded Lake Mills Middle School, which opened in 2010 and was the first public K-12 school in the world to be awarded LEED Platinum in 2011, and consequently was named “The Greenest School in the World” by The Center for Green Schools at the U.S. Green Building Council (USGBC).

The elementary school also illustrates how shifting away from straight-row, institution-style schools toward high-performance sustainable buildings gears 21st-century children for what awaits them. “In our new world, kids are going out into a working field where they have to really find their own way and create their own jobs,” says Amanda Thompson, principal of Lake Mills Elementary School. “We want kids to be prepared for that. If they’re in an environment where they’re only taking commands and directions from teachers, then they won’t have the creativity or leadership and communication skills to be able to find their own way.”

The story of a reimagined Lake Mills Elementary School began a decade ago with a deadlock over the district’s middle school. Taxpayers voted six times against funding a replacement for its overcrowded, structurally failing counterpart. In 2007, the new district administrator hired Miron Construction, which approached residents with an eye toward collaboration and transparency, gauging their priorities for a new school and showing them the full life cycle cost of a LEED-certified school. The district administrator led tours of the existing middle school to show the public the school’s stuffy hallways, exposed electrical wires, and layout that failed to conform to the Americans with Disabilities Act. “Believe it or not, after we engaged the community, the referendum passed,” Lehman says.

The LEED Platinum middle school, built at about the same cost as a code-compliant counterpart, opened to rave reviews. Low-flow plumbing fixtures immediately produced a 40 percent reduction in water use. The geothermal heating and cooling system along with a high-performance building envelope and lighting system and associated controls yielded a 50 percent reduction in energy costs. (Residents originally asked to preserve the middle school’s gym, home of so many school dances, basketball games, and sentimental moments. When they learned that heating the gym cost as much as heating and cooling the rest of the school, however, they quickly approved the gym for deconstruction.) The health benefits were palpable and immediate, too: a shop teacher, who had worked in the old school for 20 years, no longer needed to take his five-pill-a-day allergy regimen, due to improved ventilation.

When the district approached taxpayers to fund a new elementary school in 2011, voters approved the new elementary school on the first try. Building a sustainable elementary school, in fact, had become a priority. “People appreciate honesty, trust, and transparency, and money ended up taking a back seat to health improvements,” Lehman says. “I think people see that as an investment,
and they see their tax base for the city rising. Lake Mills has young families choosing to move into the community because of the quality of the schools. Prior to the schools, the population was stagnant for more than 20 years, and there has not been any new industry or businesses brought to the community to create new jobs. It is really impressive that by word of mouth, the quality of the schools and the quality of the education is breathing life back into the community. I’m really proud of the administration, the school board, and the community for trusting the project team. It has been a dream to work with the Lake Mills Area School District. They turned a community with outdated, inefficient, and unsafe schools that cost an arm and a leg to operate, into an award-winning mecca. Three years later, the elementary school still has to schedule monthly tours. Other school districts have come as far away as Turkey to see this amazing facility.

Part of the design process meant inviting a cadre of teachers to offer insights into how they taught, how students learned, and the impediments to learning they had endured in the old school. A major issue was the lack of physical space, says Katie McNeely, a second-grade teacher at Lake Mills Elementary. “There were limited options to alleviate the feeling of being too cramped,” McNeely says. “This was troublesome for kids who needed a quieter atmosphere to work. I used to run small groups at a table that was in close proximity to the workspace of the rest of my class, which was a distraction to both my small group and the kids who were working independently. The acoustics in the room, with its brick walls and stuffy air, made the class volume sound louder than it actually was. All of these factors created an overstimulating environment, for both my students and myself alike.”

The school district once again hired Miron Construction—a USGBC Gold level member company—along with Eppstein Uhen Architects and Sustainable Engineering Group LLC to deliver a high-performance, healthy building. Meanwhile, Lehman discovered that USGBC was looking for LEED v4 pilot projects. It would be the only K-12 school involved in the beta program: The school board was happy to oblige.

The final design of Lake Mills Elementary School was organized around five groups of classrooms—“neighborhoods,” in the school’s parlance—for each grade level. “From wherever you stand in the neighborhood, you can see daylight, the green on the trees, and the blue of the sky,”
Thompson says. In the classrooms, an array of flexible and movable furniture—standing-height tables, wheelie-chairs—means students are not forced to sit still until the final bell, while built-in alcoves and dry erase smartboards help foster creativity and collaboration. “In our new building, we have an ample amount of space to cater to a diverse array of learning needs,” McNeely says. “Within the second grade ‘neighborhood,’ students have access to several different learning spaces. We have our main classroom, of course, but we also have a small group room that is attached. It has glass windows so that I can monitor all of my students from every angle, yet they have an opportunity to work in a more secluded, quiet space.”

Improved acoustics means even students in the back of the classroom can hear the instructor clearly. The cafeteria features floor-to-ceiling windows, daylight and motion sensors that help save energy during off-peak hours, and includes doors that automatically lock down to protect students in the event of a safety incident. A school garden, tended year round by both students and members of the community, grows produce used in the cafeteria. Building materials were specifically chosen because they do not contain carcinogenic volatile organic compounds (VOC) or added urea-formaldehyde, which off-gas, triggering allergies, asthma, and other respiratory illnesses. Many of the materials have environmental product declarations, confirming their individual materials and chemical transparency, and the wood was FSC certified. As for the old Prospect building, Thompson says 90 percent of it was recycled when it was demolished.

Since opening, Lake Mills Elementary School has won 16 awards, including a national Best of the Best K-12 Education Project from Engineering News-Record and a Best of Green Schools Award from The Center for Green Schools at USGBC in 2011. More importantly, in its first year the school saw numerous year-after-year improvements in test scores, a 75 percent decrease in allergy- and asthma-related complaints, and a 15 percent reduction in absenteeism. Ten new families have moved to Lake Mills, in part because of its new schools. Teachers like McNeely have seen a surge in student enthusiasm. “I have seen an improvement in their engagement during learning times due to the array of choices they now have. For example, during a lesson, my students can choose to sit on the floor, sit on a chair with wheels, or sit on a cushion. When they’re comfortable, they learn at a higher rate. Children who typically require more movement during the day choose furniture that provides them with that movement. It’s wonderful to see.”

The students, by all accounts, have an abiding pride in their school and the commitment to sustainability that it represents. “I like that we are saving energy by using solar power and that we are a green school,” says Zach, a fourth grader at Lake Mills Elementary. “I think it’s neat how our school was made to represent Lake Mills.”

The district has now engaged in master planning and a feasibility study for a new high school. While its future remains an open question, pride in its sustainable buildings runs through the community at large. Lehman recalls paying a visit to the local grocery store off the town green and hearing employees—sporting her USGBC-logoed sweatshirt—boasting about their LEED Platinum schools. Thompson recalls a grandmother coming up to her in tears, proud that her community had built this space for her grandchild. “The future leaders of our world are coming to a place where they’ll learn about sustainability, they’ll learn to be stewards of our environment, they’ll learn those 21st-century skills of collaboration and communication, and they’ll know this place was built just for them,” Thompson says.

Zoe, a Lake Mills Elementary third grader, sums it up even more succinctly. “I’ll be sad when I have to leave here. But my little brother will be coming to this school someday!”

Lake Mills Elementary School was the first K-12 school in the nation to achieve Platinum LEED v4 certification, earning 80 out of 110 points. It received the U.S. Department of Education’s Green Ribbon and the Wisconsin Department of Natural Resources Green & Healthy Schools Sugar Maple award.
Excel Dryer is proud to lead the hand dryer industry into the age of transparency by initiating and being selected to chair the first global Product Category Rules (PCR) with UL Environment. Finally, there is industry consensus on how to evaluate hand dryers, allowing architects and designers to make more informed decisions.

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Green design features add a layer of learning to three acclaimed cultural institutions.

**BY KILEY JACQUES**

Boston Children’s Museum, the National Museum of African American History and Culture (NMAAHC), and the Barnes Foundation are seemingly disparate projects. A closer look reveals their common thread: Sustainability is the tie. Enhanced visitor experience is the cloth from which all three were cut. Layered together, they begin to form the fabric of future museum design.

**Boston Children’s Museum**

Originally located in Jamaica Plain, Boston Children’s Museum moved to its current location in 1979. A recent Leadership in Energy and Environmental Design (LEED) Gold-certified expansion by the U.S. Green Building Council (USGBC) member Cambridge Seven Associates (C7A) has breathed new life into the dated building, offering diverse educational experiences for a new generation.

Because the museum is geared toward children and families, the C7A team took special care in designing spaces to support and enrich the shared experience of playful learning. “A common [design] technique is to target the information to a lower-level audience,” explains principal Steve Imrich, referring to the way in which adults help to interpret information for young people. “It’s an intentional targeting relative to the pedagogy of how things work in museums.”

Since the addition’s opening, the museum has created a “green route” highlighting its green roof, graywater system, low-flow fixtures, LED lighting, and recycled materials. “We created a few museum components that interpret some of the LEED features,” explains science program manager Alissa Daniels. “Many of those features are invisible to visitors or [are] very subtle. For example, the light bulbs are all energy efficient, and there is a panel in the museum that explains how they work and what visitors can do at home [to be energy efficient].” Onsite stormwater management, daylighting, and natural ventilation were also key to the project.
Boston Children’s Museum harvests stormwater from both the green roof and main roof for building services such as irrigation and dual flush toilets. This helps to reduce water runoff into Fort Point Channel by 88 percent and potable water demand and use by 77 percent. Photo: © Robert Benson Photography
The new approach from the site's waterside was one of the biggest changes. The original entry was along railroad tracks, below the building's grade level by a few feet and highly inaccessible. C7A raised the entire site up to the level of the first floor of the existing building, via a boardwalk and a plaza deck, to make for a smooth transition from the harbor walk into the museum.

Also noteworthy is the exchange between the existing building and the expansion. Of the original building—once a wool storage warehouse—Imrich says: "It was a simple industrial building that made sense for a museum but it was not a particularly healthy environment for kids." Despite the strong character shift between the existing building and the expansion, the two spaces are well integrated because of what Imrich calls the building's circuitry. "We allowed the free zone of the building to have a very clear circulation to the stair," he says, describing the new glass spine—built from highly daylit bridges on the outside of the existing building—which allows people to come out of each gallery and orient themselves to all of the spaces at once. "Being able to add the new circuitry and spine . . . has enabled the existing building to sing and breathe on its own," remarks Imrich.

Now, thanks to the daylit high bay, light penetrates deep into the existing galleries, which further unites the spaces. The introduction of daylight has impacted the visitor (and staff) experience significantly. "In an old warehouse building such as this one," says Daniels, "that natural light is a wonderful change. I see a lot of visitors looking out the windows, watching the boats in the Fort Point Channel, watching people or just watching the day go by. We have taken advantage of all these windows by developing programs that utilize them; for example, we have done some bird watching and bird identification. Recently, we put up a weather station that encourages visitors to look outside and record their observations about the weather."

