ARCHITECTURAL RECORD

Colleges & Universities

bnp 11 2017

HEALING

A CONTINUING EDUCATION PREVIEW SPONSORED BY SUNBRELLA®

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CEU LEARNING OBJECTIVES

Upon completion of this course, you will be able to:

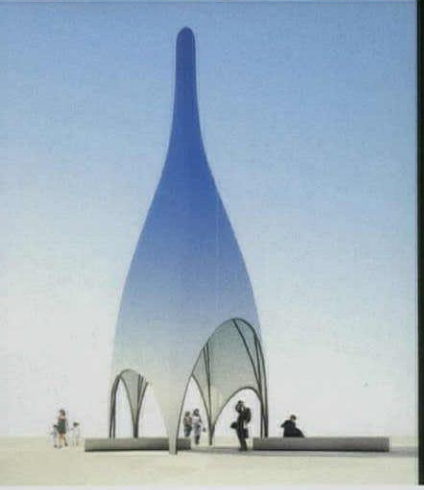
1. Recall the inception of healing gardens and the studies that led to their creation.
2. List benefits of a healing garden to patients, families, healthcare workers and the environment.
3. Describe the goals of a successful healing garden and some of the garden elements that support these goals.
4. Summarize the considerations for designing shade and seating for a healing garden.
5. Identify the fabric selection considerations for both shade and seating elements.

Learn more about the role of fabric for shade and seating in healing gardens by completing this continuing education course and passing the free test at sunbrella.com/healing.

This course has been designed to provide an overview of the benefits of incorporating performance fabrics into outdoor healing spaces in healthcare settings, with discussions on the importance of seating and shade in healing gardens and fabric selection considerations.

Reuse | Revive | Repopulate by Rafael Dualibe dos Santos envisions reusing an old building with a fallen-in roof as a community park. A frame shade structure emulates cloud formations to provide shaded areas of varying densities.

THE ANCIENT CONCEPT OF NATURE AS HEALING DIMINISHED AS TECHNOLOGY PROPELLED MEDICAL ADVANCES OF THE 20TH CENTURY. TODAY, BACKED BY EXTENSIVE RESEARCH, HEALTHCARE PROVIDERS REALIZE ANEW THE IMPORTANT ROLE NATURE CAN PLAY IN REDUCING PATIENT STRESS, IMPROVING HEALTH OUTCOMES AND HUMANIZING CONDITIONS FOR FAMILY MEMBERS AND MEDICAL STAFF.



Cooling Tower by Carlos Cuenca Solana is a bottle-shaped shade structure that provides a shaded space with natural ventilation powered by a color gradient on the fabric covering.

GARDENS

THE ROLE OF FABRIC FOR SHADE AND SEATING

Healing gardens are best designed to improve mental, physical and social well-being when they facilitate a sense of control and access to privacy, encourage social support and exercise, and give users a means to spend time in nature. Performance fabric shade structures and seating offer many options in how gardens are used and the level of privacy they provide. Group interaction, private conversation or quiet observation can all be accommodated in comfort when appropriate fabric shade structures and seating are selected.

NATURE IS HEALING

The idea of nature as restorative is a concept that spans cultures and is more than a thousand years old. Contact with nature has long been seen as beneficial for health and well-being. The World Health Organization formalized a definition of health more than 65 years ago in the preamble to its Constitution as, "a complete state of physical, mental and social well-being, and not merely the absence of disease or infirmity."

Defining health with this broad definition encompasses the understanding that there are many dimensions of wellness — and wellness is compromised when one or more dimensions is out of balance. The human connection with nature is a bond that can foster healing to restore the balance; early medical practitioners understood this.

In the Middle Ages in Europe, monastery infirmaries included gardens, often elaborate, to distract the ill. In the 1800s in both Europe and America, pavilion-style hospitals were commonly designed with gardens for the patients to use.

Florence Nightingale, nurse and public health reformer, wrote in 1898 that patients should be able to see out of windows from their beds, "to see sky and sunlight at least, if you can show them nothing else ... I assert [this] to be, if not of the very first importance for recovery, at least something very near it" (Notes on Nursing: What It Is, and What It Is Not). Those involved in caring for the sick intuitively understood that views and access to nature were therapeutic, even though they did not understand why.

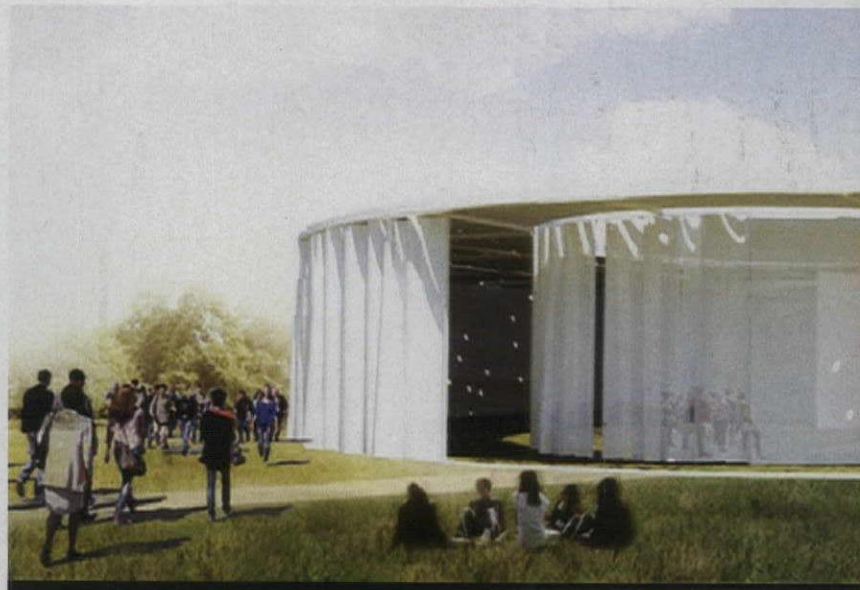
20TH CENTURY THEORY & DESIGN

The 20th century leaps in medical knowledge and technology sidelined a connection with nature. The need to accommodate modern technologies in healthcare facilities, to improve efficiency and to prevent infection overshadowed the importance of therapeutic elements such as gardens.

The result was starkly institutional hospitals that looked like office buildings — exteriors dominated by parking lots and interiors closed off with air conditioning. This design, combined with an environment in which patients have little choice or control, led to a setting that did nothing to calm patients, reduce stress or meet the emotional needs of not only patients, but also families and staff.

PATIENT-CENTERED DESIGN

The patient-centered care movement of the early 1990s began a renewed awareness of the negative effects of institutional settings. Economic factors pushed this movement forward as competition between healthcare providers grew, and patients had more choices among hospitals and assisted living facilities. Healthcare organizations are now moving toward a holistic approach to treating the patient, taking the needs of family members and staff into consideration as well. The growing body of research on the benefits of nature to mental, physical and social well-being has meant that many healthcare facilities are returning to the concept of healing gardens, this time with scientific evidence and understanding of how and why they are therapeutic.



Discover by Enrique Ramirez and Alessandra Farias is a circular shade pavilion with spaces for gatherings and solitary meditation with small perforations and large openings that allow light and shade to change shape as the sun traverses the sky.

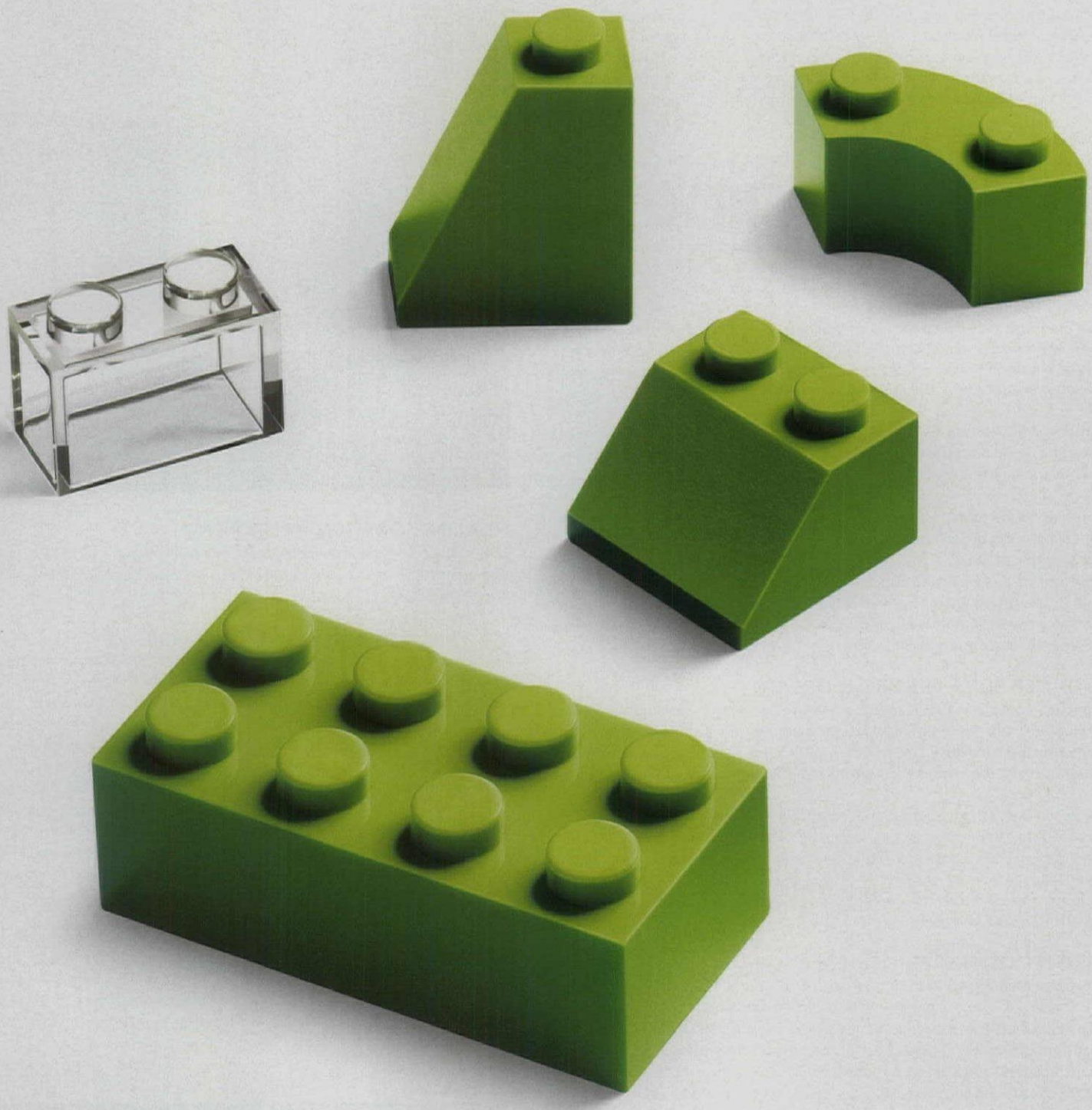
HEALING GARDEN RESEARCH

Mounting evidence shows that gardens are one way to measurably reduce stress for patients in healthcare settings and can benefit family members and healthcare staff.

In a 1984 study in science, environmental psychologist Roger Ulrich was the first to use modern medical research standards (strict experimental controls, quantified health outcomes) to demonstrate that recovery times shortened with a view of nature. Gallbladder surgery patients with a view of trees healed on average a day faster, needed significantly less pain medication and had fewer postsurgical complications than those with a view of a wall.

Even pictures of landscapes can soothe. Another study by Ulrich at Uppsala University Hospital in Sweden provided heart surgery patients with either a simulated window view showing a photo of a stream or a forest; abstract paintings; a white panel; or a blank wall. Patients who viewed the trees or stream photo needed fewer doses of pain medicine and were significantly less anxious during the postoperative period than the other patients.

Since these studies, many more have shown that exposure to healing gardens reduces patient levels of pain and stress. This may in turn boost the immune system and allow the body and other treatments to help. A well-designed healing garden can help to restore the balance of physical, mental and social well-being, and in this sense, it can facilitate healing in anyone who uses it, not just patients.



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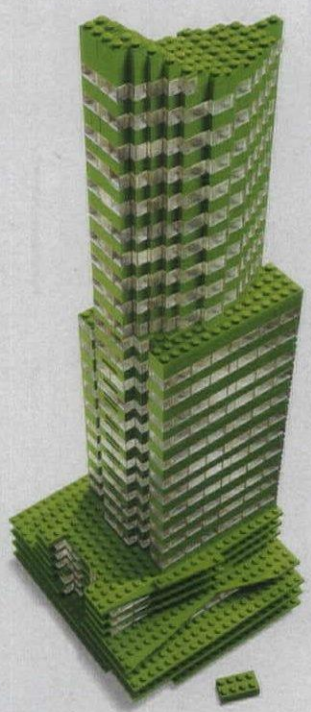

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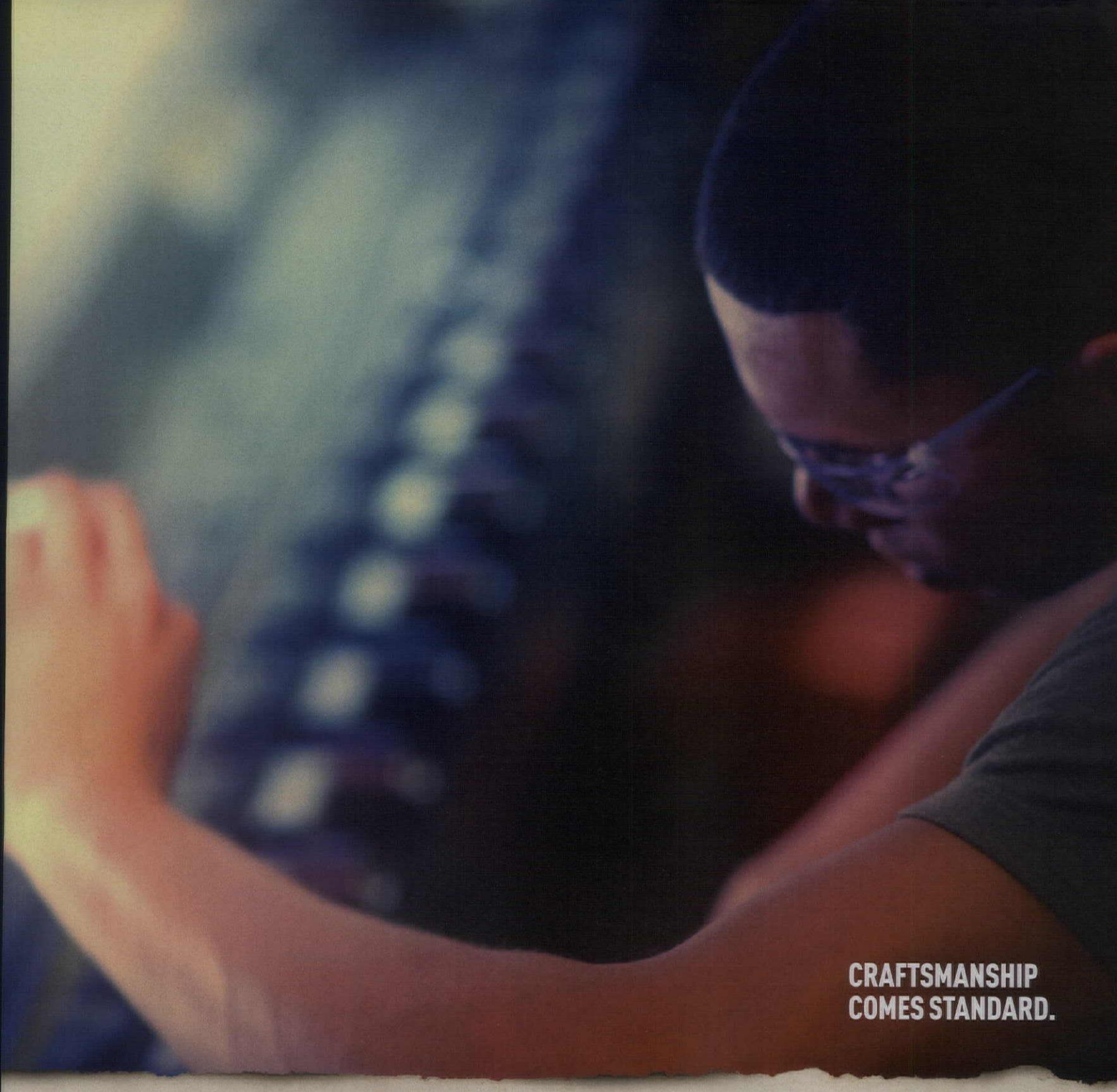

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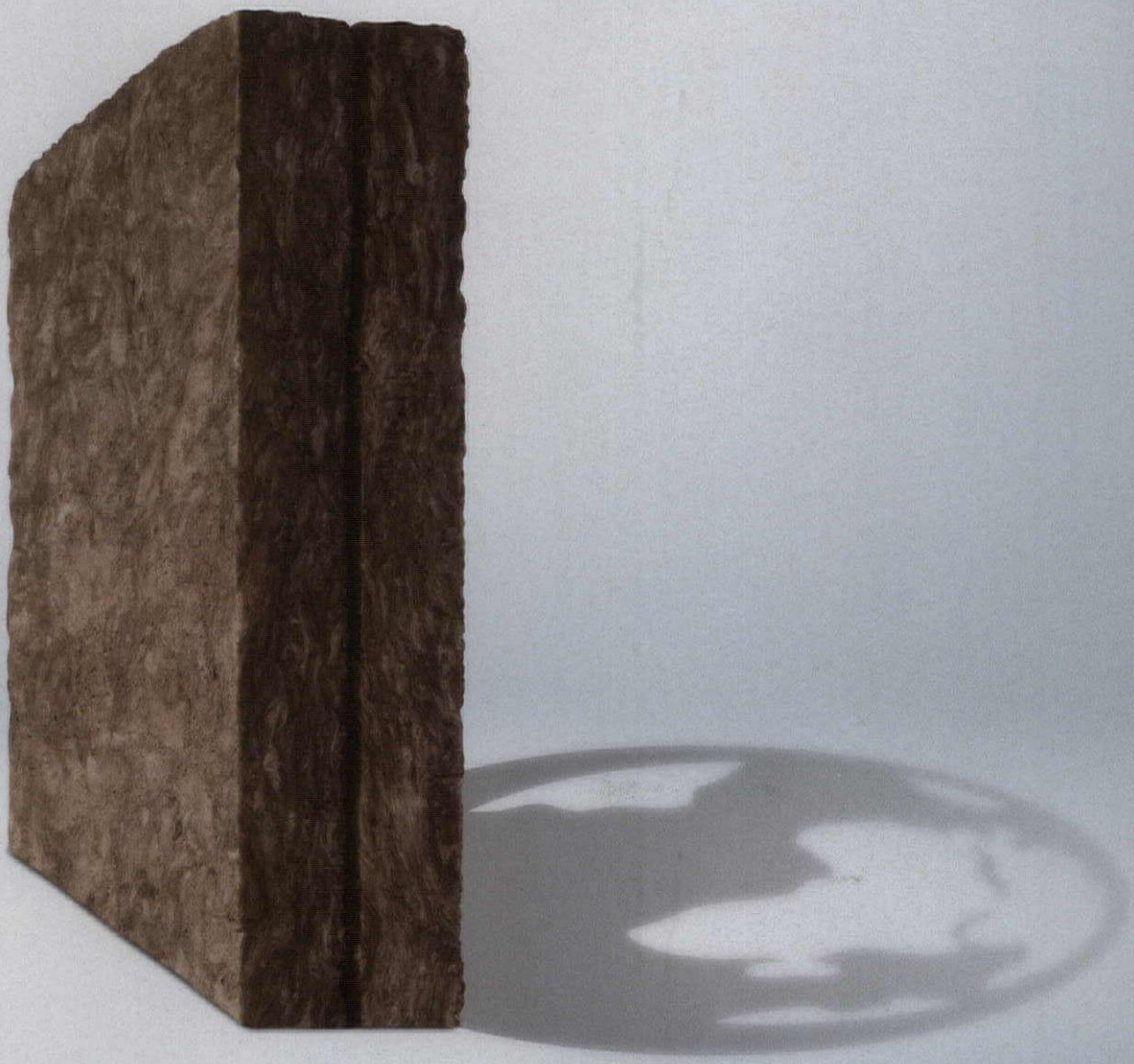

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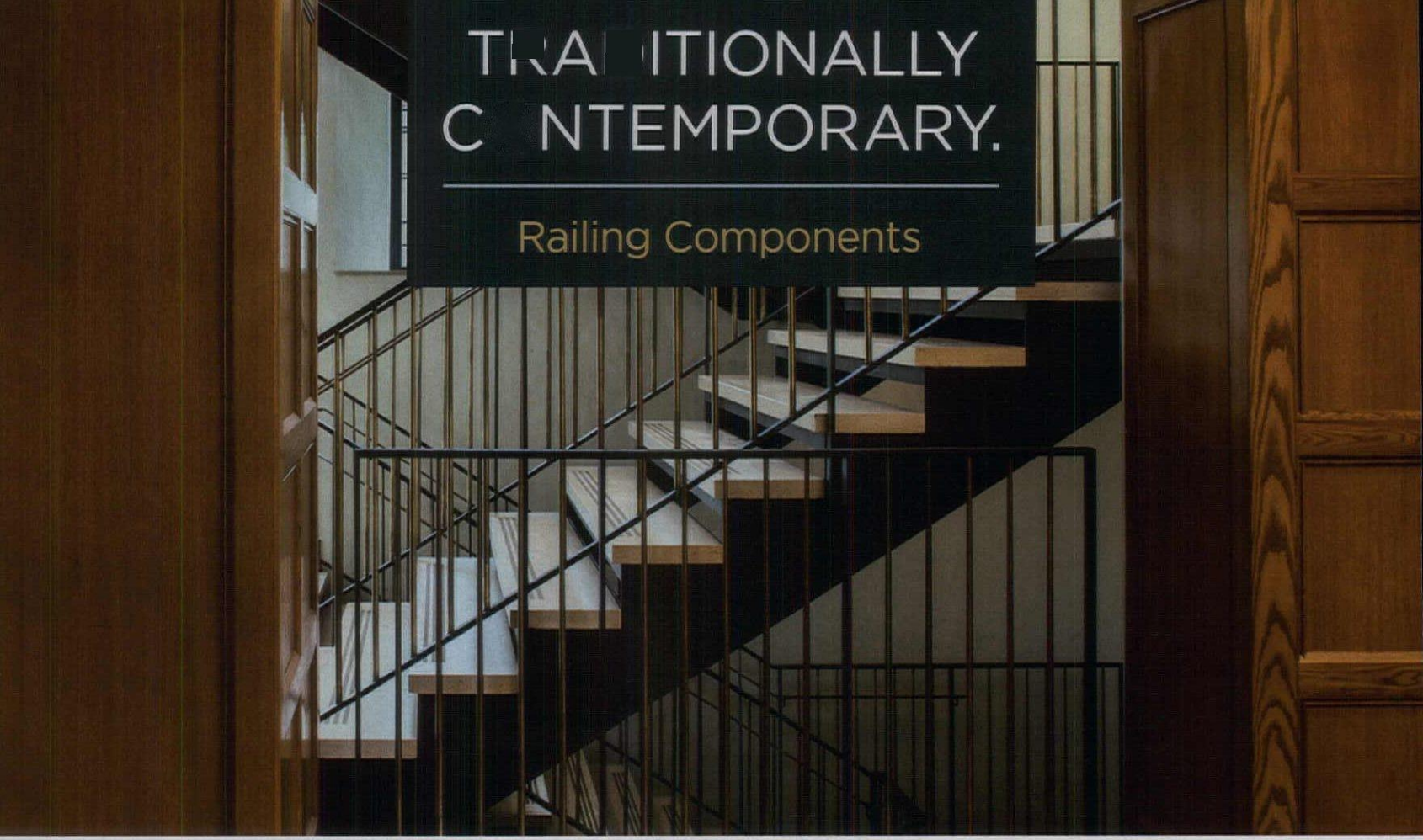

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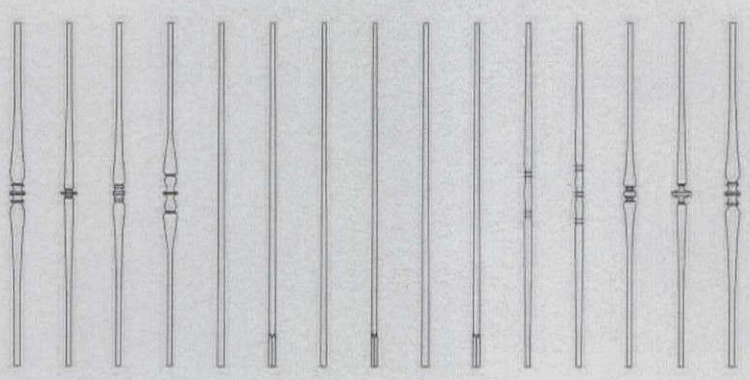

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LIGHTING

THIS PAGE: MOELIS FAMILY GRAND READING ROOM AT THE UNIVERSITY OF PENNSYLVANIA, BY GENSLER AND THE LIGHTING PRACTICE, FEATURING *FIELDS OF TRANSFORMATION*, A MURAL BY CLAUDY JONGSTRA. PHOTO BY BRAD FEINKNOPF.

COVER: BLOOMBERG CENTER AT CORNELL TECH, BY MORPHOSIS ARCHITECTS. PHOTO BY MATTHEW CARBONE.

CORRECTION: In the October issue, Record reported that Tatiana Bilbao's projects included a house for the artist Gabriel Orozco. In fact, the house was designed by Orozco himself.

Find expanded coverage of Projects and Building Type Studies as well as Web-only features at architecturalrecord.com.

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PANELISTS

Tensho Takemori and **Anand Devarajan**, Partners at Gehry Partners
Jeff Huber, Principal at Brooks Scarpa Architects
Florencia Pita, Partner at Pita & Bloom

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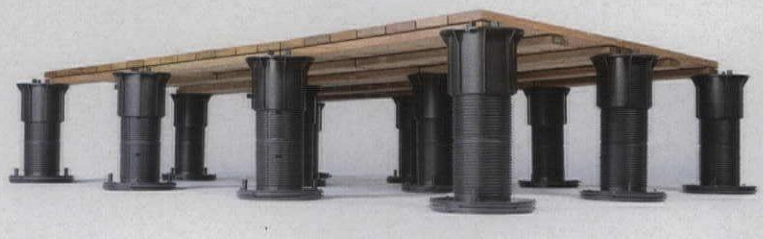

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Go to the Head of the Class

New buildings for colleges and universities reflect shifting priorities in academia.

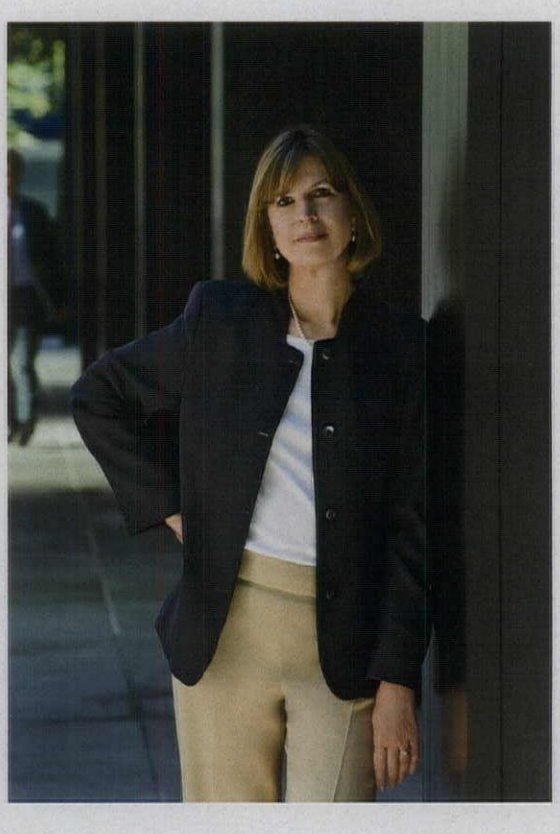
DESPITE RISING tuition and cutbacks in government aid, a college education is still a blue chip investment. Graduates between 25 and 34 years old with a bachelor's degree are more likely to be employed, and they earn a median income of 64 percent more than their cohort with only a high school diploma. About 20 million students are enrolled in American colleges and universities this fall, 5 million more than at the turn of the millennium.

To keep up with growth and embrace new fields of study, colleges and universities continue to build. And as administrators and boards of trustees know, the quality of facilities is key to competing for the best students and the best minds to teach them. In the following pages, RECORD explores new collegiate architecture and how it reflects the innovative programs and shifting priorities of academia.

Take the new campus of Cornell Tech, just opening in New York, on an island in the East River, minutes from both Manhattan and Queens. A partnership between Cornell University and the Technion-Israel Institute of Technology, this institution for the advancement of digital technologies is not a typical ivory tower. Founded to link education and entrepreneurship, it has been designed for graduate students to mingle with those in business and tech start-ups, to facilitate research and collaboration. Its first academic buildings are by Morphosis (page 128) and Weiss/Manfredi (page 134). But this model is not unique to Cornell Tech. Lab City, an immense, dystopian-looking educational complex outside Paris—with vast, surprisingly light interior spaces—has been designed by OMA to similarly foster connections between students and entrepreneurs (page 116).

Spending on educational construction in the U.S., including college and university building, has been increasing since the recession. Cornell's Ivy League sibling, Princeton University, just completed its biggest building project on campus, with the Lewis Center for the Arts, designed by Steven Holl Architects, at its core. The complex for music, dance, and other creative studies forms a new gateway on the western end of the university (page 110). Elsewhere on campus is the School of Architecture's Embodied Computation Lab, a modest new structure by the firm The Living with a big agenda—to research advanced building technologies (page 66). Not far away is an exemplary adaptive reuse of a former historic chemistry lab (Princeton honored Albert Einstein on his 70th birthday with a symposium there). Designed by KPMB Architects, the intervention sensitively integrates contemporary design with the original's collegiate Gothic style (page 86).

Restoration and expansion of existing building stock is, in fact, a significant chunk of capital spending on campuses. At Wellesley College,



KieranTimberlake was faced with the challenge of a small footprint and steep grade change in designing an addition that joins two historic buildings for the arts (one of which the firm has renovated), and serves as a nexus between various parts of the campus (page 104). At the University of Michigan, an addition and a renovation of an existing building by Preston Scott Cohen has created a new home for the school of architecture and planning, with a distinctive jagged roof and light-filled studios (page 92).

Sometimes a single work of architecture can completely transform a neighborhood. Two cases in point: Kengo Kuma's ArtLab at the École Polytechnique Fédérale in Lausanne, Switzerland, manages, with its daring, low-slung form, to bring order to a haphazard campus plan (page 98). And Carme Pinós's elegantly tough La Massana Fine Arts School in Barcelona was the catalyst for the architect to redesign the vibrant plaza on which the school and several other buildings sit (page 80).

Like the best of academic architecture, Pinós's work is not only an example of how to create a better environment for learning but is also a master class in placemaking.

