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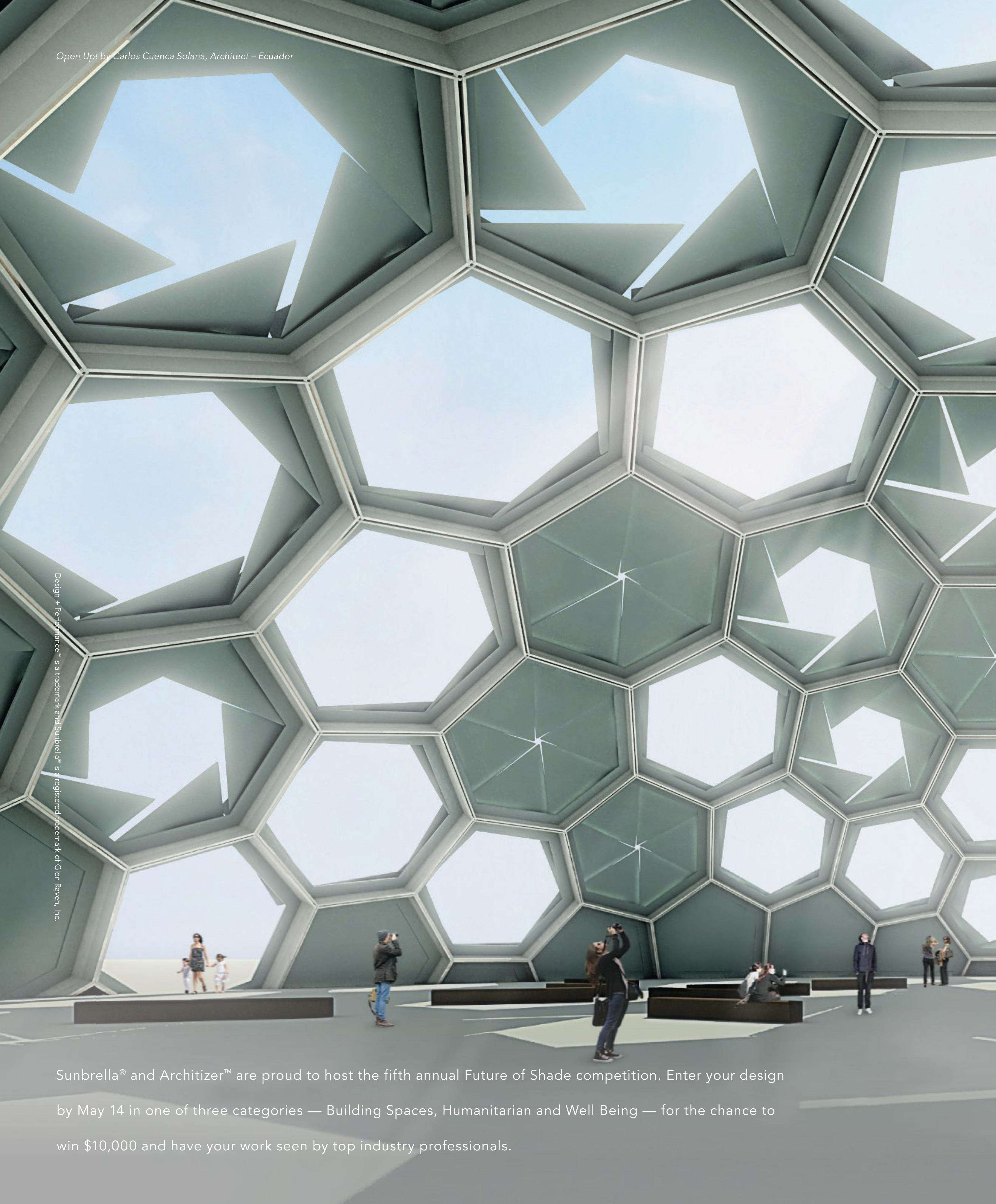
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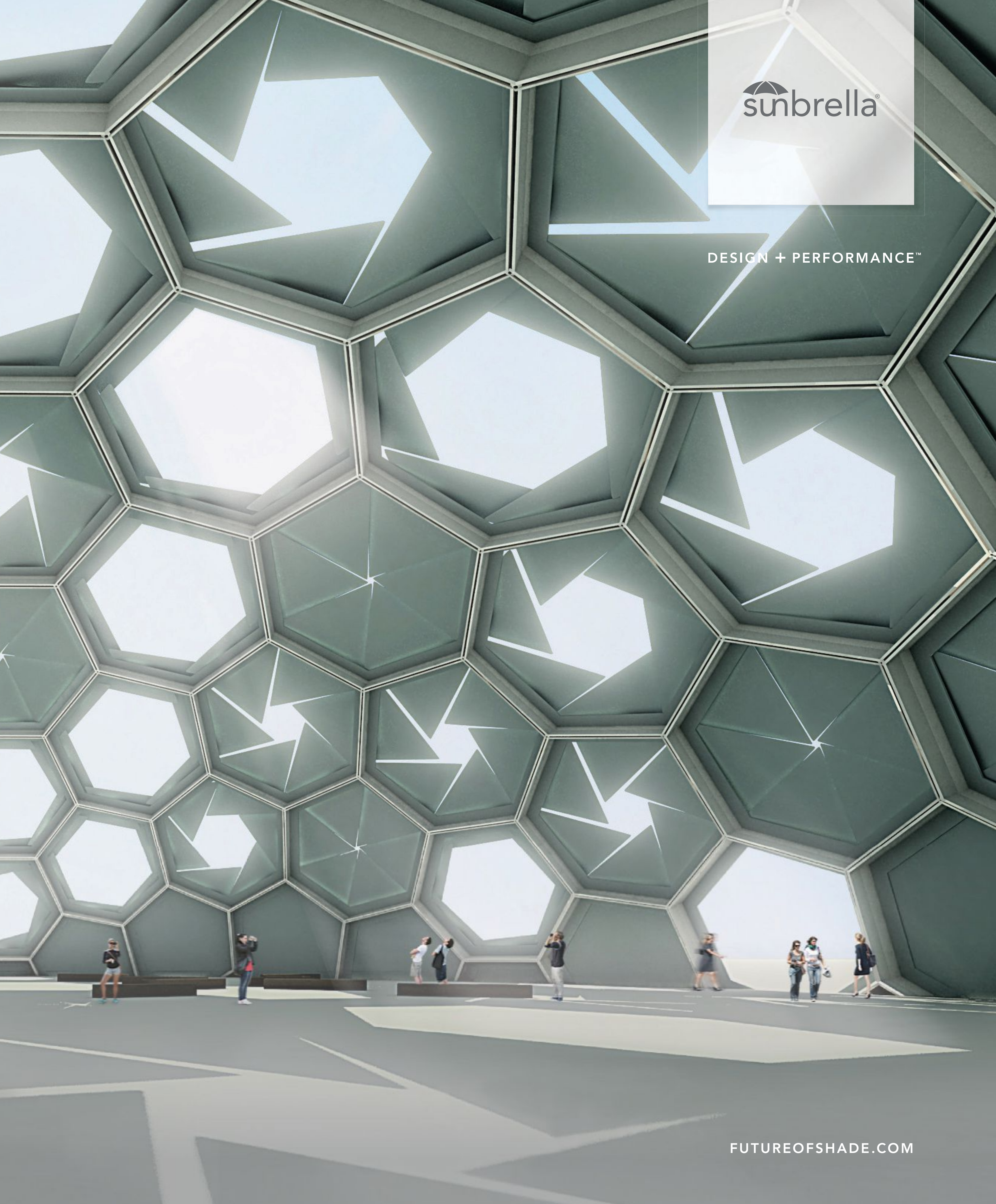
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Illustration by Alexis Franklin.

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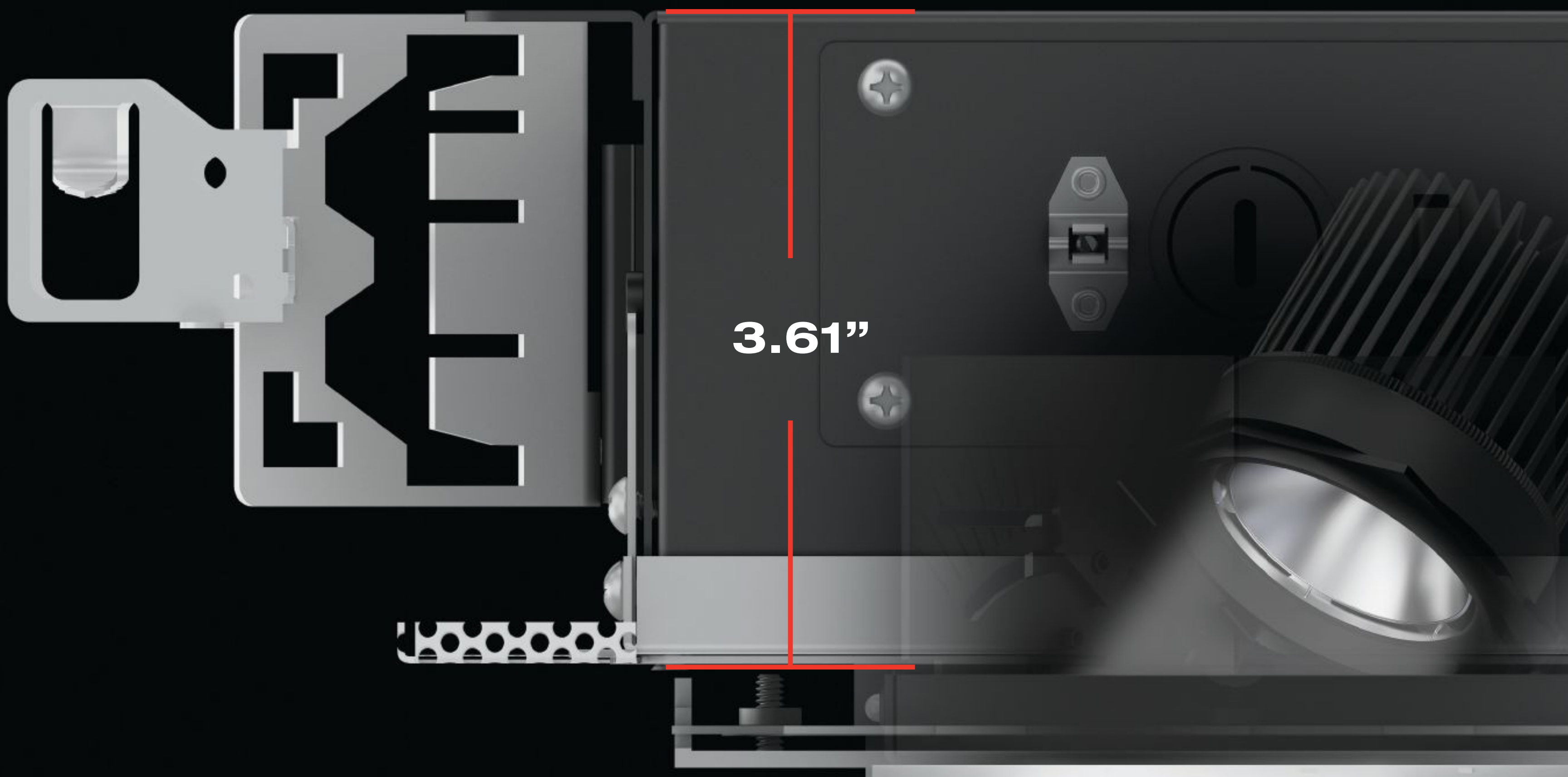

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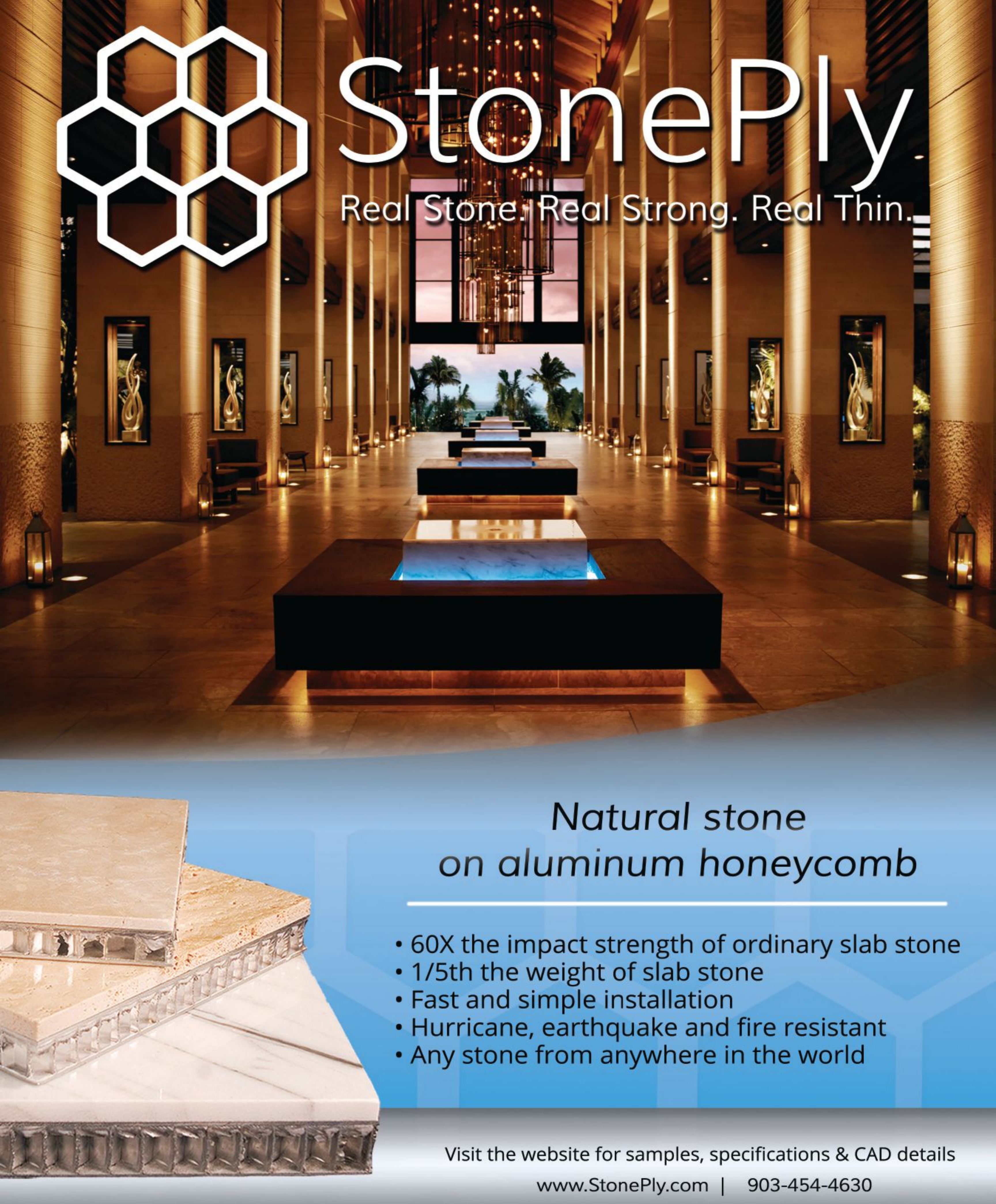
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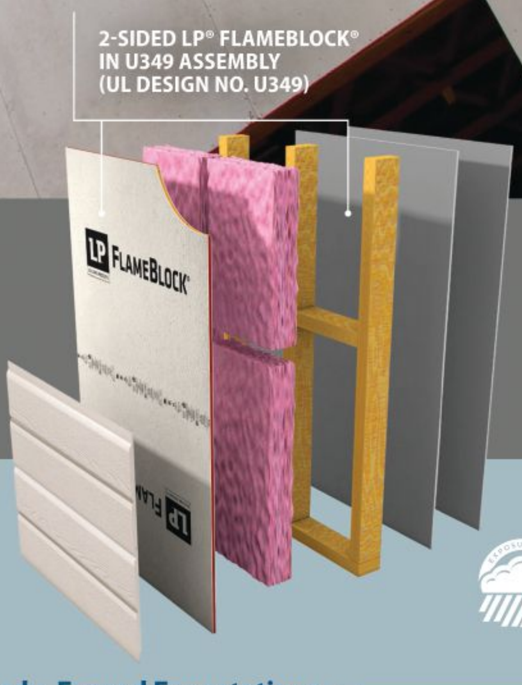

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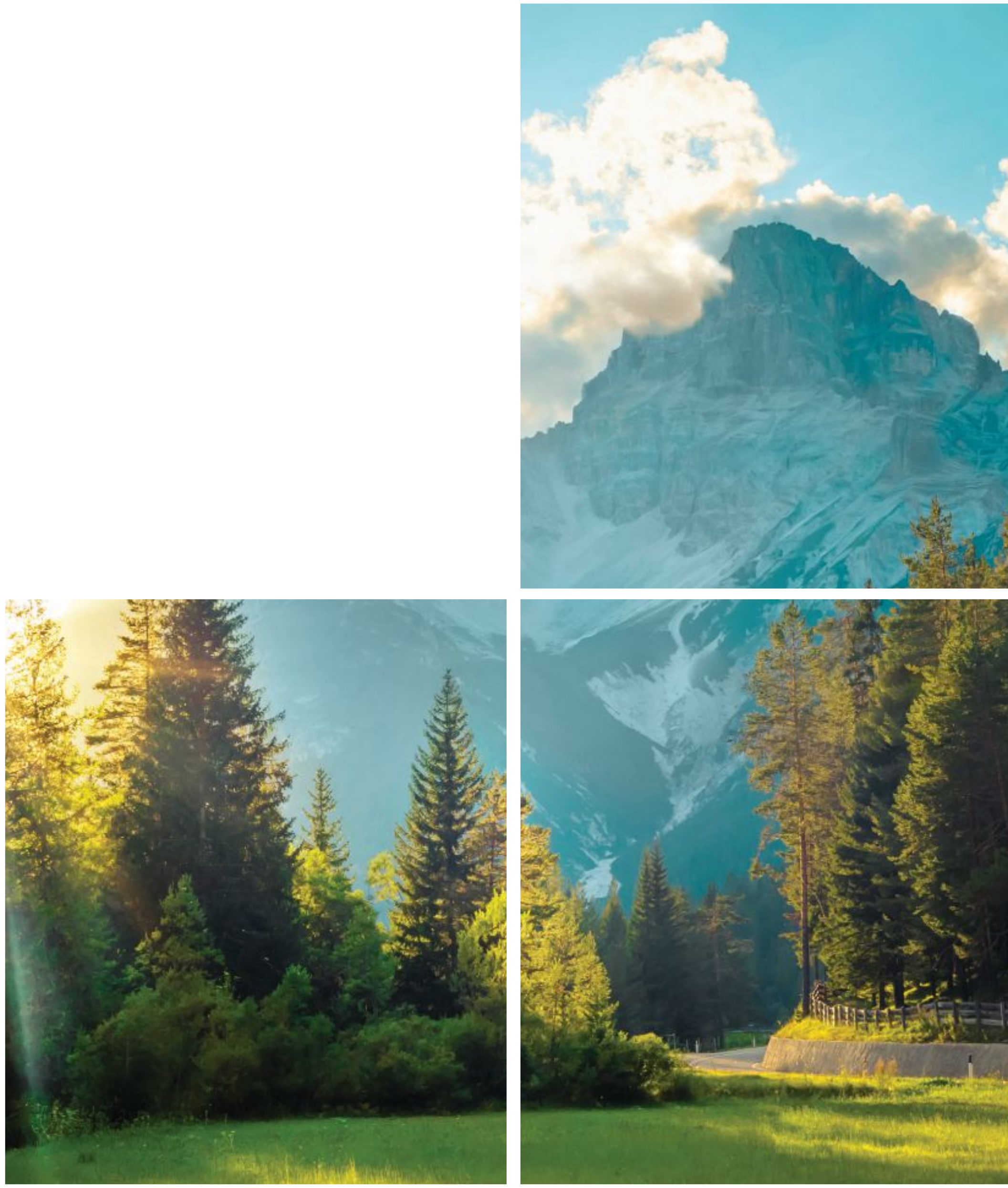

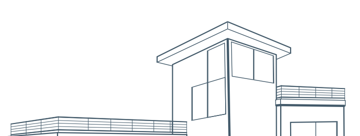


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CHRISTIAN RICHTERS

RCR Arquitectes Founding Trio Wins 2017 Pritzker Prize

Since establishing RCR Arquitectes nearly three decades ago, this year's Pritzker Architecture Prize laureates—Rafael Aranda, HON. FAIA, Carme Pigem, HON. FAIA, and Ramon Vilalta, HON. FAIA—have completed dozens of projects at home and abroad. (Here they are in Barberí Laboratory, the firm's office in the Spanish city of Olot.) The jury citation notes that "what sets them apart is their approach that creates buildings and places that are both local and universal at the same time." While pairs of architects have won the prize, this year marks the first time that the award is shared three ways. —SARA JOHNSON

> *Read more about the 2017 Pritzker Architecture Prize recipients at bit.ly/2017PritzkerPrize.*

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Polished Brass	B-840	B-850	B-8870

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CHRISTINE NELSON

Following Your Nose Through Architectural History

The Morgan Library & Museum in New York City, with its jewel-like McKim, Mead & White pavilion, holds magnate J.P. Morgan's collection of rare books, prints, manuscripts, and drawings. Exploring the connection between scent-triggered memories and architecture, professor Jorge Otero-Pailos, AIA, and his students from the Columbia University Graduate School of Architecture, Planning and Preservation are analyzing the scents of objects in the library, from cigars to leather-bound books. The team aims to catalog which of an artifact's thousands of scent molecules emit smells that are distinct to the place. —VICTORIA CARODINE

> *Read more about the Columbia University project at bit.ly/MorganLibraryExperiment.*


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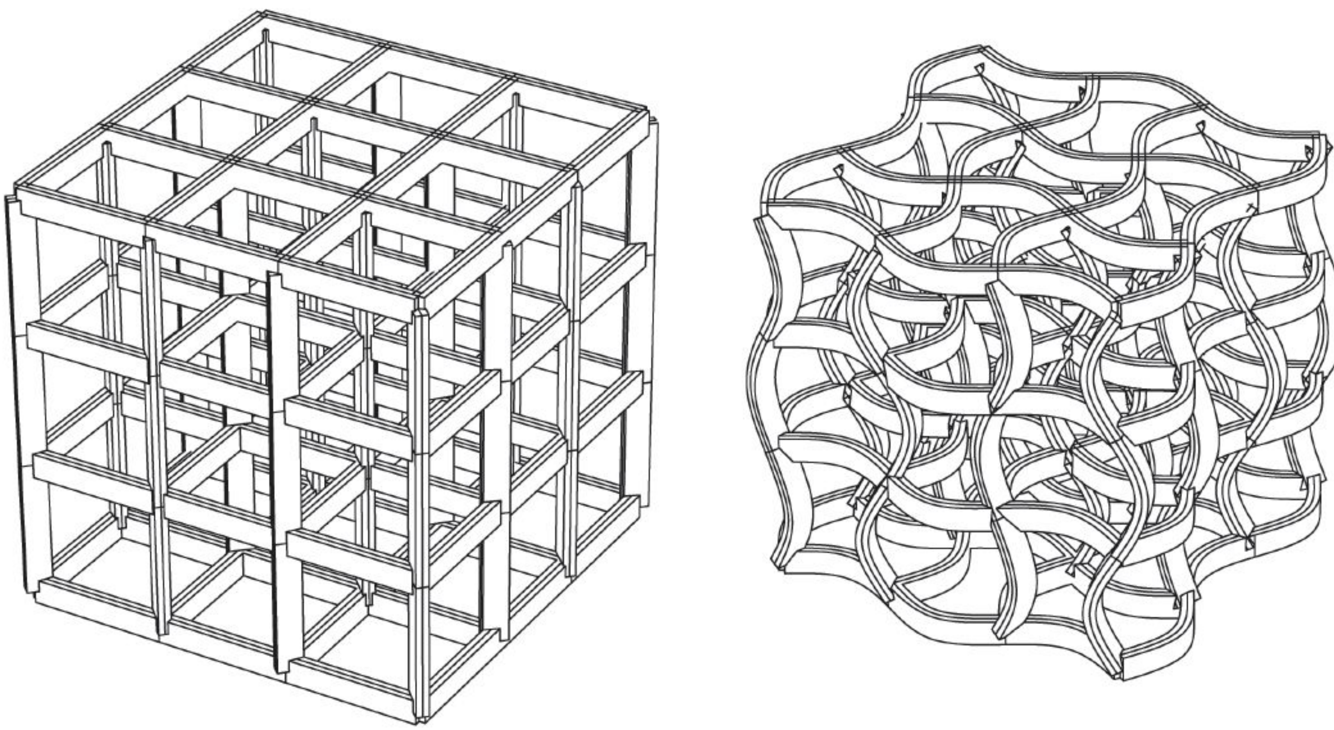
COURTESY MATTER DESIGN AND FR|SCH

A Quirky Play Structure For a Midcentury Neighborhood

A 1950s neighborhood designed by the Architects Collaborative (TAC) in Lexington, Mass., has a new addition: the Five Fields Play Structure, a timber object designed by Brandon Clifford and Michael Schanbacher, AIA, of Massachusetts-based Matter Design and FR|SCH Projects, respectively. Considering the history of the space and an existing swing set and slide, the two experimented with different spatial conditions: over, under, inside, and outside. The finished product does exhibit some typical playground elements, like ladders and poles, which are complemented by less typical features such as stairs to nowhere. —SYMONE GARVETT

> *Read more about the Five Fields Play Structure at bit.ly/FiveFieldsPlayStructure.*



COURTESY MIT SELF-ASSEMBLY LAB

Materials that Respond to Temperature

MIT's Self-Assembly Lab, a research lab focusing on programmable and kinetic materials, is testing out new heat-responsive auxetics (materials that also expand perpendicularly when stretched), which are composites made up of substances with different thermal expansion properties. This could inform the development of objects that are easier to customize for temperature control—like tightening to protect from the cold or loosening to provide ventilation for heat. The material has the potential to provide higher performance and durability in applications for clothing, packaging, and industrial or commercial products. —SELIN ASHABOGLU

> *Read more about this Self-Assembly Lab research at bit.ly/HeatResponsiveMaterials.*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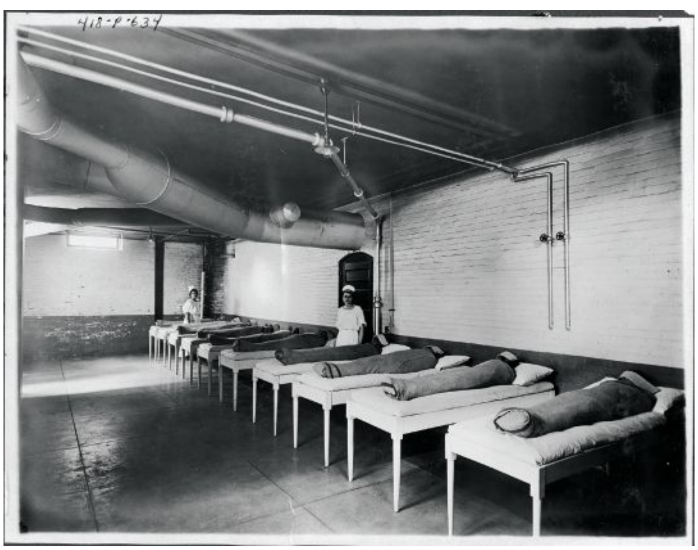

COURTESY NATIONAL BUILDING MUSEUM

The History of a Psychiatric Hospital

The nation's first government psychiatric hospital was built in 1855 in southeast Washington, D.C., and was called the Government Hospital for the Insane. In 1916, its name was changed to the gentler St. Elizabeths. In 2010, the institution moved to another location, and the old complex, a National Historic Landmark, is undergoing rehabilitation into residences, community space, and government offices. An exhibition at D.C.'s National Building Museum, "Architecture of an Asylum: St. Elizabeths, 1852–2017," features drawings, models, and photographs (above) of the campus; it runs through Jan. 15, 2018. —SELIN ASHABOGLU

> *Read more about the National Building Museum exhibition at bit.ly/NBMStElizabeths.*


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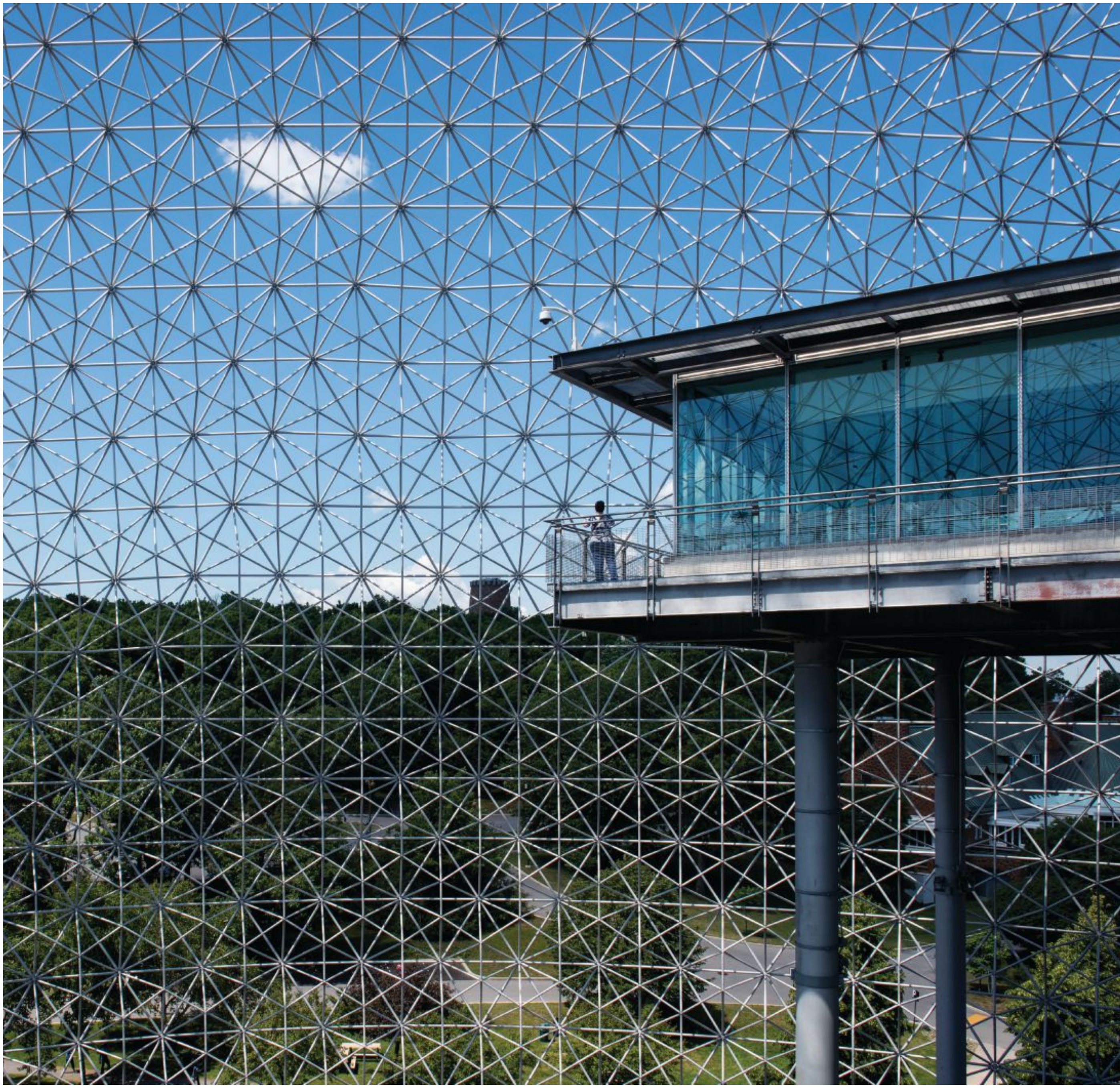
Blocks by Kuma

A set of wood building blocks by Japanese architect Kengo Kuma and forest conservation organization More Trees is now available in the United States. V-shaped with notched ends, Tsumiki are manufactured using Forest Stewardship Council–certified Japanese cedar and can be combined to create sculptures. To celebrate the launch, Kuma and three other local designers—design studio Aranda\Lasch (*Study of Shingling*, above), collage artist Nanse Kawashima, and still-life artist Sonia Rentsch—each contributed a Tsumiki piece to a four-day exhibition at the BDDW showroom in New York City. —SYMONE GARVETT

PAUL BARBERA

> *View more sculptures built with Tsumiki at bit.ly/Tsumiki.*



ALEX FRADKIN

Buckminster Fuller's Biosphere Turns 50

Fifty years ago in Montreal, Buckminster Fuller debuted his 206-by-250-foot, steel-and-acrylic geodesic dome covering a structure by Cambridge Seven Associates—together serving as the U.S. pavilion for the 1967 International and Universal Exposition. Although a fire in 1976 destroyed the acrylic panels, architect Éric Gauthier of local firm FABG transformed the interior in the 1990s into the Biosphere Environment Museum. Coinciding with the anniversary this year, the Centre d'histoire de Montreal will open a new exhibition in June, "Explosion 67: Youth and Their World," featuring recollections of the fair. —VICTORIA CARODINE

> *Read more about Buckminster Fuller's Biosphere at bit.ly/Biosphere50.*

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Best Practices: Transitioning Your Firm to an ESOP

TEXT BY NATE BERG

Firm ownership can take many forms: sole proprietorship, partnerships, and corporations to name a few. But some practices are opting to divide ownership into shares for distribution among employees based on compensation and tenure, thus creating an employee stock ownership plan (ESOP). Below, several leaders discuss their decisions to change their firms' ownership models.

Taking the Leap

With more than 100 years in operation, Baltimore-based architecture firm Ayers Saint Gross (ASG) has had its share of ownership transfers—and they have not always been pretty. "Someone got ill, someone died, or someone just wrestled control from the previous owners," says the firm's chairman and former president Jim Wheeler, AIA. "It was kind of the law of the jungle."

Around 2013, ASG's leaders decided to look for a long-term solution. A recently hired chief financial officer suggested an ESOP, in which everyone at the firm is an owner, and no one has to die to instigate a leadership change. If an employee leaves or retires, the firm buys back their shares and adds them to a pool for redistribution—an appealing prospect for ASG's leaders, most of whom were over 50 and starting to think about their own exit plans.

ASG's ESOP was finalized in 2015. "It's very well suited for design firms," says current president Luanne Greene, FAIA. "[We have] a long-term vision that's very aligned with the ESOP."

Additional Positives

Beyond being an effective mechanism by which to transfer ownership, ESOPs offer other benefits. Ownership of a firm can make employees feel more responsible for the quality of its work, according to Donna Zdanis, director of human resources at U.S.-wide JCJ Architecture. "They feel the responsibility to speak up, to understand the project, to understand how much time they have," she says.

When employees have a direct stake in the financial success of the business, they are more eager to make projects better. They are also more attentive to the firm's value—and to inquire when the stock pile drops. Instead of pointing to the executives in the room, everyone is now responsible for answering the tough questions. Together, the firm takes the time to seek solutions, develop new strategies, and assess the results. "It's a great time to do some lessons learned," Zdanis says. "We're constantly reflecting and learning and improving."

"We felt going ESOP was a decision without any compromise to it whatsoever."

—Chad Surprenant, ISG president and CEO

Be Patient

Transitioning to an ESOP can take months and involve consultants, financial advisers, accountants, and lawyers; a valuation of the firm; and then the gradual buyout of current owners by the ESOP's trust, which distributes the shares. For the Mankato, Minn.–based firm ISG, which finished transitioning to an ESOP earlier this year, the firm's leadership took 18 months to educate themselves and their employees about ESOPs, and to handle the paperwork. "The work you do internally to get ready for the valuation, to understand the transaction itself, and to get comfortable with it take a tremendous amount of time [and money]," says ISG president and CEO Chad Surprenant.

Operating under an ESOP instead of the traditional owner-based model can also require an adjustment period. ISG is still figuring out how to shift its business strategy. What was once a roughly 20-shareholder company is now collectively owned by 230 employees, and Surprenant says that's caused the leadership to be a bit more cautious about taking risks and making acquisitions. "We need to figure out our new metrics of success, and probably for period of time, maybe, we're not as aggressive," he says.

Still, Surprenant is confident about the ESOP's long-term prospects because ISG's culture is conducive to the change. "We felt going ESOP was a decision without any compromise to it whatsoever," he says.

> To learn more about transitioning to an employee stock ownership plan, visit bit.ly/ARESOP.

Next Progressives: Atelier Cho Thompson

EDITED BY KATHARINE KEANE

Location:
San Francisco and New Haven, Conn.

Year founded:
2014

Leadership:
Ming Thompson, AIA, and
Christina Cho Yoo, AIA

Education:
Cho Yoo: B.S., M.S. Stanford University, M.Arch., Harvard Graduate School of Design (GSD); *Thompson:* B.Arch., Yale University, M.Arch., Harvard GSD

Firm size: 6

How the founders met:
We were "buttmates" in graduate school (Harvard GSD–speak for sharing a desk).

Experience:
Cho Yoo: Arup, SHoP Architects, Mass Studies, Neri & Hu, Bohlin Cywinski Jackson (BCJ); *Thompson:* BCJ, Zephyr, Guggenheim Venice, Harvard Office of Physical Resources & Planning

Mission:
We are a multidisciplinary design and concept firm engaged in the art of architecture, interiors, graphics, brand strategy, furniture, installations, and exhibitions. Our expertise and passions transcend the conventional boundaries between these disciplines, resulting in a richness borne of the cross-pollination of ideas and strategies from across this spectrum of design. This integrated design approach produces holistic environments in which all elements are deeply related to each other and to a central concept.


Christina Cho Yoo


Ming Thompson

First commission:
When we were working at BCJ, we won an office competition to design the firm's Park(ing) Day installation. We saw a need for urban seating at street food events, so we designed a packable and portable kit of Tetris-like furniture pieces that could be used as tables, chairs, and stools. Our process on this tiny project shaped our future collaborations: We identified a design problem, prototyped solutions, and developed an approach that bridged space, furniture, and graphics while prioritizing the human experience.

Favorite project:
Our work with Goodwater Capital, a venture capital client, has been a long-term collaboration that has taken us from a logo to custom furniture to three office spaces. It's inspiring to work with entrepreneurs who are embarking on new businesses. Goodwater allows us to take calculated risks and push our capabilities in a way that every great client should.

Design tool of choice:
Cho Yoo: A pen and my partner Ming. Our most exciting design ideas come when we are sketching together in a notebook, and only after do we leap into the computer.

Design aggravation:
When stair guardrail posts are perpendicular to the handrail rather than the tread.

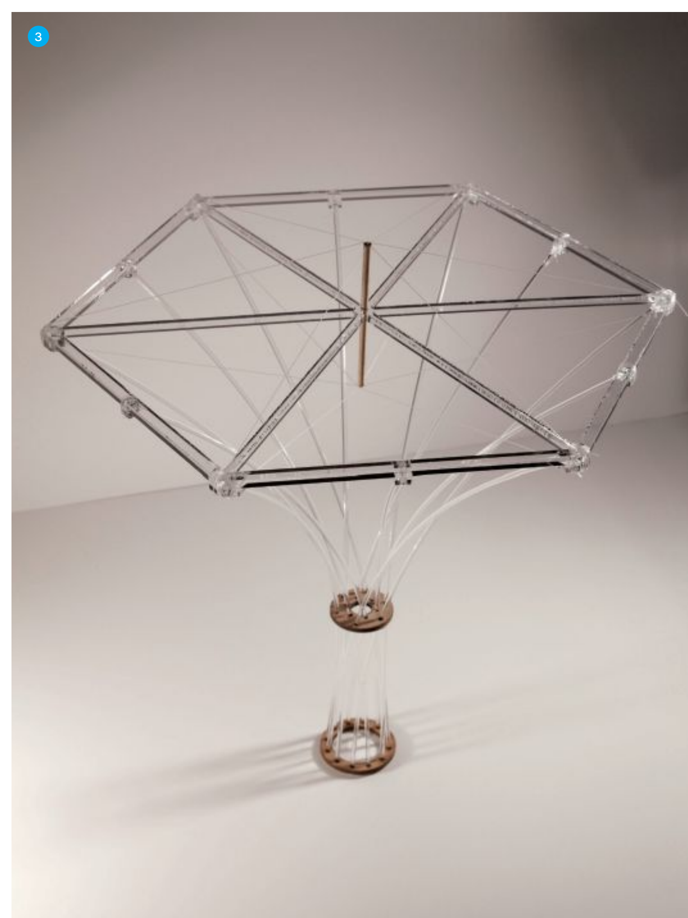
Morning person or night owl?
Both! Now that we both have kids, we have to be morning people and night owls to finish our work.

Vice:
Cho Yoo: Metallics.
Thompson: Wild and ornate wallpapers.

ALICIA CHO

> *To read more about Atelier Cho Thompson's projects and inspirations, visit bit.ly/ARAtelierCT.*

Next Progressives:
Atelier Cho Thompson



1,5: ALICIA CHO; 2: CESAR RUBIO; 3, 7: CHRISTINE CHO

1. The Packable Park is built with redwood frames and colored nylon strapping. **2.** This Los Altos Hills bathroom design won the 2017 California Home+Design Award. **3.** This is a scale model of a transportable and easily disassembled umbrella-like market structure, made of plywood stands and pipe trunks, with steel and fiberglass elements created in collaboration with designer Vera Shur. **4.** A custom red chalkboard and seating area are part of the San Francisco Unified School District Future Dining Experience initiative to engage students. **5.** This 100-square-foot room features custom ash wood library shelving, a standing desk nook, and a daybed-topped trunk that can be assembled like puzzle pieces. **6.** This swallowtail butterfly–inspired community pavilion, made of local redwood with cotton string detailing, was part of the 2016 San Francisco Market Street Prototyping Festival. **7.** Using Rhino and Grasshopper, Cho Yoo and Thompson collaborated with Greg Chunwhan Park and Jeong Jun Song to create an undulating, milled plywood bench. **8.** Painted bamboo mats create visual interest on the wall of Spice Kit restaurant in San Ramon, Calif. **9.** This Oakland, Calif., backyard addition has exposed roof joists.

4, 6, 8, 9: MARBLE RYE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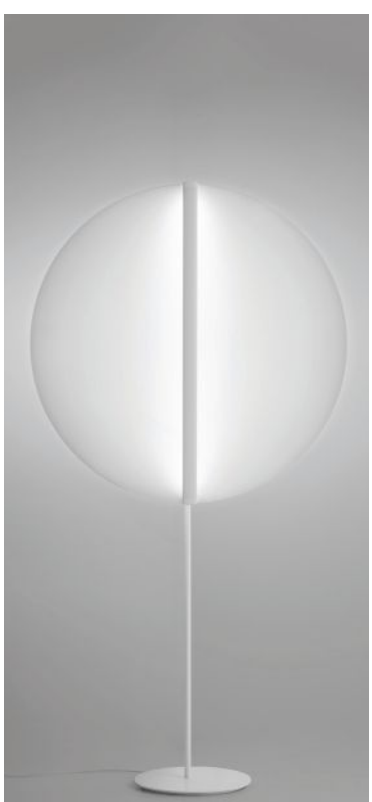
Product Focus: Lighting

TEXT BY SELIN ASHABOGLU

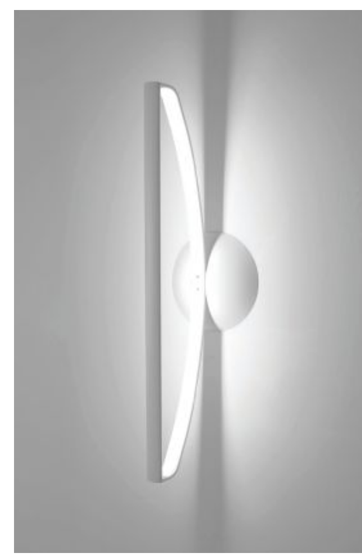
Shield, Kutarq Studio
The folded form of a protective armor used by the Maasai people of Tanzania and Kenya inspired the design of Shield, a collection of ethereal luminaires created by Kutarq Studio—the Valencia, Spain–based atelier of Spanish architect and product designer Jordi López Aguiló—and produced by German lighting manufacturer Millelumen.



Reduced to their most essential components—a semi-translucent acrylic shade and a bow-like aluminum framework that houses a linear LED light source—the fixtures evoke sophistication through their simplicity and shape. In lieu of the vibrant colors and geometric patterns found on the animal-hide Maasai shields belonging to elders who have proven their status as warriors and huntsmen, Kutarq Studio opted to finish the series in a monochromatic white.

Shield can be mounted to walls and ceilings, suspended as a pendant, or attached to a stand as a floor lamp. The luminaires' acrylic diffuser is bent into a convex form and offered in round, eye-shaped, and oval. Each of the three options—available in all fixture configurations—attach to the aluminum frame via two small cutouts on opposite ends of the diffuser's 26-inch-wide diameter.

Shield comes with a color-rendering index of 90-plus and in 2700K, 3000K, and 4000K color temperatures. It uses a TRIAC dimmer. *millelumen.de*



> *For more information about the Shield Series fixtures, visit bit.ly/ShieldSeries.*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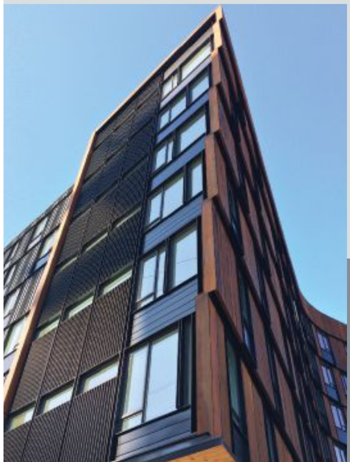

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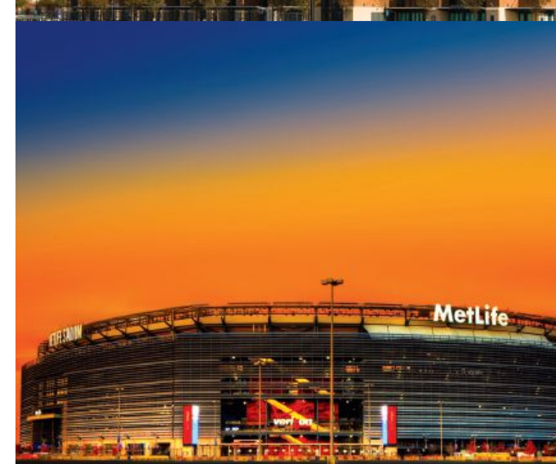
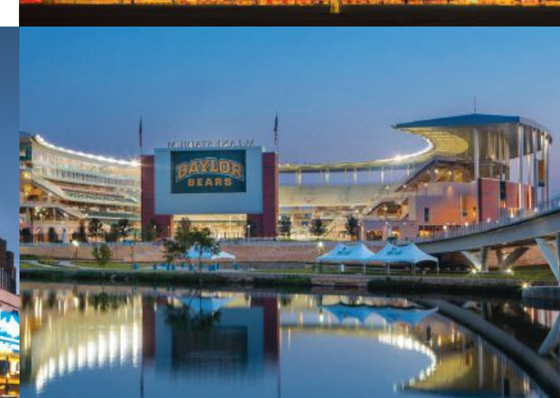

MetLife


BAYLOR
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Professional Development: Seven Alternative Careers for Architects

TEXT BY ALICE LIAO

Not all career changes from architecture require quitting a full-time job—and more importantly, the paycheck that accompanies it—for retraining or school. Myriad professions benefit from skills honed in architecture, such as design thinking, creative problem solving, and project management, which can ease and hasten the daunting transition and life decision. Expertise in architecture can even be desirable or a prerequisite in the new field.

If you are looking for a change, here are seven opportunities to consider and the stories of those who have successfully made the switch.

	Exhibition Design	Teaching
Designer	**Hana Kim**, ASSOC. AIA, design manager and exhibit designer, Smithsonian Institution, National Air and Space Museum	**Chris Humbert**, technology and engineering teacher, grades 9–12, Park City High School, Park City, Utah
Education	B.S. in Architecture and M.Arch., University of Virginia	B.Arch., University at Buffalo, the State University of New York; M.Arch., North Carolina State University
Architecture Experience	16 years at various firms, including Landscape Architecture Bureau, Washington, D.C., Streetsense, Bethesda, Md., and Glavé & Holmes Architecture, Richmond, Va.; lecturer, University of Virginia	15 years at various firms, including Smith Lineberry, Raleigh, N.C., VCBO Architecture, Salt Lake City, FFKR Architects, Salt Lake City, and Renovation Design Group, Salt Lake City
Crossover Skills	Iterative thinking, synthesizing information, project management, graphic design, 3D visualization, and presentation. Kim's role requires an ability to absorb, organize, and communicate content—presented to her by scholars, curators, editors, and content developers—in an environment that is informative and visually compelling to museum visitors.	Creating thinking, project management, and communication. Humbert must translate abstract ideas into classroom instruction that appeals to students with different interests. His capstone engineering class designs, models, 3D prints, and tests solutions in applications from workforce housing to ultraviolet-light sensors. Humbert says that his work experience increases buy-in from students "because they realize that what you say has legitimacy."
Skills to Learn	Combining information design with 3D design; working with sensitive content related to social conscience and justice. "You need to be on top of current events and be open to learning through the process," Kim says.	Understanding of teaching theory and application. To become a licensed teacher, Humbert took five classes in pedagogy, one night a week, over two years. His industry experience fulfilled several requirements for teaching specific subjects, such as technology and CAD. He met the rest through workshops, reading, and more training.
Advice	Gain experience at an architecture firm that also does exhibit design. Prior to working for Howard+Revis, a Washington, D.C.–based exhibit planning and design firm, Kim says she "was able to get experience with designing, conceptualizing, and detailing fabrication for exhibits through working at architecture firms."	Take classes on classroom management, which many school districts offer because of their need for teachers. Become a substitute teacher for an elementary school. "It's a challenge to manage 25 little kids and keep them excited for a day," Humbert says. "You quickly realize if you like it or not, and if you're good at it."

> *For more career opportunities for trained architects, visit bit.ly/ARAltCareers02.*

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Aaron Schalon, AIA, LEED AP BD+C
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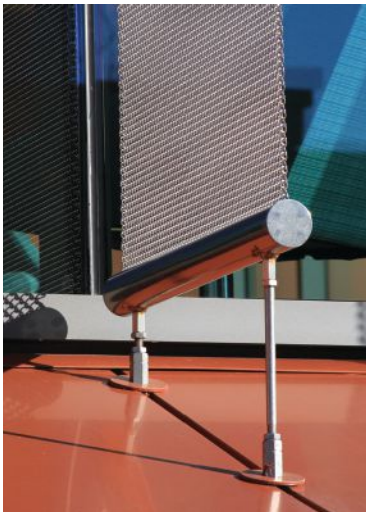

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	Product Manufacturing	Building Safety	Architectural Photography	User Experience (UX)	Fine Art
Designer	**Tiffany Coppock**, AIA, commercial building systems specialist, Owens-Corning	**Ronald Piester**, AIA, vice president of membership and certification, International Code Council	**Jeffrey Totaro**, photographer, Jeffrey Totaro Architectural Photographer	**Matt Storus**, UX designer, 21.co	**Jennifer Ivory**, artist, Insectworks
Education	B. Environmental Design, Texas A&M University; M.Arch. with preservation certificate, University of Colorado	B.Arch., Syracuse University	B.S. in architectural engineering, Drexel University	B.Arch., University of Waterloo; M.Arch., Harvard Graduate School of Design	B.Arch., Oregon State University; M.Arch., University of Oregon
Architecture Experience	Colorado Center of Preservation Research, one year; Isley Hawkins Architecture, three years; president, Construction Specifications Institute Raleigh-Durham Chapter chapter, one year	New York City Housing Authority, six years; Angerame Architects, Old Chatham, N.Y., two years; director, Division of Building Standards and Codes, New York State Department of State, 24 years	EwingCole, Philadelphia, five years	RVTR, Toronto, one year; KVA MATx, Boston, five months; Preston Scott Cohen, Boston, one year	14 years at various firms, including Bennett Shuman, Pensacola, Fla., and B.E.C.I., Pilot Mountain, N.C.
Crossover Skills	Code research, graphic communication, creative problem solving, specification writing, and CAD. In her first job as a manufacturer's representative, Coppock helped architects, including Santiago Calatrava, FAIA, ensure their project drawings met code. Her current responsibilities include technical writing, coordinating product testing, website development, and sitting on code and standards review committees.	Creative problem solving and understanding architectural design methodology and philosophy, building codes, and the construction process. One of Piester's first responsibilities in the building safety industry was helping noncompliant construction projects find alternative solutions to meet code.	Architectural vocabulary and understanding the design and construction process. Totaro's design background helps him determine how best to tell the story of his clients' projects through photography.	Iterative thinking, parametric design, rendering, 3D modeling, and presentation. Although architecture and UX design overlap quite a bit, the latter requires considerable user input to drive development. Even after an app has launched, Storus notes, "We're getting feedback on day one and can change it as needed."	Project management, illustration, and model building. Ivory turned her childhood love for insects into handmade paper sculptures using rendering and model-building skills honed in architecture school "before everything was computerized," she says. Her project management experience taught her to budget for contingencies.
Skills to Learn	Business acumen and jargon, and a refresher in physics and chemistry to understand product properties, composition, and performance. Coppock learned these skills on the job and through reading, attending lectures, and joining industry organizations.	Understanding the building regulatory system and the relationship between good design and construction practices. High-level positions in building departments typically require a professional license in architecture or engineering. Many municipalities also require building and fire officials to receive national certification.	Technical skills in photography, lighting, and postproduction. Facility with Adobe Photoshop is a must, as each architectural photograph is a composite of several exposures and can take anywhere from 15 minutes to two hours in postproduction.	Facility with Sketch and Invision, the ability to elicit user input, awareness of usage patterns and the commonality of platforms, and "how people interact with things," Storus says. Study a few favorite apps by diagramming their wire frames and trying to re-create them in Sketch, an exercise that Storus learned in school; he learned the software on the job.	Knowledge of the art show industry, small-business management, and accounting. "The biggest thing for me was being completely responsible for all of my supply lines and travel organization," says Ivory, who files sales taxes in 20 states. Artists must view their artwork critically and price it appropriately—many either undervalue or overcharge for it.
Advice	Talk to reps and manufacturers of products that you like, and look for companies with strong research and development departments. "It's critical to make sure you're working with someone who's forward-thinking and working on whatever's next," Coppock says.	A career in building safety can be very satisfying, Piester says, as it requires "translating your creativity in a different way to the construction process."	Architectural photography requires "a lot of the same visual and aesthetic skills that an architect [has]," Totaro says. While still working in architecture, he spent nights and weekends assisting on photo shoots. Speak to your firm's roster of photographers, and research shooting and postproduction techniques online and on YouTube.	UX design's particular conventions, approaches, and techniques "genuinely require your time and attention," Storus says. "It's not as simple as saying, 'I've designed a building, so I can design an app.' You have to take the craft seriously."	Attend an art show to network with exhibitors and learn how the industry works. Be prepared to budget roughly $1,500 to $2,000 per show, some of which has to be paid up front to cover booth and jury fees, as well as travel and accommodations.

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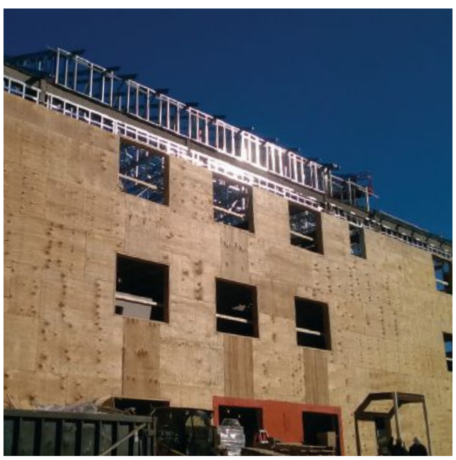

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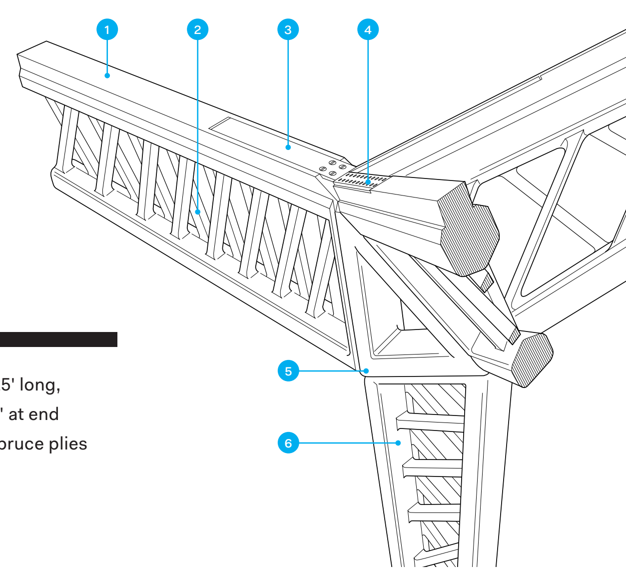
Detail:
Maggie's Manchester Timber Frame

TEXT BY TIMOTHY A. SCHULER

Nestled within a residential neighborhood at the end of a tree-lined street, the 5,400-square-foot Maggie's Centre in Manchester, England, hosts a variety of intimate spaces, including a kitchen, a living room, and a covered veranda.