Imrich says the expansion is architecturally simple. The original building was constructed with heavy timber and masonry, whereas the addition uses mostly recycled steel in the glass curtain wall. Many of the areas in the new expansion don't have ceilings, making for an exposed structure. He describes it as "fun, open, and utilitarian."

Zinc cladding and wood panels for the exterior create a kind of industrial framework. "The main intent was to allow the exuberance of the exhibits to show through what we
provided as the armature,” he explains. Some of the heavy timber structures were disassembled and reused to make the information desk and ticket counter, and incorporated into other operational areas. Colored panels were introduced for shading and to add a playful element.

One of the more remarkable features of the new space is its centrally positioned climbing structure by Tom Luckey. Built from Forest Stewardship Certified (FSC) wood, the structure reaches from the main floor to the top floor and is visible from all levels. “It offers an opportunity for the kids to feel free and to explore while allowing parents to see them from multiple vantage points,” notes Imrich. “It’s watchable and safe but it’s also intricate and interesting.” Whereas the old climbing structure was located deep within one of the galleries and had no relationship to the greater museum, the new one serves as the primary “wayfinding device.”

The new space permits museum curators and program directors to be more creative with their offerings. They can accommodate tennis ball cannons and an interactive dance floor, for example—things that require a lot of space. “One of the main characteristics of the new space is that it has more generosity both vertically and laterally . . . the existing building was very cellular . . .”

C7A also created the Commons, an area intended for collaborative learning. Located on the second floor in one of the existing galleries, it is part of the adaptive reuse design. “It was meant to be a flexible space that could be used for group demonstrations or lectures or special events. We very specifically designed it such that when it’s not being used for an event, it’s still active and interesting to be in,” Imrich explains, noting its signature wall with silhouettes and colorful built-in storage units for games like life-size chess.

Outside the museum, the visitor experience is meant to be varied and is characterized by the harbor, the renovated iconic milk bottle, a maze in patterned paving, and climbing boulders, which Imrich describes as “basic but unusual.” The museum makes relating to the environment a priority. “They view the children that visit the museum as future stewards of the environment,” explains Imrich. “They realized how important it was to hit that topic hard.”

Given how disconnected from the site the existing building had been, it made sense to use it adaptively, in concert with the new expansion, to wed it to its surroundings. “Interconnecting the site, the existing building, and the new construction was the primary goal,” concludes Imrich.
National Museum of African American History

In 2009, four architectural firms and nearly 30 consultants began a seven-year journey on behalf of those with ties to a much longer journey.

Led by the Freelon Group, which has subsequently been acquired by Perkins + Will, and lead designer David Adjaye, the National Museum of African American History and Culture (NMAAHC) project in Washington, D.C. is pursuing LEED certification.

Opened in September 2016, NMAAHC offers a rich and layered visitor experience referencing both African and American histories. Senior project manager Zena Howard, AIA, LEED AP of Perkins + Will, explains that the three-tiered inverted pyramid shape of the building references ornate crowns made by the Yoruba peoples of West Africa. She compares the all-glass building’s corona façade to a lampshade. Comprising six cast-aluminum panels of randomly patterned modulated filigree, the corona serves dual purposes: It accentuates chosen views and controls light and heat gain. A patented Kynar five-coat variegated finish simulates real bronze, which is cost and weight prohibitive. Howard notes the materiality and patterning are a nod to the craftsmanship of African-American ironworkers living in the south in the pre-Civil War era.

The route through the exhibits begins below ground—a design choice intended to symbolize the depth of African American history. Coming up, the experience is one of contemporary times, of light and empowerment, community and culture. Daylighting plays a large role in evoking that sentiment. “We thought it was important to harvest light not just for the sake of the exhibits but also to enhance the experience of the context,” explains Howard. “Daylight is used as a teaching tool to point visitors to . . . the historical significance.”

Because the site’s water table sits just five feet below grade, rerouting water was a constant. “We thought we might as well just celebrate it,” says Howard, noting that water is significant in African American culture because it was the mode by which Africans were transported from their homeland. On the south side, visitors cross over a water feature that is a combination of both moving and still water—referencing the “nonlinear” African American experience, whereby turbulence and peace occur simultaneously, as in the case of slavery and freedom.
Interestingly, all of the groundwater goes through sand filters before being reintroduced to the soil. “We are actually scrubbing D.C.’s groundwater, one drop at a time,” notes Todd Case, senior associate, AIA, LEED AP at Perkins + Will. The building also houses a 100,000-gal tank for harvesting and recycling water for potable uses.

Crossing over water and under a grand 180-ft porch—a symbol of African American life in the South, where the vernacular structure is used to celebrate community—visitors walk into a space meant to mediate the transition between exterior and interior. The overhang creates a cool microclimate for respite on the hot south-facing side. “Between the shade and the water and the captured wind, it’s a very nice cooling environment that people are drawn to,” says Howard.

The museum sits on the National Mall, “in the shadow of the Washington Monument and the White House.” The historical significance of the location is paramount. Although the visitor experience is one of immersion, the design team felt it was important to bring people out of that immersive state for moments at a time. “The idea is to immerse the visitor in the content of what they’re seeing, learning, and
processing," explains Howard, "... [but] we didn't want people to forget the sanctity of the place where [the museum] is located." She gives the example of the military gallery, which frames a view of the Washington Monument; the exhibit content and its context couldn't be more fitting, and the visitor is helped to realize that.

Night lighting was a tricky challenge, given the all-glass structure. They wanted to both avoid light pollution and deflect the harsh artificial lighting coming in from the hyper-lit Capital surroundings. "We had to figure out a way to do that that made the building something beautiful and lacy," explains Howard. To accomplish this, they lightly fritted the glass of the curtain wall, which serves two functions: It diminishes incoming artificial light and provides bird collision protection. And since the frit is backlit at night, the whole building has a soft glow devoid of hot spots. "Because the corona angles up," explains Howard, "uplighting made sense, initially. But when we found a way to revert to downlighting by fritting the glass, we switched to mounting the lighting on the top tier of each of the three levels—angled down and lit backwards." That prevented light pollution and resulted in less energy use. While the interior lighting makes use of LED technology, that is not the case with the exterior lighting, so it was important to find an alternative means of minimizing energy use. "This approach was different and helped us be more efficient and use less artificial lighting, which is a direct parallel with energy savings," notes Howard.

Because the museum is structurally supported by four cores from which the corona hangs, it remains a column-free space, which allows for its signature panoramic views. The team's mechanical engineers (WSTi) accommodated the space by using the four cores to house the workings of a highly energy-efficient HVAC system on the upper floors. "The challenge with museums is to keep air velocity relatively
Below: The enveloping lattice opens the building to exterior daylight, which can be modulated according to the season. Right: The openness to light is also symbolic for a museum that seeks to stimulate open dialogues about race and to help promote reconciliation and healing. Photos: Alan Karchmer/NMAAHC
low so as not to compete with the exhibits,” notes Case. “To their credit, that was exceptionally well done.”

The footprint of the building, being largely below grade, meant much of the park-like space surrounding it could be preserved. “We have a significant amount of building relative to the site we have,” says Case. “We were tying into the National Mall and didn’t want to just fill the site with building . . . In essence [the museum] is a monument on a piece of park land.” That park-like appeal was largely accomplished by changing the site topography. The mounding up of the north side in combination with the green roof creates significant green space. “Burying so much of the building below grade facilitated mounding up [earth] to cover the building,” explains Howard, “which created a rolling landscape that relates more to the landscape seen on the Washington Monument grounds. It’s not just a flat lawn; there’s a little bit of a roll, which makes it feel more like a park.”

NMAAHC is also a deeply evocative metaphor for the plight of African American people. Keeping sustainability at the project’s fore added yet another chapter to the narrative. “The building is sustainable in terms of being socially responsible to our environment,” says Howard, “but it’s also sustainable in terms of sustaining the heritage, culture, and identity of people who are American first and African American overall.”
The Barnes Foundation

Philadelphia is a city that cares deeply about the arts and sustainability, so it makes sense that the Barnes Foundation’s new Art Education Facility earned LEED Platinum certification—the first major art and education institution in the country to do so.

The collection of primarily Impressionist works—originally housed in a Paul Cret gallery in Merion, Pennsylvania—was moved to its present location (formerly a brownfield) on the Benjamin Franklin Parkway to make its offerings more accessible. The two-story, 93,000-sq-ft building, designed by architects Tod Williams and Billie Tsien in collaboration with Ballinger, opened in 2012 and is immediately recognizable for its crowning “light box.”

The lighting system, designed by Fisher Marantz Stone, is probably the most engaging of the building’s features. According to Peg Zminda, the foundation’s executive vice president, CFO, and COO, “The . . . immensely sophisticated filtering of natural light in the collection allows visitors to view the art and participate in our educational programs in the best possible environment.”

The signature light box—a large, seemingly all-glass light monitor—is peppered with small openings that allow diffused sunlight to enter the building. “It appears to be all glass, and it is in its imagery,” notes Williams, adding that the feature also hides the PV system above. “The building looks like it belongs in the parkway because it seems to be largely without windows. But it has a great deal of natural light brought in other ways.”

The potential volume of natural light penetrating the space called for a specialized system of controls. (Each gallery has its own lighting restrictions, depending on the percentage of sensitive organic material in the exhibits.) To start, the glass allows only 14 percent of light in; there are devices on the roof that track the sun in real time, and exterior electric shades close off the galleries to sunlight when necessary.

Williams values the less obvious ways in which design influences the visitor experience—the “domestic”
characteristics that make a place feel comfortable. He cites the stairs as an example. “One of the things that we’ve always believed in is making buildings fully accessible but also making your senses move through [them],” he explains. “That’s one of the reasons we made the stairway so prominent.” Constructed of reclaimed ipe wood from the Coney Island boardwalk and hand-hammered stone, they are inherently warm and inviting, and therefore domestic.

Claudy Jongstra, a Dutch artist renowned for her sustainable techniques, designed the 15 large-scale panels on the lightcourt. Made of wool (from sheep she raises) and silk, they add “sensuality” to the space. “The visitor experience in the center court,” says Williams, “is enhanced by the comfort in the beauty of the wood on the floor, the panels on the walls that give a different texture and absorb sound, and the light that comes from the top.”

Carrying the theme of domesticity through the space was intentional. Working with landscape architect Laurie Olin, the team created what they call “a gallery in a garden and a garden in a gallery.” Noting that most museums do not offer immediate access from exhibit space to the outdoors, Williams says, “I think it’s an important connection . . . to be able to step outside rather than experiencing it from inside a glass wall.”