Cathleen McGuigan

Cathleen McGuigan, Editor in Chief

PHOTOGRAPHY: © MICHEL ARNAUD


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Photo courtesy of Steve Hall © Hedrich Blessing

Designing Beyond Borders

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Credit: 1.25 AIA LU/HSW; 1 GBCI CE Hour; 0.1 IDCEC CEU

Page 178

Photo courtesy of Tata Steel and SOM/Bruce Damonte

Concrete-Filled Hollow Structural Sections (HSS): An Unbeatable Combination

Sponsored by the Steel Institute of New York

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Page 182

Photo © James Steinkamp Photography

Green Building with Automated Shading Systems

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Creating a New Path for Forest Products in Green Buildings

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Building Information Modeling (BIM) as an Investment

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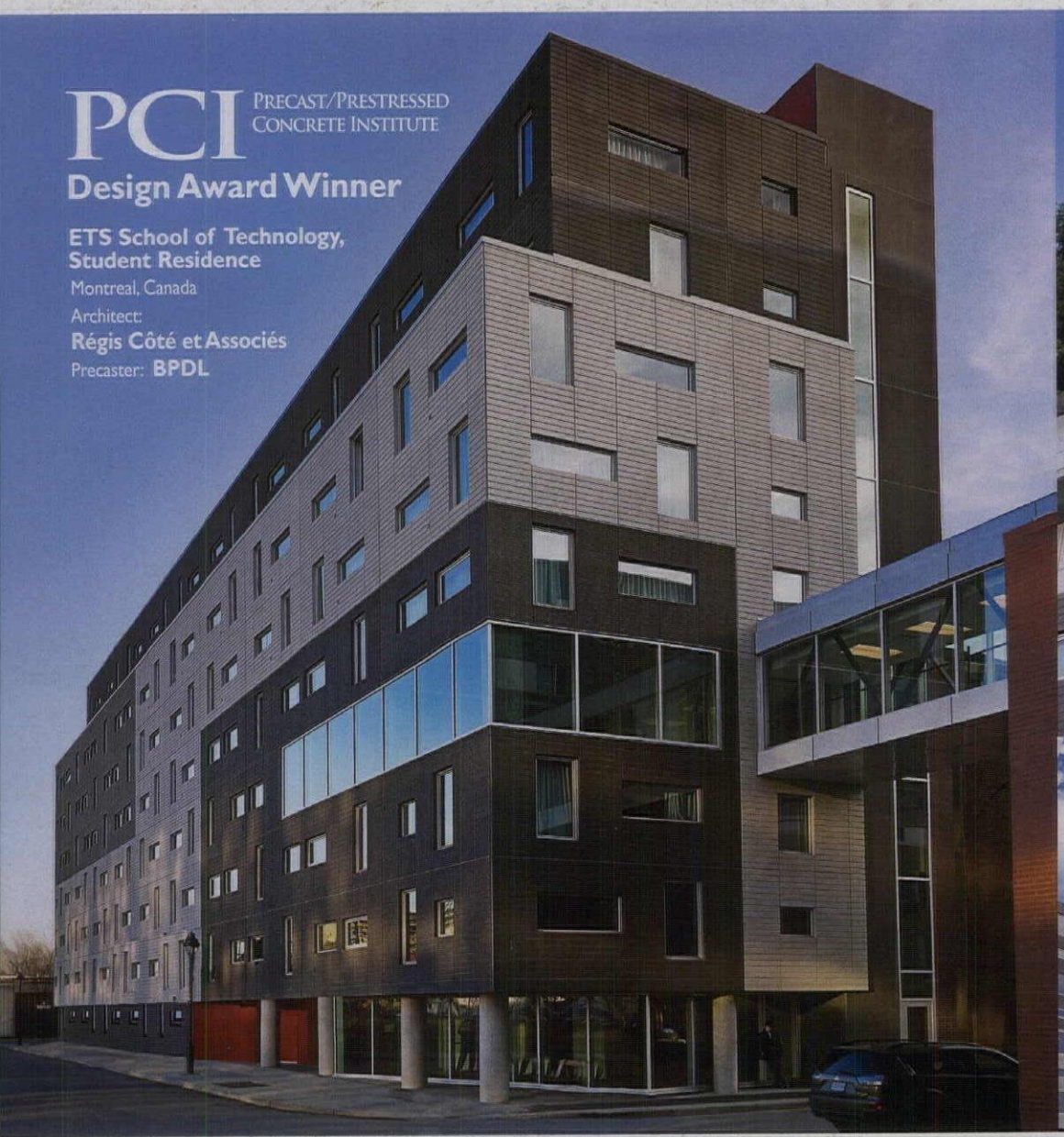

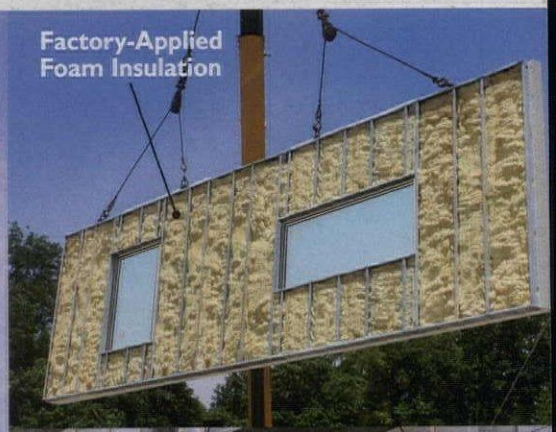

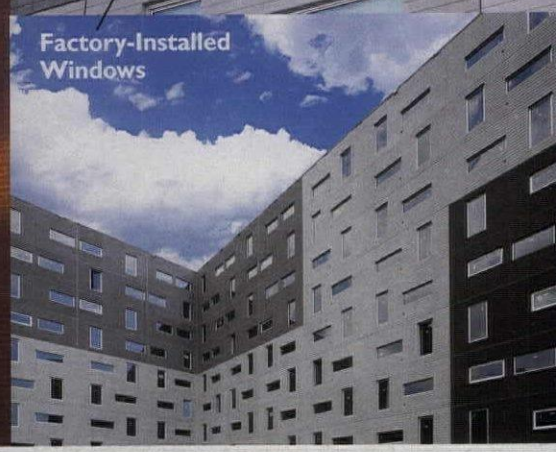

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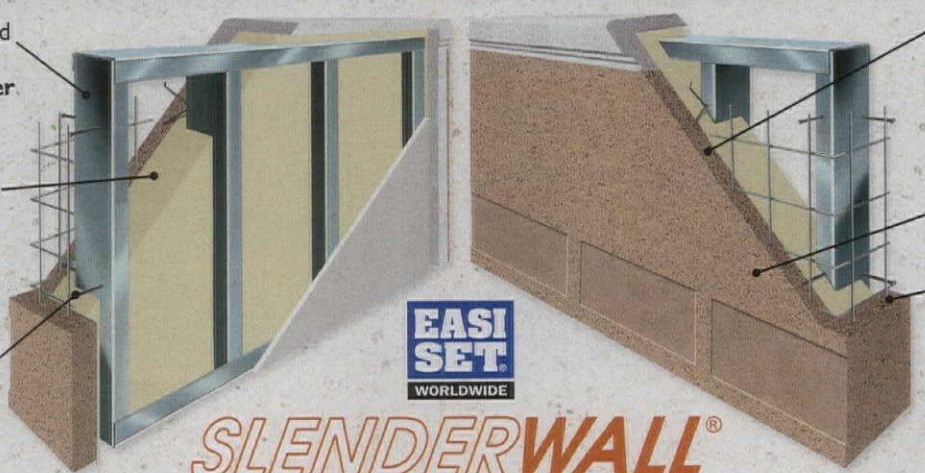

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perspective

There are no good fences. —*Artist and activist Ai Weiwei, speaking at Cooper Union on October 12 about his new exhibition* Good Fences Make Good Neighbors, *comprising more than 300 works installed throughout New York.*

In Earthquake-Torn Mexico, Architects Look to Recovery

BY RONDA KAYSEN

AS MEXICO reels from a pair of powerful earthquakes that struck the country in early September, leveling homes and leaving hundreds dead, the country's architects grapple with how to rebuild.

The first earthquake, measuring 8.1 on the Richter scale, struck on September 7 off the Pacific coast, devastating the states of Oaxaca and Chiapas in the south, and leaving at least 90 people dead. Less than two weeks later, the second tremor, measuring 7.1 on the Richter scale, hit about 75 miles outside of Mexico City. Nationwide, 369 people were killed.

Despite the damage, many believe it could have been worse. The second quake struck on September 19, the 32nd anniversary of a 1985 Mexico City quake that left more than 10,000 people dead and leveled hundreds of buildings—a disaster that led to the overhaul of the city's building codes. This time, however, damage in the city was more contained. Most of the buildings that collapsed were built before the new codes were enacted in 1987.

"About 38 buildings collapsed. We're talking about a city of 22 million people," says Bernardo Gómez-Pimienta, the founder of bgp arquitectura and the director of the architecture school at Anáhuac University. "The codes worked well."

Nevertheless, a pattern of destruction has emerged. As the long forensic slog begins—more than 100 buildings have been condemned, and hundreds more suffered structural damage—many schools remain closed, and residents wait and wonder if their homes are safe.

"I think every earthquake gives a lesson, and this one certainly did," said Alberto Kalach, an architect and cofounder of Taller de Arquitectura X, who has been focused on the recovery effort in the state of Morelos. This earthquake showed that—not surprisingly—smaller, older buildings were more vulnerable than towers made of glass and steel, he said.

PHOTOGRAPHY: © PRESIDENCIA DE LA REPÚBLICA MEXICANA

Two hours south of Mexico City in the state of Morelos, the town of Jojutla was devastated by the September 19 earthquake. At least 28 of the village's 60,000 residents were killed in the disaster.

Some architects and designers worry that, in the race to clean up, buildings that could be salvaged may be demolished, and important clues could be lost. "Citizens are really disturbed and angry," said Fernanda Canales, a Mexico City architect, because the government is taking down buildings and removing debris "without doing the proper analysis or proper inspections to determine who is to blame." Inspectors can be held criminally liable if they sign off on structurally unsound buildings.

Damage in the capital was largely isolated to an area overlying an ancient lakebed, where, as seismic waves pass through, the soil has often been compared to Jell-O. This time, maps of the destruction show that damage clustered around the western shore of the ancient lake. "What we're learning now is that the waves move differently if they're in a central part of the tub instead of at the edge," Canales said, likening the behavior of the soil to that of water splashing in a bathtub.

Some architects are questioning whether new, stronger buildings with deep, solid foundations weakened the foundations of older, neighboring structures. And a deadly brew of corruption and shoddy building practices probably contributed to the damage, including at Enrique Rébsamen, a private school where 19 children and seven adults died.

"It's not the regulations" that need to be reviewed so much as "the application of the regulations," said Derek Dellekamp, the principal of Dellekamp Arquitectos, whose offices are located in Hipódromo, a neighborhood that sustained damage.

La Condesa and La Roma, two trendy neighborhoods that sit atop the ancient

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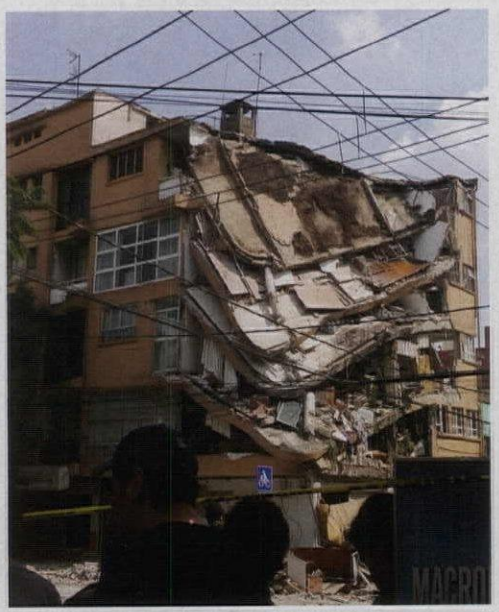
lakebed and were devastated in the 1985 quake, again sustained damage. Residents are rattled, many staying with friends and family in unaffected areas. But ultimately, few expect the quake to undo decades of investment in stylish neighborhoods that have attracted young artists and professionals. "Some people might be thinking of moving out, but, on the other side, some people say maybe prices might be coming down and it's a good time to buy," Gómez-Pimienta said.

Out of the city, the picture is bleaker. Federal officials estimate that more than 153,000 homes were damaged, with 24,000 destroyed, in a disaster zone that straddles several states. "At first, everybody was really proud in Mexico City," Canales said. "It was a really optimistic view—we've done a great job and we're fine. But very soon afterwards, we understood that things were really different in rural areas."

Attention has shifted to those rural towns and villages where homes, churches, markets, and central plazas have been battered. A group of architects, designers, and urban planners has formed a coalition called ReConstruir México, which has a Facebook page and social-media hashtag. The group has been raising funds and organizing to connect with the local communities to help save existing structures through preservation and a focus on traditional building methods.



The September 19 earthquake also wreaked havoc on many neighborhoods of Mexico City, including Colonia Narvarte, pictured here.

"This initiative is a reaction to the indiscriminate demolition of damaged buildings, which, in some cases, did not have structural damage," Dellekamp, a member of the group, said.

Coalition members are concerned that the cleanup effort is damaging the fabric of indigenous Mexican culture, unnecessarily bulldozing iconic adobe homes that could be repaired, and replacing them with tiny concrete structures. The coalition is focusing on historic buildings, old construction methods, and emergency housing, and is connecting with rural communities to provide expertise.

"Everything is going really, really fast," Canales, a member of the group, said, concerned that, because of rampant corruption, government officials and contractors are motivated to bulldoze and build anew, even when such extreme measures are unnecessary. "It is big business to house everybody," she said.

The bulldozers might be moving quickly, but the road to recovery will be a long one. "It will be work that will be needed for several years. It's not something that happens in six months," Gómez-Pimienta said. "It's a mess." ■

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Never Built New York Surveys the City's Impossible Past

BY MIRIAM SITZ

STROLLING THROUGH the crowded galleries of *Never Built New York* (*NBNY*) at the Queens Museum feels like gazing into a parallel universe: things look familiar, but not quite right. The exhibit offers a glimpse of the different versions of New York that the city could have become—for better or worse. Sam Lubell and Greg Goldin curated the show, which is a companion piece for their earlier endeavor on the West Coast (*Never Built Los Angeles*, July 28 to October 27, 2013, at the Architecture and Design Museum) and books of the same names. The pair of architecture writers spent the last two years negotiating with universities, museums, and other institutions to assemble some 250 pieces of architectural memorabilia representing more than 80 unbuilt projects.

The exhibition begins in the long and narrow Rubin gallery. The curators, along with exhibition designer Christian Wassman, have displayed objects, renderings, sketches, and models of unbuilt projects around the room, which roughly mirrors the shape of Manhattan, arranged according to their corresponding location on the island. "We wanted it to feel as if you're in the city," Lubell told RECORD. Entering the exhibition, at the equivalent of the borough's southernmost tip, visitors are greeted with drawings of Frank Lloyd Wright's Key Plan for Ellis Island and Thomas Hasting's 165-foot-tall National American Indian Memorial, as well as models of Venturi, Scott Brown & Associates' Whitehall Ferry Terminal, planned for Staten Island, and Moshe Safdie's Habitat New York. Walking farther in, one encounters Midtown schemes, Uptown plans, and finally concepts for the South Bronx.

The show benefits from the gallery's high ceilings, which allowed Lubell and Goldin to arrange illustrations of multiple projects planned for the same site on the walls in columns. The effect is a familiar if somewhat chaotic density, augmented by the gallery's close quarters.

Many of the unbuilt projects on display would have radically altered the DNA of New York—and perhaps none more so than Robert Moses's six- and 10-lane elevated roadways, against which Jane Jacobs and others lobbied vehemently. The Midtown Expressway would have connected New Jersey to Long Island through the middle of Manhattan, obliterating all the buildings on the south side of 30th Street, while the Lower Manhattan Expressway (LOMEX), planned to run from the Holland Tunnel to the Manhattan and Williamsburg Bridges, would have decimated SoHo and Little Italy, leaving what remained obscured by its literal and figurative shadow. But the drawings of the LOMEX presented at *NBNY* paint a starkly different picture, with pedestrians enjoying the pleasantly landscaped public areas created beneath the arterial expressway. "Today we would say 'no way' to plowing a freeway through a residential neighborhood," said Goldin, "but this rendering makes you realize that those planners who we think of as nefarious believed that what they were doing had genuine social value."

Frank Lloyd Wright's Key Plan for Ellis Island was the architect's last design before his death in 1959. Taliesin Associated Architects completed the scheme, which envisioned the decommissioned island as a self-contained city.

The second part of Lubell and Goldin's show takes place in the panorama room. Conceived by Robert Moses, then director of the corporation running the 1964 World's Fair held on this site, and built by a team of more than 100 people, the panorama—a 1:1200 scale model of the city spread out over 9,000 square feet—is the crown jewel of the Queens Museum's permanent collection. For *NBNY*, scale models illuminated from within have been placed across the miniature city. Joshua Jordan, director of the Fabrication Lab at Columbia University's Graduate School of Architecture, Planning and Preservation, led students in creating some 50 models, which are further enhanced by a station of virtual reality glasses that allow viewers to see some of these unbuilt works as they would appear if viewed from the city streets today. The company Shimahara Illustration designed the truly memorable visualizations, which are not to be missed.

Finally, in the museum's central skylit gallery, the curators have arranged concepts for the Queens Museum site in Flushing Meadows-Corona Park. Colorful illustrations and renderings orbit a bounce house—version of Eliot Noyes's proposed pavilion for Westinghouse Corporation at the 1964 World's Fair. Large enough for an adult to enter, the central room of the spaceship-like inflatable structure is surrounded by a series of large silver spheres where, in Noyes's concept, the manufacturing company would have showcased their technology.

Throughout the three segments of the show, the curators succeed in identifying a unifying theme from the myriad concepts—however implausible—represented in *NBNY*: the architect's impulse to solve the ills of urban society through design. Goldin pointed to the city-wide scale of many of the schemes, which were driven more by designers' ambitions to improve the built environment than by their egos. "Here," he said,"we see their attempts—sometimes painted in much too broad strokes—to answer questions that perpetually perplex the city."

Never Built New York runs through February 18, 2018, at the Queens Museum. ■

IMAGE: COURTESY THE FRANK LLOYD WRIGHT FOUNDATION ARCHIVES

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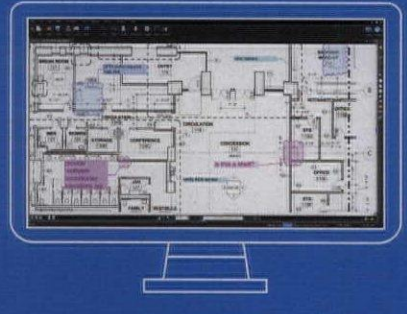

Kevin Roche Documentary Gets U.S. Premier at ADFF

BY DANTE A. CIAMPAGLIA

MAKING ITS U.S. debut on November 4 at the 2017 Architecture and Design Film Festival (ADFF), *Kevin Roche: The Quiet Architect* is the first comprehensive documentary devoted to Roche's life and career—and it's long overdue. The unassuming Irish-American architect's fingerprints are all over the postwar built environment—from Eero Saarinen masterpieces like the Gateway Arch and Dulles International Airport, which Roche completed, to his Ford Foundation Building in New York, which shifted the paradigm of office design.

At 81 minutes, *The Quiet Architect* makes up for lost time with a brisk tour through Roche's life and decades-long career: studying with Mies van der Rohe, working with Saarinen, establishing Kevin Roche John Dinkeloo and Associates, and designing his many projects around the world. Indeed, director Mark Noonan packs so much into the film—archival presentation materials, gorgeous aerial footage of the buildings, reminiscences from Roche himself—that it can feel a bit dizzying.

Still, *The Quiet Architect* works as a necessary introduction to Roche, who, at 95, seemed bemused at the idea that anyone would have interest in such a film. "I think he thought we were slightly crazy to be spending all this time and effort documenting his buildings," the director told RECORD.

Noonan's documentary is more than a primer, though. It's also the connective tissue linking films like *Eero Saarinen: The Architect Who Saw the Future* and *Columbus* (also screening at the 2017 ADFF) to form a continuum examining the history and legacy of Modernism. But, beyond that, *The Quiet Architect* also, finally, gives Roche a voice in the larger cinematic conversation about architects and their place in our society, represented at the 2017 ADFF with films such as *Designing Life: The Modernist Architecture of Albert C. Ledner*; *Glenn Murcutt: Spirit of Place*; *REM*; and *Zaha Hadid: An Architectural Legacy*. Better late than never. ■

A young Kevin Roche inspects a model of the Ford Foundation Building in Manhattan. The glass office tower was completed in 1967 and featured in Architectural Record in 1968.

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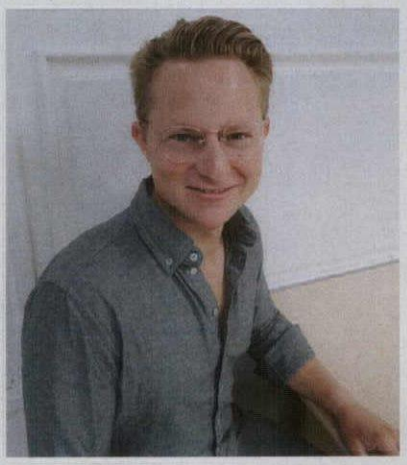
Garrett Jacobs

BY FRED A. BERNSTEIN

IN JANUARY 2015, the nonprofit organization Architecture for Humanity (AFH)—which helped architects serve populations in need, including victims of natural disasters—filed for bankruptcy and closed its doors. But many of its chapters continued to operate. Garrett Jacobs helped form an organization to support those chapters, now called the Open Architecture Collaborative, and in 2016 he was named its first director. A graduate of Tulane University's architecture school, Jacobs worked as a set designer in New Orleans and taught design to high school students there before moving to the Bay Area in 2012.



He spoke to RECORD by phone in mid-October, as wildfires ravaged Northern California. "It's a little intense right now," Jacobs, 31, said from his office in Alameda. "We can see smoke over the Bay."

Does this tragedy present opportunities for your organization?

It could, but our focus now is not so much on disaster response as on finding new ways for architects to work with systemically marginalized communities.

So more training, less building?

Exactly.

AFH got a lot of publicity and won many awards, but it was never clear how much it actually accomplished.

The organization built many things, like the 19 soccer pitches and community centers across Africa that FIFA sponsored from 2008 to 2014. Mostly, though, it acted as a developer, directing philanthropic dollars to worthwhile projects.

How did you get involved?

I started working for AFH in 2012. At first I was a volunteer with the San Francisco chapter, setting up some small-scale projects like the renovation of part of a homeless shelter and the transformation of a dead-end street into a pocket park. Then I ran a national competition in which high school students submitted ideas for making their schools more sustainable. Eventually, AFH hired me full-time as its outreach coordinator.

Were you there at the time of the bankruptcy?

Actually, in 2013, I went to work for a tech organization. I had left architecture completely, but I remained in contact with the AFH chapter leaders as a volunteer.

What do you think caused AFH to fail?

The bankruptcy is still in court, so people are hesitant to say anything about it. What I can say from my perspective is that the founders of AFH didn't ask for help when they needed it. The organization was having trouble building systems internally to keep up with the number of projects it was undertaking in the field, and it could have used advice from outside experts.

How did you get involved the second time?

When I heard about the bankruptcy, I volunteered to break the news to all the chapter leaders and help them decide how they wanted to proceed. Throughout 2015, we had a lot of really open discussions about whether we should work together or go our own ways, and ultimately we decided to form a new organization. There are now 22 active chapters in 11 countries.

What have you been doing since you took the job?

I am collaborating with a community-development corporation in Oakland to train professionals to work with residents on small neighborhood-improvement projects: murals, a pedestrian-safety campaign, a pop-up library, etcetera. We're helping people realize they have the power to change their surroundings.

You're starting very small.

Our other focus is a professional development program that we run within architecture firms. It's about how architects can use their soft skills, like navigating building codes, along with their privilege, to help less-advantaged communities. We're hoping to scale up these pilot programs in the Bay Area, and then share the lessons learned with the other chapters around the world.

How does your organization compare to AFH?

We're much smaller. I'm the only staff member right now, and our budget is about $50,000 a year. AFH, at its peak, had about 45 people and a budget of over $10 million.

So your ambitions are smaller?

Personally, I think our ambitions are way bigger. I want to change the way architects think about their profession. I'd like them to find ways to serve many more people than architecture has traditionally served. ■

noted

OMA to Design Expansion of the New Museum in New York

The contemporary art museum on Manhattan's Lower East Side has selected OMA to design the 50,000-square-foot addition to its flagship building, designed by SANAA. The project, which will double the museum's footprint, is expected to break ground in 2019.

Pratt Institute Announces Its First Female President

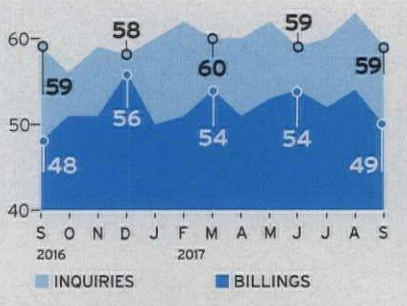
The Brooklyn school has selected Canadian educator Frances Bronet as its 12th president, beginning in January 2018. Bronet currently serves as senior vice president and provost at the Illinois Institute of Technology in Chicago, and was previously the architecture dean at the University of Oregon.

Diller Scofidio + Renfro to Lead London Centre for Music Project

The New York–based firm behind the High Line, the redevelopment of Lincoln Center, and the Juilliard School expansion has been selected to lead a team in designing the London Symphony Orchestra's new home, which will include a concert hall, practice and classroom areas, and space for commercial tenants.

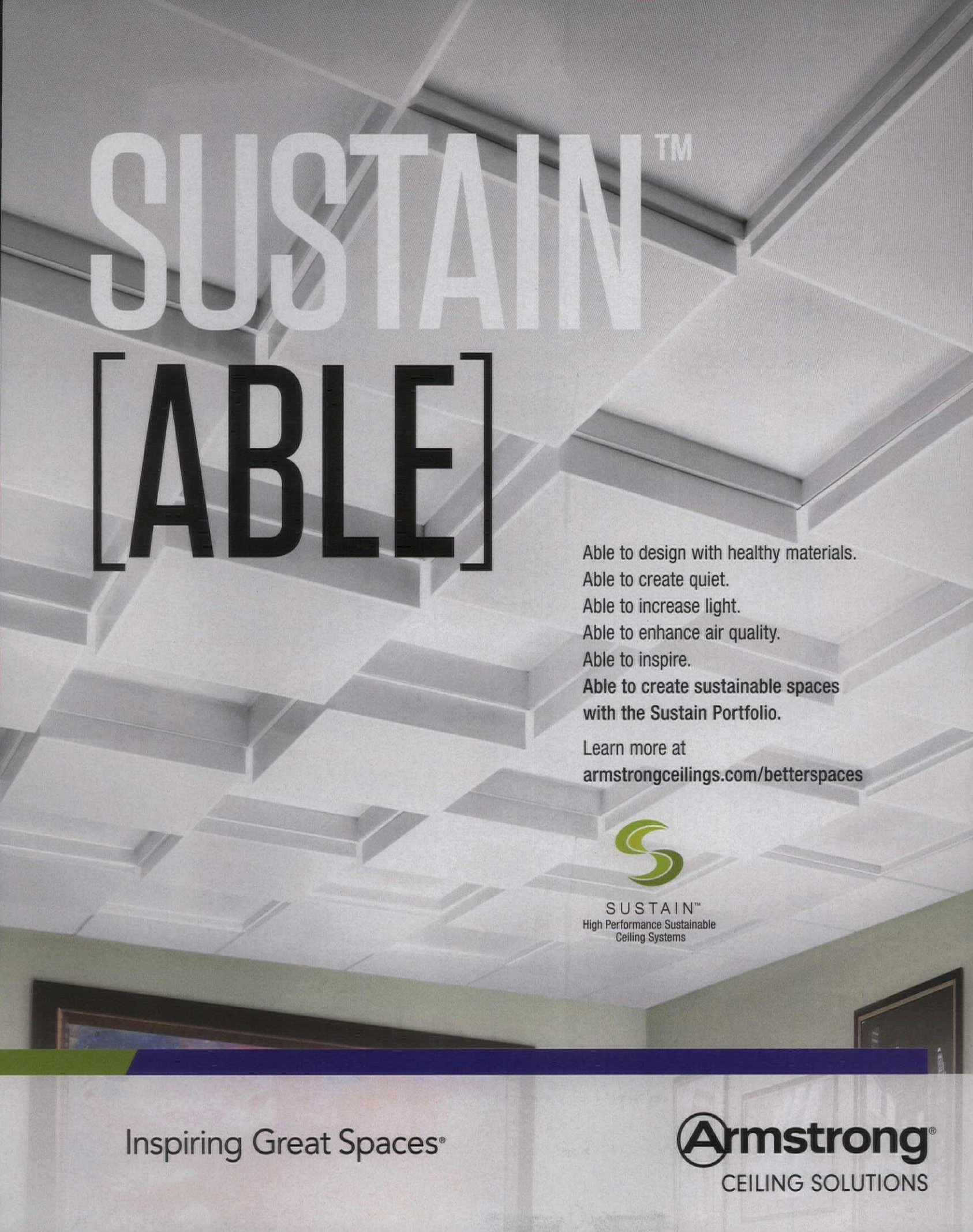
Landscape Architect and Planner Named 2017 MacArthur Fellows

Two of this year's 24 "genius grants" went to Kate Orff, founding principal of landscape architecture firm SCAPE and director of the Urban Design Program at Columbia University's Graduate School of Architecture, Planning and Preservation, and Damon Rich, founder of the Center of Urban Pedagogy and cofounder of design and planning studio Hector.



After Seven Strong Months, Demand for Design Services Dips

The AIA's most recent data indicate that the Architectural Billing Index (ABI) has dipped. The ABI score dropped by 4.6 points in September to 49.1, suggesting a decrease in billings. (Scores above 50 indicate an increase.) Both the new projects inquiry index and the new design contracts index also slipped to scores of 59 and 52.9, respectively.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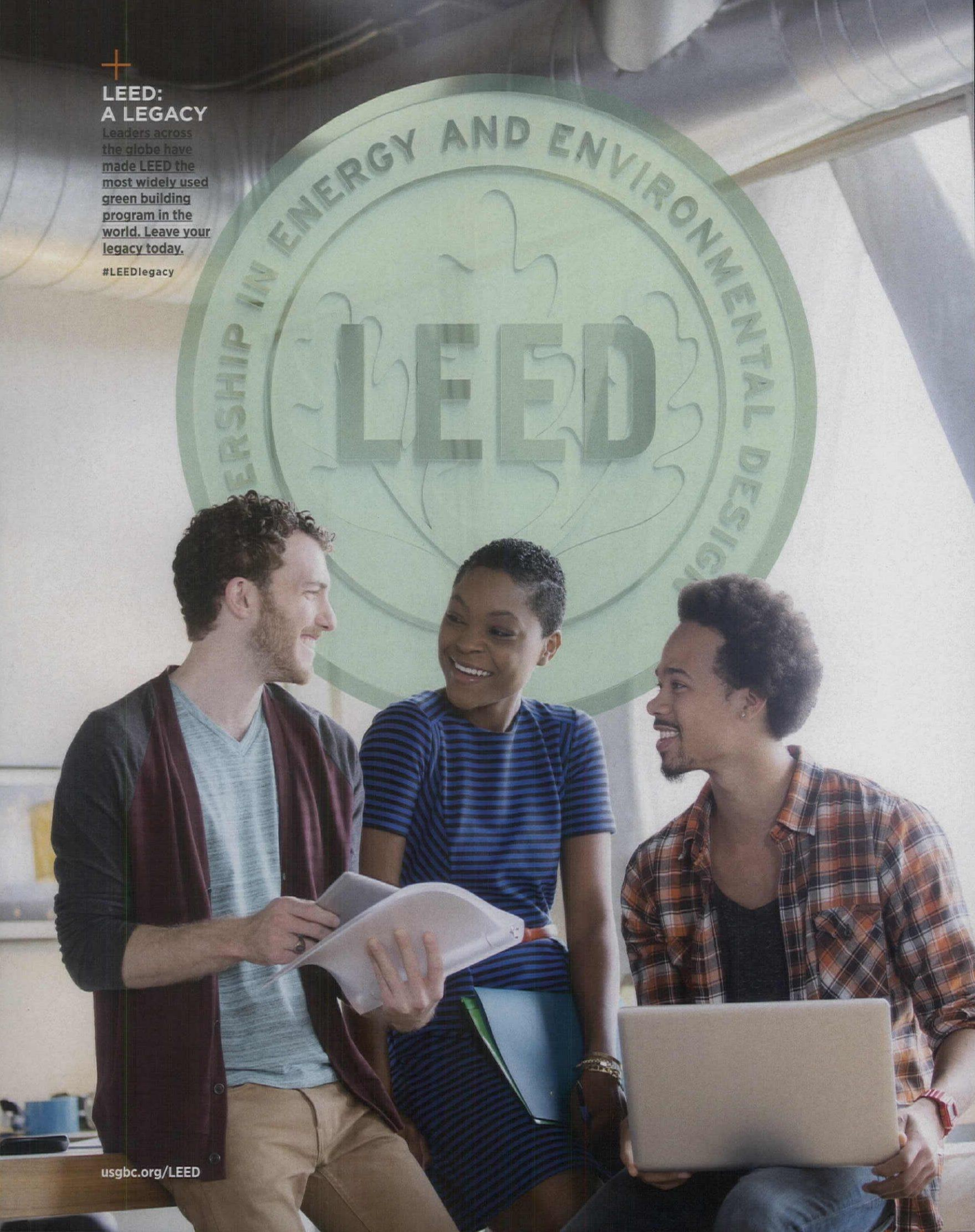

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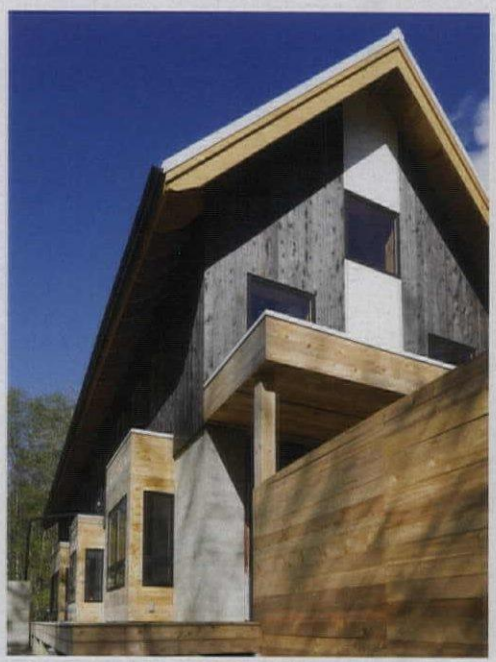
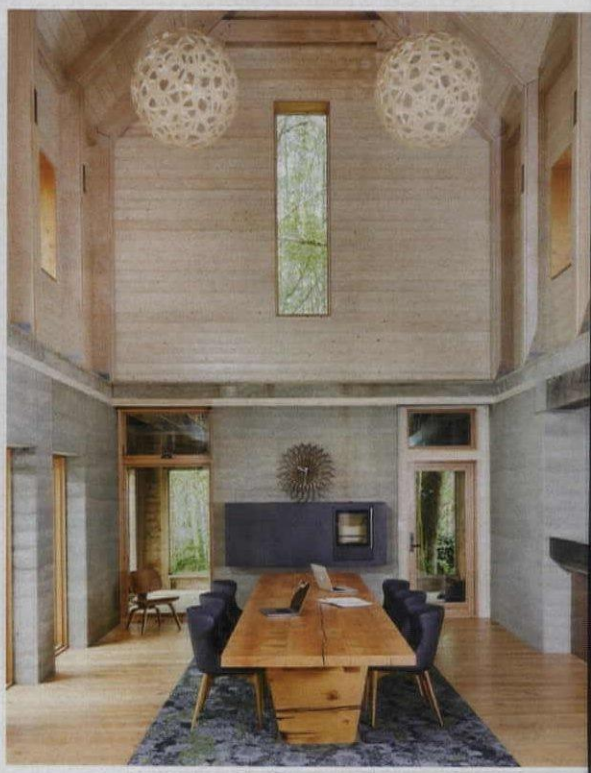
THE CREATOR OF THE RIGOROUS LIVING BUILDING CHALLENGE DESIGNS HIS OWN SUPER-SUSTAINABLE DWELLING. **BY JOANN GONCHAR, AIA**

DESIGNING A HOUSE can be difficult. But designing your own can be especially challenging. This was the case for Jason McLennan and Heron Hall, the house on Bainbridge Island, Washington, which he designed for himself and his wife, Tracy, and their children. It was natural that McLennan would set a high bar for the 3,300-square-foot structure completed in April: although he is the founder of an eponymous design firm, he is best known as the author of the Living Building Challenge (LBC). That green building-certification system is widely regarded as the world's most stringent and has a host of tough-to-satisfy requirements, including submission of 12 months of post-occupancy data to demonstrate net zero operations for energy and water. Only 15 projects have achieved full Living Building status since the program's launch in 2007.