"It creates a sense of place," says Darron Haylock, a partner at Foster + Partners, which designed the center. Seventeen wooden portal frames form the building's exposed timber structure, creating a central, light-filled atrium flanked by outstretched beams. "The structure is the protagonist," scribbled Lord Norman Foster, HON. FAIA, a Manchester native as well as a cancer survivor, on one early sketch: "Tiptoes lightly on the site."

Each beam, joist, and column is designed as a tapering truss, comprising laminated veneer lumber (LVL) routed to create an internal lattice-patterned web. Contractor Blumer Lehmann cut plies of furniture-grade spruce using a five-axis milling machine to rout out each web member and then adhered the plies in layers. The density of each truss web corresponds with the intensity of the loads that the member is carrying. Near the triangular node, where bending forces are high, the lattice is tight; toward the beams' ends, the lattice opens up. "The spacing of those struts is very closely linked and determined by the stresses of the beams and the spans they have to make," Haylock says. "So it informed the architecture and created the architecture."



1. LVL tapered truss beam, 25' long, 23" × 5" at node to 2.3" × 4" at end
2. Web struts, routed from spruce plies
3. 50mm-wide steel plate
4. 30mm-wide steel plate
5. Wooden triangular node
6. LVL tapered truss column

NIGEL YOUNG/FOSTER + PARTNERS

> *To read more about the design of the Maggie's Centre in Manchester, visit bit.ly/ARMMCentre.*

One of the advantages of CLT construction is assembly speed, especially important for educational projects bound to school-year timetables. For Washington Latin, the delivery goal was to use the gym for the June graduation ceremony, which was met. "CLT installation time, including plugs and panel taping, represented only four weeks of the total construction time," project leader Ann Neeriemer says. Gym construction proved to be minimally disruptive to class life, primarily due to project siting. In fact, the project became a living teaching lab as some teachers used the construction as part of their lesson plans that semester.

WOOD: STUDENT-FRIENDLY, BUDGET-SMART

For Washington D.C. education leaders, the **Martha C. Cutts Gymnasium** is more than just the region's first cross-laminated timber building. The 11,266 square foot facility signals an exciting new construction advance that supports student well-being and school distinction within ever-tightening budgets.

The conundrum before Washington Latin Public Charter School officials and their architectural team was familiar to many designers: How could the 10-year-old charter school construct a gymnasium of enduring distinction on a budget?

As Washington Latin's first gym, the expectations were understandably high from the school's leadership, alumni, faculty, staff, and students. The architectural team of Perkins Eastman with Demian Wilbur needed to create a delicate balance between high client expectations and cost.

Project lead and senior associate of Perkins Eastman, Ann Neeriemer, AIA, LEED AP remembers the discussions well.

Honoring The Dream

"In the original concept design, we actually proposed a two-story facility with lots of glass, brick, and a barrel-vaulted roof," Neeriemer says. "But the site's soil conditions required helical piers, an unexpected expense. After multiple rounds of scope reduction and value engineering, the design was as simple as it could be. But it wasn't their dream. How could we deliver something they could afford and love?"

Enter cross-laminated timber (CLT).

Winning Solution

A school parent asked '*Why not wood?*' Intrigued, the design team investigated the idea. The more they looked, the more they liked.

"This could be the aesthetic that would make this project unique and beautiful," Neeriemer explains.

The project has become a regional learning attraction for its innovative use of CLT construction. "The opportunity to do this from a school aesthetic standpoint with architectural innovation has made the gym something special. If we hadn't used CLT, no one would bat an eye at it. It would be just another gym," says architect Ann Neeriemer, project lead. "Wood is cost-effective, easy to use, and delivered a great result."

The list of CLT construction attributes is impressive. It's a proven, code-compliant construction process. The idea of sustainably harvested wood and carbon sequestering was exemplary and offered a fine teaching moment for the school's 600 students in grades 5 through 12. Wood also supports LEED certification, mandatory for D.C. school construction. For approximately the same material cost as steel, construction that uses CLT takes a fraction of the time, helping compress an already aggressive delivery schedule.

Code Compliant

As a first-of-its-kind project in D.C., Neeriemer and her team, which included Ziad Elias Demian, AIA, APA of demian\wilbur\architects, addressed potential code concerns the old-fashioned way—they met early and often with code officials. "We qualified as Type V construction," the architect says. "We had to prove the CLT panels would behave in a way that ensured structural integrity. They liked our post and beam system using CLT panels as lateral support and sheathing for the walls and roof."

Only Seven Months To Build

Construction began in late October 2015. After a series of minor set-backs, including a lost truck carrying glulam beams and a tough winter storm with high winds, the project was completed in late May, 2016, a mere 7 months after construction began. School officials formally opened the gym on June 8, 2016, with a naming ceremony, christening the gym after Martha C. Cutts, the founding head of Washington Latin.

Comforting Dimension

The owner's reaction? "They love it," Neeriemer says.

"Wood made all the difference in the world. The gym is beautiful. It was delivered on time and within budget," says Neeriemer. As an architect with a design focus on K through 12 education projects, Neeriemer sees another benefit. "Wood has a calming effect. Washington Latin students feel comfortable and safe within a natural environment. It's important we think about these things. Wood adds a comforting dimension you won't find with any other building material."

The Martha C. Cutts Gymnasium is a one-story structure with a roof that slopes from 32 feet to 27 feet. There are 12 structural bays, including the ends, with 75-foot long glulam beams. The beams are a single continuous piece. There are 36 glulam columns. CLT is used for both wall and roof panels. All CLT is 3-ply with slightly varying thicknesses.

Architect: Perkins Eastman with demian\wilbur\architects

Structure: Arup for KLH/wood structure and SK&A for all other structure

MEP: Setty & Associates

Contractor: MCN Build

Photography: Sarah Mechling, Perkins Eastman

Owner's Representative: Brailsford & Dunlavey

Site Design: Lee & Associates

Civil: AMT

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Green Design: Scaling Up Sustainability

TEXT BY COURTNEY HUMPHRIES

In the Dorchester neighborhood of Boston, the Codman Square district couples an underserved, low-income population with an aging housing stock. The humble square is also a national model of a green community.

During a 2009 revitalization planning process launched by the nonprofit Codman Square Neighborhood Development Corp. (CSNDC), residents voiced their interest in sustainability and economic and social equity. The effort, which focused on a 46-acre tract called the Talbot–Norfolk Triangle, resulted in recommendations to spur transit-oriented development around a new commuter rail line, traffic calming to improve walkability, energy retrofits, and a community solar project that would reduce utility bills for residents and help the city of Boston achieve carbon neutrality by 2050.

At the time, few models existed for scaling the principles of sustainable design beyond standalone building projects to entire communities. The CSNDC looked to the U.S. Green Building Council's (USGBC's) LEED for Neighborhood Development framework for guidance, but the standard applies typically to new construction.

Codman Square's homegrown process led to its 2014 invitation to join EcoDistricts' two-year Target Cities Program, joining 10 other communities in nine U.S. cities to benefit from technical assistance and guidance from the Portland, Ore.–based nonprofit. EcoDistricts staff led webinars, site visits, and national workshops with district leaders to discuss how to plan and implement neighborhood improvement projects while addressing the program's core imperatives of social equity, resilience, and climate change.

EcoDistricts defines sustainability in terms of health, community, economic, and environmental outcomes—perfect for neighborhoods like Codman Square that have concurrent goals.

The Target Cities program, which ended in December, allowed EcoDistricts to pilot and refine its protocol on a national scale. The organization now offers a free protocol and a fee-based certification program for any interested community, as well as a professional accreditation program for individuals who want to highlight their expertise in sustainable development.

EcoDistricts' protocol focuses on processes as much as outcomes. "It's not just what you want to do," says founding CEO Rob Bennett. "It's who's around the table." Each participating district first commits to the core imperatives. Then, to achieve certification, district leaders have two years to form a structure for leadership and governance, and to assemble a plan that includes mapping their current assets and setting targets, timetables, and strategies for improvement.

To maintain certification, districts must report on their status every two years and share progress publicly through the EcoDistricts Certified Registry. Though metrics are important,


Street mural in Codman Square, Dorchester, Boston

Bennett says, the EcoDistricts' protocol is not prescriptive. "It's not a technical standard," he says. "We're focused on providing inspiration and rigor, and pushing projects."

David Queeley, CSNDC's director of eco-innovation, says the collaboration and framework have helped him to think about who should be involved in governance now and in the future. "It's not a cookie-cutter approach," he says. "You make it fit the situation you're in."

The Power of Scale

EcoDistricts joins a growing number of programs that aim to scale up performance goals to neighborhoods and cities.

"The fact that there are so many frameworks is a testament to the fact that people understand the value of

DANILO MORALES

> To read about more performance-based programs that aim to encourage citywide change, visit bit.ly/ARGreenUp.

**Green Design:
Scaling Up Sustainability**

engaging at the community level," says Steven Burke, sustainability manager at Cambridge, Mass.–based architecture firm SMMA and co-chair of the Boston Society of Architecture's Committee on the Environment.

Such efforts make new kinds of projects possible. Neighborhoods can explore district-wide energy systems and community solar facilities instead of confining projects to a particular building. And neighborhood-scale

> "In the end, there should be multiple models that other cities can look to and adopt ... if they want to put similar policies in place."
>
> —Julie Hughes, co-director, City Energy Project

initiatives can link building-scale concerns, such as energy and water use, with big-picture sustainability goals such as urban greening, transportation investment, and economic resiliency.

The City Energy Project (CEP), a joint venture of the Natural Resources Defense Council and the Institute for Market Transformation, is a network of 20 cities with the single goal of reducing energy use in their largest buildings, which are also typically the most energy intensive, says the project's co-director Julie Hughes.

Cities participating in the CEP get financial support for a temporary part- or full-time staff member of the city's choosing to help implement strategies to foster benchmarking and transparency policies, improve code compliance, work with utility companies on incentive programs, and finance retrofits and green building. New legislation is often required in many cities, Hughes says.

For instance, the city of Boston had a goal to accelerate success in energy-efficiency efforts, but it was not investing in the appropriate improvements to make large-scale changes, says Milton Bevington, the CEP-funded senior adviser to the city. He's spent two years helping the local government develop Renew Boston Trust, which will allow the city to finance energy improvement above its normal borrowing cap set by credit rating agencies, based on energy performance. "The goal is an order of magnitude increase in the investment in energy efficiency and renewable energy in the built environment," he says.

These large-scale initiatives and programs also bring new combinations of networks and stakeholders together, align their interests, and enable peer-to-peer knowledge sharing across communities. "Each city's working very much in the local context," Hughes says. "But in the end, there should be multiple models that other cities can look to and adopt somewhat if they want to put similar policies in place."

Architects can take on a vital role in these initiatives by functioning as advisers and moderators of a community-wide planning process rather than driving specific design outcomes, Burke says.

Measuring Success

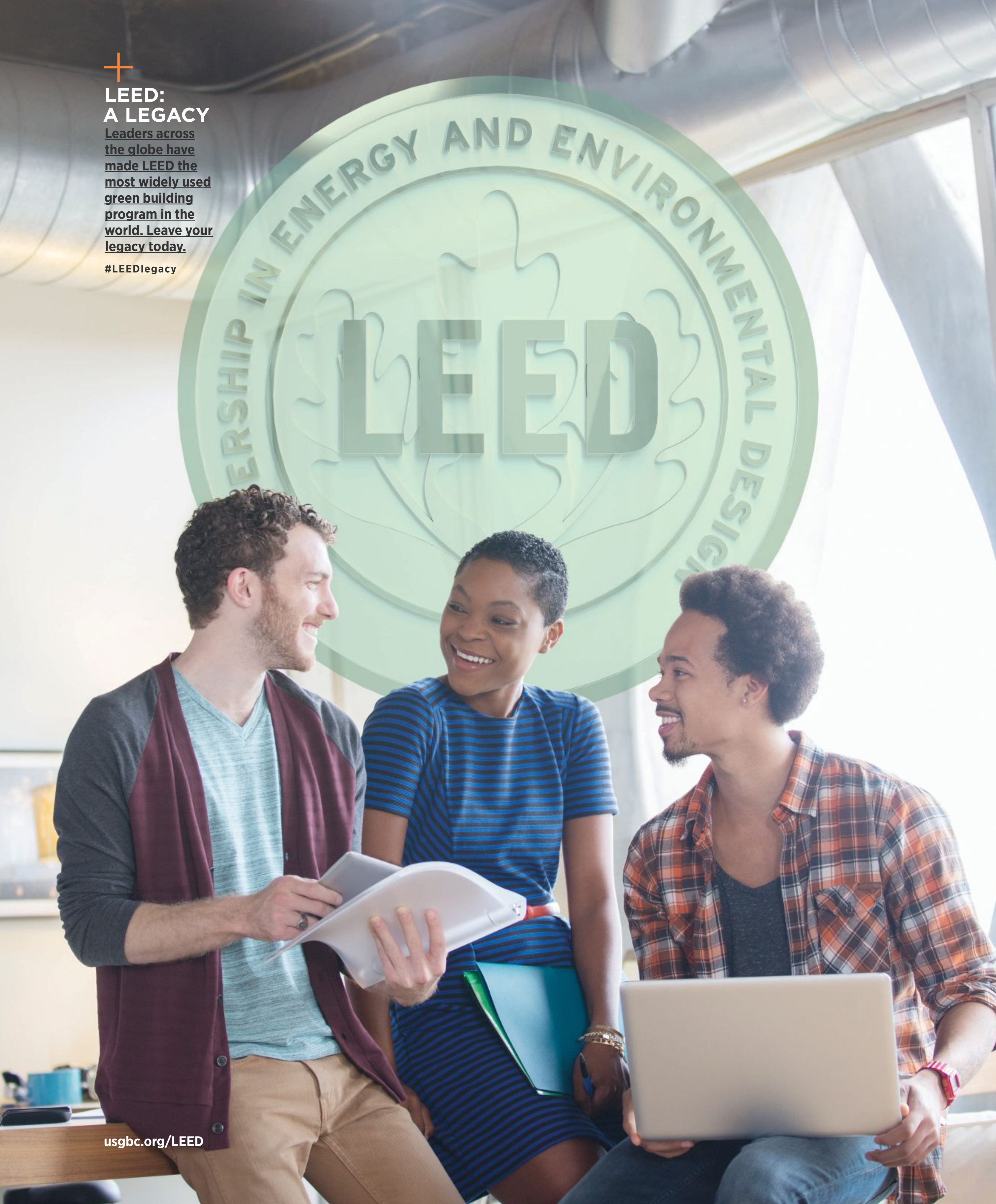
Cities looking to scale up performance goals are also seeking ways to measure, evaluate, and report their progress. Eliot Allen, a principal at Criterion Planners, in Portland, Ore., says that nearly 30 tools in the U.S. alone are available to assess sustainability at the neighborhood or city level. They include online scoring systems as well as in-depth certification programs with performance benchmarks like EcoDistricts, the International Living Future Institute's Living Community Challenge, and STAR Communities. The platforms vary widely in price, accessibility, scope, and focus, but collectively they're helping to usher in a new way of evaluating community sustainability based on performance. "These tools are going to be on hand to measure it, characterize it, and give policymakers feedback," Allen says.

Among the newest tools are LEED for Communities and LEED for Cities, which aim to help municipal governments and community leaders apply the LEED standard more broadly. After registering and applying for precertification, project managers must devise a unique road map that defines projects, goals, governance structures, and a system for tracking metrics. The standard will compare cities based on energy, water, waste, transportation, and human experience. "It's a data-driven approach," says Gretchen Sweeney, vice president of LEED implementation at the USGBC.

To accompany the new LEED standards, the USGBC created Arc, a digital platform that will connect users to LEED certification programs and other GBCI products and services, Sweeney says. For a fee, cities and projects can register on the platform and submit data regardless of whether they plan to pursue LEED status formally; the platform tracks their progress and issues a performance score.

While the growing emphasis on accountability could have profound effects on cities, data alone doesn't provide a path for change. That's where neighborhood-based protocols can come into play, SMMA's Burke says. Even citywide policies often need to be implemented at a neighborhood level to succeed, which also can pose logistical challenges.

In Boston, however, that's where the Codman Square district has a distinct advantage: committed, progressive community leadership and the support of its residents, hungry for change that benefits the entire neighborhood.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PHOTOGRAPHY: DANA HOFF

Accepting Impermanence

In Florida, embracing the need to reorganize and reuse.

Martin Gold, AIA, is an associate professor of architecture at the University of Florida and the director of CityLab Sarasota, the university's M.Arch. program focused on emerging technology, culture, and climate-responsive architecture. As such, he's intimately involved in linking Florida's past and future, the styles that emerged from its shores, and the challenges that lie ahead. Gold has also practiced since the early 1990s, providing insight into architecture's daily grind that he feels his students need to have to succeed.

As told to Steve Cimino

CityLab Sarasota could be called the evolution of the Sarasota School: modern, with newer materials, but still focused on how we connect the inside and the outside. That mindset is still alive here in Sarasota. Underlying all that, of course, is how do we deal with issues like sea level rise? How do we help communities that might have a limited life span? And how do we live in these places as best we can, while also understanding that they're not going to be here forever?

I try to frame my teachings through the idea of impermanence: the impermanence of the land around us, and this culture, and their evolution. It's philosophical in a lot of ways. As Florida's barrier islands are being nibbled away, for example, our focus is on how to keep key infrastructure elements as protected as we can. But at some point you need to plan for change and accept that the human life span and the structure's life span are very different things.

Once you accept that this is a viable way to look at things, it changes your reactions. Some buildings we keep because they're fabulous historic buildings. There is often a high cost to doing that, but we do it because it is the right thing to do. On one hand, you might say about a building, "This is unsustainable and a waste of resources to take [it] apart," but on the other, you might disassemble it and discover that it's the better choice than new construction. We recycle, we reorganize, we reuse.

Not everything should be impermanent, but when it comes to something like a house—which won't last more than 15 years in Florida anyway—it might make more sense. That's Florida's lineage, too: our culture and history. We build, the storms come in, and then we rebuild. If we embrace that idea and train ourselves accordingly, we can probably design better. We can improve and retool as we move forward.

When it comes to designing and teaching, it's really rewarding to work in that in-between place. Going back and forth, to me, is critical. If I don't have some connection to practice, how do I teach people who are going into practice? I find them to be reciprocally rewarding. One feeds the other in a very positive way. AIA

AIANow

Text by William Richards
Art Direction by Jelena Schulz

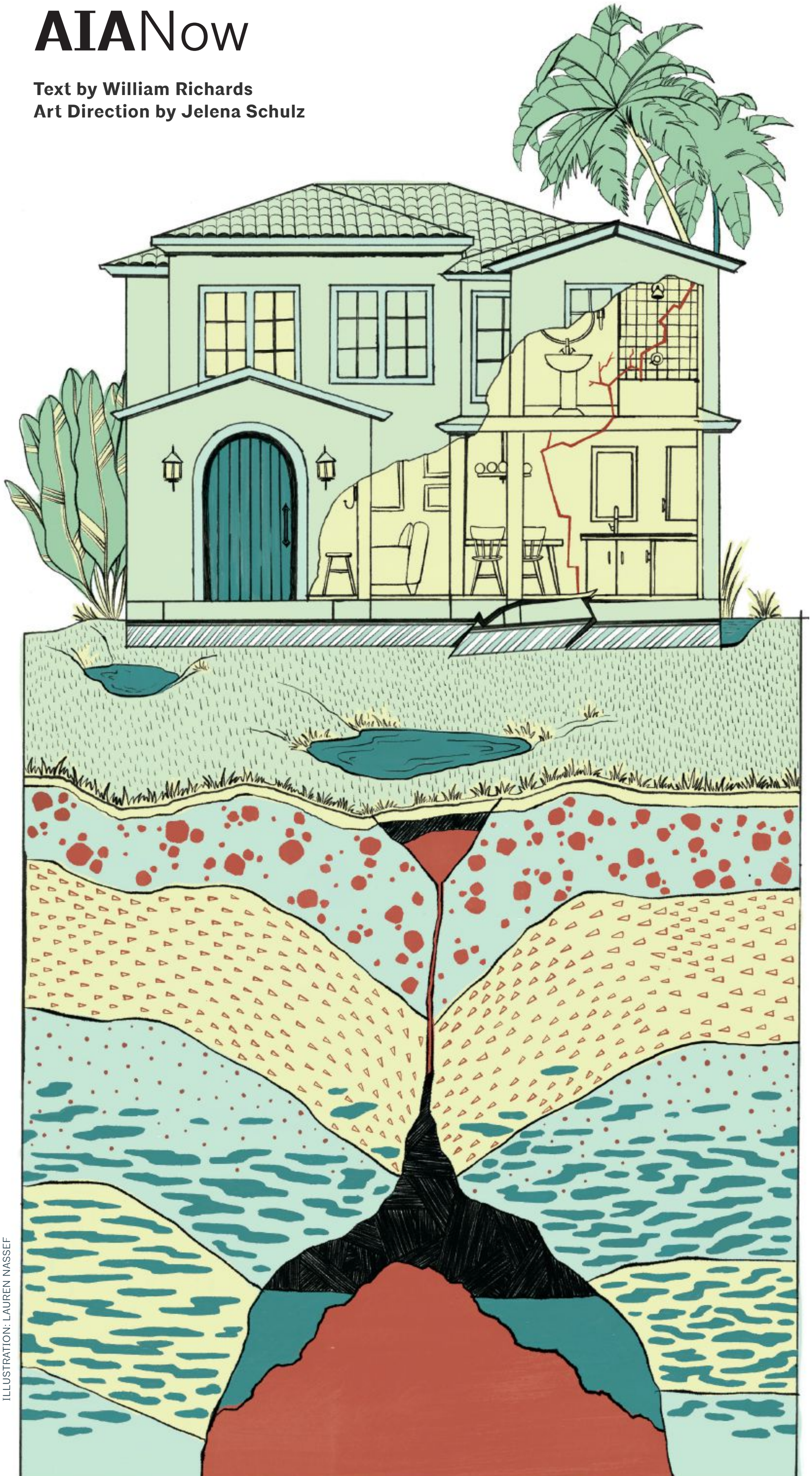

ILLUSTRATION: LAUREN NASSEF

Do You Have That Sinking Feeling?

Natural sinkholes are a major challenge for the nearly 20 million people in Florida, given the state's high water table and porous limestone below the sandy surface. Winter Park, an Orlando suburb, is famous for the May 1981 sinkhole that swallowed an Olympic-sized swimming pool and an entire car dealership—which caused no deaths but did make it into the record books as the largest sinkhole event that resulted from natural geological conditions.

In 2014, in order to predict future natural sinkholes, University of Central Florida scientists created a simulator that, ideally, will give residents and business owners enough time to vacate an area. And, also in 2014, NASA researchers claimed that satellite radar can provide clues about the likelihood of an area's susceptibility. But if you're a homeowner and you don't have NASA scientists on speed dial, how can you tell if a sinkhole is forming in your yard? Well, just take a look around.

Six Salient Sinkhole Signs

- New small ponds that appear after rain
- Dips, depressions, slopes that appear in a yard
- Cracking or buckling of house's concrete slab
- Cracks in interior walls
- Cracked tiles
- Uneven floors, warping of hardwood, bulging or sagging sections

AIADesign

Preparedness Beyond the Coast

What does resilience mean for an inland city like Orlando?

When it comes to total number of hotel rooms, Orlando is second worldwide only to Las Vegas, with some reports putting the central Florida city's count well over 140,000. And those rooms are put to use: The city is a frequent destination for conventions (such as the AIA Conference on Architecture), and the tourism industry—led by the Disney and Universal theme parks, the nearby Kennedy Space Center, and more—continues to boom. Last October, however, Orlando's hotel rooms filled for another more dire reason: evacuation.

Hurricane Matthew was a Category 5 storm that caused extensive damage and loss of life from the moment it made landfall over Haiti and Cuba on Oct. 4. The eye of the storm hovered just off the Florida coast as it moved northward, where it made landfall again in South Carolina before twisting out to sea off of Cape Hatteras. As the storm bore down, Florida Governor Rick Scott's message to coastal residents was unequivocal: "Evacuate, evacuate, evacuate. Time is running out." Many heeded the message. Hotels in Orlando filled to capacity almost overnight, with some enterprising hoteliers even offering "distress rates" for people fleeing the storm.

Inland cities might not have the same pressing concerns about sea level rise and disaster relief and recovery as coastal cities do, but their important roles as intake points for coastal evacuees means they must be able to absorb huge numbers of people under duress (and do so without compromising their own systems—power, water, transportation, and communications).

"In a situation like Hurricane Matthew, even though we were not going to be directly hit, we were going to get a lot of people staying in hotels, coming inland, trying to ride the storm out," says Fernando Rivera, an associate professor of sociology at the University of Central Florida in Orlando, and the co-author, with Naim Kapucu, of *Disaster Vulnerability, Hazards and Resilience: Perspectives from Florida* (Springer International Publishing, 2015). "We need to be sure that we have the resources, the capacity, the command center, and that our major institutions, such as the airport, are up and running."

Alternatives and Benchmarks

The Center for Resilience at Ohio State University defines resilience as "the capacity of a system to survive, adapt, and grow in the face of unforeseen changes, even catastrophic incidents." The term has helped steer action toward not just creating environmentally sound buildings, but developing cities, towns, and major infrastructure that can withstand or adapt to the potential effects of climate change and even terrorist attacks.

In Florida, not surprisingly, the coast gets the most attention when it comes to resilience. According to the organization Resilient Miami, that city ranks first in the nation in terms of potential exposure to coastal flooding. South Florida, the organization states, has experienced about 12 inches of sea level rise since 1880. Global sea level, on average, has risen 8 inches during the same time, meaning that Florida's unique geography makes the potential for flooding far more pressing than it is elsewhere.

And yet the debate over climate change and what, if anything, to do about it, rages on. On the coast, residents might have an easier time convincing government officials that resilience measures are necessary, but inland that conversation is more abstract. Orlando, however, has taken an important leadership role in the state by showing how an inland government can be committed to improving resilience and sustainability both in terms of its own municipal operations and in the broader region. Initiatives include requiring all new municipal construction to be LEED-certified, retrofitting the most inefficient "energy hog" older buildings, transitioning the municipal fleet to 100 percent alternative fuels, and committing to a goal of 100 percent renewable energy sources (such as solar) by 2030.

Orlando is also the first city in the state to adopt a benchmarking statute, which will have direct implications for the construction industry. As of press time, this much is true: Starting in May 2018, any commercial or multifamily building larger than 50,000 gross square feet, and any city-owned building larger than 10,000 gross square feet, will be required to use the Energy Star Portfolio Manager to obtain their energy benchmarking score on a scale of one to 100. Building owners will be required to report that score to the city, and it will be posted on real estate databases and publicly available.

With benchmarking, "architects will have a whole new market to reach," says Chris Castro, Orlando's sustainability director. "We're creating a marketplace for architects in helping us to make the city more efficient and resilient."

Communication and Coordination

As coastal cities become more vulnerable, it's possible that overall settlement patterns could change, and places like central Florida—already a burgeoning area—could swell further. This could put even greater demands on inland cities to be environmentally and economically sustainable.

Communication and coordination are key. "Orlando is trying to take the lead on sustainability in the Southeast along with Atlanta," says Kristopher Stenger, AIA, building and sustainability manager for Winter Park, a suburban city within the Orlando metro area. "We have a pretty good network in Florida of sustainability directors, and we all stay in touch on calls and discuss topics here in the state."

The AIA, for its part, has made resilience a priority, holding a "Resilience Summit" in 2015 and including a series of resources on its website. The association is also planning to roll out a resilience curriculum this year that will address vulnerability assessment, hazard mitigation, and design adaptation tools to help architects work with communities—inland and otherwise—to be ready for anything." AIA

By Kim O'Connell

AIAFeature

Assume There's No Magic Kingdom for Five Minutes

Orlando has invested in a booming downtown and an increasingly urban sensibility that's worth checking out.

By Kim O'Connell

PHOTO: STEVE WILLIAMS PHOTOGRAPHY

Nearly 2.4 million people call the Orlando metro area home, but most visitors never get past their hotels to see why—a fact that city officials and architects hope to change.

For the majority of the 66 million people who visit Orlando each year, "downtown" means the fairy-tale castle at the heart of Walt Disney World's Magic Kingdom, and "walkable" refers to the distance between the Haunted Mansion and the Seven Dwarfs Mine Train. Tourists dazzled by famous and flashy theme parks can be forgiven for not realizing that the city of Orlando has a real downtown and an urban identity all its own, one crafted not by Disney Imagineers but by planners, developers, and architects.

Located in central Florida, about an hour west of the Atlantic coast, Orlando is the third-largest metropolitan area in the state. The population within its city limits is about 270,000, but when you factor in the larger metropolitan area (which includes Winter Park, Maitland, Kissimmee, Altamonte Springs, and dozens of other municipalities and unincorporated communities) the population balloons to nearly 2.4 million. When Walt Disney announced plans to move his company's newest theme park to the area in the mid-1960s, the city had already been a century-old resort town. Once the park opened in 1971, however, Orlando became a boomtown.

But it's been a sprawling boomtown. With Disney World, SeaWorld, and Universal Studios situated to the southwest of the historic core, and the airport to the southeast (not to mention a seemingly endless number of shimmering lakes), Orlando has grown in nearly every direction—as much a product of the vacation industry as topographical challenges. Cars are a necessity in central Florida, and as a result Orlando was named the nation's least pedestrian-friendly city by the National Complete Streets Coalition, which advocates shared multimodal roadways.

On one hand, pedestrians (or cyclists, for that matter) are certainly challenged to get around Orlando. But on the other hand, Orlando is obviously a different kind of place than New York, San Francisco, or Boston—all empirically walkable and all founded in the 17th and 18th centuries. The question is less about holding Orlando to an unreasonable standard of placemaking, and more about how the city can carve out a sustainable future—even in spite of its walkability score.

Investment and Visioning

In the last 10 years there has been a considerable effort to change the city in ways that might surprise people who have written off Orlando as merely a tourist trap. On April 27 to 29, the AIA will bring its Conference on Architecture to Orlando and provide the city with a chance to show off its architectural gems, revitalized historic areas, and New Urbanist neighborhoods.

"Millions of people come to the airport, they go straight to the hotel, and they don't actually ever see Orlando proper," says AIA Orlando president Holly Stenger, AIA. "Yet this is an amazing city, with a skyline, new professional sports facilities, a new performing arts center, and a recently renovated football arena. Our downtown is very urban, with quite a decent residential population. It's a really great outdoor lifestyle city, too."

The groundwork for Orlando's urban success today may lie in a forward-thinking ordinance put in place 25 years ago that promoted mixed-use infill development. Under the leadership of Mayor Buddy Dyer, who took office in 2003, the city has also sought to create partnerships among the many neighboring municipalities to spur investment and development not only downtown but in the region as a whole.

"Within the last 10 years, we've added some 18,000 people into our immediate downtown," says Jason Burton, Orlando's chief city planner. "We have the brand-new performing arts center, we may have the finest arena in the country, and we opened a soccer stadium last month."

The Dr. Phillips Center for the Performing Arts, designed by Barton Myers, FAIA, with HKS and Baker Barrios Architects, opened in 2014 and features a broad glass façade and swooping roofline. Already it has become a popular destination for touring Broadway shows. Orlando City Stadium, the brand-new soccer venue designed by Populous, is located only a few blocks west. Both are in the heart of downtown, near apartments, hotels, restaurants, and libraries.

Two years ago the city developed a visioning process called Project DTO (for "Downtown Orlando") that is meant to guide development in the coming years. Guiding principles for the plan include highly connected neighborhoods and districts, a creator culture, diversity and inclusiveness, an iconic visual identity (sure to make architects cheer), and more. Already, the effects of this work are beginning to be felt.

New Neighborhoods, New Urbanism

Although the big institutional landmarks are important, it's down on the human level—on the sidewalk, in the street, and in the bike lanes—where Orlando officials are noticing an increased urban sensibility, too. Compared to other Florida cities that are geared more toward retirees, Orlando has a youthful vibe, with many clubs, bars, and cafés. Burton says

AIAFeature
CONTINUED

that at times there is more foot traffic on the sidewalk at midnight than there is during the day. (One of those clubs, Pulse, was the site of a mass shooting last year, and the city continues to honor the victims of that tragedy in various ways, including a section of rainbow-colored seats in the new soccer stadium.) Burton says that he hopes Orlando will eventually land on a "walkable city" list.

Neighborhood reinvestment has come in the form of historic preservation initiatives, the Orlando Main Street Program (the city has 10 so-called "Main Street Districts"), and New Urbanist Development. One of these projects, Baldwin Park, for instance, is situated on Lake Baldwin, just 2 miles from the urban core. Opened 15 years ago, the development took more than 1,000 acres of an abandoned military training installation and converted it into a mixed-use, walkable neighborhood that is better connected to the city around it than earlier New Urbanist experiments, such as Celebration, Disney's famed master-planned community located in the same metro area.

Fulvio Romano, a partner with the local firm of Rabits & Romano Architecture, serves on the city's Appearance Review Board. He says that the board is tasked with not just encouraging good architecture, but with establishing good connections between new buildings and distinctive existing ones, and integrating the new ones into the character of their neighborhoods. His own firm recently completed a residential project called the Brownstones at Thornton Park. "The front door is on the sidewalk. It's connected to the park and walking distance to great things," Romano says.

One thing Romano would still like to see happen is some kind of public transit between the theme park areas and the downtown. "That would really bring things together, so people could see the real Orlando," he says.

Still, he says, it's a good time to be an architect in Orlando. "I feel like we are helping shape the face of downtown," he says. "We've had a lot of new buildings, all sizes, and the mayor is trying to get people to invest in downtown, and I think it's paying off. Every day you see more activity."

"Orlando is a good location for a firm because it is centrally located and you can easily get to other parts of the state," AIA Orlando's Stenger says. "We hope that after the conference we can continue that momentum and keep architecture in the minds of the community—and not just the buildings, but the urban design around it. We are planting the seeds, and we hope we can continue to grow that awareness." AIA

PHOTO: COURTESY ORLANDO CITY SOCCER CLUB | TOP AND MIDDLE: STEVE WILLIAMS PHOTOGRAPHY.

TOP and MIDDLE: Since it opened in 2014, the Dr. Phillips Center for the Performing Arts has become a cultural anchor downtown. It cost more than $500 million, two-thirds of which came from public funds. BOTTOM: Orlando City Stadium, a few blocks west of the Phillips Center, held Orlando City SC's first home game in early March.

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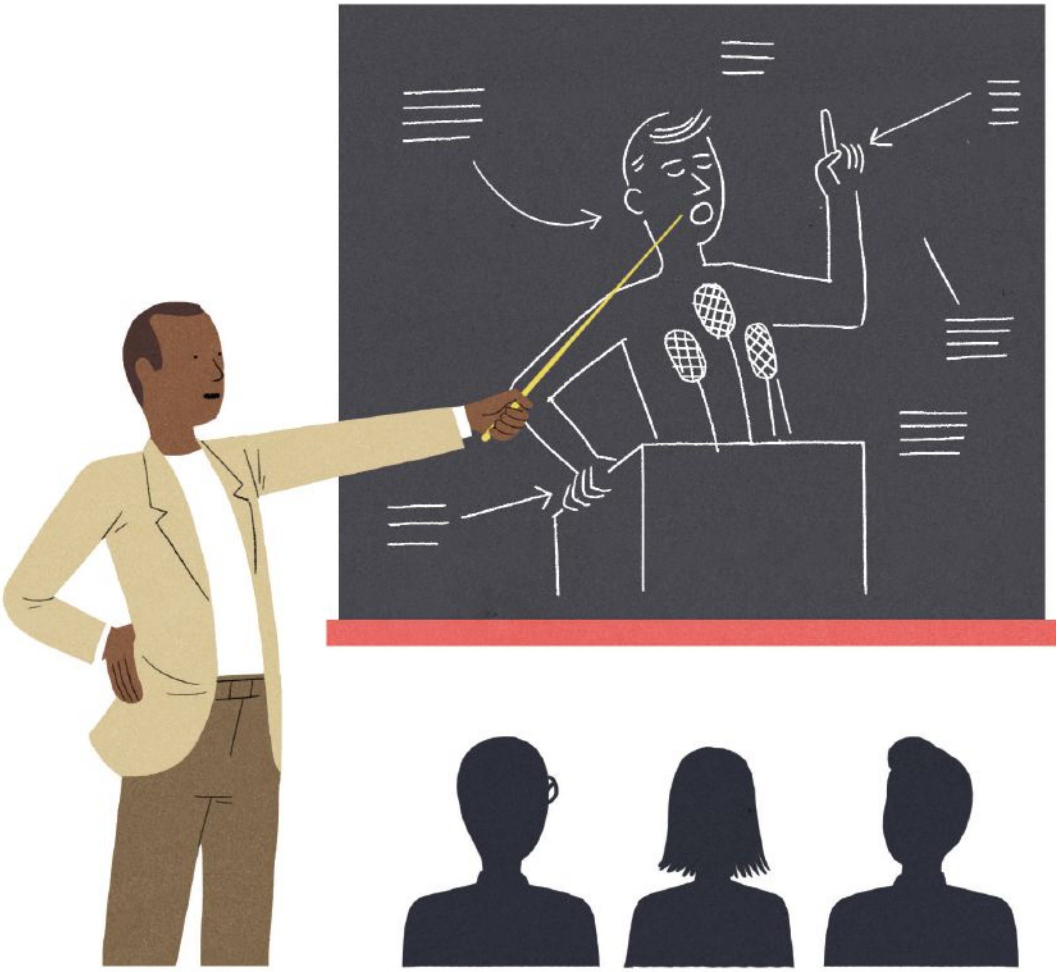
What Is a Talent Pipeline?

Firm growth is about more than the next big job. It's about attracting the next big talents.



As AIA California Council uncovered in its report "Attracting and Retaining Talent," firm principals have to shed assumptions about what matters to prospective and current team members. Neither a firm's history nor its published design works seem to matter to prospective or current employees, the survey found. What matters, according to AIA director of public affairs John Schneidawind, is the firm's overall portfolio and what researchers call its "street reputation."

Another notable finding is that work-life balance matters to young architects just as much as do big paychecks and benefits in estimating their overall picture of employment. As the presenters for "Engage, Train, and Retain: Cultivating Leaders," a session at the AIA Conference on Architecture 2017 (A'17), will explore, cultivating a long-term leadership strategy relies on careful attention to collaboration as well as individual achievement. But isn't that already a time-honored, fundamental concept?

"Today's young professionals are not looking for something they think is unique," says Megan Dougherty, ASSOC. AIA, of Costa Mesa, Calif.–based Dougherty Architects. "They are looking for something they feel should be commonplace in our profession. The profession has always prided itself on mentorship, but the reality is that some firm leaders do not know what that really means. It is not just signing off on AXP."

For Dougherty and many of her millennial peers, mentorship is the backbone of a successful start in their professional careers. Hilary Barlow, AIA, organized the A'17 panel on retaining talent to encourage young professionals and firm leaders alike to rethink employee engagement. Fundamentally, mentorship comes down to a balance between providing support and giving independence. Barlow is an architect at Payette in Boston, where its Young Designers Core (YDC) has a 17-year legacy.

"Our firm leaders are very hands-off; they trust us," she says. "The YDC establishes annual goals that are relevant to participating designers each year; it is always fresh."

Barlow says the YDC's autonomy is essential to its success. She hopes the panel dialogue—slated to touch on sustainable leadership, budgets, time constraints, programming, and the logistics of creating and empowering staff—will capture distinct perspectives from young professionals at Payette, Turner Construction, and Simpson Gumpertz & Heger, while also forging AEC industry collaboration.

"Independence," "relevance," and "responsibility" are words young designers use often when speaking about career development. For Matt Dubin, a designer at the Michael Hsu Office of Architecture (MHOA) in Austin, Texas, the "street cred" of the firm has become part of its attraction.

"I am working on projects that are relevant to me and how I experience Austin," he says. MHOA has transformed the city with its designs for popular restaurants, bars, and boutique hotels. "The fast nature of the work allows for a lot of variety," he adds, "which I appreciate."

Four years out of school and just shy of six months in his new post, Dubin says that he has learned more about how things get built, the design process, and why things "are the way they are" at MHOA than anywhere else.

"I have more responsibility, and I am allowed to make mistakes here," he says. The casual office environment is important to him, and its collegial supportive culture encourages him to take ownership of the work. "They expect me to work hard and care about the

"Architecture as we know it will not exist in the near future. The design process is not immune to automation." —Megan Dougherty, ASSOC. AIA

ILLUSTRATION: MICHAEL KIRKHAM

AIAPractice

work. Before I got here, I spent most days in Revit; now I am teaching people how to use Revit and should see a project that I designed built before the fall. It's very gratifying."

For Dougherty, the findings of the AIA California Council report prioritizing firm culture make sense. "Our generation is one of grassroots organization, exponential innovation, and career ADD," she says. "These traits lead us to prioritize a great work environment rather than an award-winning firm. For us, street reputation has a longer shelf life."

> "Our generation is one of grassroots organization, exponential innovation, and career ADD."
>
> —Megan Dougherty, ASSOC. AIA

Dougherty notes that the office atmosphere is what makes her excited to go in every morning, but it's a kind of existential crisis that keeps her engaged. "Architecture as we know it will not exist in the near future. The design process is not immune to automation. [If architecture is to survive] we need to be thought-leaders, rather than just technicians or designers," she says, adding that computers can do 100 iterations of a project a lot quicker than humans can.

"[In other words] sitting at a desk working in Revit or AutoCAD—although necessary for now—is doing nothing for our future success," she says. "We want well-rounded professional development that will help us grow as thought leaders, which will always have relevancy, while working within a firm culture that encourages relationship-building to create an environment of open communication."

By 2020, millennials will constitute more than 40 percent of the workforce. They are poised to transform the architectural profession and are proactive about defining things for themselves.

"Innovative architects we look up to, and aspire to become, are not practicing traditional architecture," Dougherty says. "They are melding several professions that don't fit into the box." **AIA**

—Catherine Gavin

AIAPerspective

PHOTOGRAPHY: CARL BOWER

Politics—As Usual

Challenges abound in unusual times.

Architecture is our profession, and the American Institute of Architects—our sole national organization—exists to stimulate the demand for architecture, to improve our capacity to practice, and to promote our interests.

When members' interests are ignored, dismissed, challenged, overlooked, or threatened, the Institute's role is to defend and protect them. The AIA is a bipartisan organization with a clear political agenda to advance architecture and architects' interests—and we are engaged.

AIA members consistently identify political influence as one of our primary roles—indeed, this is one of the fundamental purposes for which the Institute was established: to be political.

That's why we develop policies and position statements. That's why we lobby in Congress, state legislatures, and city halls. That's why we have ArchiPAC. That's why we support candidates and policies that promote excellent architecture and urban quality, enhance the built and natural environments, and help practices to thrive.

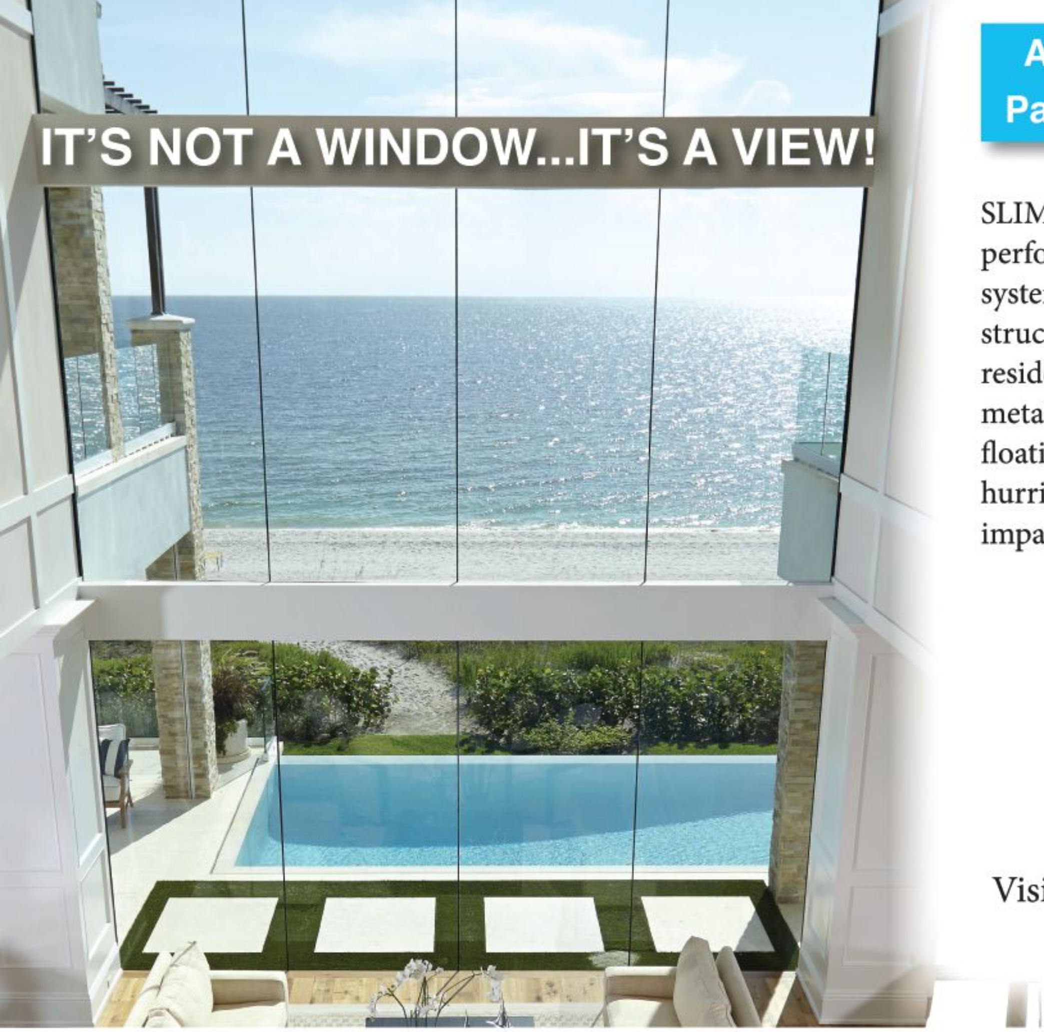
When these interests and values are at stake, the AIA can't shy away from making its voice heard, or from joining with other organizations to reverse steps that undermine our work and our standing, harm the environment, or subvert our values. What credibility will our policies have—what credibility will *we* have—if we don't speak up?

Political success and influence require unity. Challenges should spur unified action. AIA members are regarded around the world as leaders in energy-efficient design, conservation practices, building-system innovation, and high-level technology. We must continue to lead, in these and other domains, for the benefit of our practices, our clients, and our society.

With our allies in urban planning, landscape design, interiors, real estate, engineering, and construction—along with many other organizations—the Institute is preparing to advance strong positions on infrastructure, energy conservation, renewable energy, support for the design arts, transportation and housing, and other issues of key concern to our profession.

This makes sense on every level—for architects, for clients, for the economy, and for the planet. The AIA, led by your elected leaders and supported by the staff, will reach out to every component to enlist support. We count on your help. **AIA**

Thomas Vonier, FAIA
2017 AIA President



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POLYCARBONATE SHEET PRODUCTS FOR HIGH PERFORMANCE ARCHITECTURAL GLAZING

Presented by:

LEARNING OBJECTIVES

Upon completion of this course the student will be able to:

1. Examine the key properties and benefits of polycarbonate.
2. Reference standard test methods, specifications, regulatory codes and performance criteria for polycarbonate.
3. Identify key application areas where polycarbonate is used.
4. Understand how to specify polycarbonate architectural grades.

CONTINUING EDUCATION

AIA CREDIT: 1 LU/HSW
AIA COURSE NUMBER: AR0417COURSE1

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By Tom Niziolek—Architectural Segment Manager, Polycarbonate Sheets NAFTA, Covestro LLC

POLYCARBONATE IS ALL AROUND YOU

Polycarbonate has been around for over 50 years and combines strength, clarity (or translucency when needed), and lightweighting (density) beyond what can be achieved with glass. Some applications include windows for vehicles such as aircraft, trains and heavy equipment, and other applications such as basketball backboards, skylight lenses and roofing. Durable against heavy impact and highly resistant to harmful UV rays that cause degradation, polycarbonate is a superior but underutilized polymer in construction applications such as skylight lenses and safety and security glazing in doors and windows. The strong impact resistance of polycarbonate is due to its chemical structure. The ability of structures like carbonates and phenyl groups to dissipate energy is believed to be the main reason polycarbonate can endure heavy force without breaking.

On the other hand, other plastic glazing materials such as acrylic are far more brittle and much more likely to be damaged by wind-borne debris and other high force impacts. Polycarbonates are also used on architecturally significant buildings world-wide, from stadium façades to airports and monumental buildings.

Polycarbonate Sheet Production

Polycarbonate begins as a by-product of oil production and is turned into pellets through a chemical process. These pellets are melted and formed into shapes by molding or extrusion. Most resin injection-molded polycarbonate is used in products such as optical lenses or car headlight lenses.

Most polycarbonate used for architectural glazing in construction starts in the form of extruded sheets. The sheets are produced from resin pellets that are pumped through an extrusion die and cooled between chilled rollers. Think of the extrusion process as similar to pasta running through a pasta maker or Play-Doh through an extruder device.

The texture of the sheet is determined by the surface of the rollers used on the extruder. Polycarbonate sheets can be highly polished or have special textures such as pyramids for light diffusing skylight lenses or matte and pebble finishes for privacy glazing.

Different grades of polycarbonate sheets are produced by varying the type or color of resin and the texture of the rollers used during cooling.

Grades of Polycarbonate Sheet Products

Polycarbonate sheet products for the architectural market can be divided into three categories: multiwall sheet, which is also known as structured or cellular; monolithic solid sheet; and laminated sheet, which is comprised of sheets laminated together under heat and pressure. All three types are UV resistant and capable of being used outdoors for extended service life. The one exception is the general purpose, textured monolithic sheet which is designed for interior privacy glazing. All three types of polycarbonate sheets are lightweight and strong (high impact performance) compared to traditional glazing such as glass.

Multiwall sheets have lower light transmission due to their internal structure and they are typically used to provide diffused daylighting or in roofing applications. Monolithic solid sheets can be supplied with abrasion resistant coatings to provide additional UV resistance, chemical resistance and mar resistance as well as co-extruded layers or caps which add outdoor lifetime to sheets. Monolithic sheets are a more suitable solution for cold bent applications such as curved barrel vaults and dimensional sloped glazing.

Laminated sheets are comprised of multiple sheets of polycarbonate, and at times acrylic sheets, bonded together with polyurethane. Laminated sheets always have an abrasion resistant coating and are supplied in different grades and thickness levels offering protection against a variety of threats. Grades are available for forced entry protection, ballistic protection or blast protection.

KEY PROPERTIES OF MULTIWALL SHEETS

Multiwall sheets are UV resistant for long term exterior performance and stability, offering a combination of light weight, strength, high light transmission, outstanding thermal insulation and high impact resistance. The cellular spaces in multiwall sheets provide high thermal performance and allow the product to meet ICC building code flammability requirements for a CC1 rating, which is characterized by low flame spread and smoke emission. Multiwall sheets are available in a range of thicknesses for different applications as well as a full range of translucent colors. They have a proven long term history as a glazing solution for architectural projects all over the world.

Typical Property Values:

Thickness inch/mm	Structure		Weight lbs/ft² / kg/mg²	Luminous Transmittance: Clear and Opal	U-Value / R-Value	Coefficient of Thermal Expansion	Tensile Modulus ASTM D638 (ISO 527)	Tensile Strength ASTM D638 (ISO 527)	Minimum Bend Radius
0.157/4	2/4-6		0.164/0.8	82% / 51%	0.72/1.4	3.75×10^{-5} in/in/F	345000 psi	9400 psi	29"
0.236/6	2/6-6		0.266/1.3	80% / 45%	0.62/1.6	3.75×10^{-5} in/in/F	345000 psi	9400 psi	39"
0.315/8	2/8-10.5		0.307/1.5	80% / 46%	0.60/1.7	3.75×10^{-5} in/in/F	345000 psi	9400 psi	49"
	4/8-6		0.328/1.6	68% / -	0.49/2.0	3.75×10^{-5} in/in/F	345000 psi	9400 psi	47"
0.397/10	2/10-10.5		0.348/1.7	80% / 48%	0.56/1.9	3.75×10^{-5} in/in/F	345000 psi	9400 psi	59"
	4/10-6		0.358/1.75	68% / 61%	0.44/2.3	3.75×10^{-5} in/in/F	345000 psi	9400 psi	59"
0.629/16	3X/16-25		0.512/2.5	66% / 54%	0.35/2.9	3.75×10^{-5} in/in/F	345000 psi	9400 psi	118"
	6/16-20		0.573/2.8	59% / 49%	0.32/3.1	3.75×10^{-5} in/in/F	345000 psi	9400 psi	94"
	6/20-20		0.635/3.1	58% / 47%	0.29/3.4	3.75×10^{-5} in/in/F	345000 psi	9400 psi	147"
0.984/25	5M/25-20		0.697/3.4	49% / 40%	0.23/4.3	3.75×10^{-5} in/in/F	345000 psi	9400 psi	na
1.26/32	5M/32-20		0.758/3.7	48% / 38%	0.19/5.3	3.75×10^{-5} in/in/F	345000 psi	9400 psi	na
1.575/40	5M/40-20		0.861/4.2	47% / 35%	0.18/5.6	3.75×10^{-5} in/in/F	345000 psi	9400 psi	na

Luminous transmittance: D65 Observant
U and R-values calculated, EN ISO 6946

Multiwall sheets are manufactured with various cross-sectional structures to provide different key performance attributes depending on the application.

Multiwall sheets are manufactured with various cross-sectional structures to provide different key performance attributes depending on the application. For example, a sheet with a cross section similar to an I-beam provides high strength and stiffness with less material mass (4–40 mm thick). X-structures have high stiffness and reduced deflection under load, with a lower weight per square foot. Tunnel structures have high load bearing capabilities, long purlin distance and good cold bending characteristics, which provides design freedom.

Light Weight and Strength

Primary benefits of multiwall sheet are its light weight structure coupled with high strength. This makes it a great choice for roofing since long sheets can be used in conjunction with lighter support structure and framing systems. From creative stadiums and rail station roofs utilizing complex dome constructions, or continuous skylights to lightweight conservatory roofs multisheet polycarbonate offers functionality, economy and an aesthetically pleasing appearance.

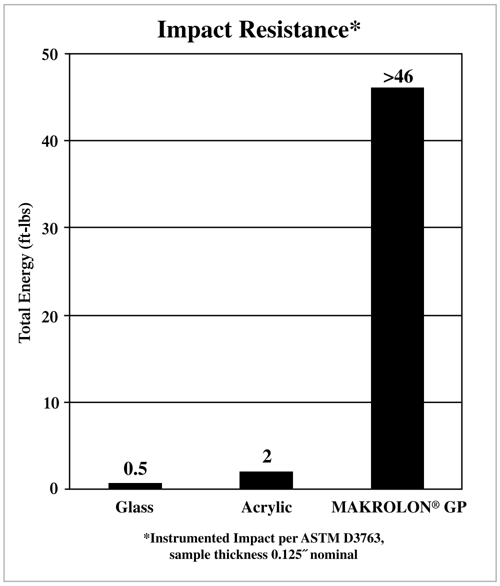
Outstanding Thermal Insulation

As mentioned, thermal performance is another primary benefit of multiwall sheet. A range of configurations and thicknesses are available, depending upon the project needs, to balance stiffness, strength and thermal performance (SHGC and U-Factor). The table above shows an example of typical product thicknesses and cross-sections along with the accompanying weights and insulation properties.

Light transmission for these products can range from 35 percent to 80 percent. Glazing with 35 to 60 percent transmission is available in opal white, while products with 40 to 80 percent transmission are clear. Specialized products are available to further reduce solar heat gain and improve U-values. These include solar tints and aerogel that fills the air space inside sheets.

KEY PROPERTIES OF SOLID SHEETS

Solid sheets possess similar benefits to multiwall sheets such as durability, impact resistance, design freedom and ease of fabrication, but they have additional capabilities of high abrasion resistance and excellent clarity.



Polycarbonate has superior toughness when compared to any other glazing material when subjected to a range of impact conditions in architectural applications.