Bathed in natural light, a visitor relishes simultaneous views of the paintings and the exterior gardens—a palpable design strategy. Or, as Williams puts it, “a technical and a psychological condition.”

The building’s LEED features are not pointed to with signage. “Visitors come in and they feel good,” says Williams, and for him, that is what matters most. The idea is to encourage people to “interpret” the space for themselves—similar, in principle, to Dr. Barnes’s own decision not to display text explaining the paintings he collected and exhibited. “He wanted people to use their eyes and to realize they didn’t need to know the title to appreciate the art,” explains Williams.
Biologist and author Janine Benyus shares sustainable, nature-inspired solutions to some of the challenges facing today's green building professionals.

BY KILEY JACQUES

Were it not for biologist Janine Benyus’s keen interest in nature’s systems, the term “biomimicry” may not have been coined. Defined as “an approach to innovation that seeks sustainable solutions to human challenges by emulating nature’s time-tested patterns and strategies,” biomimicry can be applied to any number of situations in the fields of science, architecture, and engineering.

A natural history writer, Benyus has published multiple books about the ways in which plants and animals adapt to their habitats. These “ecosystem-first” field guides are intended to help people find nature-inspired solutions to challenges facing the green building industry and beyond. “That adaptation to place always has to do with these amazing technologies,” explains Benyus, citing examples that include UV-resistant animals living in high altitudes and thriving with thin air; and those living at the bottom of the ocean, withstanding enormous pressure. It is their ability not only to survive extreme conditions that fascinates her, but also their ability to enhance their environment—perhaps by making the soil more fertile or the water and/or air cleaner. Benyus describes the phenomena as “nature creating conditions conducive to life.”

Noting these adaptive characteristics, Benyus wanted to know whether or not all organisms have such “technologies.” She began thinking in terms of physics, chemistry, and “ecosystem strategies.” Being a researcher, she collected volumes of scientific studies pertaining to this idea of emulating nature for the sake of innovation. Her findings revealed that there was no name for the notion. And so, in 1990, the term “biomimicry” was born, as was another book by Benyus.
The book *Biomimicry: Innovation Inspired by Nature* received some unexpected attention. Architects and urban planners began calling. "I really had no idea that the design community would pick up on the idea," she recalls. (Incidentally, the book did not include an intended chapter on architecture, which she omitted for space.) Yet the first person to contact her was Jane Jacobs, the writer and activist whose work revolutionized the way urban planners think about the built environment. "Architects read outside of their field," notes Benyus, adding that their understanding of the Fibonacci sequence makes them sensitive to the natural world.

Next came sustainability champion and founder of BNIM Bob Berkebile, and before long, Benyus found herself giving a talk at an American Institute of Architects (AIA) conference in Toronto hosted by Jacobs. "The architectural committee was very excited about the possibilities inherent in the idea," says Benyus. Soon after, large corporations like Boeing, General Electric, Herman Miller, Nike, and Interface started inviting biologists to their design tables.

The buzz led to Benyus’s founding her consulting firm, Biomimicry 3.8. She and her team started working with inventors on things like desalination. “We would tell them how mangroves work, or how the nasal glands of seabirds work to take salt out of water, and how kidneys work to do the same. And then we would help them translate that into new products,” explains Benyus.

Examples of biomimicry at work in the built environment include bone-inspired lightweighting of structural beams, based on the work of Jeff Brennan. Benyus explains: Bones are constantly forming and reforming throughout a given life span according to lines of stress, to which they react by removing mineral from elsewhere to support areas of weakness. Brennan’s OptiStruct software—found in computer-aided design (CAD) and computer-aided manufacturing (CAM) programs—assesses solid beams in terms of how much stress they need to handle, then removes mass where it isn’t needed. The beams end up looking like bony structures. “Lightweighting has incredibly high sustainability potential,” remarks Benyus, “because less material is used.”

Another application: self-cleaning façade paint inspired by the lotus leaf. Lotusan paint—widely used in Europe—mimics the leaf’s bumpy structure, which causes water molecules to ball up; as they roll off, they pick up loose dirt on the surface. It is an excellent alternative to sandblasting.

Designers are also starting to use “structural color,” which replaces potentially toxic pigments with structural properties. The study of peacock feathers has revealed a lack of pigment; in truth, they are straight brown. The colors seen by the human eye are created when layers of keratin, which is transparent, allow light through and then bounce it back, amplifying, say, the color blue. Move a few millimeters over and the structure changes, resulting in the color yellow. A few more millimeters in another direction and yet another color appears. This kind of coloring is four times brighter than pigment. Paints containing mica chips—in lieu of pigment—mimic the finding.

Consider, too, imitating marshlands to treat wastewater, resulting in what Benyus calls the “whole living machine,” comprising different genomes of bacteria, crustaceans, plants, and animals that are cleaning water in a series of tanks, “basically mimicking the entire ecosystem.”

Benyus and her cadre devised the Biomimicry Global Design Challenge, sponsored by the Anderson Foundation, as an opportunity for professionals of all types to go through a biomimicry training that includes an intensive, seven-week MBA program. Contestants create small businesses with the
goal of addressing real-world problems; this year’s theme is global warming. “I believe that climate change is the biggest thing that we have to get right,” says Benyus. “And the built world contributes so much CO₂.” As a biologist, she sees carbon dioxide as a building block. “It has always occurred to me that we are missing a grand opportunity,” she says, noting the way in which plants sequester CO₂, and how that process can be applied to the built environment by turning CO₂ into sugars and starches, which are essentially long-chain polymers, that is, plastics.

California-based New Light Technologies is now using CO₂ as well as methane—another greenhouse gas—as food stock to make plastics. Benyus marvels at the possibilities inherent in carbon-sequestering plastic products. Ikea is jumping on the bandwagon; they have signed a contract to make all of their products out of methane. And The Body Shop is planning to use it for packaging. “This is really starting to happen,” enthuses Benyus.

Asked which biomimetic solution has impressed her most, Benyus cites the mimicking of coral reefs to make a concrete-like material. Reefs (and the shells of crustaceans) form when CO₂, calcium, magnesium, and carbonate are dissolved. “There is a recipe ... very similar to concrete—the most widely used building material on the planet.” Biominalization expert Brent Constantz’s company, Blue Planet, makes carbon-negative concrete by taking CO₂ from smoke stacks, running it through saltwater containing all of the minerals used in the making of coral reefs, and precipitating out the raw materials for concrete. “People should be thinking about all of the materials that go into a built environment that emit carbon dioxide to see whether or not there’s a way in which to sequester it,” says Benyus, who sees sidewalks, roads, and entire cities built of CO₂-sequestering concrete.

But biomimicry goes beyond the individual technologies. Benyus wonders what a biomimetic city would look like. “If biomimicry is about function,” she notes, “then a city should function like an ecosystem.” She advocates for “ecological performance standards”—metrics for tracking ecosystem services, meaning, environmental benefits. Pollination, for example, is an ecosystem service for which a building with a green roof might receive credit. “We call it a generosity score,” she explains. “How many ecosystem services is the building producing? It’s ‘generous’ by giving away these services.”

Today, biomimicry has burgeoned into a field for which a master’s degree program is now available at Arizona State University, as is training through the Biomimicry Institute, a nonprofit founded in 2006 by Benyus and Bryony Schwan. Online resources include asknature.org, a deep pool of cutting-edge biomimetic applications.

Benyus’s mission is to accumulate performance-based data to determine a building’s functionality as an ecosystem. With that information, comparisons can be made between buildings, between developments, and between cities. Those findings, she believes, will lead to the production of more ecosystem services, which, in turn, will result in sustainable, resilient design on a global scale. “The goal is to build cities that are functionally indistinguishable from the wildlife around them. That’s true biomimicry.”

Left: A combination of microscopic bumps and hairs on the lotus’s waxy leaves causes water droplets to bead up. Middle: The colors of a peacock feather depend on the exact position of the spot on the branch and on the angle of the incident light. Top: The emerging science of biomimicry is guiding the development of Lavasa, a new India hill town spread across 12,500 acres of picturesque land southeast of Mumbai.
How parking garages are becoming the newest city parks.

BY MARY GRAUERHOLZ

Boston has almost 7.5 million square feet of designated, off-street parking space. Wide swaths of concrete, asphalt, and steel, often spattered with oil from vehicles and salt from roadways. The parking facilities in this East Coast city—and across the country—have long been an egregious land-hog. But that is changing.

Parksmart, formerly Green Garage Certification, is a relatively new addition to the suite of sustainability rating systems administered by the Green Business Certification Inc. (GBCI) and was developed with the support of the International Parking Institute. Parking facilities are rated on the basis of sustainable practices in management, programming, and technological design. As a result, parking structures now have an opportunity to show communities how they can be more environmentally friendly, by finding innovative ways to reduce energy consumption, maximize performance, and minimize waste.

There are currently 10 Parksmart-certified facilities—all in the United States, though certification is open to facilities worldwide—and 63 sites pursuing certification, says Paul Wessel, the director of market development for Parksmart and the former executive director of the Green Parking Council. “The ultimate goal of Parksmart is to create more mobility for more people, using fewer resources,” Wessel says. “All the pieces are there, or are emerging. Parksmart makes sure parking asset owners are at the front of the curve.”

Right: Post Office Square is mitigating 100 percent of its electricity footprint with renewable energy under a 25-year Power Purchase Agreement, partnering with MIT and Boston Medical Center, to purchase all of the output from Summit Farms, a solar project in North Carolina.

Photo: Ed Wonsek ArtWorks Inc.
Consider the Garage at Post Office Square, located in Boston's Financial District, the first Parksmart-certified parking garage in Boston. (Another, Charles Square Garage, is in nearby Cambridge.) Formerly a rundown, three-story, above-ground parking garage, today the Garage at Post Office Square is a modern, seven-story underground facility with a sophisticated ventilation system and eye-catching green roof: the 1.7-acre Norman B. Leventhal Park designed by Halvorson Design, dotted with trees, fountains, and a gazebo-covered café.

John Dalzell, AIA, senior architect for sustainable development for the Boston Planning & Development Agency (BPDA) and a LEED Fellow, is optimistic about Parksmart's role in Boston. The big story today, Dalzell says, is how municipalities are leveraging the suite of GBCI rating systems to promote sustainability in cities and drive best practices. "Parksmart gives us a new tool to drive sustainability and best practices for structured parking garages and marks a new milestone in that story," he says.

Parksmart also offers an opportunity to explore partnerships between cities, private enterprise, and the nonprofit community. The City of Boston made the Garage at Post Office Square, formerly an above-ground parking garage, available for redevelopment. That process involved the local business community, which saw the value in having a public park as a beautiful amenity, as well as the additional parking made possible by the underground garage.