Of course, McLennan plans to submit the house for certification once all the data are available. But at Heron Hall, named after the bird regularly spotted on the one-acre site, McLennan's ambitions are already visible, starting with the 10kW photovoltaic (PV) array on the south-facing slope of the long gabled roof. This defines the house's barnlike volume and shelters a double-story living/dining space and an adjacent master suite on the first floor, as well as the children's bedrooms and a family room above.

In addition to the PVs, which are expected to generate at least as much electricity as the house consumes over the course of a year, other resource-conserving strategies include a heavily insulated, airtight building envelope and a radiant system for space heating and hot water. Because the house is not connected to the municipal water or sewer system (a feature that entailed modifying the local building code), it has composting toilets and a 15,000-gallon rainwater cistern for all water needs, even drinking.



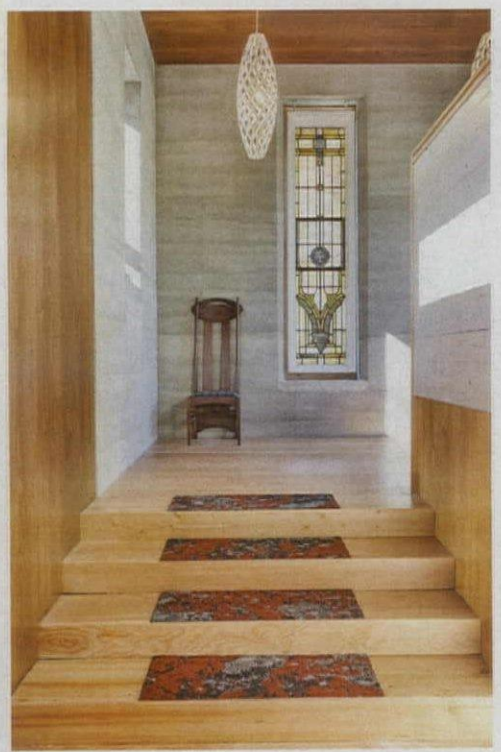


Although Heron Hall is an assemblage of several volumes (top), the house's primary element is a barnlike enclosure (above). Its gabled roof shelters the main living spaces, including a double-story living and dining area (right).

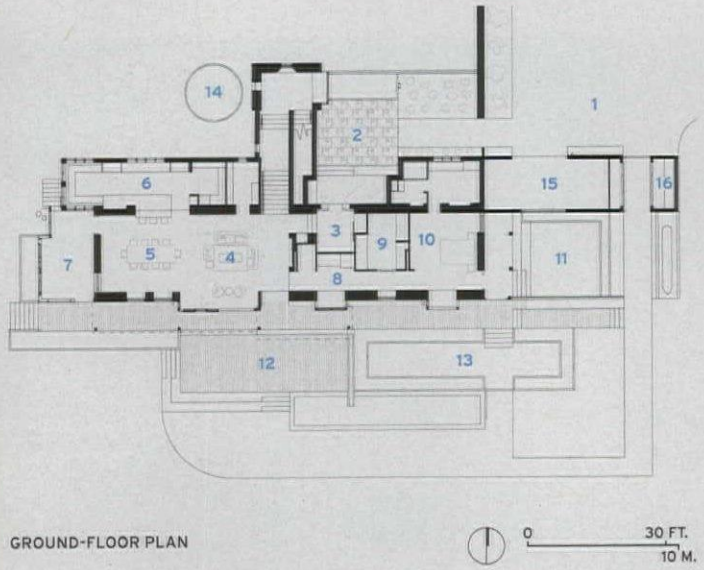
McLennan chose uber-sustainable materials: above a rammed-earth base, the house is made almost entirely of wood, inside and out. It has Douglas fir roof trusses, interior paneling made from cottonwood trees cleared from the site, charred cedar exterior siding, reclaimed flooring, and a few well-placed muscular beams from dismantled old heavy timber structures. It is a "carbon sequestering house," says McLennan, referring to wood's carbon dioxide–retaining properties.

The house incorporates repurposed items, such as stained-glass windows from a local church built in the 1920s, wicker beehives transformed into light fixtures, and a set of hand-carved doors from Afghanistan that had been brought to Seattle a decade ago and then discarded. McLennan calls this aesthetic "Salvage Modernism." If it is done right, he says, "the old and new make each other better."

It is also a showcase for commercially available materials and finishes that McLennan developed in collaboration with manufacturers, including carpet tiles with a pattern



The house incorporates commercially available materials that McLennan helped develop, such as a rammed-earth wall system and a line of lichen-patterned carpet tiles.



GROUND-FLOOR PLAN

1 PARKING
2 ENTRY COURT
3 ENTRANCE
4 LIVING
5 DINING
6 KITCHEN
7 SCREENED PORCH
8 LAUNDRY
9 CHANGING ROOM
10 MASTER BEDROOM
11 COURTYARD
12 DECK
13 GARDEN
14 CISTERN
15 BIKE SHED
16 TOOL/RECYCLING SHED

inspired by lichen; the rammed-earth system, which incorporates reinforcement and insulation; and pavers made from remnant stone. These products, as well as all the others used in the house, are free of the 22 potentially toxic substances prohibited in LBC projects but commonplace in building materials.

Visitors to Heron Hall may not even be aware of the absence of the noxious cocktail of chemical odors often present in new buildings. But they are sure to take note of its mix of materials and textures, its light and airy look, and the quirky remnants from old buildings. And that's just what McLennan had in mind. He hopes guests will leave saying, "If this is a Living Building, then I want one." ■

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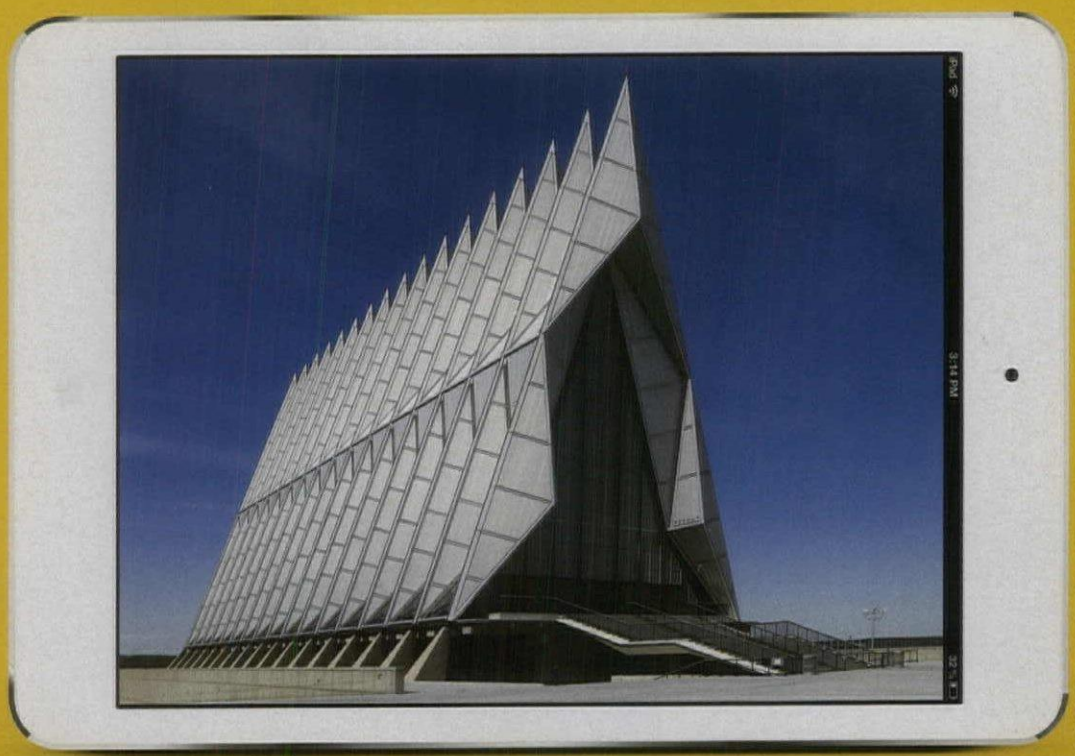

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▶ TAKE A LOOK ON PAGE 47

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JOHNSON FAVARO'S NEW HEDRICK STUDY AT UCLA IS A GAME CHANGER FOR STUDENTS' WORK-LIFE BALANCE. BY DEBORAH SNOONIAN GLENN

TODAY'S COLLEGE STUDENTS want the freedom to study, snack, and socialize at any time and anywhere on campus. At UCLA, the newest hot spot for the mobile, wireless-enabled generation is Hedrick Study, located on the ground floor of Hedrick Hall, a 1960s-era high-rise dormitory. With its European-style food hall, cozy fireplace, and variety of comfy seating arrangements, you might mistake it for the lobby of a boutique hotel. "In fact, the Ace Hotel was one of the inspirations for the interior," says Jim Favaro, principal of Johnson Favaro of Los Angeles, which designed the $9.1 million renovation.

The project replaces a 1990s food-court-style cafeteria that was dying on the vine due to changes in technology and student lifestyles. Hedrick Hall is a hilly, 12-minute walk from UCLA's central campus to the east; the dorm's 1,100-plus residents were increasingly staying on campus after classes to mingle with friends and tackle assignments before heading home at night. But the cafeteria closed after traditional dinner hours (read: there was nowhere to satisfy a late-night case of the munchies), and its tables and chairs weren't conducive to group or solo studying. To bring the large common

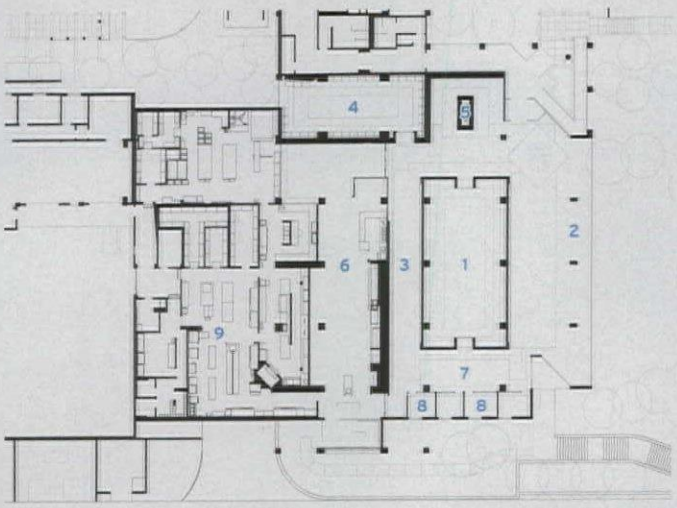
The central reading room, wrapped in white subway tile, sits like a jewel box in the center of the study areas (above). The adjacent east lounge (top) features sofas, study carrels, and reading tables for solo or group work. Its backlit ceiling insert is made of prefabricated wood panels in a mahogany stain.

PHOTOGRAPHY: © JOHN ELLIS

In the central reading room (above), the ceiling features a custom-printed image of the California sky at sunset, a nod to the painted ceilings of libraries past. With midnight blue walls and private desk carrels, the study den (right) has a ceiling treatment comprising a wallcovering printed with an outer-space photo from NASA.

area back to life, Johnson Favaro envisioned it as a round-the-clock space that functioned as a 24–7 food market and a library without books—and with all the amenities and connectivity expected on today's campuses.

The original 22,000-square-foot space had been roughly divided in half, between back-of-house kitchen and open-plan cafeteria with seating. Improving the floor plan was the architects' top priority. "We knew the interior architecture had to drive function here, or else the new space would be as underutilized as the old one," says Favaro. In lieu of an open plan, the architects crafted a series of interconnected seating and study areas on the eastern side of the footprint that range from quiet to busy, where students can work alone, side by side, or in groups, and socialize during breaks. These areas ring an enclosed central reading room—a nod to traditional library design. The food hall, nestled between the study areas and the revamped kitchen, takes its cues from Italian *rosticcerias*, French boulangeries, English pubs, and American delicatessens, says Favaro. There students can buy grab-and-go meals, brick-oven pizza, coffee, baked goods, and other snacks and take them right to their seats. The new 7,000-square-foot kitchen supports the food hall and is also the meal-prep center for 13,300 students on UCLA's food plan.



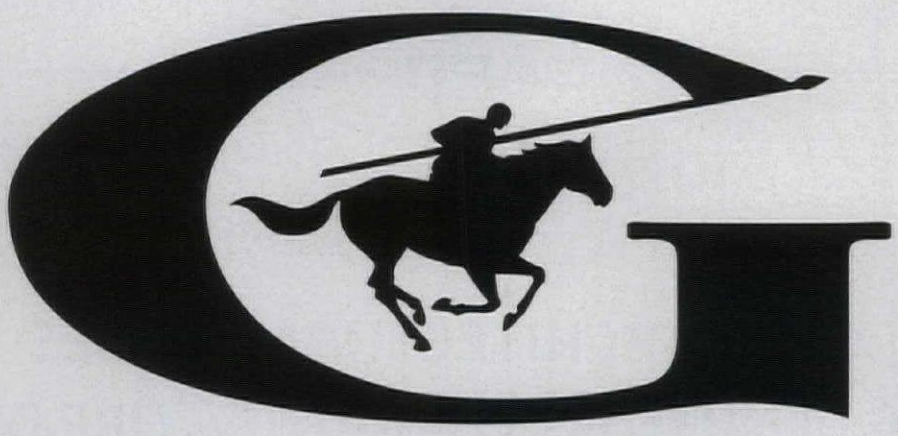
FLOOR PLAN

0 20 FT. 6 M.

1 READING ROOM
2 EAST LOUNGE
3 COMMUNAL TABLE
4 STUDY DEN
5 FIREPLACE
6 FOOD HALL
7 SOUTH LOUNGE
8 STUDY ROOM
9 KITCHEN

Furnishings and finishes in warm, textured neutrals lend the interior a vibe that's inviting and intimate rather than institutional. Johnson Favaro designed the fireplace, fixed furniture, and a few decorative touches such as ceiling treatments and durable, custom-printed floor tiles laid to look like Persian carpets. "Materials in public buildings need to be long-lasting so clients get the best bang for the buck," says Favaro. "The goal was a luxury feel without the luxury price tag." Rodrigo Vargas Design helped the firm select furnishings and designed some custom pieces.

Since opening in January 2017, Hedrick Study serves about 3,000 students per day, and twice that number when final exams roll around. As hoped, it's buzzing at all hours, and many dorm residents return from campus right after classes so they can snag their favorite seats and stay there for the rest of the day. "It's like a communal living room," says Favaro. For these students, there's no place like home—especially if it comes with great grub and high-speed Internet. ■



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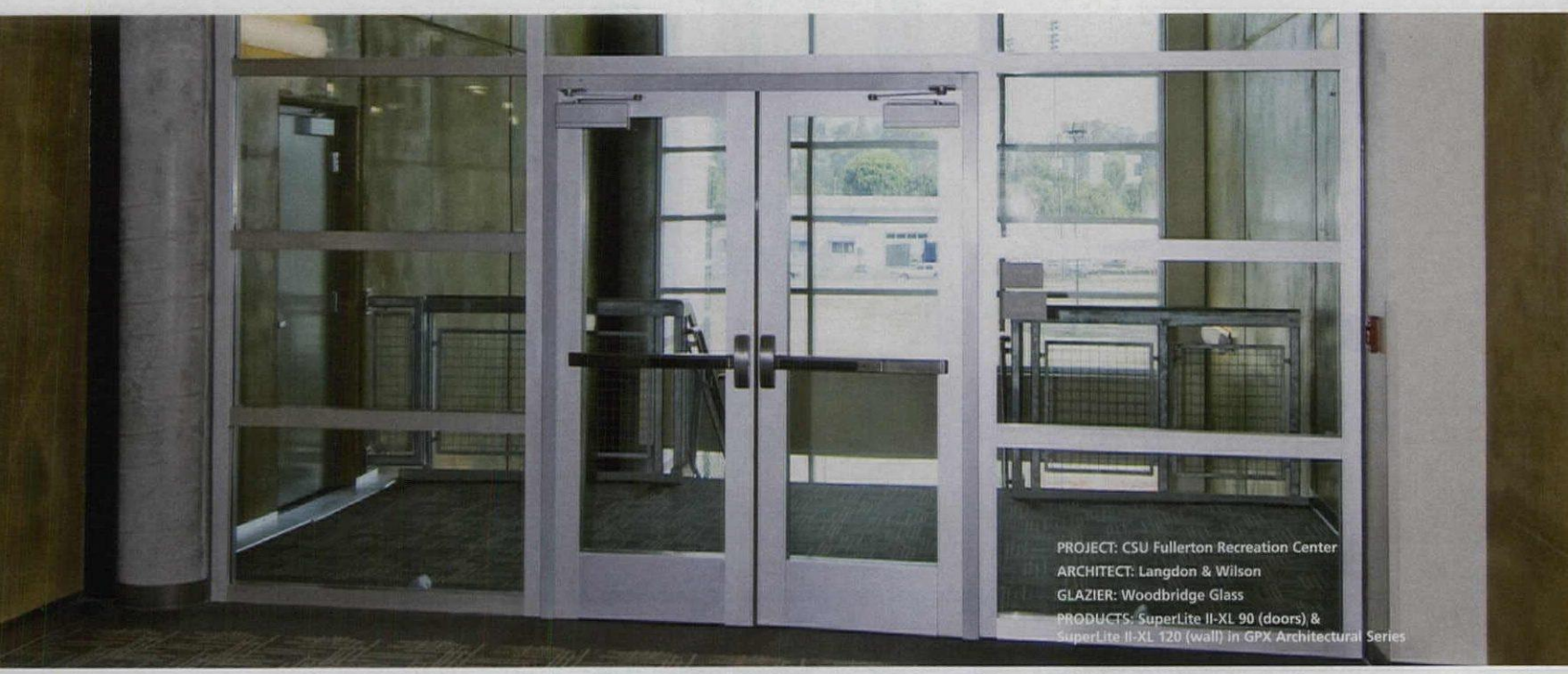

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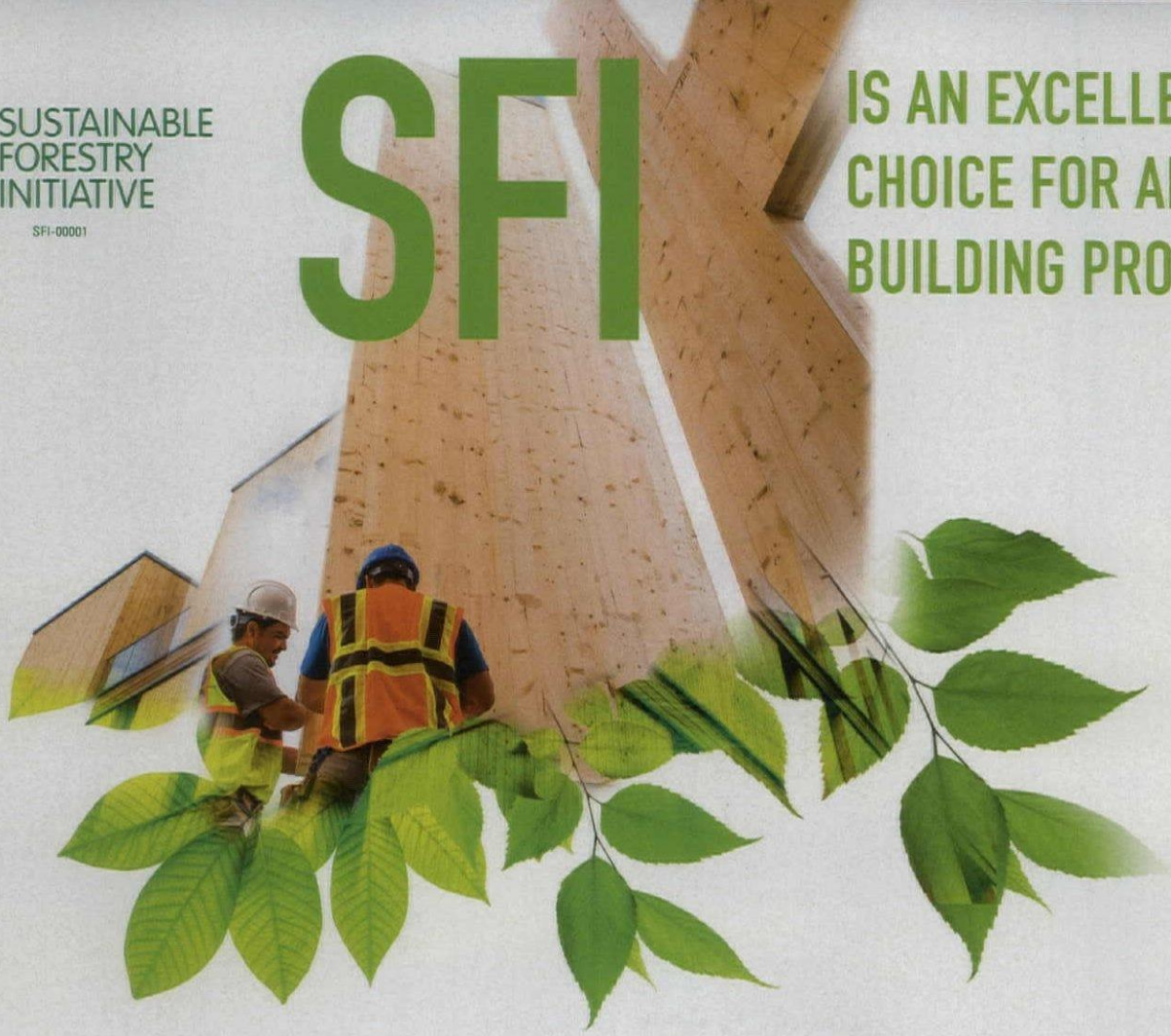

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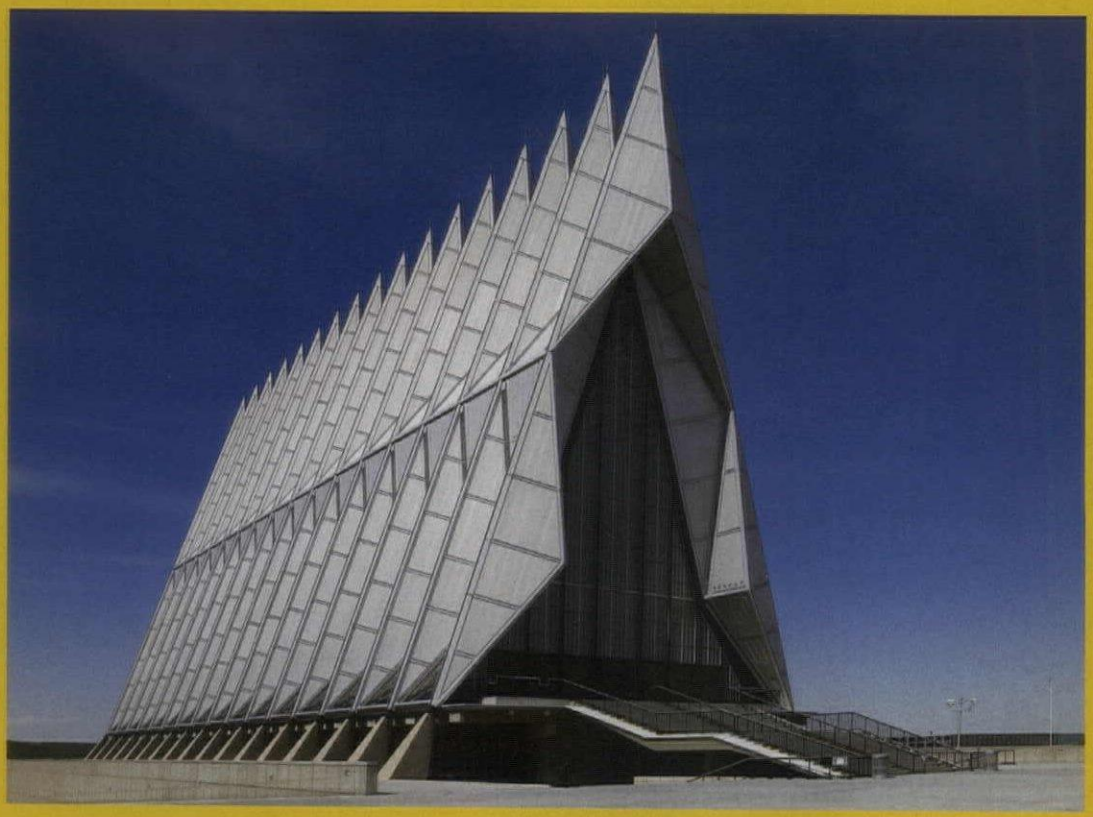

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The architect for the October issue's contest is Israeli-Canadian **MOSHE SAFDIE**, who designed the housing complex Habitat (left) for Expo 67 in Montreal. Safdie's undergraduate-thesis-turned-pavilion was his first built project and launched an illustrious career, though Habitat remains his most widely recognized work.

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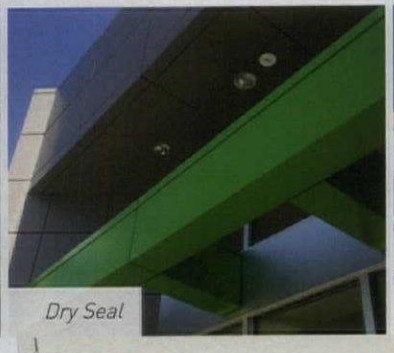

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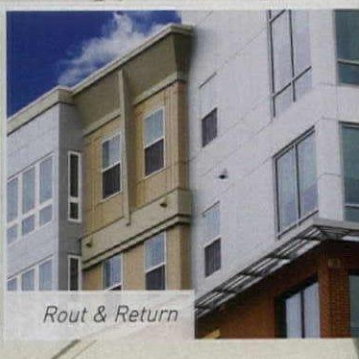

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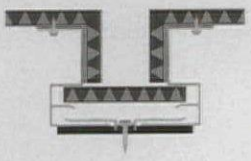

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Immersive murals by Turner Prize–winning British painter Chris Ofili fill the ground-floor restaurant, Marisol (above), which Johnston Marklee designed.

PHOTOGRAPHY: KENDALL MCCAUGHERTY, © HALL+MERRICK

Softening the Edges

Johnston Marklee's thoughtful renovation to the Museum of Contemporary Art, Chicago, rethinks the interior spaces.

BY JAMES GAUER

WHEN CHICAGO'S Museum of Contemporary Art (MCA), designed by German architect Josef Paul Kleihues in accord with his theory of "poetic rationalism," opened in 1996, its 151,000-square-foot interior—distinguished by barrel-vaulted galleries around an atrium—was well received. But critical reaction to its exterior—a five-story symmetrical composition clad in a relentless grid of cast aluminum and limestone panels—was decidedly negative. Blair Kamin, writing in the *Chicago Tribune*, dismissed it as "a cold, colorless culture palace." Stanley Tigerman called it "an embarrassment."

Despite its reviled rigidity, MCA is a handsome urban-design set piece nestled between two parks, for which it creates strong edges. But its unyielding geometry was the last gasp of neorationalism, a stripped-down classical language that had flourished in the postmodern 1970s and '80s. Just one year after MCA's completion, the opening of Frank Gehry's Guggenheim Museum in Bilbao heralded the hegemony of a very different style, which made Kleihues and his grids seem old hat.

The mission of museums had also moved on. MCA was conceived in the tradition of cloistered containers for the contemplation of art. But before it was finished, the paradigm was shifting toward transparency, openness, social engagement, and community outreach. This is the direction in which director Madeleine Grynsztejn has chosen to lead MCA with a recently completed $16 million renovation, designed by Los Angeles–based Johnston Marklee (JM).

As artistic directors of this year's Chicago Architecture Biennial (page 57), titled "Make New History," architects (and spouses) Sharon Johnston and Mark Lee were sympathetic to the Kleihues design's hybrid historic form. "We looked at it with love," recalls Lee. "Kleihues described it as somewhere between Schinkel's Altes Museum and Mies's New National Gallery, between the neoclassical and the modern. We asked, How can we help solve its problems through the lens of its original intentions?"

"One of the reasons MCA selected us," says Johnston, is that Mark and I and our team acknowledged that it's a tough building, but there are great qualities in it." Among these is the rigorous modular grid, which they saw not as a constraint but as a powerful organizing structure that just needed some life injected into it. For example, rather than fight the grid, they used it to transform a flat-ceilinged space on the ground floor into a voluminous spatial sequence capped by white plaster handkerchief vaults. These articulate the grid while recalling the barrel vaults of the upper-level galleries and, according to Lee, "dialing back to the neoclassical."

In an artful feat of spatial layering, JM resolved the problems of cramped circulation

A glittering, geometric installation by Mexico City–based design duo Pedro y Juana hangs in the multipurpose Commons area (above).

and inadequate non-gallery public space by reconfiguring the ground floor of the building's northern flank. They merged a lobby for an existing theater with a new restaurant to create the "Street," an alternate path to and from the main floor above, as well as a social gathering place. Pedestrians looking into Kleihues's big, square-gridded windows now see a lively and stylish dining room, bar, and lounge instead of uninspired institutional classrooms.

A new elliptical stair—an homage to a much-admired existing one by Kleihues—leads up to the "Commons," a multipurpose area that opens onto a terrace overlooking the museum's garden. Above, JM inserted a third-floor classroom and meeting area in what had been the upper half of a two-story café. Elegantly detailed and visible from the atrium, it "puts education front and center," says Grynsztejn. The project has transformed 9,000 square feet and added 3,000 more with no changes to the exterior, which many Chicagoans and even some architects have grown to love—or at least hate less—over the years.

JM has made its interventions not only with linear precision but also with painterly warmth. Walls are sheathed in panels of birch stained a rich chestnut color, a finish repeated in the stair and in other millwork, mixing with richly veined black-and-white marble and brightly colored upholstery to strike a balance between cool and warm. British artist Chris Ofili has decorated the restaurant, called Marisol (after the artist who painted the first work acquired by MCA), with monochrome drawings and polychrome murals. Mexico City–based designers Pedro y Juana have covered the ceiling of the Commons, which will feature new installations by other artists every few years, with a dense network of festive, colorful pendants that serve both as light fixtures and as hanging planters.