Impact Performance

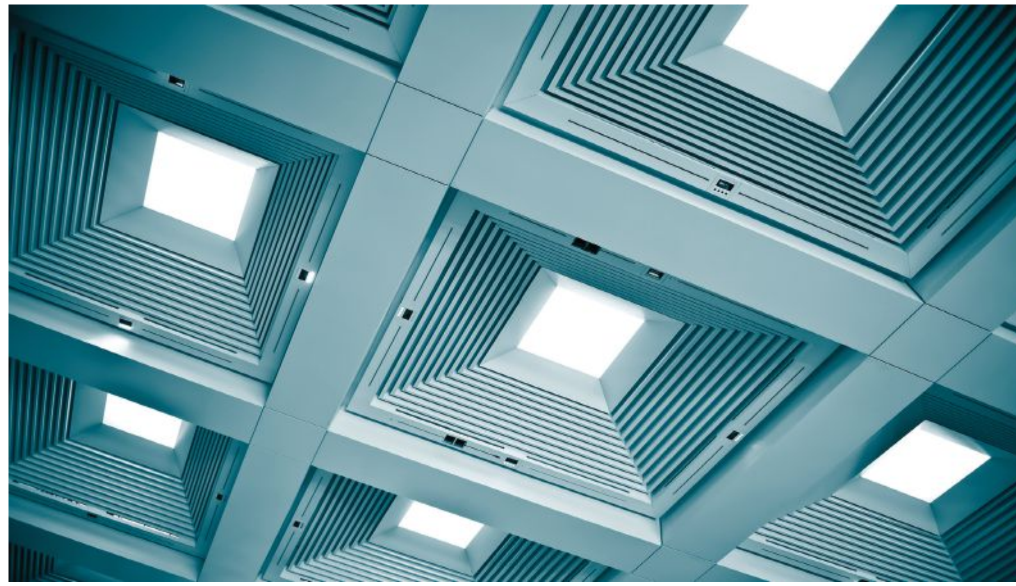
For glazing applications, the primary benefit of polycarbonate is impact resistance. It has superior toughness when compared to any other glazing material when subjected to a range of impact conditions in architectural applications. There was a storefront property in Philadelphia that was repeatedly vandalized and broken into. The original monolithic glass with standard aluminum storefront framing was replaced with 3/8" abrasion resistant polycarbonate sheet. A staged video was taken at the property showing just how tough the material is to a range of different impact conditions, as a subject attempted to throw a brick through the window, and break it with repeated blows by a crowbar, then ax. The polycarbonate glazing was still intact after such efforts. Some polycarbonate products comply with the UL972 standard for burglary resistant glazing materials. Upon attack, these materials may not need to be replaced due to surface fracturing or spider webbing like laminated glass would.

Daylighting Performance

Daylighting has become an important factor in green building design and is a growing design consideration for architects in general. As skylights are incorporated into these daylighting designs, it is imperative that glazing systems provide the highest possible loss prevention protection against the risk of fire, natural hazards and live loads. Polycarbonate glazing provides the much needed balance of high light transmission, diffusion/light spreading and impact resistance that is necessary for optimal daylighting performance.

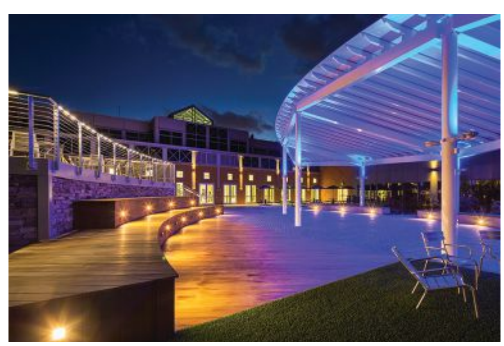
Though new polycarbonate technologies all but eliminate discoloration, polycarbonate is still seen as a material that degrades over years from sun damage. With previous polycarbonate technologies, UV could cause electrons to detach from their chemical position over time. As the electrons reacted to UV light the molecular rearrangement made the polycarbonate vulnerable to erosion. No longer molecularly attached, the electrons in the molecules could be washed away by wind and rain and as the polymer surface oxidized it eroded. This caused the previous polycarbonate technologies to turn slightly yellow and haze, allowing less visible light to pass through.

Prismatic polycarbonate sheet for daylighting is now available with a proprietary UV cap for enhanced UV resistance and durability. A significant advance in polymer technology, this UV-absorbing "cap layer" nearly eliminates



Prismatic polycarbonate sheet for daylighting has a proprietary UV cap for enhanced UV resistance.

CASE STUDY—DELAWARE TECHNICAL COMMUNITY COLLEGE



The courtyard canopy on the campus of Delaware Technical Community College.

At the heart of the Stanton campus of Delaware Technical Community College, the courtyard is a place for students to congregate and relax. The area was underutilized by students and faculty alike as there was no protection from the elements. EXTECH/ Exterior Technologies Inc. was contracted to provide a surface mount canopy system that would withstand weather extremes while remaining attractive and functional.

The courtyard canopy was designed with laminated glass in mind. However the sleek, sweeping curves needed to be cut on the job site to form the end angles. In addition, the weight of polycarbonate sheets compared to laminated glass allowed for the elimination of cross mullions in the design. These changes allowed for enhanced aesthetics and character, and provided leak-resistant protection. Typically municipal codes for canopies require high impact, wind, and snow-load resistance making the product selection critical to the end use product.

The solution was polycarbonate sheet with high UV resistance that also had high impact strength, light diffusing, was lightweight, thus reducing the metal framing system, and was building code compliant.

sunlight damage to polycarbonate. By nullifying the effects of UV deterioration, this thin, highly concentrated polymer layer co-extruded and fused onto a solid polycarbonate sheet has changed industry thinking on polycarbonate and its use in daylighting skylights. With the UV light absorbed by the cap layer, the polycarbonate no longer yellows, hazes or degrades. Any observable change in appearance is in the cap layer itself, leaving the polycarbonate layer below strong and virtually undamaged.

The prismatic pattern in this product is optimized to diffuse and distribute light while maintaining high light transmission while reducing glare. The product can be draped and thermoformed for contoured applications and is approximately 60 times stronger than acrylic and 15 times stronger than impact modified acrylic. Applications include awnings, skylights, entryway canopies, barrel vaults, glazed archways, covered pedestrian walkways, transom windows, wall panel glazing and sloped, vertical and curved glazing.

Skylights made with polycarbonate glazing can meet Factory Mutual's Approval Standard 4431, Skylights, which tests skylights for fire, hail resistance, wind uplift resistance, and resistance to the impact of live loads. An optional test is also available for wind-borne debris, such as large and small missile impact.

Durability

Just like finishing products, technology for providing long term durability to polycarbonate has come a long way. Sheets can be supplied with two types of protection: surface coatings for enhanced mar resistance, chemical resistance and UV resistance; or surface treatments that are added during the extrusion process. Because uncoated sheets with surface treatments are integral to the sheet, they provide superior UV resistance and can be cold formed.

Let's differentiate between the two:

1. Coated sheets have superior mar resistance along with increased UV and chemical protection but are only designed for flat applications. Surface coatings increase the abrasion resistance of an uncoated sheet by 10 times. These products are usually used for vertical glazing.
2. Extrusion capped sheets can be cold formed or thermoformed but do not offer the same level of mar resistance. These products are usually used for overhead glazing.

In both cases warranties are available for long term performance including break resistance and change in appearance such as yellowing and hazing.

Clarity, Design Freedom and Ease of Fabrication

It's worth emphasizing the level of clarity and optical quality that can be delivered by polycarbonate sheets. Polycarbonate has long been the material of choice for critical quality applications where clarity, high light transmission and low distortion are critical, such as jet canopies. Grades with visible light transmission as high as 90 percent are available, as are tinted products to match solar control glass.

QUIZ

1. True or False: Virtually all polycarbonate used for construction starts in the form of extruded sheets.

2. Which polycarbonate sheet product can be used for cold bent applications such as curved barrel vaults?
   a. Multiwall
   b. Monolithic solid
   c. Laminated

3. Which grade of polycarbonate sheet product is used for forced entry, ballistic or blast protection?
   a. Multiwall
   b. Monolithic solid
   c. Laminated

4. True or False: The cellular spaces in laminated sheets provide high thermal performance and allow the product to meet ICC building code flammability requirements.

5. True or False: Skylights made with polycarbonate glazing can meet Factory Mutual's Approval Standard 4431.

6. Which of the following is added during the extrusion process so that it is integral to the sheet, providing superior UV resistance and ability to be cold form?
   a. Surface coating
   b. Surface treatment

7. ______________ glazing is a specific classification of laminate designed to protect from forced entry or attack.
   a. Containment grade
   b. Ballistic grade
   c. Blast resistant

8. Which of the following is a benefit of blast resistant glazing?
   a. Light weight
   b. No spalling
   c. Withstands multiple impacts
   d. Reduced standoff requirements
   e. All of the above

9. Glazing products fall under the CSI code ______ for Openings.
   a. 03 00 00
   b. 05 00 00
   c. 06 00 00
   d. 08 00 00
   e. 09 00 00

10. True or False: Polycarbonate can be used to replace deteriorated FRP daylighting systems.

This article continues on http://go.hw.net/AR042017-1. Go online to read the rest of the article and complete the corresponding quiz for credit.

SPONSOR INFORMATION

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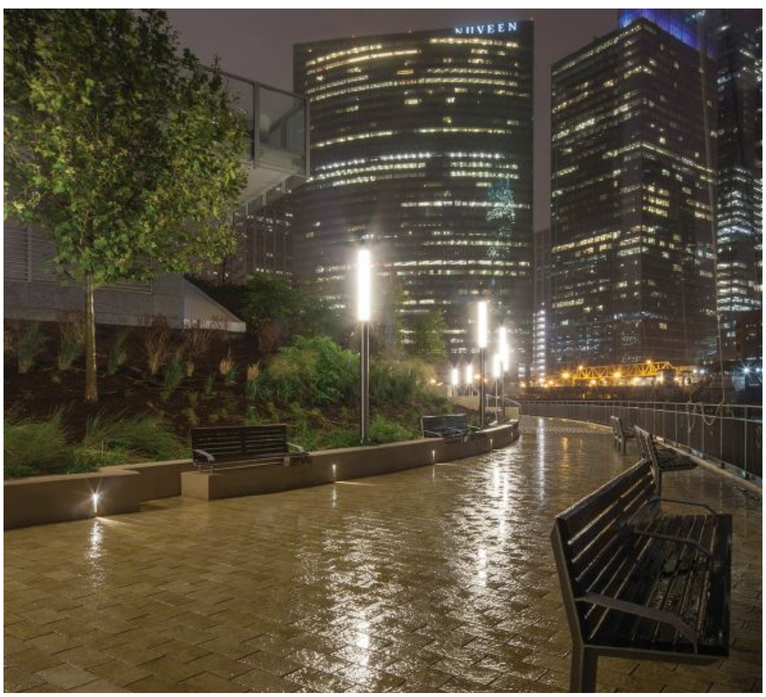
SELECTING MATERIALS FOR OUTDOOR APPLICATIONS

CHOICE OF MATERIALS—AND PRODUCT SUPPLIERS—MATTERS ON MANY LEVELS

All photos courtesy of Forms+Surfaces



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LEARNING OBJECTIVES

- Identify conditions and constraints typical of outdoor environments, and understand the potential impact these can have on materials, finishes, and the installed project
- Evaluate several types of materials appropriate for outdoor applications based on criteria including durability, performance, aesthetics, and environmental impact
- Recognize leading green building standards and rating systems, and understand the importance of a product supplier's environmental impact management programs and environmental data collection and reporting practices
- Cite examples of products that use high-performance materials to balance these diverse challenges while offering tremendous design potential and adhering to a higher environmental standard.

CONTINUING EDUCATION

CREDIT: 1 LU/HSW

COURSE NUMBER: AR042017.3

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Architects and designers have many options for specifying site furniture products for their projects, and selecting materials and finishes is an integral part of this process. Yet making material selections has become more and more complex.

Traditionally, material selection was based on criteria pertaining to aesthetics, durability and performance. More recently, in response to the rapidly growing sustainable design movement, the environmental impact of materials has become increasingly important as well.

Today's architects and designers have the responsibility of recommending materials that balance these different requirements. While numerous product options exist, the materials that comprise these products are not created equal.

It's a lot to keep up with as new materials hit the market and green building standards evolve. Two areas of focus can help guide the selection process:

1) By identifying ways to evaluate materials and select the best options for outdoor applications, the end result is beautiful, durable products—and projects—that adhere to a higher environmental standard.

2) By identifying product suppliers who can help navigate this ever-changing playing field, the better architects and designers—and their customers—can confidently make informed decisions.

Beginning with material selection, it's first critical to assess the conditions and constraints of a project site's climate, intended use, and the passing of time.

SITE CONDITIONS & CONSTRAINTS

Exposure to any or all of the following factors can have varying effects on the materials used in outdoor environments, and by extension, installed projects as a whole. The wrong materials are liable to perform poorly against desired end results, potentially requiring costly and time-consuming maintenance or repair, or even complete product replacement. The right materials can endure beautifully.

Climate & Weather

Climate and weather play a significant role in the durability of materials. Weather patterns such as fog, mist, rain, and high humidity can result in rot, oxidation and corrosion. In urban areas, acid rain caused by vehicular emissions and concentrated pollution can have a similar effect.

Likewise, exposure to deicing and coastal salts can cause materials to corrode. When it comes to coastal salt, while immediate coastal proximity might be an obvious concern, more distant locales aren't necessarily spared. Sites within five to ten miles of the shore are considered coastal; however, wind patterns can carry salt even further inland.

Hardwoods, too, are subject to weather, even those with a naturally high resistance to decay. Mildew can grow during periods of excessive moisture and sunlight's UV rays can degrade the surface of the wood.

Seasonal conditions are also important to consider. Extreme cold and freeze-thaw actions can cause distress and deterioration in porous materials like concrete. The potential weight of snow loads on overhead structures—shelters, sunshades and umbrellas, for example—can influence product and material decisions.

Sun and heat come into play as well. For example: light-colored powdercoat finishes and perforated materials are capable of reflecting or mitigating heat generated by exposure to direct sunlight. This can be important in urban areas where materials that absorb less heat can help alleviate the urban heat island (UHI) effect—a phenomenon that makes cities significantly warmer than their surrounding rural areas due to human activities.

Light-colored powdercoat finishes and perforated materials can help mitigate the effects of heat generated by exposure to direct sunlight.

Finally, the tactile qualities and thermal conductivity of materials are of utmost importance, especially among surfaces that users may touch or come into contact with. Metal surfaces quickly register temperature changes, while concrete and wood absorb ambient temperature more slowly and retain temperature longer.

Intended Site Usage

Intended site usage should also be considered when choosing materials for outdoor applications. Public spaces and high-use areas especially require products constructed of materials appropriate to the task(s) at hand.

For example, in settings destined for large gatherings, crowds or assemblies, materials should be able to withstand boisterous human activity and potential misuse or abuse.

In urban environments, materials might need to be resistant to vandalism such as burning, carving and spray painting.

In security-conscious environments, the ability of a product to effectively protect a structure or setting can be as much a factor of the right material used in the product's fabrication as the right design, tamper-resistant mounting hardware, and solid construction.

In multi-use environments, where products are regularly moved to accommodate different needs, operational hours or events, or where on-site use is balanced by off-site storage, materials and finishes need to stand up to these routines.

The Passage of Time

Finally, it's important to consider the expected lifespan of the materials and products chosen for a given setting. How long will they need to function in the space—and look good while doing it? How much, and what kind of, maintenance will they require? Month after month, year after year, how will the weather and usage conditions described above take their toll?

Product longevity has become increasingly important to material selection as we move away from our disposable mindset in favor of designs and materials that last. High-performance materials not only contribute to a good environmental story as part of the overall product manufacturing process, but they also often lead to products that can remain in use for decades. Evaluating all of these factors upfront creates a sound backdrop for the next step in the process: material assessment.

MATERIALS

Many materials are commonly found in products designed for outdoor spaces. Among the most prominent today: wood, metal, concrete, and increasingly, glass. Each has its own aesthetic and performance characteristics. Each can be evaluated by separating these top-level groups into two distinct categories:

1) Conventional materials—those traditionally available—offer varying degrees of versatility and success when it comes to meeting aesthetic, durability, performance and environmental impact requirements.

2) High-performance materials—more recently available—offer higher degrees of versatility and success when it comes to aesthetics, durability and performance. They adhere to a higher environmental standard.

WOOD

Long a popular choice for use in site furniture products, wood is a material with multiple advantages. As a natural element, it blends harmoniously with outdoor spaces. It lends warmth and character to settings of all kinds. It's relatively easy to work with, so can be shaped and detailed in numerous ways. It's versatile, as different wood varieties suit a wide range of aesthetics and functionalities. It's structurally sound. If correctly installed and maintained, it can have an extremely long service life. Finally, if properly managed, it's a renewable resource.

Conventional: Non-certified hardwoods

Many of the woods used in site furniture applications are hardwoods. Several of these are tropical hardwoods—Teak and Ipé (aka Brazilian Walnut) are among the examples found on the market today.

Durability & Performance
Tropical hardwoods have become a favored material because of their inherent hardness and strength, as well as their natural resistance to moisture, fire, insects and decay. With minimal maintenance using natural oils, they perform well over time, even in the most demanding outdoor environments.

Aesthetics
Rich variations in color and graining and the ability to weather beautifully with or without regular maintenance are two reasons tropical hardwoods make an appealing addition to exterior spaces of all kinds.

Environmental Impact
Unfortunately, while hitting high notes for durability and aesthetics, many of the tropical hardwoods traditionally used in site furniture products are inferior on the environmental impact front—largely because they're the result of irresponsible harvesting and unsustainable forestry practices.

The most biologically diverse and complex forests on earth are tropical rainforests—forests that play a critical role in mitigating climate change because they act as a carbon sink, soaking up carbon dioxide and other greenhouse gases that would otherwise be free in the atmosphere and contribute to ongoing changes in climate patterns.

But these forests are being destroyed and degraded at alarming rates. Deforestation comes in many forms, including unsustainable logging for timber, fires, clear-cutting for agriculture, ranching and development, and degradation due to climate change. This impacts people's livelihoods and threatens a wide range of plant and animal species.

High Performance: FSC®-certified Hardwoods

Fortunately, better alternatives exist in the form of hardwoods—including tropical hardwoods like Ipé—certified through the Forest Stewardship Council® (FSC®). The Forest Stewardship Council was created in 1993 to halt deforestation and safeguard forest ecosystems using the power of the marketplace. A nonprofit organization, FSC sets voluntary standards by which forests are independently certified to help customers identify and purchase products from responsibly managed forests. Over the past 20 years, FSC has earned a reputation as the most rigorous, credible forest certification system. As a result, there are significant advantages to choosing FSC-certified products.

Durability & Performance

The inherent hardness and strength of hardwoods make them incredibly durable, and FSC-certified hardwoods are no exception. They're naturally resistant to moisture, fire, insects and decay. With minimal maintenance using natural oils, they perform well over time, even in demanding outdoor environments.

Aesthetics

A growing number of FSC-certified tropical hardwoods are used in site furniture products. Teak, Ipé, Cumaru and Jatoba are a few examples. Colors and visual characteristics vary, as do FSC certification categories. Selecting FSC wood may influence choice of colors and visual characteristics because only certain species are available FSC-certified.

FSC Certification Levels

There are three types of FSC certification, including FSC Mix, FSC Recycled, and FSC 100%. Of these, FSC 100% and FSC Recycled are most relevant to the hardwoods found in site furniture products.

The FSC 100% rating means that all of the wood designated FSC 100% is harvested from forests that are legally run, environmentally sustainable, have a long-term management plan, and are socially responsible to their local villages and communities. No non-FSC fiber of any kind is permitted. Yearly audits and re-certifications ensure that products and suppliers are in full compliance with the FSC 100% designation.

The FSC Recycled rating indicates that the wood has been reclaimed from built structures, including wood-consumptive boardwalks and piers, that were demolished or otherwise retired, and that no new trees were cut down—an especially compelling aspect when you consider that the world's forests are so heavily compromised.

A growing number of FSC-certified tropical hardwoods such as Teak, Ipé, Cumaru and Jatoba are used in site furniture products.

An inherent characteristic of reclaimed wood is that anomalies like nail or screw marks, minor blemishes, or other visual signs of prior use may be present in the end product. These are not considered defects but rather speak to the authenticity of the reclaimed materials themselves and should be anticipated. Products are often designed around maximizing wood yields while minimizing these occurrences. A site furniture supplier's inspection criteria can help ensure that remaining visible blemishes don't compromise the structural integrity of the wood.

The FSC Mix rating means that at least 70% of the wood in a product is from FSC-certified material or recycled material; and 30% is controlled wood. While not fully FSC-certified, controlled wood cannot be illegally harvested; harvested in violation of traditional and civil rights; harvested in forests where high conservation values are threatened; harvested in forests being converted to plantations or non-forest use; harvested in forests where genetically modified trees are planted.

Environmental Impact

FSC is generally accepted in the industry as a gold standard. As projects seek to meet their own sustainability goals, FSC-certified wood can help as most green building standards give credit for the use of FSC-certified wood, especially wood labeled FSC 100% and FSC Recycled. There are other forest certification systems recognized by some green building standards but FSC is the most widely recognized. FSC-certified hardwoods are sustainably harvested, biodegradable, and have a long lifecycle. Maintenance needs are minimal and require no harsh or toxic cleaners.

Products incorporating FSC-certified hardwoods may help to meet multiple green building standards, including those pertaining to certified wood, materials with recycled content and/or salvaged materials. Compliance will vary per product and ranking system; site furniture suppliers should be able to provide product- and material-specific details.

METAL

Conventional: Carbon Steel

Carbon steel (an iron alloy in which carbon is the main alloying ingredient) has traditionally been one of the most commonly used metals in site furnishings and other products designed for outdoor environments.

Durability & Performance
As a material, carbon steel is inherently strong. But it's extremely vulnerable to corrosion so requires a secondary coating for corrosion resistance. Powdercoat finishing is a typical and effective option but must be done thoroughly, without breaches that expose the underlying material, to ensure the longevity of the steel as well as the product in which it is used.

If the finish is compromised—during the coating process or in the course of a product's day-to-day use—the steel can succumb to corrosion and experience a significant compromise in its structural integrity. In addition, corrosion can negatively impact the finished aesthetic of a product. It can stain surrounding surfaces and it can wash away, potentially contaminating nearby soils and surface water.

Aesthetics
Carbon steel can be formed or cast into a diverse array of shapes and sizes, making it appropriate for a wide range of aesthetics and outdoor product designs. Powdercoating, the most common form of protection, offers a tremendous array of color and texture options that further expand the visual versatility.

Environmental Impact
Carbon steel is an inherently non-toxic, non-emitting material that contains recycled content and is recyclable. Maintenance needs are minimal assuming an appropriate powdercoat finish; no harsh or toxic cleaners are required. Products incorporating carbon steel may help meet multiple green building standards, including those pertaining to materials with recycled content and low emitting materials. Specifics will vary per product and ranking system; site furniture suppliers should be able to provide product- and material-specific details.

QUIZ

1. True or False: Many of the tropical hardwoods traditionally used in site furniture products are inferior on the environmental impact front, largely because they're the result of irresponsible harvesting and unsustainable forestry practices.

2. True or False: Hardwoods are not subject to weathering because they have a naturally high resistance to decay.

3. True or False: Light-colored powdercoat finishes and perforated materials are capable of reflecting or mitigating heat generated by exposure to direct sunlight.

4. Which FSC certification level means that all of the wood designated is harvested from forests that are legally run, environmentally sustainable, have a long-term management plan, and are socially responsible to their local villages and communities?
   a. FSC Mix
   b. FSC 100%
   c. FSC Recycled

5. True or False: Both stainless steel and aluminum are inherently non-toxic, non-emitting materials that are recyclable, contain a high recycled content, and have a long lifecycle.

6. Which of the following is a class of concrete defined by its exceptionally high strength and durability?
   a. Traditional Precast Concrete
   b. Ultra High Performance Concrete
   c. Insulated Concrete Forms
   d. Shotcrete

7. True or False: Ultra High Performance Concrete is over ten times as strong as traditional precast concrete and performs exceptionally well in harsh conditions that cause most concrete to crack and degrade over time.

8. True or False: Safety laminated decorative tempered glass consists of one or more structural decorative interlayers laminated between two lites of glass under heat and pressure to create safety laminated glass.

9. Which green building rating system is administered in the United States by the Green Building Initiative® as an alternative to LEED?
   a. Living Building Challenge
   b. BREEAM
   c. CALGreen
   c. Green Globes

10. Which of the following should you look for in a reputable site furniture product supplier?
   a. Documented and readily available environmental impact data for their products, materials and processes
   b. Dedicated sustainability personnel that stay up-to-date on evolving green building standards
   c. Third-party supplier certifications
   d. A comprehensive Environmental Health and Safety program
   e. All of the above

Visit http://go.hw.net/AR042017-3 to read more and complete the quiz for credit.

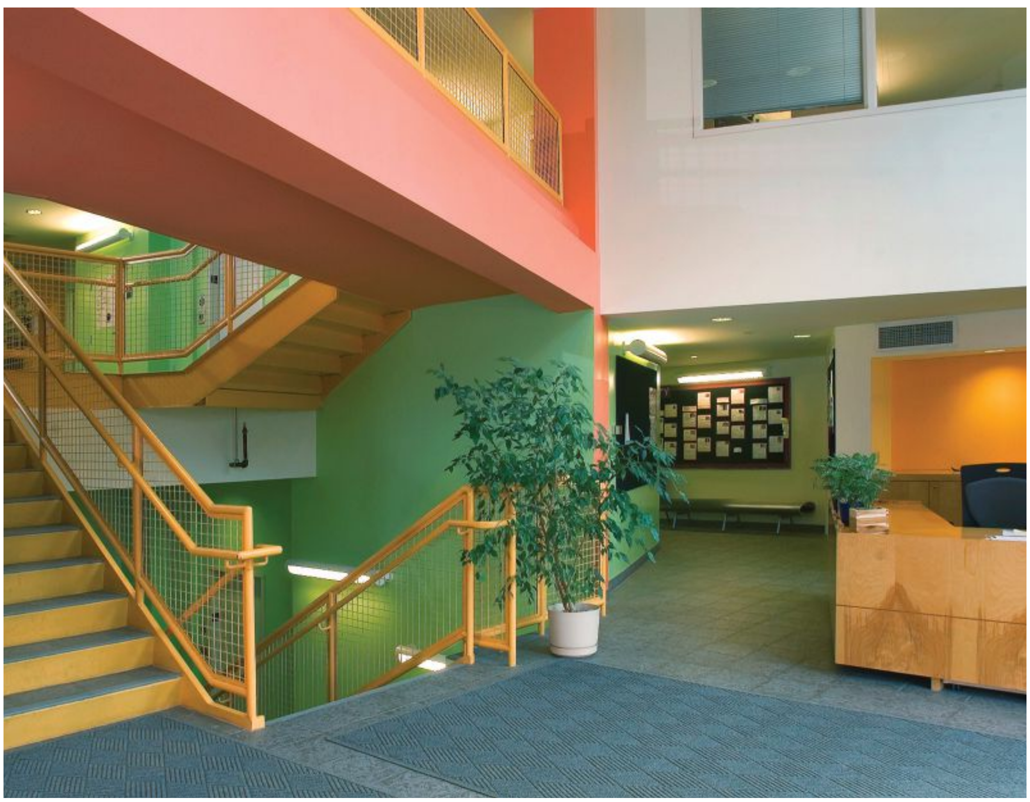
SPONSOR INFORMATION

FORMS+SURFACES®

Forms+Surfaces is a leading designer and manufacturer of architectural and outdoor products used in public spaces worldwide. The company maintains a comprehensive environmental management system and is an FSC®-certified supplier (FSC-C004453). Their products emphasize stainless steel, aluminum, FSC®-certified hardwoods, high recycled content and recyclability, and low- and no-VOC finishes.

BENEFITS AND APPLICATIONS OF SPECIALIZED PERFORMANCE GYPSUM PANELS

Presented by:



Specialized performance gypsum panels, such as abuse-resistant and impact resistant, are increasingly used in schools such as the one pictured here. The same performance characteristics make valuable contributions to commercial and multifamily construction.
Project: Capital Public Charter School, Washington, D.C., Architect: Shinberg.Levinas, Image courtesy: Shinberg.Levinas

LEARNING OBJECTIVES

Upon completion of this course the student will be able to:

1. Describe the performance attributes and limitations of the five featured types of specialized performance gypsum panels
2. Discuss how specialized performance gypsum panels can add value and reduce lifecycle costs in both commercial buildings and multi-family dwellings
3. Understand how specialized performance gypsum panels can increase efficiency of construction in commercial structures
4. Learn how to properly specify and install specialized performance gypsum panels

CONTINUING EDUCATION

AIA CREDIT: 1 LU/HSW
AIA COURSE NUMBER: AR042017.6

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By Aphrodite Knoop

1. PERFORMANCE ATTRIBUTES AND LIMITATIONS OF SPECIALIZED PERFORMANCE GYPSUM PANELS

Gypsum board is the dominant wall, ceiling, and partition building material in the United States and Canada—and with good reason. It is a proven, economical, and easy-to-install material that has transformed the building industry since its commercialization in the early 20th century.

Often called drywall, wallboard, or plasterboard, gypsum board consists of a noncombustible core, made primarily of gypsum, and has a paper cladding along its face, back, and long edges. The noncombustible core and paper facers are what distinguish gypsum panel board from other panel-type building products such as plywood, hardboard, and fiberboard.

The precursor to today's gypsum board was Sackett Board, a composite material made of layers of thin plaster placed between four plies of wool felt paper. Augustine Sackett patented this manufacturing process in 1894.

Although Sackett Board did not provide a satisfactory finish, it was a good base for the application of gypsum plaster. In some parts of the country, it became a replacement for wooden slat lath.

Between 1910 and 1930, a rapid series of improvements in board manufacturing technology resulted in the gypsum board in use today, which is designed for finishing. In 1910, a process for wrapping the board edges was created, followed in short succession by the elimination of the two inner layers of felt paper, the replacement of the exterior facings with paper-based coverings, the creation of air-entrainment technology to make board lighter and less brittle, and the evolution of joint treatment materials and systems.

In seeking to increase the naturally occurring fire resistance of regular core gypsum board, manufacturers during the 1940s created type X. This new product provided "eXtra" fire resistance, hence the name. Gypsum, glass fibers, and vermiculite are the components of type X that provide superior fire resistance.

During the 1960s, further modifications of the original type X resulted in formulations of gypsum board used in some systems—particularly ceiling systems—that offered improvements without compromising the fire-resistive qualities. The new product demonstrated additional fire resistance over type X core and became known as "improved type X."

Dominance Throughout the Construction Industry

Despite its many benefits, gypsum board initially failed to overtake its more costly and time-consuming predecessor, plaster. It wasn't until World War II that use of gypsum board surged as consumers and the construction industry sought an affordable and time-saving building material during a period of extreme resource and labor shortages. In addition to ease of installation, gypsum also proved to be easy to repair and durable.

Today, gypsum wallboard continues to be the dominant material for interior and exterior applications, with more than 20 billion square feet of gypsum board manufactured each year to meet market demand in North America.

In response to the ever-evolving needs of the building sector, the gypsum industry continues developing new and improved products, including specialized performance gypsum panels. These enhanced panels include exterior gypsum sheathing, abuse resistant and impact resistant gypsum panels, mold/moisture resistant gypsum panels, and gypsum shaftliner.

Environmental Stewardship and Sustainability

With increasing need for environmental protection and preservation, sustainability efforts are both valued and promoted throughout the building industries.
For more than 50 years, manufacturers have been using recycled paper for the board face and back. Use of gypsum board and other gypsum products help meet environmental goals because they are sustainable building materials that are readily incorporated into green building projects.

The gypsum industry throughout North America maintains an environmentally sustainable approach to operations, including:

- Preservation of natural resources
- Establishment of recycling and waste management programs
- Robust industry-wide Life Cycle Assessment (LCA) program, accompanied by transparently reporting environmental impact via Environmental Product Declarations (EPDs)
- Responsible policies toward land use
- Compliance with applicable laws, regulations, and manufacturing standards

Overall, gypsum board manufacturers incorporate recycled or recovered materials, use energy-efficient technologies, and rehabilitate former mines and quarries, among other environmentally sound practices. Also, gypsum products create little to no waste during the manufacturing process.

Properties and Production of Gypsum Board

Much of gypsum board's strength is derived from its composition and ongoing improvements in manufacturing technologies. However, gypsum board's fire resistance is inherent in the mineral from which it is composed. Gypsum is a soft mineral found in sedimentary rock formations known as calcium sulfate dihydrate and contains a large amount of chemically combined water in crystalline form. The individual molecules of gypsum are dry and give finished board its fire-resistance. As the gypsum board heats during a fire, the structure of the gypsum destabilizes and the water vaporizes as it reaches its boiling point. The evaporating water keeps the drywall cool and the structure behind it safe from excess heat.

Quarried gypsum is transported for manufacturing where it is washed, crushed, then ground into a fine powder and heated to about 350 degrees F, driving off three-fourths of the chemically combined water in a process called "calcining." The calcined gypsum (or hemihydrate) then becomes the base for gypsum plaster, gypsum board, and other gypsum products.

Synthetic gypsum, commonly known as flue gas desulphurization (FGD) gypsum, is also used in the production of gypsum board. The production process for calcining synthetic gypsum is like that of mined gypsum, but without the need for primary crushing.

Shown in red, exterior sheathing gypsum panels are an ideal underlayment for a wide range of exterior wall cladding materials typically specified for multi-family projects; they are designed to help the wall assembly resist air and water infiltration, mold growth, noise transmission and flame spread.

Gypsum board is created by mixing calcined gypsum with water and additives to form a slurry that is fed between continuous layers of paper on a board machine. As the board moves down a conveyer line, the calcium sulfate rehydrates, chemically combining with the water in the slurry, and thus reverting to its original crystalline-rock state. The paper becomes chemically and mechanically bonded to the core. The board is then cut to length and conveyed through dryers to remove virtually all free moisture before a finish cut, stacking, and warehousing.

Limitations of Gypsum Panels

As with any building product, gypsum panels must be specified and installed properly to fully meet the design objectives required for a structure's exterior and interior wall and ceiling surfaces. For detailed limitations, specifiers and installers should look to manufacturer recommendations for specific gypsum products. The following are general guidelines:

- To install gypsum panels and finishes, room temperature should be no less than 40 degrees F for the mechanical application of gypsum board and no less than 50 degrees F for the adhesive application of gypsum board and for joint treatment, texturing, and decoration, unless recommended otherwise by the manufacturer. After gypsum board installation, interior temperatures should be maintained at no less than 50 degrees F for a minimum of 48 hours.

- When installers use a temporary heat source, they must not allow ambient temperatures to exceed 95 degrees F in any given room or area. They must maintain adequate ventilation in the working area during the installation and curing periods.
- Gypsum board should not be used in conditions where exposure to moisture and high heat is extreme or continuous—for example, in a sauna/steam room.
- When gypsum board is used in air handling systems, the board surface temperature must be kept above the air stream dew point temperature but below 125 degrees F.

Specialized Performance Gypsum Panels

Compared to traditional drywall, specialized performance gypsum panels are relative newcomers to the marketplace. Here, we focus on five types of specialized performance gypsum panels, including their applications and benefits:

1. **Abuse-resistant panels** resist more surface indentation, abrasion, and penetration than standard gypsum panels.
2. **Impact-resistant panels** offer greater resistance to the impact of both hard and soft bodied solid objects from high traffic and vandalism.
3. **Mold and moisture resistant board** incorporates various methods of mold and mildew prevention on a board's surface.
4. **Exterior gypsum sheathing** is designed for use as a substrate for multiple cladding options, on the undersides of eaves, canopies, carports, and in other commercial and residential exterior applications where there is indirect exposure to the weather.
5. **Gypsum shaftliner** board serves as a liner panel in shaft walls, stairwells, chase ways, area separation fire walls, and corridor ceilings. It has a special, one-inch thick, fire-resistant core encased in moisture-resistant paper.

2. SPECIALIZED PERFORMANCE GYPSUM PANELS ADD VALUE AND REDUCE LIFECYCLE COSTS IN COMMERCIAL BUILDINGS AND MULTI-FAMILY DWELLINGS

Specialized performance gypsum board embodies advanced building technologies and function, making these panel products ideal for new construction and renovation. These specialized panel types meet a range of architectural requirements for design and construction in commercial, multi-, and single-family building, including:

- Ease of application
- High performance
- Ease of repair
- Availability of materials
- Conducive to all forms of decoration

Multi-Family Housing Considerations

Due to demographic and economic forces, multi-family housing has become increasingly popular over the course of the past decade. This has led to a boom in multi-family housing construction, including townhouses, condominium complexes, and apartment buildings.

Connected housing requires special methods of design to ensure occupant comfort and safety through fire resistant and acoustical separation between units.

Gypsum board area separation wall systems are specifically developed to protect occupants of attached and multiple unit residences via code compliant and cost effective assemblies. These wall systems must be continuous from the foundation to the underside of the protected roof sheathing or must continue through the roof to form a parapet, depending on local code and building design. These systems are designed to allow for collapse of the construction on the side of the wall exposed to fire without collapse of the separation wall.[i]

Commercial Building Considerations

Commercial environments, encompassing everything from office buildings to laboratories to hospitals to retail to sports and entertainment facilities, have their own requirements—many of which parallel those of multi-family construction. These requirements include attractive and well-maintained wall and ceiling surfaces; easy access to building systems in walls and ceilings; flexibility for fit-outs, customization, and repairs; acoustic comfort; and environmental performance that supports occupant comfort and productivity. Specialized performance gypsum panels help building owners meet these requirements.

Since the early 1980s, fiberglass-faced gypsum exterior sheathing has proven highly dependable in commercial construction. Gypsum sheathing is a specialized performance panel consisting of a noncombustible,

Shown in red, abuse-resistant gypsum panels provide a tougher, more durable version of traditional drywall to minimize cosmetic maintenance costs and repairs to walls in high traffic areas due to surface scuffs, abrasions and indentations.

moisture-resistant core encased in fiberglass facers on both front and back surfaces and along the long edges. Previously produced with treated paper facers, the products made for commercial construction are now overwhelmingly manufactured with fiberglass mat surfaces.

Another option for commercial structures are gypsum shaftliner panels, which offer a lighter weight and less laborious installation for mechanical shafts and area separation walls compared to many other materials. These panels are designed to meet the unique requirements of shaft spaces including elevator shafts and stairwells, utility and ventilations shafts, waste chutes, and other types of chutes. [ii]

Shaftliner panels are also engineered to handle the stresses, wind pressures, and vibrations created by the rapid movement of modern elevator carriages. They can be a strong, durable component of a structure's access and mechanical shafts and of area separation fire walls.

Array of Benefits

In both multi-family dwellings and commercial buildings, shaftliner panels used in shaft walls and area separation walls help provide high levels of fire protection. These 1"-thick, noncombustible type X panels are UL-classified for vertical wall assemblies designed to provide fire-rated values ranging from one up to as many as four hours.

The maintenance and durability of specialized performance panels are also

Shown in red, gypsum shaftliner panels simplify construction of fire-resistant elevator shafts, stairwells and mechanical chases to maximize occupant safety while providing vital occupant access and utility distribution.

priorities in all applications to protect the appearance of a property and reduce installation and maintenance costs. In these cases, abuse-resistant gypsum panels can offer multiple project advantages from construction through occupancy.

Abuse-resistant gypsum panels provide a more durable wall construction material compared to traditional drywall, helping prevent surface scuffs and abrasions and deeper indentations that require frequent cosmetic repair. These panels are suitable for common areas, hallways and spaces where high occupancy and elevated activity levels lead to incidental wall contact, wear and damage.

Impact-resistant gypsum panels also contribute to a building's durability and appearance by providing a stronger, more durable surface than standard gypsum wallboard. They further help protect interior walls against typical surface wear and abrasions, as well as deeper dents and complete penetrations into the wall cavity, reducing the need for repair.

This article continues on http://go.hw.net/AR042017-6.
Go online to read the rest of the article and complete the corresponding quiz for credit.

QUIZ

1. Which of the following is the precursor to modern gypsum board?
   a. Sackett Panel
   b. Alabaster
   c. Sackett Board
   d. Dry board

2. Why was gypsum board so widely used after World War II?
   a. Easy to install
   b. Cost effective
   c. Time saving
   d. All of the above

3. How does gypsum board use promote environmental responsibility?
   a. All waste is disposed of locally
   b. Material is used ubiquitously
   c. Gypsum is easily quarried
   d. Gypsum board manufacturers participate in robust LCA program

4. Which of the following characterizes specialized performance gypsum panels compared to traditional drywall?
   a. Perform well at temperatures above 125 degrees F
   b. Can be used below grade
   c. Embody advanced building technologies and function
   d. Perform better in commercial applications

5. Which of the following describe the use of specialized performance gypsum panels in multi-family housing and commercial environments?
   a. Are conducive to all forms of decoration
   b. Provide high performance
   c. Are easily repaired
   d. All of the Above

6. True or False: The benefits of specialized gypsum panels in multi-family housing don't apply to single family dwellings.

7. How do specialized performance panels increase efficiency in the construction of commercial structures?
   a. Tools used to install these panels can also be used to install other materials
   b. Panels are relatively large compared to other materials and can cover large surfaces
   c. Panels require customization for each application
   d. Panels can be recycled into other products

8. How does the gypsum industry ensure high quality and standards?
   a. Requires individual product testing and inspections
   b. Adheres to the ASTM standard
   c. Outsources research and development
   d. Participates in third-party testing and certification

9. Which of the following is not a benefit of shaftliner panels?
   a. Enhance curb appeal as a finish panel
   b. Provide fire protection in multi-family and commercial construction
   c. Are ideal for elevators and chutes
   d. Enable easy access for maintenance of ducts and mechanical systems

10. Which is true of the GA-600 manual?
    a. Distinguishes between abuse-resistant and impact-resistant specialized performance panels
    b. Helps architects specify high-performance acoustic gypsum panels
    c. Is a primary source of fire resistant and sound control rated systems for walls and floor/ceiling assemblies resist weatherization such as mold and mildew
    d. Covers building systems that use gypsum panel to

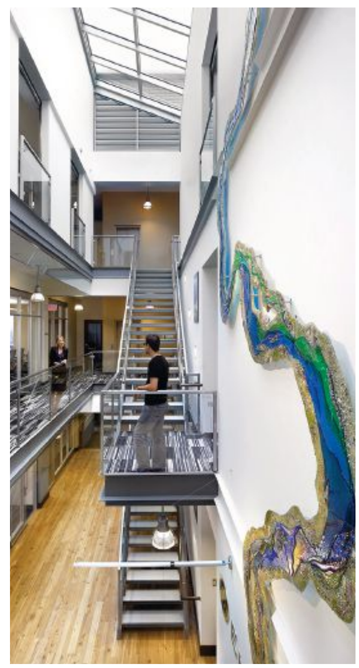
SPONSOR INFORMATION

GYPSUM™ ASSOCIATION

The mission of the Gypsum Association, a not-for-profit trade association founded in 1930, is to promote the use of gypsum while advancing the development growth, and general welfare of the gypsum industry in the United States and Canada on behalf of its member companies.

INSULATING CONCRETE FORMS FOR COMMERCIAL CONSTRUCTION

Presented by:



Enermodal Engineering Headquarters, Kitchener, Ontario. Photo courtesy of Nudura and Enermodel Engineering.

By Lionel Lemay, *PE, SE, LEED AP. Executive Vice President, Structures and Sustainability, National Ready Mixed Concrete Association*

Tien Peng, *Assoc AIA, LEED AP+, PMP. Vice President, Sustainability, Codes and Standards, National Ready Mixed Concrete Association*

LEARNING OBJECTIVES

Upon completion of this course the student will be able to:

1. Understand the basic design criteria and construction elements of commercial and institutional buildings built with Insulating Concrete Forms (ICFs).
2. Demonstrate and recognize the energy efficiency characteristics and economic benefits of building with ICFs.
3. Understand the contribution concrete makes to a building's resilience to fire, flood, wind and earthquakes.
4. Identify ways that ICF concrete construction can contribute efficiencies to the on-site construction phase of the project and to long-term efficiencies during the operational phase.

CONTINUING EDUCATION

CREDIT: 1 LU/HSW

COURSE NUMBER: AR042017.2

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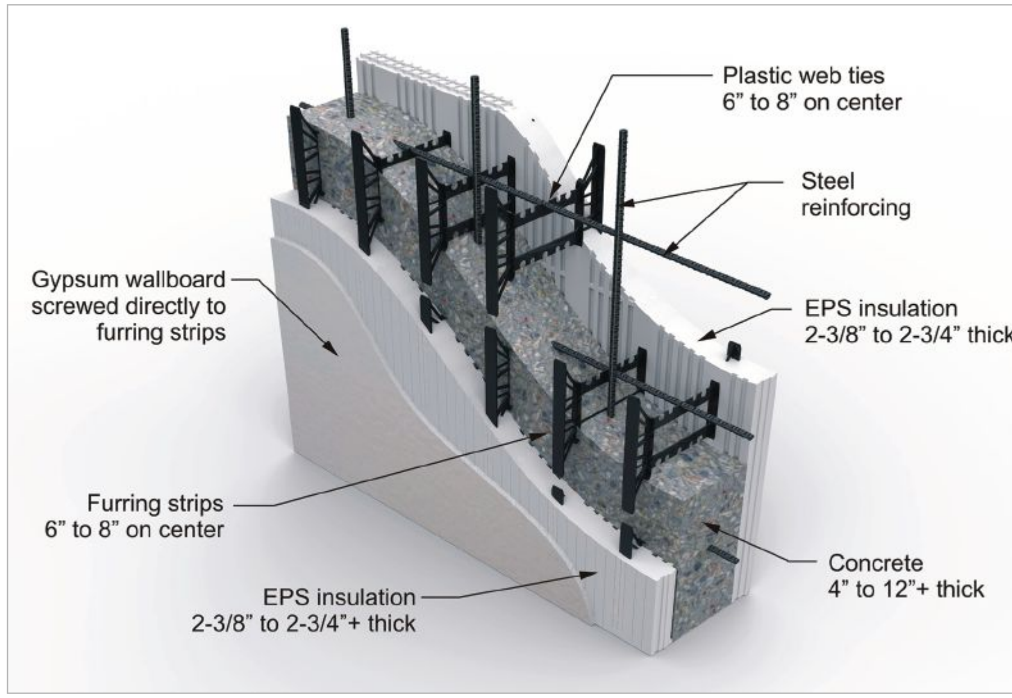
INTRODUCTION

Insulating Concrete Forms, or ICFs for short, combine two well-established building products, reinforced concrete for strength and durability, and expanded polystyrene (EPS) insulation for energy efficiency. ICF walls are made up of two layers of rigid insulation held together with plastic ties to form ICF units with a cavity in the center. The ICF units are stacked in the shape of the wall, reinforcing steel is added into the form cavity and then concrete is placed into the form. The result is a reinforced concrete wall with a layer of insulation on each side. What makes ICFs different than traditional concrete construction is that the forms remain in place after the concrete is cured to provide thermal insulation. The combination of reinforced concrete and insulation provides an ideal load bearing wall, thermal envelope, fire barrier and sound barrier.

Most buildings built in North America are low to mid-rise buildings using bearing wall construction. This means there are exterior and interior walls that are designed to carry the vertical loads and the floors span between the bearing walls. Often the bearing walls also serve to resist lateral loads from wind and earthquakes. ICF wall systems have been used for bearing wall buildings ranging from single story to high-rise buildings up to 30 stories tall and everything in between.

There are examples of ICF buildings all over the U.S. and Canada including single-family residential, multifamily residential, hotels, dormitories, assisted living facilities, offices, healthcare facilities, manufacturing and warehouse buildings. Schools built with ICF are popular due to low- or net-zero energy use. Theaters are also trending towards ICF construction for superior sound attenuation. For this article we'll focus on commercial applications including offices, schools, retail and institutional buildings. To learn more about ICFs for multifamily residential, including apartments, condos, hotels, dormitories and assisted living facilities visit http://go.hw.net/AR217Course1.



Typical ICF wall. Image courtesy of Logix®

ICF Wall Systems

The efficient construction process is what sets ICF building systems apart from other building systems such as wood frame, steel frame and masonry construction. ICF construction can help contain construction costs and reduce construction time because of the inherent efficiencies of the installed assembly that serves nine functions:

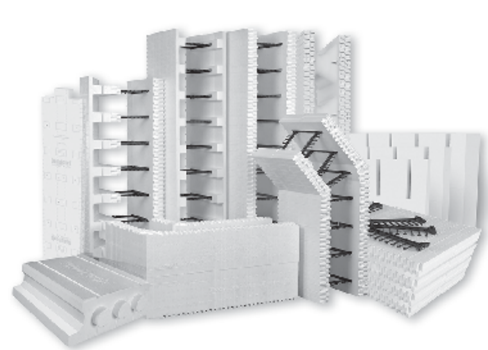
1. Concrete form (that stays in place)
2. Thermal barrier
3. Air barrier
4. Moisture barrier
5. Fire barrier
6. Sound barrier
7. Substrate for running utilities
8. Substrate for attaching finish materials
9. Reinforced concrete structure

In other forms of construction, these functions are installed by several different trades, usually at significantly added cost. General contractors can realize a number of on-site efficiencies including fewer trades, reduced crew-size and accelerated construction schedules. Because construction schedules are usually much shorter with ICF construction, the general contractor is able to finish on time and within budget. The building owner is able to put the building into service sooner, cutting short his financing costs and initiating a quicker revenue flow.

There are many different ICF manufacturers with similar ICF systems. The blocks range in size from 48 to 96 inches long and 12 to 24 inches high depending on the manufacturer. The most common configuration of an ICF unit is made up of two layers of 2-3/8-inch to 2-3/4-inch thick EPS insulation spaced 4, 6, 8, 10 or 12 inches apart depending on design requirements. The most common spacing is 6 inches or 8 inches for most low to mid-rise buildings, but for taller buildings, taller walls, or exceptionally large loadings, thicker walls are necessary. For simplicity, ICFs are generally called out by the width of cavity, hence an ICF with a 6-inch cavity is called a 6-inch ICF and an ICF with an 8-inch cavity is called an 8-inch ICF and so forth.

ICF manufacturers have a variety of ICF blocks to accommodate any design condition and have outstanding technical support including design manuals, design details, engineering support and all the test reports needed for commercial construction including fire, energy and noise. They have special components including straight blocks, corner blocks, brick ledge, angled block, curved blocks and half height units, minimizing the need for field modifications which further reduces construction time.

Another benefit of ICFs is that construction projects can continue through the coldest and hottest weather because of the insulating quality of the ICF forms. This means that concrete will continue to gain strength within the protective formwork despite freezing conditions and not overheat during extreme summer conditions.



ICF wall and floor components. Image courtesy of BuildBlock®

In general, ICF construction costs are about the same as wood, steel or masonry construction, but because of the reduced construction time of ICF construction they usually win out. Building with large ICF units instead of individual small framing elements such as dimensioned lumber or cold formed steel studs saves on initial cost.

Floor Systems

In addition to ICF walls there are also ICF concrete floor and roof systems. The concept is similar in that the ICF floor or roof is made with rigid insulation to function as a one-sided form at the bottom surface. The forms are installed to span between concrete walls, reinforcing steel is placed and then concrete is placed over the forms. The result is a reinforced concrete floor or roof with rigid insulation on the bottom. Other types of floor systems often used in combination with ICF walls include precast hollow core plank and composite concrete floors over steel joists.

Construction Process

The construction process is simple which is why ICF construction is so cost effective and helps reduce construction time. Once the foundation or structural floor is in place, the following process is followed:

Step 1: ICFs are stacked in the shape of the wall and openings for windows and doors are formed using bucks made of treated wood or plastic.

Step 2: Then steel reinforcing is placed into the forms and secured in place.

Step 3: Bracing and scaffolding are installed to keep the wall straight, plumb and secure and to provide a working platform.

Step 4: Concrete is pumped into the forms.

Step 5: Electrical and plumbing lines are installed into the EPS by cutting channels with a hot knife or other tool.

Step 6: Interior and exterior finish is installed directly to the ICFs by screwing into the embedded plastic furring strips.

Construction Process of ICF Walls. Images courtesy of Nudura.

When building multi-story buildings, the walls are generally erected and cast one story at a time. Structural floors are installed and finished before continuing with walls on the next level. There are also examples of walls being placed several stories at a time and installing structural slabs later. Some contractors have panelized ICF walls off site to further reduce construction time. Others are beginning to use steel fibers in place of horizontal shrinkage and temperature reinforcement which can also significantly reduce construction time.

With these cost and schedule advantages, along with fire safety, durability and energy efficiency, ICFs are quickly becoming the system of choice for commercial construction of all types including office buildings, schools, hospitality and institutional buildings.

Office Buildings

Many office buildings are owner occupied so operating efficiency, low maintenance and long term value are key attributes for a building system. That's why many building owners are turning to ICFs. The low cost and reduced construction schedule of ICFs are attractive, but the fact that ICF buildings offer the most energy efficient design option is a key factor in selecting ICFs. In addition, owner/tenants often like to offer their employees healthy buildings and demonstrate their commitment to sustainability by achieving LEED certification.

The energy codes, IECC and ASHRAE 90.1, consider ICFs to be mass walls with continuous insulation. Typical whole wall ICF assemblies have an R-value ranging from R-24 to R-26 or even higher depending on the manufacturer. Because thermal mass reduces temperature swings and delays heat transfer, there are fewer spikes in temperature inside an ICF building. Thermal mass shifts energy demand to off-peak hours when utility rates are lower, reducing costs further. Since the mass buffers indoor temperature fluctuations it also contributes to improved occupant comfort.

The other benefit of ICF walls is that they are more air tight than wood or steel frame construction. In many cases the air infiltration rates are as low as 0.5 air changes per hour. Because there are no studs to interrupt the insulation, thermal bridging is eliminated, further improving energy performance. Another key factor in lowering construction cost is the ability to downsize the HVAC system. Energy analysis and building owner experience suggest energy savings with ICFs ranging from 20 percent to as much as 50 percent depending on other energy efficiency strategies employed for the building.

CASE STUDY: CMTA HEADQUARTERS, LOUISVILLE, KENTUCKY


CMTA Headquarters, Louisville, Kentucky. Photo courtesy of Nudura and CMTA Consulting Engineers.

When MEP engineering firm CMTA outgrew its office space, they took the opportunity to design and build a state of the art headquarters. Their goals included demonstrating green technologies, consuming minimal energy, earning LEED Gold certification and taking steps towards becoming a net-zero energy building. The exterior bearing walls of their new 20,000 square foot office building were built using an ICF system to provide a superior thermal barrier and lower air infiltration rates. Combining additional roof insulation and high performance glazing resulted in a building that exceeds ASHRAE 90.1 by 20 percent and earned an Energy Star rating of 100. The design team also accomplished its goal of achieving LEED Gold certification. CMTA employees are proud to be working in the building and it's also being used as an effective recruiting tool for new hires. The building is also used by CMTA to demonstrate its high performance building design expertise.

CASE STUDY: ENERMODAL ENGINEERING HEADQUARTERS, KITCHENER, ONTARIO

Enermodal Engineering Headquarters, Kitchener, Ontario. Photo courtesy of Nudura and Enermodal Engineering.

Enermodal Engineering designed and built their headquarters to reflect the company's commitment to sustainability and to actively demonstrate their green building design expertise. At the same time, they wanted to maintain a quiet, comfortable and healthy environment for employees. One of the ways the building achieved these goals was by using an extremely air tight and well-insulated building envelope comprised of ICFs along with insulation lined window openings and triple-glazed windows with automated window shades. The 22,000 square foot office building is reportedly Canada's most energy-efficient office, using a metered 21.9 kBtu per square foot compared with the Canadian average of more than 118.9 kBtu per square foot. The building is the first LEED Canada Triple Platinum building with certification in three categories: New Construction (NC), Commercial Interiors (CI) and Existing Building: Operations and Maintenance (EB: O&M).

Education

Protecting children's health, safety and welfare along with providing comfortable learning environments are important factors when building a new school. Reinforced concrete and polystyrene, the two main components of ICFs, are inert and do not off–gas like other building materials, making it an ideal system for school buildings. The combination of insulation and thermal mass result in a building with more consistent temperature which vastly improves occupant comfort. In addition, concrete and polystyrene are noncombustible which means schools are safer.

Concrete is the most fire resistant of all construction materials used today which means ICF construction offers a significant safety advantage over wood and steel frame construction. Concrete cannot burn like wood or soften and bend like steel under fire conditions. All ICF manufacturers involved in commercial construction have tested their products in accordance with standard fire testing protocol including ANSI/UL 263 and ASTM E119. Typically, 4-inch ICF walls achieve a 2-hour fire rating, 6-inch ICF walls achieve a 3- or 4-hour fire rating and 8-inch and thicker ICF walls exceed a 4-hour fire rating. Generally the assemblies tested include reinforced concrete with a minimum compressive strength of 2,900 psi and 1/2-inch gypsum wall board on each side.

The EPS used in ICFs is flame retardant and is approximately five times better than wood at stopping flame spread from materials burning in close proximity. EPS is completely unable to support a flame without an outside flame source. This is what provides the extra margin of safety for occupants and fire fighters over wood and steel construction. EPS used for ICFs is strictly required to have a flame spread index of less than 25 and smoke developed rating of less than 450 when tested in accordance with ASTM E84 and ANSI/UL 723. ICF companies that maintain national evaluation reports from ICC-ES or other accredited testing agencies have all conducted a long list of materials tests in order to comply with national safety standards.