The Garage at Post Office Square is owned by a civic corporation made up of 20 Boston firms and individuals who have a strong interest in improving the Post Office Square district, Friends of Post Office Square. Creating a park, complete with free activities, had the support of the City of Boston and the local community, which were seeking ways to create more green space in the city. "This isn't just about how the city works with Post Office Square, but how cities work with organizations like the real estate company and the U.S. Green Building Council (USGBC)," Dalzell says. USGBC, he adds, provided the means for the city to define acceptable practice and the market recognition to reward leading practitioners. "This is about what we can do together."

Parking structures have been "a glaring gap" in environmentally minded construction, Dalzell says. "They have an enormous impact. We see Parksmart as a new, important addition to the suite of green building and sustainability rating systems."

Located completely below ground, the Garage at Post Office Square is invisible to the throngs of people buzzing through Boston's busy downtown on any given day. The only landmark is the Norman B. Leventhal Park, set above the garage. The park, a respite from the urban traffic and busy sidewalks, offers places to relax while its trees and flowers absorb CO2 and give out oxygen. In the summer, the park offers free music concerts and fitness classes organized and provided by Friends of Post Office Square.

The park turned site of the previously decrepit three-story garage, which had been city-owned, into a community
connector. “It was a horrible property,” says Pamela C. Messenger, general manager of Friends of Post Office Square, of the above-ground facility. “Above-ground parking garages leave a lot to be desired in urban environments,” she muses. “They are not the highest and best use of land; you’ve got four sides of a building that don’t offer anything. They’re just not welcome neighbors.” The park, besides offering green space and greatly decreasing stormwater runoff from the city block, also generates revenue through property taxes and increases the value of nearby properties. “The park is our face to the world,” Messenger says.

Inside, the garage installed a sophisticated ventilation system to reduce pollution and carbon monoxide detectors on every level, with fans that switch on before carbon monoxide levels become dangerous. Offices and underground restrooms are climate controlled.

The previous garage was demolished in 1988. “The irony is, it was almost 34 years old,” Messenger says. “The new garage is 26 years old and we’re not anything close to [the wear and tear] of the old one. We look a lot younger than our years.” The garage includes two car-sharing services, one devoted to 100 percent electric cars and one for traditional gasoline-powered cars, which diversifies mobility options available to the community and promotes alternative modes of transportation.

The Post Office Square Garage is certified at Parksmart’s Pioneer level, as are all existing qualified parking facilities that earn certification. (The Pioneer level is currently the only designation for existing garages.) New facilities, or those commissioned within two years of registration, are eligible for Bronze, Silver, or Gold certification.

Since the certification, Friends of Post Office Square has formed a consortium with Boston Medical Center and the Massachusetts Institute of Technology (MIT) to purchase credits for alternative energy, produced at Summit Farms, a solar facility in northeastern North Carolina. “Under our Power Purchase Agreement, we’re offsetting 847 kilowatts of electricity annually,” Messenger says. “This is the equivalent of the entire annual electric bill for the garage and the park.”

For the City of Boston, Parksmart and other GBCI rating systems have the potential to open a new pathway in an expanding vision for a more environmentally sustainable future. In addition to Parksmart, Boston has already set precedents, says Dalzell at the BPDA, including a first-in-the-nation zoning ordinance that requires projects of more than 50,000 square feet to achieve LEED certification. The zoning ordinance turned 10 years old this year.

Boston continues to demonstrate leadership when it comes to building strategies and best practices in sustainability. This past January, Boston Mayor Martin J. Walsh committed Boston to be carbon neutral by 2050. “We can look at Parksmart to provide a framework for low-impact/high-performance parking facilities with energy storage, electric-vehicle charging, and solar canopies,” Dalzell says. “Parksmart fills an important gap in our strategy.”
Elevating Education

Education @USGBC is giving green building professionals wider and faster access to courses that help them expand their knowledge and maintain their LEED credentials.

WRITTEN BY CALVIN HENNICK
The U.S. Green Building Council (USGBC) constantly encourages design and building teams to adopt an integrative process that brings stakeholders together early on to improve outcomes down the line.

So when the organization wanted to revamp its educational programming several years ago, it followed its own advice. Rather than simply picking a path and plowing forward, USGBC sought input from more than 250 users of the organization’s educational offerings, along with other firms that it thought could benefit from the programs, and people and groups involved with green building education in other capacities.

“We talked to all types of folks who were already touching the education that we did, or those that weren’t touching it, and we thought should be,” says Melanie Share, project manager for education platforms. “We stumbled upon the pretty clear trend that people didn’t necessarily expect USGBC to be the one creating all of the education related to green building and Leadership in Energy and Environmental Design (LEED), but people did view USGBC as the convener in this area. That idea was really transformational for us, because it kind of clicked—the idea that our role should be to bring like-minded individuals together and provide that space for interaction.”

Thus began Education @USGBC, an online “one-stop shop,” in Share’s words, that gathers hundreds of courses developed by USGBC education partners, and even member companies. After a soft launch in late 2013, the platform kicked off in earnest in January of 2014, and since that time, more than 30,000 users have taken online courses, helping them to maintain their LEED credentials and to keep growing their green building knowledge.

Previously, USGBC had offered a subscription webinar service, along with many in-person trainings. “We would coordinate pretty much every aspect of the event,” Share says. “We felt like we were trying to be all things to all people, and it wasn’t necessarily scalable.” In the new model, USGBC brought together organizations that were previously seen as competitors and fostered a spirit of collaboration.

Along with curating educational content from a number of different groups, one of the big ideas to emerge from the brainstorming around the revamp was the implementation of a peer rating system. “We were thinking of it like an Amazon marketplace of green building education,” Share says. “The attitude we had was, how can we collectively leverage the work that is being done for the greater good of the movement? And we knew that an important component of that was having a peer feedback-driven experience.”

The result, Share says, is a combination of quantity and quality. The large volume of partner-provided content gives users a wide range of choices, and the peer feedback system ensures that they see the highest-quality courses first.

The most obvious benefit of Education @USGBC is that it provides green building professionals with flexibility and control in obtaining the educational content they need to maintain their LEED credentials. Share hopes that credential maintenance is only one of the things users are walking away with.

“There are people out there taking way more than their 30 hours of required maintenance [every two years],” Share says. “We know those individuals aren’t looking to just check a box, but to learn more. One of the ways we seek to support them is by having such a large pool of courses to pick from. They can choose the courses that are right for them, and expand their knowledge of green building.”

Many USGBC member companies are embracing Education @USGBC in innovative ways. Whether they are contributing new courses or leveraging existing offerings for the benefit of thousands of employees worldwide, organizations are connecting with the education content to deliver better buildings. Here are four examples of companies making the most of the platform.
Increasing Flexibility
Before the advent of Education @USGBC, the global architecture and design firm, and USGBC Platinum member, Perkins + Will had to create and deliver much of its LEED-related educational content in-house.

“We did a lot of lunch-and-learns for LEED specifically,” says Paula McEvoy, co-director of sustainable design for the company. “We have almost 900 LEED APs who need continuing education, and we were having to develop courses to [help them] study for the exam, and then find a way to deliver the courses across our 25 different offices across the globe.”

Ann Peters, learning and development manager for the firm, had to scour different departments for people who were both experts on a specific topic and able to devote the time to creating a course and presenting it. Even when all of those pieces came together, it still proved challenging to simply deliver the content to everyone who needed it.

“It sounds easy to do a lunch presentation,” McEvoy says. “But we had to hit time zones, from all the way across the U.S., to Brazil, China, and the Middle East. So we were finding ourselves developing these courses, presenting them at least twice during the day, and then still missing some of our offices.”

While outside classes were an option, the high dollar figure for in-person classes, coupled with Perkins + Will’s large number of employees, made it more cost-effective for the firm to develop trainings on its own.

Then came Education @USGBC. With the online platform and the benefits available via its Platinum level membership, Perkins + Will is able to offer its employees unlimited courses, on a much wider variety of topics than the firm was able to offer previously. “It simplifies things,” says Peters. “It also provides us some much-needed flexibility in terms of learning opportunities. We’re able to reach a larger audience. And given the nature of project demands, and everything that all of our employees have going on, the ability for them to learn anytime, anywhere, is fantastic, and really, really helpful.”

The platform also gives employees more chances to explore new content, and to take control of their own learning. “Now, it’s less us telling them what they should learn,” Peters says. “They have the opportunity to go in and say, ‘Oh, this looks really interesting, I’d like to take a deeper dive there.’” Peters says that there is a “pretty wide range” of ways that Perkins + Will employees interact with the online learning platform. “I think a big portion of our usage comes from people maintaining credentials,” she says. “But we have a pretty curious audience that’s actively learning and engaged in professional development. Depending on the project that they’re working on, they’re going in and seeking additional information and expertise. They’re going in and they’re looking and exploring and finding new ideas and methods.”

“The content is continually updated,” Peters adds. “So as technology changes, and research evolves, we are able to go to the online content and see what’s been added.”

Net Numbers
More than 500 courses are included in the Education @USGBC subscription.

Individual courses cost $45, while an annual subscription is $175 for USGBC members and $199 for nonmembers. Subscription content is available free of charge to all employees of USGBC Platinum level member companies.

More than 31,000 individuals have completed at least one class on the online platform.

In total, more than 293,000 courses have been delivered over the platform.
For McEvoy, that’s one of the biggest benefits of Education @USGBC: Perkins + Will employees can access it when they want, and how they want. “We get calls or emails from people saying their LEED AP accreditation is about to expire, and they need courses now, and it’s really helpful when people let stuff slip up,” she says. “It’s available in multiple formats, anytime anybody wants it, with both very specific content or very general content, depending on what they’re looking for, and in multiple languages. That flexibility, for us, was really a key.”

Cutting-Edge Content

In 2015, the Seattle-based Callison and the Baltimore-based RTKL merged to become CallisonRTKL, a design consultancy of the Dutch firm Arcadis, a Platinum-level member of USGBC. At the time, RTKL required all of its employees—down to its receptionists—to attain at least the LEED Green Associate accreditation, while Callison did not. After the merger, the requirement extended across the entire consultancy.

This meant pushing dozens of employees toward LEED accreditation in a short amount of time. “It was a monumental task to educate that many people, but we did it,” says Amber Richane, the performance driven design lead for the firm.

To get things started, CallisonRTKL offered a series of in-person workshops. “The workshop format worked well for this as it brings people together to learn from not only the instructor, but each other. It also encourages them to work together in studying for the exam.” Richane says. Most employees were able to attend these workshops to successfully earn their LEED Green Associate credential. But for people who wanted to continue learning and pursue a LEED AP credential, the Education @USGBC platform provided a path forward.