Grynsztejn has fulfilled her commitment to community outreach by opening the Street to the public free of an admission charge. "We're trying to make the ground floor part of the life of the city," explains Johnston. "Kleihues intended his building to be a station on a journey from the city to the lake. It's a beautiful metaphor, but it didn't quite work out as he envisioned it." Now, thanks to Johnston and Lee's sure-handed redesign, visitors can follow a promenade that begins on Mies van der Rohe Way and ends in a garden with views toward Lake Michigan. What could be more rational or poetic? ■

The Announcement of the Decade

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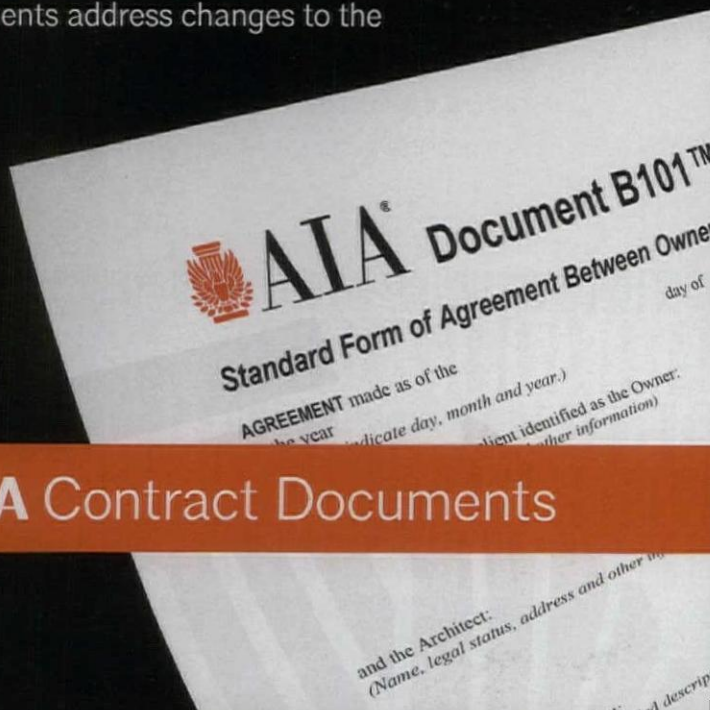

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Historical Reference

The Chicago Architecture Biennial spotlights the next generation of architects by looking back.

BY JOSEPHINE MINUTILLO

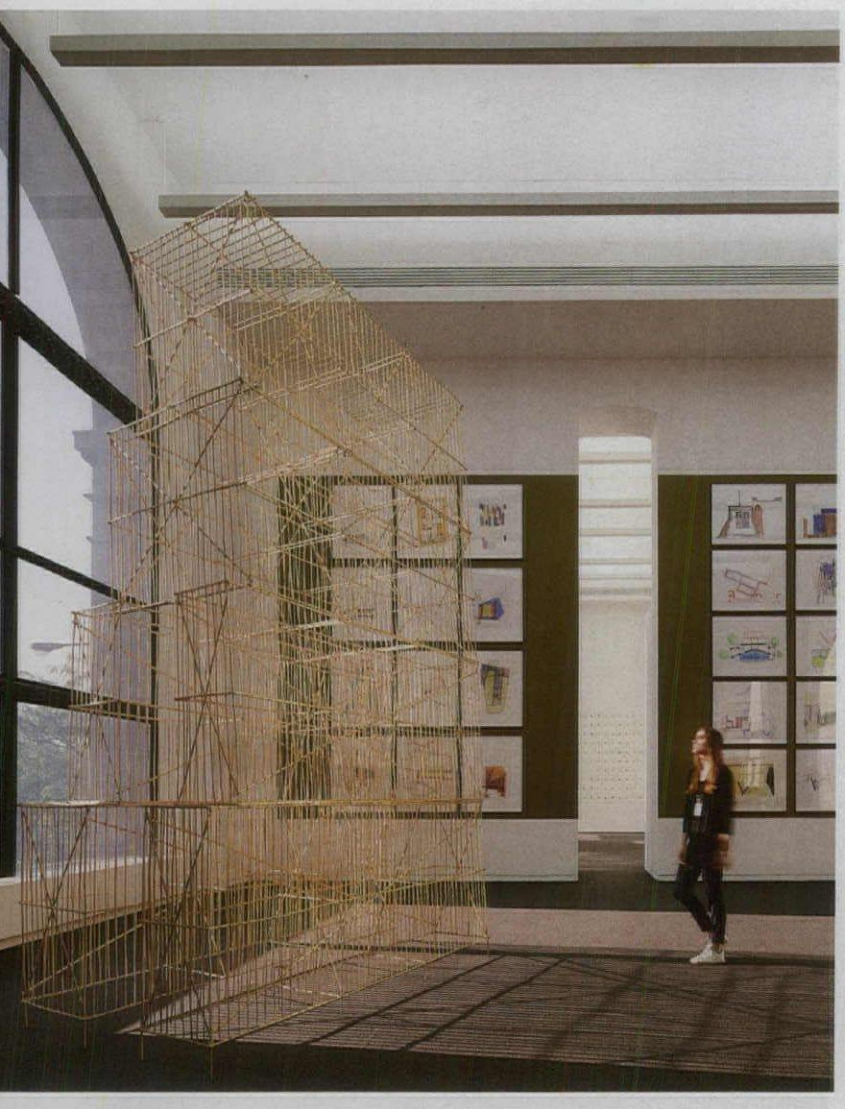
JUST AS the most iconic building of the recent past, Frank Gehry's Guggenheim Museum Bilbao, is turning 20 years old, the Chicago Architecture Biennial (CAB) offers some hints about who could design the next one. And it may well not be one of the usual suspects.

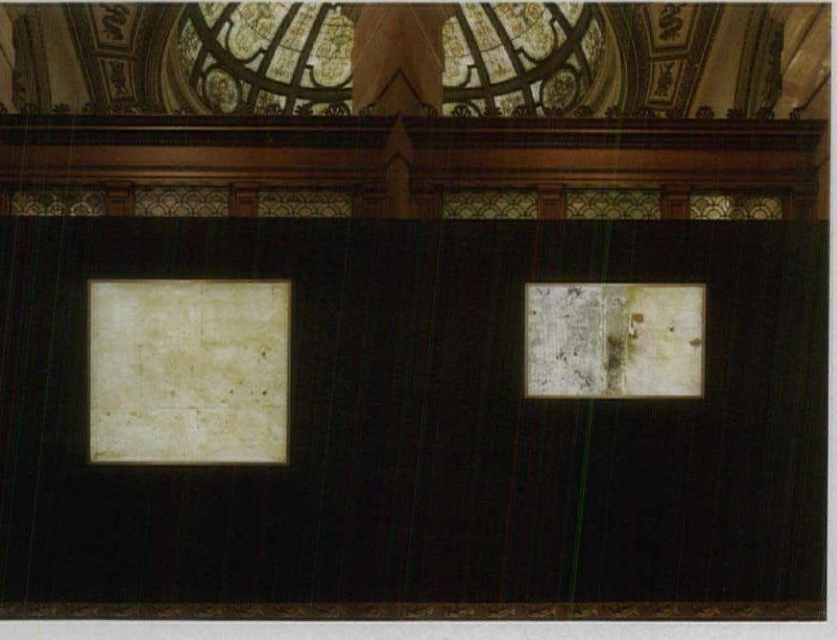
The Biennial, which opened September 16 and runs through January 7, is showcasing the work of more than 140 architects, designers, and allied artists from around the world, many of them relatively unknown in the U.S. While a few more senior figures—Toshiko Mori, Dominique Perrault, Kazuyo Sejima of SANAA—are included, most of the participants represent a new generation of talent, closer in age to CAB's artistic directors—Sharon Johnston, 51, and Mark Lee, 49—or younger. The couple, founding partners of the nearly 20-year-old Los Angeles–based firm Johnston Marklee, are themselves having a banner year, not only with the Biennial but also the unveiling of their redesign of the Museum of Contemporary Art Chicago (page 51), and the imminent completion of the Menil Drawing Institute in Houston, their most important project to date.

In Vertical City (top), 16-foot-high models that revisit the 1922 Chicago Tribune Tower design competition populate the top floor of the Chicago Cultural Center (bottom).

Of course, for most architects who aren't Bjarke Ingels, it takes at least 20 years of practice, if you're lucky, to get a commission for a ground-up building for a prestigious cultural institution or similar high-profile project. So what can we expect from the younger architects on view in Chicago—those who are on the cusp of breaking through, and who presumably will be designing the next wave of muse-

PHOTOGRAPHY: © STEVE HALL (TOP); TOM HARRIS (BOTTOM)





Studio Mumbai created a towering sculpture made of bamboo sticks (top). Jorge Otero-Pailos creates works of art out of films of dust from historic buildings (above). Bureau Spectacular's fur-covered model is part of the exhibit called *Horizontal City* (opposite).

ums, civic centers, theaters, performance halls, and maybe even significant typologies we can't imagine yet? And what criteria link their work to the larger message of the Biennial?

The very title of the Biennial, Make New History (drawn from a work by artist Ed Ruscha), is a telling sign that the new generation—now comfortably distanced from Postmodernism and no longer enamored of the kind of radical parametric design we saw at the turn of this century—is not afraid to look to the past. "We've seen a renewal of interest in historical precedents among a generation of architects perhaps less encumbered by the past 30 years," says Lee.

The projects on display in the Chicago Cultural Center—an 1897 Neoclassical former library building that manageably contains the bulk of the Biennial's exhibitions—are, for the most part, conceptual rather than actual representations of built work. Though conjured in response to the broad theme of Make New History, they also allow the architects to express their own design impulses.

This is best witnessed in *Vertical City*, the highlight of the show. That exhibit brings together 16 firms to reconsider the 1922 design competition for the Chicago Tribune Tower, the most memorable entry for which was Adolf Loos's design of a giant Doric column. Scale models from the 16 firms, each 16 feet high, alongside a model of Loos's tower, create a sort of hypostyle hall on the Cultural Center's top floor.

In fact, two of those firms—Barcelona-based Barozzi Veiga (RECORD Vanguard 2014) and Basel-based Christ & Gantenbein, whose partners are each in their 40s—have, like the 43-year-old Ingels (who is not in the Biennial), already built significant museum projects—all in Switzerland. Barozzi Veiga, whose main interest is the specificity of different contexts, took inspiration from Chicago's rich terra-cotta legacy and its later Miesian landmarks to create a black cuboid form that discreetly merges structure with surface ornament. The firm's Graubünden Museum of Fine Arts in Chur, completed last year, similarly combines ornament within a rationalist structure. Emanuel Christ and Christoph Gantenbein, who completed two museums last year—an extension to the Swiss National Museum in Zurich (RECORD, November 2016, page 84) and the Kunstmuseum Basel—draw from their longstanding research project on typologies with their students at the ETH in Zurich to introduce an *objet trouvé* into the mix. Their chosen model is an existing concrete garage tower in São Paulo built in 1964, which, to them, achieves a classical beauty based on its honest, and simple, structure.

On the other hand, many of the towers are whimsical. London-based Serie Architects looked to Asian pagodas for inspiration. The tiered tower Serie produced uses its multiple roofs "as opportunities, rather than limits," according to founding partner Christopher Lee. Mexico City–based Tatiana Bilbao (RECORD Vanguard 2007) divided her lively tower into multiple sections, and brought in more than a dozen other studios as collaborators to design those individual areas, creating a patchwork vision that reflects the true diversity of a city.

The first Biennial, in 2015, attracted over half a million visitors. The second one will welcome at least that many, according to Mark Kelly, Chicago's Department of Cultural Affairs and Special Events commissioner. Even if overly didactic, with long, sometimes arcane wall texts next to each of the displays, the exhibition is not just meant to remind us of the architecture that has come before us and to anticipate what's next; it is also meant to entertain, inspire, and provoke.

One need not be an architect to enjoy the Biennial. For instance, Bijoy Jain of Studio Mumbai, in a section called "Civic Histories" that is devoted to the city and its representations, offers nearly 20-foot-high lyrical latticework sculptures made of thin bamboo sticks that are both awe-inspiring and ever so slight, suggesting that even the ephemeral can be monumental or vice versa. Jorge Otero-Pailos's contribution, *The*

PHOTOGRAPHY: © KENDALL MCCAUGHERTY (2)

PHOTOGRAPHY: © TOM HARRIS

Ethics of Dust, is a haunting work at the intersection of art, architecture, and preservation made of thin films of dust and pollution from historic buildings. Part of a section of the Biennial called *Building Histories*, Otero-Pailos presents several films taken from Westminster Hall, the birthplace of modern parliamentary democracy, and from the site of the 2011 white-supremacist terrorist attack on Norwegian ministries—among the few works on display that connect to the darker aspects of our world.

In a fourth and last section, *Horizontal City*—a counterpoint to *Vertical City*, where architects were asked to reconsider the architectural interior—Bureau Spectacular puts a witty twist on a house by Adolf Loos (who seems to have replaced Cedric Price as the dead architect du jour). The firm presents a model of Villa Müller (1930) as a viewing machine: to peer inside, to look out at the views from within, and to see blurred images of yourself on a reflective surface. Then the architects covered the little structure in fur. If the general public isn't aware of Loos's love of fur—what he referred to as the original textile—it doesn't matter. The thing looks cool.

Sprinkled throughout the Cultural Center are extraordinary photographic works that engage with or are inspired by architecture. Some are highly abstract, like Philipp Schaerer's sequence, *Chicago Series*. Photographer Filip Dujardin, with *Chicago Shuffle*, offers up collages of Chicago buildings of various types that feel surreal because they seem actually to have been built.

Many big-name architects working today, young or old, were noticeably excluded. And while some countries, like Belgium, are surprisingly well represented, others, like most of the Scandinavian ones, not at all. And, yes, the overwhelming majority of participants are men. This may be less an indicator of what's to come for the profession than an indication of what guided Johnston and Lee, not least of which is how they imbued the Biennial with an element of discovery by choosing designers who are fairly new to the American scene. One obvious kinship among the participants, most of whom seem to take a carefully considered approach to architecture, is not just that they look at history—and many histories, at that—but they look at the details. Based purely on the strength of the Biennial, the future of architecture is bright. ■

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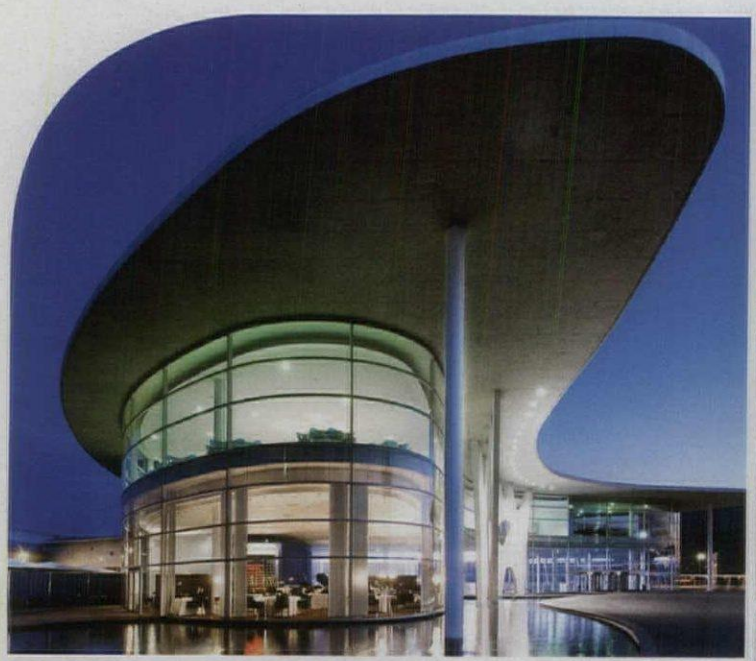

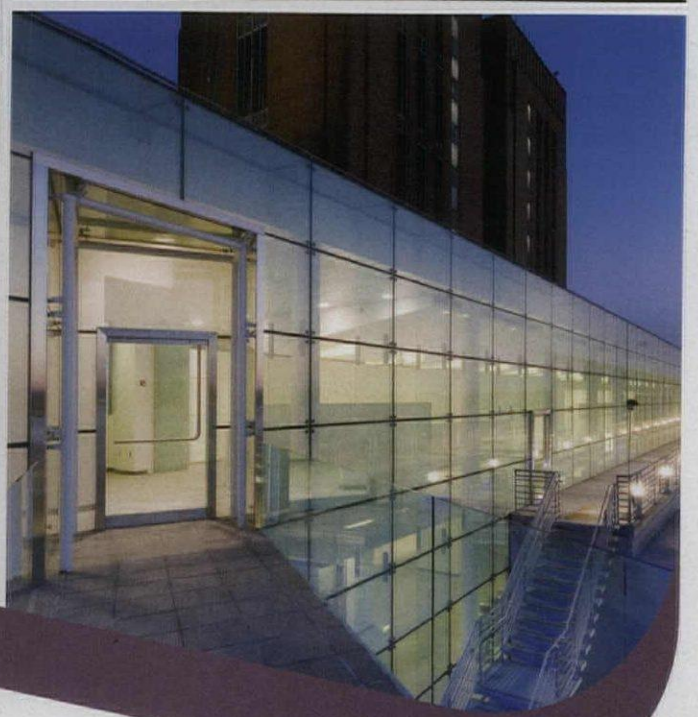

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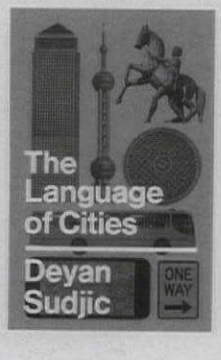
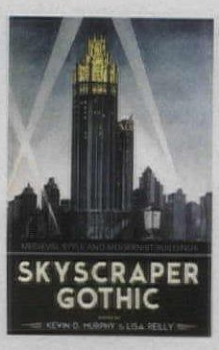
As Cities and Buildings Evolve: The Importance of Traditions

Reviewed by Anna Shapiro



The Language of Cities, *by Deyan Sudjic. Allen Lane/Penguin, 230 pages, $39.95.*

In the creation of cities, is Corbusian purity better than hodgepodge development? Does the unrestrained market produce the best results for its denizens? What about restrictions on building sizes or types, limits on cars or human population? Sudjic, head of the Design Museum in London and acclaimed author of *The Language of Things: Understanding the World of Desirable Objects,* asks the questions but, for the most part, offers random examples and diffuse meanderings by way of response. Exceptions include, as an instance, the history of Docklands. If only he had stuck to one topic—the role of streets and roads, which he touches on—and dug in.

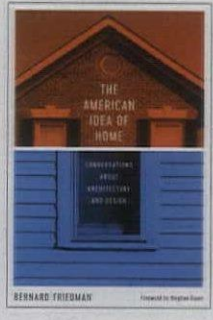


Skyscraper Gothic: Medieval Style and Modernist Buildings, *edited by Kevin D. Murphy and Lisa Reilly. University of Virginia Press, 228 pages, $39.50.*

That architectural oxymoron, the medieval style of early skyscrapers, seems like a great idea for a book. But the flair of these eight scholarly essays by academics and consultants (including the editors) does not come close to that of their subject in their sober docketing of the structural similarities between European cathedrals and steel-frame design. They also take on the role that attitudes played—both toward the "moral" aspect of Medieval architecture and toward corporate branding—and how these changed in the journey from Cass Gilbert's Woolworth Building in 1913 to Raymond Hood's Radiator Building in 1924.

Rome: Urban Formation and Transformation, *by Jon Michael Schwarting. Applied Research + Design Publishing, 211 pages, $45.*

In this oversize volume of painstaking reconstruction and deconstruction—through visual analysis, measuring, and, primarily, architectural drawing—architect, urban designer, and Prix de Rome–recipient Schwarting invokes this magnificent (and confusing) city as an exemplar of planning. The drawings show the ways that particular locations, such as the Piazza Navona and the Campidoglio, incarnate ideal forms while integrating with and enhancing preexisting structures. Piazzas of this kind also act as organizing voids for the larger network of roads. Throughout, the way Roman architecture takes its forms from conceptual paragons while making a virtue of practical realities is visually and verbally demonstrated.



The American Idea of Home: Conversations About Architecture and Design, *by Bernard Friedman; foreword by Meghan Daum. University of Texas Press, 227 pages, $27.95.*

The author, who made a documentary along these lines in 2012 after restoring and adding to his Midcentury Modern L.A. house, presents Q&A's with 30 distinguished architects on designing houses so that they feel like homes. Some articulate specific principles (Elizabeth Plater-Zyberk, Jeremiah Eck, and Sarah Susanka, among others), and most rail against houses scaled to impress, sited indifferently, or ecologically insensitive, but the conversations tend toward wide abstractions. The foreword, by novelist and literary nonfiction writer Daum, on the other hand, beautifully grapples with the idea of homes as "not just showplaces but hiding places."

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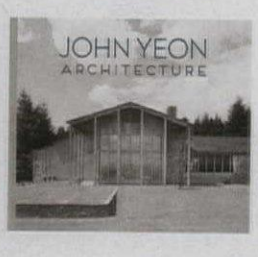
Modernist Poet

John Yeon Architecture: Building in the Pacific Northwest, *edited by Randy Gragg, with essays by Barry Bergdoll, J.M. Cava, and Marc Treib. Andrea Monfried Editions, 240 pages, $60.*

Reviewed by Wendy Moonan



JOHN YEON (1910–94) might be the most important architect you've never heard of. He was self-taught and produced a small body of work, completing only 18 of the 65 buildings he designed. He wasn't even licensed. Yet he developed a distinctive style of regional modernism, featuring a planar simplicity and use of local materials, techniques, and vernacular forms, that responded to the Pacific Northwest climate.

The work can now be appreciated through an excellent monograph published to coincide with a retrospective, *Quest for Beauty: The Architecture, Landscapes and Collections of John Yeon*, held at the Portland Art Museum from May 13 to September 3. Randy Gragg, editor of the monograph and executive director of the John Yeon Center for Architecture and Landscape at the University of Oregon, was a cocurator.

The son of a timber magnate in Portland, the young Yeon interned in the office of a local architect and took courses at the Portland Art Museum School from landscape painter Henry Wentz. Yeon and his friend Pietro Belluschi often visited Wentz's painting studio on the slopes of Neahkahnie Mountain. As Yeon recalls, the balloon-framed cabin, with walls of spruce lap siding, was "the first really beautiful piece of architecture" he had seen in Oregon.

In 1928, the 17-year-old attended Stanford briefly before heading to New York, where he worked at an architecture firm and became acquainted with such influential New Yorkers as Alfred Barr, Philip Johnson, Lincoln Kirstein, and Edgar Kauffman, Jr. In 1930 he returned to Portland and was appointed to Oregon's first State Park Commission.

Fellow parks commissioner Aubrey Watzek, another timber heir, hired Yeon, then 26, to design a house. The elegant courtyard scheme with pitched roofs and clad in tongue-and-groove Douglas fir was organized on perpendicular axes to choreograph views of mounts Hood and Saint Helens.

After the house was completed in 1937, Henry-Russell Hitchcock, the architecture historian and frequent curator for New York's Museum of Modern Art, visited it. Subsequently, the Watzek house appeared in MoMA's 1939 catalogue and show *Art of Our Time: 10th Anniversary Exhibition*. Editors and curators on the East Coast were drawn to "Yeon's distinct and restrained aesthetic of wood architecture in taut dialogue with its local landscape," as architecture historian and MoMA curator Barry Bergdoll writes.

Yeon went on to build other houses, but by 1955 he stopped to devote himself to land conservancy in Oregon, curating museum exhibitions, and collecting art. Nonetheless, he deserves a place in history for pioneering a regional response to the stringently pure International Style. Marc Treib, professor of architecture emeritus at the University of California, Berkeley, compares Yeon's minimal, woodsy style with that of William Wurster and others in Northern California and concludes, "Yeon had blazed the trail." ■

A Living Lab

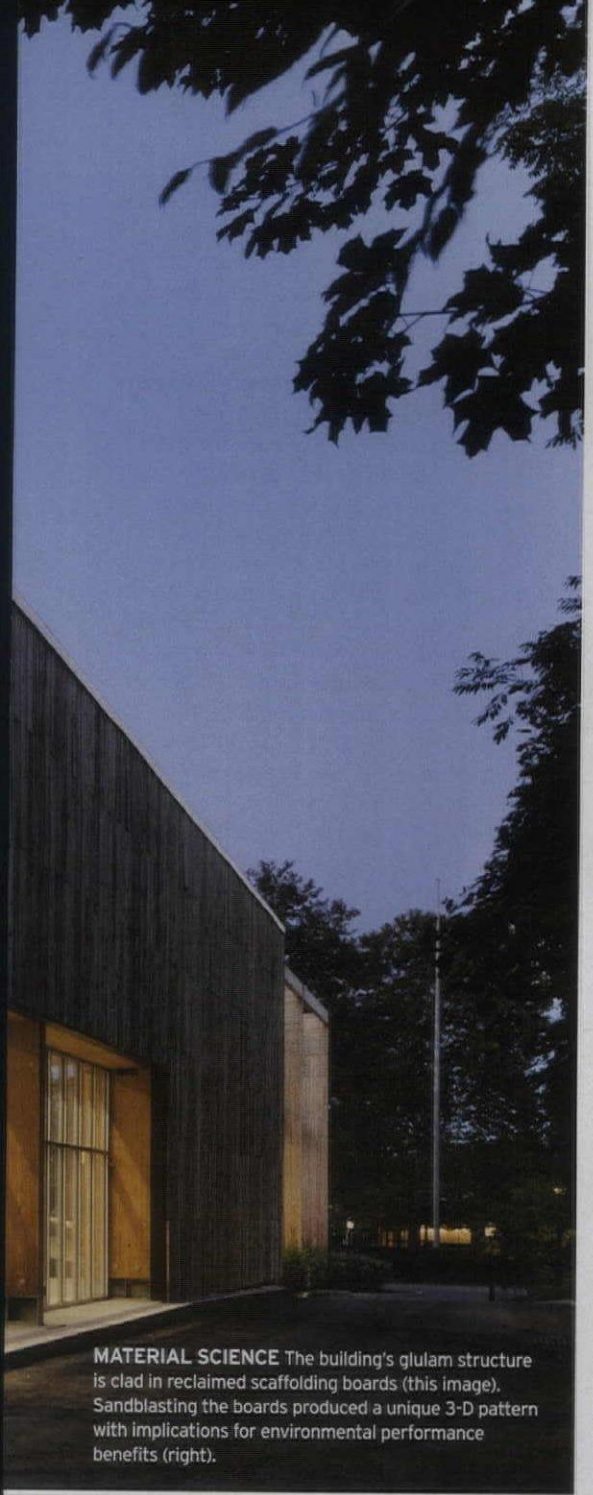
Princeton's new architecture workshop evolves with the very research it nurtures.

BY ALEX KLIMOSKI

TUCKED ONTO a slender parcel surrounded by a large arena, an athletic field, and a hulking four-story chemistry building, the Princeton School of Architecture's new 8,500-square-foot Embodied Computation Lab is easy to miss. More, its modest shedlike form and rustic wood facade belie its function as a state-of-the-art classroom and workshop for research into advanced building technology including automated construction, feedback systems, energy harnessing, and new wall and roof assemblies. Its most remarkable features are subtle if not invisible. The result of a rigorous design process and insatiable drive to innovate, the lab is the first ground-up building designed by David Benjamin, founder of the New York–based research studio The Living.

Established in 2011 and acquired by software giant Autodesk in 2014, the group's name suggests the area of exploration central to its work: the intersection of biology with computation and design. Projects have ranged from producing organic bricks from a mixture of agricultural waste and mycelium for a 43-foot-high tower, for MoMA PS1's 2014 Young Architects Program, to developing an algorithm based on the transformative qualities of slime mold to generate a high-performance prototype for the world's largest metal 3-D-printed airplane component.

Benjamin's involvement with the Princeton project began with a 2014 feasibility study for the site, the architecture school's designated



MATERIAL SCIENCE The building's glulam structure is clad in reclaimed scaffolding boards (this image). Sandblasting the boards produced a unique 3-D pattern with implications for environmental performance benefits (right).

PHOTOGRAPHY: © MICHAEL MORAN/OTTO (2); PABLO MARVEL, COURTESY THE LIVING (TOP, RIGHT)

area for the tectonic testing of structures, large-scale mock-ups, and teaching of construction methods since the 1940s. Charged with determining if the school's existing buildings—an early 20th-century horse stable and an adjacent 1950 glass box designed by then-professor Jean Labatut—could be adapted to provide the space and support needed for more progressive programming and cutting-edge research, he concluded that the stable, the laboratory's primary facility, should be replaced. Considering the legacy and significance of Labatut's modern addition (in the 1960s it hosted Buckminster Fuller's first Geosphere), Benjamin suggested that the university keep it. ("It's also a great research feature for testing the worst-case scenario of the midcentury, single-glass-pane typology," he adds.)

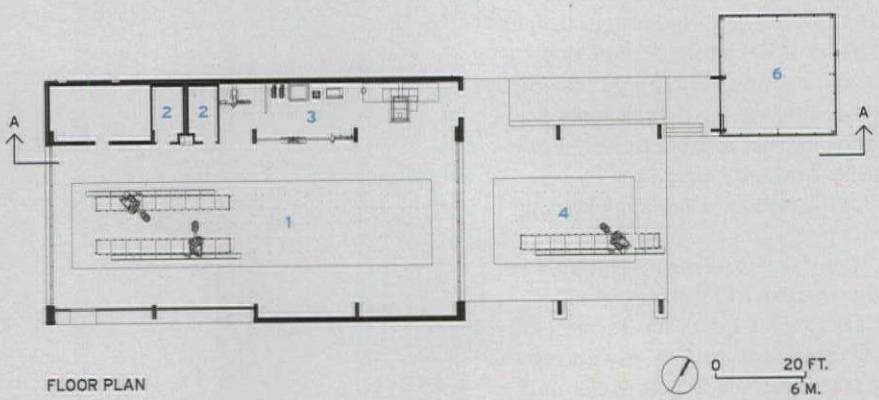
"Part of the challenge was figuring out the type of equipment that will be needed for research not just next year but also in five, 10, and 20 years," says Benjamin. "That led to the idea of accommodating something that will continue to be interesting and relevant—two robots, on tracks, that collaborate with each other." Unlike CNC technology, the robots have the intelligence to extrapolate data for rapid prototyping.

The building's open, elongated 140-foot by 52-foot form was driven by programmatic needs such as flexible spaces for testing, exhibitions, and classrooms (a loftlike mezzanine provides a seated instruction area); the ability to simultaneously work on multiple projects; and plenty of storage. The radius of movement for the two robots helped determine precise dimensions for the floor plate and 23-foot ceiling height. Benjamin also thought about how the robot tracks could potentially be extended to form a production line.

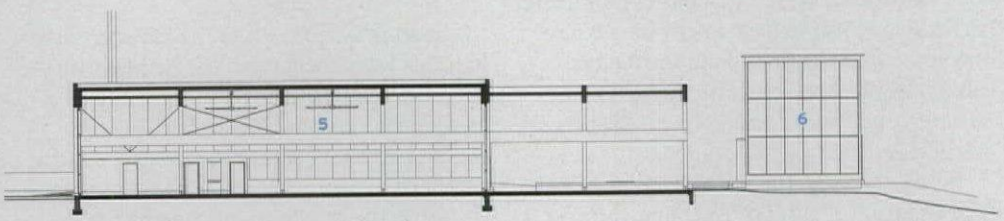
In several ways, the lab was designed to be "open-source." A third of its framework, for instance, extends out beyond the enclosed structure, providing researchers with the bones to build out their own wall assemblies. "In order to test out materials, construction processes, mechanical systems—you have to do it at full scale," says Benjamin. "The idea was to home in on features of the building that would help researchers learn new things." Another example of open sourcing is the heating system: while the lab currently harvests waste heat from the neighboring chemistry building, Benjamin installed equipment and controls so that students could swap heat sources by hooking up to a geothermal well.

Just as the building was constructed to foster these types of investigations, the process of designing it was a way for Benjamin to propel his own research on materials with low embodied energy—or the energy required to extract, produce, transport, and assemble materials into buildings. For the structural frame, Benjamin opted for glue-laminated wood (glulam)—an unusual choice given the requirement to support a 5-ton gantry crane.

OPEN SOURCE The new laboratory was intentionally designed to be incomplete; over time, it will have many authors. Its neighbor, a 1950 glass pavilion, was also built to be a test structure. Today, it is used for climate-control research, and features equipment for high-resolution three-dimensional temperature readings.



FLOOR PLAN



SECTION A - A

1 ROBOTS & AUTOMATION AREA
2 RESTROOM
3 WORKSHOP
4 OPEN TESTING AREA
5 SEATED INSTRUCTION
6 ENVIRONMENTAL SYSTEMS TESTING

"People asked me, 'Why isn't this steel?'" Benjamin says. "Well, it turns out, it doesn't need to be steel. It just took a little more thinking to achieve with wood." Much of the building's interior is fashioned from plywood, and its facade is composed of over 900 salvaged New York scaffolding boards.