QUIZ

1. The main components of ICFs are:
   a. Steel and plastic
   b. Insulation and concrete
   c. Plastic and aluminum
   d. Wood and masonry

2. ICF walls are most frequently used as ________ walls to support vertical and horizontal loading.
   a. Frame
   b. Bearing
   c. Partition
   d. Clearstory

3. One of the reasons ICFs are cost competitive is that they serve 9 functions, including:
   a. Exterior finish and roofing
   b. Photo voltaic panels and sunscreen
   c. Thermal barrier, air barrier and moisture barrier
   d. Columns and beams

4. True or False: To attach interior and exterior finish to an ICF wall one must first install wood furring strips.

5. Even though ICF construction costs about the same as wood, steel or masonry, they are often used in commercial construction because of reduced:
   a. Winter months
   b. Wall lengths
   c. Transportation distances
   d. Construction time

6. Floor systems often combined with ICF walls in commercial construction include:
   a. Precast hollow core plank
   b. ICF floor systems
   c. Composite concrete floors over steel joists
   d. All of the above

7. Which three attributes of ICFs contribute to energy efficiency?
   a. High insulation value, thermal mass and low air infiltration
   b. High insulation value, thermal bridging and low air infiltration
   c. Thermal mass, thermal bridging and high air circulation
   d. Thermal mass, thermal bridging and convection

8. A 6-inch ICF wall will typically have a fire rating of:
   a. 1 hour
   b. 6 hours
   c. 20–30 minutes
   d. 3 or 4 hours

9. The concrete core of an ICF wall system offers:
   a. Noise and vibration control
   b. Fire resistance
   c. Thermal mass
   d. All of the above

10. True or False: Once concrete is placed into ICF forms and concrete hardens, the forms are removed for re-use.

SPONSOR INFORMATION

BUILD WITH STRENGTH

Build with Strength, a coalition of the National Ready Mixed Concrete Association, educates the building and design communities and policymakers on the benefits of ready mixed concrete, and encourages its use as the building material of choice. No other material can replicate concrete's advantages in terms of strength, durability, safety and ease of use.

This article continues on http://go.hw.net/AR042017-2 Go online to read the rest of the article and complete the corresponding quiz for credit.

What helps one of America's leading hotel chains sleep at night?

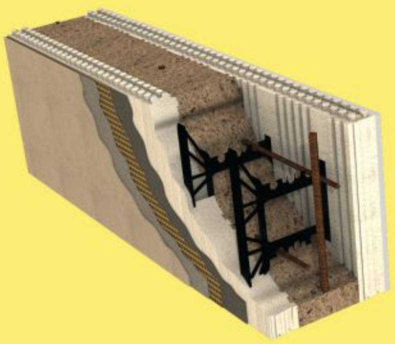
Insulated Concrete Forms.

ICF SPOTLIGHT:

Drury Plaza Hotel Cape Girardeau, MO

- All Drury hotels are 100% family owned, so there's **added focus on quality, safety and long-term value**—three essentials that are inherent to building with ICFs.
- The technology inside each Insulated Concrete Form translates to **real-world benefits including less building maintenance**, lower operating costs and greater long-term value.
- 16-inch concrete walls **significantly dampen sound between rooms**, creating a quieter, more comfortable environment.
- While thick ICFs contribute to **better energy efficiency**, a specialized energy recovery ventilation system improves indoor air quality by continuously introducing fresh air into the hotel.

Cross-Section of ICFs



Strong. ICF walls are reinforced with rebar, creating a structure that has 10X more thermal insulating ability than cross-laminated timber (CLT).

Simple. The technology is light and easy to use. If you can stack LEGO® blocks, you can build with ICFs.

Safe. ICFs are fire-safe, durable, mold and rot resistant—and the lower humidity levels in each wall provides improved indoor air quality.

A HOLISTIC EXAMINATION OF WALL ASSEMBLY PERFORMANCE

IN MULTI-FAMILY CONSTRUCTION

Presented by: TAMLYN TamlynWrap Drainable Housewrap

Photo courtesy of Levy Des Partners

LEARNING OBJECTIVES

Upon completion of this course the student will be able to:

1. Examine the importance of designing for both moisture management and continuous insulation in wall assemblies for superior wall systems.
2. Explain the technology behind commercial drainable wrap and how it can help achieve durability in facades and wall assemblies.
3. Describe the importance of designing proper flashing for the roof-to-wall interface, particularly in multi-family construction.
4. Describe how drainable wrap improved the performance in a multi-family case study.

CONTINUING EDUCATION

CREDIT: 1 LU/HSW

COURSE NUMBER: AR042017.4

Use the learning objectives above to focus your study as you read this article. To earn credit and obtain a certificate of completion, visit http://go.hw.net/AR042017-4 and complete the quiz for free as you read this article. If you are new to Hanley Wood University, create a free learner account; returning users log in as usual.

MOISTURE: A LEADING CAUSE OF MULTI-FAMILY CONSTRUCTION DEFECTS

Building scientists and other experts agree: no matter how tightly a building is constructed, no matter how well it's insulated, no matter what type of exterior cladding is chosen and how expertly it's installed, moisture will always find a way into the building enclosure. Moisture infiltration can undermine structural integrity, cause exterior surfaces to deteriorate, and shorten the life of paints and stains.

Moisture can also foster mold and rot that not only cause structural damage to multi-family buildings but also pose serious health hazards. For example, a moisture content pushing 28% exceeds the accepted content of 22%. If sustained, this will inevitably result in fungal decay. New studies have pushed this number lower suggesting that mold can grow on wood at levels above 15%.

Most moisture problems are caused by poor architectural design that traps or directs water back into wall assemblies and does not allow sufficient drainage. At times, there is a lack of a well thought out moisture management plan that includes the right materials and best practices for construction. Additionally, moisture is sometimes generated from building occupants and a lack of ongoing maintenance.

The effect of moisture on a building's durability and comfort have been well documented with 90% of building and building material failures directly associated to moisture, per ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers). These failures are a significant contributor to a staggering $9 billion spent by the construction industry each year on construction defects related to water intrusion as compiled by ASTM (American Society for Testing and Materials).

Most moisture problems are caused by poor architectural design that traps or directs water back into wall assemblies and does not allow sufficient drainage.

Given the enormous impact of moisture on buildings such as multi-family units, let's look at how water gets into the wall assemblies in the first place.

WAYS THAT MOISTURE GETS INTO MULTI-FAMILY WALL ASSEMBLIES

There are basic science fundamentals that explain how wetting and drying take place within a multi-family wall assembly. First, heat moves from a warmer state to a colder state. Second, moisture moves from a wetter state to a drier state. And third, pressure moves from a higher level to a lower level.

While exterior cladding usually is considered to be the primary barrier to water entering a building enclosure, no cladding can keep out all water. For this reason, it is important to understand how moisture still gets into wall assemblies.

Condensation

High humidity and extreme temperatures can cause vapor diffusion, with moisture flowing from a warmer state to a colder state. As a result, condensation occurs on the colder surface. Moisture is often transported by air movement through leaks or penetrations in the wall assembly.

Wind and Gravity-Driven Rain

Wind and gravity-driven rain can be forced into small openings in the exterior cladding at joints, laps, utility cut-outs, electrical outlets, nail holes, and other openings. Wind blowing around the building can create a negative pressure within the wall assembly. Because of the pressure difference, the wall assembly siphons water into the wall.

Solar Drive

Some "reservoir" claddings, such as brick, stone and stucco, can absorb and store moisture which the sun then drives into the wall assembly (solar drive). For instance, when a brick gets wet and then is warmed by the sun, some moisture moves to the colder, outside air and some moves to the backside of the brick into the exterior wall cavity. This is because there is more moisture in the brick than there is within the wall cavity.

Surface Gaps and Porosities

It is commonly understood that siding expands and contracts as outside air temperatures fluctuate. However, the expansion and contraction process can create gaps in the exterior surface of multi-family wall assemblies. This means that intersections, joints, and wall penetrations are all susceptible to moisture infiltration. Furthermore, porosities found in brick, stone and stucco cladding can lead to the absorption of unwanted moisture.

Capillary Action

Capillary action refers to the ability of water to travel in tight air spaces against the pull of gravity. In small spaces, gaps, holes, or pores, water molecules like to stick together through the forces of cohesion. For example, when you dip a portion of a paper towel sheet into a bowl of water you can see capillary action by watching water travel up the paper towel sheet. Although not as serious as bulk water movement, capillary action is a powerful force and can lead to moisture problems inside wall assemblies.

Diffusion

Diffusion is moisture flow as vapor from a higher humidity environment to a lower humidity environment. This is a process where moisture is absorbed by building materials and then the moisture is released to a drier environment. An example of moisture flow by diffusion is the drying process that would take place if the wall sheathing was damp and the moisture diffused or evaporated through a vapor permeable housewrap.

Air Currents

Air contains moisture and there are air currents in and out of wall assemblies. Consequently, moist air currents can dampen building materials, condense on cold surfaces, and create conditions for mold and decay.

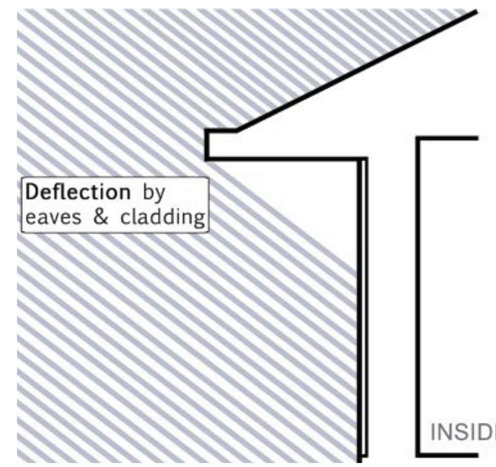
MOISTURE MANAGEMENT CONSIDERATIONS

For multi-family construction, designers should organize their thinking around the four D's of moisture management:

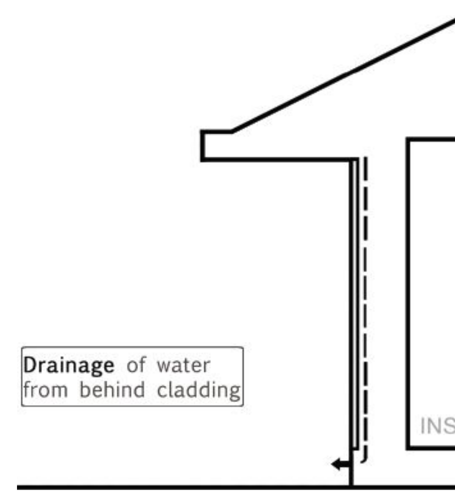
- Deflection
- Drainage
- Drying
- Durability

Deflection—This means designing wall assemblies and products that deflect rain water away from a multi-family building. A one-inch rain storm will deposit over 600 gallons of water per 1,000 square feet of roof. Designing to deflect this water away as fast as possible means that there will be less water for a building assembly to have to drain away. Avoid complex designs that make it difficult for water to drain. Instead, design roofs that slope away for fast and easy drainage. Avoid horizontal valleys and surfaces because water tends to be trapped in those areas. Another deflection technique is to use seamless kick–out flashings to divert roof water away from roof wall intersections.

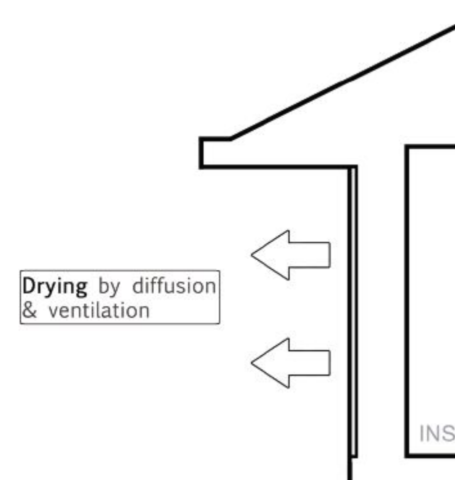
Drainage—All cladding systems can leak and allow water to penetrate. The faster water drains from a multi-family building the less water is absorbed by building materials. Fast, efficient drainage reduces the amount of time needed for drying because components are less wet. This means less chance for fungal decay. The key here is to provide as much unrestricted drainage as possible. Eliminate reverse shingling of building wraps and flashings that trap and divert water to the inside. Use drainable housewraps, rainscreen walls, adhesive flashings, and through wall flashings at cladding transitions and at the base of masonry walls.



Designing to deflect water away as fast as possible means that there will be less water for a building assembly to have to drain away.



Fast, efficient drainage reduces the amount of time needed for drying because components are less wet.



To ensure faster drying, use a good drainable weather-resistive barrier (WRB), or building wrap, to prevent water intrusion.

Drying—Deflection and drainage reduce the amount of water absorbed by multi-family building materials and therefore reduce the drying time. Since all cladding systems can leak, the underlying building materials can get wet. In turn, the potential damage is a function of how quickly wet building materials drain and dry out. To ensure faster drying, use a good drainable weather-resistive barrier (WRB), or building wrap, to prevent water intrusion. The WRB is also breathable enough to allow damp building materials to dry out should water ever get behind the wrap.

Durability—Since building wraps, rainscreens, flashings and sealants are a primary line of defense against moisture problems, it is critical that all these components are durable for the life of the multi-family building. Some recent U.S. census data suggest that 50% of all homes in America are over 40 years old and the average age of U.S. homes is 36 years. For this reason, it is important to specify the right products and design features to meet durability requirements.

Selecting appropriate moisture management strategies is key to successful building enclosure design. The four D's remind designers to deflect water away from the building, drain the water efficiently, dry the building materials quickly, and use durable materials for moisture control over the life of the multi-family building.

Methods for Flashing Options

Another moisture management consideration is the use of flashing. Without flashing, it is a challenge to control the rainwater because most multi-family buildings have transitions between materials or wall assemblies. Flashing helps to bridge these transitions and accommodate any building movements that may occur from settlement or other natural forces.

When designing a moisture management system, there are flashing options to consider at a number of key locations in multi-family buildings:

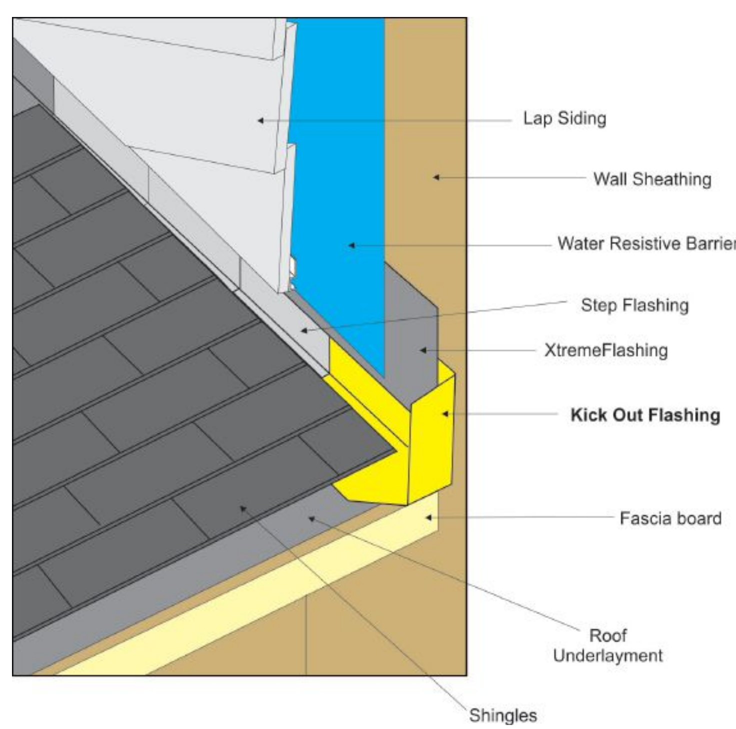
- Roof-to-wall intersections—use a step and seamless kick-out flashing
- Material transitions—use through-wall flashing
- Transition of dissimilar claddings—use through-wall flashing
- Base-of-wall assemblies— use through-wall flashing
- Base-of-wall for masonry/stucco claddings – use through-wall flashing and a weep system
- Roof penetrations – use prefabricated seamless flashing boots
- Windows, doors and all penetrations – use adhered flashing systems

Care must be taken to seal penetrations and openings. It is key to make sure the self-adhered flashings and sealants are compatible with each other and all window, door and penetration materials. Most flashing designs have evolved over time and based on what worked. The minimum requirements for flashings are found in building codes and serve as a useful guide to designers.

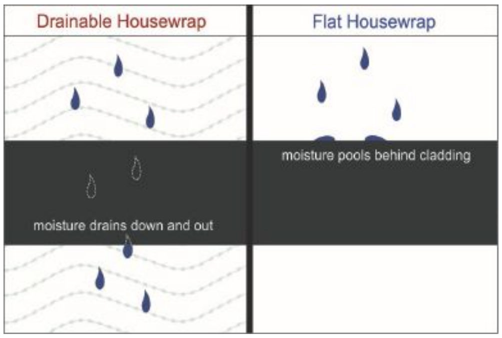
DRAINABLE HOUSEWRAPS: A CLOSER LOOK AT A FAST-GROWING TECHNOLOGY

There is growing recognition among building scientists and building codes that walls do need to drain and that housewraps will increasingly be judged by how effectively they provide positive drainage of water from the wall. Drainable housewraps, the fastest-growing segment of the market, address this need by using both a water-resistive layer and a drainage gap.

Standard housewraps provide only a water-resistive layer and can trap water behind cladding. In contrast, drainable housewraps help water to drain from behind the exterior cladding system. More specifically, they provide a continuous drainage gap that allows water to quickly escape from the wall system and thereby protect the building enclosure. Compared to standard housewraps, the newest drainable housewraps - especially those that



Without flashing, as in the image on the left, it is a challenge to control the rainwater because most multi-family buildings have transitions between materials or wall assemblies.



Drainable housewrap provides a continuous drainage gap that allows water to quickly escape from the wall system and thereby protect the building enclosure.

provide a minimum of a one (1mm) millimeter gap—can be as much as 100 times more effective at removing bulk water from the wall.

Let's examine some of the performance criteria that helped shape the direction of drainable housewrap technology for multi-family wall assemblies.

Water Resistance

As its most basic function, a housewrap must hold out liquid water. ICC-ES allows for three different testing standards: Boat Test, Water Ponding and Hydrostatic Pressure tests.

- The Boat Test, developed for paper and felt, is the least stringent standard. It is overly sensitive to humidity and vapor transfer. Therefore, it is unreliable for plastic housewraps.
- Water Ponding is a test that measures a housewrap's resistance to a "pond" of 1 inch of water over two hours.
- Hydrostatic Pressure, the most stringent test, exerts significant pressures on a housewrap sample through a column of water (55 cm or higher).

The better approaches are the Water Ponding and Hydrostatic Pressure tests. A premium housewrap should be able to pass both of these tests.

Durability

A housewrap must be able to withstand the handling and application process without compromising its water-resistance performance. The tear resistance, or tensile strength of the product, is the best available indicator of whether or not a housewrap might be damaged.

UV and cold resistance are also tested for housewraps. UV resistance depends on the time between the installation of the housewrap and the application of the siding. Many housewraps provide a 90 to 180 day recommendation for installation of siding. However, in most cases housewrap should be covered within 30 days if possible. The cold resistance test standard is to ensure that housewraps do not start to crack at low temperatures.

Vapor Permeability

Permeability measures the amount of vapor transmission that a housewrap will allow over a period of time, minimizing the potential for accumulation of moisture vapor. The higher the perm number, the more vapor permeable the material. There is debate on the optimal permeance range for housewraps, with 10 to 20 perms considered by some to be optimal.

Although grounded in building science, the debate over appropriate vapor transmission often focuses too much on the perm number. In reality, the permeability of a housewrap varies

QUIZ

1. Water has the ability to travel in tight air spaces against the pull of gravity because of __________.
   a. Solar Drive
   b. Air Currents
   c. Capillary Action

2. True or False: Moisture can not only cause structural damage to multi-family buildings but also pose serious health hazards.

3. The four D's that guide the design of a moisture management system are:
   a. Diffusion, Drainage, Drying, Damping
   b. Deflection, Drainage, Drying, Durability
   c. Deflection, Design, Decaying, Durability

4. True or False: Without flashing, it is a challenge to control rainwater because most multi-family buildings have transitions between materials or wall assemblies.

5. When designing a moisture management system, use a step and seamless kick-out flashing for:
   a. Material transitions
   b. Roof-to-wall intersections
   c. Transition of dissimilar claddings

6. True or False: If the surface tension of water is increased, it can penetrate deeper into a wall material.

7. Drainable housewraps use both a water-resistive layer and a minimum of a ____ drainage gap.
   a. 1mm
   b. 2mm
   c. 5mm
   d. 7mm

8. True or False: Compared to standard housewraps, the newest drainable housewraps can be as much as 100 times more effective at removing bulk water from the wall.

9. Two types of materials commonly used for Continuous Insulation (CI) are:
   a. XPS, Cellulose
   b. ICF, Mineral Wool
   c. XPS, Mineral Wool

10. True or False: Continuous Insulation (CI) is an uninterrupted blanket of insulation that covers a building's structure without thermal bridges other than from fasteners and service openings.

This article continues on http://go.hw.net/AR042017-4. Go online to read the rest of the article and complete the corresponding quiz for credit.

A NEW ERA OF PERMEABLE PAVING DESIGN

Presented by:

UNILOCK®
DESIGNED TO CONNECT.

Liberty village is a large residential development in downtown Toronto. This parkette is one of the many interesting places to stop and enjoy a moment. The pavers add a comfortable and relaxed appeal and are also permeable.

LEARNING OBJECTIVES

At the conclusion of this educational unit, the learners will be able to:

- Describe the expanded design choices for permeable unit pavers in today's market and the suitable applications.
- Identify how permeable paving products can contribute to sustainable site design.
- Explain the system components, performance capabilities, and installation procedures for permeable paving.
- Understand the cost benefits of permeable pavers over other systems.
- Review best maintenance practices of permeable pavements for all seasons.

CONTINUING EDUCATION

CREDIT: 1 LU

COURSE NUMBER: AR042017.5

Use the learning objectives above to focus your study as you read this article. To earn credit and obtain a certificate of completion, visit http://go.hw.net/AR042017-5 and complete the quiz for free as you read this article. If you are new to Hanley Wood University, create a free learner account; returning users log in as usual.

By: Kathy Price-Robinson

INTRODUCTION

Sustainable, permeable, concrete unit paving is a long-respected solution for stormwater management in large parking areas. However, a new era in permeable paver systems creates design potential that is much wider in application and more aesthetically diverse than parking lot applications.

"Water issues are hot topics for many communities, and many people are turning to landscape architects for creative green infrastructure solutions," says Nancy Somerville, executive vice president and CEO of the American Society of Landscape Architects (ASLA).[i]

According to a recent survey of more than 800 landscape architects, 77% indicated that permeable paving is one of most popular outdoor features. The top three most popular outdoor features also include rainwater/grey water harvesting, as well as native/drought tolerant plants.

"Sustainable residential landscape architecture, if part of a broader integrated site design, can dramatically reduce water usage and stormwater runoff over the long term while creating a healthy residential environment," Somerville continued in a press release.

Moving well beyond parking lots, the potential for permeable paver systems has expanded to include promenades, plazas, park hardscapes, walkways, entry courtyards, and other important outdoor spaces. Thanks to modern and ever expanding finishes, colors, shapes, sizes and technologies, designers no longer need to compromise their design intent to provide sustainable permeability for these applications.

EXPANDED DESIGN POTENTIAL FOR PLAZAS, PROMENADES, TOWN SQUARES, AND MORE

The Loyola University, St. Ignatius Community Plaza is a case in point.

When Loyola University in Chicago expanded its Lake Shore campus to the south, the planners decided to buy an entire avenue from the city, close it to vehicle traffic, and replace the street with a wide concrete paver shared-use plaza. This is one of the first pedestrian-only streets on the city's far north side.

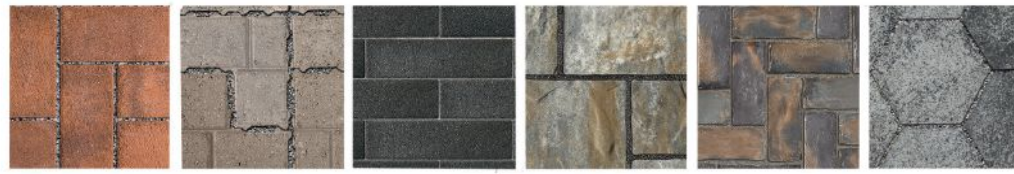
The designers wanted to allow pedestrians and bicyclists safe passage between the southern areas of the school including the new Institute of Environmental Sustainability building and several student dormitories, as well as the main campus.

The plaza builds upon the university's commitment to sustainability by featuring a new storm water management system, which includes permeable pavers, native plantings, and a meadow living-learning laboratory for students and visitors. Stormwater management was an important campus design consideration because of the proximity to Lake Michigan. The majority of the campus is within a half mile of the shoreline with soils highly suitable for infiltration.

The striking design of this plaza was created with 20,000 square feet of permeable pavers in 5 x 5 in., 5 x 10 in., and 10 x 10 in. sizes. These permeable pavers allow for rainwater infiltration to manage stormwater on site.

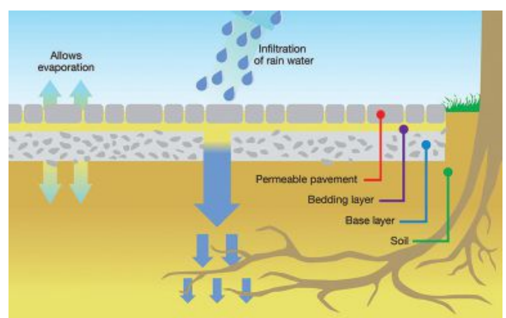
The new permeable path system eliminated the need for underground storage tanks, as the rainwater will naturally filtrate back into the ground. This change from impervious asphalt to permeable paving is a more sustainable best practice for the campus.

"In the past, runoff pouring from Loyola's impervious streets and parking lots created flooding problems and sent more than 6 million gallons of water annually into Chicago's storm sewer system and Lake Michigan," wrote planner Doug Kozma, RLA, ASLA, in a newsletter.[ii]



The new plaza and its permeable pavers, he wrote, is part of "a remarkable stormwater management system" that demonstrates a "testament to the university's environmental ethics."

HOW AN INTERLOCKING PERMEABLE PAVING SYSTEM WORKS



Permeable interlocking concrete pavements (PICPs) is a surface of unit block pavers that have an expanded joint between units. The joint size is usually controlled by enlarged spacer bars cast into the units. These joints range in size from 1/4 inch to 1/2 inch to create openings in the paved surface, which typically comprise 5% to 15% of the paver surface area. The joint is then filled with chip aggregate instead of sand that will facilitate the flow of water, making the pavement permeable.

PICPs are typically built over a number of layers of open-graded aggregate bases consisting of hard, crushed stone, although a variety of aggregate materials, including dense-graded, may be used depending on project parameters. The open-graded aggregate used to form these layers should have a narrow range of particle sizes with little or no fine sized particles. The open voids between the larger particles should provide 30% to 40% porosity and remain well drained.

With infiltration rates of more than 500 inches per hour, these permeable paving systems are typically able to eliminate runoff completely for frequent, short duration storms. These storm types make up 75% to 85% of all rainstorms in the United States.[iii] Of course, the infiltration rate of the soil below plays a big role in the efficacy of the system.

EXPANDED DESIGN CHOICES

Large-scale permeable parking lots have been promoted for decades by savvy planners, architects, landscape architects, engineers and others who appreciate the system's many significant benefits, from replenishing natural aquifers, to preventing runoff into municipal systems, to saving money on costly infrastructure for handling and storing runoff that is no longer required with a permeable pavement system.

In the meantime, remarkable design and finish advancements have launched this paving system into a new era of design potential. Permeable concrete pavers are now a viable and even exciting consideration for plazas, town squares, courtyards, and other large and small projects.

Today, specifying permeable concrete pavers doesn't mean sacrificing design. Modern permeable interlocking pavers can mirror numerous natural products but with a consistency, stability and reliability that natural products cannot possibility achieve.

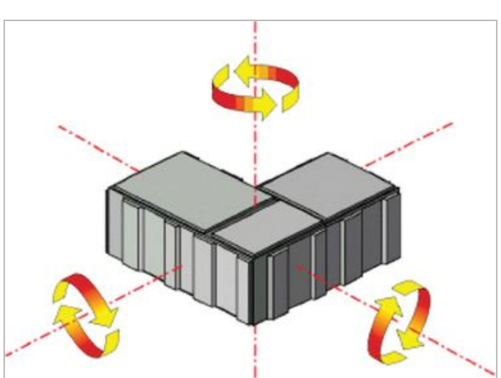
SHAPES, SIZES, AND LAYING PATTERNS

A modestly textured surface and several compatible sizes—small, medium, and large rectangles, for instance—create permeable paving with a pleasing random look.

A wider variety of shapes, finishes and sizes can inspire the designer's creativity. The design goal of a permeable pavement feature should be to complement the surrounding built and natural environment, as well as making a design statement with the pavement itself. A hexagon shape evokes a traditional architecture and the selection of a vibrant custom color and modest texture may be just what is needed to tie together the elements in a scene. Other shapes such as square, rectangular, and L-shape in a variety of sizes provide a wide array of choices.

Plank shape permeable pavers are currently trending. Standard sizes may range from about 9 in. to 14 in. long, and about 3 in. to 5 in. wide. When combined with a striking surface finish, such as smooth, brushed, washed aggregate, ground, or mottled, a sleek, polished, yet intriguing design can be created.

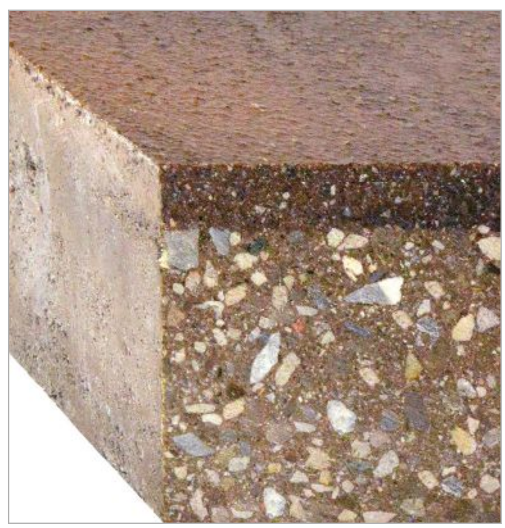
For permeable applications that require structural loads greater than pedestrian, the laying pattern used can add a significant amount of strength to a design. A herringbone pattern provides the best "lock-up" adding strength against rotational forces such as those created by tires at a roadway intersection.



The L-shaped unit is ideal for heavy-duty applications including H-20 and HS-20 load ratings as it prevents shifting or twisting under the demands of vehicle loads, braking and turning. This increases the structural performance of the permeable paver system and makes it ideal for large square footage vehicular applications.

FACEMIX COLOR TECHNOLOGY

The highest quality permeable concrete pavement products are manufactured in a two-step process that combines a base of coarser aggregates for a stronger foundation, with concentrated color and wear-resistant finer aggregates on top.



These products are highly resistant to the appearance of fading because the top layer prevents large, lighter color aggregates from showing through as the colored concrete wears over time. A complex blend of granite and quartz, some of nature's highest performing minerals, are combined with color pigments that are highly resistant to fading under UV light and extreme weather conditions.

SURFACE TECHNOLOGY

Newer technologies allow for the creation of ultra-realistic Old-World textures by producing a cast from actual natural stone, brick, and cobblestones. Combined with cutting-edge color systems, these unique shapes and textures can be found in rich colors such as burgundy red, burnt clay, old oak, and basalt. These new varieties offer designers an expanded palette with which to leave their aesthetic mark.

Other manufacturing advancements have allowed the industry to go beyond the standard facemix finish allowing for washed exposed aggregate finishes, brushed finishes, finishes that look like granite, and finishes that look flamed or etched, all while ensuring robust and enduring colors. These finishes are now all available as design considerations for permeable paver applications.

CASE STUDY: UNIVERSITY OF MASSACHUSETTS

The University of Massachusetts in Amherst MA committed to the construction of an honors residential complex in 2010. The initiative focused on the vision to establish

UMass Amherst as the destination of choice for the next generation of Commonwealth's high school graduates. The goal was to increase the student body while also increasing academic and student facilities all while creating an integrated living and learning environment.

This 515,637 square foot complex known as the CHCRC (Commonwealth Honors College Residential Complex) is the largest single construction project the University has tackled at one time. A LEED Silver project, CHCRC is made possible through the collaboration of William Rawn Associates Architects, Stantec Landscape Architect, and Dimeo Construction Management.

This new housing area includes undergraduate residences, faculty residences, classrooms, administrative offices, and the first 24-hour café on campus. The design incorporates both informal and formal gathering spaces that add many opportunities for academic and social interactions between students and faculty. The buildings, courtyards, and pathways are laid out to connect and open the honors community to the broader campus and encourage interaction between the students in the CHC residential community with those in other residential areas. The small-scale courtyards add a sense of spaciousness and provide comfortable seating areas. The project was completed in the fall of 2013.

"We met [LEED Silver] because it was a steady goal at the beginning of the project. The project team worked really hard to make sure it was paramount in a lot of decisions that were made during construction," says Andy Soles, project manager. The LEED certification was the driving force in the selection of permeable pavers. Chris Fee, RLA project manager at Stantec says, "We like to be environmentally responsible. The money isn't always there, but if you measure the upfront costs and balance against energy benefits, lower maintenance costs, and higher efficiency, it's a good choice and it lends prestige to your project. We feel good about using it." Fee further describes the paver choice: "It looks more like a traditional paver and the joints act as a locking unit. We wanted a look of a traditional paver and one that was heavy duty, but gave the permeability that satisfied LEED which requires a certain percentage of groundwater recharge."

The walkways, courtyards and large linear plaza were paved with 20,000 square feet of permeable pavers. The paving supplier collaborated closely with the Landscape Architect, Stantec, to help develop a solution that would work cohesively with the design. Four colors were chosen to accent the materials on the new buildings. After learning about the superior durability benefits of the facemix smooth manufacturing technology the University chose to go one step further and made the upgrade.

"CHCRC will help to improve an already excellent program", Priscilla M. Clarkson, Dean of Commonwealth Honors College, has stated. "This new complex will serve as a visible representation of the commitment of this campus to academic excellence and will help attract even more students to the program."

The project was a group effort between manufacturers, design teams, and installers making the largest single construction project at UMass, a success. [iii]

Visit http://go.hw.net/AR042017-5 to read more and complete the quiz for credit.

QUIZ

1. According to a recent survey of more than 800 landscape architects, 77% indicated that permeable paving is one of the three most popular outdoor features. What are the two other most popular outdoor features?
   a. Rainwater/grey water harvesting
   b. Native/drought tolerant plants
   c. Integrated security cameras
   d. Coordinated dog houses

2. What does the acronym PICP stand for?
   a. Percolating interrelated concrete pavers
   b. Permeable interlocking concrete pavement
   c. Permanent intermittent concrete pavement
   d. Percolating interlocking concrete particulates

3. True or False: The 20,000 sq. ft. plaza was surfaced with permeable pavers with a variety of colors and in a variety of paver sizes: 5 in. x 5 in., 5 in. x 10 in., and 10 in. x 10 in. sizes.
   a. True
   b. False

4. Permeable interlocking pavers have an expanded joint between units. The joint size is usually controlled by enlarged spacer bars cast into the units. What is the range in size of these joints?
   a. From 1/4 inch to 1/2 inch
   b. From 1/4 inch to 1 inch
   c. From 1/2 inch to 2 inches
   d. From 1 inch to 2 inches

5. True or false: The maximum standard size of plank-shaped permeable interlocking paves available in the market is 10 in. long and 3 in. wide.
   a. True
   b. False

6. Which applications are not suitable for interlocking concrete permeable pavers?
   a. Roadways
   b. Pedestrian plazas
   c. Residential and heavy-duty vehicular
   d. None of the above

7. For permeable applications that require structural loads greater than pedestrian, the laying pattern used can add a significant amount of strength to a design. Which pattern provides the best "lock-up" for adding strength against rotational forces such as those created by tires at a roadway intersection?
   a. Herringbone
   b. Checkerboard
   c. Random
   d. None of the above

8. A project manager with Santec Landscape Architects said this about permeable pavements installed on a university's courtyards and walkways: "It looks more like a traditional paver and the joints act as a locking unit. We wanted the look of a traditional paver and one that was heavy duty, but gave the permeability that satisfied LEED which requires a certain percentage of groundwater recharge." At which university is the project located?
   a. University of Southern California
   b. University of Texas, Austin
   c. University of Pittsburgh
   d. University of Massachusetts

9. In LEED 2009, the stormwater design credit was called Stormwater Design in the Sustainable Sites category. That credit has been modified for LEED v4. What is the new design credit called?
   a. Flood Design
   b. Rainwater Design
   c. Rainwater Management
   d. Rainwater Resilience

10. In LEED v4, which material-related credits can permeable pavers earn points?
    a. Materials Disclosure and Optimization: Environmental Product Declarations
    b. Building Product Disclosure and Optimization: Sourcing of Raw Materials
    c. Building Product Disclosure and Optimization: Material Ingredients
    d. All of the above

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“FA teamed with Amnesty International investigators to create an architectural model of Saydnaya Prison, a Syrian military facility notorious for torture and summary executions.”

The Rise of Forensic Architecture by Andrew Curry

In early March, an Israeli architect named Eyal Weizman and a team of sound and static engineers, smell specialists, cameramen, and other architects gathered in a basement conference room of the Haus der Kulturen der Welt, just a few hundred yards from the German parliament building in Berlin. Using scaffolding, plexiglass sheeting, Ikea furniture, and blue-painted drywall, they constructed a full-scale model of an internet café in Kassel, a city about a four-hour drive to the southwest. Their goal: justice.

More than a decade earlier, at the real café, the owner's son, 21-year-old Halit Yozgat, was manning the front desk when he was shot twice with a silenced pistol. The attack was the work of a trio of far-right terrorists later dubbed the National Socialist Underground (NSU). Between 1999 and 2010, the group planted bombs in Cologne, murdered 10 people of Turkish or Kurdish descent as well as a policewoman, and robbed 14 banks. At the time, authorities blamed the deaths and bombings on ethnic mafias or family quarrels, and police in several German states publicly dismissed the possibility that they were hate crimes or terrorism.

Yozgat's case featured a bizarre twist: a police officer named Andreas Temme was in the café at the time of the murder. But he didn't intervene or even stick around. It took two weeks for officials to track down Temme, who claimed he didn't come forward earlier out of embarrassment. A married man, he said he was using the café to anonymously surf internet dating sites. Besides, he claimed, he didn't see or hear anything unusual in the café at the time of the shooting.

The NSU was exposed when two of its members died in a fire and the third turned herself in, leading to one of the most-watched trials in postwar Germany. For his part, Temme was cleared—but his unlikely story and hastily closed case left victims' families and activists in Germany unsatisfied. If Temme's testimony was demonstrably false, it might point to a larger official cover-up. If the officer was lying about being a witness, was it possible that he might have been an accomplice or even a direct participant?

"Our aim is to see if the police were right in closing the file on Andreas Temme," said Weizman, standing in front of the re-created café's front door in March. "We're conducting an investigation of the investigation."

The reconstruction was more than a media-friendly stunt. It was the sort of painstaking analysis that Forensic Architecture (FA), a London-based research agency founded by Weizman, has pioneered over the past seven years, in the process unraveling official accounts of killings and human rights abuses from Gaza to Guatemala.

FA's work has been presented as evidence in courts around the world, before United Nations panels, and in cooperation with nongovernmental organizations like Amnesty International and Israel's B'Tselem. "What makes Forensic Architecture stand out is they are one of the few groups to isolate core skills like modeling and design and apply them to very urgent matters," says Brendan Cormier, a curator at the Victoria and Albert Museum in London who included the organization's work in his "A World of Fragile Parts" exhibition at the Venice Biennale last year. "In the fog of war, they seek out the truth."

The NSU investigation is a classic example. Using floor plans of the three-room space, stills taken from YouTube videos, witness testimony, thousands of pages of official investigation material, and 1 minute, 18 seconds of leaked police video of Temme retracing his steps during his testimony, FA created a precise computer reconstruction of the scene. They applied specialized eye-tracking software to show what Temme was able to see as he moved through the space. An accurate digital reconstruction allowed the agency to test dozens of different scenarios: Could a gunshot have been heard in the café's back room? Did Temme have an obstructed view of the front door, or of the shooter? How long would it have taken for the smell of gunpowder to dissipate after the two shots

FA's "Bomb Cloud Atlas" at the Venice Biennale

were fired? "We need to see if he was a witness—an eyewitness, an earwitness, or a smell witness," Weizman says. "Is there enough information, in other words, to show that Temme was lying?"

To "ground truth" or verify the computer model's accuracy, FA built the café replica. Some parts were reconstructed precisely: The two mugs on the café's front desk, the spoon in an empty cereal bowl, the mouse plugged into a desktop computer. Other aspects were portrayed in outline: Strips of white tape traced the locations of the café's computer cabins and rear

ANDREA AVEZZÙ/LA BIENNALE DI VENEZIA

wall. Over the course of two days, the team calibrated the computer model. State-of-the-art microphones measured how audible a 130-decibel silenced gunshot was from different parts of the café. A smell specialist had configured a smoke machine to release puffs of "gunsmoke" that were then tracked using GoPros.

Outside the conference room, activist Tim Klodzko—part of the National Socialist Union Tribunal project, a coalition of NGOs devoted to bringing attention to the case and its implications for German society—watched with visible emotion. "Forensic Architecture could prove the statements of the police are wrong, using their methods," he says. "Seeing this reconstruction, I'm really impressed. I have the feeling this can change something."

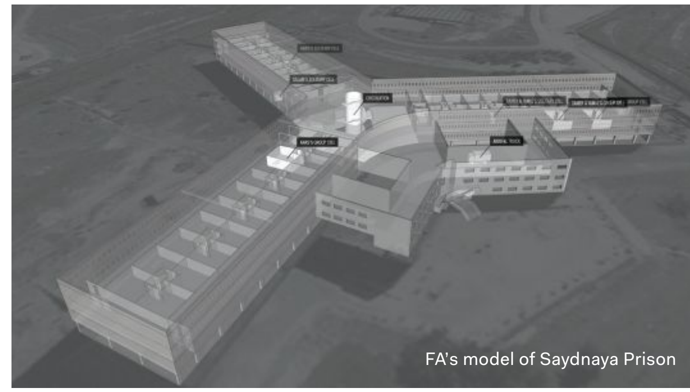
A Dynamic New Evidence Model

Since Weizman, 46, founded FA in 2010, it has established itself as a unique hybrid of architecture studio and human rights investigator. The agency's reports balance high-flown architectural theory with cold facts. "To build a quasi-discipline requires a combination of theoretical, historical, experimental, and technical capacity—along with serious historical analysis and serious theoretical understanding of the relationship between the architectural materiality and events," Weizman says. "On the other hand, we're very practical. It's important to provide evidence to convince people and win cases."

In one of their recent high-profile projects, FA teamed with Amnesty International investigators to create an architectural model of Saydnaya Prison, a Syrian military facility near Damascus notorious for torture and summary executions. Access to the prison, controlled by the Bashar al-Assad regime, was impossible, so FA used aerial satellite images and testimony from survivors about how the prison sounded to reconstruct the interior.

For Amnesty International, more accustomed to gathering evidence using pen and paper, the collaboration was a window into entirely new ways of presenting and analyzing evidence. "That element of dynamism and creativity is so useful for us as human rights activists," says researcher Nicolette Waldman, one of Amnesty International's Saydnaya investigators. "Their process isn't necessarily linear or step-by-step, but in the end it's amazing."

Published online last summer, the interactive map of the prison was, technically, an appendix to an authoritative report based on dozens of hours of witness testimony and fact-finding. But, Waldman says, the way the model allowed viewers to virtually enter the notorious prison resonated beyond Amnesty's



FA's model of Saydnaya Prison

usual audience. In addition to CNN, the BBC, and NPR, the project was covered in outlets like *Wired* and *Fast Company*. "It allowed us to reach a whole new segment of the population," Waldman says, "people who wouldn't read an Amnesty International report but might click on a tour of the prison."

The agency's flair for showmanship is thanks in no small part to Weizman himself, who manages to marry undisputed intellectual heft—he's published more than a dozen books (*Forensic Architecture: Violence at the Threshold of Detectability* comes out in May) and teaches at the University of London and Princeton University—with undeniable stage presence. Take his appearance outside an Israeli Army base in the West Bank, filmed for a 2014 Al Jazeera documentary called *The Architecture of Violence*: Weizman initiated a shouted exchange with an unseen (but presumably armed) soldier concealed inside a tall concrete watchtower. "Is this place only yours? It's everybody's place," Weizman yelled in Hebrew, with an exaggerated wave and theatrical shrug. "Why are you here, anyway? Is that tube your home? It's not even your home and you're sitting in that tube telling me what to do?"

Point made, Weizman turned his back on the tower and strode through a scrubby field back to the waiting camera, sporting a toothy grin under aviator shades. "Fuck them," he said dismissively. "Doesn't he look ridiculous, inside his pipe house? Like he's king of the hill, inside his tube?"

Weizman's dramatic style often helps give FA's presentations an extra emotional impact. After the Israeli army used artillery shells full of white phosphorus over the dense urban center of Gaza in December 2008 and January 2009, Israeli human rights lawyer Michael Sfard worked with Weizman and his team to bring a case against the army in court. FA reconstructed the explosion of a single white phosphorus shell and modeled how the prevailing winds that day would have spread the burning

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chemical over the city below, presenting the evidence to a U.N. panel in Geneva in 2012.

When they brought the case before Israel's High Court of Justice, Sfard says, the FA took the analysis a step further. It superimposed the resulting rain of fire on maps of Paris, New York, and Tel Aviv, literally bringing the effects of the controversial weaponry home to the Israeli court. "The judges could see which buildings would have been hit," Sfard says. "It seemed to me they were impressed." In 2013, shortly before the court was scheduled to rule in the case, the army announced it would voluntarily stop using the weapon in populated areas.

A Team of Designers Seeking the Political Edge

On a gray December morning in London, the FA studio—a white-painted brick loft on the second floor of Goldsmiths College, University of London—is cold enough that several of the young architects bent over their laptops at spare trestle table desks are wearing puffy down jackets and watch caps.

Aside from the tables, the office's furnishings consist of little more than a lone Ikea Kallax bookshelf and some framed images: forensic reconstructions of the remains of infamous Nazi doctor Josef Mengele, the subject of Weizman's 2012 book *Mengele's Skull: The Advent of a Forensic Aesthetics*. A whiteboard in the corner lists projects the office is working on; the one-word project nicknames read like a catalog of the world's trouble spots: Saydnaya, Negev, Guatemala, Karachi, Gaza.

FA is largely funded by the European Research Council, which awarded Weizman a five-year, €1.2 million grant in 2011. Last year, it renewed the agency's funding through 2021. Other funding comes from museums that exhibit the agency's work or NGOs it partners with. FA employs a wide range of professionals from disciplines as far-flung as art, law, and computer science. Yet architecture remains at the core of its mission, and Weizman is a restless presence in the middle of it all, wearing a blue blazer over a black sweater with a purple scarf knotted around his neck against the indoor chill.

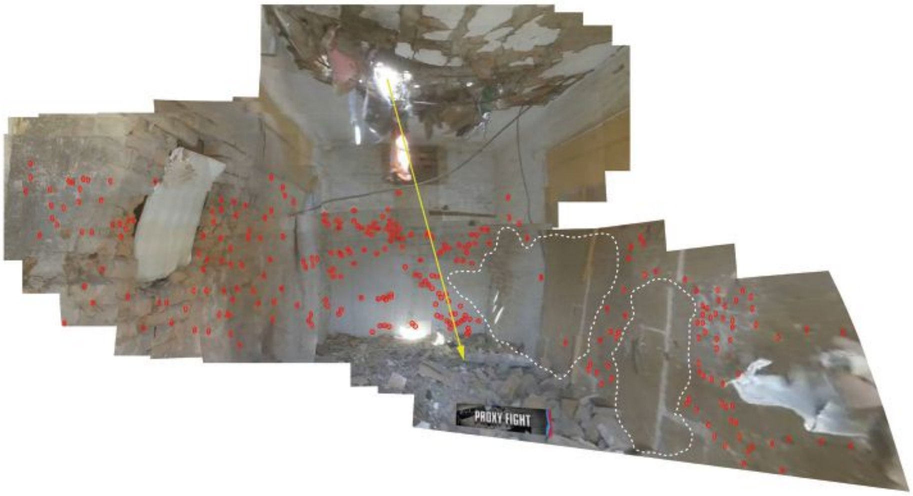

Image from FA's Miranshah, Pakistan, drone strike reconstruction

COURTESY FORENSIC ARCHITECTURE

Most of the bundled-up collaborators in the loft were trained as architects; the work they're doing uses programs like Rhinoceros 3D, Blender, QGIS, Agisoft PhotoScan, and 3D Studio Max to model everything from the Kassel internet café to Pakistani sweatshops. By design, each project is a one-off. "We're not training people to repeat work that has already been done here. Each project tries to push a certain dimension in new directions," Weizman says. "On the one hand they open up new political or technological possibilities and on the other, they are relevant—they are where the political edge is."

Weizman himself studied architecture at London's Architectural Association in the 1990s. While still a student, he began volunteering for the Palestinian Liberation Organization's planning office. It was just after the assassination of Israeli Prime Minister Yitzhak Rabin, which galvanized a generation of young left-wing Israelis like Weizman, who was born in Haifa.

Weizman discovered that Palestinian planners didn't have access to modern cartography and were relying on outdated Jordanian maps and colonial-era plans instead. As an Israeli citizen, Weizman could freely access Israeli sources. He volunteered to work as "something like a lower-grade industrial espionage person," culling information about the geography and infrastructure of Palestinian-controlled areas from Israeli open-source documents and providing them to Palestinian planners. The work inspired Weizman to begin thinking about maps as a way to represent the daily lives of the oppressed, a means of revealing the sheer physical brutality of the occupation. He was already theoretically inclined, he says: "I managed to walk through the AA without designing much."

When scholar Edward Said and others called for a "counter-mapping" movement to use colonial cartographic techniques in the service of indigenous communities in the mid-1990s, Weizman saw a way he could combine architectural tools with political convictions. Weizman began applying the techniques he had learned as an architect to look at human rights abuses perpetrated by the Israeli government, particularly the way buildings and urban planning disrupted Palestinian communities.

"There has been a shift in architecture in the past decade to see architectural investigation as something that is not directed at design solutions," Weizman says. "The linear thread that connected research to construction is being snapped and architectural knowledge, architectural intelligence, architectural investigation are being used to unpack other situations."

As much as the tools and techniques of architecture can expose and explain crimes against humanity, there's a flip side, argues Weizman. Architects can be accomplices to violence, war, and human rights violations. Architecture itself, he says, can be a weapon as deadly as any gun. In his 2007 book *Hollow Land: Israel's Architecture of Occupation*, he describes a purposeful, decades-long "strategy of turning natural and built features

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[to] serve military ends."

After founding FA, Weizman discovered a new topic for his research: drone strikes. Over the course of a decade, drone-launched missiles, once an anti-vehicle or anti-personnel battlefield weapon, had increasingly become a tool used to kill people in houses, often in the middle of dense urban environments. The weapons were touted as precision munitions, but as their use proliferated, so did "collateral damage," in the form of civilian casualties.

Designed to penetrate a building's roof before exploding, drone-launched missiles leave a telltale small hole in the top of a building while devastating everything inside. For Weizman, missiles can have theoretical implications: He describes them in his book *Forensic Architecture* as "counterarchitectural

"[FA's] dynamism and creativity is so useful for us as human rights activists. Their process isn't necessarily linear or step-by-step, but in the end it's amazing."

—Nicolette Waldman, researcher, Amnesty International

technology," interacting (via delayed fuses) with the materials of targeted buildings to achieve their effect. On a more practical level, Weizman argues that by billing the contained explosions as "surgical strikes," planners justified their widespread use on homes and in dense urban areas, increasing the number of children and innocent civilians killed.

Proving it, though, was complicated: Journalists are forbidden from traveling in the "federally administered tribal areas" along the Pakistani border with Afghanistan, a prime hunting ground for U.S.-directed drones. Working with the European Center for Constitutional and Human Rights, FA used pixel-by-pixel analysis of an MSNBC clip showing the aftermath of a 2012 drone strike to map the shrapnel spray inside a house in Miranshah, Pakistan. Spots without shrapnel divots, they concluded, traced the ghostly outlines on the walls of two people whose bodies absorbed part of the impact. Another strike was reconstructed based on the testimony of a traumatized survivor.

The results, featured in a 2014 exhibition in Berlin, "Forensis," combined a millimeter-level look at the effects of drone strikes with a broad look at their frequency and geographic distribution. It was one of the most detailed unclassified looks at this little-scrutinized weapon of modern war. Among other things, it showed that as drone warfare shifted


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to urban targets, the number of civilian casualties went up—counter to the claims of drone proponents.

The Challenges of Going Solo

In court, opponents sometimes dismiss FA's work as ideologically motivated or question whether the testimony of architects should be admissible as expert evidence in human rights cases in the first place. Weizman bristles at the implication that the agency's projects are unfairly biased—a charge, he points out, that's rarely levied against the police: "We often confront state experts, sometimes in uniform. I don't think anyone is asking them whether they're biased or not."

The team's unconventional approach, meanwhile, is often born of necessity. As an NGO adamantly opposed to cooperating with state authorities, FA has to rely on unusual sources—satellite imagery, witness testimony, still photos gleaned from Al Jazeera B-roll and CNN stand-ups—to reconstruct events or crimes. "States defend themselves against independent investigations," Weizman says. "Sometimes, we don't even have images."

The NSU investigation was a case in point. Adamantly refusing to cooperate with German authorities—"we don't work with the police," Weizman says—the agency cobbled together various pieces of evidence from open sources. When he was in Berlin, Weizman explained that the results of that project will take months to compile. They'll be presented in May at an event in Cologne organized by German NGOs, then as an installation at the 2017 Kassel Documenta festival.

Meanwhile, FA is beginning to look at cases where environmental change—both in the short and long term—can be seen as a potential instrument of violence. "There is the violence of architecture, planning that slowly encroaches, envelops, and suffocates the life out of an area. There is a slow violence of environmental transformation, destroying fields and changing a rural landscape into suburban industrial one," Weizman says. "Then there is the slower violence of climate change, which has started to affect our region very critically."

To train the next generation of designers to practice his "insurgent forensic work," Weizman has just established a degree program in forensic architecture at Goldsmiths, open to architects and those in other fields, such as the social sciences, the arts, and journalism.

"All these things we used for the first time within this field have now become more commonplace," says Lorenzo Pezzani, a slight Italian grad student and veteran of several FA projects who runs the program. "In a sense, I think that's the interesting aspect of the project as well—it introduces new languages and tools and they become part of a larger movement and a larger attempt for justice."

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Santa Rosa Chapel at Children's Hospital of San Antonio, San Antonio, TX

AWCI

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AWCI Team Members: BASWA acoustic North America, LLC, ClarkDietrich Building Systems, Fry Reglet Corporation, L&W Supply, Radius Track Corporation, Rew Materials, Trim-Tex, Inc., USG Interiors

Architect: Stanley Beaman & Sears

General Contractor: Bartlett Cocke General Contractors

Drywall
Old Parkland West, Dallas, TX

AWCI GYPSUM ASSOCIATION

AWCI Contractor: Baker Drywall Dallas

AWCI Team Members: Armstrong World Industries, Foundation Building Materials, Georgia-Pacific Gypsum, Grabber Construction Products, Hilti, Inc. L&W Supply, Radius Track Corporation, USG Corporation

Architect: Beck Architecture, Inc.

General Contractor: The Beck Group

Stucco
Westfield Village at Topanga, Woodland Hills, CA

AWCI

AWCI Contractor: Performance Contracting, Inc.

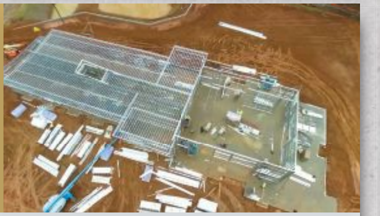
AWCI Team Members: 3M Construction, CEMCO, Clinch-on Cornerbead Co., GCP Applied Technologies, Georgia-Pacific Gypsum, Hilti, Inc., Johns Manville, LaHabra, Larsen Products Corp., Pecora Corp., USG Corporation, Westpac Materials, Westside Building Material

Architect: Westfield Design

General Contractor: Westfield Construction

Steel Framing
SECU Jim & Betsy Bryan Hospice Home of UNC Health Care, Pittsboro, NC

AWCI SFIA



AWCI Contractor: Precision Walls, Inc.

AWCI Team Members: Delta Gypsum, Inc. (AD Building Materials), Johns Manville - Building Insulation Division, Hilti, Inc., L&W Supply, Marino\WARE, National Gypsum Company, Phillips Manufacturing Company, USG Corporation

Architect: MHAworks Architecture

General Contractor: LeChase Construction

Ceilings
San Francisco Museum of Modern Art, San Francisco, CA

AWCI

AWCI Contractor: RFJ Meiswinkel Company, Inc.

AWCI Team Members: GC Products, Inc., Hilti, Inc.

Architect: Snøhetta

General Contractor: Webcor Builders

EIFS
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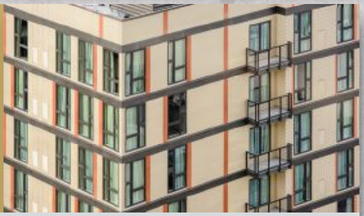


AWCI Contractor: Applied Restoration Inc.

AWCI Team Members: ClarkDietrich Building Systems, Demand Products, Inc., Dryvit Systems, Inc., Insulfoam of Florida, L&W Supply, Vinyl Corp

Architect: Johnson Braund, Inc.

General Contractor: Halvorson Construction Group, LLC

Small Projects
Restoration Hardware at Cherry Creek Shopping Center, Denver, CO

AWCI

AWCI Contractor: South Valley Drywall, Inc.

AWCI Team Members: CEMCO, Colorado Drywall Supply, LLC, Grabber Construction Products, Hilti, Inc., NeverMiss International, LLC, Owens Corning, Phillips Manufacturing, USG Corporation

Architect: Nelsen Partners

General Contractor: W.E. O'Neil Construction


IMV JOINT

“The program has come to represent an unconventional but important approach to governance, demonstrating how enlightened political thinking can improve the built environment.”