“We have heard many people say, ‘Wow. That [workshop series] was really helpful. I now have a better understanding of green building concepts and LEED accreditation and now I’d like to get my LEED AP with specialization,’” Richane says. “That is where we see the most value in the online resources to continue the education of our people.”

USGBC Platinum members like CallisonRTKL are able to give all of their employees anytime/anywhere access to the online education platform—a benefit that Richane has not seen with other education programs. “We are a company with offices all around the globe and the Education @USGBC platform allows our entire firm to take advantage of this resource in their own time zone, as they are able,” she says. “Many of the other online resources are purchased on an individual class basis and that can be very expensive and inconsistent. Education @USGBC delivers high-quality and consistent content.”

The employees who are most deeply involved in green building work, Richane says, tend to rack up enough continuing education hours through project experience to maintain their LEED AP credentials.
For the firm’s other employees, the online education platform is often the most convenient way to keep their LEED credentials up to date. But if some employees—accountants, for instance—will never design a solar panel installation or make decisions about how to improve natural lighting in a building, then why have them pursue and maintain LEED credentials in the first place? For CallisonRTKL, Richane says, it’s a matter of instilling a knowledge of green building concepts throughout the organization.

“The LEED Green Associate is a great first step in understanding the basics, but it is not as in-depth as the LEED AP with specialization credential,” she says. “But understanding the basic sustainability strategies and philosophies is something that can be applied in all aspects of life for our employees including practices at home. So it just seems to make sense to educate our employees across the firm so we can practice what we preach at work and home.”

Education @USGBC has become the predominant education resource for CallisonRTKL, with employees gobbling up nearly 3,000 hours of instruction on the platform last year. Richane says that the courses provided via the platform are among the most rigorous and engaging in the industry.

“These are engaging and challenging classes with a quiz at the end that you have to have had paid attention to pass,” she says. “You can’t just check out during the webinar or podcast and expect to pass but the content is presented in an interesting manner though, so I haven’t heard people complain. The feedback we are hearing is that people are enjoying learning and engaging on the topic that they selected to learn about.”

Richane says she continually promotes the online education platform to the firm’s employees, not only as a resource for credential maintenance, but to push learning around new topics. “There are a lot of topics beyond just LEED that our people are interested in learning more about and the Education @USGBC platform has a diverse amount of topics (such as performance modeling, mass timber, Life Cycle Assessment (LCA), the WELL Building Standard, Living Building Challenge (LBC), etc.) that support their interests. “This keeps our employees engaged and hearing the latest thinking around a topic,” Richane says. “That’s what makes these resources so valuable for CallisonRTKL and our employees; it is a platform for in-depth learning about cutting-edge concepts so we can be at the top of our game.”

Education @USGBC Bonus:
Web-based LEED Reference Guide

The web-based LEED v4 Reference Guide is fully interactive, with more than 50 multimedia modules, tutorials, and case studies to help projects succeed.

The online version of the LEED Reference Guide typically costs $99, but access is included with annual subscriptions to Education @USGBC.
Creating Content

While a large portion of the courses available on Education @USGBC are made by third-party organizations that specialize in producing sustainability education resources, some are produced by USGBC member companies like the global structural engineering consulting firm and Gold-level USGBC member Thornton Tomasetti.

Scroll through the course offerings on the online platform, and you’ll stumble upon Thornton Tomasetti courses like “Parametric Modeling: Visualizing and Calculating Sustainable Building Designs” and “Sustainability Best Practices for the Structural Engineer.” One Thornton Tomasetti course, based on lessons the firm learned during a project that was striving to achieve a LEED v4 Platinum certification, has been taken more than 1,500 times and receives nearly a perfect five-star rating from users.

“I don’t think there are a lot of firms like ours that are in the business of designing buildings and bridges and other things that are providing content,” says Amy Seif Hattan, vice president of corporate sustainability for the firm. “But we think it’s important to educate. That’s a value that we have.”

“We’re unique in that we bring a boots-on-the-ground, practitioner perspective to these courses,” says Gunnar Hubbard, principal and sustainability practice leader at Thornton Tomasetti.

Hubbard helped design and produce the firm’s Education @USGBC course on parametric modeling, a practice that allows users to simulate a number of different options—including building height, glazing, window-to-wall ratios, and shading strategies—and optimize projects for comfort and energy reduction early in the design process.

“We’re out there applying principles on projects, and learning as we go in real life,” Hubbard says. “Others that [create courses] are curriculum developers, and they don’t necessarily have the content at their fingertips. They’ve got to seek it out. I’m not saying one is better than the other. I think it just helps support and enhance the [education] program, and it’s why we’ve been sticking with it.”

While other content creators can dedicate substantial time and resources to crafting new courses, Thornton Tomasetti has to be choosy, only developing

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Course 1: The Fundamentals of Operating and Maintaining Chillers—Cooling Towers
A review of the basics of cooling tower maintenance from daily through annual maintenance, to see what is needed to maintain the efficiency and the life of the cooling tower system.

Course 2: Transportation Demand Management: Parking Strategies
A review of Transportation Demand Management strategies with a focus on those involving parking. These strategies are illustrated using examples from various organizations that have used Transportation Demand Management successfully to improve employee and patron commutes, improve the overall transportation experience, and help mitigate parking constraints.

Course 3: LEED v4: The Intersection of Collaboration, Performance and Well-being
Review the lessons learned during an office build-out/tenant improvement project that is striving to achieve LEED v4 Platinum certification.

Course 4: Cultivating Young Minds: A Net-Zero School for Tomorrow’s Leaders
Through a series of interviews with the school faculty and the design team, explore the creation of a net-zero-energy building that complements the children’s studies of the balance of nature.
classes when employees are able to find time between projects. So far, the firm has created just four courses. Hubbard says that the firm only creates new classes when they’re seen as important to the company’s internal efforts, and that the company must maintain a “delicate balance” when deciding to take time away from project work for content creation.

“We always look for opportunities to sort of piggyback on things we’ve already done, whether it’s a conference presentation or an internal seminar,” says Hattan. “Our primary goal is not to produce online courses. Our goal is to provide education to our folks internally and externally. We often start with an internal course that was produced for our own employees, and then we turn that into an external course.”

Seif Hattan says she would encourage other firms to consider becoming USGBC Education Partners and creating their own courses for Education @USGBC. “It’s a nice route to reaching a wider audience than maybe we normally reach, and it’s a good way to develop our internal expertise in different areas,” she says. “It makes a lot of sense to participate in the platform, both to reach an audience, and to educate, which I think is important to everyone who feels that sustainability in design matters.”

Enhancing the Employee Experience
Jenna Rowe, senior vice president of energy and sustainability service in the Americas for the global real estate professional services and investment management company JLL, a USGBC Platinum level member company, sees Education @USGBC as a way for the company to give employees access to something they’re demanding more now than ever before: high-quality, ongoing professional development.

“Education is so important to people,” Rowe says. “In the past, my mom would say, ‘I just want to go to work, do my job, do well enough that I get a pay raise, and hopefully get a pension.’ It’s not like that anymore. It doesn’t matter who you are, where you sit, what you do. Education is really a big part of the benefits that you receive from a company.” Accordingly, Rowe sees USGBC’s online education platform not merely as a way for employees to accumulate a mountain of LEED continuing education credits, but as a resource that allows workers to keep growing in their professional roles. “It’s more than just LEED accreditation,” she says. “It’s more than, ‘I want to look good in front of my client.’ It’s, ‘I want to know for me.’”

The constant addition of new courses, Rowe says, allows JLL employees to stay on top of the most current practices in green building. And the sheer breadth of
course offerings, she adds, allows employees to seek out content that is relevant to them.

“Think about the drought in California,” Rowe says. “If someone’s looking for water conservation information, they can go to the water efficiency section of the education site. If they are more interested in waste and recycling, they can find information about that topic as well. Where there’s increased legislation, in New York for example, you’re going to see a lot of people interested in energy audits and energy reporting. So it can vary depending on where you’re located, what your role is, or what you focus on.”

In addition to expanding employees’ own green building expertise, Rowe says, the Education @USGBC platform arms those employees with the knowledge needed to make sustainability feel more relevant to their clients. “As a commercial real estate services firm, a lot of our clients have a very specific goal in mind when they come to JLL,” Rowe says. “Our clients sometimes look at us and say, [green building] doesn’t impact me. And my response has been: ‘It should.’ Sometimes, clients just want to save money. But energy costs are one of the best places to look for savings, because it’s the biggest line item cost in your operations budget. So if you understand how you, as a commercial real estate services executive, can impact and benefit from what your company is trying to achieve, from a business strategy and environmental or corporate social responsibility perspective, you’re going to be well ahead of your colleagues and your competitors.”

Rowe adds that the wide array of courses—which cover topics ranging from social equity and sustainable travel tips to daylighting strategies and the advantages of prefabricated homes—helps to reinforce the idea of sustainability as a broad area of concern that encompasses many other facets of daily life, the economy, and the built environment.

“It’s not just energy,” Rowe says. “It ties into health and well-being. It’s protecting the planet. It’s gender equality. Sustainable development goals cover the gamut of everything that we should be concerned about societally and environmentally. USGBC is demonstrating this through their curriculum. That’s amazing, and it’s critical, and it is what makes this different.”

Left: Gunnar Hubbard, principal and sustainability practice leader at Thornton Tomasetti; Right: Jenna Rowe, senior vice president of energy and sustainability service, JLL.
HEALTHY PARTNERSHIP
Green Health Partnership aims to apply the market transformation principles of the green building movement to make health promotion standard within the built environment.

For all the progress that has been made to understand and reduce the negative impacts of the built environment on the natural environment, the important role that buildings have on human health has not been as actively pursued. In recent years, however, health care and public health communities have begun to recognize the need to create spaces that promote the well-being of the people who occupy them. New strategies and practice-relevant tools have been established for owners, designers, and builders in the real estate market, including additional health-related credits in the U.S. Green Building Council’s (USGBC) Leadership in Energy and Environmental Design (LEED) green building rating system, and the advent of the WELL Building Standard, an evidence-based system that measures, certifies, and monitors features of a building that impact human health and well-being.

“It’s the right thing to do. We’re in the business of advancing good ideas,” explains Ben Kallechey, an architect with Davis Partnership, a Colorado-based architecture, land planning, and interior design firm.

Kallechey applied principles related to health, wellness, and sustainability as the lead architect for an office building in the uptown neighborhood of Denver that was commissioned by the Colorado Health Foundation and completed in December 2016. Designed with the physical health, mental health, and social equity of its occupants and surrounding community in mind, the building is pursuing both WELL and LEED certification, using a pilot credit within the LEED v4 BD+C rating system known as the Integrative Process for Health Promotion.