Intrigued by the idea of analyzing and exposing each board's unique properties, Benjamin focused on the feature with the most visible variability—the knots. He found that sandblasting the knots deepened the ridges of the wood's fine natural grains, implying possible environmental benefits for the building envelope: the micro contours can trap pockets of air, serving as an "invisible parka"; they also form discrete channels for water runoff. (Sensors placed behind the sandblasted boards, which clad only the south facade, actively track performance data. Untreated boards on the north facade feature sensors as well, serving as a control sample.)

Altering the boards also allowed Benjamin to incorporate machine learning—the same area of artificial intelligence enabled by the robots—in a novel way: the design team used algorithms derived from facial-recognition technology to identify the individual knots, which were then treated with a custom-made CNC sandblasting machine. In some cases, the computer missed the knots—a slipup he embraces. "This is a tangible representation of machine learning today, with all of its potential pitfalls and accuracies," he says. "And in the end, it's a great example of what the building is—a place where computation gets embodied in the physical world." ■

credits

ARCHITECT: The Living – David Benjamin, founder; John Locke, project architect; Danil Nagy, Ray Wang, Lorenzo Villaggi, Jim Stoddart, Damon Lau, Dale Zhao, team

ARCHITECT OF RECORD: NK Architects

ENGINEERS: Buro Happold (structural, m/e/p, energy performance); Van Note-Harvey Associates (civil)

GENERAL CONTRACTOR: Epic

CLIENT: Princeton University

SIZE: 8,500 square feet

COST: withheld

COMPLETION DATE: April 2017

SOURCES

GLULAM: Structural Wood Systems

ROOF: Sarnaclad Sarnafil Membrane

HANGAR DOOR: PowerLift Hydraulic Doors

LIGHTING: Nulite (interior); Kenall (exterior)

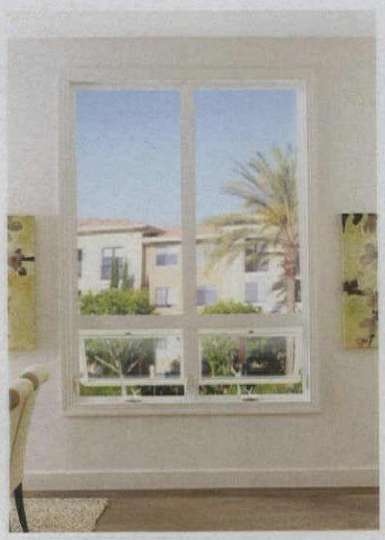
CEILING FANS: Big Ass Fans

PHOTOGRAPHY: © MICHAEL MORAN/OTTO

Taking in the View

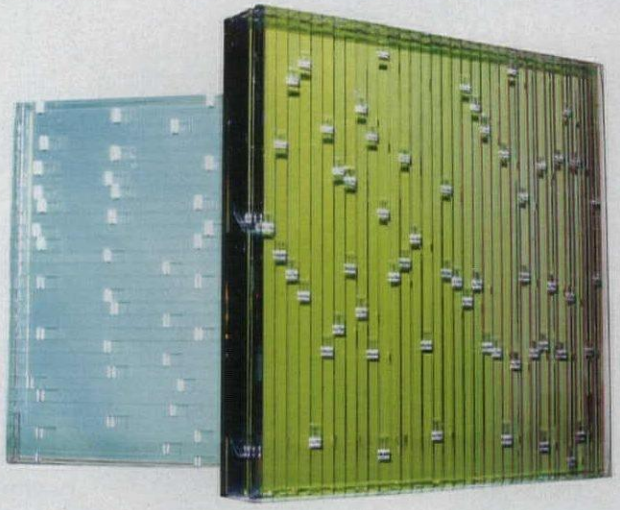
These glazing treatments minimize the appearance of hardware and maximize light and vistas.

By Kelly L. Beamon



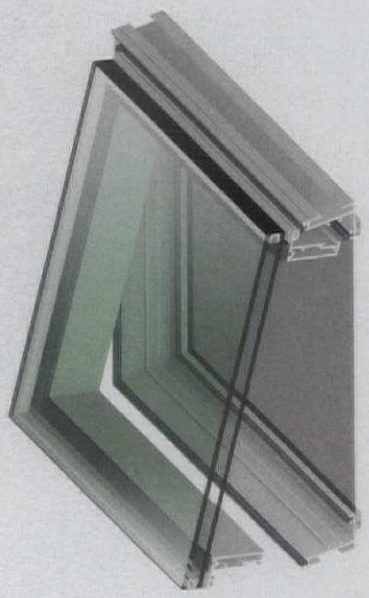
West Pro 200/700 Series

To simplify the installation of windows that have a combination of operating and fixed units in a single opening, Ply Gem has launched a new integral-mullion system called West Pro 200/700. The system can accommodate combinations measuring up to 72" x 96" while still achieving an LC40 performance level.
plygem.com



Lumina

From Sensitile, this glazing option channels the glow of electric light while letting daylight through. Lumina panels are made of textured resin sandwiched between two layers of glass, edgelit by LEDs. The panels (4' x 8', 5' x 8', and 5' x 10') have a high fire rating and can be installed on feature walls and bar fronts and in signage. The color-changing tunable-white LED delivers a range of white color temperatures.
sensitile.com

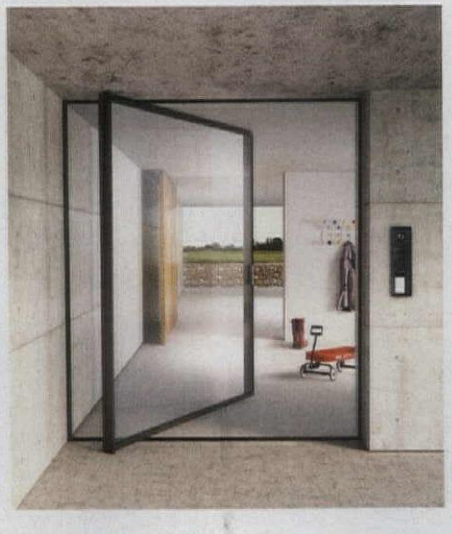


Phantom 5000

This operable zero sightline window by Tubelite provides ventilation when open but appears to be part of a single glass facade when closed. Concealed aluminum framing allows it to blend in with the company's curtain wall, window wall, and storefront systems. Windows come in awning and casement versions, with a depth of 4¼" and a U-Factor of 0.32 for thermal transmittance.
tubeliteinc.com

PanoramicView Lift & Slide

A wide view and improved energy performance are benefits of Zola's PanoramicView Lift & Slide. The sliding sash measures just 3½" wide but can hold an 8' x 10' panel of glass. The unit's R-11 triple glazing is standard, and a U-Factor of 0.07 glazing is available.
zolawindows.com



Pivot

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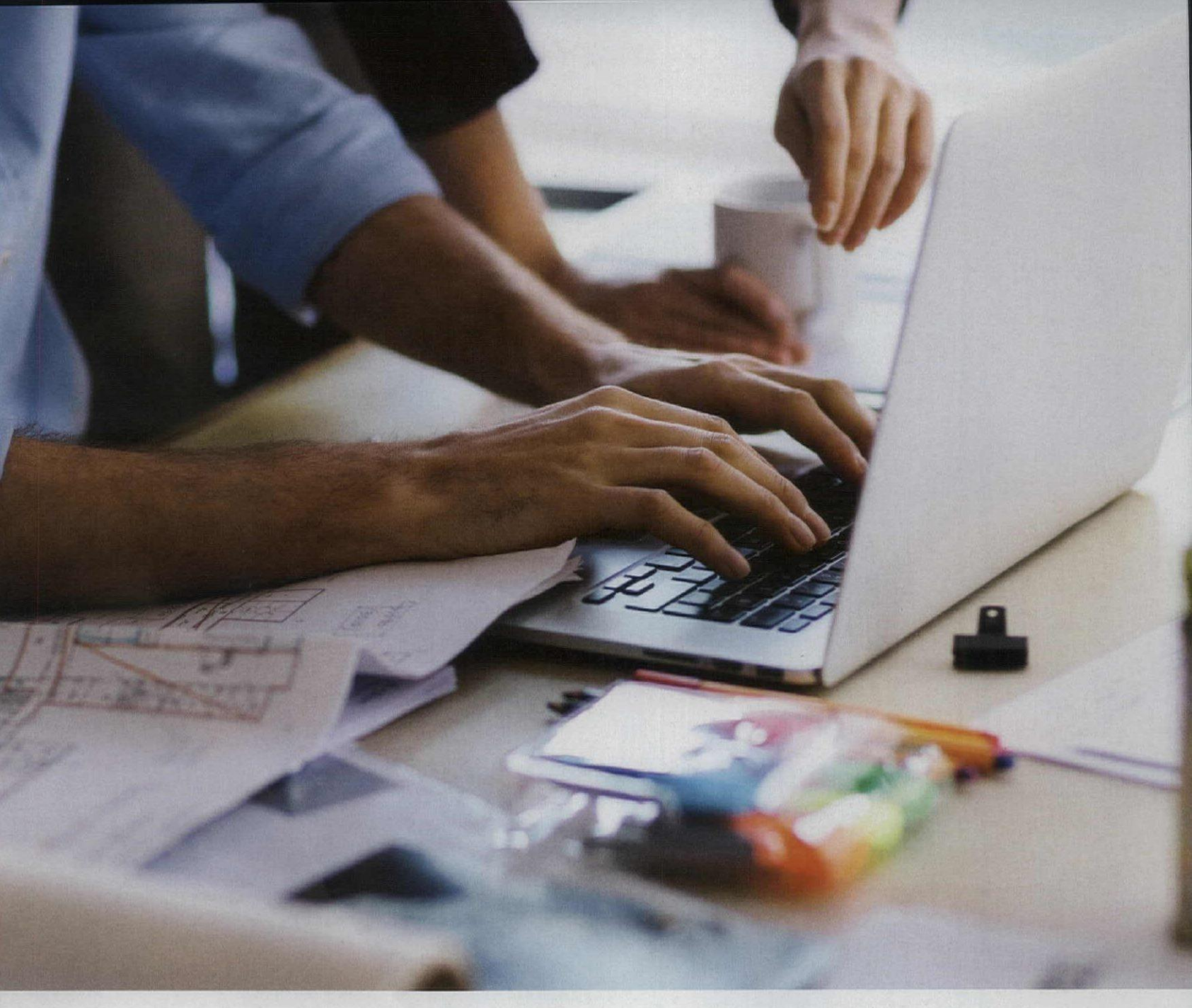
sky-frame.com



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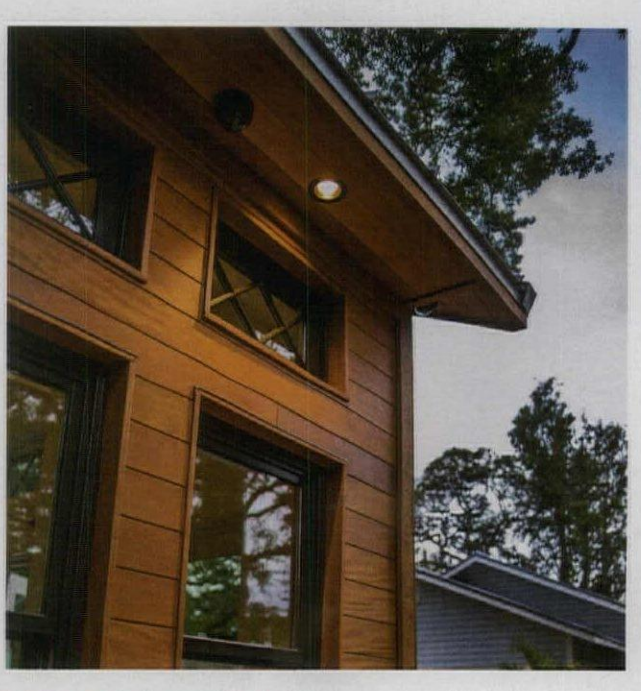
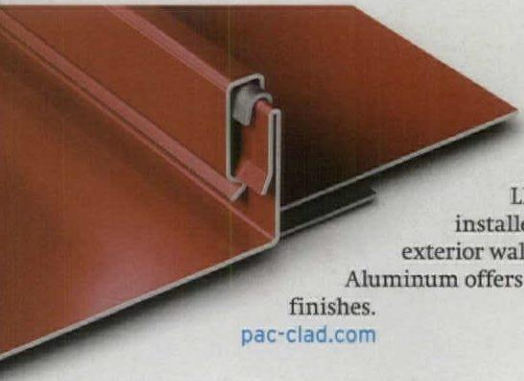
By Kelly L. Beamon

Castagno Woodtime
What appears to be wood planks are actually 40" x 120" porcelain slabs. Monocibec's digital-printing technology means its surface patterns can mimic other building materials, from natural stone to wood. Meanwhile, resistance to temperature changes, stains, and water penetration make porcelain a resilient low-maintenance choice for creating ventilated facades. Slabs here attach to a concealed system of aluminum-alloy brackets.
www.monocibec.it

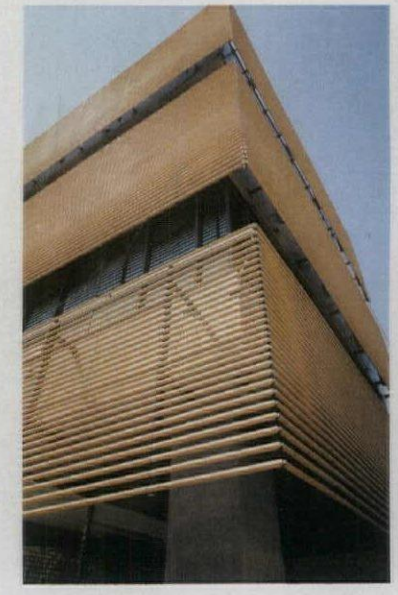


Cumaru Rainscreen Siding
Besides being able to resist the effects of damp weather, this cumaru wood rainscreen wears well over time and offers builders the option of working with a sustainably harvested hardwood. The cladding also resists termites, mold, and mildew and is Class A rated for flame spread.
advantagelumber.com

Truten A606
With a 3" x ⅞" corrugated profile, Bridger Steel's A606 was designed as a structural metal for bridge building that would need little maintenance. Applied to facades, it can add character and a layer of weather protection derived from the company's film of copper, phosphorous, and silicone. Ideal for dry climates, the panels are available in lengths of up to 30' in custom pre-rust shades.
bridgersteel.com



Highline Wall Panel
Available in aluminum as well as 22- and 24-gauge steel, these LEED-eligible panels can be installed vertically or horizontally on exterior walls, in 45 colors. Petersen Aluminum offers a 30-year warranty on the finishes.
pac-clad.com



Geolam Hybrid Aluminum/WPC
This composite is not susceptible to the splintering, fading, or decay that affects natural wood. And, unlike unadulterated wood, the material can be bent to accommodate different radii and directions. The components include recycled aluminum and resin, which contain no chlorine, CFCs, PVCs, formaldehyde glues, or solvents.
extechinc.com/products/geolam

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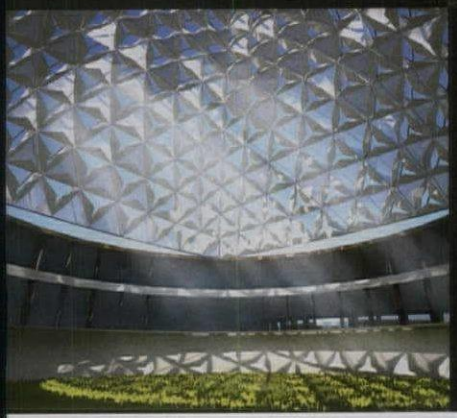
LEARNING OBJECTIVES

1. Discuss innovations and futuristic objectives for using shade structures constructed with fabric in commercial architecture.
2. Explain how shade structures made of fabric can add both appealing design and functionality to building structures.
3. Define the benefits of shade structures for personal health and UV protection.
4. Discuss how the use of textiles in shade structures can positively impact thermal performance and energy efficiency.
5. List LEED® V4 credits to which awnings and solar shades can contribute directly.

Learn more about the future of shade by completing this continuing education course at sunbrella.com/fosceu.

Responsive Shading System by Arman Hadilou is a kinetic façade composed of large strips of fabric mounted on a frame system that can open and close the fabric strips in response to existing light conditions.

SHADE IS ARGUABLY ONE OF THE VITAL ELEMENTS IN MODERN LIFE, THOUGH NOT SOMETHING THAT TYPICALLY TAKES CENTER STAGE IN THE DESIGN DIALOGUE. UNTIL RECENTLY, FABRIC SHADE STRUCTURES WERE AN APPENDAGE TO A BUILDING, AN AFTERTHOUGHT, AN ACCESSORY.



Invertible Shade by Ehsan Fatehifar is a tensile shade system of repeating geometric shapes that can be adjusted to allow varying amounts of light inside the building.

OF SHADE

FABRIC COMPONENTS IN SUSTAINABLE ARCHITECTURAL DESIGN

Increasingly, shade structures begin the design conversation especially for commercial buildings, structures in sunny climates, those which will inhabit a warming planet (this one) and architects looking for new ways to create built environments in harmony with nature's forces. The future includes a conscious intention toward shade structures.

THE EVOLUTION OF SHADING FABRICS

In order to appreciate the future of shade and position oneself on the leading edge of this movement, it helps to review the past, the long history of using fabrics as architectural add-ons and how the practice has evolved.

Prior to the 1960s, most awnings and shading fabrics were made of cotton canvas, which the sun broke down quickly. In 1961, the owners of one of the oldest, most respected fabric brands decided to change the nature of shading materials the company had been making since the 1880s. They replaced cotton with acrylic fibers and pre-extrusion pigments and offered an unheard-of warranty of five years. They were dubbed "performance fabrics."

In the 1970s, performance fabrics got the attention of boaters, and the outdoor furnishings industry exploded with these new, long-lasting yet pliable fabrics. In 1988, BMW became the first car brand to adopt this company's fabrics for its convertible models.

By the early 2000s, as the green building movement gained momentum with the U.S. Green Building Council's LEED rating program, more attention was paid to the sustainable nature of performance fabrics. As high-performing shade fabrics last longer, people use less fabric and thus generate less waste as compared to other fabrics that might fade, lose strength or give in to mildew and atmospheric chemicals. In fact, some fabrics can be recycled through manufacturer recycling programs, reducing impact on landfills.

SIGNAGE AND BRANDING WITH FABRICS

As the use of shading fabric continues its trajectory in modern architecture, its use as a business branding strategy spans the decades. Historically, a print canvas canopy over a cigar shop or beauty parlor signaled the establishment's presence to passersby. While that design practice continues today, modern corporate branding with fabric is often spectacular, with enormous printed banners moving in the breeze. They are a signal to passersby and even passing aircraft that business or cultural events are happening there. The colors of the shading fabric convey their own branding message, tying into the corporate, company, educational or nonprofit organization's identity.

EXPANDING SPACE

Shading strategies in corporate, cultural and residential settings create copious amounts of added space for meetings, gatherings, meals and leisure. While the cost of walls and a roof could be prohibitive, and most likely exceeding a particular lot's allowable square footage of structure, the addition of shaded "rooms" becomes a possible way to expand the amount of usable space. Fabric enclosures in commercial spaces such as restaurants can help boost profits by increasing the amount of outdoor seating available year-round.

SHADE STRUCTURES FOR HEALTH AND UV PROTECTION

Protection from the sun has always been important to humanity, but never so much as it is in modern times, with holes in the ozone layer and the unprecedented speed at which our planet is warming. Whereas natural climate change occurs gradually, giving organisms the opportunity to evolve their own protections, the speed of this man-induced climate change requires man-made protections. Ideally, we don't want sunlight to be totally "on" or "off," and that is where UV-resistant shading fabric (as well as shade itself) comes into play.

Frames to Shams-Ol-Emareh by Nastaran Torabi and Zahra Noori Jamshidi is a series of orange-fabric-covered frames suspended in the forecourt of the historic Shams-ol-Emareh mansion in Tehran. The frames provide shade and seating, while also offering visitors a new framed perspective on the mansion.

Cotton Hill by Sergii Borodenko and Aljona Kolesznikova uses Sunbrella fabric to create a modular shading system that doubles as a no-soil planting system for urban areas that lack space for landscaping.

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COLLEGES & UNIVERSITIES

Colleges and universities updating their campuses with additions, renovations, and new buildings are almost always faced with the challenge of working within an existing, often historic, context. The following projects show it is possible to maintain an authentic sense of place but still use a dramatic—though sympathetic—modern architectural vocabulary. One exception, presented here, Cornell Tech on New York's Roosevelt Island, is devoted to the creation of a completely new campus. With the freedom of a tabula rasa, however, the three architects for this undertaking also had to confront such momentous concerns as an evolving program, symbolic significance, and urbanistic integration.

PENDLETON WEST ADDITION AND RENOVATION, WELLESLEY COLLEGE, MASSACHUSETTS KIERANTIMBERLAKE

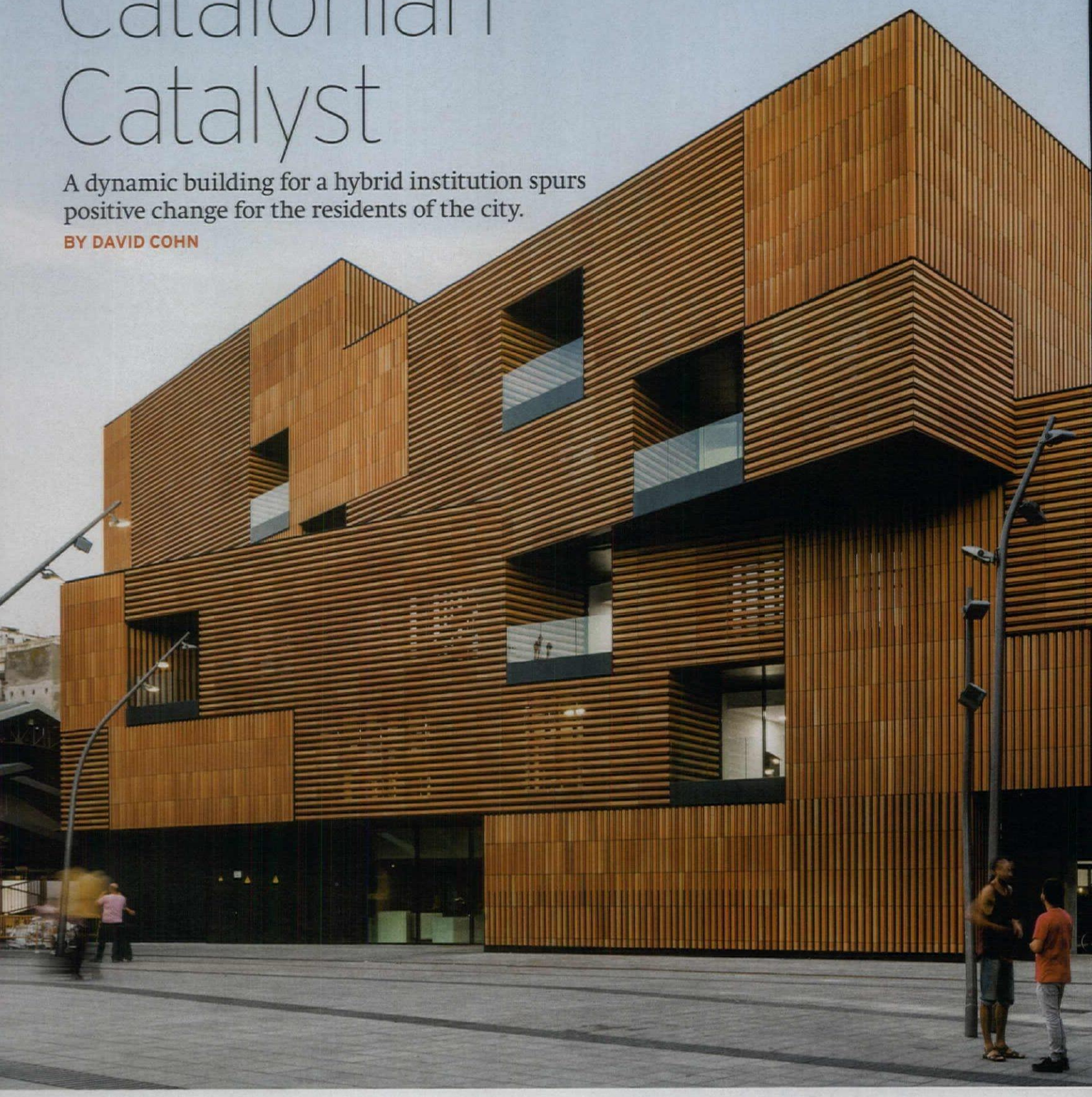
PHOTOGRAPHY: © MICHAEL MORAN

La Massana Fine Arts School | Barcelona | Carme Pinós

Catalonian Catalyst

A dynamic building for a hybrid institution spurs positive change for the residents of the city.

BY DAVID COHN



PHOTOGRAPHY: © IÑIGO BUJEDO-AGUIRRE

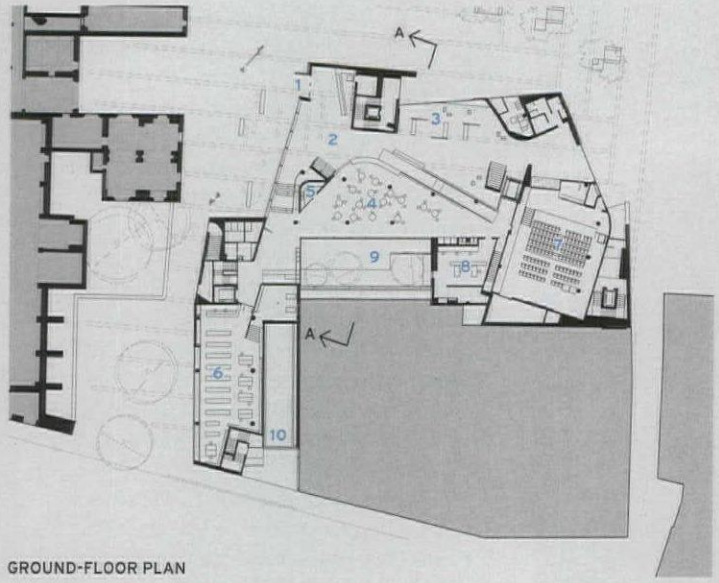
When commissioned to design a new home for La Massana Fine Arts School in Barcelona, located behind the city's famous Boqueria Market, architect Carme Pinós faced a double challenge—wrestling with both the density of the city's Medieval Raval quarter and with the masses of tourists who flood the plaza that the building faces. Affiliated with the University of Barcelona, Massana is a hybrid, offering university degrees in the visual arts and design, vocational degrees in the applied arts, and an extensive high school program for local students.

Pinós's response was to turn the school inward around a skylit interior "street" or atrium. This solution was inspired, she says, by the building that was the school's quarters since its founding in 1929, at the nearby Medieval Santa Creu Hospital, where it was walled off from the street and organized around a leafy courtyard, one of those surprising spaces hidden inside many blocks of the city's Gothic Quarter. But unlike the outdated facilities in the former hospital, Pinós's design also engages the mobbed spaces outside in a guarded way, with gestures such as a glazed exhibit area for student work on the ground floor, and large balcony windows scattered across the otherwise opaque facade. With its red ceramic cladding and dynamic massing, the building is a striking presence on the plaza.

Together with the school, Pinós redesigned the square itself, known as the Plaza de la Gardunya, as well as a new rear facade for the Boqueria Market and a row of multifamily housing—both public and market-rate —still under construction opposite the school. This operation of "urban suture," as she calls it, is the result of a city competition she won in 2006 for the school site and plaza. Much of the site had been cleared in the 1960s for an office tower that was never built. Pinós designed underground parking and loading docks for the market under the square, with entry and exit ramps discreetly incorporated into the new buildings, and included a grouping of trees and benches at the plaza's center. She also resolved the exposed ends of the market's shed roofs with overlapping peaks, to create a more human scale on the plaza and a more protective, though open, enclosure.

Pinós's compositional technique typically

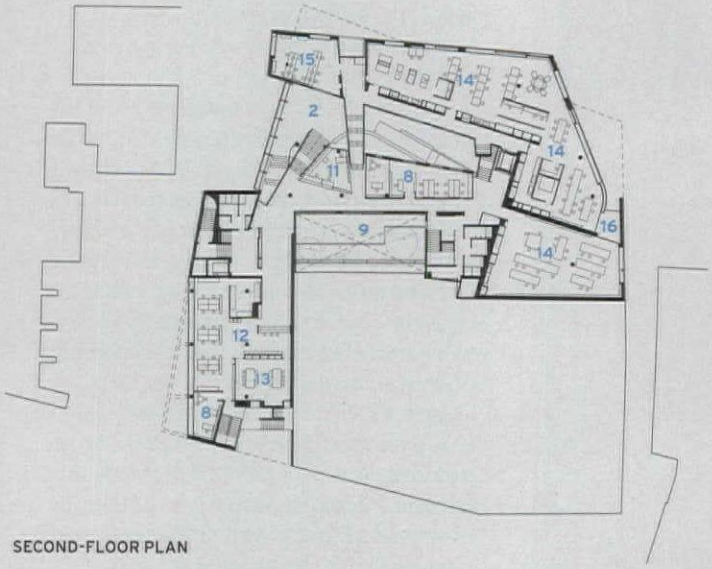
MUSCLE ON THE PLAZA The dynamic massing is lightened by cantilevers and the louvered ceramic cladding, which shields the interiors from a crowded plaza. Balconies mark view corridors through the building; a corner entrance on the right is indicated by subdued gray ceramic cladding on a narrow side street.



GROUND-FLOOR PLAN

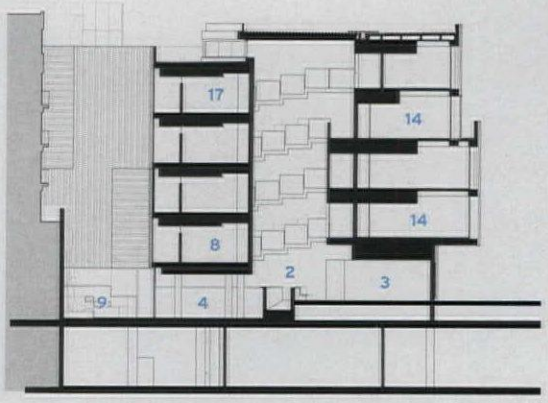
1 LA MASSANA
2 BOQUERIA MARKET EXTENSION
3 HOUSING BY CARME PINÓS
4 PLAZA DE LA GARDUNYA

SITE PLAN 0 200 FT. 60 M.



SECOND-FLOOR PLAN

1 ENTRANCE
2 ATRIUM
3 EXHIBIT SPACE
4 CAFETERIA
5 KITCHEN
6 LIBRARY
7 AUDITORIUM
8 OFFICE
9 PATIO
10 PARKING RAMP
11 INFORMATION
12 OPEN WORKSPACE
13 MEETING ROOM
14 WORKSHOP
15 I.T. ROOM
16 TERRACE
17 CLASSROOM



SECTION A - A 0 16 FT. 5 M.

FOURTH-FLOOR PLAN 0 30 FT. 10 M.