Rebuild by Design’s Enduring Legacy by Karrie Jacobs

The most moving architectural renderings I've seen lately show the New Jersey Meadowlands, not far from where I grew up, as beautifully restored natural wetlands. The Hackensack River, still crisscrossed by 20th-century artifacts like the soaring elevated stretches of the New Jersey Turnpike, is unexpectedly full of swimmers; the improbably bucolic scene is ringed with dense, well-thought-out urban neighborhoods. It looks nothing like the Meadowlands I once knew, famous in my childhood for its smoldering landfills and toxic waste dumps. Nor does it resemble the Meadowlands of today, dominated by a cluster of sports arenas surrounded by infinite acres of asphalt and accompanied by a hideous, unfinished shopping and entertainment center (with an indoor ski slope and water park) that was supposed to be called Xanadu, but has more recently been renamed American Dream Meadowlands.

The renderings in question were part of a proposal drawn up by a team of designers—led by MIT's Center for Advanced Urbanism and Dutch firms ZUS

The indoor ski slope at American Dream Meadowlands

and De Urbanisten—for Rebuild by Design, a New York–area resilience competition launched in 2013, in the wake of Hurricane Sandy. The New Meadowlands Project, as the proposal was called, was one of seven competition winners.

Rebuild by Design was the product of President Barack Obama's Hurricane Sandy Rebuilding Task Force, but it was really the brainchild of the administration's first secretary of Housing and Urban Development (HUD), Shaun Donovan, who had previously served as commissioner of New York City's Department of Housing Preservation and Development. With graduate degrees from Harvard in both public administration and architecture, Donovan drew on his double-edged background to structure a competition that took a creative approach to making the New York region less vulnerable to future storms and that also motivated a broad range of public officials and community leaders to think deeply about the long-term project of resilience.

Today, most of Rebuild by Design's winners are substantially funded and moving methodically from design to approval to construction. As the projects take shape, Rebuild has come to represent an unconventional but important approach to governance, demonstrating how enlightened political thinking can improve the built environment—a lesson that has taken on new urgency in the aftermath of the recent presidential election.

A Tour Guide with a Curious Title

In March, I sat in on an urban design seminar at Columbia University, led by *New York Times* architecture critic Michael Kimmelman, at which Donovan was the guest speaker. He said that as HUD secretary, he was sometimes frustrated by the fact that the role of the federal government in this country is so limited. Many of the decisions on things like land use and building code that are increasingly crucial as climate change brings more extreme weather are made not by officials in Washington D.C., but by those in state and local governments.

Still, after President Obama had asked him to develop a long-term resilience plan following Sandy, Donovan made a side trip during a family vacation to Germany, visiting the Netherlands to learn what he could about that low-lying country's long history with water management. "Henk Ovink was my tour guide," Donovan told the Columbia students. "He had the most curious title I'd ever heard." At the time, Ovink was director general for spatial planning and water affairs. Donovan spent a couple days touring the Dutch countryside with Ovink in a bus, learning about what resilience means in a country where 76 percent of it is at or below sea level. The two men talked about how to make Americans smarter and more conscientious about the risks associated with climate change. What they came up with was a device that would engage local officials—those willing to entertain and support unconventional solutions—and give them access to the scientific resources and deep pockets of the federal government.

The idea they arrived at was to respond to the devastation caused by Sandy with a design competition that would begin with multidisciplinary teams devoted to pure research, attempting to figure out the problems before contemplating solutions. It's not an unprecedented model: At the Museum of Modern Art,

BRAD MILLER

for example, former architecture curator Barry Bergdoll mounted two exhibitions, “Rising Currents” in 2010 and “Foreclosed: Rehousing the American Dream” in 2012, that were the outgrowth of extensive research. But an open-ended structure was highly unorthodox for a federal rebuilding program following a natural disaster. And this unusually cerebral experiment in governance wasn’t an easy sell.

“I toured him around,” Ovink, who is now the Netherlands’ special envoy on international water affairs, recently told me about his meeting with Donovan, “and we had this great conversation. A lot of the conversation was actually focused on: Can the federal government pull this off?”

One of the problems, from Ovink’s perspective: “A government is about security and not about risk,” he told me. “Innovation is about risk and not about security.”

The riskiest part about Rebuild was its philosophical basis, the research phase, which came without a set of deliverables and consisted of several hundred design professionals and scientists, broken into teams, pondering the vulnerabilities in the New York region that had been exploited by Sandy. The overall concept proved impossible for the feds, even at their most enlightened, to fund. Ovink, who worked closely with Donovan to coax the federal bureaucracy into embracing the strategy, recalls, “My discussion with the Office of Management and Budget at the time was, ‘So Henk, you want a billion dollars for a process where you don’t know what the outcome is.’ They asked me if some of the projects could fail and I said yes.”

To enable his dream of an innovative, open, free-spirited public sector, Donovan had to secure money from private funders. Rebuild began with a $4 million grant from a consortium led by the Rockefeller Foundation. After the winners were chosen and the projects were clearly defined, HUD put up $930 million to implement the designs (just a small percentage of the $60 billion Sandy recovery effort).

“Oystertecture”

Today, the New York–based landscape architecture firm Scape, one of the winners, is busy putting the finishing touches on a design for series of “living breakwaters” to be constructed (and cultivated) off the south shore of Staten Island. The structures will be made out of stones, concrete, and discarded oyster shells collected from local restaurants, but they will also be expanded and strengthened over time as successive generations of oysters create what the Scape team calls “biogenic build up.” Scape has been promoting the idea of “oystertecture” since the “Rising Currents” exhibition in 2010, but this is the firm’s first time implementing the concept. The job of the breakwaters is threefold: to protect waterfront neighborhoods from future wave action, to help the ongoing reintroduction of oysters and other sea life to New York City’s waterways, and to reconnect Staten Islanders with their local ecology and maritime heritage.

In Hoboken, N.J., meanwhile, a city that was largely underwater after Sandy, Mayor Dawn Zimmer has emerged as one of Rebuild’s great champions. Working with a design lead from the Office for Metropolitan Architecture, she will soon be bidding out construction on $230 million of infrastructure (in conjunction with neighboring Weehawken and Jersey City) that will, as the project title puts it “Resist, Delay, Store, and Discharge” water. As of late March, the project was in the process of obtaining an environmental impact statement and final approvals.

Some Hoboken residents have fought the project, protesting that the proposed sea walls would block their Hudson River views. But those walls will actually take the form of waterfront parks or outdoor restaurant seating or planters. “It’s a park, but it’s also built in a way where it can hold back the water,” Zimmer says.

Similarly, a series of new inland parks will act as sponges, absorbing stormwater. “We’ve got three resiliency parks that we’re working on that are going to be designed to hold back anywhere from 100,000 gallons to a million gallons of water,” Zimmer adds. In the name of resilience, Hoboken, just one square mile large, will wind up with nine new acres of parkland.

Zimmer hasn’t stopped there. “We’re adding resiliency into everything,” she boasts, “whether it’s doing road projects or doing park projects. And we’ve also changed legislation to make it easier for people to do green roofs. … Ideally, we want to get to a place where everyone is thinking about it. It’s not just what

the city is doing, but it's also people thinking about, 'How can I make my own building more resilient?'"

The Meadowlands proposal, which came with a price tag of $850 million, has not fared as well. The project was only awarded $150 million, ostensibly for a "first phase." Last year, at a conference in which winning Rebuild teams gathered to discuss their progress, the current design leader for the Meadowlands project, civil engineer Chris Benosky, a vice president at AECOM, explained that even if he took just one aspect of the original proposal, a 9-mile line of berms to protect low-lying towns from flooding, it would still cost approximately $35 million a mile, more than twice what the available funds allow. Referring to the current budget, Benoksy admitted, "It doesn't do much."

AECOM, working with some members of the original team and local stakeholders, had to completely rethink the project. Instead of a stunning natural environment ringed by berms and dense, skillfully planned new development, the New Meadowlands would be a lot like the Old Meadowlands, but with green slivers of flood mitigation infrastructure interspersed throughout the hodgepodge of residential, commercial, and industrial development that had been built atop marshes and flood plains. As Benosky framed it: "We pulled apart the concept and created a kit of parts."

One AECOM kit, intended to offer protection from storm surges, includes a variety of berms, walls, and more decorative objects, like planters, that could act as sea walls. Another kit is designed to enhance drainage, using pumps and attractively landscaped open spaces that serve as bioswales to carry water away from residential areas. A hybrid option would include elements of both kits. On paper, the interventions look minor, but when I drove around Little Ferry and South Hackensack, it became clear that they would make a discernable improvement to communities that haven't benefited from the sophisticated landscape design that's now commonplace in many U.S cities.

Unintended Consequences

Rebuild by Design has its critics, none of them more vocal than Bill Sheehan, who 20 years ago founded Hackensack Riverkeeper, an environmental advocacy organization that also offers "eco-cruises." Sheehan says that the construction of the berms shown in the New Meadowlands proposal would violate Clean Water Act rules that forbid building over wetlands, that the dense development depicted didn't make much sense either, and that even the diminished "kit of parts" approach is destined to have unintended consequences, perhaps protecting one town from a storm surge but

inundating another community upstream. "Which means that the energy of that surge is going to move right up the wall that they build, and then when it gets to the end of that wall, it's just going to spread out into Hackensack and Teaneck or whatever town is next in line," Sheehan says.

I ask Dennis Reinknecht about this problem. An engineer who manages the Bureau of Flood Resilience for New Jersey's Department of Environmental Protection, he's busy trying to get AECOM's version of the New Meadowlands ready for implementation. His response, in essence, is that they're working on it: "That's all part of the analysis we're doing right now. I think the questions you're asking are ones we're doing internally in the engineering. And those answers are going to have to come forward and we're going to have to show them to everyone."

But even if a solution emerges, Sheehan thinks the berms are just another way of eating up precious wetland acres. "I hear it from people all the time," Sheehan says. "We never used to get flooded like

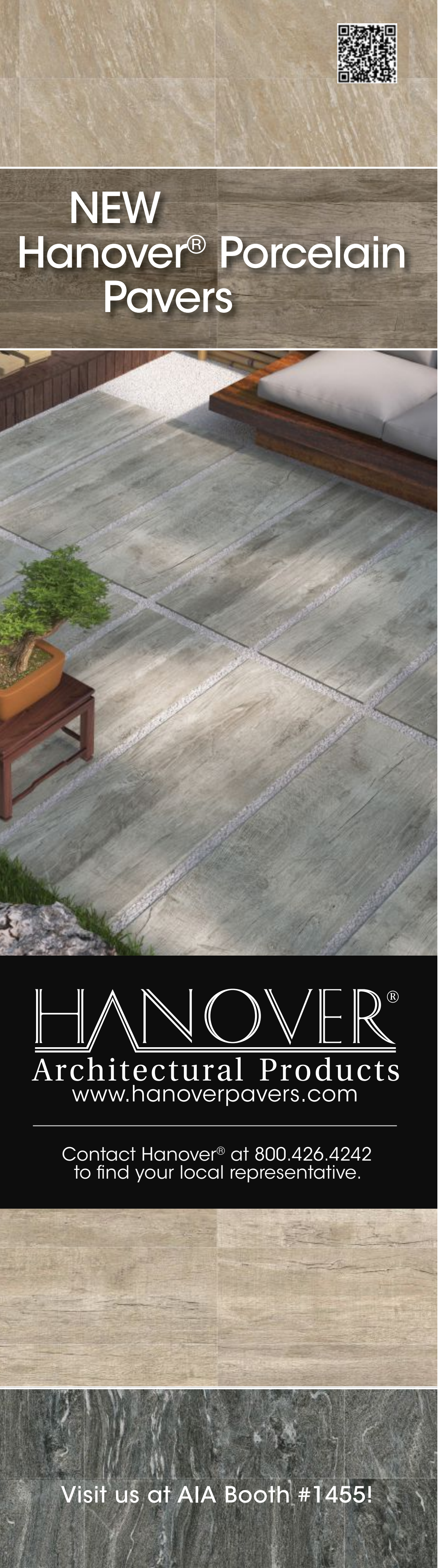
> "We're adding resiliency into everything, whether it's doing road projects or doing park projects. Ideally, we want to get to a place where everyone is thinking about it."
>
> —Dawn Zimmer, Mayor, Hoboken, N.J.

this. And that's because when you were a kid, the Meadowlands still had almost 20,000 acres of wetlands to absorb some of that water, so you never got a flood. But now that we're down to 8,400 acres and we're trying to hold onto them for dear life, we've got to do something."

His preferred plan would be to buy out or otherwise dislodge those who've built their homes in the most vulnerable area. "I would say take all of the money that you're throwing into this resiliency planning and use them to buy people out and move them on."

Rebuild, Post-Obama

Despite the disagreement over tactics, the Rebuild vision seems a lot like an appropriation of Sheehan's Arcadian view of the Meadowlands. Which is as it should be, according to Donovan. In his recent lecture at Columbia, he expounded on the nature of innovation, arguing that it's not the result of "an individual thinker with light bulb," but rather that "most innovation is theft," emerging from "a communal process of creativity." In Donovan's view, since the



federal government is everywhere, it's uniquely able to "see what innovative things are happening in communities" all over the country. The federal government's job, then, is to encourage the theft of ideas, to take the best ones and disseminate them.

As HUD secretary and later at the federal Office of Management and Budget, Donovan developed "structures and processes" to do just that. For instance, he established the National Disaster Resilience competition, a streamlined version of Rebuild set up to fund worthy disaster-relief projects across the country, such as watershed management in Iowa and green infrastructure in Virginia. The end goal, according to Donovan, was to make federal programs that are not monolithic and top-down but instead respond to myriad local needs.

After the Columbia seminar, I asked Donovan what would happen post-Obama to programs like Rebuild and his mission to distribute innovation. "I don't think it's necessarily a Democratic ideal that federal government should be listening more to communities and spreading innovation," he told me. "In some ways, it's very consistent with the federalist view of the Republicans that the federal government ought to be a supporter of local communities rather than dictating to local communities."

Arguably he's right, although it doesn't appear that the current administration agrees. Despite Trump's talk of a massive infrastructure bill, Congress reportedly plans to eliminate funding for the Transportation Investment Generating Economic Recovery (TIGER) grants that pumped $5 billion into more than 400 transportation projects around the country. The only project that the president seems ready to implement is his much ballyhooed borderwall, a 2,000-mile structure that will cost upwards of $20 billion, decimate sensitive environments like Big Bend National Park and the Rio Grande flood plains, divide communities and farms that straddle the border, and require the purchase of thousands of acres of private property or the taking of that land through eminent domain. Trump's wall is the diametric opposite of what Donovan was advocating with Rebuild: to identify, study, and fully understand a complex problem before proposing a solution.

Donovan's achievement was to gather teams of design professionals, scientists, and public officials to craft radical new approaches to the threats posed by global warming. Cities and towns across the country will continue to find new responses to these challenges. But the answers won't come as quickly, nor will they be as far-reaching, if Washington isn't clever enough to facilitate and fund that innovation, let alone acknowledge the existence of the threat.

MEET VIOLET VERBENA, 2017 COLOR OF THE YEAR

Say hello to Violet Verbena, the 2017 color of the year. This blended hue is a "grounding violet nuanced with a shade of gray" and is expected to do a star turn across a wide array of projects, from building interiors and exteriors to automotive, aerospace, and soft goods.

So forecasts Pittsburgh-based PPG, the 133-year-old paint, coatings, and materials company. Violet Verbena is their consensus choice from a 2017 candidate roster of 120 colors. Each year PPG assembles a global cast of color experts, consultants, and marketing specialists that are uniquely qualified to review the latest information influencing color and design direction.

This collective judgment, gathered in a lively 115-page booklet*, may be the closest thing to a safe, can't-miss bet at color specification time.

The 2017 winner is a unique violet hue with a quality that allows it to adapt to surrounding environments and complement a variety of design aesthetics. When paired with dark neutrals, the color unveils gray undertones, but when paired with whites, it reads as a purer purple explains Dee Schlotter, PPG senior color marketing manager.

IDEAL EVOLUTION

Yet, how do you narrow a field as manifestly diverse as color? In the case of Violet Verbena, the panelists recognized a new era of consumer mindsets in their selection process. These new attitudes defy convention and blend ideations of gender, relationships, careers, workplaces, and living spaces says Schlotter.

For example, Violet Verbena serves as an ideal evolution of the bohemian, gypset (gypsy-jetset) consumer lifestyle. Schlotter says this type of consumer is attracted to galactic dark colors that combine deep purples, blues, and grays to create an intriguing futuristic vibe.

MICRO/MACRO

"Color preference may be subjective, but it is not random. Who are you trying to attract? Baby boomers? Millennials? What industry? What impression do you want to convey? Wellness? Security? Luxury? We offer a very special set of filters to the specification process," Schlotter says.

"If an architect or design firm specializes in health care, they want to see colors that resonate well in health care," observes Schlotter. "What works regionally, nationally, or globally? What's the latest in France? Germany? Asia?"

FOUR THEMES

Violet Verbena falls into a palette informed by four global color trend stories, or themes, for 2017. PPG calls the themes Hourglass, Essense, Fire, and BioCentric. Each theme describes a story unique to a range of interiors and exteriors in automotive, aerospace, and consumer products. Violet Verbena is common to all four themes.

ENDURING IDEAS

Architects and designers looking to confidently specify colors that support an aesthetic intent and brand story should "look to a color advisor that suggests direction" advises Schlotter. "An architect or designer should say, *'Okay, I see where you're going with this blue.'* He or she will then tweak it to their preference."

The decisions an architect or designer makes must hold up for years. The disciplined, international vetting process behind the color of the year selection is a way for design professionals to leverage the insights of a respected global color leader to the benefit of their clients and practice.

To explore the range of PPG color tools and support for architects and designers, visit ppgvoiceofcolor.com/designer/color-tools.

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The AIA Honor Awards

2017

The art direction of ARCHITECT*'s 2017 AIA Honor Awards coverage pays homage to this year's Gold Medalist, Paul Revere Williams. The illustrations on the cover and with his profile (next page) are the work of 20-year-old African-American artist Alexis Franklin. For the latter, Franklin transposed Williams to the Beverly Hills Hotel's Fountain Coffee Room, a space he designed in 1949 but would not have been allowed to use as a customer, due to racial segregation. The green backgrounds and accents on these and the following pages match the hotel's signature color, which Williams and his collaborators specified. For the lettering that appears throughout, Los Angeles type designer David Jonathan Ross echoed the famous script of the hotel's signage, which itself was based upon Williams' handwriting.*

FROM THE CENTER TO THE MARGINS AND BACK AGAIN

Paul Revere Williams was a prolific and gifted architect whose recognition is belated in more ways than one.

TEXT BY CHRISTOPHER HAWTHORNE
ILLUSTRATION BY ALEXIS FRANKLIN

In 1965, the architectural photographer Julius Shulman was hired by the United States Information Agency to take a portrait of Los Angeles architect Paul Revere Williams, who this year is being posthumously honored as the first African-American winner of the AIA Gold Medal. Shulman took Williams to Los Angeles International Airport, which at that point had been open for four years. It was a natural choice, given that LAX was among the most prominent symbols of modern Los Angeles (and the growth of postwar Southern California more generally) and that Williams had been a prominent member of the airport's design team.

Shulman asked Williams, then 71, to pose in front of the airport's futuristic and highly photogenic Theme Building, which sits near the center of the airport, with the terminals bending in a horseshoe around it. The resulting photograph, which shows Williams wearing a dark suit and a repp tie, and squinting a little in the sun in front of the Theme Building and its spider-like legs, has not only become a familiar image of Southern California Modernism; it also seems to suggest the cultural openness of the region, casting L.A. as a place where even the infrastructure was inventive and foward-looking.

There is only one problem: Williams didn't work on the design for the Theme Building. (According to one version of this story, Williams told Shulman that fact as he posed but the photographer took the picture anyway.) That part of the airport job belonged to the office of William Pereira, the busy and well-connected modernist who in the summer of 1965 was presiding over a series of opening parties for his new Los Angeles County Museum of Art on Wilshire Boulevard. Williams and his firm had instead worked on several other sections of LAX.

Given the fact of Williams' race and the complicated relationship he negotiated throughout his long career with the WASP establishment in Los Angeles, the photograph is in all sorts of uncomfortable ways emblematic of the role he played in Southern California architecture culture. Williams, a highly prolific architect who produced both expensive estates and affordable housing and worked across an eclectic range of tasteful styles, was to a greater or lesser degree always estranged from his own work. He designed houses in neighborhoods where African-Americans were not allowed to spend the night, to say nothing of buying property; in a broader sense he diligently built a career over many decades that he always understood to be to one degree or another tenuous, that depended on a client base that was mostly white and mostly very wealthy, and whose acceptance of him must have seemed unpredictable if not capricious.

In other words, the sense of misplaced authorship that animates the image by Shulman suggests more than the photographer could have realized. It shows an architect who was at the center and the margins at the same time and who gradually developed a set of skills to manage his trips back and forth. There is also the fact that the year that photograph at LAX was taken, 1965, was the year the Watts section of Los Angeles erupted in riots, violence, and flames as African-American residents faced off against the LAPD.

In a cruel twist of history, it would be another riot and series of fires in Los Angeles—in 1992, following the not-guilty verdicts in the trials of the LAPD officers accused of beating Rodney King—that would lead to the destruction of much of the Paul Williams archive, shrouding his work in yet another layer of mystery and misidentification. (Williams had died 12 years before, in 1980, and his archive wound up in a bank building that he had redesigned in South Los Angeles. It burned alongside several other nearby buildings during the unrest.) "Without those original records," as one website dedicated to cataloging the architect's work puts it, "much of the material produced about Williams ... is based on popular lore or speculation."

An Emerging Practice in a Booming City

Paul Revere Williams was born near downtown Los Angeles in 1894 to parents who had moved to California from Memphis. His father, who was a fruit seller in L.A., died of tuberculosis two years later; the same disease took his mother's life when Williams was four. While his older brother went to live elsewhere, Paul was taken in by a family his parents had met at the First African Methodist Episcopal church. (As an adult, he would join the board of First A.M.E. and design its new building at the corner of 25th Avenue and La Salle Street, in L.A.'s West Adams neighborhood.) From an early age, Williams showed an interest in and talent for art; after graduating from high school, he took classes at an L.A. branch of

Preminger Residence, Brentwood, 1925

Degnan Residence, La Cañada Flintridge, 1927

Lehman Residence, Toluca Lake, 1937

Above: Paul Williams' Residence, Lafayette Square, 1952

Previous Spread: An illustration of Williams based on a 1951 portrait

BENNY CHAN

the New York–based Beaux Arts Institute of Design before enrolling at the University of Southern California to study engineering. As his granddaughter, Karen Hudson, who has written more about Williams and his work than anyone, told a reporter for the university's alumni magazine, "USC was the school in the neighborhood—and the school that accepted black faces."

Williams worked for the Pasadena architect Reginald D. Johnson (who mostly designed large houses) and L.A.'s John C. Austin (whose firm had a good deal of public work) before starting his own office, Paul Williams & Associates, in 1922, at the age of 28. He was able to do so in part because while he was still working for Austin, Louis Cass—a (white) high-school classmate of Williams'—asked him to design an expansive house for his family in Flintridge, a suburb north of downtown Los Angeles where racial covenants were especially strict.

As Los Angeles boomed, Williams spent the rest of the 1920s overseeing a growing practice that produced largely conservative and well-made houses in a diverse collection of styles. L.A., in this period especially, was a city of transplants made good, and many of Williams' clients were Midwest or New England natives who after making a bit of money in Hollywood or the real-estate business decided a brick Colonial, Tudor, or Georgian-style house might remind them of home. As Carey McWilliams wrote in 1946 about the residential architecture of Los Angeles in the early 20th century, "With no architectural tradition in the region, aside from the meager fragments from the Spanish period, it is not surprising that the newcomers should have imported the style of house then prevailing in the particular region from which they came. Since many ... came from New England, they dotted Southern California with typical New England homes, with high steep roofs to shed the snow that did not fall." In this sense, Williams shared a sense of alienation with the architecture of his native city.

As his career progressed, the architect broadened his remarkably prolific practice and began taking on a number of civic, cultural, and commercial projects, including churches, banks, hotels, and schools. In 1940, as part of a consortium of architects including Richard Neutra, Gordon Kaufmann, and Welton Becket, Williams contributed to the vast Pueblo del Rio apartments for the Housing Authority of Los Angeles, perhaps the most orthodox modern design of his career. He designed a county courthouse on downtown L.A.'s Bunker Hill and the Polo Lounge in the Beverly Hills Hotel and redesigned some of the interiors of the famed Ambassador Hotel on Wilshire Boulevard. He became the first African-American member of the AIA as well as the first to be named an AIA Fellow.

But it was the residential part of his practice that really shaped the course of his career and—for better and worse—the way architects, critics, historians, and the general public have understood his work. Williams became well known for designing houses for the Hollywood elite, including Frank Sinatra, Tyrone Power, Cary Grant, and Zsa Zsa Gabor. These ran the gamut from Tudor Revival to French Provincial, with plenty of stops in between at other period styles.

When it came to his own house, which was built in 1952 and is still owned by his family, Williams settled on a subdued, handsome version of Modernism; located in the Lafayette Square neighborhood about 5 miles west of downtown L.A., it is set back behind a wide lawn and features ribbon windows, a flat roof, and a broad second-story terrace. A *Los Angeles Times* society columnist who attended a party there in 1960 described the dominant interior color as a "soft pistachio, from the telephones to the piano."

A New Respect for an Eclectic Portfolio

There is no doubt that it was Williams' race that primarily shaped the kinds of clients he worked for and the social circles he had access to. But the painfully slow recognition of his achievement also has something to do with the eclecticism of his work and his comfort in moving from one historical mode to another. Like Julia Morgan, who received a posthumous Gold Medal in 2014, Williams was a hugely prolific architect with a keen business sense who practiced in a era when, while faith to avant-garde Modernism might have landed your work in museums or on magazine covers, it was fluency in a range of styles (along with speed and reliability) that made you attractive to the widest pool of moneyed clients. In that sense as an African-American architect—just as was the case for Morgan, as a female one—an openness to working in a number of stylistic modes was as much a mechanism for professional survival as a statement of philosophical or aesthetic principles.

Now that our own architectural era has made eclecticism, as well as an interest in history and even ornament, safe again, the work of both Morgan and Williams has begun to be seen in a different light. As much as honoring them with the Gold Medal is about righting historical wrongs having to do with gender and race, it may also have something to do with a newfound respect for 20th century architects who worked outside a narrow band of avant-gardism. Much the same thing has happened in the art world, as figurative painters from the middle of last century like Alice Neel, David Park, and Jacob Lawrence, overlooked for a long period while abstract artists occupied the spotlight, are gaining new attention. The case is admittedly more complicated in architecture, given that artists can paint whatever they like while architects are left to rely on clients to see their work realized. But we should recognize that the approach to practice that allowed Morgan and Williams to beat the odds and succeed in a profession dominated by white male architects—pursue a huge amount of work, in a range of styles dictated as much by their clients as themselves—is also what caused them to be overlooked and underappreciated for so long.

Let's also hope that in winning the Gold Medal what Williams receives posthumously is not some simplistic acclaim that comes with a heavy dose of moralizing but instead an understanding of the layered way he worked both aesthetically and strategically. Looking carefully at a well-worn anecdote about him may be useful in this regard. It's often said that Williams learned to sketch upside down, while reaching across the table, in order to avoid upsetting potential white clients who might feel uncomfortable sitting next to him.

Williams, as *The New Yorker* reported in 2005 article on the Ambassador Hotel, had a more nuanced explanation for the skill. In an essay called "I Am a Negro," published in 1937, he wrote that his aim was to amaze those potential clients within a few minutes of meeting them, so that they would focus more on his drawing ability than his race. This is a subtle distinction but a crucial one. It suggests an architect who had not only come to terms with the fact that he'd always be at a certain remove from his own work but had turned that distance into an advantage—into a kind of parlor trick.


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THE ETHICAL DRIVE OF LEDDY MAYTUM STACY

LMS promotes social responsibility and sustainability without sacrificing design.

TEXT BY DAVID HILL
PHOTOS BY DREW KELLY

Sometimes, all it takes for an architecture firm to find its calling is a single, exceptional project. That's true for San Francisco–based Leddy Maytum Stacy Architects (LMS), winner of the 2017 Architecture Firm Award. Soon after principals William Leddy, FAIA, Marsha Maytum, FAIA, and Richard Stacy, FAIA, founded LMS in 2000, they were commissioned to design a building for the formerly homeless in San Francisco's gritty Skid Row neighborhood.

The nine-story Plaza Apartments helped shatter the convention that affordable housing has to be ugly or blandly institutional. The LEED Silver–certified building is constructed of concrete, but LMS added sunshades and multicolored wood panels to "soften the look," Stacy says. As the project was nearing completion, Leddy recalls, he and his colleagues began getting phone calls from commercial real estate brokers asking how much the "cool condos" on Howard Street would be listed for. "We'd say, 'Those aren't condos. That's housing for the homeless.' The response was usually, 'Are you kidding?'"

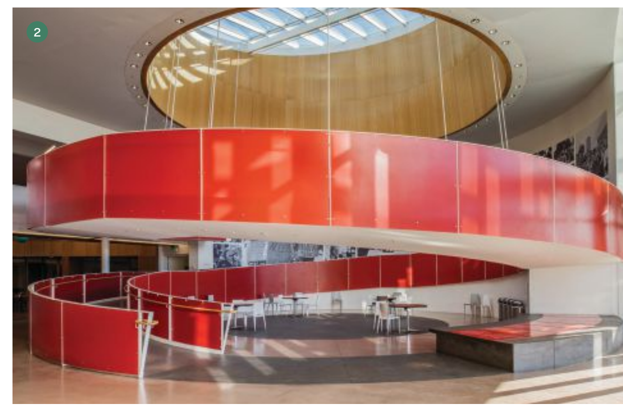
The success of the Plaza Apartments, which became the city's first permanent housing for the formerly homeless, cemented LMS's reputation as a mission-driven firm focused on "design with a purpose," as Leddy puts it. "We realized that we could work for for-profit developers building high-end condos for rich techies," he continued, "or we could take this other path. We saw that there was this segment of society that needed great design, but that often got second-rate design. So why would we not want to follow that path?"

Craig Hartman, FAIA, senior consulting design partner in Skidmore, Owings & Merrill's San Francisco office, praises the firm's approach: "I think LMS represents the kind of values the architectural profession should aspire to, especially at this particular moment in history," he says.

Based in a former elevator repair shop in the South of Market neighborhood, LMS (originally founded in 1989 as Tanner Leddy Maytum Stacy Architects) has deliberately stayed small; currently, the firm employs about 25 designers. "We try to do one or two great projects at a time," Leddy says. "We try to make the most with the least, both in terms of resources but also in terms of architectural expression."

LMS's projects share an understated design palette and a pioneering commitment to sustainability (the firm has won nine COTE Top Ten Awards). But the connecting thread is more about impact. "Many of our buildings have had ripple effects beyond the Bay Area," Maytum says. "They serve as case studies showing that you can have great design that integrates good social values and environmental stewardship."

Here are five case studies that demonstrate the firm's enduring influence.



1. California College of the Arts, 1999
After the 1989 Loma Prieta Earthquake, a cavernous 1951 maintenance facility for the Greyhound bus company, designed by Skidmore Owings & Merrill's Walter Netsch, "was about 30 seconds away from a catastrophic collapse," Leddy says. The structure proved salvageable, however, and in 1996, Oakland, Calif.–based California College of the Arts purchased it for a new San Francisco campus.

Tanner Leddy Maytum Stacy brought in the engineering firm Arup to help design a new bracing system for the structure. Together, they devised a series of tubular steel frames that support the building's original concrete arches at their weakest points. The frames, painted white, are angled to allow for an uninterrupted corridor that extends from one end of the building to the other.

Studios, workshops, classrooms, galleries, and a café are elegantly placed on either side of the corridor. Light pours in through skylights and 30-foot-high glass curtainwalls. "We took the path of doing the most with the least," Leddy says.

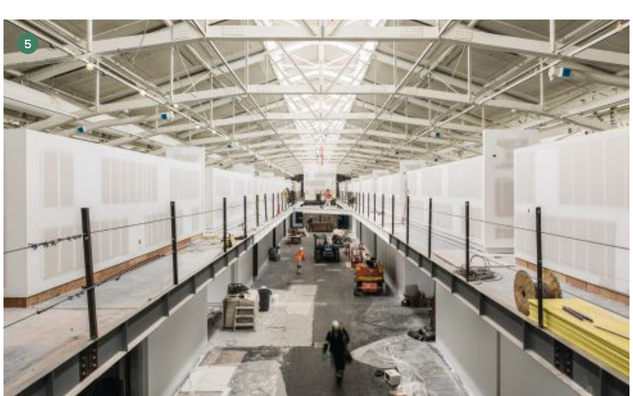
The firm convinced CCA to heat the building almost entirely by using solar hot-water collectors on the roof. "This was at a time when solar was still considered kind of hippy-dippy," Leddy says. "But we were able to show the college that they'd save about a million dollars in construction costs."

2. Ed Roberts Campus, 2010
The signature element at Berkeley's Ed Roberts Campus, home to about a dozen agencies and nonprofits serving people with disabilities, is a red-paneled helical ramp that allows visitors—disabled or not—to move easily between floors of the 82,500-square-foot building. The ramp, just off the lobby entrance, is 56 feet in diameter and delicately suspended from the ceiling by steel rods.

The firm could have designed a more conventional and less expensive switchback-style ramp. But LMS wanted to make a statement: "This building really cemented for us the notion that architecture is for everyone," Leddy says.

Project architect Gregg Novicoff, AIA, adds: "Office spaces can often be dark and hard to get to. For the disabled, navigating them can lead to a sense of shame, seclusion, and isolation. Entering a building that is well-lit and uplifting leads to a greater sense of self. That was a fundamental goal of the building."

Inside, walkways (including the ramp) are 7 feet wide to accommodate two wheelchairs side-by-side. Elevators can be operated by foot pedals and are also double-sided to allow people in wheelchairs to exit without having to turn around.



"It is an egalitarian oasis that, with luck, will send ripples into the mainstream," raved John King in the *San Francisco Chronicle.*

3. Rene Cazenave Apartments, 2013

The Rene Cazenave building in San Francisco's Transbay Redevelopment Area sits on a tight, irregular site that once contained a parking lot and a freeway off-ramp. LMS partnered with two nonprofit housing developers, Bridge Housing and Community Housing Partnership (the building's owner) on the project, which provides housing and support services for 120 formerly homeless persons. There's a private courtyard off the lobby and a second-floor community garden, and the attractive studio and one-bedroom apartments have floor-to-ceiling windows and brightly painted walls. "The idea," says project architect Vanna Whitney, "is to create spaces that are comfortable, homey, and welcoming."

Typically, Whitney says, such buildings tend to have support facilities—medical and psychological services—tucked away in back offices. "There's some reluctance for residents to use the services," she says. "There's a stigma attached to them. We thought that was too bad, so we decided to make them more prominent." LMS created a "main street corridor," daylit by several large, circular skylights and lined with community spaces and support services. "We wanted them to be a part of the residents' everyday experience as they go to and from their apartments."

4. Family House, 2016

Located in San Francisco's Mission Bay neighborhood, the LEED Platinum–certified Family House offers free housing for families of children being treated for life-threatening illnesses at nearby UCSF Benioff Children's Hospital. For LMS, the challenge in designing the 80-bedroom, five-story facility was: How do you create a temporary living space for traumatized families that doesn't feel sterile and institutional? "We used a number of different strategies," says Stacy. "We started by organizing the guest rooms into clusters of eight 'mini neighborhoods,' each with its own common living, kitchen, dining, laundry, and play spaces."

Downstairs, the lobby features a low, unintimidating reception desk, a lounge area, and a wide wooden staircase that doubles as auditorium seating for movies. "We tried to make the whole arrival sequence feel more like a hotel," Stacy says.

Generous shared spaces promote interaction among the guests. "These are pretty traumatic events for the families," Stacy says. "Often they have little notice. They get a diagnosis, and the next day they're off to San Francisco. Socializing and creating bonds between families is critical."

5. Pier 2 at Fort Mason Center, 2017

Overlooking San Francisco Bay, Fort Mason once served as a major port of departure for U.S. Army soldiers shipping out to the Pacific. Today, the site is a National Historic Landmark District owned by the National Park Service. In 2014, LMS completed a $21 million rehabilitation of Pier 2, a massive Mission Revival shed built in 1912.

Now, the firm is piloting the adaptive reuse of the structure into the graduate center of the San Francisco Art Institute, a project scheduled to be completed in June. The challenge: inserting studios, galleries, and offices into a 35,000-square-foot space without losing its historic character. "Our solution," says Maytum, "was to put the studio spaces off to the sides, leaving a long corridor down the center of the building. When you walk in, you can see from one end to the other, and you can look up and see the trusses that support the roof."

The studios are arranged in pods broken up by open spaces, allowing unobstructed views of the other historic piers on either side of the building. On a recent tour, Maytum showed off a seminar room with a direct sight line of the Golden Gate Bridge: "Look at the view these lucky students will have!"

THE FOLLY THAT BECAME A TRIUMPH

Two architects who worked with I.M. Pei on the Louvre Pyramid recall the emergence of an icon.

In 1983, when I.M. Pei, FAIA, received one of the most illustrious commissions of his career—the modernization of the Louvre—he kept the project a secret from his firm. For four months, Pei did not tell his team in New York that François Mitterrand, the French president, had personally asked him to overhaul one of the world's most celebrated art museums. Pei wanted time to consider the project's scope before agreeing to take it on.

The challenges of what Mitterrand called his Grand Louvre project were myriad. Here was one of the finest collections of art in the world, yet the historic buildings that housed it were in disrepair, the galleries were disjointed, and more than one visitor got lost down the labyrinthine corridors in search of one of only two public restrooms. Galleries accounted for the bulk of the interior, leaving curators no behind-the-scene space to manage, store, and care for the artworks. Never mind that the French Minister of Finance had claimed the Richelieu Wing for its offices, shuttering it from the public and refusing to leave even when the museum grew desperate for the space.

Pei made several clandestine trips to Paris to study the Louvre, walking its galleries and grounds. He also studied the historic landscape architecture of famed French designer André Le Nôtre. Pei saw

TEXT BY ELIZABETH EVITTS DICKINSON
PHOTO BY AGIP/GETTY IMAGES

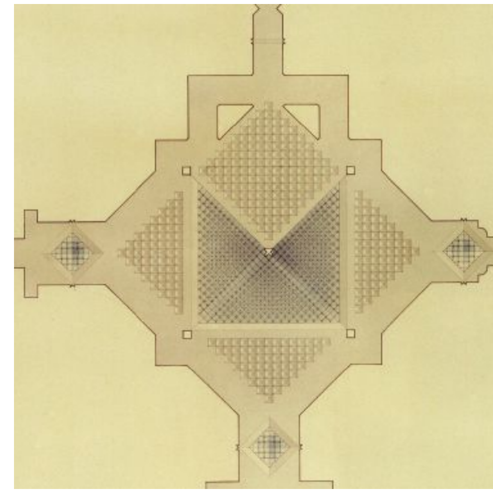
a solution: He could place a new entrance in the gravel-filled Cour Napoléon, an exterior courtyard enclosed by the museum's existing buildings. Brand new infrastructure underground could create a functional and welcoming reception area, as well as a system of public spaces and circulation for visitors to access the collections. The new entrance would be in the middle of the courtyard, marked with a translucent sculptural gesture to both define the visitor's arrival and to light the underground addition, all while respecting the historic buildings. Pei went to Mitterrand and accepted the commission.

The uproar began even before Pei unveiled the design of his infamous 71-foot-tall glass-and-metal pyramid. To understand the sweeping changes at the Louvre, it's important to remember the sweeping changes in French politics at the time. In 1981, Mitterrand, a socialist, surprised the country by ousting his conservative incumbent in the election. He doubled investment in the arts, and established a list of *grand projets*. For the Louvre, which topped his list, he wanted Pei from the beginning, forgoing an open competition and snubbing French firms in favor of the Chinese-American architect. The unilateral decision infuriated many.

Then Pei unveiled his design. The international response was swift and it was brutal. Dubbed the "Battle of the Pyramid," Pei and Mitterrand were roundly chastised, with one 1985 *New York Times* story rounding up the criticisms: The pyramid was "an architectural joke, an eyesore, an anachronistic intrusion of Egyptian death symbolism in the middle of Paris, and a megalomaniacal folly imposed by Mr. Mitterrand."

In the early years of the decade-long project, Pei was publicly mocked. "When I first showed the idea to the public, I would say 90 percent were against it," Pei recounted in a PBS documentary. "The first year and a half was really hell. I couldn't walk the streets of Paris without people looking at me as if to say: 'There you go again. What are you doing here? What are you doing to our great Louvre?' "

Today, the pyramid at the Louvre rivals the Eiffel Tower (itself a project borne amidst controversy) in defining the Parisian landscape. In honor of the Grand Louvre receiving the Twenty-Five Year Award, we spoke with two of the architects at Pei Cobb Freed who worked on the project: Ian Bader, FAIA, now a partner at the firm who had only just started his career when he began working on the project's subterranean expansion; and Michael D. Flynn, FAIA, an expert in curtainwall design who had become a partner in 1962 and worked on the pyramid itself.



Previous Page: Pei on the Louvre Pyramid construction site

Above: Reflected ceiling plan of the pyramid and underground passageways

Opposite: Mitterand at the pyramid opening on March 29, 1989

COURTESY PEI COBB FREED & PARTNERS

Ian Bader

I came to New York from South Africa. I had just finished a master's thesis in architecture and this was my first job. I started at the firm in 1981. Working with I.M. was the beginning of a wonderful adventure for me. He had a magnetic personality, and he was a very caring person. He had this ability to talk about architectural space with you without drawings. I.M. made space and form feel animated; there was a kind of a life to everything. Conversations with him, in my experience, were pointed and focused, and it was a question of who could have a penetrating or effective idea quickly. There was a sense of pace.

I.M. was awarded the Louvre commission in 1983, and the emergence of the solution was entirely his invention. It was important that the project had his singular vision, and at the same time it was the product of tremendous collaborative effort. I.M. made people feel empowered, but he was himself very decisive. He was open to dialogue and questions and gave people a lot of space to work things out.

I joined the Louvre project in 1984. The idea of putting a pyramid in that courtyard was controversial, both politically but also architecturally. I think it was surprising, even in the firm. Given the controversy, it was a question about whether it was a wise thing to get embroiled in this whole Louvre project. I.M.'s reputation was already well established. The question was: *Why did we need this in our lives?*

But the project was of such enormous importance and I.M. knew that in a profound way. I.M. was not a verbose person. He was economical in his expression. He did not exaggerate in any way. He had a way of cutting to the essence of a matter that enabled people to connect well with what was intended. He was not an architectural salesman in any respect. For him it was a question of clarity and credibility and personality. That combination made his presence, and his presentations, compelling. The whole firm was very much behind the Louvre, and we gave the project our all.

There was a team in Paris and I.M. was in New York, and he wanted me to work with him there to be able to evolve ideas and then communicate with the people in Paris about his intentions. I worked with him primarily on the project spaces below grade. The Louvre at the time was in separate pieces, and a lot of what we call the Louvre today, the Richelieu Wing for example, was occupied by the Minister of Finance. They didn't want to leave, but Mitterrand kicked them out.

I traveled to Paris a lot. It was such a controversy at the time, and I remember walking down the street and seeing a newspaper with a cartoon of all of Paris trapped inside the pyramid, as if this monster had taken over the culture of France. The fact that there were shops introduced into the new underground portion of the museum was also controversial. But it was important in terms of making the new space a part of the city.

The fact that the pyramid was the entrance was probably the most difficult design of the whole concept. It was clear that the other entrances would need to remain in effect because the capacity of the pyramid was limited. We spent a lot of time on the entrance and the circulation from the pyramid to the lower level. That was always a very ticklish item. A lot of time was also spent on the technology of the pyramid, on the design of the cables and counter-cables, and the glass. It was meant to be as diaphanous as possible.

Few people realize that the construction of the pyramid itself was advanced out of sequence. During the course of the project, Mitterrand was standing for re-election and there was real concern that he would not be re-elected and that the project would be halted. So the pyramid was built before the supporting structure was completely in place to make it an established fact in case the election did not work out. Finding a way of doing that was a technological feat.

The most pivotal moment was perhaps when we did a full-scale mock-up of the pyramid in the courtyard for Jacques Chirac, who was the mayor of Paris at the time. This was an incredible concoction that was lowered into the courtyard. Chirac saw it and thought it was pretty good, and then after that, things got much easier.

FRANS LEMMENS

Michael D. Flynn

I joined the team when I.M. decided he wanted to put a glass pyramid in the center of the courtyard. First, we worked on size. I.M.'s desire was that the form not be competitive with any of the design elements of the surrounding buildings. He didn't want it to be taller than a certain line, or to stick out above rooftops. We did a study on the height of the pyramid as it related to the existing buildings. From there, the dimensions of the pyramid were influenced by two things. One: the angles that were most desirable from an architectural standpoint. And two: how large of a footprint the pyramid could have given the constraints of the courtyard and its impact on the circulation spaces below. The program informed the pyramid's size.

I.M. wanted the structure of the pyramid to have a certain delicacy and not be a muscle-bound structure. He wanted transparency. At the outset, he was interested in a lightly reflective glass, so models were made to allow him and the team to view that at different angles. He wasn't satisfied. He decided to make the glass as transparent as possible. The reason wasn't just the delicacy of the pyramid itself, but also the fact that any color strengthened the perception of form and he didn't want that. He wanted no color. Also key to I.M. was that when you stood outside and looked through this transparent pyramid, or when you were down below and looked up, the glass should not alter your perception of the color of the existing buildings. When we started the project, the surrounding buildings had a couple hundred years of soot on them from burning coal. The hindsight benefit to what we did is that when they cleaned those buildings, the decision to make the glass super-clear was all the more important.

We spent a fair amount of time on selecting the right glass. Normal glass that's used in buildings, that's called clear glass, has a greenish tinge to it because of the way it's manufactured. So if you want it to be clearer, you have to get rid of the green. You have to find a factory that has the ability to do that. Today clear glass is a no-brainer, but at that time it was less in demand. It was a lot of legwork. We used a glass that is similar to what people call "low-iron glass" today. It wasn't quite the same, but it doesn't have any color. It was the clearest glass we could find at that time and in that place. We doubled the weight of the glass to put more load on the pyramid structure to keep it stable. It's like putting salt on a bird's tail. You need to do something to keep it down.

I.M. also said, "OK, I want the metal framework to have a certain presence, but not to be overly done." He wanted us to match it to the color of the roofs of the existing buildings. It turned out there were 11 different shades of gray on those buildings. We had a series of conversations about which shade of gray we should do.

One day an article appeared in one of the Paris journals [that told the story of when] Napoleon wanted to build a monument to his army. It was the Arc de Triomphe. According to this story, they built a full-scale mock-up for people to see. The last line of this journal article said, "Mr. Mitterrand, that's the least you can do."

We designed a wire frame structure. The site was under construction and fenced in and you couldn't see it. We had a crane pick up what would be the top of the pyramid so that Mr. Mitterrand could see the form of the pyramid full scale with wires. There was no glass; it was just enough to give the sense of the scale. He said, "OK, that's fine," and we dropped the pyramid back down again. And then we did the same thing for the mayor. It was an amusing exercise. Not quite as dramatic as Napoleon, but it worked.

Honor Awards

Edward C. Kemper Award

Ronald Skaggs, FAIA, the chairman emeritus of HKS Architects, has earned the Kemper Award for his significant contributions to the profession through his service to the AIA. Skaggs served as chairman and chief executive officer at HKS from 1988 to 2001. Named the 76th president of AIA National in 2000, he established the first financial committee and created relationships with other international architectural associations. Skaggs also served as the 51st chancellor of the AIA College Fellows and as president of both the AIA Academy of Architecture for Health and AIA Dallas. “Ron is a valuable role model of leadership and service, showing others what is possible when someone sees a need and steps forward to assure it is addressed,” wrote RK Stewart, FAIA, 2007 AIA president, in a recommendation letter.

Whitney M. Young Jr. Award

The **Detroit Collaborative Design Center** has won the Whitney M. Young Jr. Award for its contributions to social change. For the past 23 years, the initiative, which is an arm of the University of Detroit Mercy’s School of Architecture, has worked with residents and grassroots groups to create solutions for the city’s urban planning issues. One of the center’s most significant projects was the Detroit Future City Strategic Framework, released in 2013 in collaboration with the think tank Detroit Future City. The plan provided a detailed guide for decision-making by all of the city’s stakeholders for the next 50 years. The project engaged with more than 90,000 citizens and policy leaders at a local, state, and national level. The center has since authored a how-to guide for other communities that wish to author their own plan.

Thomas Jefferson Awards for Public Architecture

Alan Greenberger, FAIA, the former Philadelphia deputy mayor and chairman of the city’s planning commission, has been honored with the Thomas Jefferson Award for his architectural advocacy work. Between 2009 and 2015, Greenberger created the comprehensive Philadelphia2035 city plan, which updated antiquated and convoluted zoning codes. He also helped complete and approve redevelopment plans for 37 miles of the region’s waterfront. Greenberger is now a distinguished teaching professor, Lind Fellow, and the department head of the newly renamed Department of Architecture, Design & Urbanism at Drexel University. He also serves as chairman of the Philadelphia Art Commission.

Topaz Medallion for Excellence in Architectural Education

Robert A.M. Stern, FAIA, has been awarded the Topaz Medallion, the highest honor given to educators in architecture. He served as dean of the Yale School of Architecture for nearly 20 years before stepping down last spring. Previously he was a professor of architecture and the director of the Historic Preservation Program at Columbia University’s Graduate School of Architecture, Planning and Preservation. “He loves the debate, the conversation,” says Deborah Berke, FAIA, who succeeded Stern as Yale dean. “He wants to hear arguments and discussions.”

Associates Award

Je’Nen M. Chastain, ASSOC. AIA
Chastain, a designer at San Francisco–based Heller Manus Architects, earned a B.Arch. at the University of North Carolina at Charlotte. She previously held marketing coordinator positions at the San Francisco offices of Perkins+Will and Kwan Henmi Architecture/Planning.

Michael Friebele, ASSOC. AIA
Friebele is a senior associate at Irving, Texas–based FTA Design Studio. Previously, he was an associate at CallisonRTKL and a project designer at New York–based Laguarda.Low Architects. He is an at-large member of the board of directors for AIA Dallas.

Linsey Graff, ASSOC. AIA
A campus planner associate at Ayers Saint Gross’ office in Tempe, Ariz., Graff earned her M.Arch. at the University of New York at Buffalo. In 2015, she was awarded the AIA Buffalo Community Service Award.

Mona Zellers, ASSOC. AIA
Zellers joined Seattle-based LMN Architects in 2011 and has worked on award-winning commercial, academic, and cultural projects. Zellers serves on AIA Seattle’s board of directors and previously co-chaired the 2013 and 2014 AIA Seattle Honor Awards Committee.

Young Architects Award

Kara Bouillette, AIA
Bouillette is a project manager at Hufft Projects in Kansas City, Mo. She designed the interiors for the expansion of the John F. Kennedy Center for the Performing Arts in Washington, D.C. She also helped found AIA Kansas City’s Education Outreach Committee, which introduces elementary-age children to design.

Shannon Christensen, AIA
Christensen, an associate principal of Montana–based CTA Architects Engineers, has served on Montana State University's School of Architecture Advisory Council. She has held multiple leadership roles within AIA Montana and also directed the AIA Young Architects Forum for the Northwest and Pacific Region.

R. Corey Clayborne, AIA
A project manager in Wiley|Wilson's Richmond, Va., office, Clayborne was elected 2016 president of AIA Richmond and joined the AIA Blue Ridge chapter's board of directors, founding its Young Architects Forum.

Danielle C. Hermann, AIA
An associate principal at OPN Architects in Des Moines, Iowa, Hermann transformed the AIA Iowa chapter's Diversity Committee by taking it from a task force to a full-fledged committee. She also established the nonprofit Iowa Women in Architecture.

Jeffrey Erwin Huber, AIA
A principal at Brooks + Scarpa, Huber manages the firm's Fort Lauderdale, Fla., office. In 2005, he assumed a position as professor at the University of Arkansas Community Design Center, a think tank that functions as a teaching center for designers.

Benjamin Kasdan, AIA
As director of design at KTGY Architecture + Planning in Irvine, Calif., Kasdan mentors emerging professionals through his various roles: as a chair for the KTGY Licensure Committee, as an NCARB licensing adviser, and as vice president of the AIA California Council's Academy for Emerging Professionals.

Andrea Love, AIA
The director of building science at Boston-based Payette. Love has helped the firm to establish itself as a leader in high-performance buildings. She spearheaded the development of the AIA 2030 Design Data Exchange, which allows firms to benchmark and report the energy use of their portfolios.

Kurt Neiswender, AIA
Neiswender, a project architect at Sedgewick & Ferweda Architects, in Flint, Mich., responded to the city's water crisis by founding Project FORA in 2014. The organization provides design solutions for distressed areas of the city.

Jonathan Opitz, AIA
The design principal of AMR Architects in Little Rock, Ark., Opitz has worked on redevelopment projects at Arkansas Tech University. He cofounded nonprofit community outreach and design center StudioMain, which strives to promote good design to the public.

Jeffrey Pastva, AIA
Pastva is a project architect at JDavis Architects' Philadelphia office. He has served in several roles within the Young Architects Forum, and he recently joined AIA Philadelphia's board of directors as its AIA Pennsylvania representative.

Jessica Sheridan, AIA
An architect at New York–based Mancini Duffy who previously was employed by Gensler, Sheridan has worked with the Emerging New York Architects Committee and now serves as a co-chair for the committee's international design competition City of Dreams.

Chris-Annmarie Spencer, AIA
A project architect at Wheeler Kearns Architects in Chicago, Spencer has worked with Inspiration Kitchens, a nonprofit responding to the food desert issues in East Garfield Park. The project won the 2013 Gold Medal in the Rudy Bruner Award for Urban Excellence.

Lora Teagarden, AIA
A project architect at Indianapolis' Ratio Architects, Teagarden led the design of the atrium and interior offices for the Indiana School of Informatics and Computing. She serves as AIA Indiana's public relations chair and co-chairs the Young Architects Forum Indianapolis Committee.

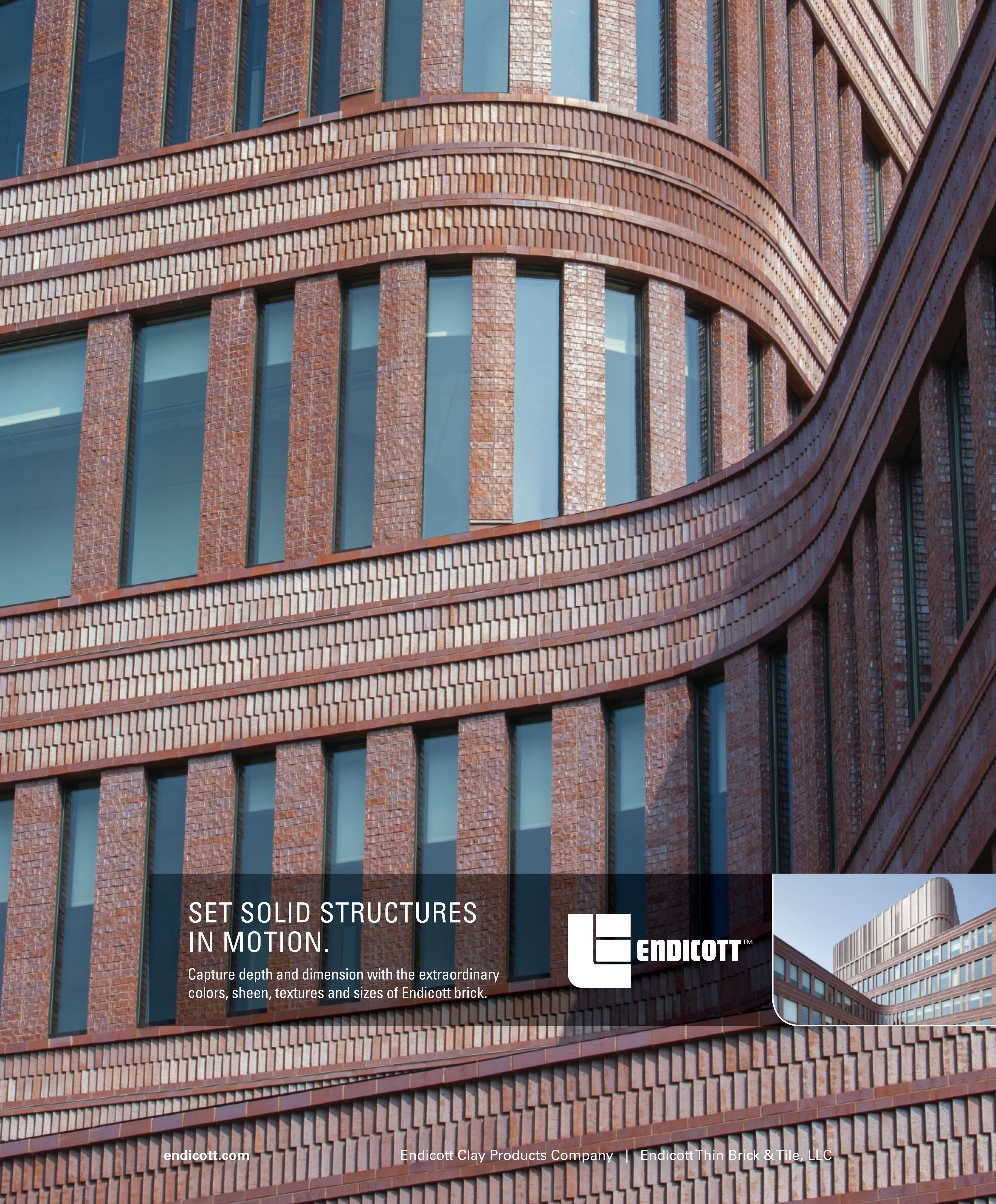
Luis Vélez-Alvarez, AIA
Alvarez, a SmithGroupJJR associate in the Washington, D.C., office serves as AIA|DC's associate director and works with the Washington Architectural Foundation's Architecture in the Schools program.