Made available as a pilot credit in May 2016, the new Integrative Process for Health Promotion credit was launched by the Green Health Partnership—a collaboration between researchers from the University of Virginia School of Medicine and USGBC that is funded by the Robert Wood Johnson Foundation. Founded in 2012 by Dr. Matthew Trowbridge, an associate professor in the Department of Emergency Medicine at the University of Virginia School of Medicine and Dr. Chris Pyke, chief strategy officer at Aclima and formerly COO of GRESB and vice president for research at USGBC, the purpose of the partnership is to explore the appetite for increasing consideration of health within the built environment.

Today, along with Dr. Trowbridge, Kelly Worden, project manager of Health Research at USGBC; Megan Hazer, health research associate at the University of Virginia School of Medicine; and Daniel Lau, manager at the Build Healthy Places Network and part-time employee of the Green Health Partnership, make up the partnership’s team. They are working to transform...
the real estate market by encouraging real estate developers, designers, and portfolio managers to invest in and create a built environment that intentionally integrates health.

“The green building movement has taken sustainability from a fairly broad-based goal and turned it into a successful and valuable focus of the real estate industry,” Trowbridge says. “The Green Health Partnership came from asking questions about whether that same template could be employed to more intentionally address health and well-being in the real estate industry, alongside traditional goals of sustainability.”

Influenced by the integrative process from the green building sector and health impact assessment from the public health sector, the Integrative Process for Health Promotion pilot credit is just one of the solutions developed by the Green Health Partnership. The pilot credit is designed to address the numerous health promotion tools and strategies that are evolving within the real estate market, and to provide a more formal framework that incentivizes project teams to promote health in the built environment.

“We have gone so far as to institutionalize the benefits of energy and environmental protection, but we don’t have the same set of tools for health. We don’t have equivalent guidelines. We don’t have commissioning standards. We don’t have monitoring protocols,” Pyke says. “If you want your building to stand out, we’re looking for new things, and one of the new things is health promotion. We understand from our work that our built environment is a strong predictor of health outcomes.”

Project teams who pursue the pilot credit are asked to partner with public health professionals in order to better promote health in the development of their projects. Beyond providing a central framework that connects the public health and real estate sectors, the pilot credit also guides project teams through a systematic consideration of health and well-being outcomes, and rewards teams that prioritize addressing existing health needs and opportunities.

“The pilot credit is also a symbol. The credit demonstrates that health promotion isn’t just a simple list of features. It’s about the process—your intention,
what are the needs of your population, and how are you addressing those needs through the design and operation of your building,” Pyke says.

During its first phase of research from 2013 to 2015, the Green Health Partnership looked to the green building movement to understand its success in transforming the real estate market and analyzed LEED. The team performed a scan of the LEED 2009 rating system to better understand where health and well-being were represented within the system and the kind of language that was used to describe these topics.

“Health is a long-standing value of the green building movement and we found a number of existing strategies within LEED that either explicitly or implicitly addressed health. However, these strategies weren’t organized in a cohesive manner,” Worden says. “It wouldn’t have been easy for a project team to intentionally select and combine strategies to address specific health outcomes. We also found that the language and actual words used to describe health were quite different from the language and words used by the public health sector, creating a barrier to collaboration between the two sectors.”

The partnership determined that a cohesive system for applying health and well-being-related strategies within the real estate market was lacking, and noted a gap in how health was thought of between the two industries. So beginning in 2015 (and continuing until 2018), they launched a second phase of research aimed at creating tools that could be applied within the green building industry to address health in a more intentional manner.

“The value of LEED or other rating systems is they help the real estate market differentiate green property from nongreen. The observation of the Green Health Partnership was that we lacked a similar mechanism for differentiating health-promoting property. The real estate market doesn’t work efficiently to promote health and well-being because we don’t have the right kinds of information in the market to help distinguish property that promotes health from property that doesn’t,” Pyke says. “It was time to create a similar rich and robust set of processes to promote health. It is a natural evolution of the green building industry. The movement stemmed from a desire to create better buildings that benefitted both people and the environment.”

This second phase of research has focused on two scales: the project scale, or looking at individual building and neighborhood projects, along with the architects, designers, and engineers who work on them; and the portfolio scale, or understanding what controls the flow of institutional investment in real estate and establishing health metrics that could influence those decisions.

“It’s exciting that the real estate market and practitioners across all domains relevant to green building have realized there’s an opportunity to join in on efforts to create healthy places,” says Trowbridge. “It’s tempting to think that health will roll out identically to green building, but I think there will be some important differences. I think measuring health can be very complex. It’s also incredibly important to get it right. I think that’s part of the reason why we are inclined to promote, as a first step, a focus on process rather than purely a laundry list of specific design features. We feel the most important step will
be to give project teams an ability to certify that they very carefully and intentionally thought about health throughout the process.”

At the portfolio scale, the Green Health Partnership worked with GRESB—an investor-driven organization that sets the global standard for environmental, social, and governance (ESG) assessment of real estate portfolios and infrastructure assets—to help develop and launch the GRESB Health & Well-Being Module in March 2016.

“The intent of the GRESB Health & Well-Being Module is to inform and help investors understand the performance of their investment and build health into that understanding,” Worden says of the module, which is an optional supplement to the GRESB Real Estate Assessment.

Similar to the concept of how the Integrative Process for Health Promotion within LEED defines a process for project teams to prioritize actions based on existing health needs and opportunities, the GRESB Health & Well-Being Module assesses the existence of processes for health and well-being promotion at the scale of a real estate portfolio. The module considers how a company assesses the presence of processes to meet health needs and prioritizes action within their real estate products on the well-being of customers and the communities surrounding individual real estate assets.

Part of the rationale for focusing on these two different scales was recognizing that, in order for individual project teams to be innovative in applying new types of tools, there needed to be demand for those tools as well as capital funding available to address health in a more intentional manner at the individual project scale.

Many project teams are already beginning to work with the Green Health Partnership and pursue the pilot credit. Researchers from the Green Health Partnership also provide technical assistance to project teams pursuing the credit, and, in so doing, gain a better understanding of what additional resources and guidance are needed.

“The overall concept of health can sometimes be overwhelming, so we help teams think through the

The Colorado Health Foundation building’s design features vegetation inside the building which helps connect its occupants with nature.
various ways that a given project could impact health,” Worden says.

Kallechey and his team, along with staff from the Colorado Health Foundation and the Green Health Partnership, are in the final phases of pursuing WELL and LEED certification for their project in Denver. Intentionally located in the uptown neighborhood, the building is in a prime, up-and-coming area.

“The Colorado Health Foundation wanted to have their building in a place that was prominently located in the communities in which they work,” Kallechey says. “They wanted their building to embody their mission of not only making Colorado the healthiest state in the nation but also an example for people in the neighborhood.”

Kallechey and his team were connected to the Green Health Partnership through the Colorado Health Foundation, and, as they began conceptualizing what the project might look like, formed principles focused on health, wellness, and sustainability. They started concept design work for the office building when the pilot version of the WELL Building Standard was released, and they discovered that many components of the WELL system were in line with the Colorado Health Foundation’s mission.

The building was designed with the physical and mental health, as well as social equity, of the people in the surrounding communities in mind. A grand circular stair placed at the focal point of the building’s design encourages tenants to use the stairs more often throughout the day, operable windows that allow for individual control over thermal conditions are installed within 25 feet of each work station and help maximize daylight.

Other features include vegetation inside the building, which helps connect its occupants with nature, an entry courtyard decorated with tables, chairs and planters that functions as both a welcome space before entering the building and as an extension of the office environment, two roof decks including one that is directly off of a fitness room with free weights, cardio equipment, and organized group classes, and a cherry tree orchard on the south edge of the site that serves as both a meeting place for employees and a recreational space for public use.

“As urban infill continues, and the neighborhood and city are built up over time, that’s one of those pocket parks that will be a celebration point going forward,” Kallechey says.

The Green Health Partnership has also collaborated with Mithun, a USGBC Gold-level member and Seattle-based integrative design firm that provides architecture, landscape architecture, interior and urban design, and planning services, to apply the pilot credit in a more informal manner in several affordable housing projects that Mithun is designing in California.

“It’s important that design firms like Mithun institutionalize the process for health promotion within their practice for building. The degree to which our partners have been institutionalizing those kinds of processes in their practice, that’s what success looks like to me,” Pyke says.

One of those affordable housing projects, a mixed-use building to be located on a vacant lot near the Balboa Park Station in San Francisco, for which Mithun is in the process of doing a site analysis, will promote health and well-being.
“The way these [affordable housing] buildings are set up is to support a social network,” says Anne Torney, a partner at Mithun in San Francisco. “Right now, the site for this project is a big vacant lot. It’s noisy. It’s right next to a freeway. It’s kind of a placeless place. We’re thinking about this building as an opportunity to define a kind of plaza near the Balboa Park Station and to create a sense of place for the community.”

In addition to offices on the ground floor occupied by childcare and community development organizations connected with job training and mental health services for residents, Mithun is considering a café that would be open to residents and the public along with some neighborhood retailers, all of which are intended to help create a sense of community and place. However, Mithun plans to engage in community meetings for several months to determine what the community would like before beginning any detailed designs for the project.

Other health considerations include pedestrian safety issues, such as sidewalk design and how to make pedestrian crossings safer since the site is located near a large transit hub in San Francisco where multiple bus, subway, and metro lines converge; how to tackle noise pollution as the building docks on a freeway, and more. According to Torney, construction for the project will be completed in 2020.

“It’s a rich problem when viewed through the lens of health. Health is a great way to engage and determine what should be the priorities as we design this building,” Torney says.

The Green Health Partnership has been working with Mithun to better understand a design firm’s perspective and what kind of tools and resources are helpful for project teams to encourage these designs for health. For both the partnership and Mithun, it’s been an enriching experience.

“There’s a lot of value to the LEED pilot credit because it helps walk people through a process. It asks design teams to engage a public health professional. Public health professionals think in terms of metrics and research-based outcomes. If you undertake a certain design strategy, you want to know based on research that it’s going to be effective in terms of supporting
health. Having a much more intentional formal process, I think that’s important if we’re going to transform industry,” Torney says.

“Having a public health person as part of the design team is a very direct path to getting there. Our expertise is design. It’s not all the important research that happens. It’s fabulous to have that link,” says Erin Christensen Ishizaki, a partner at Mithun.

While innovation in health within the real estate industry has, in the past, occurred by addressing health conditions on a more specific basis, from indoor air quality to material toxicity, the Green Health Partnership takes pride in having defined a process for health promotion that encourages project teams to take a more holistic approach to health while also meeting LEED standards.

“What we envision is a time where a project team can get credit as part of a LEED certification for showing that they have intentionally considered health and well-being impacts throughout the entire course of the project, from conception to land acquisition, planning and design, construction, ongoing maintenance and operation,” Trowbridge says.