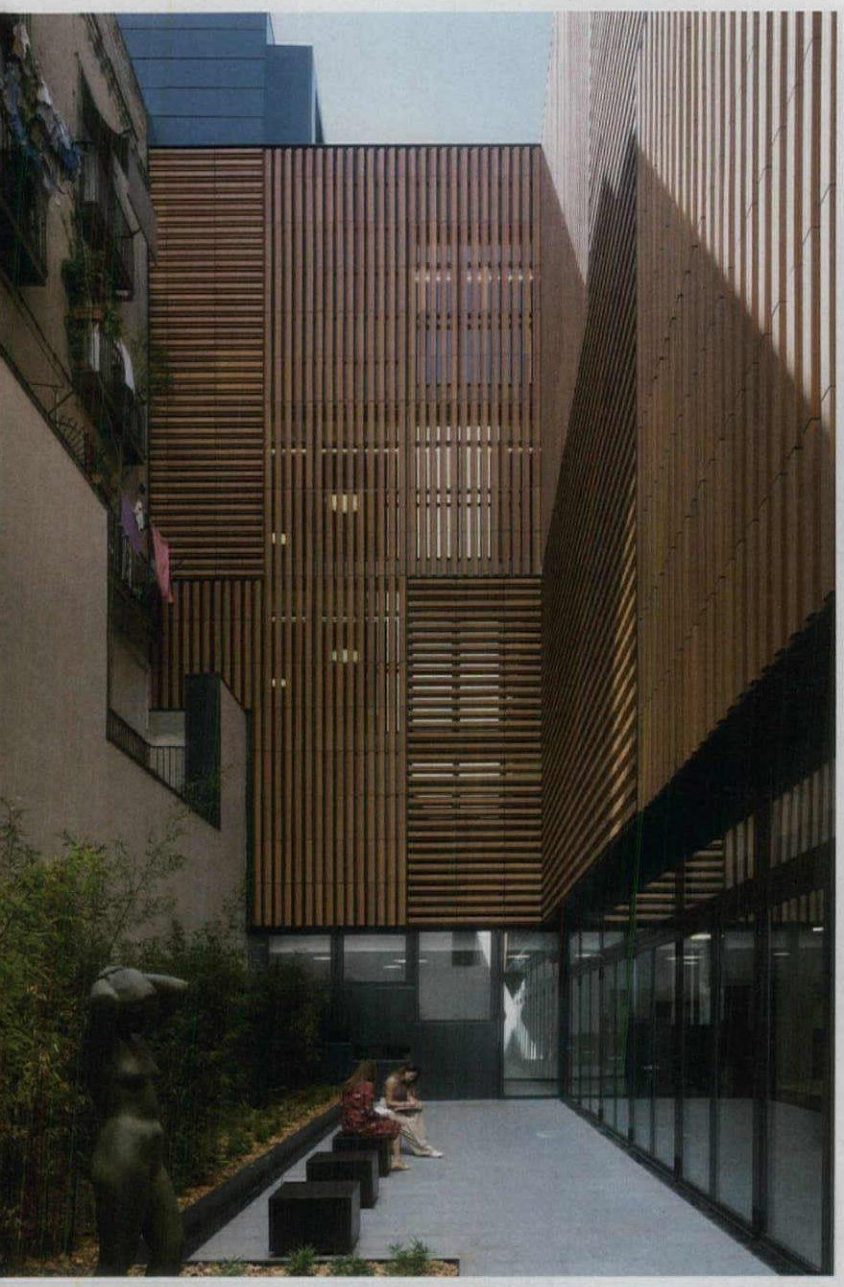
TAILORED URBANITY The building opens on a side street at the ground level (right). The overlapping roofs in the foreground are an addition to the Boqueria Market and also by Pinós, as is the plaza both buildings face (opposite).

involves syncopated openings, overlapping angles, large cantilevers, and fragmented, dynamic massing. For the school, she used these strategies to lighten the impact of the 120,000-square-foot building on the neighborhood, tailoring it to the narrow streets on three sides. At the corner entrance, for example, she pulled the school back from the street line to create a small, secondary plaza, and covered the entry itself with a dramatic cantilevered volume, the one gesture counterbalancing the other. The windows on this side of the building feature folding louvered shutters, for a domestic touch, and the ceramic cladding is a quiet gray color, in contrast to the terra-cotta hue of the main facade.

Despite the complexity of her design, Pinós used a simple scheme in which two L-shaped volumes interlock around an atrium. Lining the plaza and the side street to the east, the reddish volume is finished with a ventilated skin of ceramic louvers, crafted by the noted local ceramist Toni Cumella. It contains art studios and workshops, with large windows hidden behind the ceramic screening. Taking pride of place is the top-floor painting studio in the corner, with northern light, a 20-foot ceiling, and a mezzanine.

The gray ceramic volume folds into the block behind the workshops to form the back wall of the atrium and contains classrooms, which overlook the central space. Corridors on the opposite side face a rear light well that the building shares with the existing apartment buildings on the block.

The atrium is an architectural tour-de-force at the heart of the building. Sky bridges at various levels, staggered in position and rippling upward in groups of steps from the classroom wing to the workshops, crisscross it–spanning a 5-foot rise in grade from the back of the site to the plaza, which Pinós has carried up through every floor. The long sides of the atrium are solid, to reinforce its character as an interior street, with punctured openings for the classroom windows and along the corridors of the workshop wing, while the ground floor is completely open. Overlooking the plaza on one side is the exhibit space;



PIRANESIAN FLIGHT Studio and classroom wings surround a central atrium crisscrossed by bridges and lined with windows like a street (opposite). A sunken student lounge overlooks a light court (left) with classroom corridors around it. A painting studio (bottom) has windows behind the ceramic louvers of the main facade.

5 feet below it, the student lounge, with lockers and work tables designed by Pinós, has a more protected position under the classrooms, with windows facing the light court.

The atrium receives direct sunlight throughout the day from different sides. Up on the sky bridges, view corridors pierce through the entire building, ending at the large balconies on the main facade, an idea that Pinós says was inspired by the building cuttings of artist Gordon Matta-Clark. The sky bridges add a Piranesian complexity to the otherwise straightforward circulation, enriching the experience of the students' constant movement through the building.

In the 1980s, the Raval neighborhood was a degraded, crime-ridden place that seemed beyond recovery. But years of heavy municipal investment, including Richard Meier's MACBA Museum of Art in 1995, have proved almost too successful. The struggle now is to maintain a balance between the demands of mass tourism—cheap food, trinkets, lodging, and amusements—and the role of the district as a living part of a vibrant city.

With Carme Pinós's La Massana Fine Arts School and Plaza de la Gardunya, Barcelona has taken a stand to accommodate both sides of this difficult equation. Her powerful, though hardly solemn, design for the school claims its place on the square, clearly establishing the complex terms of this interaction. ■

The Julis Romo Rabinowitz Building and the Louis A. Simpson International Building | Princeton, New Jersey | KPMB Architects

Economies of Scale

An existing building is transformed into elegant homes for two academic departments.

BY LAURA RASKIN

PHOTOGRAPHY BY ADRIEN WILLIAMS

It's a challenge that many universities face: What to do with lovely, old buildings on campus that have become run-down and outdated? Some schools add jarring additions or try to create a faux period piece with a renovation, while others tear them down and erect bold contemporary structures in their place.

At Princeton University, a campus with a tapestry of collegiate Gothic buildings, as well as major midcentury and contemporary icons, KPMB Architects skirted all these choices and came up with a stunning solution. The Toronto-based firm reinvented the 1929 Frick Chemistry Laboratories, designed by Charles Klauder, by perfectly straddling a line between preserving what made the building special and creating a new core that has everything a student or faculty member could want. Landscape designer Michael Van Valkenburgh's careful deletions and additions around the building are also critical to the magic, as is his restoration of Beatrix Farrand's original landscaping. According to university architect Ronald McCoy, the former Frick's transformation into the conjoined Julis Romo Rabinowitz Building and Louis A. Simpson International Building is the most significant renovation of any Princeton historic building.

credits

ARCHITECT: Carme Pinós – Carme Pinós, principal; Samuel Arriola, project manager; Elsa Martí, Roberto Carlos García, Holger Hennefarth, Blanca Perote, Ana Isabel Rodriguez, Inés Senghour, Francisco Olivas, design team

ENGINEERS: BOMA, Masala Consultors (structural); Indus (facilities, acoustical, budget)

GENERAL CONTRACTOR: UTE Massana

CLIENT: Consorci d'Educació de Barcelona

OWNER: City of Barcelona, BIM/SA

SIZE: 118,000 square feet

COST: $13.6 million

COMPLETION DATE: September 2017

SOURCES

CERAMIC CLADDING: Ceramica Cumella

WINDOWS: Technal, Schüco, Jansen

FURNISHINGS: Estudio Carme Pinós (fixed furniture); Ergomobel, Mobles 114 (chairs); FAMO (tables); Sellex (shelving units); Figueras (auditorium seats)

PHOTOGRAPHY: © DUCCIO MALAGAMBA

NEW ASSETS Glass conference rooms peek above the 1929 collegiate Gothic building's original roofline (opposite). The architects added two new atriums. One of them is for the consolidated economics and international-programs departments and looks out on Minoru Yamasaki's 1965 Scudder Plaza (above).

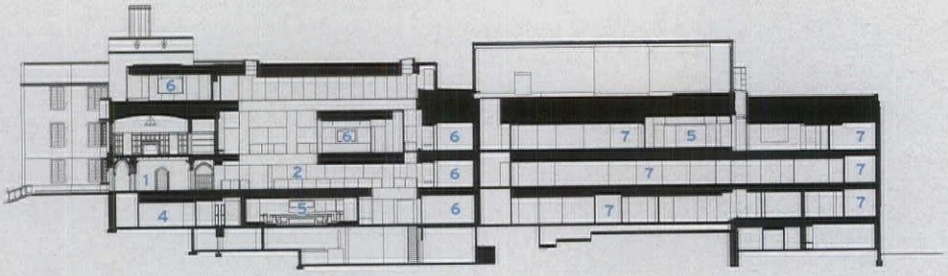
The structure, which faces busy Washington Road, now houses Princeton's economics department, which was scattered around campus, as well as the university's international programs (the consolidation was the final piece of the puzzle in Princeton's last master plan from 2006). It also provides a porous boundary between the historic western campus and its contemporary northeastern corner.

KPMB's strategy for the 200,000-square-foot building was less about precious restoration than celebrating its quirky features while drenching the interior with daylight and lavishing it with careful detailing and a variety of luxurious spaces to work, learn, and hang out. The firm retained the cast-in-place concrete structure with its masonry walls, purple-gray argillite facade, and limestone quoins and arches, but gutted the interior, which had felt like a basement. "Now it has gravitas, but also light and flow and buzz," says Shirley Blumberg, KPMB's partner in charge.

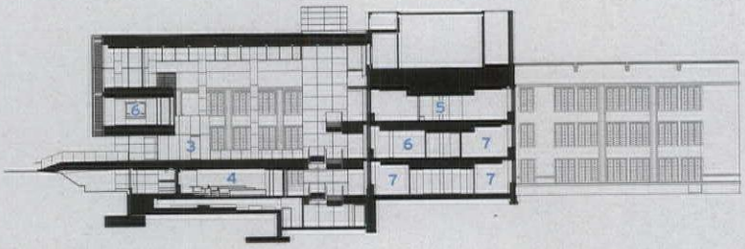
Most dramatically, KPMB added two light-filled, anchoring atriums, one just inside the western entrance off Washington Road, serving the economics department, and one to the south—where the Frick's original H-shaped footprint was given a rectangular addition in 1964—for the international departments. After stepping through the carefully preserved original lobby, with its iron gates by master metalsmith Samuel Yellin (1884–1940), visitors emerge into the first soaring atrium. Dubbed the forum, it is a hushed space, with inviting lounge furniture, underneath a suspended glass-walled seminar room. Offices, classrooms, and more seminar rooms are grouped around the perimeters of the upper three stories, with corridors that overlook the central space.

The architects made a showcase of the dividing line between the 1929 building and the 1964 addition, creating a glass vitrine that brings daylight streaming as far down as the basement levels from new skylights. Glass-walled seminar rooms on the fourth floor have views of the campus and peek up above the building's original roofline. A quirky, complicated building—that rises one floor higher toward the east—is now cohesive and easy to navigate.

As with the entrance lobby, KPMB preserved the building's former library, a rich, wood-paneled room, retaining the white oak floors but adding a fireplace and a hidden kitchen. "We saw the microcosm of the whole campus in this building," says Bruce Kuwabara, KPMB design partner. "It moves from Gothic to more modern." The south atrium, for example, incorporates walls that were once on the Frick exterior, complete with their arched limestone windows. A small café here has a porcelain-tile floor that matches the bluestone seen around campus. Nearby, the architects removed an unsightly narrow addition from the east elevation to create an inviting new entry off the back of the build-

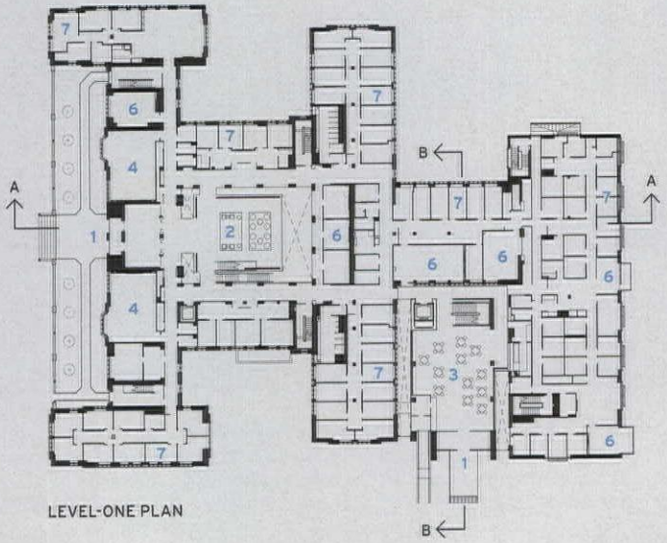


SECTION A - A

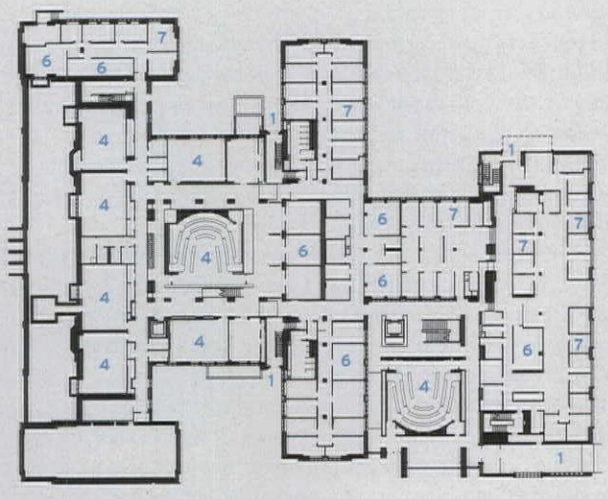


SECTION B - B

1 ENTRANCE
2 FORUM ATRIUM
3 INTERNATIONAL ATRIUM
4 CLASSROOMS
5 LIBRARY
6 SEMINAR & MEETING ROOMS
7 OFFICES

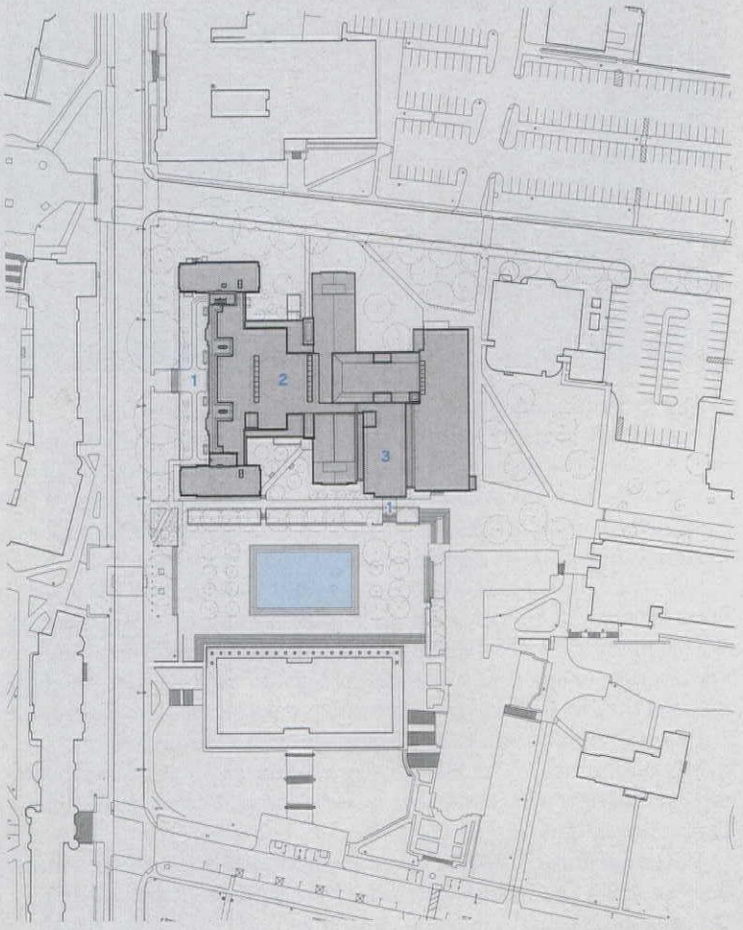


LEVEL-ONE PLAN



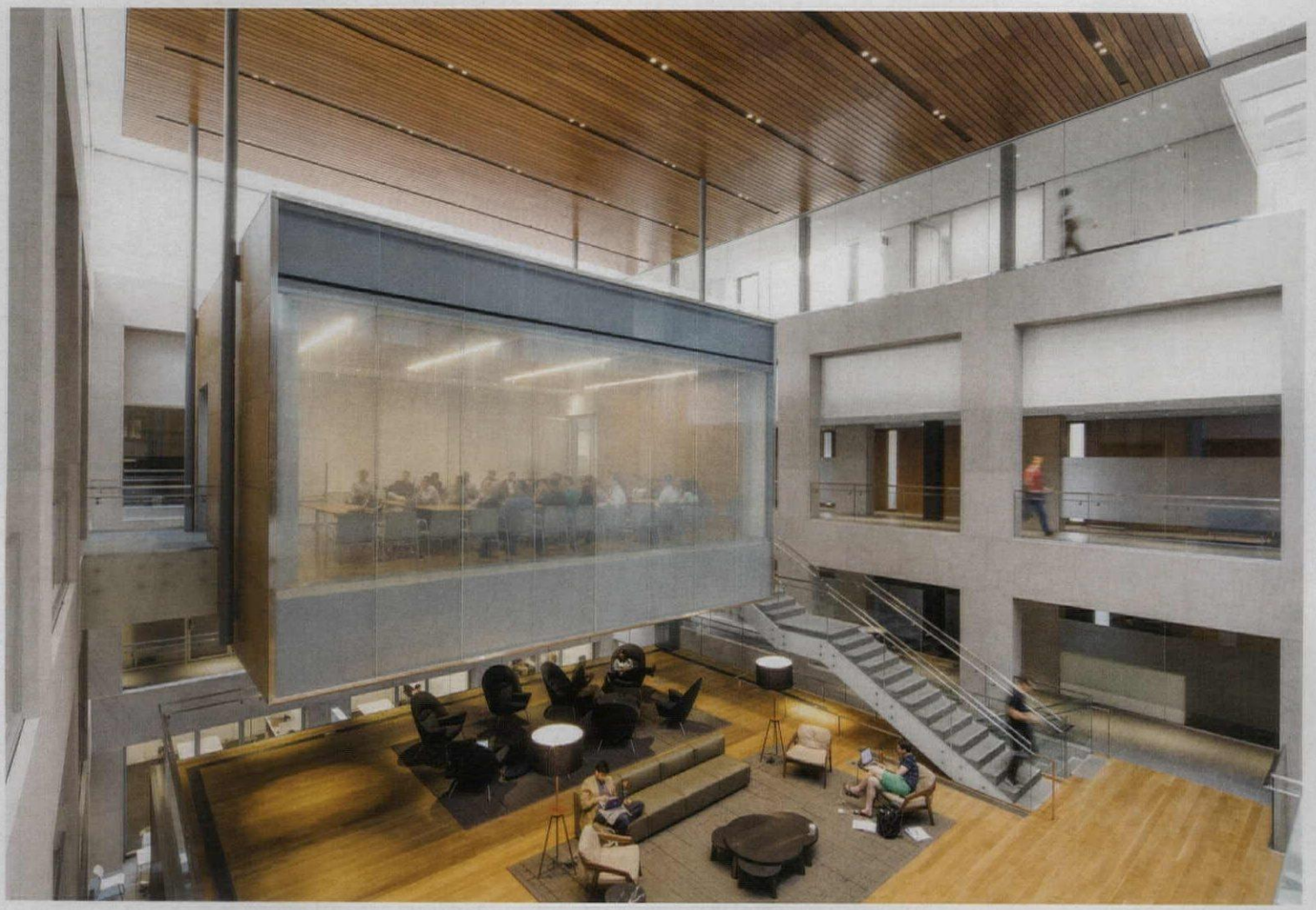
CAMPUS-LEVEL PLAN

0 30 FT.
10 M.



SITE PLAN

0 100 FT.
30 M.

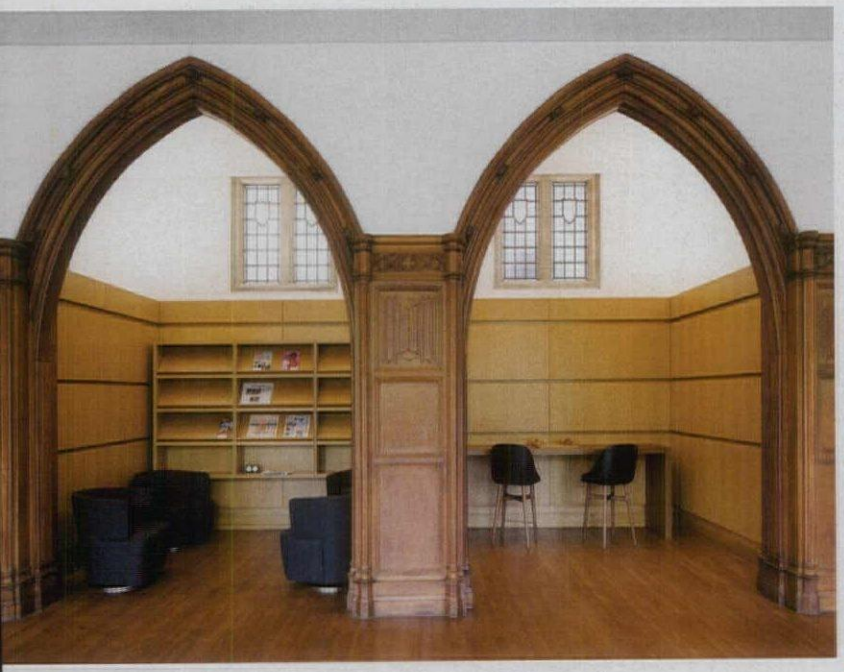


FLOATING CLASSROOM In the atrium just off the building's main entrance, a seminar room is suspended over an inviting, intimate lounge area (above). The surrounding hallways have views into the daylight-filled central space (right).

ing, facing Minoru Yamasaki's iconic Woodrow Wilson school and the Scudder Plaza.

KPMB and Van Valkenburgh have brought a new sense of openness to that plaza, with its sunken, rectangular reflecting pool, which Yamasaki designed in tandem with his slender-columned building. Its neighbors include Stephen Voorhees's 1951 redbrick Corwin Hall, and Fisher and Bendheim halls, designed by Venturi, Scott Brown and Associates in the 1990s. "At a campus like Princeton's, where the strategy is connectivity, this bit of Modernism was isolated and inward-looking and very selfish," says McCoy. That impenetrability is now gone, thanks to the removal of some of Yamasaki's plaza walls and KPMB's new entrances in the former Frick.

Besides the plaza, "Princeton is full of courtyards and quadrangles," says Kuwabara. "But our atriums are the equivalent." Given the amount of working, chatting, and even nap-



HERITAGE MOMENTS The architects retained select pieces of the original core, including a wood-paneled library that is now a faculty lounge (above and below). In the south atrium (opposite), a café serves students, staff, and faculty. Clerestory windows drench the room in daylight.

ping in these well-appointed spaces, the students have clearly embraced them. "There's a word-of-mouth effect among students when a great new space opens up," says McCoy. "I think it was a surprise to the economists that it would be such an attractor; they are adjusting to the fact that they are on the map of nice places." ■

Laura Raskin, formerly an editor with RECORD, *writes frequently on architecture.*

credits

ARCHITECT: KPMB Architects – Bruce Kuwabara, design partner; Shirley Blumberg, partner in charge; David Jesson, senior associate; Mark Jaffar, David Smythe, associates; Lynn Pilon, project architect; Gabriel Fain, Annie Pelletier, Ya'el Santopinto, Elizabeth Paden, Victor Garzon, Clementine Chang, Kristina Strecker, Samantha Hart, Carolyn Lee, Rachel Cyr, Dina Sarhane, team

ENGINEERS: Thornton Tomasetti (structural), Altieri Sebor Wieber (m/e, fire), Van Note-Harvey Associates (civil)

CONSULTANTS: Michael Van Valkenburgh Associates (landscape), Tillotson Design Associates (lighting), Jablonski Building Conservation (heritage), Atelier Ten (sustainability)

GENERAL CONTRACTOR: Barr & Barr

CLIENT: Princeton University

SIZE: 197,000 square feet

COST: withheld

COMPLETION DATE: December 2016

SOURCES

MASONRY: Indiana Limestone Company

METAL CLADDING: Kingspan, Alucobond

GLAZING: Viracon

ACOUSTICAL CEILINGS: Armstrong Ceiling Solutions

PLASTIC LAMINATE: Formica

LIGHTING CONTROLS: Lutron

RESILIENT FLOORING: nora

A. Alfred Taubman Wing | Ann Arbor, Michigan | Preston Scott Cohen, Inc.

Jagged Little Thrill

A skillful expansion of the University of Michigan's architecture and urban planning building cuts a striking silhouette on campus.

BY JAMES GAUER

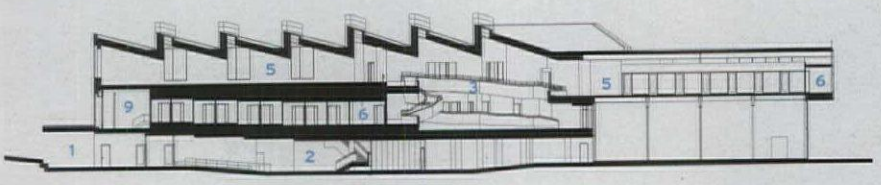
PHOTOGRAPHY BY JAMES HAEFNER

The University of Michigan's Art and Architecture Building, home of the Taubman College of Architecture and Urban Planning and the Stamps School of Art & Design, has a distinguished lineage. Eliel Saarinen's son-in-law, Robert Swanson, designed the flat-roofed, low-slung brick courtyard complex in 1974 for a site on Ann Arbor's leafy North Campus, for which Eero Saarinen had devised an early master plan in the 1950s.

The college recently added another landmark to this legacy with the September opening of the A. Alfred Taubman Wing, designed by Cambridge, Massachusetts–based firm Preston Scott Cohen, Inc. (PSC), in collaboration with Integrated Design Solutions (IDS) of Troy, Michigan, as architect of record. The project includes 36,000 square feet of new construction and 11,000 square feet of renovation, at a total cost of $28.5 million. Highlights of the new facility include a 5,700-square-foot double-height commons and a 5,500-square-foot studio.

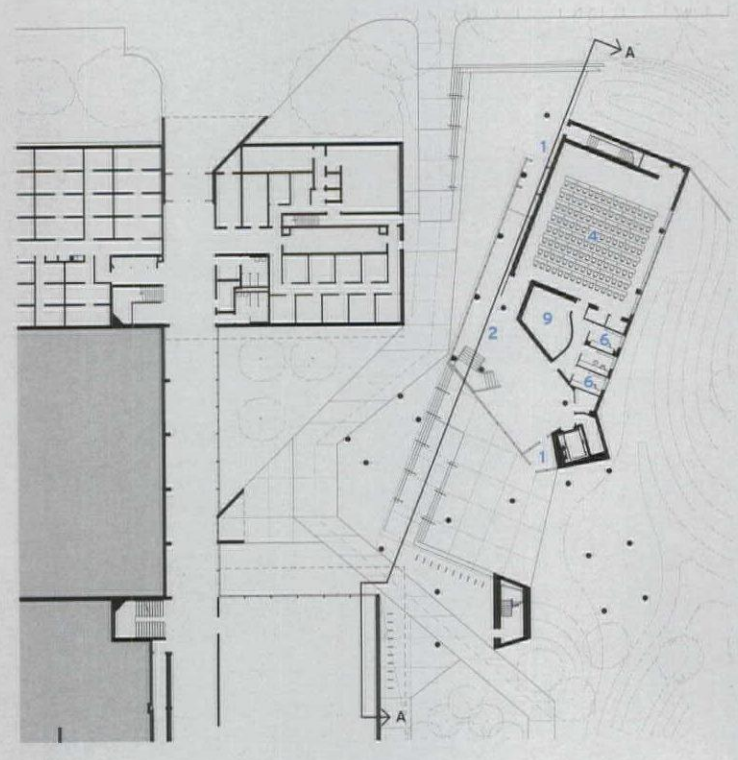
SERRATED SECTION South-facing skylights on the sawtooth roof bring light deep into the building, which is clad in a purplish gray semigloss ironspot brick. Behind the glazed wall on the ground floor, a 2,400-square-foot classroom seats 120 students.

PRECISE PLAN The southwest end of the building deviates from its rectangular form to wrap around the hexagonal commons area (right). A courtyard between new and existing structures creates a natural point of entry to the glazed galleries (opposite, top). Thanks to solar analysis and algorithmic modeling, sunlight does not directly strike workspaces in the studios (opposite, bottom).

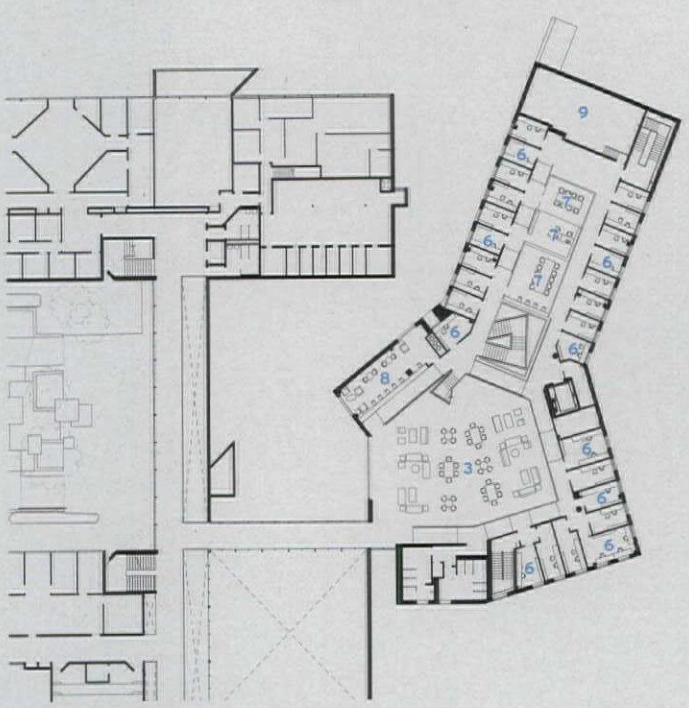


SECTION A - A

1 ENTRANCE
2 GALLERY
3 COMMONS
4 CLASSROOM
5 STUDIOS
6 FACULTY OFFICES
7 READING/CONFERENCE ROOMS
8 LOUNGE
9 MECHANICAL



FIRST-FLOOR PLAN



SECOND-FLOOR PLAN

0 30 FT.
9 M.

The combination of two academic institutions under one roof can cause identity problems. Stamps occupied the frontage along Bonisteel Boulevard and concealed Taubman behind a courtyard, depriving it not only of a direct link to a major campus artery but also of visibility. The new linear wing stretches diagonally to connect Taubman to the street, where it now enjoys a prominent presence. The challenge was to make this appendage, which is off to one side, function as the nexus of circulation for students and faculty. "The goal was to make a center within an edge building," says design principal Scott Cohen.

At one end, the attenuated addition connects to the original structure via a glass-enclosed bridge tucked beneath an existing cantilever. At the other, it provides a new entrance facing Bonisteel. The acute angle of its placement, however, creates a forced perspective, which funnels people in and gives them the option of using another entrance in a courtyard between

LIGHT-FILLED LEVELS Ramps, stairs, and landings enclose the 5,700-square-foot commons, a flexible space for performances, exhibitions, social activities, conferences, and final reviews (this page and opposite).

new and old. In plan, PSC's building is a rectangle that splits open to wrap around the new hexagonal commons, which is raised up one level on pilotis to fulfill a requirement that the space below remain open to views of a nearby valley and retention pond. It serves as an outdoor gallery and—less artistically but nonetheless usefully—covered bicycle parking.

Cohen has made his reputation with schemes composed of complex geometries, as seen in the Tel Aviv Museum of Art (RECORD, November 2011, page 72). But here he wisely decided that both site and budget called for something more modest. Despite these constraints, he has created a bold form with a striking silhouette, sheathed in purplish dark gray semigloss ironspot brick in a pattern that mixes running bond with soldier coursing. Its repetitive sawtooth roof profile articulates a series of skylights, and windows vary in size and shape to signal the scale of the spaces behind them.

The commons is the school's new hub, intended to bring faculty and students of both architecture and planning together for casual socializing, collaboration, conferences, and final reviews. It's a dynamic, skylit vertical space encircled by ramps and stairs that lead to studios, lounges, and faculty offices, along with meeting and reading rooms. "The entire sequence," explains Cohen, "is experienced as a promenade with landings that subtly define social groupings, all with access to natural light and ventilation." "Everything wraps and shapes it, and it's full of life," says the new dean, Jonathan Massey, with evident pride and pleasure. "It's like an opera house."

On the third floor, overlooking the commons, is the spacious undergraduate studio, also skylit. "Being up there is like being in a big attic," says the architect. The room exemplifies his interest in—and skilled hand at—mixing architectural idioms. "The studio combines the loftlike lighting and spatial proportions of a gallery with a midwestern factorylike workspace," Cohen explains. Generous tall windows provide views in multiple directions. But graduate students should not feel left out: new faculty offices have transformed their old studio by wrapping its perimeter in an elegantly detailed layer of aluminum and glass, and one of its corners has been cut away to provide dramatic views into the commons.