Institute Honors for Collaborative and Professional Achievement

The **Enterprise Rose Architectural Fellowship** and **Lawrence Scarpa**, FAIA, were each awarded the Collaborative Achievement Award, which "recognizes and encourages distinguished achievements of allied professionals, clients, organizations, architect teams, knowledge communities, and others who have had a beneficial influence on or advanced the architectural profession."

The fellowship, established by affordable housing and community development organization Enterprise Community Partners, is a three-year position that pairs early-career designers with 75 local community development organizations to promote sustainable and affordable building and planning.

Scarpa is credited with co-founding the nonprofit Livable Places in 2001 as well as the Los Angeles A+D Architecture and Design Museum, which hosts an annual exhibition and symposium to promote exemplary work from California design students. More recently, Scarpa collaborated with city planner Maurice Cox, FAIA, to create the Affordable Housing Design Leadership Institute, which brings together leaders from around the country to share best practices and innovations in the field. The institute is administered by Enterprise, where Scarpa serves as an advisory board member.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IN MOTION.
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The Institute Honor Awards

2017

The AIA Institute Honor Awards recognize design excellence in every sector. This year, three separate juries—for Architecture, Interior Architecture, and Regional & Urban Design, respectively—awarded a total of 23 projects.

TEXT BY IAN VOLNER

Architecture Jury

Mark Reddington, FAIA, LMN Architects (chair)
Gregory P. Baker, AIA, HNTB Architecture
David Cordaro, AIAS Representative
Leslie K. Elkins, FAIA, Leslie K. Elkins Architect
Timothy J. Johnson, AIA, NBBJ
William Q. Sabatini, FAIA, Dekker/Perich/Sabatini
Adrian D. Smith, FAIA, Adrian Smith + Gordon Gill Architecture
Beatrice Spolidoro, AIA, Rothschild Doyno Collaborative
Marilyn Terranova, Pocantico Hills Central School District

Interior Architecture Jury

Hagy Belzberg, FAIA, Belzberg Architects (chair)
Jodi R. Ernst, AIA, Universal Studios
Karen Fairbanks, AIA, Marble Fairbanks
Paula Peer, AIA, Trapolin-Peer Architects
Jim Poteet, FAIA, Poteet Architects

Regional & Urban Design Jury

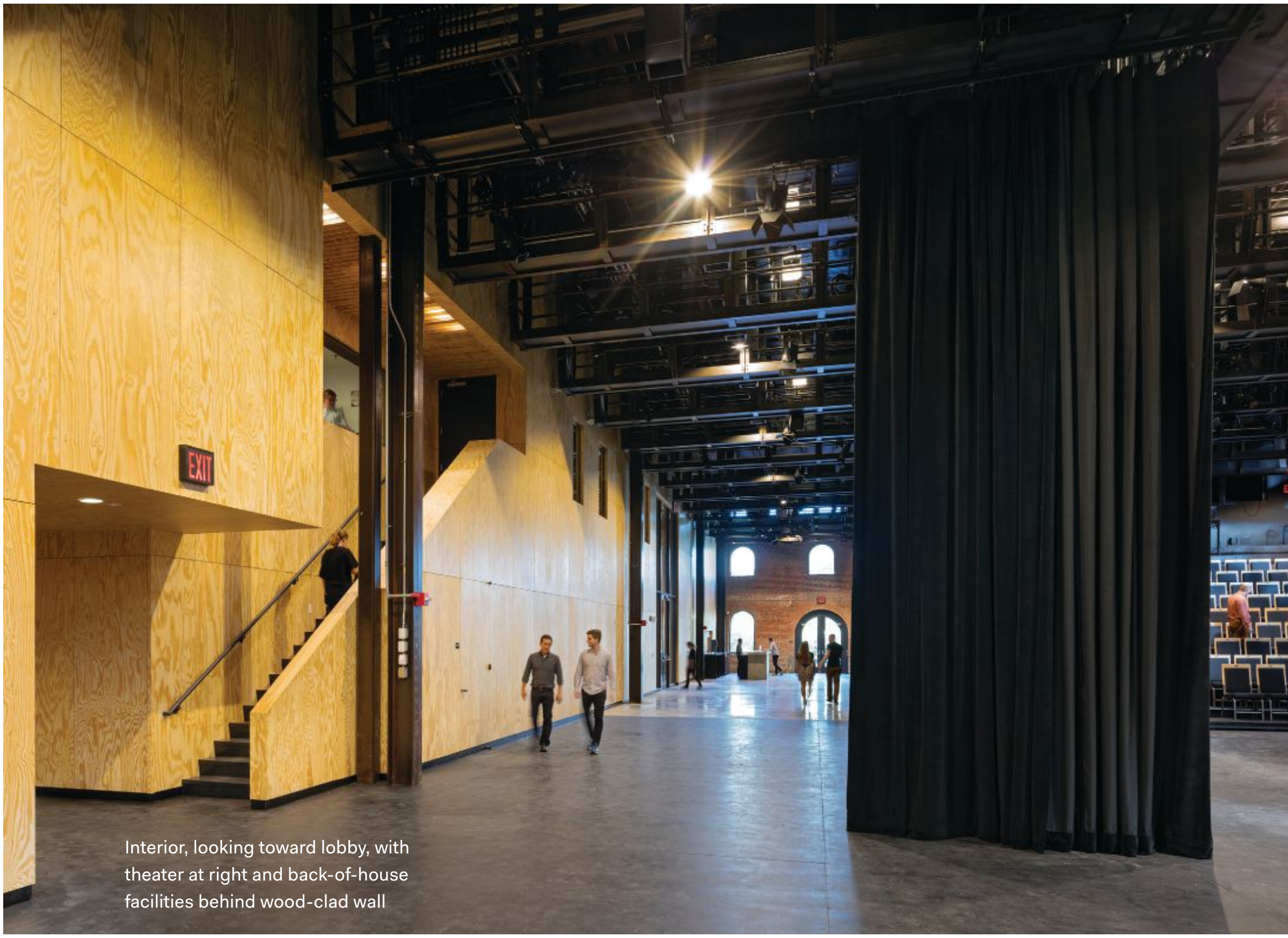
Susan Chin, FAIA, Design Trust for Public Space (chair)
David W. Benn, AIA, Cho Benn Holback + Associates
James S. Bershof, FAIA, OZ Architecture
Sheila Kennedy, FAIA, Kennedy & Violich Architecture
Robert L. Ooley, FAIA, Santa Barbara County Government, Office of the County Architect

ARCHITECTURE

St. Ann's Warehouse
New York
Marvel Architects

PHOTOS BY DAVID SUNDBERG/ESTO

Walled garden, designed by Michael Van Valkenburgh Associates

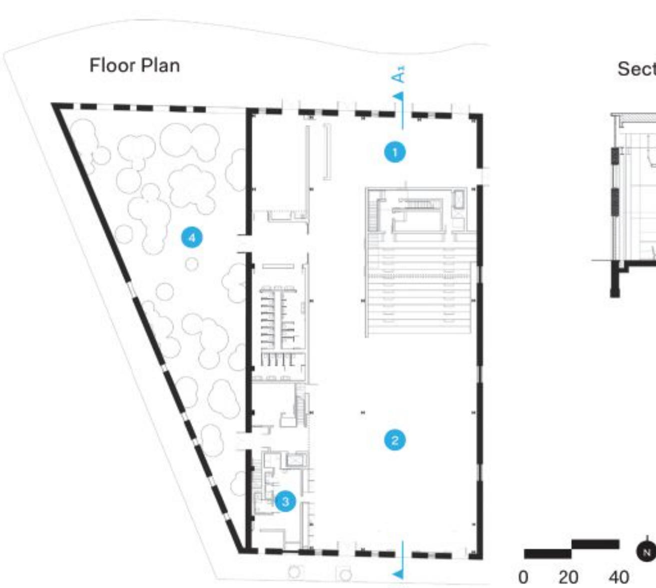


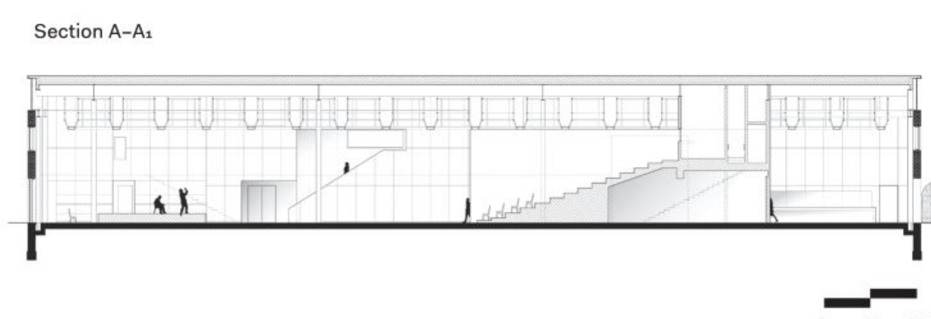
Interior, looking toward lobby, with theater at right and back-of-house facilities behind wood-clad wall

Popular Brooklyn performance venue St. Ann's Warehouse has long been something of a misnomer. Originally located in a church (whence the name), it relocated in 2000 to a former spice-milling factory near the East River waterfront. It was only two years ago that it moved into a proper warehouse—taking up residence in a former tobacco storage facility adjacent to the newly completed Brooklyn Bridge Park. And what a warehouse it is.

Built in 1860, the building bears the traces of more than a century of New York City history: it was originally five stories tall, and had to be altered when the approach to the Brooklyn Bridge was built overhead. In the 1940s, three stories were removed to avoid adding fire protection, a decision that would prove fateful 30 years later, during the arson wave of the 1970s, when the building suffered a fire that left it abandoned for years.

Keeping up the momentum of Brooklyn's ongoing cultural revival, the building has now been resurrected by St. Ann's as a creative hub, with a 700-seat theater, offices, auxiliary spaces, and a graceful interior courtyard by landscape master Michael Van Valkenburgh at its center. The sensitive renovation by New York's own Marvel Architects takes the historic Dumbo structure—with its surviving x-shaped tie-rod anchors and elegant brick arches—and does as little to it as the new program allows, popping up the roof for extra space and technical accommodations, and dramatically lighting the new glass-brick-clad clerestory to give the old building a little bit of showbiz glamour.





1. Lobby
2. Theater
3. Dressing rooms
4. Garden

Exterior view at dusk, showing new popped-up glass-brick-clad volume

Project Credits

Project: St. Ann's Warehouse, New York
Client: St. Ann's Warehouse · Susan Feldman (artistic director)
Architect: Marvel Architects, New York · Jonathan J. Marvel, FAIA (founding principal); Lissa So, AIA (founding partner); Scott Demel, AIA (director); Zachary Griffin, AIA (associate)
Mechanical Engineer: BuroHappold
Structural Engineer: Robert Silman Associates
Lighting Designer: Domingo Gonzales Associates (exterior); David Weeks Studio (custom light fixtures)
Landscape Architect: Michael Van Valkenburgh Associates
Construction Manager/General Contractor: Yorke Construction
Theater Design Consultant: CharcoalBlue
Project Manager/Owners Representative: DBI Projects
AP Expeditor: JM Zoning
Historic Preservation Consultants: Higgins Quasebarth & Partners
Graphic Design: Flyleaf Creative
Sign Sculptor: Tom Fruin
Size: 24,000 square feet
Cost: $31 million

REGIONAL & URBAN DESIGN

Regeneración: A Vision for the Campus and District of the Tecnológico de Monterrey
Monterrey, Mexico
Sasaki Associates

Since its founding in 1943, Mexico's Monterrey Institute of Technology and Higher Education has demonstrated an enterprising and ambitious spirit unusual in an academic institution. It was among the first in the country to seek accreditation from the United States Department of Education—thereby drawing students from north of the border—and its campus, designed in the late 1940s, was conceived as a showcase for the best in modernist architecture.

Enrique de la Mora, a key figure in Mexico's own national brand of Modernism, created a gorgeous suite of buildings for the original campus, which he arranged for optimal exposure to light and air. In the intervening decades, however, subsequent additions have departed from de la Mora's vision and added architectural clutter, while also cutting off the school grounds from the surrounding city.

Looking to counter this unfortunate trend, Boston-based landscape and planning specialists Sasaki Associates devised a scheme called Regeneración that reintegrates the school into the community, centered around a new corridor that will cut through the campus and connect its disparate parts. At either end, two new "learning nodes" will transform the former periphery into active hubs, while a massive, underused stadium and adjacent surface-level parking will be repurposed with new multi-use playing fields and a smaller sports facility for the town. Not just a revitalized plan for the university, Regeneración promises to help attract new investment and development for the city of Monterrey as a whole.

Project Credits
Project: Regeneración: A Vision for the Campus and District of the Tecnológico de Monterrey, Monterrey, Mexico
Client: Instituto Tecnológico de Monterrey
Architect and Planner: Sasaki Associates, Boston
Size: 1,434 acres
Cost: Withheld

Rendered site section shows mix of uses in a learning node in the re-envisioned education district

INTERIOR ARCHITECTURE

In Situ
San Francisco
Aidlin Darling Design

PHOTOS BY ALANNA HALE

Lounge, with view of mural by local artist Rosana Castrilla Diaz

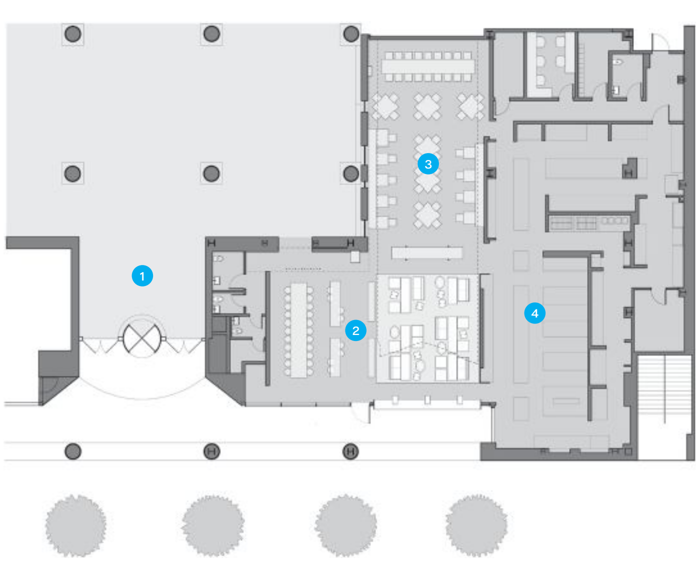
Opening to much buzz last year, the Snøhetta-designed addition to the San Francisco Museum of Modern Art is a major new landmark for its namesake town, its giant cloud-like form unmissable on the streetscape. Tucked inside the older Mario Botta, HON. FAIA–designed structure, however, lies a new gem: The restaurant In Situ, by local firm Aidlin Darling Design, takes all the drama of its high-profile home and distills it to its most elegant and serene essence.

Entering either from the street or from the museum's lobby in the Botta building, diners find themselves in a space abuzz with motion yet tempered by organic materials and simple geometries. A reticulated wood drop-ceiling, studded with pendant light fixtures, hovers over a floor with blocky wood tables and low-slung leather seating. Working closely with chef Corey Lee, the designers created a series of near-subliminal cues and associations—the ceiling suggesting a woven textile, the couches evoking the great modernist interiors of yore, and the custom fixtures (including a concrete serving station) and specially commissioned artworks (such as a wall mural by artist Rosana Castrilla Diaz) suggesting a narrative dialogue between the natural and the synthetic.

It's a thematic thread that connects neatly with the culinary context, recapitulating the process by which raw ingredients are transformed into elaborate dishes, and it makes the restaurant an appropriate transitional space between the social life of the city and the high-minded cultural atmosphere of the museum.

Project Credits
Project: In Situ, San Francisco
Client: Corey Lee
Architect: Aidlin Darling Design, San Francisco · David Darling, AIA, Joshua Aidlin, AIA (principals); Adam Rouse (project designer); Roslyn Cole, AIA, Ryan Hughes, Jeff LaBoskey, Kent Chiang, AIA (project team)
General Contractor: Plant Construction
Branding/Graphics/Environmental Graphics: a l m project
Lighting Consultant: JS Nolan & Associates
Kitchen Design: Harrison & Koellner
Wood Ceiling: Acosta and Sons
Wood Supplier/Custom Lounge Table Fabricator: Arborica · Evan Shively
Custom Table Fabricator: Northwood Design Partners
Size: 6,330 square feet
Cost: Withheld

Floor Plan

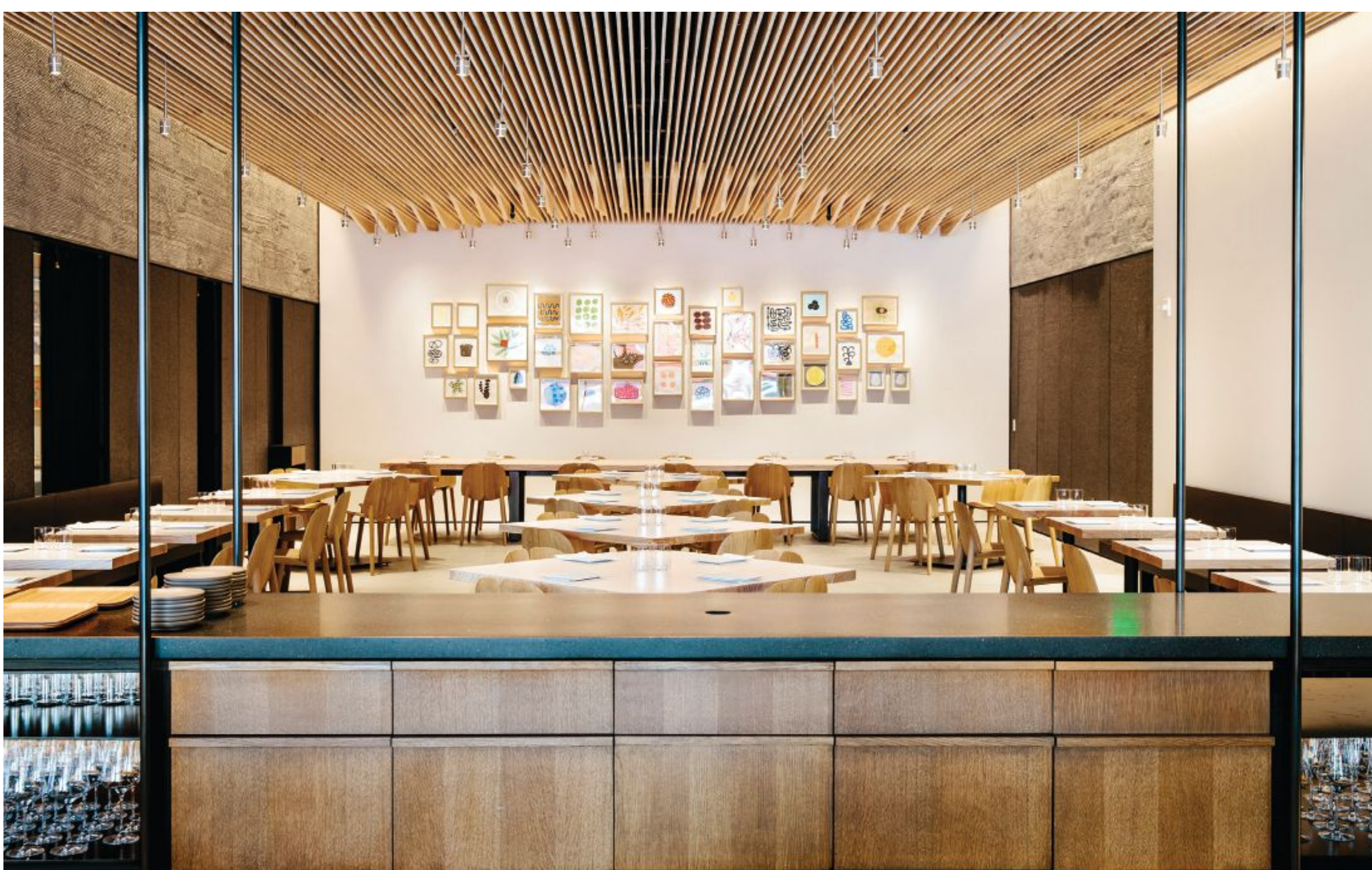


1. Museum lobby
2. Lounge
3. Main dining room
4. Kitchen

0 5 10 N

Opposite, Top: Lounge area with custom-milled tables and suspended wood ceiling

Opposite, Bottom: Main dining room



ARCHITECTURE

Reva and David Logan Center for the Arts
Chicago
Tod Williams Billie Tsien Architects | Partners with Holabird & Root

PHOTOS BY TIMOTHY HURSLEY

Exterior view showing the project's low and tower volumes

The New York–based partnership of Tod Williams, FAIA, and Billie Tsien, AIA, recently snagged the coveted commission for the Barack Obama Presidential Library in Chicago, and one need not look far for a prelude to that new work. The firm's Reva and David Logan Center for the Arts, on the University of Chicago campus, a stone's throw from the site of the future library, is a 184,000-square-foot cultural facility for the school's visual arts, film, music, and theater programs that combines an auditorium, film production studios, an eatery, galleries, offices, and more, into a complex that's divided between a warehouse-ish low-rise and a looming, half-glass and half-masonry tower.

The architects' approach to the two-in-one typology is a nod to Chicago's dual architectural traditions—bringing together the horizontality of Frank Lloyd Wright and the Prairie School with the skyscrapers of Louis Sullivan and Ludwig Mies van der Rohe. (Williams and Tsien have also noted that the raked skylights in the low-rise block recall old daylit factories, and that the tower echoes the muscular quiddity of Louis Kahn or late-career Marcel Breuer.)

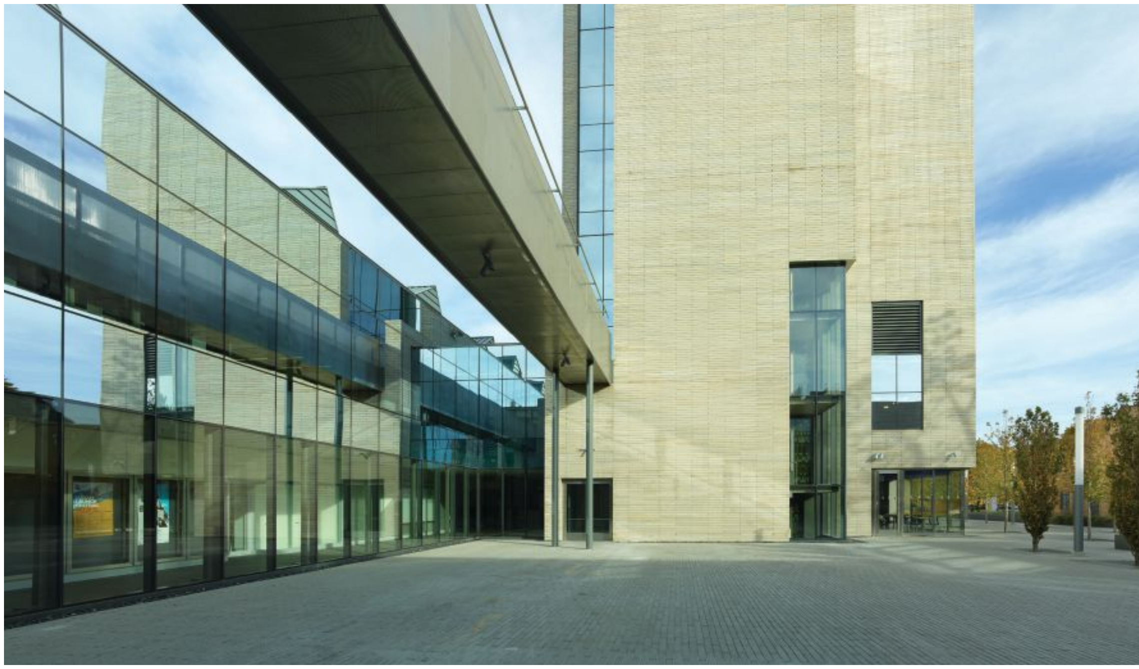
But these intertwined resonances of some of the great masters are not merely reverence. They are part of a broader urban objective—to make the building at once present at the neighborhood scale, and still a landmark on the Chicago skyline, allowing the center to belong both to the university and its environs and to the city at large. A foretaste of things to come? We'll have to wait and see.

Project Credits
Project: Reva and David Logan Center for the Arts, Chicago
Client/Owner: University of Chicago
Architect: Tod Williams Billie Tsien Architects | Partners, New York—Tod Williams, FAIA, Billie Tsien, AIA (partners-in-charge); Philip Ryan, Felix Ade, AIA, Johnny Cho, Azadeh Rashidi, Brian Abell, Aaron Fox, Evan Ripley, Archana Kushe, Forrest Frazier, Annika Bowker, Aaron Korntreger, Aurelie Paradiso (design team)
Associate Architect: Holabird & Root, Chicago
M/E/P Engineer: Ambrosino, DePinto & Schmieder
Structural Engineer: Severud Associates
Civil Engineer: David Mason Associates
Geotechnical Engineer: Ground Engineering Consultants
Landscape Architect: Hargreaves Associates
Lighting Design: Renfro Design Group
Acoustics and AV: Kirkegaard Associates
Theater Design: Schuler Shook
Construction Manager: Turner Construction
LEED Consultant: Steven Winter Associates
Curtainwall Consultant: Axis Group
Elevator Consultant: Van Deusen & Associates
Code Consultant: Jensen Hughes
Film Theater Consultant: Full Aperture Systems
Signage: Pentagram
Contractor for Café: Riis Borg Construction
Concrete Consultant: Reg Hough Associates
Auditorium LED Ornamental Lighting: Studio 1Thousand
Security: Sako & Associates
Industrial Hygiene/Ventilation: ACTS; David Gordon
Size: 184,000 square feet
Cost: Withheld

South–North Section

1. Auditorium
2. Restaurant
3. Film screening room
4. Rehearsal room
5. Performance space

0 20 40



Top: Plaza

Above: Art studio beneath sawtooth skylights

Lobby interior


So many cocktail parties are less than festive
may be valuable. The room should not be
The host should have plenty of ice. He should
than three kinds of drinks without a
should be plenty of food stashed away in case
be voracious. There should be spare glasses.
should be abstemious and not ply his guests

INTERIOR ARCHITECTURE

Pinterest HQ
San Francisco
IwamotoScott Architecture with Brereton Architects

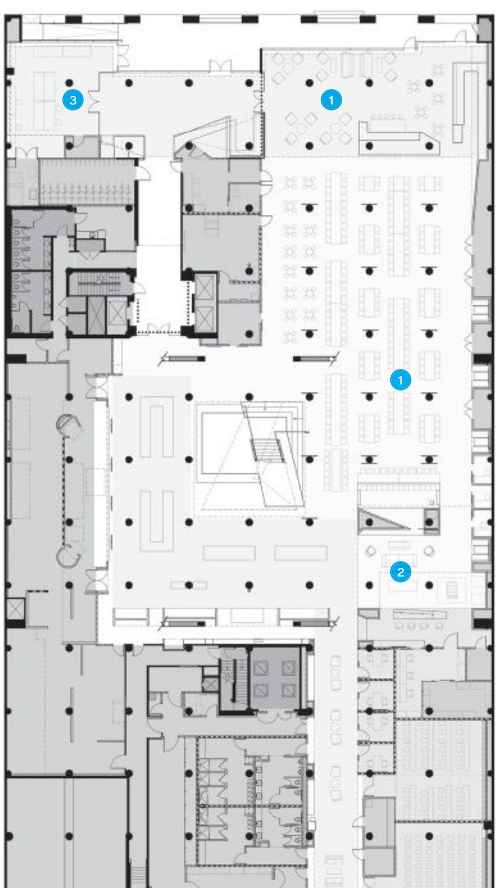
PHOTOS BY BRUCE DAMONTE

View of lobby café under coffered wood ceiling

In a gratifyingly improbable pairing of the old economy and the new, a former factory for tractor-builder John Deere now houses the offices of Pinterest, the online visual platform presently listed as the 60th most-viewed website in the world. Only seven years old and already boasting more than 800 employees, the company now has room to grow even bigger in its new headquarters, designed by the local team of IwamotoScott Architecture and Breton Architects, in San Francisco's tech-rich South of Market district. Its four stories hold offices, meeting rooms, and all the employee amenities that the tech industry is famous for—including, but not limited to, a dining room, coffee bar, and myriad social spaces for lounging and spit-balling.

The tech-industry aesthetic is evident from the get-go: The lobby features a coffered plywood ceiling that spans the entire length of the amenity-rich lowermost floor, with surface elements peeking playfully out of the voids; upstairs, the individual workspaces are arranged so that workers can enjoy the abundant daylight in the former industrial space. Most strikingly, a central atrium runs the full height of the office, and into it the designers have inserted what they call the "Knitting Stair," a winding circulation system fashioned out of perforated steel that reflects both natural and artificial light to beguiling effect. With all too many high-tech companies preferring the wide-open spaces of the South Bay, Pinterest and its architects have re-created a bit more of Silicon Valley in the city.

Ground-Floor Plan



Typical Upper-Floor Plan

1. Café and dining
2. I.T. Lounge
3. Maker Space
4. Workspace
5. Conference

0 10 20

Above: Central stair, with views into office floors

Project Credits
Project: Pinterest HQ, San Francisco
Client: Pinterest
Architect: IwamotoScott Architecture, San Francisco · Lisa Iwamoto, Craig Scott, AIA (founding partners)
Architect: Brereton Architects, San Francisco · Donna Cook, AIA (principal)
Mechanical Engineer: Amit Wadhwa & Associates
Structural Engineer: Forell/Elsesser Engineers
Construction Manager: Urban Works
General Contractor: Novo Construction
Lighting Designer: Niteo Lighting
Furniture Consultant: InsideSource
Kitchen Consultant: Muller Design
AV Consultant: AVDG
Code: The Fire Consultants
Size: 100,000 square feet
Cost: Withheld


EXIT
EXIT

Base of central "Knitting Stair," surrounded by dining facilities and amenities

ARCHITECTURE

Carmel Place
New York
nArchitects

PHOTOS BY IWAN BAAN

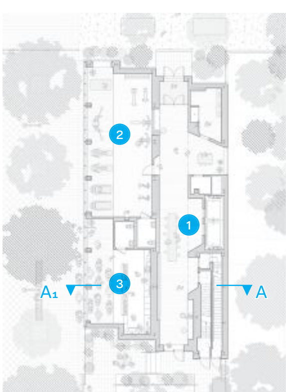
Aerial view showing Carmel Place's stepped back envelope containing modular micro-units

Once upon a time, New York City developers could build apartments almost as small as they pleased, no matter how inhumane or unsanitary the result. That all ended with a series of civic reforms in the 1980s that stipulated 400-square-foot minimums—a giant step forward, at least until our own time, when those minimums began to seem a little too generous given the cost of living in a city growing ever more crowded. Now, under a new zoning initiative, the first of the city's legal micro-apartments has been completed.

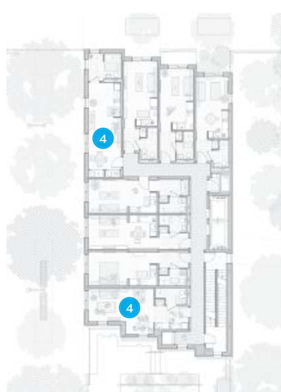
Designed by Brooklyn-based nArchitects, Carmel Place is located in Manhattan's Kip's Bay neighborhood, and features 55 studios in the 260- to 360-square-foot range. Twenty-two of these were designated as affordable units—14 for applicants through the city, and eight for supportive housing through Veteran's Affairs. From start to finish, the project has been an experiment in efficiency, with the modular units prefabricated in the Brooklyn Navy Yard and then trucked to the site and assembled—all nine floors—in about four weeks.

Far from the squalor that the old regulatory measures were meant to combat, the apartments at Carmel Place are airy and elegantly minimal, with 9-foot-plus ceilings and lofted storage to keep floors and surfaces clutter-free. The architects' choice of a simple, setback envelope means that the same housing model could easily be adapted to almost any site, anywhere in the city, and the low-key façade treatment allows the building to blend in with the neighborhood.

Ground-Floor Plan



Second–Seventh-Floor Plan



Eighth-Floor Plan

Section A–A_1

Project Credits
Project: Carmel Place, New York
Client: Monadnock Development
Design Architect: nArchitects, New York · Eric Bunge, AIA, Mimi Hoang, AIA (principals), Ammr Vandal, AIA (project manager), Tony-Saba Shiber, Daniel Katebini-Stengel, Cheryl Baxter, Albert Figueras, Prathyusha Viddam, Gabrielle Marcoux, Amanda Morgan, AIA, Zach Cohen, Matthew Scarlett, AIA, Matthew Wilson, Alexis Payen (project team); Christopher Grabow, Alex Tseng, Nancy Putnam (project team, competition phase)
M/E Engineer: Abraham Joselow
Structural Engineer: De Nardis Engineering
Civil Engineer/Landscape Architect: Langan Engineering
Construction Manager/General Contractor: Monadnock Construction
LEED Consultant: Taitem Engineering
Code Consulting: JM Zoning
Consulting Architect (competition phase): Willis DeLaCour
Marketing Consultant: Corcoran Sunshine
Graphic Design: Project Projects
Builders (modular units): Capsys Corp.
Size: 35,000 square feet
Cost: $12.95 million

1. Lobby
2. Gym
3. Café
4. Apartment
5. Terrace

Above: Apartment interior

INTERIOR ARCHITECTURE

University of Massachusetts Dartmouth, Claire T. Carney Library
Dartmouth, Mass.
DesignLAB Architects with Austin Architects

PHOTOS BY JONATHAN HILLYER

Group study space outside lecture halls, with view of new curtainwall


202

Study room in new addition

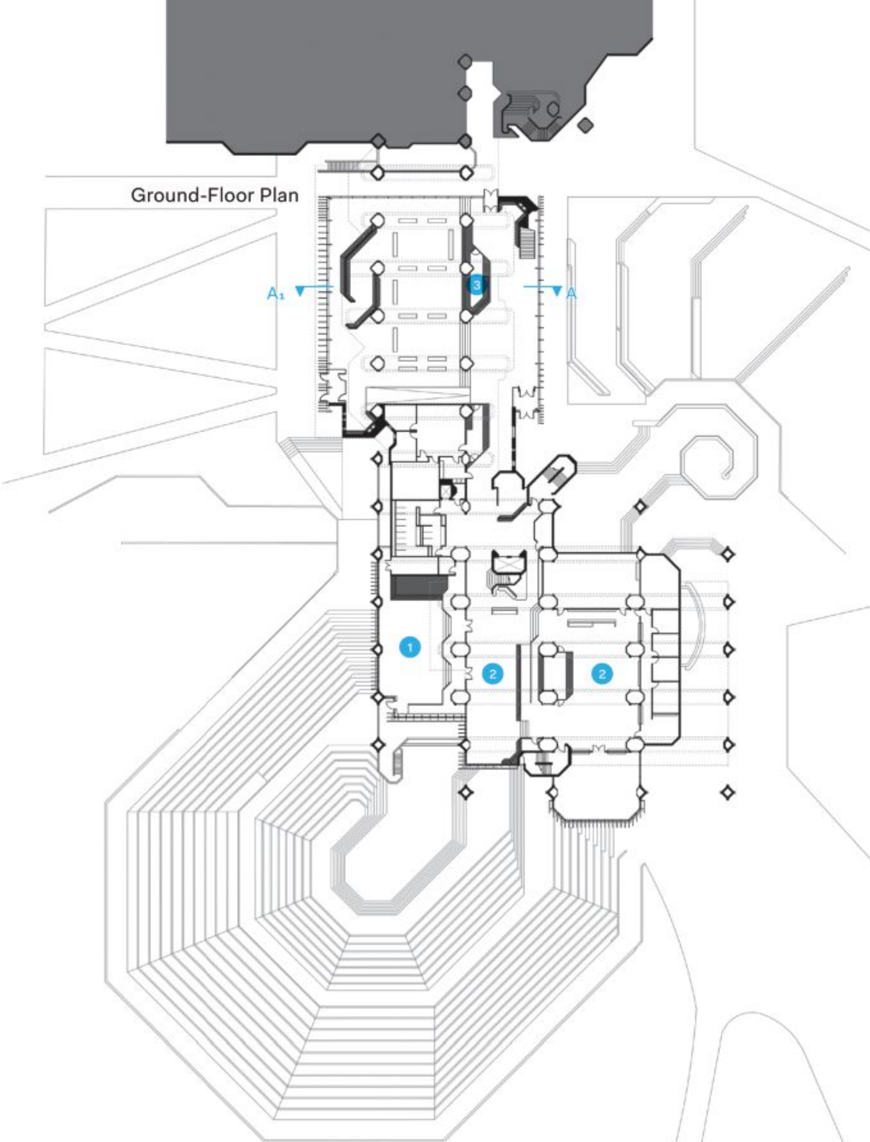
Though much loved by design enthusiasts, Brutalist buildings of the 1960s and '70s pose unique challenges to the cities and institutions that have inherited them, and few buildings of the period are so unique (or so challenging) as the University of Massachusetts Dartmouth's Claire T. Carney Library. Designed by Paul Rudolph and completed in 1972, the library is a massive complex of tiered concrete cantilevers—a muscular, sculptural ensemble such as only Rudolph could deliver. It has also long been in need of a serious upgrade, a dicey task that Boston-based DesignLAB Architects, working with Cambridge, Mass.–based Austin Architects, has carried off with aplomb.

Renovating 160,000 square feet of the existing interior, the team also discretely enclosed 27,000 square feet of formerly open-air space beneath the volume of Rudolph's Science & Engineering lecture halls. With room for thousands more books, the renovation also features a new art gallery, lecture halls, and study rooms—some carved out of former stack space and rearranged for greater access to daylight.

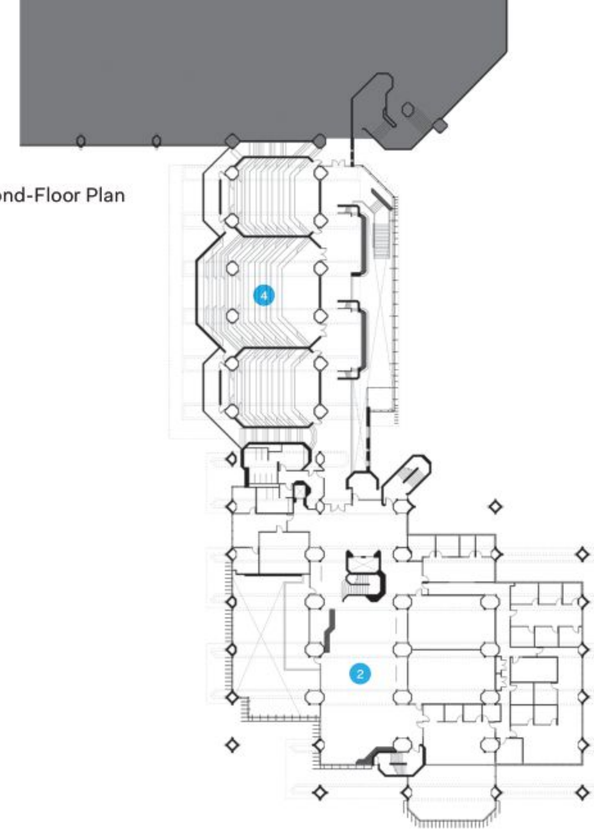
Ever respectful of Rudolph's Brutalist vision, the architects nonetheless have taken measures to blunt some of the building's rougher edges: The interior now features colorful textile treatments and graphic wayfinding, and the hard concrete mini-plazas that appear throughout Rudolph's design find a softer echo in new wood-clad lounges. All this was done for $200 per square foot, and to rave reviews from students, twice as many of whom now frequent the library.

PETER VANDERWARKER

Ground-Floor Plan



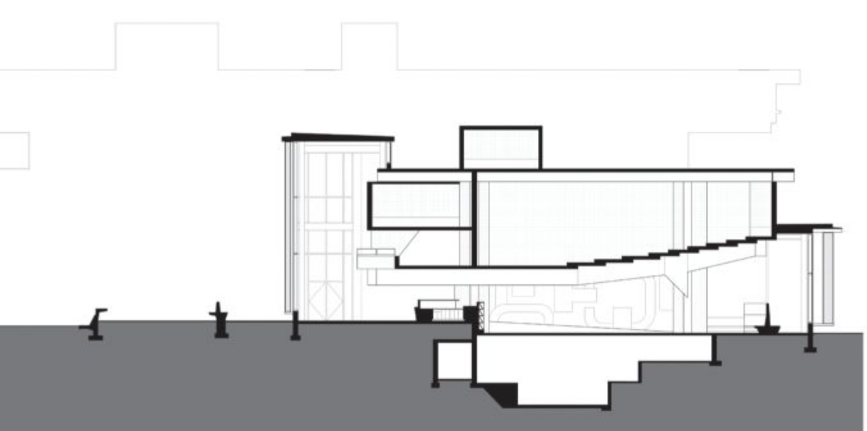
Second-Floor Plan



1. Reading room
2. Learning Commons
3. Café
4. Lecture Hall

0 20 40

Section A–A₁



0 10 20

Project Credits
Project: Claire T. Carney Library at the University of Massachusetts Dartmouth, Dartmouth, Mass.
Client: University of Massachusetts Dartmouth
Architect/Interior Designer: DesignLAB Architects, Boston · Robert Miklos, FAIA (principal-in-charge); Ben Youtz, AIA (project manager); Kelly Haigh, AIA (project architect)
Associate Architects: Austin Architects, Cambridge, Mass. · Jonathan Austin (principal-in-charge)
Structural Engineer: RSE Associates
Mechanical Engineer: Fitzmeyer & Tocci Associates
Electrical Engineer: Garcia Galuska DeSousa
Civil Engineer: Nitsch Engineering
Geotechnical Engineer: GZA
Construction Manager/General Contractor: Consigli Construction Co.
Landscape Architect: Richard Burck Associates
Lighting Designer: Sladen Feinstein Integrated Lighting
Furnishings: Leslie Saul & Associates
Graphic Design: Roll Barresi & Associates
Size: 155,000 square feet (renovation); 27,000 square feet (addition)
Cost: $34 million

REGIONAL & URBAN DESIGN

Philadelphia 30th Street Station District Plan
Philadelphia
Skidmore, Owings & Merrill

View of proposed district from downtown Philadelphia, with 30th Street Station at center

"The only station stop in Philadelphia," as Amtrak conductors have declared it for eons, 30th Street Station is the central node in a neighborhood that has long seemed on the cusp of some kind of breakthrough. With 11 million riders passing through every day (a figure that could pass 20 million over the next two decades), the grand Neoclassical edifice is a stone's throw from the University of Pennsylvania campus and backs directly onto the Schuylkill River, which separates the station from downtown.

The problem, as with so many of America's aging transit hubs, is an 88-acre rail yard directly to the north, currently a gaping hole in the urban fabric that the designers and logisticians at Skidmore, Owings & Merrill (SOM) are poised to turn into an economic bonanza: In conjunction with a dizzying array of commercial and institutional stakeholders, the firm has concocted a plan to build a mixed-use district of 18 million square feet directly on top of the rail yards. The plan also calls for a new public plaza to be constructed on the west side of the station, binding it visually and programmatically with the surrounding district.

Signaling their focus on public space, the plaza is of a piece with SOM's overall vision of a new Philly nabe with the right sense of openness at a human scale, yet enough density to ensure that both the city and private developers will realize a return on what is bound to be a very steep investment. Both daring and pragmatic, the Philadelphia 30th Street Station District Plan strikes just the right balance.

Project Credits
Project: Philadelphia 30th Street Station District Plan, Philadelphia
Client: Amtrak; Brandywine Realty Trust; Drexel University; PennDOT; SEPTA
Master Planning and Architecture: Skidmore, Owings & Merrill · Anthony Vacchione, AIA (managing partner); Roger Duffy, FAIA (design partner); William F. Baker, (structural engineering partner); Charles Besjak, FAIA (structural director); Kristopher Takács, AIA (project manager); Olin McKenzie, AIA (senior design architect); Daniel O'Shaughnessy (senior urban designer); Derek Moore, AIA, Jennifer Pehr (senior planners); Alexandra Thewis (structural engineer); Angel Rodriguez-Colon, Jenny Joe, AIA (urban designers); Peter Glasson, AIA (architect); Drew Cowdrey, Andy Rah (architectural designers)
Transportation Consultant: WSP | Parsons Brinckerhoff
Economics/Commercial Opportunities: HR&A Advisors
Historic Preservation: Building Conservation Associates
Railroad Engineering: Burns Engineering
Parking Analysis: CHANCE Management Advisors
Public Engagement: Envision Consultants
Retail Strategy: Williams Jackson Ewing
Film: Thirst
Cost Estimation: Faithful+Gould
Surveying: GTS Consultants
Traffic Analysis: KMJ Consulting
Size: 18 million square feet
Cost: $10 billion in public and private investment (total plan)

INTERIOR ARCHITECTURE

Writers Theatre
Glencoe, Ill.
Studio Gang Architects

PHOTOS BY STEVE HALL/HEDRICH BLESSING

Lobby, which can double as performance space

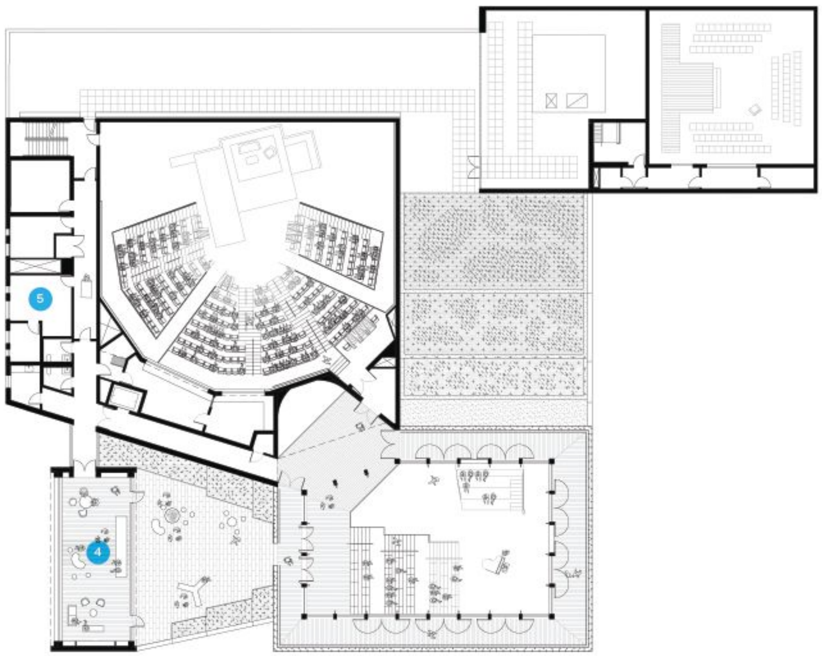
Donor lounge, with view across event terrace to lobby volume

It's been a long journey for director and actor Michael Halberstam: What he launched in the early 1990s as an offbeat experimental theater—operating, at its inception, in the cramped back room of a bookstore—has become a staple of the regional cultural scene, and now it finally has a home commensurate with its stature. At 36,000 square feet, the new Writers Theatre in Glencoe, Ill., designed by Chicago architect Jeanne Gang, FAIA, is a major presence in the leafy village-like community, and about as far from that long-ago bookstore as one could plausibly get.

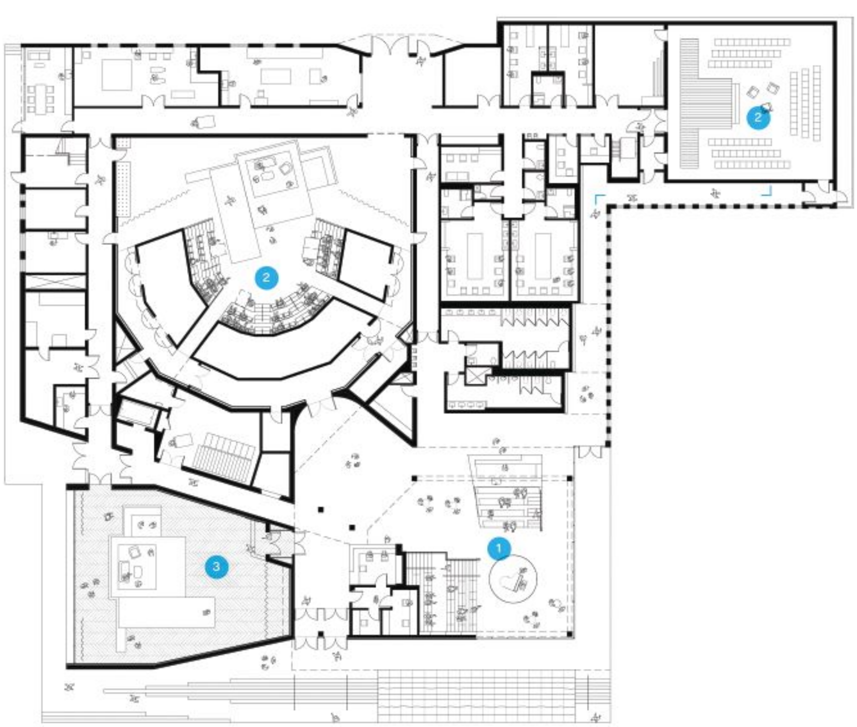
An elegantly understated composition in wood and glass, the project seems to break the cardinal rule of theater design by not simply being a hermetic, windowless block. From the fully glazed and high-ceilinged lobby, to the lofted catwalk where playgoers can loiter and take in the surrounding views, to the sliding glass doors that allow the building to be instantly converted to an indoor-outdoor performance space, the project is an experiment in permeability. That continuity with the landscape is further emphasized by a box office and concession stand made from wood sourced on site.

In keeping with the company's enduring commitment to head-on, up-close encounters with the lively arts, the two main venues—a 250-seat thrust stage and a 99-seat black box—place visitors in unusual proximity to the stage, almost reversing the spectator-performer relationship, as the building itself turns the theatrical experience inside out.

Second-Floor Plan



Ground-Floor Plan



1. Lobby
2. Theater
3. Rehearsal room
4. Donor lounge
5. Offices

0 25 50

Project Credits
Project: Writers Theatre, Glencoe, Ill.
Client: Writers Theatre
Architect: Studio Gang Architects, Chicago · Jeanne Gang, FAIA (founding principal); Mark Schendel, AIA (managing principal); Juliane Wolf (design principal); Angela Peckham (project architect); Margaret Cavenagh, AIA (principal, interior architecture); Harry Soenksen, AIA (senior director, technical); William Emmick, AIA (senior director, operations); Claire Cahan (studio design director); Michan Walker, Rodia V. Sánchez, AIA (senior project leaders); Kara Boyd (project architect); Maciej Kaczynski, Rolf Temesvari, Lindsey Moyer, Christopher Vant Hoff, Stephen Claeys (design team)
General Contractor: W.E. O'Neil Construction Co.
Owner's Counsel: AMS Planning & Research Corp.; VMS
Theater Consultant: Auerbach Pollock Friedlander
Landscape Architect: Coen + Partners
M/E/P/FP Engineer: dbHMS
Structural Engineer: Halvorson and Partners
Lighting Consultant: Lightswitch Architectural
Engineering Specialist: Peter Heppel Associates
Civil Engineer: SPACECO
Geotechnical Engineer: Holmes Testing
Graphic Designer: Thirst
Acoustical Consultant: Threshold Acoustics
Timber Specialist: Trillium Dell Timberworks
Cost Consultant: Venue
LEED/Sustainability Consultant: WMS Consulting Engineers
Size: 36,000 square feet
Cost: $28 million

This Image: Gallery shelving made from wood sourced on site

Opposite: Brick detailing in main theater

ARCHITECTURE

Stanford University Central Energy Facility
Stanford, Calif.
ZGF Architects

PHOTOS BY MATTHEW G. ANDERSON

View toward chilled-water storage tanks behind metal screening

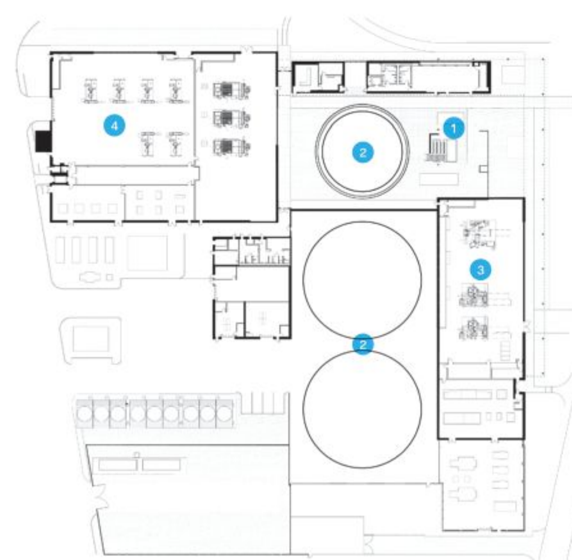
Stanford University's campus is forested, gorgeous, and very, very big. Eight-thousand acres in all, the great swath of Northern California landscape known as "the farm" is home to dozens of buildings, all of which have to be powered, plumbed, heated, and cooled. Such quotidian technicalities could easily be hidden away in a modest shed, but Stanford's new Central Energy Facility puts them front and center.

Designed by Portland, Ore.'s ZGF Architects, the facility plays up its innovative, ultra-efficient technology with vivid colors and dramatic material contrasts: On the campus-facing side, a glass volume housing administrative offices abuts a concrete block with generators, chillers, and cooling towers—the whole ensemble topped by a series of photovoltaic sunshades held aloft on metal piers. A mechanistic showcase recalling the grand old radicalism of the Centre Pompidou, the building's pipes are painted a brilliant blue, and its thermal tanks a blaring red. In a softer, more contemporary touch, the shade structures shelter landscaped outdoor spaces with indigenous plantings.

But what the project represents is even more striking than the building itself: The facility is just one part of the Stanford Energy Systems Innovations, a massive infrastructural initiative expected to improve campus energy performance by 75 percent. And to prove how central the initiative is, Stanford has made the building part of its campus tours—another lure for prospective students alongside the original Mission-style architecture and mascot-inspiring evergreens.