Left: Sansome and Broadway Family Housing’s design, central location, supportive services, and large roof garden with a play area communicates a sense of permanence and dignity. Top: Mithun’s Broadway and Sansome Family Housing provides affordable housing for families, including formerly homeless families, in the heart of San Francisco on a former Embarcadero Freeway ramp site. Photos: Bruce Damonte
SEAMLESS INTEGRATION
Touting 27 acres of transit-oriented space, the Blairs Master Plan in downtown Silver Spring may be the future of sustainable urban design.

The numbers alone are impressive: a 20-year, $700 million urban redevelopment in the heart of downtown Silver Spring, Maryland; 27 acres of land abutting the Washington, D.C., Metro transit system; 2,800 high-rise apartment units; 200,000 square feet of office space; 125,000 square feet of restaurant and retail space; a 200-key hotel; a 5,000-sq-ft urban organic farm; and five acres of interconnected, transit-oriented parks, running paths, festival space, playgrounds, water features, and native vegetation.

This is the Blairs Master Plan, a project of the Rockville, Maryland–based developer, the Tower Companies, a USGBC Silver level member company. And it’s scaling sustainable design to neighborhood proportions. “Nobody gets the opportunity today to have 27 acres on a transit system, especially one bordering Washington, D.C., so you get the sense of a district or little city, rather than a collection of buildings,” says Jeffrey Abramson, a second-generation partner in the family-owned Tower Companies. “It’s a necklace of parks connecting four new residential buildings with a central pathway—a spine that connects everything to a shopping center with retail and restaurants, and it all leads through the complex to the Metro.”

The Tower Companies, founded by the late Albert “Sonny” Abramson in 1947, built the original Blairs complex in the late 1950s and 1960s. The complex featured multiple residential buildings, including Blair Towers, four mid-rise buildings with 257 units. In the decades since, the company has become a pioneer in Leadership in Environmental Design (LEED)-certified and sustainable development. In 2004 it became the first developer in the nation to open a LEED-certified apartment complex, Blair Towns. Today, 90 percent of the firm’s commercial and multifamily residential projects are LEED and ENERGY STAR certified.

The centerpiece of the Blairs Master Plan is its transit-oriented design. Traditional vehicles take a backseat to more environmentally sound transportation, which explains the subterranean garage and reduced parking-to-resident ratio. There are also Zipcar and electric vehicle charging stations, storage for more than 100 bikes, and plans for a residential electric bike program. And all footpaths are strategically designed to take residents between home, work, shopping, entertainment, parks, and of course, multiple Metro transportation hubs.

The transit-oriented vision is part of a growing trend in sustainable urban design, and one that can’t come too soon for Silver Spring. That’s according to Jane Redicker, president and CEO of the Greater Silver Spring Chamber of Commerce. Redicker says Silver Spring has come a long way since the early
The Blair's Master Plan will see the transformation of existing surface parking lots into townhouses and apartment towers, open urban parks laced throughout the community, new restaurants, retail shops, and numerous other amenities offering a sustainable and environmentally friendly lifestyle.
1990s, when the region’s businesses were struggling. Community and business leaders have since revitalized downtown Silver Spring, bringing restaurants, retailers, and residential construction back to the region. But increased development has brought heavy car traffic, and green space is still in short supply. “The Blairs Master Plan gives people the opportunity to live, work, and play in the same area and never really have to leave or get into a car,” says Redicker.

To spearhead the project, the Tower Companies found like-minded design firms in Bing Thom Architects, based in Vancouver, Canada, and Sasaki Associates, a USGBC Silver-level member company based in Watertown, Massachusetts. The internationally renowned planning and architectural firms pride themselves on creating community-centered urban spaces, and they collaborated on a plan that was both environmentally progressive and seamlessly integrated with the surrounding urban landscape.

According to Ling Meng, Bing Thom’s design director, the greatest challenge in crafting the Blairs Master Plan was not the project’s city-sized scope or LEED Gold aspirations, but its two-decades-long timetable. “Over time, the spaces can be improved and modified, but we wanted to make sure the essence—the integration of mixed-use facilities with the community, the accessibility, the public spaces—will always be there,” says Meng.

In looking at the existing site, Meng saw a 1960s-styled community with a large supermarket and massive parking lot in the middle, but little integration with the surrounding community. With public transportation less than a quarter mile away, it was, in his words, “the perfect site” to develop an integrated, mixed-use space.

The property’s 45-ft gradient inspired a vision of a walkable European hill town within Silver Spring, with every social amenity accessible by foot. The plan also envisioned a community that was anything but insular, with a layout that encourages locals to pass through the Blairs on their way to the Metro, engaging with the community’s retail, restaurant, and entertainment offerings. “It’s everything we talk about when we talk about transit-oriented principles,” says Meng.

Alan Ward agrees. Ward is principal at Sasaki and a renowned urban planner and landscape architect. His past projects include the historic redesign of the landscape at the Lincoln Memorial and Reflecting Pool. He and his team worked with Bing Thom during the urban planning and design phase of the Master Plan, and they met extensively with Silver Spring...
county officials to determine appropriate rezoning, building and outdoor space sizes, and common space elements that would enhance the communal life in downtown Silver Spring. Once those spaces were defined, Ward’s team then fit the buildings with the site’s unique topography and led the design of the site’s landscapes, from locating recreational spaces, water features, and gardens, to selecting and placing sustainable vegetation native to the nearby Piedmont Forest.

The result is an outdoor environment that includes more than 100 local species of vegetation. The plantings are strategically located to recapture rainwater runoff from buildings and the surrounding landscape, reducing annual demand for irrigation by 60 percent, or 84,000 gallons of water.

And while the green features and resource savings are impressive, Ward is particularly proud of his firm’s collaboration on the Master Plan’s transit-friendly elements. In the long run, those may arguably result in the greatest impact on the health of the surrounding environment and community residents.

“When you create a site that encourages pedestrian and transit use, and it’s a redevelopment of a site that creates more density in closer proximity to mass transit, that is the bigger story,” says Ward.

With the Master Plan in place, the Tower Companies tapped two more industry heavyweights to design and build the Pearl, the first of four residential buildings registered for LEED, which opened in February. Baltimore-based Design Collective, Inc., is a national leader in mixed-use urban planning and design, and Clark Construction is a prolific contractor with more than 68 million square feet of LEED-certified projects in its portfolio. Both companies are USGBC Silver-level members.

Spearheading the Pearl’s design meant picking up where the Master Plan’s vision left off, a challenge that felt familiar to Michael Goodwin, senior principal at Design Collective.

“On a number of projects, we’ve found ourselves inheriting a masterplan that we did not author,” says Goodwin. “But our approach is more holistic than some of the firms that are just mixed-use or planning firms. We analyze the masterplan to understand its goals, look at what it’s trying to achieve, and improve it.”

From the start, Goodwin says, his firm understood the Blairs Master Plan’s vision of residential buildings that were not just LEED-certified, but fully integrated into the existing urban landscape. With an interdisciplinary team that included urban
designers, architects, and environmental graphic designers, Design Collective developed the Pearl as a progressive, multi-tiered building with sections 5 stories, 8 stories, and 14 stories high. The modification to the original design improved on the Blairs Master Plan’s goal of providing residents with maximum views of the outdoors while minimizing the solar impact on area homes and businesses.

Goodwin’s firm also decided to fully submerge the parking garage, which had been at ground level and wrapped by residential units. The new design brought the social amenities down to the ground level, further diminishing the impact of cars and improving access to green spaces.

Before construction could begin, the Tower Companies had to tear down the 60-year-old Blair Towers. In keeping with Sonny Abramson’s community-centered approach to development, residents were offered units in the adjoining Blair Apartments building. The developer also paid for moving expenses, which might explain why more than 40 percent of them have chosen to stay throughout the construction process.

And when it came time to build Design Collective’s vision of the Pearl, the nationally ranked Clark Construction was more than ready. The Bethesda-based contractor has more than a century of experience building everything from museums to mixed-use residential communities. And with more than $3.2 billion in annual green projects, the company is well versed in the products, designs, and site practices required to achieve LEED certification.

“Nowadays, just about every project we do is LEED certified,” says Mike Alto, senior vice president at Clark Construction. “So we help to optimize the budget, and that means working closely with the design team and owners to help them make design decisions.”

So, what is the end result? The Pearl is a U-shaped complex of 284 units spread across low-, mid-, and high-rise structures, providing occupants with maximum views of the property’s expansive green spaces. In addition to cutting-edge green features—the building boasts a solar photovoltaic system, green rooftops, high-efficiency heat pumps and water fixtures, and postconsumer recycled construction materials—the building and environs...
integrate abundant opportunities for healthy living and sustainable practices across residential, commercial, retail, and common spaces.

Residents of the Pearl, for example, can take part in free composting and a community supported agriculture program. From the spacious lobby, they can see the two-story floating glass fitness center above a central courtyard with green space and water features. From the rooftop pool, residents can take in views of the 1,750-acre Rock Creek Park, part of the National Parks system.

The development’s outdoor spaces also promote recreation, with swaths of grass and trees ideal for yoga classes; residential gardens; communal dining and cooking space for residents and restaurant chefs; a playground, outdoor athletic equipment, and a dog run; and running and pedestrian paths throughout the property. In Abramson’s words, you can “literally see the green.”

That holistic vision is aligned with the evolution of LEED, as the U.S. Green Building Council (USGBC) looks beyond solar panels and heat recovery systems to consider a building’s impact on occupants and the community. LEED credits can now be earned for proximity to public transportation, access to outdoor parks and affordable, locally sourced food, and a site footprint that minimizes strain on the surrounding environment.

As the Pearl prepared to open its doors, Jeffrey Abramson called the collaboration between the Tower Companies, Bing Thom Architects, Sasaki, Design Collective, Inc., and Clark Construction “world-class,” and he was already looking forward to breaking ground on the Blairs Master Plan’s second residential building.

The project itself is a testament to the impact of LEED and sustainable urban design, and to Abramson’s father’s vision of building healthy, thriving communities, not just buildings. In honor of that vision, residents of the Pearl and members of the Silver Spring community can now gather on Sonny’s Green, a green space at the property’s center that includes a 400-person amphitheater, urban garden, and playground. A more expansive Sonny’s Park will be a permanent fixture on the property as additional residences are built.

“We wanted to design something memorable,” says Abramson. 🌿
Ron Rambo is many things: a friend, a son, a volunteer and advocate for the disabled community, and a well-known figure of the city of Lancaster, Pennsylvania. Now, he’s adding the word “pioneer” to that list, thanks to the Rambo Project, a cutting-edge home that will not only provide a totally accessible place for him to live with his wheelchair, but also one that will be radically sustainable.