Interior finishes are basic: polished concrete floors and lots of white paint. But the overall effect is incandescent, thanks to skillfully manipulated natural illumination. "The warm color temperature of reflected southern light is the most distinguishing

characteristic of the new building," says Cohen. Contrary to custom, the north faces of the roof's sawteeth are opaque, and the skylights face south, but sawtooth widths and roof slopes determined by solar analysis and algorithmic modeling prevent sunlight from striking desktops directly. Heat gain is controlled well enough for LEED Gold certification.

Intelligently conceived and artfully lit spatial sequences may be nice, but the ultimate test is how well these new facilities serve the students and faculty who use them. Cohen's design gets high marks from both. "A lot of schools claim to have integrated architecture and planning curricula," says professor Richard K. Norton, "but with the collaboration made possible by our new quarters, we really have." Students seem happy too. "We love all the light," say several undergraduates of their new studio, though some acknowledge that glare from the big windows is a problem. The commons is an unqualified hit. "You can always be a part of what's happening," says one enthusiastic graduate student, "no matter what level you're on." ■

James Gauer, an architect and author based in Victoria, BC; Chicago; and San Miguel de Allende, Mexico, contributes regularly to ARCHITECTURAL RECORD.

credits

ARCHITECT: Preston Scott Cohen, Inc. – Preston Scott Cohen, Carl Dworkin, design principals

ARCHITECT OF RECORD: Integrated Design Solutions (IDS)

ENGINEERS: IDS (m/e); SDI Structures (structural); Beckett and Raider (landscape, civil)

GENERAL CONTRACTOR: The Christman Company

CLIENT: A. Alfred Taubman College of Architecture and Urban Planning, University of Michigan

SIZE: 36,000 square feet

CONSTRUCTION COST: $22.6 million

TOTAL PROJECT COST: $28.5 million

COMPLETION DATE: January 2016

SOURCES

FURNITURE: Knoll, Herman Miller

METAL PANELS: Centria

CURTAIN WALL, WINDOWS, ENTRANCES: Wausau Window and Wall Systems

ROOFING: Firestone

GLAZING: Guardian Glass, SuperSky

HARDWARE: Schlage, VonDuprin

ACOUSTICAL CEILING: Armstrong Ceiling Solutions

PAINTS AND STAINS: Sherwin-Williams

RAISED FLOORING: Haworth

LIGHTING: Lithonia Lighting, Focal Point, Lumen Werx

ELEVATORS: ThyssenKrupp

ArtLab | Lausanne, Switzerland | Kengo Kuma and Associates

The Long and the Short of It

Bold in its program and form, a new arts building dramatically announces an experimental curriculum.

BY NAOMI R. POLLOCK, AIA

Located on the campus of Switzerland's École Polytechnique Fédérale de Lausanne (EPFL), Kengo Kuma's ArtLab is an elegant, low sliver of a building, overlooking Lake Geneva and the Alps beyond. Making a strong urban as well as architectural statement, its linear form slices across the landscape, asserting the humanities' newfound role at this historically technical university.

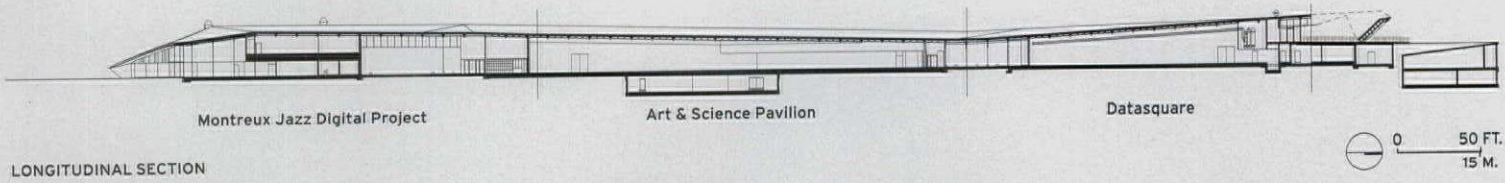
ArtLab is the latest addition to the school's growing collection of high-profile buildings—SANAA's Rolex Learning Center (RECORD, June 2010, page 156) and Dominique Perrault's New Mechanics Hall (2016) are both nearby. This project began with an international competition held in 2012. The brief called for three pavilions, containing a café, an art gallery, and an exhibition space. Taking a gamble, Kuma proposed a single, 33,000-square-foot structure instead. This strategy not only combined all three components under one roof, it also helped organize the school's chaotic campus. "There are many interesting buildings here, but they had no order," the architect says.

ArtLab's impact is disproportionate to the size of its footprint. It clearly demarcates the edge of the Place Cosandey, an open plaza abutting the SANAA and Perrault buildings, and establishes a north–south axis linking the student dorms and the Esplanade Piazza, the school's social hub north of the new building. In addition, ArtLab's slender proportions—it measures just 20 feet across at the north end and 52 feet at the south—and the stepped east elevation gently guide the eye toward the shimmering gray lake and the majestic mountains in the background.

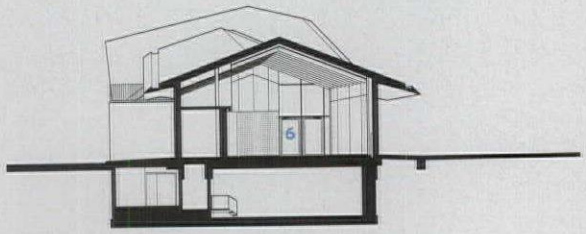
Unlike EPFL's typically boxlike multifloor buildings, ArtLab's three programmatic pieces are independent and clearly articulated. From the building's north end, the sequence starts with the DataSquare, an inter-

EDGE CONDITION
The building slopes up from the south end to its north end (above), where the slate roof dramatically folds over. ArtLab brings Dominique Perrault's New Mechanics Hall and SANAA's Rolex Learning Center into a formal relationship (right).

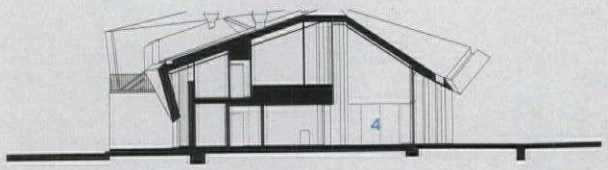
PHOTOGRAPHY: © MICHEL DENANCÉ, EXCEPT AS NOTED; ADRIEN BARAKAT (BOTTOM)



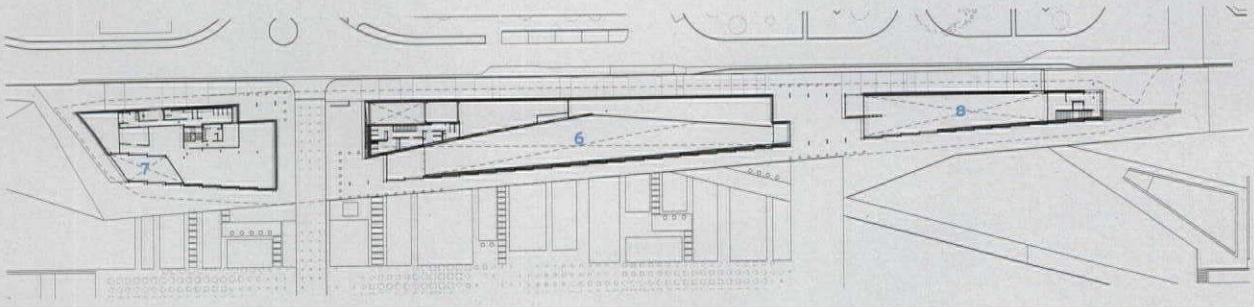
LONGITUDINAL SECTION



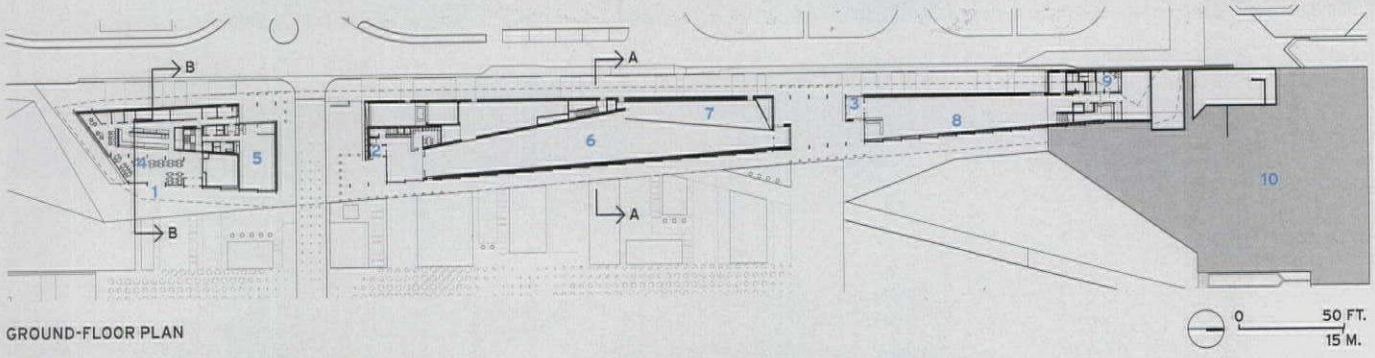
SECTION A - A



SECTION B - B

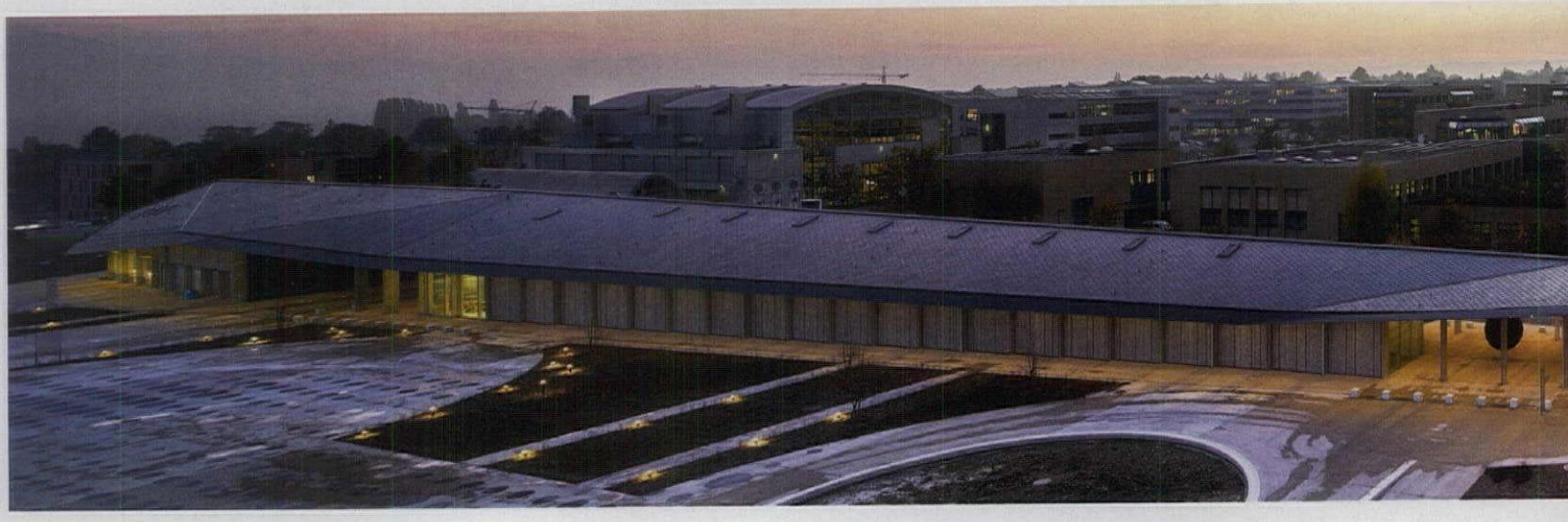


SECOND-FLOOR PLAN



GROUND-FLOOR PLAN

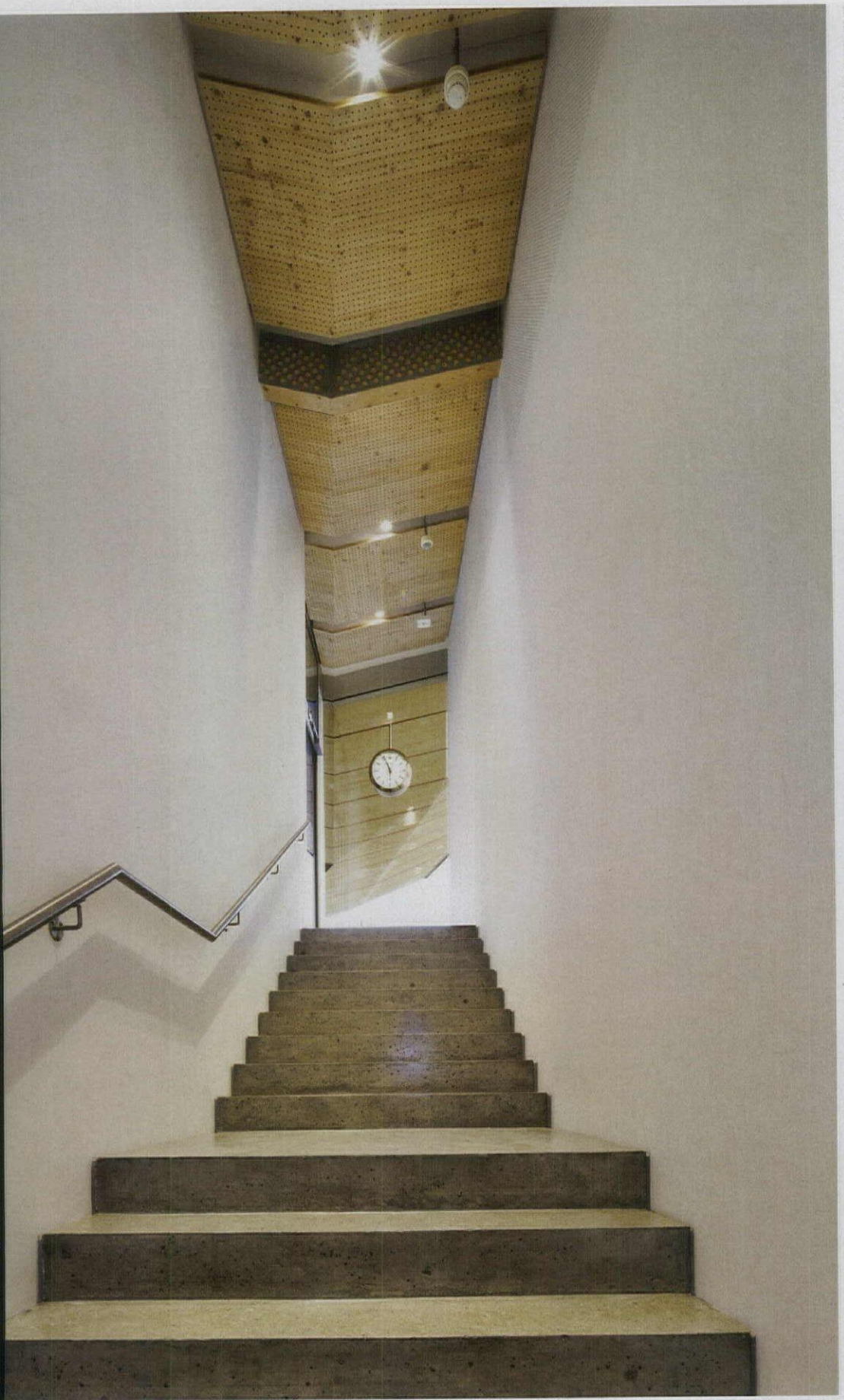
1 MONTREUX JAZZ DIGITAL PROJECT ENTRANCE
2 ART & SCIENCE PAVILION ENTRANCE
3 DATASQUARE ENTRANCE
4 MONTREUX CAFÉ
5 MONTREUX MEETING ROOM
6 ART & SCIENCE MAIN EXHIBITION ROOM
7 ART & SCIENCE SMALL EXHIBITION ROOM
8 DATASQUARE EXHIBITION SPACE
9 DATASQUARE OFFICES
10 PARKING



BARING IT ALL The eaves' soffits and structural frames carry over from outside to the Art & Science Pavilion's reception area (right), revealing the building's construction tectonics. Punctuated by open porches, the east elevation's evenly spaced columns create a vertical pattern reminiscent of Kuma's signature wood louvers (below).

active display hall for EPFL-created projects; goes on to the Art & Science Pavilion, an experimental exhibition space; and ends with the Montreaux Jazz Café, which serves up the famous music festival's archived collection (it was digitized by EPFL), alongside student-friendly cuisine. In between each discrete space or volume, covered porches facilitate circulation into and around ArtLab. In addition to accommodating individual entry vestibules for the programmed spaces, the porches open to the perpendicular streets that cross the site in two places, allowing people and vehicles to pass right through the building.

Uniting these components is a prominent 820-foot long roof. "I wanted one strong identity, an umbrella for all those elements," explains Kuma. It is made with folded planes that adjust as the building widens, with the ridgeline shifting and the eaves rising up or touching the ground dramatically at either end. "We did not want the building to simply stop like a cut baguette," explains Javier Villar Ruiz, Kuma's partner in charge. Along ArtLab's west elevation, the roof quietly bends over and hugs the wall, but on the east elevation it terminates in generous eaves, creating a covered walkway. Shielding students from Lausanne's frequent rains, it evokes the Japanese



INNER WARMTH Stairs ascend to the Esplanade Piazza from DataSquare, which is partially underground (left). Within the Art & Science Pavilion (opposite, top), LED spotlights drop from the ceiling. Outside (opposite, bottom), LED fixtures installed at various angles keep the lights' rays vertical to the ground, regardless of the soffit's changing surface.

engawa (porch), a favorite Kuma motif.

Though bold and sculptural, the roof's shape resulted from a mixture of internal and external conditions, including a 15-foot-high wall for the exhibition space, truck clearances, and access for emergency vehicles. Square slate shingles, imported from Spain, are the roof's cladding, a polite nod to the Swiss vernacular. Resembling fish scales, the stone plates, installed on a 45-degree angle, adjust to the roof's changing geometry.

Fifty-seven prefabricated frames, spaced 12 feet apart along the length of the building, hold up the roof. Composed of columns and beams measuring 5 inches wide and 2 feet deep, each frame is the same in section but differs in height and span due to the roof's irregularities. All are made of spruce sandwiched between perforated steel plates secured with transparent glue. Lightening the metal's hard surface both literally and figuratively, the round cutouts allow dots of warm wood grain to show through. Within the frames' standardized width, the ratio of metal to wood varies invisibly, enabling the use of additional steel where needed. "We can change the proportions like a cocktail's," jokes Ruiz.

The frames, which straddle the exterior walls of 2-inch-thick glass sheets and gray spruce panels, also secure them. The spruce, pre-aged to prevent uneven coloration, is also used for the eaves' soffits, which continue inside for the ceilings. Since the wood does not conduct heat, Kuma could use the same material inside and out without incurring the heat loss that happens with metal. The architects, who were responsible for the interior design (except for the café), selected minimal finishes such as white gypsum board and polished concrete flooring.

Unlike Kuma's approach in many other buildings, delicate detailing and decorative surfaces are conspicuously absent. This time, Kuma was after something different: dramatic and daring, his ArtLab makes its mark with one bold sweep.

The exposed structure becomes its own ornament, and its rational construction methodology becomes an educational tool, as befits a school known for nurturing the next engineers. True to its name, ArtLab is a place for art as well as a lab for learning. ■

PHOTOGRAPHY: © VALENTIN JECK (OPPOSITE, TOP)

credits

ARCHITECT: Kengo Kuma & Associates – Kengo Kuma, architect; Javier Villar Ruiz, partner in charge; Nicola Maniero, Rita Topa, Marc Moukarzel, Jaeyung Joo, Cristina Gimenez, project team

ASSOCIATE ARCHITECT: CCHE Lausanne

ENGINEER: INGPHI (structural)

CONSULTANT: L'Observatoire Internationale (lighting design)

CLIENT: École Polytechnique Fédérale de Lausanne

SIZE: 33,000 square feet

PROJECT COST: $36.25 million

CONSTRUCTION COST: $31.5 million

COMPLETION DATE: August 2016

SOURCES

WOOD WORKS: JPF-DUCRET

WINDOW FRAMES, GLAZING, MAIN DOOR: Fahrni Fassadensysteme

FIBER CEMENT CLADDING PANELS: Viroc

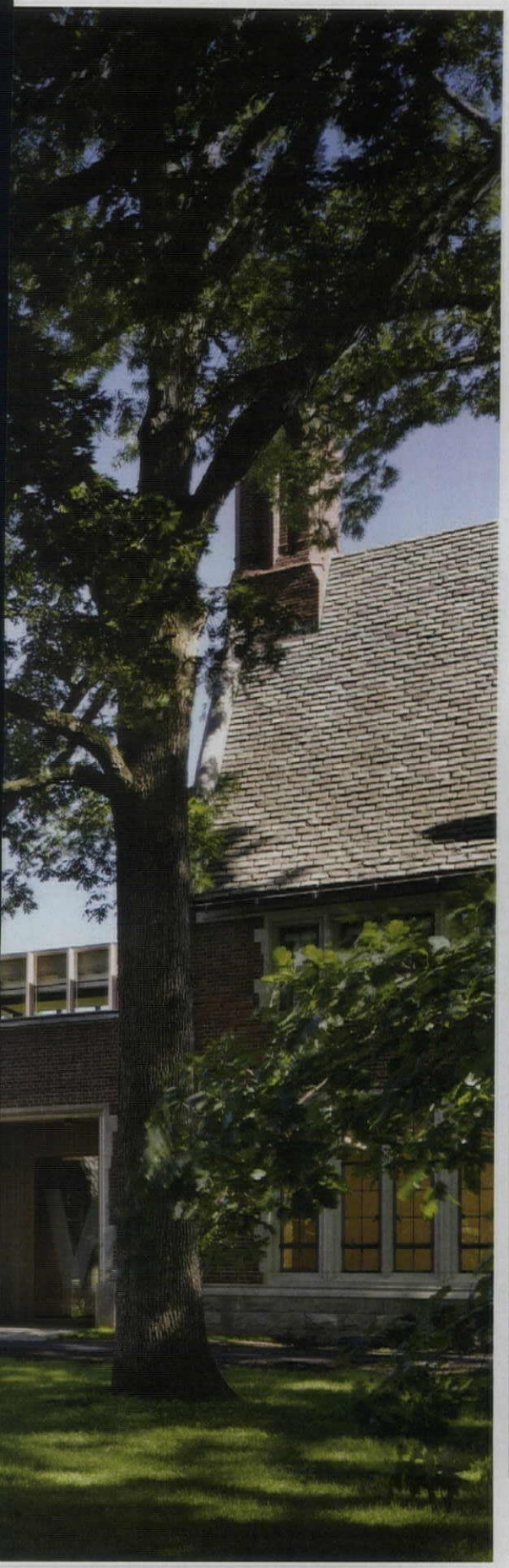
Pendleton West Addition and Renovation | Wellesley, Massachusetts | KieranTimberlake

The Strong Silent Type

A small but muscular addition creates a campus gateway and, along with the renovation of a neighboring building, reunites the arts.

BY BETH BROOME

PHOTOGRAPHY BY MICHAEL MORAN

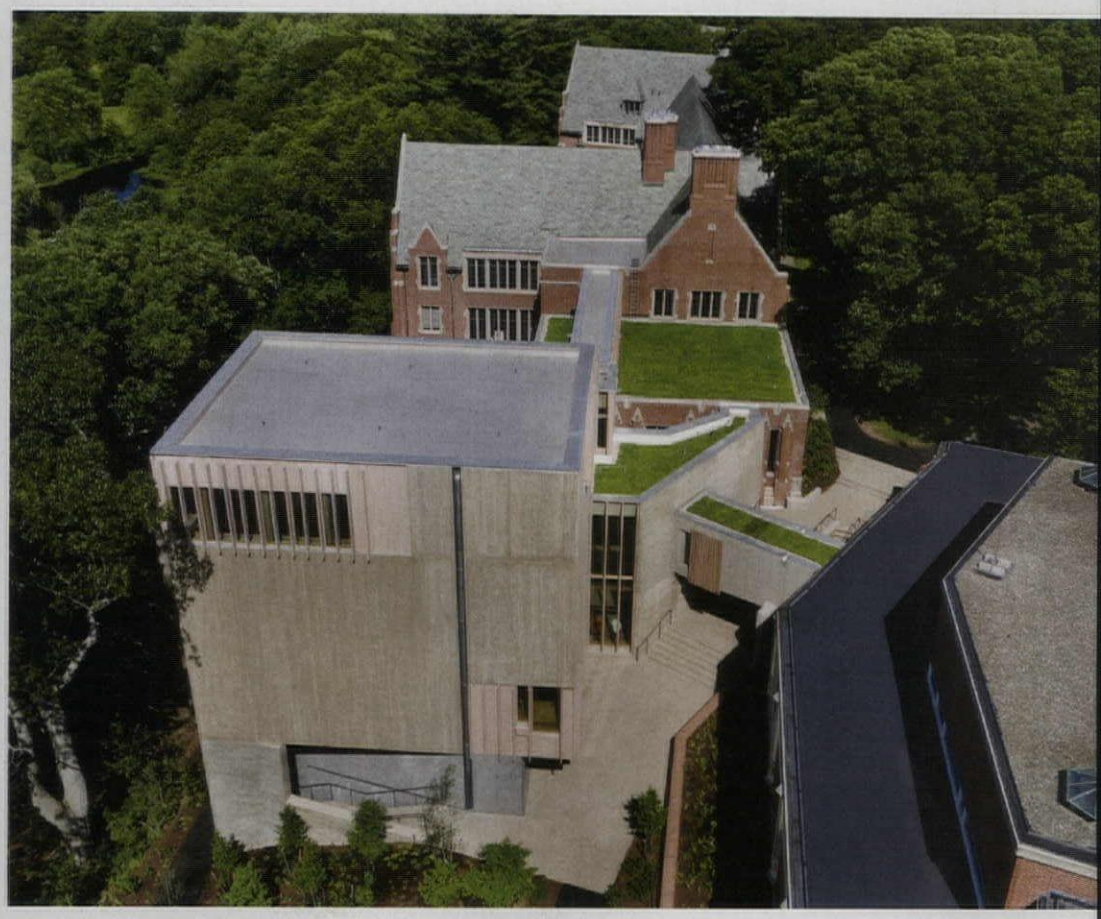


Founded in 1870 in a leafy suburb 12 miles west of Boston, Wellesley College, a liberal arts institution for women, has a student body of just 2,350. Intimate though it is, its alumnae roster, which includes Madeleine Albright and Hillary Rodham Clinton, is sometimes referred to as "the most powerful women's network in the world." So it is fitting that a modern addition on the historic Academic Quad here, by KieranTimberlake, is diminutive but has a quiet power and a complex agenda.

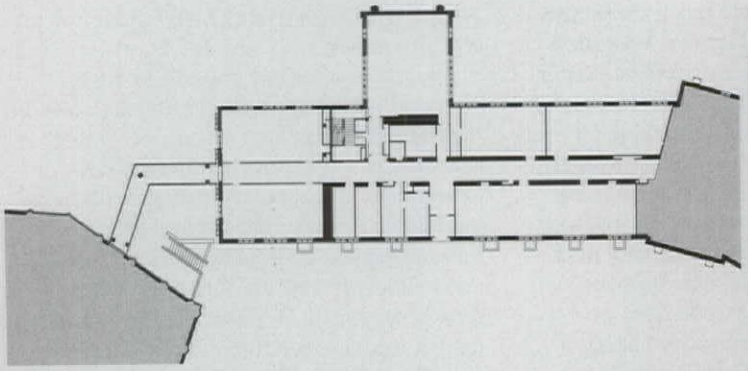
The campus, with a 1921 master plan by Frederick Law Olmsted (and another by Michael Van Valkenburgh in 1998), is something to behold. Five hundred acres of rolling hills and vales, wetland meadows, and woodlands are traversed by rambling paths and offer views out across Lake Waban. At the campus's heart, Norumbega Hill, is the Academic Quad, ringed by buildings at its periphery, including Pendleton Hall. Designed by Charles Klauder in 1934 for the physics and chemistry departments, the western half of the collegiate Gothic building was later turned over to house the arts, which, for 30-odd years, occupied the lab building in an ad hoc manner.

About five years ago, the college began planning some capital improvements, including those for visual arts and music—which also occupied Paul Rudolph's Jewett Arts Center (1958), adjacent to Pendleton. The campus had no formal choral or orchestral rehearsal space, and the improvised visual-arts studios were sorely outdated, and inadequate for the needs of the burgeoning field of media arts. After an invited RFP process, KieranTimberlake, which had renovated the school's chapel in 2006, was selected for the project, including a gut renovation of Pendleton West, and the 10,000-square-foot addition—the maximum allowable size for the tiny site—wedged between Jewett and Pendleton.

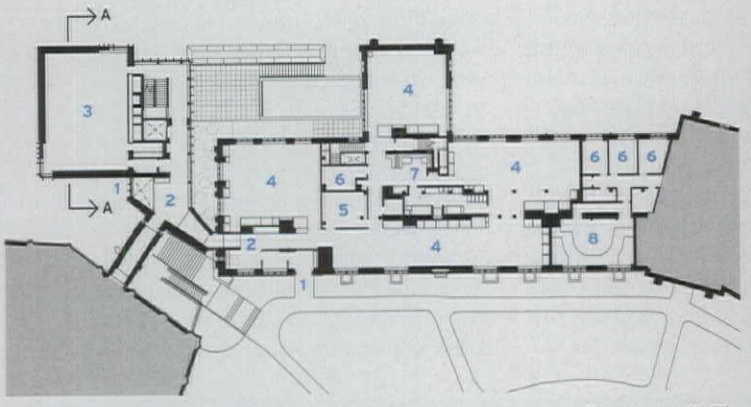
In recent years, Wellesley's campus has grown to the west, with Rafael Moneo's Davis Museum, as well as a large sports complex and Mack Scogin Merrill Elam's Lulu Chow Wang Campus Center farther down the hill. This shift made what had been a back-door entry to the Academic Quad—a narrow brick stair between Pendleton and Jewett—into a front



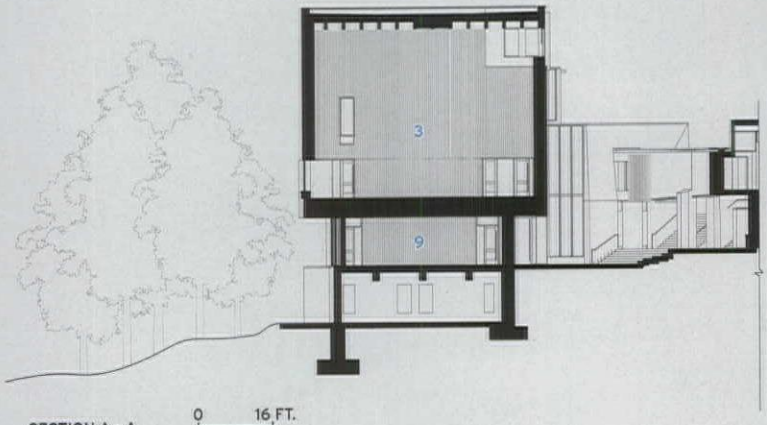
MISSING LINK The addition serves as a linchpin between West Pendleton (opposite, at right) and the Jewett (at left). It stands sentry (above) alongside the Arts Passage, which squeezes up between the new building and Jewett, connecting the west campus to the Academic Quad. A bush-hammered granite base references nearby historic structures.