Second-Floor Plan

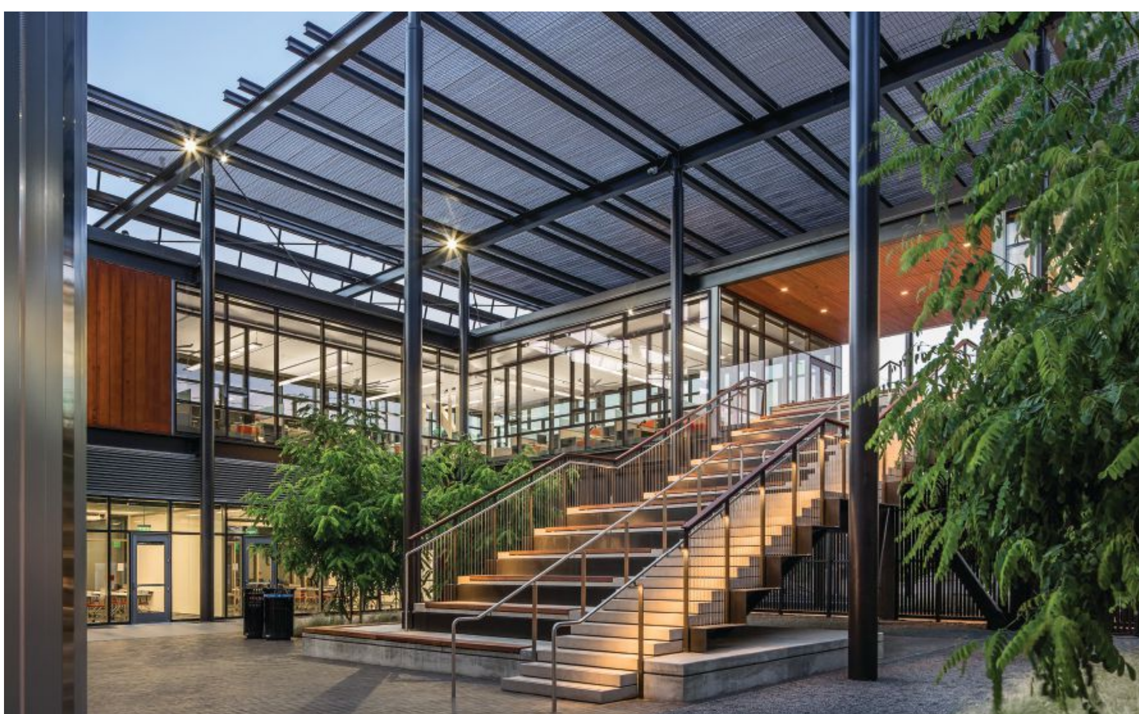
Ground-Floor Plan



1. Entry courtyard
2. Water storage tanks
3. Heat recovery chillers
4. California State Office of Health Planning Development plant
5. Office

0 20 40

Project Credits
Project: Stanford University Central Energy Facility, Stanford, Calif.
Client: Stanford University
Architect/Interior Designer: ZGF Architects, Portland, Ore. · Joseph Collins, FAIA (partner-in-charge); Toby Hasselgren, AIA (principal designer); Renee Kajimoto, AIA, Curt Williams (project architects); Solvei Neiger, AIA (programmer); Chris Flint Chatto, ASSOC. AIA (sustainable designer); Glen Justice, AIA, Michael McGale, Kelvin Ono, AIA, Halliday Meisburger, AIA, Jonah Hawk (design team)
Structural Engineer: Rutherford + Chekene
Mechanical Engineer: Affiliated Engineers
Civil Engineer: BKF Engineers
Construction Manager/GeneralContractor: Whiting-Turner Contracting Co.
Landscape Architect: Tom Leader Studio
Size: 125,600 square feet
Cost: $485 million



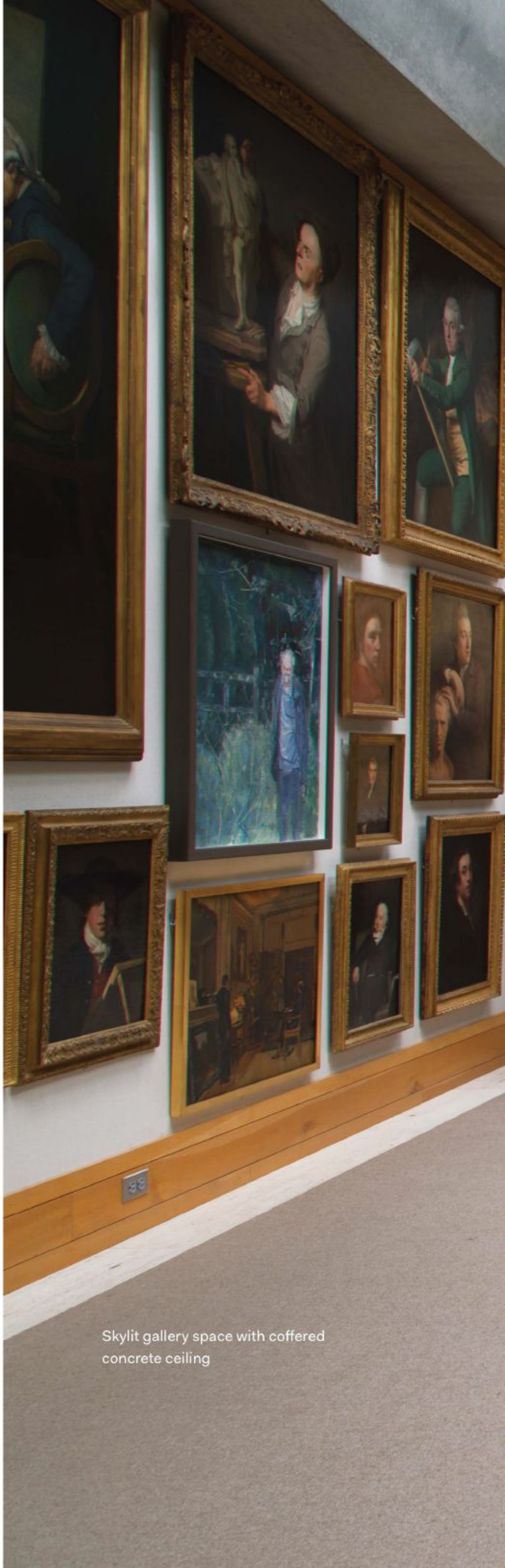
Top: View of exterior showing photovoltaic sunshades

Above: Entry courtyard with stairway to second-floor offices

ARCHITECTURE

Yale Center for British Art Building Conservation Project New Haven, Conn. Knight Architecture

PHOTOS BY RICHARD CASPOLE

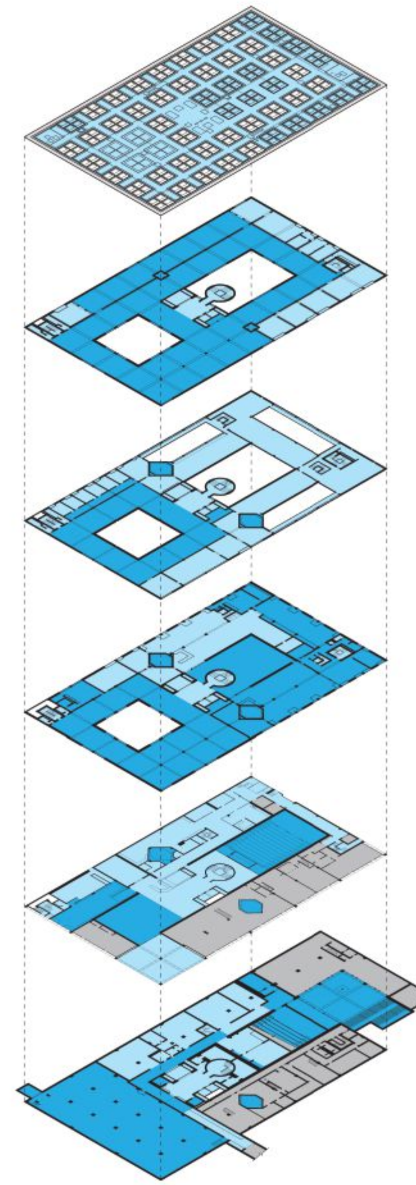


Skylit gallery space with coffered concrete ceiling

The motto for Knight Architecture's recent renovation of the Yale Center for British Art might be: "Keep Kahn and Carry On." As one of Louis Kahn's last significant projects (which happens to be directly across the street from his first major institutional commission, the Yale University Art Gallery), the 1977 building is a landmarked structure from a designer who, despite his outsized influence, died at a relatively early age and completed remarkably few projects in his lifetime. The local firm's double responsibility—to transmit this piece of architectural history untouched while simultaneously rendering it durable enough for continued use—involved some 10 years of study and analysis into the building's development, followed by a phased construction timeline that began as far back as 2008.

Preservation was priority number one: Inside, everything from the white oak trim to the travertine floor tiles to the Belgian linen covering the display walls has been repaired or replaced; the concrete exterior walls were treated for corrosion and improved insulation, without losing the any of the mottled texture that was Kahn's hallmark. But the architects weren't content to leave it there, adding new and important features like additional seating in the auditorium, a new teaching and study gallery, and wheelchair accessibility throughout, including to the famed barrel staircase with its triangular skylight. With its 2,000-item collection, the center is now fully operational again, a research facility that is also, by dint of Kahn's genius, an intensely intimate environment for encountering art.

Compiled Plans Diagram



Primary building conservation area

Secondary building conservation area

No work

Opposite: Library court, with view of concrete-enclosed stairs

Above: Exterior, with repaired concrete walls

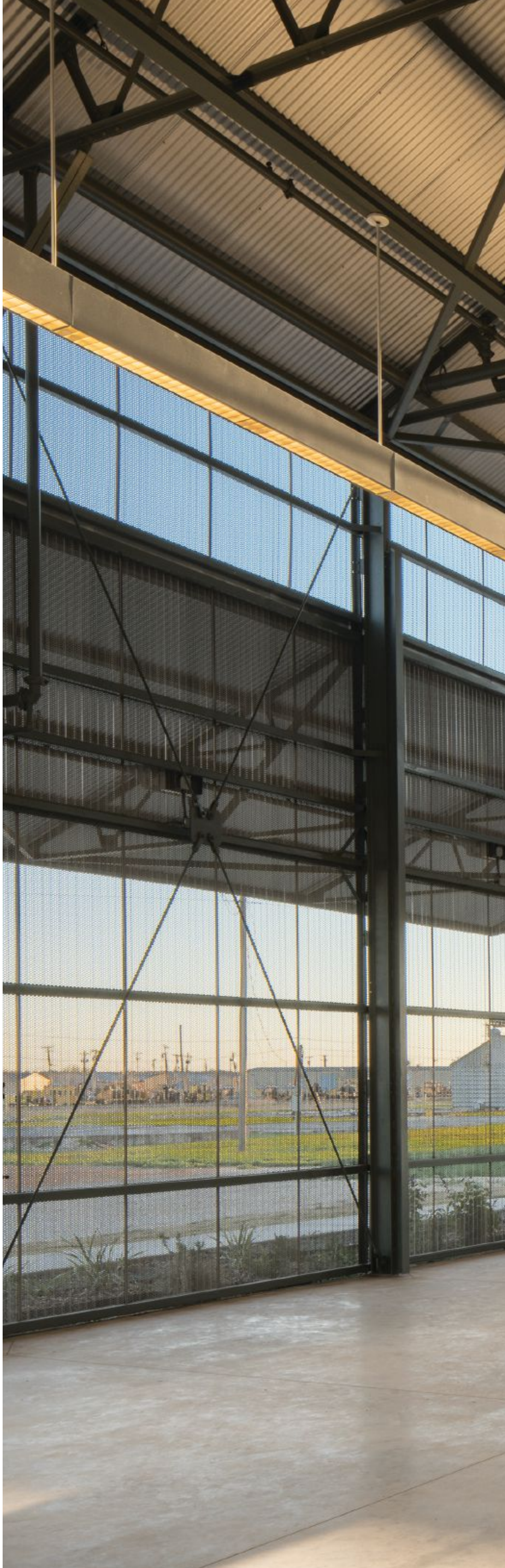
Project Credits

Project: Yale Center for British Art Building Conservation Project, New Haven, Conn.
Client: Yale University
Architect: Knight Architecture, New Haven, Conn. · George Knight, AIA (principal-in-charge); Daphne Kalomiris, AIA, Nikolaos Tombras, Megan Milawski, Jeffrey Pollack, AIA, Kyle Dugdale, AIA, Dylan Hayn, Thomas Day, Dan Shea, Amrita Raja, Britton Rogers (project team)
M/E Engineer: BVH Integrated Services
Structural Engineer: Wiss, Janney, Elstner Associates
Construction Manager: Yale Facilities Office of Planning and Project Management
General Contractor: Turner Construction
Lighting Designer: Hefferan Partnership Lighting Design
Building Conservation: Peter Inskip + Peter Jenkins Architects
Furnishings/Fixtures/Equipment Consultant: Staples & Charles
Acoustics/AV/Theater Consultant: Cavanaugh Tocci Associates
Code Consultant: Philip R. Sherman
Size: 90,000 square feet
Cost: $33 million

View of connections between galleries

ARCHITECTURE

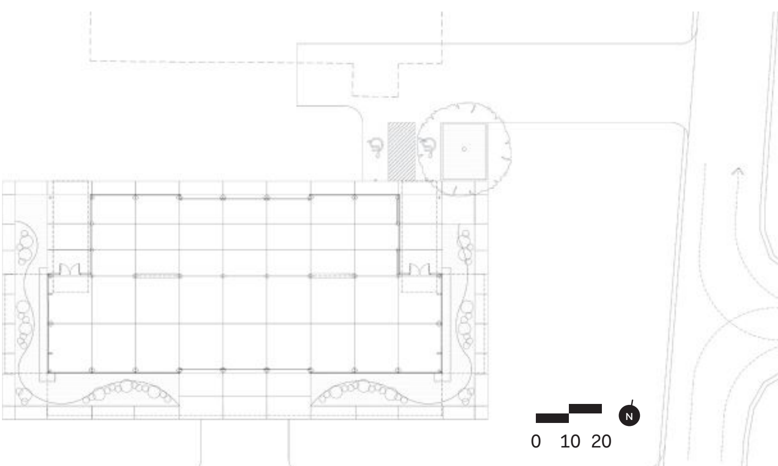
The Cotton Gin at the Co-Op District
Hutto, Texas
Antenora Architects



PHOTOS BY BRIAN MIHEALSICK

Interior, showing view out through
perforated stainless steel cladding

Floor Plan



The Cotton Gin at the Co-Op District is a new event venue in Hutto, Texas, about 20 minutes north of Austin. Located on a former agricultural site of 16 grassy acres, the project by Antenora Architects is an exercise in adaptive reuse from an area firm that's no stranger to bringing life back to historic buildings: Antenora transformed a storied Art Deco movie theater at the University of Texas at Austin into a complex of contemporary shops and cafés and turned an old masonry structure downtown into a mixed-use hub, splicing contemporary materials into the aging façade.

The Hutto project, however, seems like a new step for the office, and its remarkably surgical and subdued approach has earned well-deserved accolades from a host of professional organizations, including AIA Austin and the Texas Society of Architects. Leaving intact most of the original shed-like industrial structure, including the airy and sparsely columned steel interior, the architects have refaced it in a perforated stainless steel that is superficially similar to its former all-metal cladding. The minute, patterned apertures in the skin give the building a ghostly translucency that elevates it above its hardscrabble surroundings, making it a glowing light box by night while acting as a screen against the harsh Texas sun by day. Already a much-loved fixture of the area, the Cotton Gin deftly combines old Texas and new, and its beauty is just off-beat enough for Austin's famously weird brand of cool.

Opposite: Exterior view pre-renovation

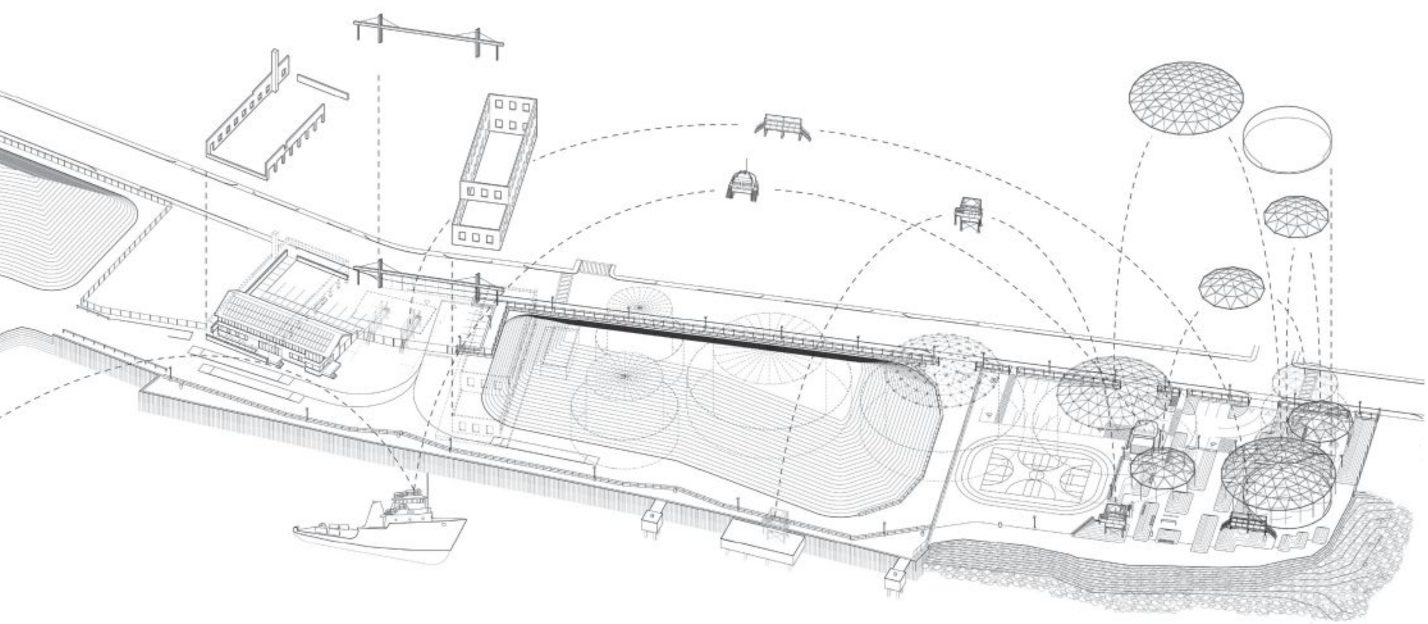
Above: Exterior view of renovated structure at night

Project Credits

Project: Cotton Gin at the Co-Op District, Hutto, Texas
Client: City of Hutto, Texas
Architect/Interior Designer: Antenora Architects, Austin, Texas · Michael S. Antenora, AIA (principal-in-charge, lead designer); Gordon B. Bingaman, AIA (project manager); Justin Gesch (project architect)
M/E Engineer: TTG
Structural Engineer: Architectural Engineers Collaborative
Civil Engineer: Stantec
Geotechnical Engineer: Terracon
General Contractor: American Constructors
Landscape Architect: TBG Partners
Lighting Designer: ERT Lighting
Size: 6,500 square feet
Cost: $1 million

REGIONAL & URBAN DESIGN

Rock Chapel Marine
Chelsea, Mass.
Landing Studio



The conversion of postindustrial space to recreational use is nothing new, but what about creating park space on a site that's still actively industrial? Just across the Mystic River from Boston, the city of Chelsea, Mass., is still very much a working town, with storage and shipping facilities lining the waterfront. The decommissioning of massive oil tanks posed both an opportunity and a problem: How do you put the space to public use while a vast road salt distribution center still operates next door?

Rather than airbrushing the hard edges of the site, Sommerville, Mass.–based Landing Studio's solution for Rock Chapel Marine took a pluralist tack, interweaving the original functional features with new public space to create new and cohesive synthesis. The salt piles, secured under containment covers, now act both as surge barriers and as dramatic landscape features onto which light installations can be projected at night. The skeletons of the old oil drums have been left in place—sculptural elements to which lighting for the recreation areas has been mounted. Even an old tugboat has been pressed back into service, moored to the site for use as a guard tower for the salt supplies.

Rock Chapel Marine (named for Rockchapel, Ireland, the ancestral home of the family behind Eastern Salt Co., which owns the site) changes with the seasons—the size of the salt piles grows in winter and shrinks in spring, letting the site return to parkland. Not just a triumph of physical logistics, the project also represents a bureaucratic victory: a privately owned, publicly accessible park that overcame regulatory hurdles to provide needed community space.

Waterfront esplanade at Rock Chapel Marine

Project Credits
Project: Rock Chapel Marine, Chelsea, Mass.
Client: Eastern Salt Co.
Architect: Landing Studio, Somerville, Mass. · Daniel Adams, Marie Law Adams, AIA
M/E/Structural Engineer: BuroHappold Engineering
Civil Engineer: Nitsch Engineering
Geotechnical/Environmental Engineer: Haley & Aldrich
General Contractor: Tocci Building Cos.
Cost Estimator: Daedulus Projects
Demolition Contractor: Testa Corp.
Hazardous Materials Survey Engineer: Axiom Partners
Maritime Infrastructure Engineer: Childs Engineering Corp.
Solar PV Contractor: SunBug Solar
Specifications Consultant: Kalin Associates, Architectural Specifications
Size: 12 acres
Cost: Withheld

INTERIOR ARCHITECTURE

General Motors Design Auditorium
Warren, Mich.
SmithGroupJJR

PHOTOS BY JAMES HAEFNER

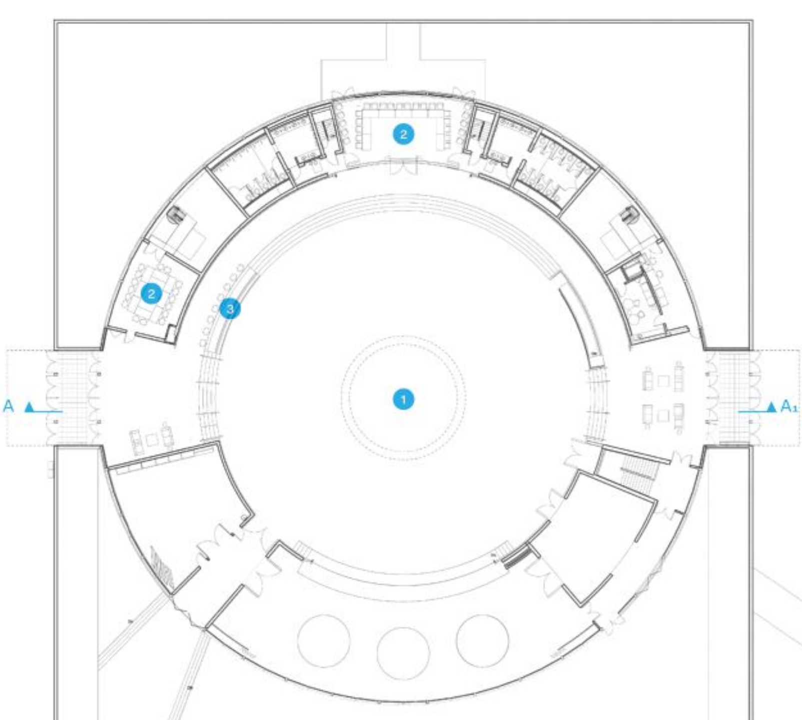
Renovated and restored interior, with view toward executive conference room

"A place for leadership in furthering new attacks on the technological frontier": So declared President Dwight D. Eisenhower in 1956, feting General Motors' new Tech Center in Warren, Mich. The showpiece of the 710-acre campus was, and remains, Eero Saarinen's Design Auditorium, a 180-foot-diameter dome atop a short colonnaded base faced in linked aluminum sheeting. The building is a sort of surgical theater for the automotive set, allowing engineers, management, and select members of the public to examine the company's latest products in a controlled setting.

As car culture has changed, however, the demands of presentation have changed as well, and SmithGroupJJR has restored Saarinen's masterpiece to pristine condition while making it a more dynamic display environment for contemporary cars. New multimedia equipment—embedded invisibly in the dome and circumferential soffit—make for a more stimulating and informative experience, while an adjacent auxiliary space has been adapted into a corporate meeting room with views of the show floor, so that while they're deciding company strategy GM execs can look right out at the goods. They can even spotlight which cars they're discussing: The pendant lighting system, which for years could only be adjusted by hand, is now controlled from a central console that not only directs light, but can also alter its color and bring up video and audio. In a suitably nostalgic touch, the console desk is a graceful modern swoosh, a tribute to the hood ornament of a classic 1940s Cadillac.

Project Credits
Project: General Motors Design Dome, Warren, Mich.
Client: General Motors
Architect/Interior Designer: SmithGroupJJR, Detroit · Paul Urbanek, FAIA (design principal); Wayne Bills, AIA (principal-in-charge); Terry Guitar, AIA (principal architect); Mark Goyette (architect); Lori James (interior designer); Rodrigo Manriquez, Leland Curtis (lighting specialist); Edward Pfannes (senior mechanical engineer); ZY Liu (structural engineer); Dominick Pastore (project engineer); Gerard Gutierrez (designer); Ryan Dashkevicz, Matthew Seeley, Margaret Wiggins, Joe Sanchez, Gary Nelson, Andrew Bodley, Thomas Le, Justin Butts (project team)
M/E/Structural/Civil Engineer: SmithGroupJJR
Landscape Architect/Lighting Designer: SmithGroupJJR
General Contractor: Roncelli
AV Consultant: AVI-SPL
Size: 39,500 square feet
Cost: Withheld

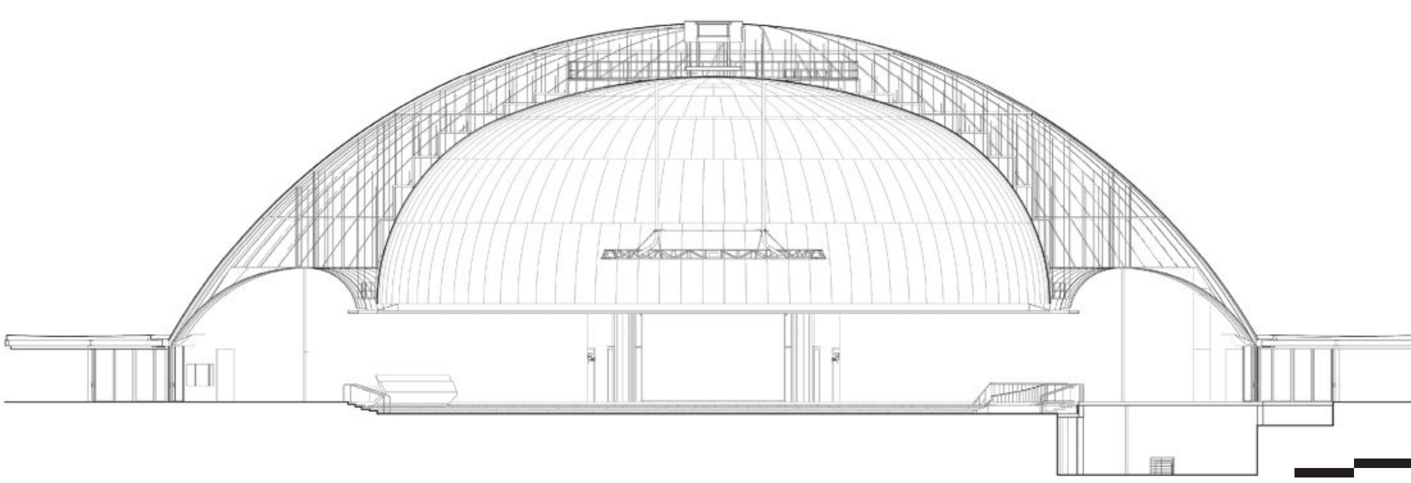
Floor Plan



1. Display floor
2. Conference room
3. Media console

Exterior view at dusk

Section A–A₁



ARCHITECTURE

The Six Affordable Veteran Housing
Los Angeles
Brooks + Scarpa

PHOTOS BY TARA WUJCIK

Exterior view from east, showing interior, second-floor courtyard

Project Credits
Project: The Six Affordable Veteran Housing, Los Angeles
Client: Skid Row Housing Trust
Architect: Brooks + Scarpa, Los Angeles
Structural Engineer: John Martin & Associates
M/E/P Engineer: Innovative Engineering Group
Civil Engineer: Barbara L. Hall
Specifications: Phil Easton
General Contractor: Golden Bear Construction
Landscape Architect: Brooks + Scarpa; LandStudio 360
Size: 18,390 square feet (gross conditioned floor area)
Cost: $10.1 million (construction, excluding furnishing)

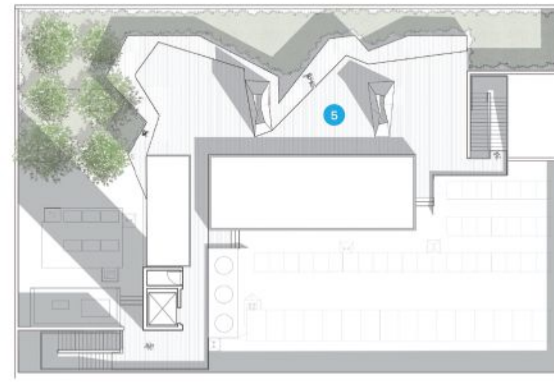
Left: Apartment interior

The Six, a new affordable housing project in Los Angeles' MacArthur Park neighborhood, is, at first glance, a bit of a formal puzzle. As seen from the east, with its giant opening into a courtyard, the newest building for the Skid Row Housing Trust looks like a big white Möbius strip, a beguiling sequence of balconies, stairways, and overlooks. Yet all this aesthetic complexity serves a very important purpose: The building's 52 below-market-rate apartments are reserved for disabled veterans, and the scheme, from local architects Brooks + Scarpa, is in fact a carefully crafted system for fostering a sense of community.

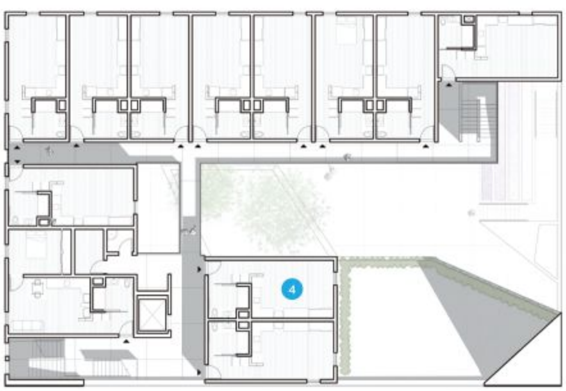
Connecting the apartments to one another, to the open landscaped areas (including a rooftop vegetable garden), and to a host of shared amenities like bike storage and meeting rooms, the building's involved circulation patterns and irregular envelope encourage residents to interact with one another and with their environment, with the intent of fostering the kind of supportive culture too often absent from the veteran-care experience. With eco-sensitive features like low-flow water fixtures and passive ventilation, the architects have gone a step further in making the building a community asset. The area around MacArthur Park has historically been one of Los Angeles' poorest and most crowded, with a high concentration of homeless. Rather than add one more social problem spot to an already ailing area, the Six helps veterans get off the street, while adding a striking presence to the neighborhood.

Fifth-Floor Plan

Roof Plan

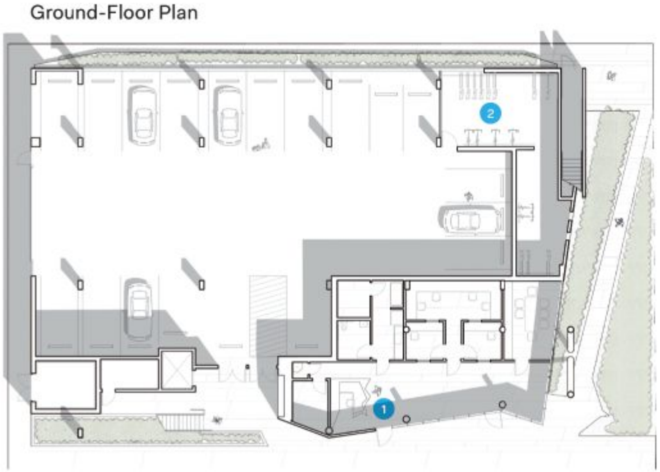


Third-Floor Plan



Fourth-Floor Plan

Ground-Floor Plan



Second-Floor Plan

1. Reception
2. Workshop/bicycle storage
3. Community space
4. Residential unit
5. Roof deck

0 10 20

COURTESY BROOKS + SCARPA

View from west, showing unit windows

INTERIOR ARCHITECTURE

George Washington University, Milken Institute School of Public Health
Washington, D.C.
Payette with Ayers Saint Gross

PHOTOS BY ROBERT BENSON

Atrium view showing circulation and informal study areas

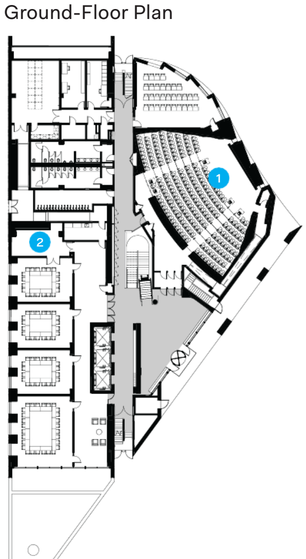
One of the 1980s' most notorious Wall Street whiz kids, Michael Milken, long ago left aside his Gordon Gekko image and embraced a different cause: public health. Over the last three decades, he and his family have given millions to develop new healthcare strategies, and their think tank's most recent initiative has led to a remarkable new project: the Milken Institute School of Public Health at George Washington University (GW), a 161,000-square-foot facility by Boston-based Payette working with local firm Ayers Saint Gross.

The Milken Institute School occupies an irregular lot on one of the capital's curiously wedge-shaped blocks, where Payette was challenged to make a space that could bring together GW's disparate health programs under one roof. Making hay with the unusual site, the designers responded to the brief by dividing the program in two, placing administrative services in a bar to the west side of the building and classrooms along its curvaceous east façade. While they were at it, they tossed out the rule book for academic interiors, fashioning a series of pod-like learning spaces to accommodate lectures and smaller groups clustered around the eastern edge that afford lovely views of Washington Circle park.

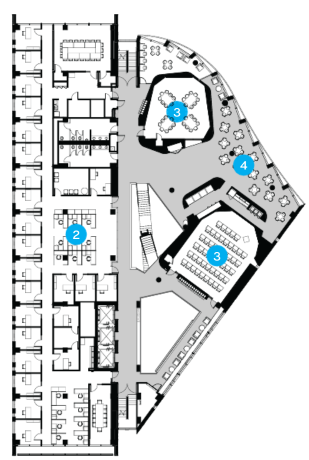
The plan is perforated with atria—these lacunae foster social interaction and are punctuated by a grand stair topped by a dramatic skylight. In a deft bit of zoning interpretation, the building's dense program was squeezed onto the site by reducing ceiling heights to 12 feet to create a seventh floor.

Project Credits
Project: Milken Institute School of Public Health, Washington, D.C.
Client: George Washington University
Architect/Interior Designer/Landscape Architect: Payette, Boston · Jim Collins Jr., FAIA (principal-in-charge); Peter Vieira, AIA (associate principal); Mark Bandzak, AIA, Cara Pomeranz, AIA (associates); Arlen Li, AIA (associate principal); Dan Russoniello, ASSOC. AIA (designer); Mary Gallagher (interior designer); Brian Carlic (landscape architect)
Associate Architect: Ayers Saint Gross, Washington, D.C. · Adam Gross, FAIA, Jason Wilcoxon, AIA (principals); Jim Wheeler, AIA (chairman); Sam Brooke (project manager); Carolyn Frederick, AIA (senior associate)
Structural Engineer: Tadjer-Cohen-Edelson Associates
M/E Engineer: Affiliated Engineers
Civil Engineer: Wilen Mensch Corp.
Construction Manager: Whiting Turner
Lighting Designer: Atelier Ten
LEED Consultant: S.D. Keppler & Associates
Elevator Consultant: Zipf Associates
Acoustical/AV Consultant: Shen Milsom Wilke
Code Consultant: Rolf Jensen Associates
Fire Protection Consultant: R.W. Sullivan Engineering
Size: 161,100 gross square feet
Cost: $60 million (construction)

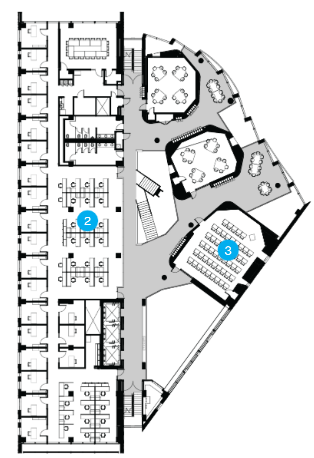
Ground-Floor Plan



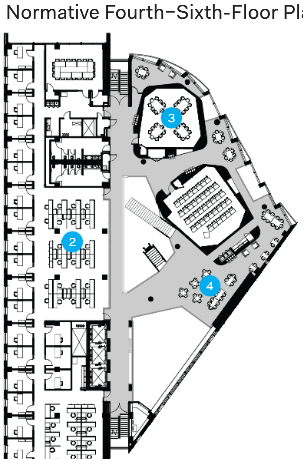
Second-Floor Plan



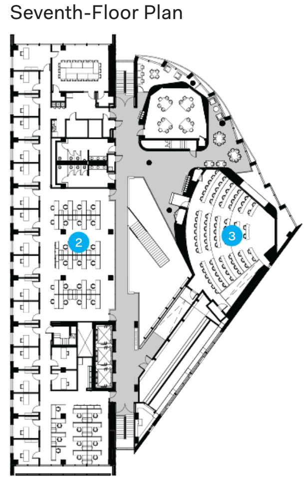
Third-Floor Plan



Normative Fourth–Sixth-Floor Plan



Seventh-Floor Plan



Interior view showing wood-clad programmed pod and break-out spaces along east façade

1. Auditorium
2. Administration
3. Classroom
4. Break-out space

ARCHITECTURE

Grace Farms
New Canaan, Conn.
SANAA with Handel Architects

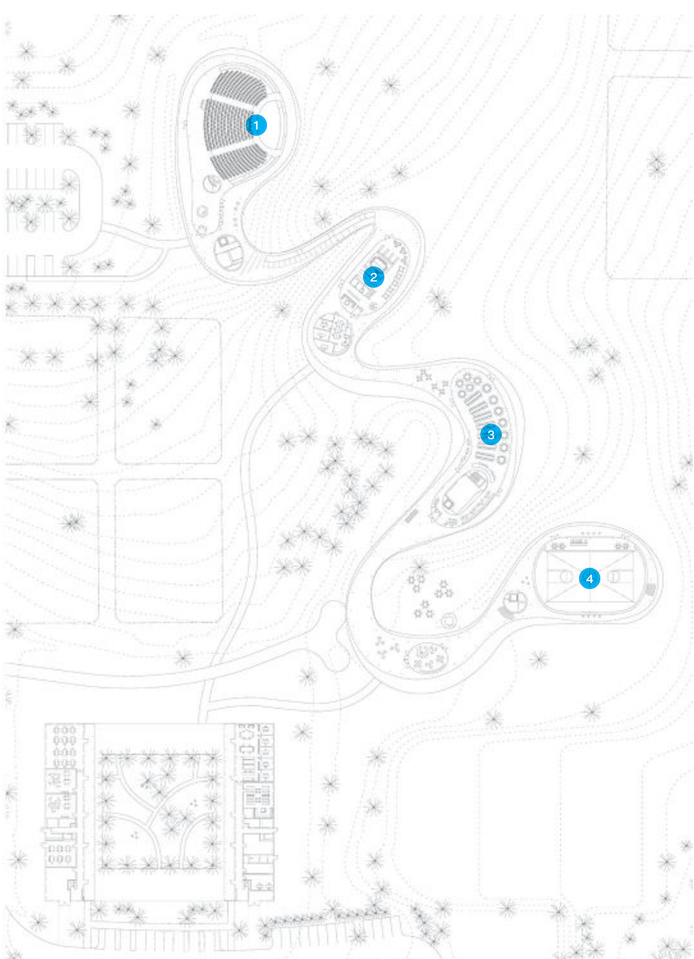
PHOTOS BY IWAN BAAN

Exterior view showing relationship to landscape and site topography

When the commission for Grace Farms was announced, it was the source of some puzzlement: What exactly was it supposed to be? With SANAA's 80-acre compound in New Canaan, Conn., now open, we have our answer—and the remarkable thing is how mysterious it remains. A parish community center that is also a public recreational facility and a stunning bit of landscape architecture, this project from Japanese duo Ryue Nishizawa and Kazuyo Sejima, who worked with New York–based Handel Architects, is hard to pin down, and not just in terms of its program. A glass-enclosed corridor that snakes down a lush hillside, the building is almost a living organism, widening to accommodate internal organs in the form of functional spaces like a library, dining hall, and gymnasium.

The nonprofit Grace Farms Foundation acquired the wooded property, one of the last such undeveloped spots in the area, to preserve it in its pristine natural condition, and the building manages to activate the site without intruding on it, a minimal-impact approach complemented by its locally sourced materials and energy-efficient construction. As nebulous as the program is, the building is grounded in a rather distinct architectural tradition—that of midcentury Modernism, for which this particular corner of Connecticut was once a sort of cradle. Only a short drive from Philip Johnson's Glass House, and not far from seminal projects by Marcel Breuer and Eliot Noyes, SANAA's building is a latter-day reflection on the elegant simplicity of the early modern masters.

Floor Plan



Opposite, Top: Exterior view of sinuous rooftop

Opposite, Bottom: Gymnasium

1. Auditorium
2. Library
3. Dining
4. Gymnasium

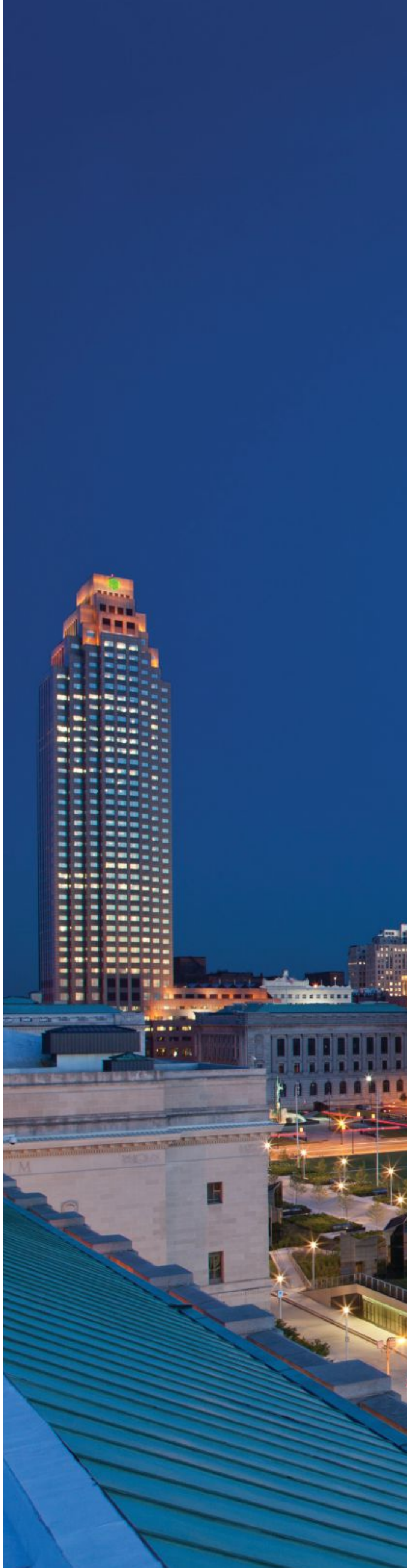
Terrace, with view of bonded-gravel pathways covered by Douglas fir glulam–beam roof

Project Credits
Project: Grace Farms, New Canaan, Conn.
Client: Grace Farms Foundation
Design Architect: SANAA, Tokyo · Kazuyo Sejima, Ryue Nishizawa, (principals); Shohei Yoshida, Takayuki Hasegawa, Tommy Haddock (project team)
Architect of Record: Handel Architects, New York · Gary Handel, FAIA (managing partner); Frank Fusaro, AIA (partner-in-charge); Rick Kearns, Peter Miller, AIA (project architects); Danielle Chao, Adham el Ghatit, Shujian Jian, Marcos Salcedo, Harshad Pillai, Michael Regan, Ana Untiveros-Ferrel, Amy Wynott (project team)
Owner's Representative/Project Direction: Paratus Group
Landscape: Olin
Construction Manager: Sciame Construction
Structural Engineer: SAPS/Sasaki and Partners; Robert Silman Associates
Civil Engineer: McChord Engineering Associates
Mechanical Engineer/Lighting/Daylighting/Sustainability Engineer/Energy Modeling: BuroHappold
Geotechnical Engineer: Langan Engineering
Geothermal Designer: Alderson Engineering
Building Envelope Consultant: Front
Sustainability Consultant: Transsolar
Wood Consultant: Wood Science Specialists
Concrete Consultant: Reginald Hough Associates
Acoustics Consultant: Nagata Acoustics
Acoustics/AV/IT/Security Consultant: Harvey Marshall Berling Associates
Meadow Consultant: Larry Weaner Landscape Associates
Soils and Wetlands Consultant: Environmental Planning Services
Conservation Planning and Herpetologist: Michael W. Klemens
Elevator Consultant: Van Deusen & Associates
Commissioning: Genesys Engineering
Cost Estimating: Stuart-Lynn Co.
Façade Maintenance: Entek Engineering
Kitchen Planning: Frank N Giampietro Associates
Surveyor: Rocco V. D'Andrea
Testing/Inspections: HAKS Engineers
Graphics: Pentagram
Size: 75,000 square feet (total enclosed area); 80 acres (site)
Cost: $67 million (construction)

REGIONAL & URBAN DESIGN

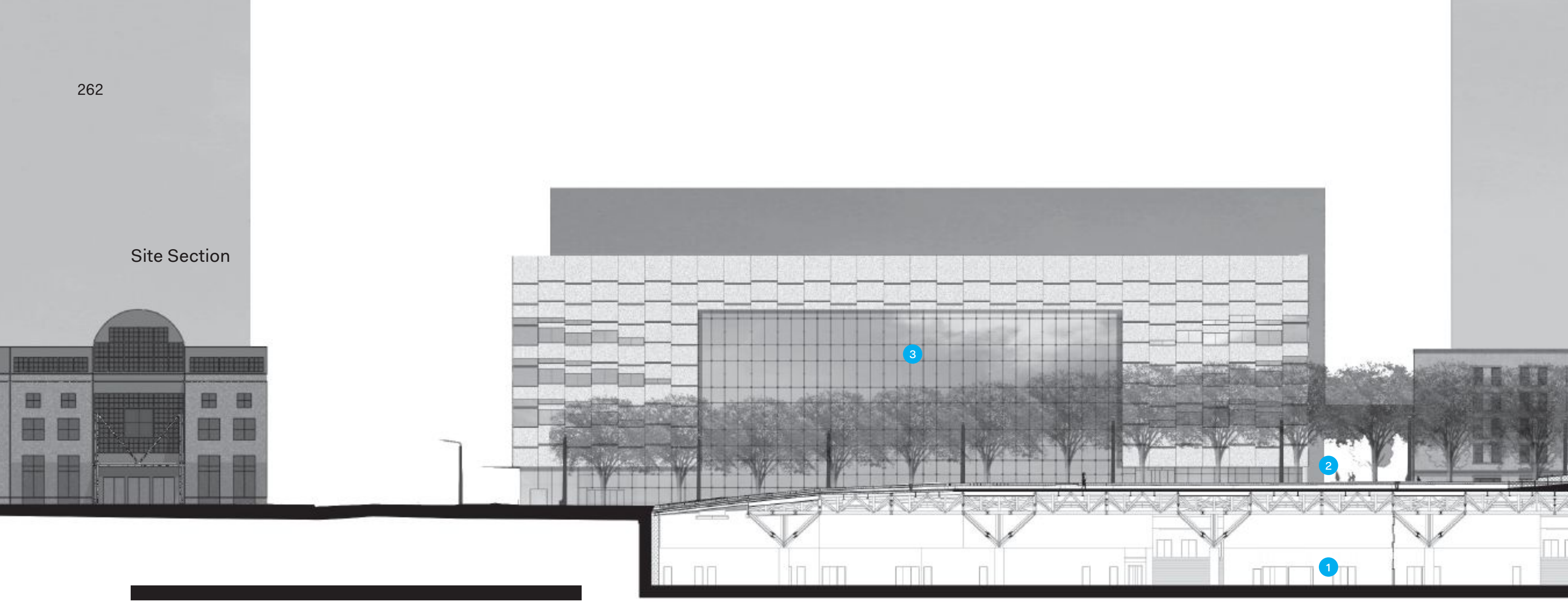
Cleveland Civic Core
Cleveland
LMN Architects

PHOTOS BY JIM MAGUIRE



Night view of Mall showing convention center in foreground and Global Center for Health Innovation beyond

Site Section



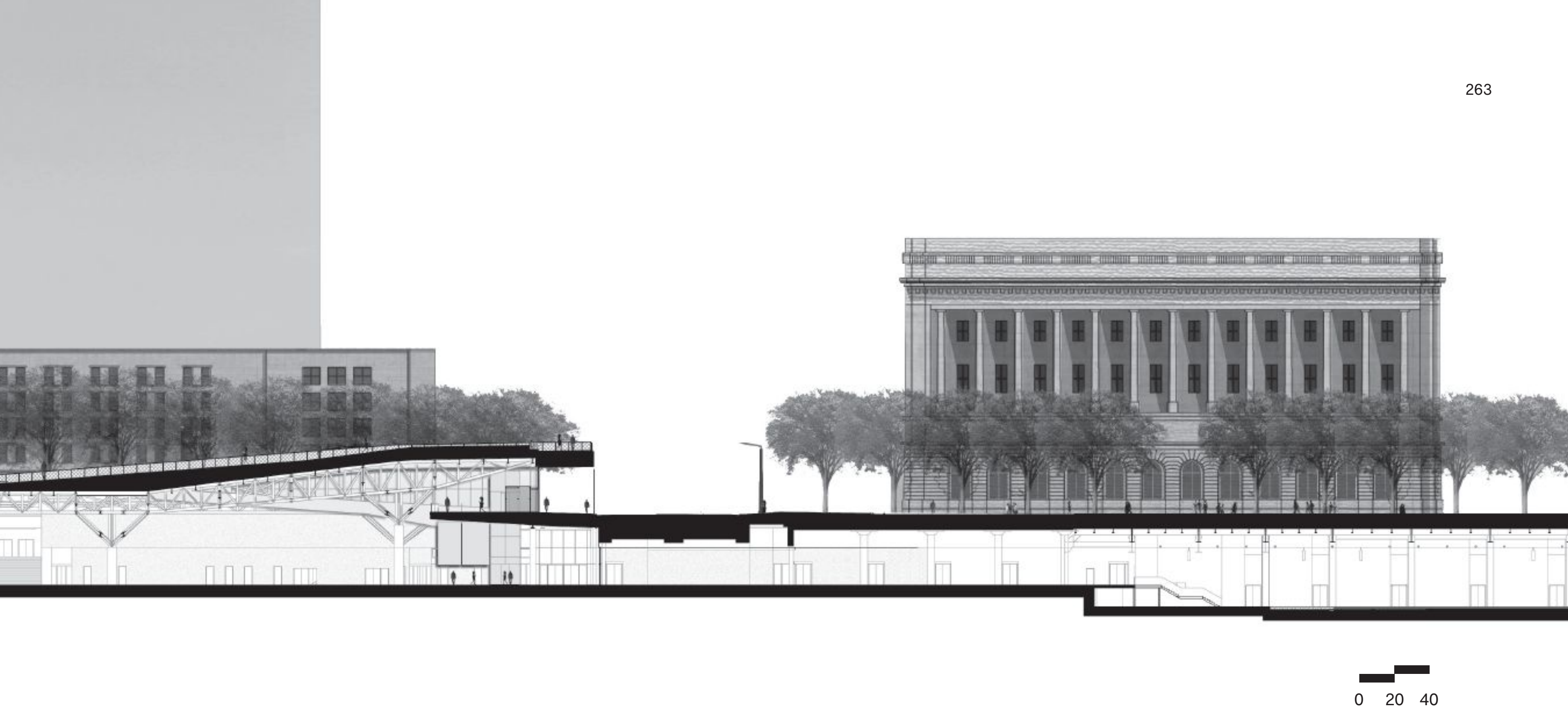
1. Convention Center
2. Mall
3. Global Center for Health Innovation

Daniel Burnham—“Uncle Dan” to the generation of American architects that came of age at the turn of the 20th century—was one of the country’s foremost proponents of the integrated, Beaux-Arts-inspired planning approach known as the City Beautiful movement. Among his few completed urban-scale projects is the Cleveland Mall. Often called the Burnham Mall in his honor, the monumental corridor with its stately public buildings has seen its fortunes rise and fall with those of the city around it. The city took advantage of its current upswing to revitalize the 600,000 square feet of lakefront parkland with the help of Seattle-based LMN Architects. Part of that plan, a new Cleveland Convention Center, is (as its predecessor was) discreetly hidden beneath the Mall.

Taking its cue from the sweeping Connecting Cleveland 2020 Citywide Plan, the new convention center organically connects the subterranean space to the city via a glass-enclosed pavilion that emerges dramatically out of the ground, carrying the greenway on its back. The “Lakeside Lift,” as its designers have termed it, admits ample daylight and affords views of Lake Erie, giving the convention center much-needed breathing room without disturbing Burnham’s scheme.

LMN has also designed the new Global Center for Health Innovation on the Mall’s western perimeter, a five-story structure dedicated to Cleveland’s all-important medical industry. Contemporary in its aesthetic, the building still exudes a stateliness suitable to the historic site. Uncle Dan would have approved.

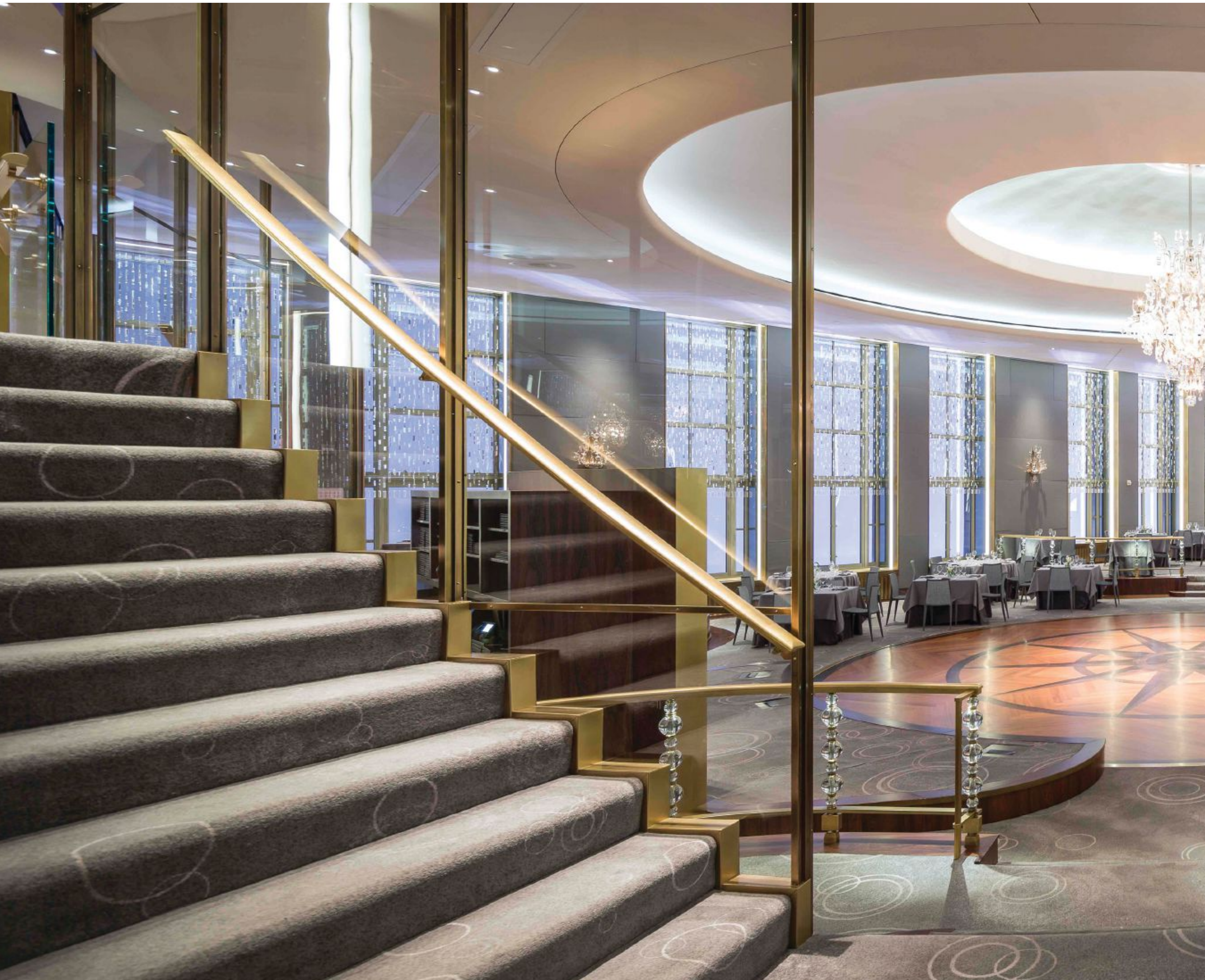
Project Credits
Project: Cleveland Civic Core, Cleveland
Client: MMPI
Owner: Cuyahoga County
Design Architect/Interior Designer: LMN Architects, Seattle · Mark Reddington, FAIA, Rafael Viñoly-Menendez, AIA, Stephen Van Dyck, AIA (partners); Chris Eseman, AIA (senior principal); Howard Howlett, ASSOC. AIA, Lori Naig, Leo Da Costa, ASSOC. AIA (principals); Scott Crawford, ASSOC. AIA (associate); Michael Petersen, ASSOC. AIA, Brian Tennyson, AIA, Tyler Schaffer, AIA, Dawn Polak, Eric Nothdurft, AIA, Alex Woodhouse, AIA, Kailin Gregga, AIA, Kalan Beck, Maria Hui, AIA (project team)
Prime Architect: URS; Robert P. Madison International
Landscape Design: Gustafson Guthrie Nichol; McKnight Associates
Design/Build Contractor: Turner Construction Co.
Civil Engineer: Ralph Tyler Cos.; Osborn Consulting
M/E/P Engineer: Karpinksi Engineering
M/E/P Adviser: McCleskey Consulting
Structural Engineer: Magnusson Klemencic Associates; Barber Hoffman; Osborn Consulting
Lighting Designer: Horton Lees Brogden
Vertical Transportation: Lerch Bates
Code/Life Safety: Howe Engineers
Historic Renovation: Van Auken Akins Architects
Exterior Envelope: Morrison Hershfield
Size: 235,000 square feet (Global Center for Health Innovation and entry pavilion); 767,000 square feet (convention center)
Cost: $348 million (construction)



View along Mall toward Lake Erie

INTERIOR ARCHITECTURE

30 Rockefeller Plaza: 65th Floor, Rainbow Room, Bar SixtyFive
New York
Gabellini Sheppard Associates with Montroy Anderson DeMarco



PHOTOS BY PAUL WARCHOL

Restored Rainbow Room

Iconic New York City landmarks don't get much more iconic, or more New York, than the Rainbow Room, the beloved bar and event space on the 65th floor of 30 Rockefeller Plaza. Following its opening in 1934, it remained the highest-elevated restaurant in the United States for decades. Countless bar mitzvahs later, and after taking a wallop during the 2008 downturn, the Rainbow Room had fallen on hard times—but now it's back, following a spectacular new renovation by local firm Gabellini Sheppard Associates, working with Montroy Andersen DeMarco.