Nicknamed “Ramboland,” this ambitious project has been years in the making and has attracted the attention and cooperation of green builders, designers, government officials, and many others who have been inspired by Rambo’s desire to create a home that embodies the word “independent” in every way, from personal independence for the disabled, to complete energy and water independence for the home itself.

“I hope this house will give me a more safe and accessible home with more independence, including independence from high utility bills!” says Rambo.

Rambo was born with cerebral palsy, which limits his speech and his ability to move his arms and legs. He uses a wheelchair exclusively and faces mobility challenges every day, the biggest of which is in his own home, a subsidized apartment that isn’t accessible and isn’t required to be: The Americans with Disabilities Act (ADA) applies to public accommodations, while the Fair Housing Act applies to new design and constructions. Rambo’s apartment has front steps leading from the sidewalk to the front door, narrow doorways, and a tiny bathroom that’s hard to maneuver in. Eventually, Ron added a ramp so he could access the apartment via the rear door.

“The apartment is not wheelchair friendly, but I was desperate. Because of steps, the front door is not accessible, and I can’t even access the front porch or front hallway from my apartment because of the narrow doorways,” says Rambo. “But the biggest problem is the bathroom. It is so small that it is almost impossible to use either the toilet or shower safely. Even with two aides, I’ve slipped and fell in the tub.”

Rob Rambo—when he’s not working on his dream home—hangs out at Square One coffee with his friends or heads to the local farmer’s market to shop. Photo: Ryan Smith
The struggle to find an accessible place to live has been ongoing for Rambo, but it was an offhand comment from his mother, Joyce Killian, who owns a small plot of land next to her house in Lancaster, that would change the trajectory of his life. “I said, ‘Gee, too bad you don’t know an architect, we could get a house back here for you,’” she remembers. “And he took off running from that.”

In fact, Rambo did know an architect: Max Zahniser, a LEED fellow, educator, and green building and corporate sustainability consultant. When Rambo approached him with his idea to build a green, accessible home, Zahniser's imagination took off and he became project facilitator for the Rambo Project. “Realizing that there were actually these huge synergies between universal access design and sustainability got me really excited,” Zahniser says.

There’s also the idea of fostering health, from the health of the planet as a whole to everyday human health, and how they intersect. For instance, using polished concrete floors will not only provide a smooth surface for wheelchair users but also better indoor air quality than carpeting, Zahniser says. In addition, lights that go on and off without a switch when you enter and leave a room not only save energy, but also remove the barrier of light switches that are out of reach for wheelchair users.

**Beyond “good enough”**

Rambo is certainly not alone in his struggle to find accessible housing. A 2015 report by the U.S. Department of Housing and Urban Development Office of Policy Development and Research found that “although around a third of housing in the U.S. is potentially modifiable for a person with a mobility disability, currently less than five percent is accessible for individuals with moderate mobility difficulties and less than one percent of housing is accessible for wheelchair users.”

One barrier to accessible housing is how expensive it is to retrofit existing structures. But innovation is lacking too, Zahniser says. In setting accessibility standards in 1990, the Americans with Disabilities Act actually halted much incentive for exceeding those standards.

“Innovation in the field of accessibility completely ceased,” Zahniser says. “Although we brought the floor up for accessibility, we brought the ceiling down as well.”

The Rambo Project wants to far exceed ADA standards. For instance, according to the ADA rules, doorways must be at least 32 inches wide, but in a wheelchair, you can “lose your knuckles if you’re not careful,” Zahniser says. Although 32 inches might technically be “good enough,” it’s not really very good. That’s why the doorways in Rambo’s house will be a comfortable 40 inches wide.

“Did we really want to stop at good enough?” Zahniser asks.
A Model for the World

When it’s complete, Rambo’s home will demonstrate how the core of a city block might function, says Zahniser, serving as an infrastructure supplement for its small part of the city. The plan is to provide energy, water, and ecosystem services to the surrounding neighbors, as well as Rambo.

The house’s design includes a full rooftop solar array that will produce more than four times as much energy it uses, eventually helping to power its neighbors, too. An onsite system for collecting rainwater and treating it through constructed wetlands and other technology will mean that the house won’t rely on municipal water or sewer services. Plus, the energy and water systems will work together through smart-grid technology. Zahniser says these water and energy smart grids will be “making decisions” about moving electrons from this battery to that battery or water from this cistern to that fixture, based on sensors to tell them, for instance, that the potable water system is getting low, or even that there’s a rainstorm coming, and that they need to make room in the system for it.

“To our knowledge we haven’t seen an integrated water and energy smart grid, and that’s exactly what this will be when we pull it off the way we want to,” Zahniser says.

The Rambo Project also aims for Rambo to eventually get 50 percent of his dietary needs from his own land—growing fruits, vegetables, nuts, and herbs with the help of an integrated irrigation system.

“There are two big words that we have kind of latched onto: independence and interdependence,” Zahniser says, and Ramboland aims to achieve both, improving life for the people who benefit from it without degrading the environment in the process. Not only will the house help provide energy to its neighbors, but Rambo wants to make sure that whoever lives there after he does will also be able to use the house to its fullest extent.

“There’s nothing selfish about this,” Zahniser says.

Among those tasked with making this idea a reality is Jesse Pellman, LEED AP, a partner at the Lancaster-based LongView Structures, an Organizational-level member of USGBC. “The hope is to combine parallel but often disparate goals: really high performance, healthy housing, and universal access and design,” Pellman says. “There’s not much that isn’t going to be pushing the envelope here.”

The house will feature other elements that marry universal access with sustainability, as well. Reclaimed and recyclable materials like reclaimed wood and steel both minimize off-gassing and reduce the number of virgin materials needed for the house. Extra-wide doorways, automation, adjustable-height equipment, lots of natural light, and air filtration and indoor plants.
also add up to the healthiest home possible for Rambo.

“We’re saying all of these things matter and we’re taking that holistic, equitable approach as the baseline,” Pellman says. “If not everyone has access, obviously someone is left behind, and that’s not how we want to envision a future.”

**Partnerships at Work**

The sheer number of people involved with Ramboland is staggering, from ecologists, to plumbers, to civil engineers, to architects. They’ve been drawn to the project by its groundbreaking approach to systems and the performance they will yield, but even more so they have also been inspired by Rambo’s excitement, vision, warmth, and generosity of spirit.

“That’s him,” says Rambo’s mother, Joyce. “If you know Ron, he’s your friend or you’re his friend.”

Among the most inspiring things about the project is the way it’s drawn in unexpected stakeholders.

“These amazing synergies and symbioses come out of it,” Zahniser says. For instance, inner-city students with the partner nonprofit, the Philadelphia-based Coded by Kids, will be doing some of the coding for the house’s smart grids.

And the project wouldn’t have been possible at all without the cooperation of the city of Lancaster, which is allowing the project to move forward even though a lot of what it’s asking to do is unprecedented in terms of building and permitting for urban residential areas, such as allowing onsite capture and utilization of rain-water for drinking and other uses, and onsite bioremediation for gray and black water.

“This is one of the examples of living laboratory functions we are not proposing houses ultimately do, but perhaps city blocks,” Zahniser says. “And
tying those systems in with healing ecosystems (which will provide food and reduce pests) is not something you see in cities much yet, if at all.”

Lancaster Mayor Richard Gray has been an enthusiastic supporter of the project.

“They didn’t have to talk to me long to convince me,” says Gray. “I’ve told the people in this city we want to be as friendly as possible and be as assisting as possible…we shouldn’t get hung up on technicalities.”

“We’re going to do it the way Ron wants,” Zahniser says. For instance, Rambo insisted on height-adjustable features, like cooktops and sinks, inside the home so that anyone who lives there after he does can do so comfortably.

Moreover, “Ron’s way” always comes back to Rambo’s desire to be a pioneer. Zahniser has taken him at his word. The team is pushing the boundaries for green and accessible design, making the house as meaningful and innovative as possible, even if it means a greater expense and longer timeline. Fundraising for the project is crucial and ongoing.

Even so, Zahniser says they’ve “designed a building that will be cost-competitive to build if it were plumbed and wired like a normal home, and compared to standard custom-built homes of that size, in that part of the country.” Moreover, the team believes that the cost of the sustainability systems “is far outweighed by the economic, social, and environmental resilience they will establish for not just one household, but a neighborhood,” Zahniser says.

For Rambo, the house will be more than a dream come true. “I hope that my house will lead the way to other homes like it that help heal the earth, give back to the neighborhood, and improve the quality of life for any person facing a mobility challenge,” he says. “It makes me feel useful.”

“Ron’s Way”
What started as an idea for a new home for Rambo has evolved into something incredibly ambitious, and perhaps even unique in the world. When it’s complete, the Rambo Project aims to serve not only as a place for Rambo to live, but also a living laboratory and a model for equitable living space. Throughout the project Zahniser says the phrase “Ron’s way” has been a touchstone for their goals.

Left top: Lancaster Mayor Richard Gray. Left bottom: Ron and Max have demonstrated what can be achieved through true partnerships. Photos: Ryan Smith
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PROFESSIONAL PULSE

Jennifer Seydel

An educator with more than 35 years’ experience preparing youth for success in an ever-changing world, Jennifer Seydel is the executive director of the Green Schools National Network where she brings together all sectors invested in green, healthy, sustainable schools through professional development, network development, and research.

What is your greatest fear? Not making the most of each day. Which historical figure do you most identify with? Rachel Carson
Which living person do you most admire? Michelle Obama
What is your greatest extravagance? My new Trek bicycle!
What is your favorite journey? Any hike or paddle into the backcountry!
What do you consider the most overrated virtue? Patience. We do not have the time to wait...the future is at stake!
Which words or phrases do you most overuse? I grew up in a military family and picked up some colorful language. I am not sure you would want to print them!
What is your greatest regret? I try to live life without regrets. Any regret I have ever had, I have addressed so that it does not linger.
Which talent would you most like to have? The ability to tell a good joke!
What do you consider your greatest achievement? I believe that each experience provides a foundation for what is to come. I am currently working to create a strong organization that positions green, healthy, sustainable schools in the broader conversation related to education reform.
If you were to die and come back as a person or thing, what do you think it would be? Starfish. The starfish has the ability to regrow its bits and pieces as they are torn away. They symbolize the capacity for rebirth and renewal...something that is essential for any changemaker.
What is your most treasured possession? Family
What do you regard as the lowest depth of misery? Loss of a loved one.
What is your favorite occupation? Educator and coach
What is your most marked characteristic? Perseverance
Who are your heroes in real life? My mother, my husband, and the many mentors who have supported my journey and inspire me to continue to challenge the status quo.
What is it that you most dislike? Narcissists
What is your motto? Live, love, laugh, and be happy.
What will you have them put on your tombstone? She followed her path and left a trail.
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