The de facto caretakers of Rockefeller Center, Gabellini Sheppard has been responsible for restoring the complex's Fifth Avenue retail façades, as well as designing the Top of the Rock viewing platform. Under their sensitive stewardship, the landmarked portions of the Rainbow Room's 13,500-square-foot interior have regained their erstwhile luster: The famed rotating floor has entirely new mechanicals, the dome above has been refinished in silver leaf, and the giant chandelier dangling from its center has been fully spruced and had its broken crystals replaced.

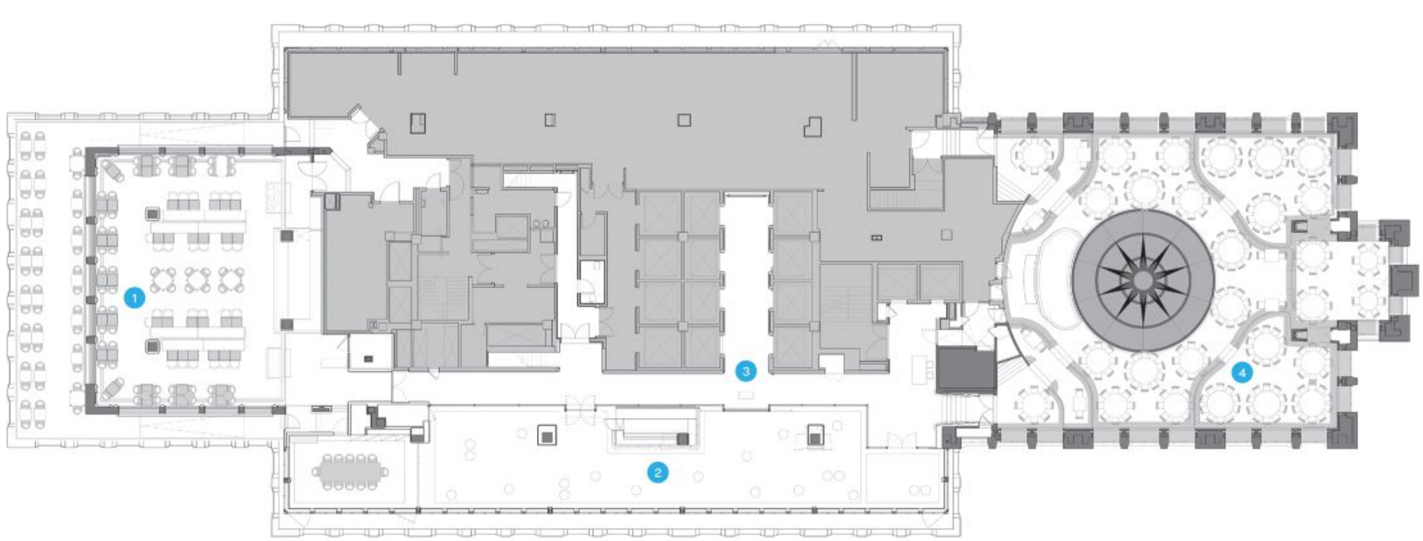
SixtyFive, the bar that occupies a third of the space at the west end of the building and does not have landmark status, has been given a fresh look consistent with the Deco atmosphere. New window treatments, wall hangings, and custom furniture throughout sensitively blend with the older ambience. Even the project's new LEED rating seems appropriate: Silver.

Project Credits
Project: 65th Floor, Rainbow Room, Bar SixtyFive, New York
Client: Tishman Speyer Properties
Design Architect: Gabellini Sheppard Associates
Architect of Record: Montroy Andersen DeMarco
M/E/P Engineer: Edwards & Zuck Engineers
Construction Manager/General Contractor: Turner Construction
Lighting Designer: Tillotson Design Associates
Landmarks Consultant: Higgins Quasebarth & Partners
Acoustics: Longman Lindsey
AV Consultant: CMS AV Solutions
Purchasing Co.: Evenson Best
Size: 14,060 square feet
Cost: Withheld

1. Bar SixtyFive
2. Terrace
3. Restored hallways
4. Rainbow Room

0 10 20

Floor Plan



Top: Refreshed Bar SixtyFive

Right: Restored hallway

ARCHITECTURE

Aspen Art Museum
Aspen, Colo.
Shigeru Ban Architects with CCY Architects

PHOTOS BY MICHAEL MORAN/OTTO

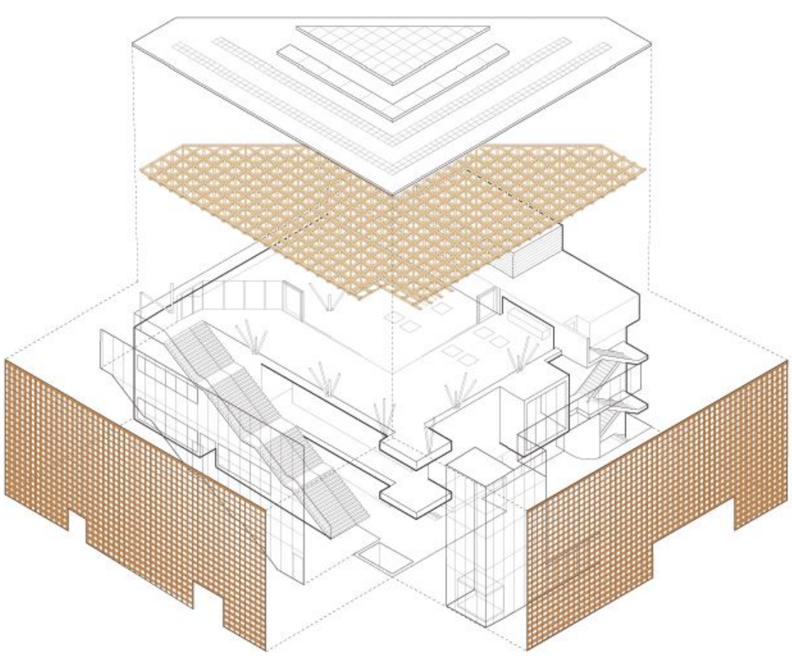
Exterior view

Shigeru Ban, HON. FAIA, is a master of material sorcery, a designer who's made magic out of such humble stuff as recycled paper and wooden boxes, stacking and laminating them into structures that are visually boggling and yet relatively inexpensive. The Aspen Art Museum is a little (though not too far) further up the budget food chain, and it shows what the Japanese architect can do when given room to run.

The 33,000-square-foot building features a wooden brise soleil over two sides of its glass façade, a suitably organic cladding system given the rustic Rocky Mountain locale. The material theme continues onto the roof, where a wooden truss supports a sculpture garden that also happens to be the only public rooftop in the snowbound city. Programmatically, the scheme lures visitors up to the terrace by way of a large, glazed elevator that is set into a corner and fully visible from the street: Passersby get to enjoy the spectacle of watching it float gently up and down, as the museum-goers ascend to the uppermost floor and then work their way down through the galleries.

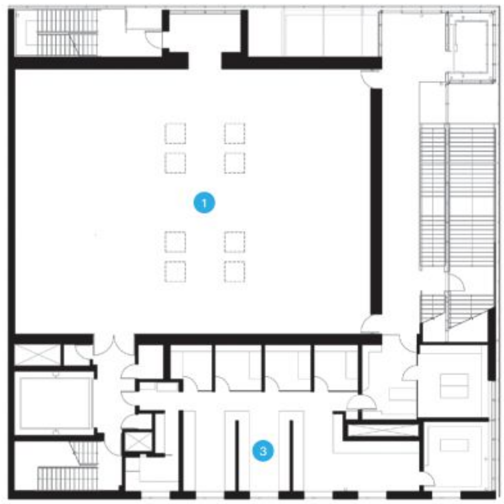
Besides the obvious gravitational logic of this earthward progression, it also ensures that everyone who gets to the top will get a good gander at the extraordinary view of the snow-capped mountains through the layered frames of the windows, the truss, and the wood lattice. The success of Ban's solution is borne out in the bumper five-fold increase in museum attendance since it opened in 2014—the same year, appropriately, that its designer won the Pritzker Prize.

Exploded Axonometric

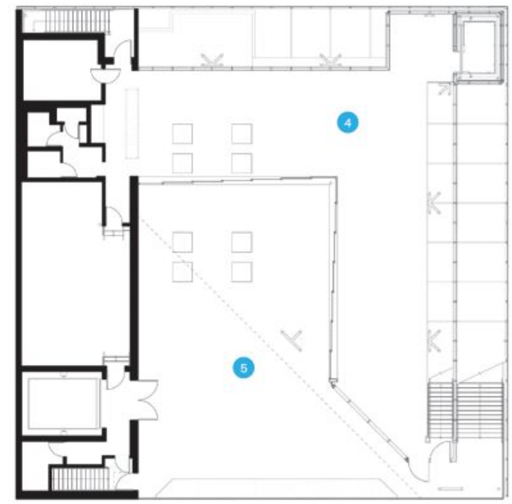


Project Credits
Project: Aspen Art Museum, Aspen, Colo.
Client: Aspen Art Museum
Design Architect: Shigeru Ban Architects, Tokyo · Shigeru Ban, HON. FAIA, (principal); Dean Maltz (partner); Nina Freedman (director of projects); Zachary Moreland, AIA (project architect); Ji Young Kim, AIA (architect); Grant Suzuki, Takayuki Ishikawa, Mark Gausepohl, Jesse Levin, Christian Tschoeke (project team)
Architect of Record: Cottle Carr Yaw Architects, Basalt, Colo. · John Cottle, FAIA, Rich Carr, AIA, (partners, principals); Robin Schiller, AIA (principal, project manager); Chad Weltzin, AIA (project architect); Erica Golden, AIA, Maura Trumble, Matt Smith (project team)
Interior Designer: Shigeru Ban Architects; Cottle Carr Yaw Architects
M/E Engineer: BG Buildingworks
Structural Engineer: KL&A; Hermann Blumer (Création Holz Gmbh)
Civil Engineer: Sopris Engineering
Lighting Designer: L'Observatoire International
Landscape Architect: Bluegreen
General Contractor: Turner Construction; Summit Construction
Building Envelope: Front
Climate Engineering: Transsolar
Specialty Timber Fabricator: Spearhead
Owner's Representative: O'Connor Consulting
Size: 33,000 square feet
Cost: $24 million

Second-Floor Plan

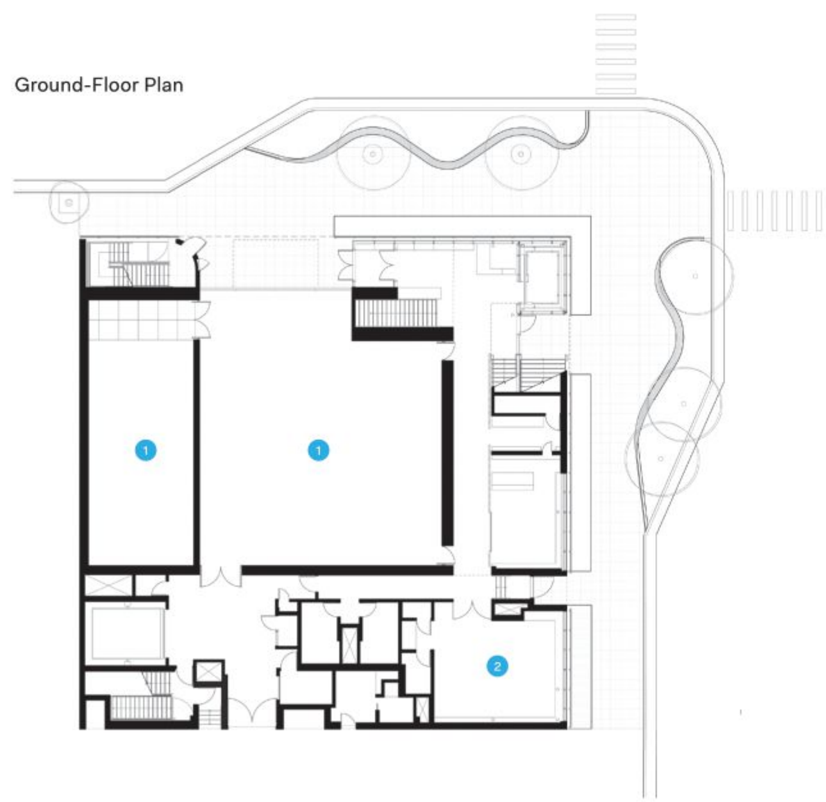


Third-Floor Plan



Lower-Level Plan

Ground-Floor Plan



1. Gallery
2. Education workshop
3. Offices
4. Café
5. Roof terrace/sculpture garden

Top: Café, with operable glass walls that open onto roof terrace

Above: Ground-floor gallery interior, with movable walls that can be reconfigured for each exhibition

Opposite: Grand staircase, split by building envelope into inside and outside runs

ARCHITECTURE

Carnegie Hall Studio Towers Renovation Project
New York
Iu + Bibliowicz Architects

PHOTOS BY JEFF GOLDBERG/ESTO

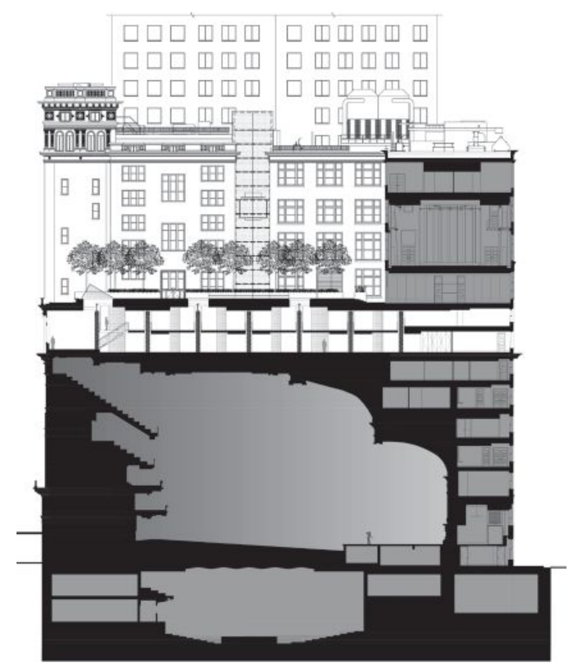
Exterior view from northwest,
showing landscaped terrace

New Yorkers of a certain vintage who were lucky enough to visit the artists studios that once occupied the tower above Carnegie Hall will recall fondly those rundown lofts, packed with the possessions of their bohemian tenants. But no need to mourn: The Carnegie Hall Studio Towers Renovation Project, by local office Iu + Bibliowicz Architects, hasn't so much deleted a chapter in the building's history as it has written a new one.

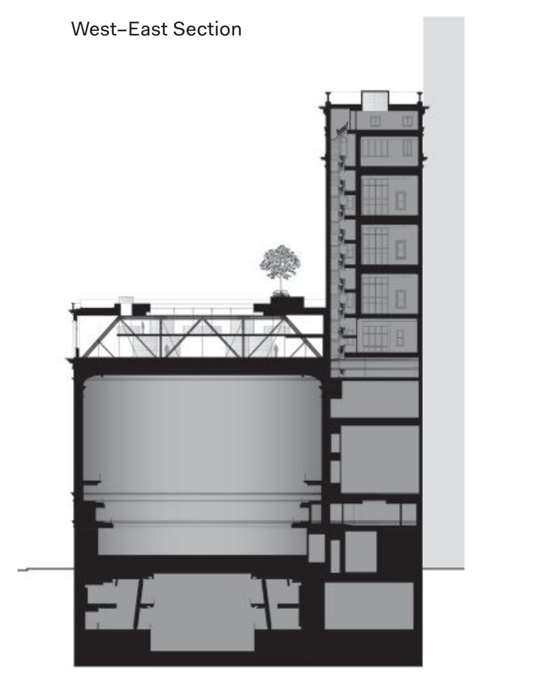
Fully 165,000 square feet of educational spaces, rehearsal rooms, administrative offices, and more now fill the tower, making it an integral part of the public programs and cultural mission of the world-renowned music and performance venue downstairs. The intervention was measured, but it is still extensive—existing walls and columns have been removed and rearranged to improve acoustics in the practice spaces, and glass walls have been added to bring more light into the former dwellings.

The update brings the 1891 tower up to LEED Silver standards, and the building wears its green credentials on its sleeve with a new landscaped outdoor terrace on the roof above the music hall. All of this has left the exterior practically untouched, save for a dramatic new LED lighting system that makes the monumental structure an unmissable landmark (all but rendering moot the old joke about how to get there). In a further logistical coup, not a single performance had to be canceled during the years-long renovation.

North–South Section



West–East Section



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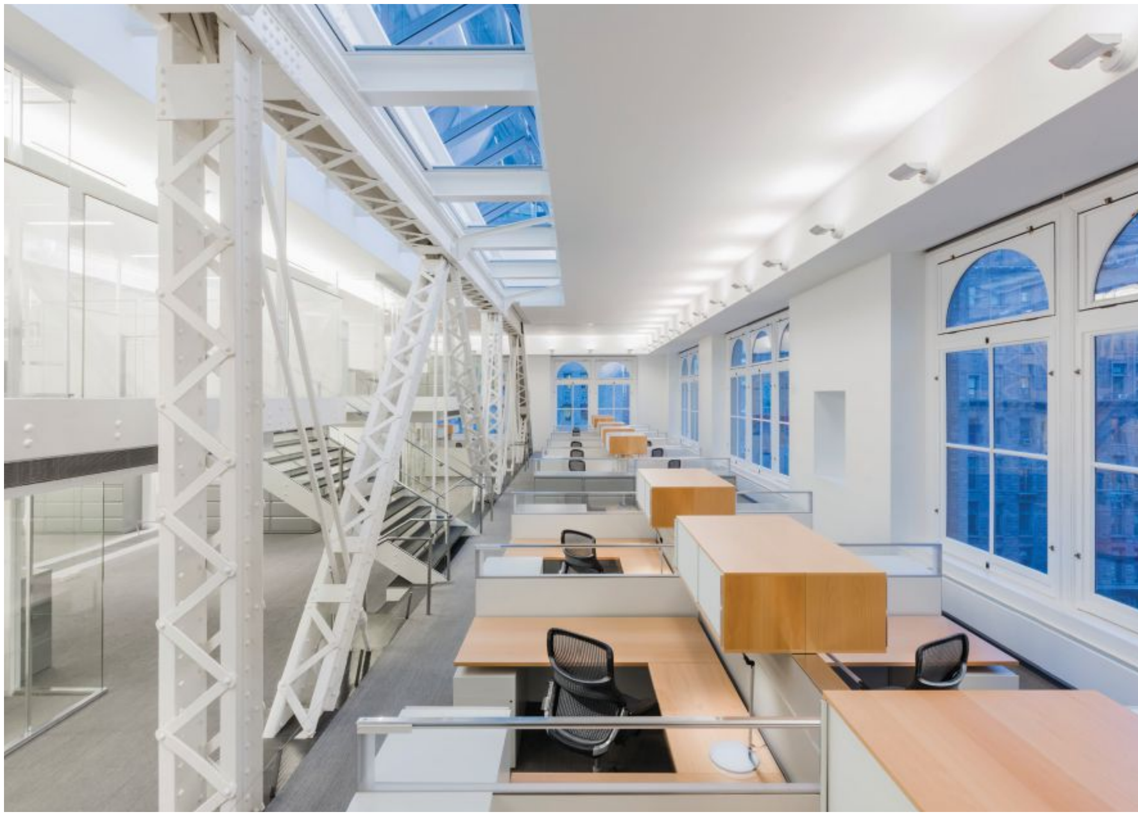
Project Credits
Project: Carnegie Hall Studio Towers Renovation, New York
Client: Carnegie Hall
Architect/Interior Designer: Iu + Bibliowicz Architects, New York · Carolyn Iu, AIA, Natan Bibliowicz, AIA (partners); Harold Gross, AIA (associate); Anne Watenberg, AIA, James Christerson, AIA, Linda Bower, Gregory DeNicola, Michael Hughes, Vaso Mitrou, Jenny Kononenko Peysin, Etien Santiago, Andrew Wetzler, Thomas Kosbau (project team)
M/E Engineer: Cosentini Associates
Structural Engineer: Robert Silman Associates
Construction Manager: Tishman Construction
Landscape Architect: Olin
Lighting Designer: Kugler Ning Lighting Design
Acoustics: Kirkegaard Associates
Theater Design: Auerback.Pollock. Friedlander
Elevators: VDA
Roofing and Exterior Consultant: Gilsanz Murray Steficek
Signage & Graphics Design: Graham Hanson Design
Code Consultant/Expediter: KM Associates
Specifications: Construction Specifications
Kitchen Design: Foodservice Facilities International
Window Washing Systems: Entek Engineering
Irrigation: Fluidity Design Consultants
Renderings and Movies: Studio AMD
Size: 165,000 square feet
Cost: $230 million



Top: Double-height open office space, with exposed 19th-century trusses

Above: Rehearsal room, retaining fireplace from original artists studio

REGIONAL & URBAN DESIGN

Reinventing Vilonia
Vilonia, Ark.
University of Arkansas Community Design Center

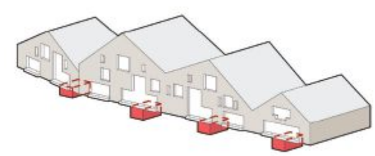
Aerial view of new urban plan showing new town square that increases density of amenities, creating new central hub for Vilonia

A 45-minute drive north of Little Rock, Ark., the town of Vilonia has long been prey to tornadoes, but the one that struck in April 2014 was like none before: Winds that approached 200 miles per hour uprooted houses, shattered shop windows, and blew a massive fertilizer tank more than half a mile. When the dust settled, 16 people had been killed. But the calamity inspired a firm resolve to rebuild—and to rebuild right.

Together with the University of Arkansas Community Design Center, Vilonia has embarked on a Reinvention Plan, aimed at making the town more resilient to future catastrophes while giving residents a higher quality of life through smart urban thinking. On the resiliency front, the plan calls for the installation of an underground network of shipping containers to be used as bunkers in the event of another twister: More reliable than home-built storm shelters and less likely to cause dangerous traffic in a disaster than a single communal bunker, the solution puts every resident within a five-minute walk to safety.

Above ground, new parks and public sports facilities, a new central square and farmers market, and a pedestrian-friendly refurbishment of the highway running through the center of town will make the area more attractive to businesses and prospective residents. Beyond their aesthetic value, these features will improve access to the underground "safescape." With incidences of weather-related disasters on the rise, the Vilonia plan is one that could become a model for towns throughout the state.

Single-Family Safe Rooms



Community Container Safe Room

Project Credits
Project: Reinventing Vilonia, Vilonia, Ark.
Client: City of Vilonia, Ark.; Rebuild Vilonia
Designer: University of Arkansas Community Design Center, Fayetteville, Ark. · Stephen Luoni, ASSOC. AIA, Matt Hoffman, ASSOC. AIA, Paco Mejias Villatoro, Joshua Palmer, AIA, Tanzil Idmam Shafique, ASSOC. AIA, Jay Williams, ASSOC. AIA, Chen Lu, Jonathan A. Martinez, ASSOC. AIA, Linda Komlos (project team)
Consultants: Gateway Planning Group; UALR Institute for Economic Advancement
Sponsors: Central Arkansas Planning and Development District; U.S. Economic Development Administration; Metroplan

ARCHITECTURE

Thread: Artists' Residency and Cultural Center
Sinthian, Senegal
Toshiko Mori Architect

PHOTOS BY IWAN BAAN

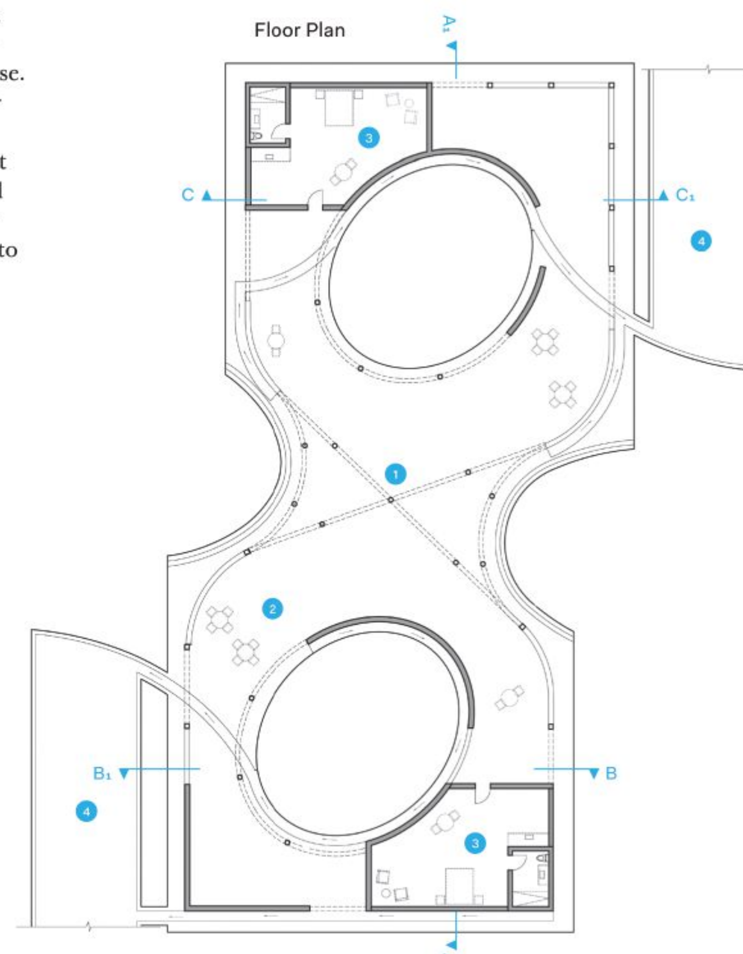
Exterior view, showing perforated brick walls that allow air to circulate through building

A Japanese architect, a Senegalese doctor, and a long-dead German-American painter: These three unlikely figures are the driving force behind Thread, a remarkable new initiative in the small rural town of Sinthian in eastern Senegal. The architect, Toshiko Mori, FAIA, is a longtime professor at Harvard's Graduate School of Design; in 2004, she designed an exhibition for the Josef and Anni Albers Foundation, the nonprofit organization created by the 20th-century artist. Learning of the foundation's work in Sinthian in support of local doctor Magueye Ba, Mori was so intrigued that she traveled to the village to lead a series of community workshops—an experience that in turn gave rise to a much larger venture.

Doing triple duty as a social center, healthcare facility, and infrastructural tool, Thread gives artists a place to practice their craft, for schoolchildren to learn, and for villagers to gather. The building itself helps provide water for the town through a novel design and structural solution: A thatched roof of dried grass and bamboo shaped into a sequence of sloping V's directs rainfall into water troughs strategically positioned in and around the structure that, in turn, flow into two adjacent cisterns where the water is stored for later use. All this Mori was able to carry out remotely from her New York studio, working up the digital design and then sending it off to local craftsman who executed it with astonishing precision. Adding still another level of functionality, Thread also serves as home base for an international artist residency, bringing the world to Sinthian and Sinthian to the world.

Project Credits
Project: Thread: Artist's Residency and Cultural Center, Sinthian, Senegal
Client: Josef and Anni Albers Foundation
Architect: Toshiko Mori Architect, New York · Toshiko Mori, FAIA, Jordan MacTavish
Structural Engineer: Schlaich Bergermann & Partner
General Contractor: Dr. Magueye Ba
Size: 11,285 square feet
Cost: $227,715

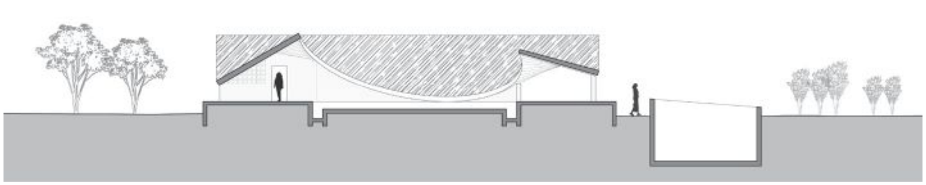
Floor Plan



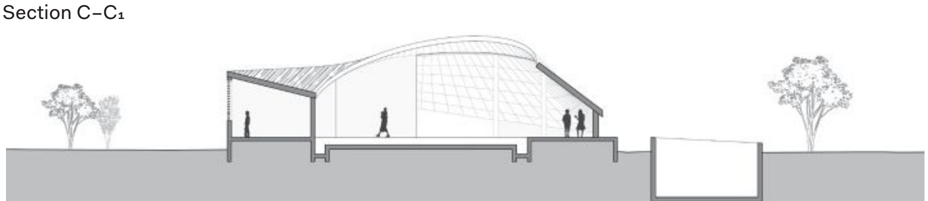
1. Gathering space
2. Breakout area
3. Artist's bedroom
4. Cistern

Section A–A$_1$

Section B–B$_1$



Section C–C$_1$



Above: View of sloping thatched roof that funnels rainwater to storage cisterns

Community gathering space, with
doorway to artist's residence at left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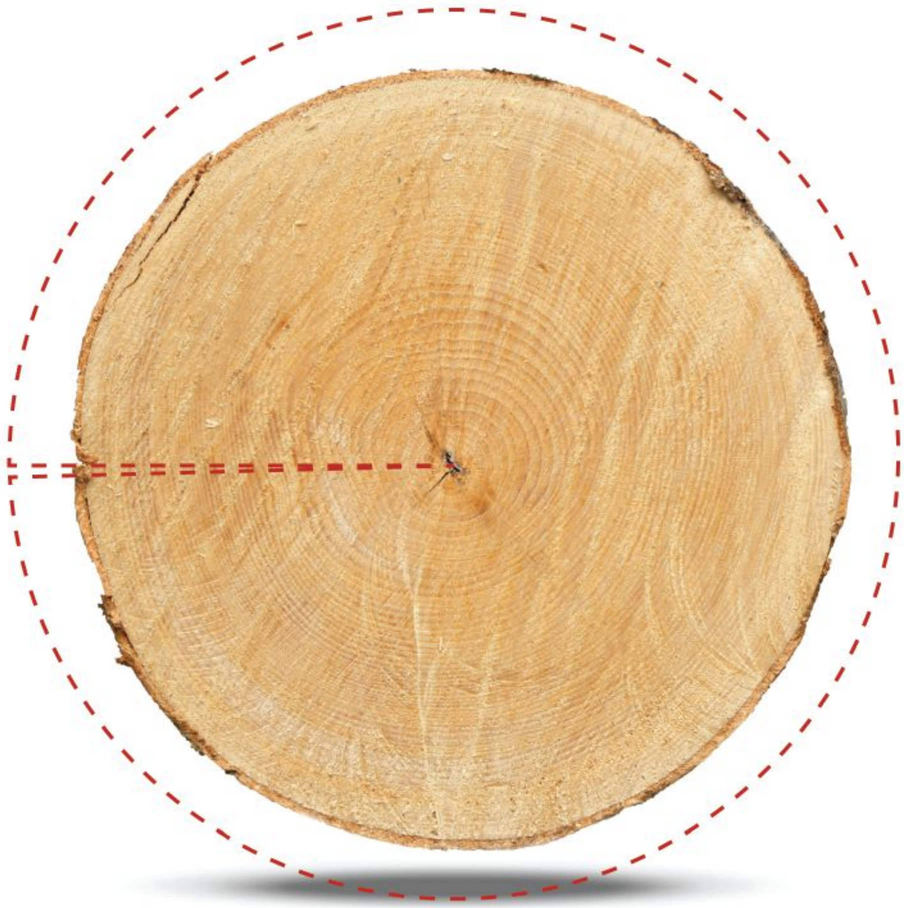
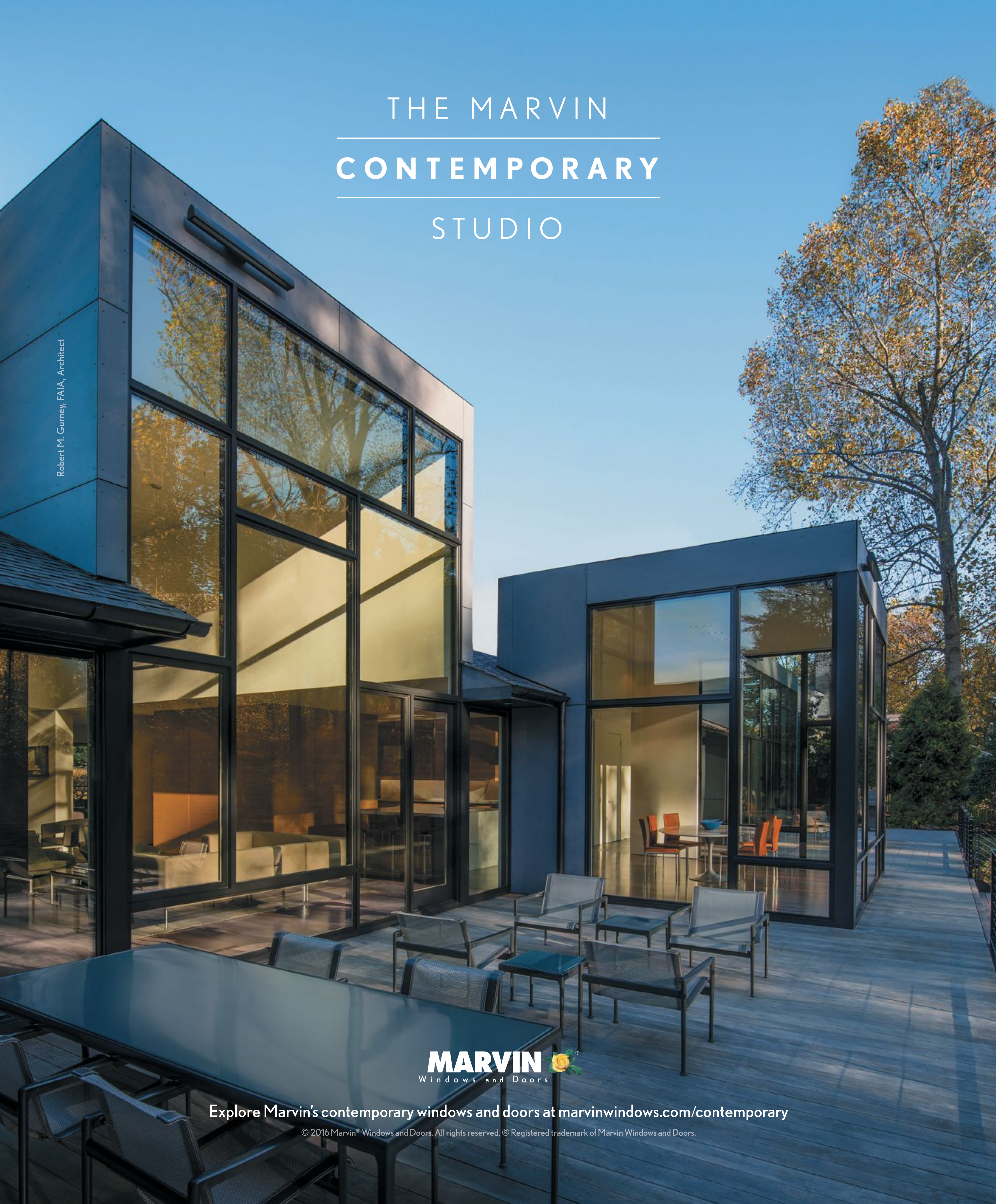
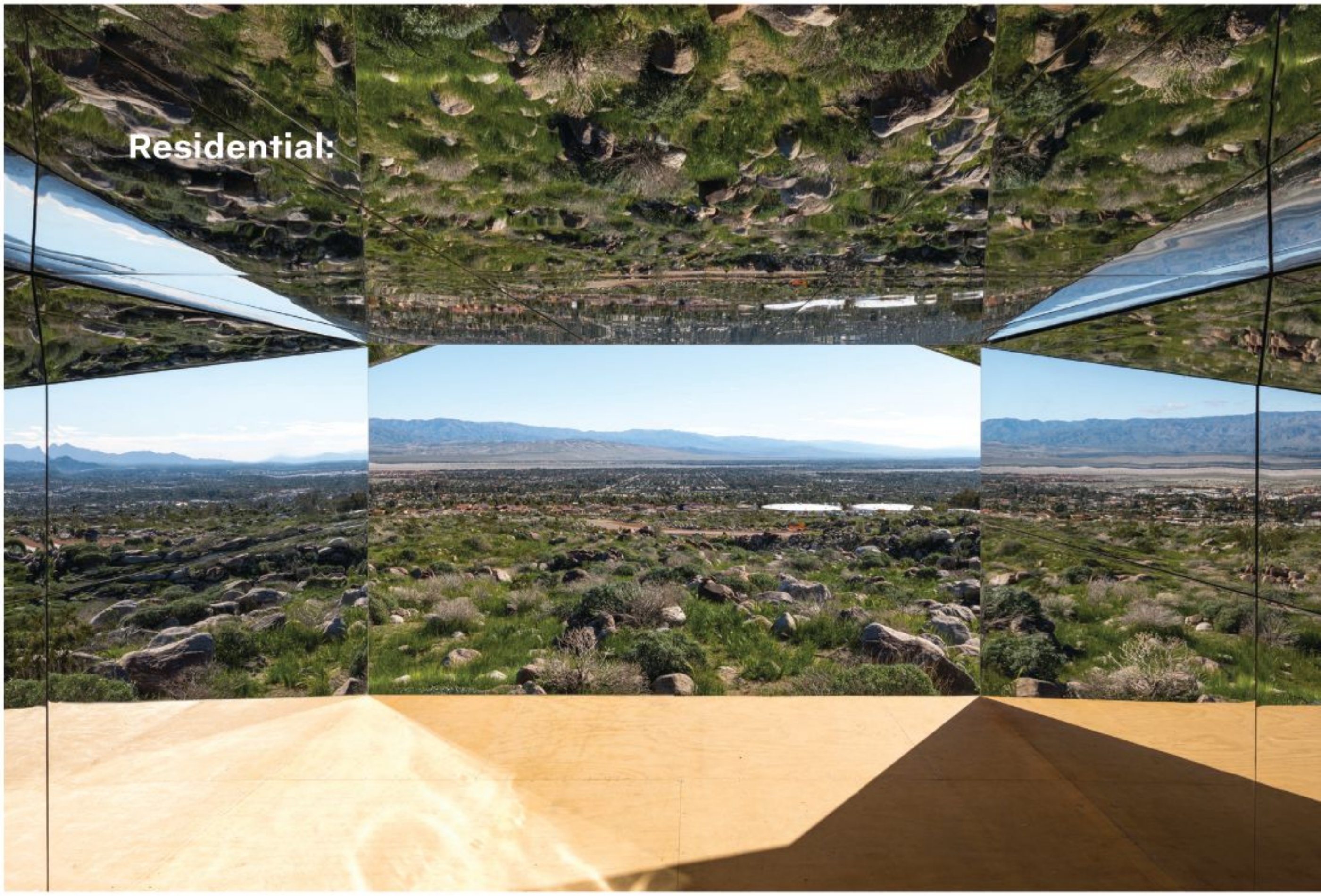
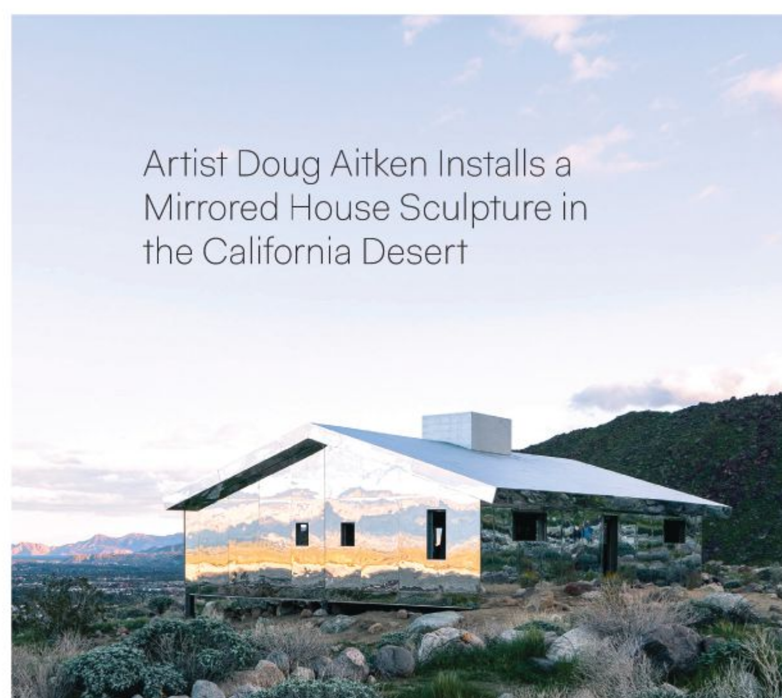




Residential:



Artist Doug Aitken Installs a Mirrored House Sculpture in the California Desert



LANCE GERBER

TEXT BY SYMONE GARVETT

Known for transforming buildings such as the Hirshhorn Museum (*Song 1*, 2012) and the Museum of Modern Art (*Sleepwalkers*, 2007) with video projections, American artist and filmmaker Doug Aitken continues his architectural manipulations with *Mirage*, an uninhabited, 1,800-square-foot structure in Palm Springs, Calif., modeled after a ranch house. The mirrored interior and exterior surfaces reflect the San Jacinto Mountains and desert terrain, and the work—on view until Oct. 31—aims to examine the dueling desires to preserve and conquer nature. "I want to see this work disappear and reappear in continuously different ways," Aitken says.

> *See more images of Mirage at bit.ly/AitkenMirage.*

Three Table Lamps Emanate Both Light and Elegance

TEXT BY SELIN ASHABOGLU

1. Bounce Table Lamp, Roll & Hill This smooth-edged LED fixture uses a slim, folded wood-veneer shade to reflect light from below for soft illumination. The 10W table lamp has an aluminum base and measures 17" tall by 22.5" wide. *rollandhill.com*
2. Theia, Marset Named after the mythological Greek goddess, the spun-metal fixture is topped with a semi-spherical thermoformed plastic shade. The 7.8W Theia measures 17" tall by 12.5" wide and is available in white (shown) and black finishes. *marset.com*
3. Eva, Lumina Designed by London-based Foster + Partners, this 18.8W glass fixture emits light from a single LED at its aluminum base upward into a reflective cone. The grooved base—also a rotating dimmer—is offered in four finishes. *lumina.it*

CLAIRE BENOIST

> For more information about these table lamps, visit bit.ly/TableTopLamps.

A University of Southern California Architecture Studio Designed This 92-Square-Foot Movable Shelter to Fight Homelessness in Los Angeles

TEXT BY VICTORIA CARODINE

On any given night, about 50,000 people are homeless in Los Angeles—a number that has increased 5.7 percent since 2015. The situation has reached such a crisis point that Mayor Eric Garcetti recently declared a state of emergency. While many projects focus on providing long-term housing for the homeless, a studio at the University of Southern California's School of Architecture instead looked to make a more immediate impact with a design for a movable temporary shelter.

The Homeless Studio, a course supported by the Martin Architecture and Design Workshop foundation, has created Homes for Hope, a prototype for a 92-square-foot unit with a bed, desk, chair, and shelves. Each unit will cost about $25,000 for labor and materials.

The modular units can be stacked and assembled into an entire complex in two weeks. The Homeless Studio estimates that a 45-unit, 30-bed complex—including 15 units for offices and communal space—would cost $1.5 million. For an additional $60,000 to $65,000, the complex could be disassembled and rebuilt elsewhere.

Designed to meet the city's building and zoning codes, Homes for Hope is considered congregate housing, and since the project is locally manufactured and assembled on-site, a unit can be put up on any residential or commercial plot of land and stay there for up to two years. Hope of the Valley Rescue Mission, the first client, is fundraising for the pilot installation catering to senior homeless women in L.A.'s Sylmar neighborhood.

BRANDON FRIEND-SOLIS

> *Read more about Homes for Hope at bit.ly/HomesforHope.*

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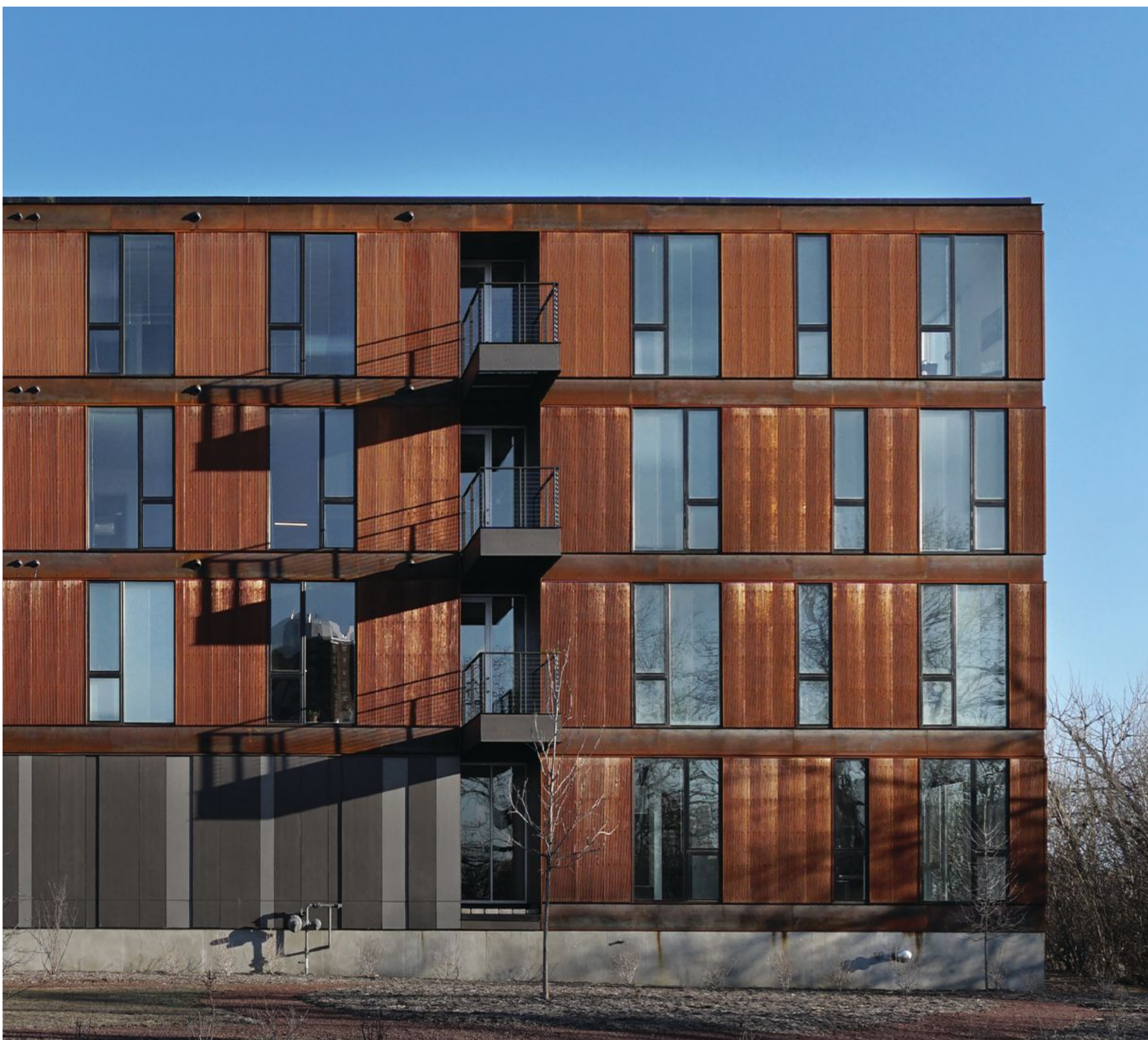
Belay MKE
Milwaukee
Johnsen Schmaling Architects

TEXT BY EDWARD KEEGAN, AIA
PHOTOS BY JOHN J. MACAULAY



Rock climbing and residential isn't an obvious mix of uses, but when a suburban Milwaukee gym started looking for a location closer to downtown, they teamed with an enlightened residential developer and local firm Johnsen Schmaling Architects to forge a solution that deploys the "big box" necessary for the program without that typology's typically anti-urban aspects.

The firm started with a remarkable advantage in designing the building, Belay MKE: The developer set no requirement for the number of rental apartments, allowing design to drive the program. The architects positioned the 60-foot-tall blank-walled gym at the site's northwest corner, facing a main thoroughfare, and configured units on a single-loaded, backwards L-shaped corridor, fitting 46 apartments in all. One-bedroom units along the building's east side and two-bedroom units on the south overlook the Milwaukee River and provide views of either Lake Michigan or downtown in the distance.

The unusual combination of programs suggested a hybrid structural solution: A poured-in-place, below-grade parking structure is topped by precast concrete planks at the first floor. From this base, the gym's steel frame supports 80-foot, long-span steel trusses to provide a column-free space. The apartment wings are wood-framed.

The site was once a railroad yard, and the architects wanted to honor that gritty legacy. "We wanted this

Previous Page: The south façade incorporates three shared balconies.

This Image: HardiePanel siding from James Hardie Building Products and boards from Cement Board Fabricators complement the Cor-Ten steel façade.

Second–Fourth-Floor Plans

First-Floor Plan

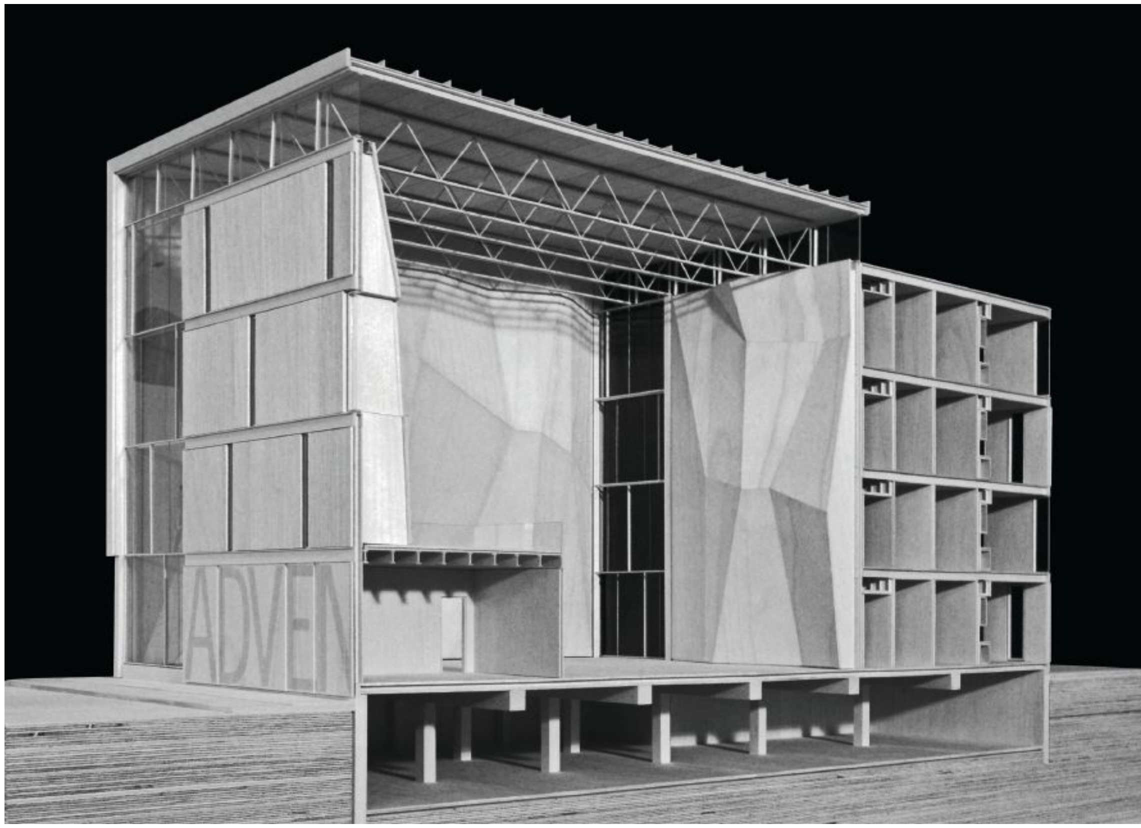
to be an unapologetically raw building, but with refinement," says partner Brian Johnsen, AIA. The exterior is clad largely in corrugated panels of naturally weathering Cor-Ten steel, with a flat, bent-plate detail denoting each floor's framing. Cement board in varying shades of gray wraps the first floor of the gym and clads the north face of the long-span structure, where it is accented by sculpted aluminum fins that nod to the faceted climbing walls inside. "It's our way to conceptualize natural mountain ranges and the industrial context," Johnsen says.

Belay MKE's composition makes the most of its mixed-use typology, and rethinks how a "big box" program can fit comfortably within an urban setting.

Left: The Adventure Rock climbing gym encompasses 17,800 square feet, and rises the full four floors of the building.

Opposite, Top: A section model shows the quadruple-height gym.

Opposite, Bottom: Open-plan living spaces in the one-bedroom units contain American Standard kitchen fixtures and GE appliances.


ADVEN

The east-facing, one-bedroom units contain Atlas carpet and Tarkett flooring.

LACY LANDRE

Project Credits
Project: Belay MKE, Milwaukee
Client: Mandel Group
Architect: Johnsen Schmaling Architects, Milwaukee · Brian Johnsen, AIA, and Sebastian Schmaling, AIA (principals-in-charge); P.J. Murrill (project architect); Matt Wendorf, Andrew Cesarz, Ben Penlesky, Marty Wicklund (project team)
Structural Engineer: Pierce Engineers
Civil Engineer: Pinnacle Engineering Group
Construction Manager and General Contractor: Greenfire Management Services
Lighting Design: Johnsen Schmaling Architects
Climbing Wall Design: Eldorado Climbing Walls
Size: 88,600 square feet (total); 17,800 square feet (gym); 47,100 (apartment block)
Cost: $9 million (construction)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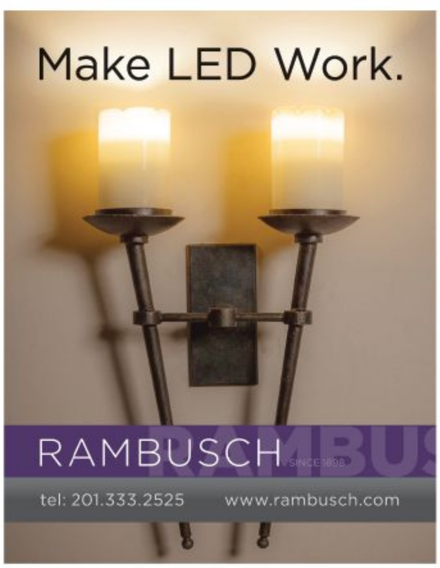

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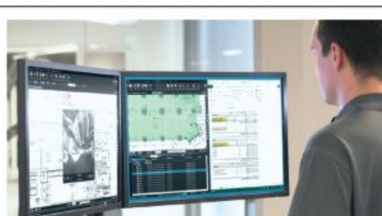

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Editorial: What Won't You Build?

The 2016 election has sparked political engagement in the architecture community like I've never seen. The wall along the U.S.–Mexico border, in particular, has emerged as a flashpoint. On March 10, the first deadline in the Department of Homeland Security's request for proposals for the wall, the Architecture Lobby organized a job walkout. Critic Paul Goldberger, HON. AIA, tweeted, "Any architect who responds to this [RFP] has sacrificed his/her professional integrity on the altar of Trump." And students at Barnard, Columbia, Cornell, Ohio State, Rice, Texas Tech, and Yale posted signs in their windows proclaiming, "We won't build your wall."

What won't you build?

Government is a perennial target for protest, and the border wall, if realized, could have devastating socio-spatial effects. But why stop there? Tribalism, inequality, corruption, climate change, and other iniquities continue to bedevil society, and populations worldwide are frustrated by their leaders' unwillingness or inability to foster solutions. As if to confirm that the mood of disquiet has fully permeated architecture, last year an activist-practitioner from Chile, Alejandro Aravena, received the Pritzker Prize and was chosen to direct the Venice Biennale (which he organized as a critique on "the social, political, economic, and environmental end of the spectrum"). And this month, Aravena's keynoting the AIA Conference in Orlando.

Architectural commissions that once might have seemed benign look more and more like matters of conscience. We know, for instance, that greenfield development destroys wildlife habitats even as species extinctions are occurring at a catastrophic rate. We know that projects in the United Arab Emirates are being built with slave labor. We know that luxury housing in New York and other cities has become a vehicle for international money laundering.

Many firms maintain a list of specialties on their website. New York–based Vishaan Chakrabarti, AIA, of PAU has one titled "What We Do," and it encompasses pretty much what you'd expect of an ambitious firm: cultural, institutional, and so forth. But Chakrabarti includes another, less typical list right below the first: "What We Don't Do," which names "Single-Family Suburban Homes; Suburban Subdivisions, Malls, and Office Parks; Work for Autocratic/Dictatorial Nations; Work for Nations or Corporations with Unacceptable Labor or Environmental Practices; Correctional Facilities; Casinos/Facilities for Slot-Machine Gambling; Facilities that Manufacture Arms."

It's a brave, some might say antagonistic, move to call out specific markets and clients as personally unacceptable, especially since lots of architects take on those very kinds of jobs. Not everyone can grab a bullhorn and start marching—and of course not everyone feels the need. Saintliness isn't a requirement of licensure, and every project, no matter how well-intentioned, entails compromise. Still, who doesn't ask themselves, now and again, "Where should I draw the line?" Maybe we should ask ourselves that question more often, as individuals, as firms, and as a profession. Protecting the health, safety, and welfare of the public encompasses far more than preventing buildings from falling down. The social contract invests architects with responsibility for civilization itself.

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