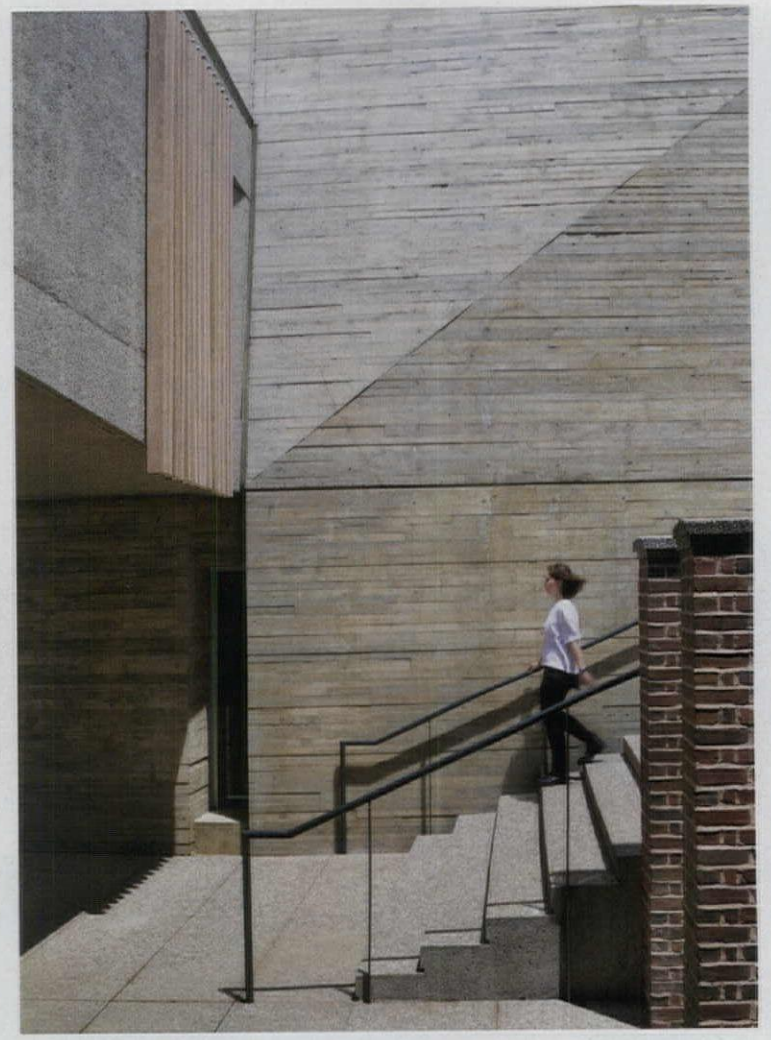
SECOND-FLOOR PLAN EXISTING



SECOND-FLOOR PLAN RENOVATED

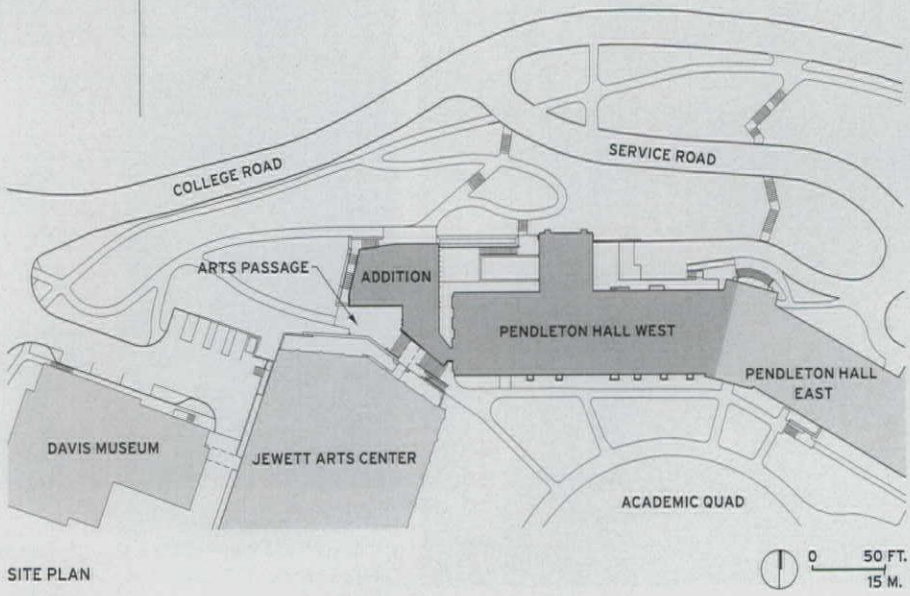


SECTION A - A



MAKING CONNECTIONS The Arts Passage travels beneath a bridge between the addition and Jewett Hall (above); the new stair sits alongside the narrow preexisting one (indicated by the brick). The addition's glazed east facade (opposite) reveals interior circulation and looks out to a new terrace, which provides another entry point to the building from the north.

1 ENTRANCE
2 LOBBY
3 REHEARSAL HALL
4 2-D STUDIO
5 CRITIQUE ROOM
6 OFFICE
7 COMMON
8 CLASSROOM
9 RECITAL SALON



SITE PLAN

door. "There was an opportunity here to make the master plan whole again at this particular juncture," says founding partner Stephen Kieran, "by celebrating passage from the newly developed campus of the west up to the historic campus of the Academic Quad—it had to be not just a building, but also a portal."

Not only would the project need to reunite the arts (including bridging to Jewett) and celebrate a threshold, the architects realized; it would also have to connect the quad and the residential buildings to the north, negotiating the site's 35-foot grade change and making the quad fully accessible for the first time. "We thought about it broadly as a building that was about physical passage," says Kieran. "That started to inform a project that was about movement on a lot of levels and gave rise to strategies inside." Seeing this little corner as a way to resolve a slew of campus circulation problems, the architects came up with the idea of pulling the stairs and elevators (which were not code-compliant) out of Pendleton and into the new addition. Along with removing the double-loaded corridors of the old building, this strategy would solve another problem—not enough building to accommodate the program—by enabling the team to maximize the space in the old science hall. "That one move unlocked everything programmatically," says Kieran, noting that it allowed the team to accommodate all the new visual-arts studios—from sculpture to printmaking to digital media—in the historic building. Here they have created flexible interiors re-envisioned as loftlike, state-of-the-art studios, with concrete floors and exposed systems. "We were thinking about how the building could intermingle traditional art forms and new media," says Phyllis McGibbon, professor of art and the building director and faculty-client lead, "and make the student experience more holistic." Consolidating the visual arts in Pendleton meant that the new structure,

BALANCING ACT Acoustical ceiling panels add a splash of color to the concrete surfaces that carry inside (top). The old building was gutted and opened up to provide flexible, loftlike studios (above). Strategically placed windows connect the oak-lined rehearsal hall (opposite) to the surrounding tree canopy.

besides its circulation functions, could be dedicated to housing music: a rehearsal hall, recital salon, and classroom—acoustically sensitive spaces that are best served by a purpose-designed building.

The addition's tower-like form, which calls out its mission as a gateway, was driven in part by tight physical and regulatory constraints, but also took shape in response to creating a 35-foot-high rehearsal space that would meet the various acoustical demands of different music forms. It also speaks to its neighbor; the architects liken the building to a fourth pavilion added to Pendleton's three gabled ends that reach out toward the lake.

Choosing concrete—which contrasts with the quad's predominantly brick vocabulary—made sense for a variety of reasons. The material helps the building assert itself as a portal through its distinctness while subtly nodding to the Rudolph and Klauder buildings, with their precast and limestone copings and trims. On a pragmatic level, its thermal and acoustical mass were beneficial, but it was also perfect since the building functions as a retaining wall on its steeply sloping site. Of course, concrete has aesthetic appeal too, and its versatility enticed the architects to apply it

in many forms. Vertical and horizontal board-formed concrete—both precast panels and cast-in-place—as well as "as-cast" and sandblasted cast-in-place concrete give the exterior a rich tactility. "It's a building for making," says associate Tim Peters, referring to the complete project, "so it should express how it's made."

The team carried this effect inside. Responding to the surrounding forest, they started considering the whole building as cast from wood, with the material's memory imprinted by the formwork outside and in interior circulation areas, and the presence of warm white oak lining the music spaces. The rehearsal hall's proportions lend the space a grandeur, but the honey-colored slats give it warmth, bringing it down to earth.

Wellesley does not build much, but when it does, it does so with intent. Embarking on this project, the team was keenly aware of the campus dialogue—across time and between designers—that they were entering. Quietly and thoughtfully, they have joined that conversation. ■

credits

ARCHITECT: KieranTimberlake – Stephen Kieran, David Riz, Marilia Rodrigues, Tim Peters, Jeremy Leman, Brendan Miller, Yves Gauthier, Emily Scrimger, Darby Kline, Elizabeth Lovett-Keshet

CONSULTANTS: Altieri Sebor Wieber (m/e/p/fp); LeMessurier (structural); Nitsch Engineering (civil); Michael Van Valkenburgh (landscape); Acentech (acoustical); Fisher Marantz Stone (lighting); OEHS2 (environmental health and safety); Marguerite Rodgers (furnishings)

GENERAL CONTRACTOR: Consigli

SIZE: 58,000 square feet

COST: withheld

COMPLETION DATE: March 2017

SOURCES

MASONRY: Fletcher Granite

PRECAST CONCRETE: Strescon

CURTAIN WALL: Duratherm Window Corporation

GLAZING: Viracon

ROOFING: Sika, Revere Copper

ACOUSTICAL CEILINGS: Decoustics

PAINTS AND STAINS: Sherwin-Williams

Lewis Arts Complex | Princeton, New Jersey | Steven Holl Architects

Balanced Composition

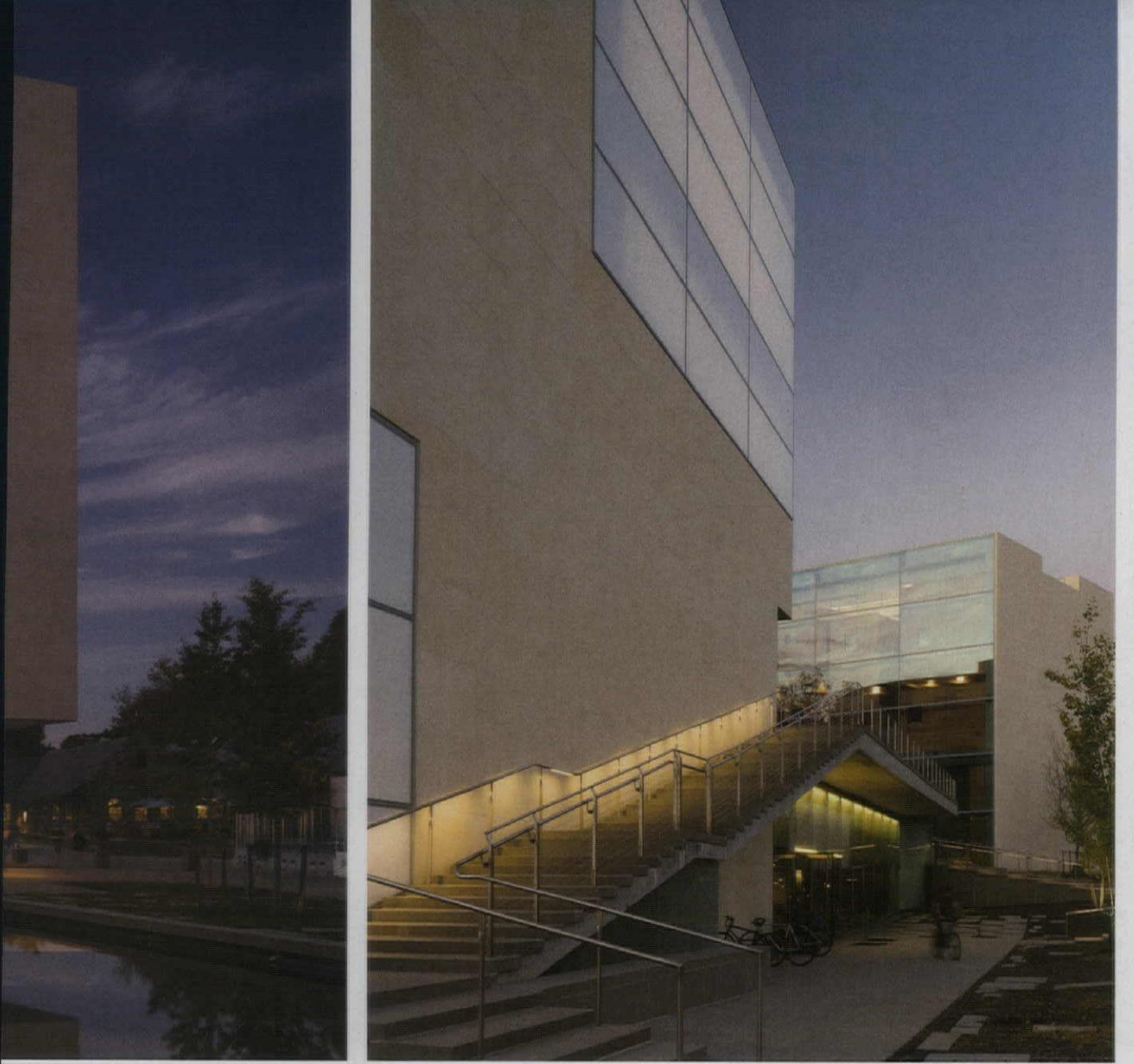
Musical influences and classical proportions shape a creative and performing arts facility.

BY JOSEPHINE MINUTILLO

PHOTOGRAPHY BY PAUL WARCHOL

Steven Holl Architects (SHA) has built some of the most imaginative buildings of the last decades. Several of them are university projects, including two gems at the University of Iowa campus; the most recent, the Visual Arts Building, opened just last year (RECORD, November 2016, page 110). But even an architect of Holl's stature has seen his share of misses along with the hits. In theory, his latest project, the Lewis Arts Complex at Princeton University, named for the late alumnus and philanthropist Peter B. Lewis, has all the ingredients to make a great building—an enlightened client, a robust program, a prominent site, and a subject close to the architect's heart. With one major exception, unfortunately, in the execution, much of this work falls short.

Princeton has long enjoyed a reputation as one of the most elite educational institutions in the country, nestled within a pastoral campus with a rich mix of collegiate Gothic and Romanesque revival buildings. In recent years, it has devoted increased attention to the creative and performing arts, historically taken less seriously than



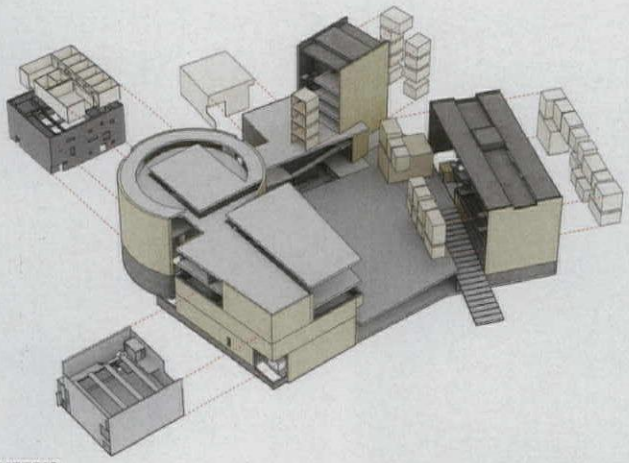
CAMPUS GATEWAY
On the northern edge of the site sits an arts tower (opposite). Coming from the new train station, one can enter the complex at grade from the south (left). The glazed music building reveals the rhythmic composition of the suspended wood practice rooms (below).

academic courses. Its plans for a purpose-built complex on the western edge of campus to house the growing number of students in theater, dance, music, studio art, and creative writing—previously scattered in buildings all over campus—were ambitious, perhaps overly so.

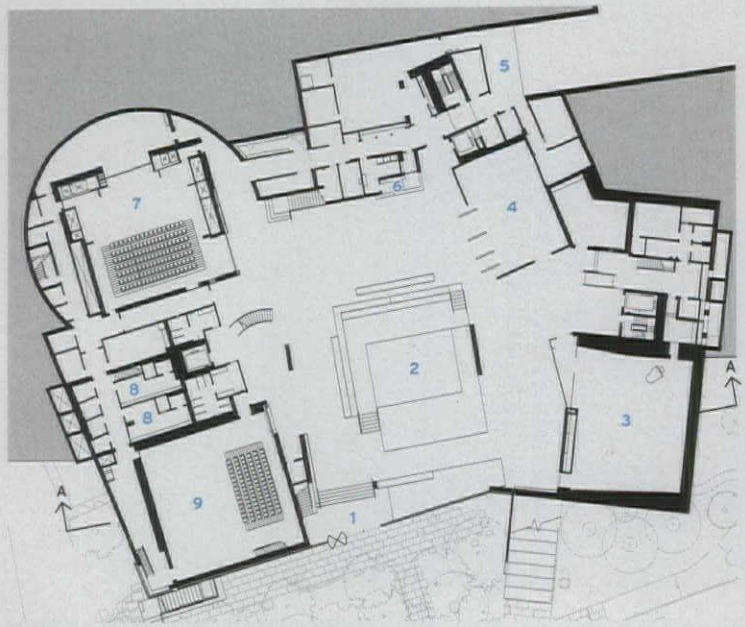
Before construction could even begin on the Lewis Arts Complex—the largest building-development project on the Princeton campus in its history, according to university architect Ron McCoy—the railway station for the "Dinky," a small train that connects the spot to the New Jersey Transit line, had to be moved. A new station, designed by Rick Joy and also recently completed, sits across from the complex, which now serves as a gateway to the campus.

As a gateway, Holl's assemblage of buildings—a rounded one to the west that contains theater and dance, a tall central one for visual and literary arts, and a boxy structure to the east for music—could work, if it were a gateway to somewhere else. Exiting the station, one can either enter Lewis at grade, into the vast interior forum

PATHS THROUGH CAMPUS



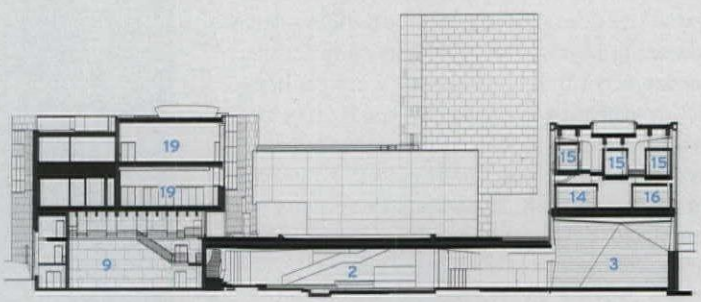
AXONOMETRIC



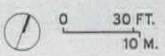
FORUM-LEVEL PLAN

PLAZA-LEVEL PLAN

LEVEL-THREE PLAN



SECTION A - A



STONE COLD The various volumes, including a rounded one that houses a black box theater, are clad in a light-colored limestone.

space that connects the entire complex, or ascend a gently inclined stairway to an outdoor plaza level that features a large reflecting pool, around which the three buildings that make up the complex are positioned. If the arrangement seems familiar, it should. Holl modeled it after Michelangelo's Campidoglio in Rome, not only in plan but also in the slope of the steps.

However, at Princeton, Holl's concrete-framed volumes, clad entirely in a light-colored limestone from an ancient Roman quarry in Lecce, Italy, feel out of place amid the university's ornate, highly textural buildings. That's not to say modern additions aren't encouraged. Two recent ones featured in this issue, by design studio The Living (page 66) and KPMB Architects (page 86) respectively—not to mention the Rick Joy station—do a nice job fitting in through either their scale or deference to existing buildings, or even their construction quality, which at the Holl project is, in some areas, inferior. Another building, by Tod Williams Billie Tsien Architects | Partners, completed last year (RECORD, November 2017, page 96), is a beautifully minimalist yet highly contextual insertion. The facades on Holl's buildings, even where there are swaths of glazing, are completely unarticulated and—let's face it—just too beige. They are not only uncharacteristic for Princeton, they're uncharacteristic for Holl, who has never been afraid to experiment with form or materials or to add a pop of color, and has been perhaps the one contemporary architect to most effectively use light as a building component and almost as a surface. None of that is evident here.

What's more surprising about the bland exteriors is that some of the interiors display an opposite tendency—incorporating too many materials, too many ideas. In each of the three buildings, they feature

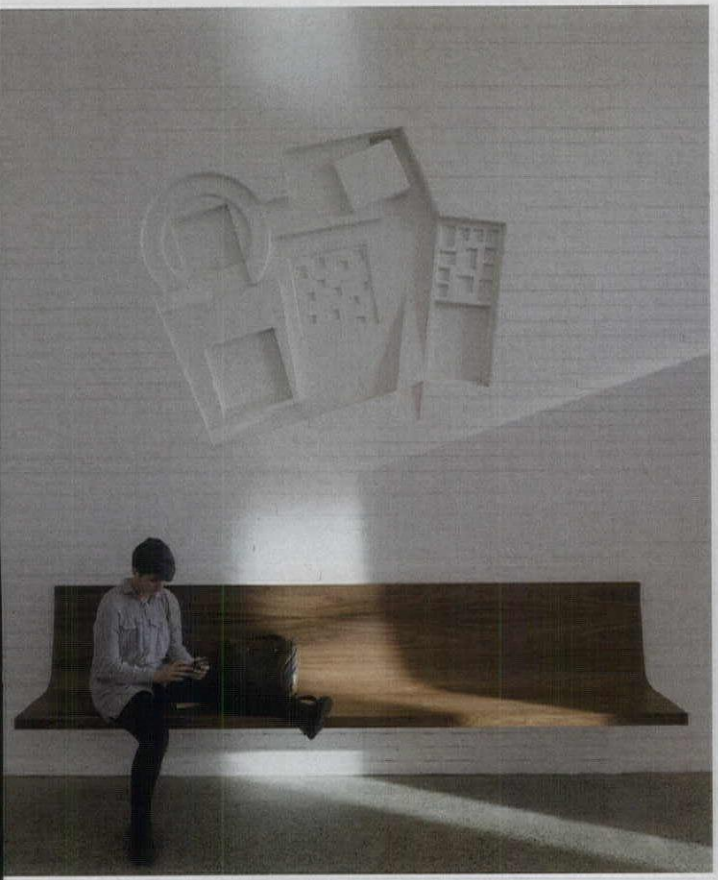
1 ENTRANCE
2 FORUM
3 INSTRUMENTAL-REHEARSAL ROOM
4 COLAB GALLERY
5 LOADING DOCK
6 TICKETING AND CONCESSIONS
7 BLACK BOX THEATER
8 CHANGING ROOM
9 DANCE THEATER
10 JAZZ STUDIO
11 GALLERY
12 REFLECTING POOL
13 DESIGN STUDIO
14 MUSIC STUDIO
15 PRACTICE ROOM
16 OFFICE
17 SEMINAR ROOM
18 LOUNGE
19 DANCE STUDIO

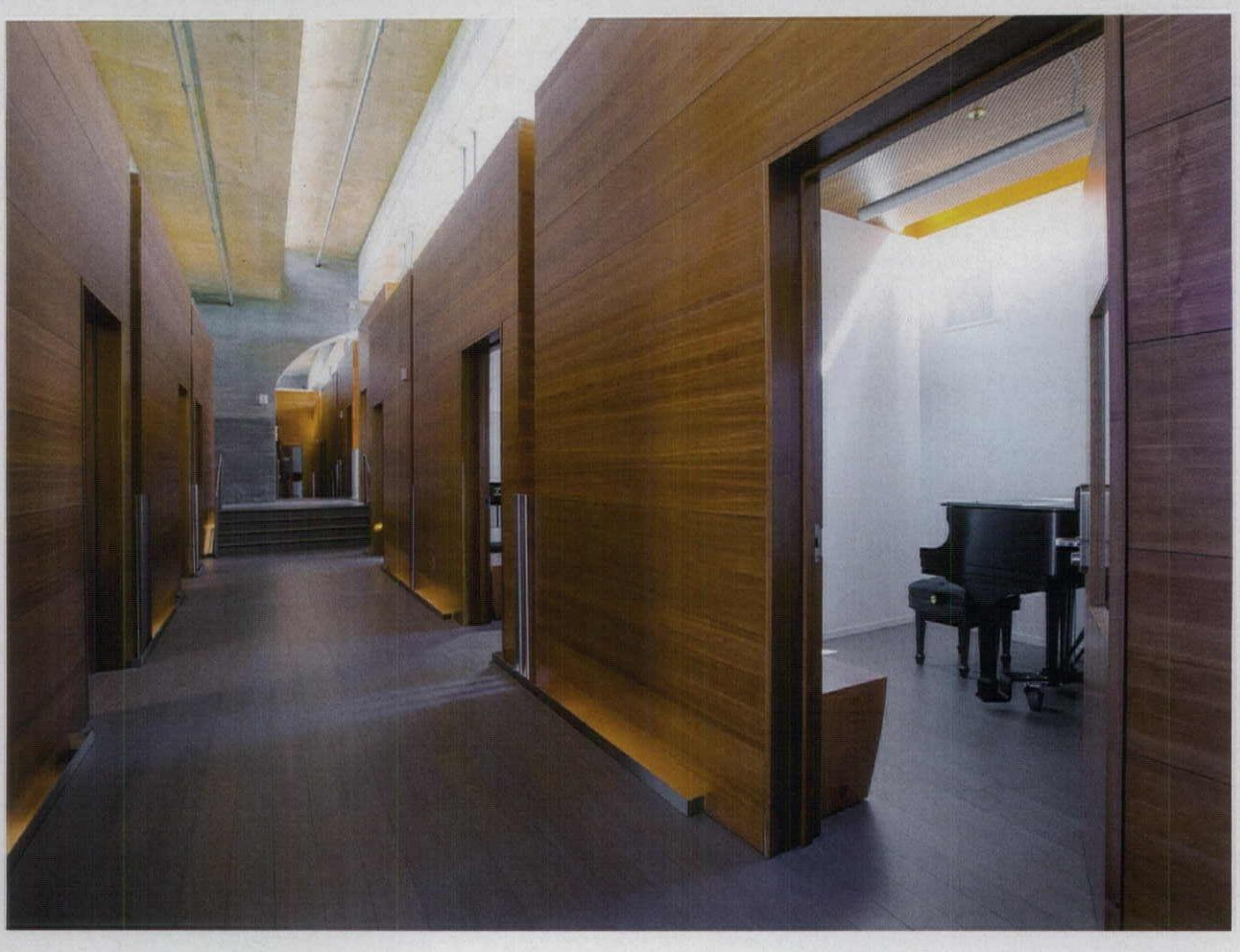
credits

ARCHITECT: Steven Holl Architects
ASSOCIATE ARCHITECT: BNIM
ENGINEERS: Arup (structural, m/e/p); Vanasse Hangen Brustin (civil); R.W. Sullivan Engineering (code); Front (facade); IBA Consulting and Engineering (waterproofing)
CONSULTANTS: Michael Van Valkenburgh Associates (landscape); Auerbach Pollack Friedlander (theatrical systems); Arup (acoustics and lighting); CMS (pool)
GENERAL CONTRACTOR: Turner Construction
CLIENT: Princeton University
SIZE: 145,000 square feet
COST: withheld
COMPLETION DATE: October 2017

SOURCES

MASONRY: Pimar (facade); Tompkins Quarry (bluestone paving)
STEEL STRUCTURE: SteelFab
GLASS AND SKYLIGHTS: Gartner
LIGHTING: Solid State Luminaries, Visual Lighting Technologies, Alcolyte LED, Philips, Moda Light, Cree, USA Illumination, Architectural Lighting Works, Axis Lighting, Delray Lighting, Lightolier





LIVELY CONTRAST
A wall features a relief of the complex's plan (above, left). Skylights in the forum reflect the movement of water from the pool above (above). The cherrywood-clad practice rooms are discrete boxes (left). Custom rug designs are based on Holl's musically inspired watercolors (opposite).

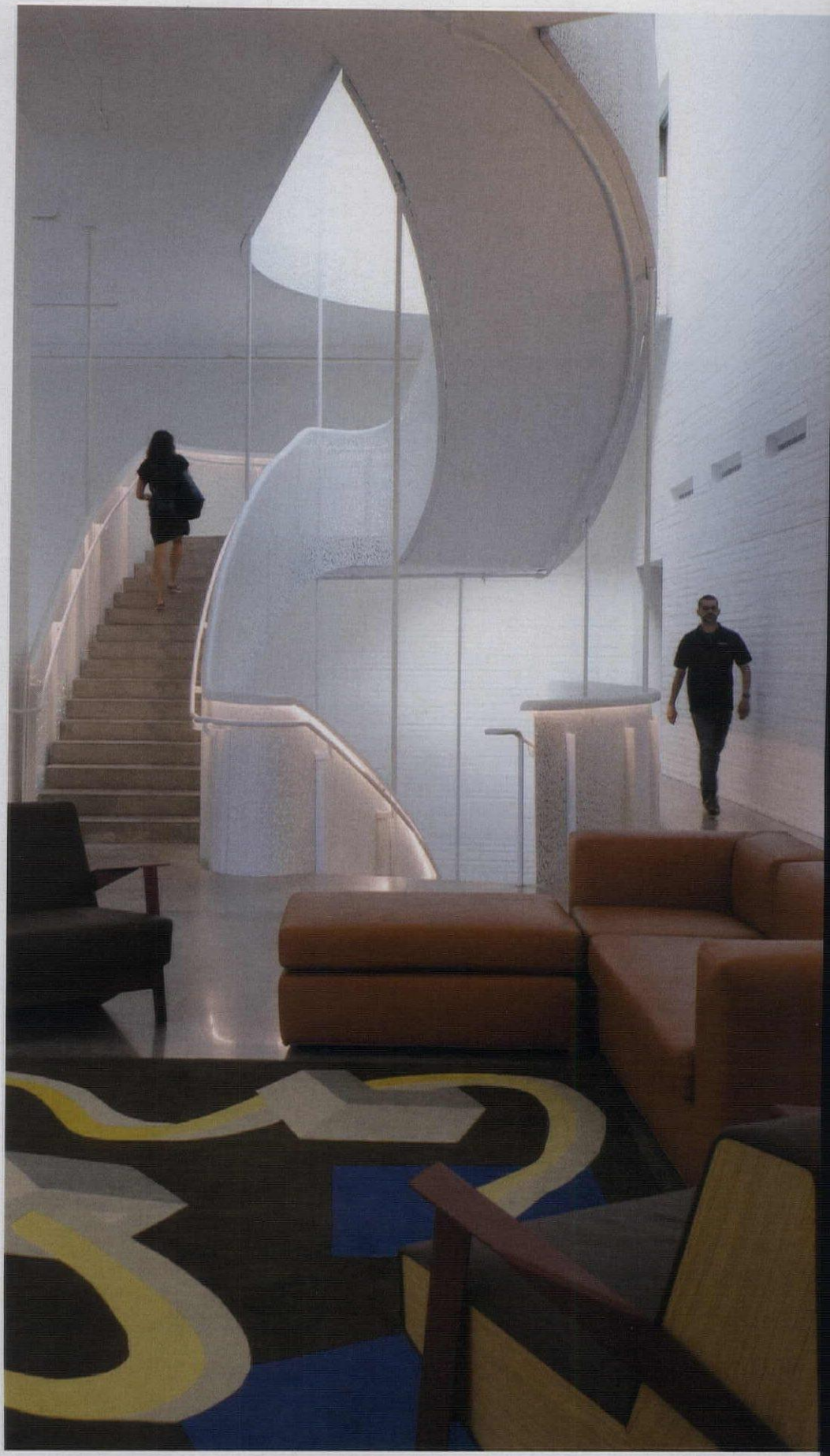
PHOTOGRAPHY: © DENISE APPLEWHITE (BOTTOM)

different design elements. It is an attempt, says SHA partner in charge Noah Yaffe, "to provide a strong identity for each department." That's fine within the individual structures. But within the forum—the great connector and "purposely non-purpose-built" social space that opens onto the ground-floor theaters and instrumental-rehearsal space, with their various finishes—dark end-grain wood floors and seating surfaces mix with colorful furniture and walls of board-formed concrete painted white. A spiraling "dancing stair" made from sheets of perforated metal, whose pattern was derived from a dance notation, similar to stairs Holl has used elsewhere to great effect, here seems too contrived. It's all a bit jarring. The deep-set skylights overhead, reflecting the movement of water from the pool above onto their edges, add a mildly calming effect but are overwhelmed by the cacophony of materials and forms.

It's not surprising that the most successful of the three individual structures is the one devoted to music; taken on its own, it's a great little building. For several years now, Holl has taught a series of studio classes with composer Raphael Mostel at Columbia University's Graduate School of Architecture, Planning and Preservation called the Architectonics of Music (RECORD, May 2016, page 122). Musical scores have influenced many of his projects, including a private house and gallery in Seoul (RECORD, May 2012, page 136) whose plan was inspired by a never-performed composition by István Anhalt entitled *Symphony of Modules*. At Princeton, Morton Feldman's multilayered musical approach, which Mostel wrote about in an online piece for RECORD on the Lewis Arts Complex, served as inspiration.

Stepping into the music building is like stepping inside an instrument. Raw concrete walls, floors, and a floating staircase harmoniously juxtapose with the cherrywood offices and practice rooms. For optimal acoustic isolation, the practice rooms are suspended from the roof, the rhythmic composition of those hanging boxes visible through the entirely glazed facade. It is, to be sure, a high note of the complex.

Another strength of the project is its porosity, both with respect to allowing multiple views into the buildings and multiple routes through the complex to different areas of the campus. It works well as a gateway for that reason. And Holl did look to historic structures in other areas of the campus—the height of the five-story arts tower matches that of Blair Arch, for instance. The diameter of the round structure that houses the black box theater mimics that of Alexander Hall, home to Princeton's orchestra. That emphasis on dimensions, proportions, and even composition works well in certain individual elements of the complex, but an equal emphasis on the combination and integration of materials, texture, and scale would have benefited the complex as a whole. ■



DINING HALL At the center of the vast complex is a three-story forum space that houses a cafeteria; above it is sound and lighting equipment used when the tables are cleared away for parties.

Lab City CentraleSupélec| Gif-sur-Yvette, France | OMA

Factory for Learning

Two engineering schools merge to create a sprawling research hub in a Paris suburb.

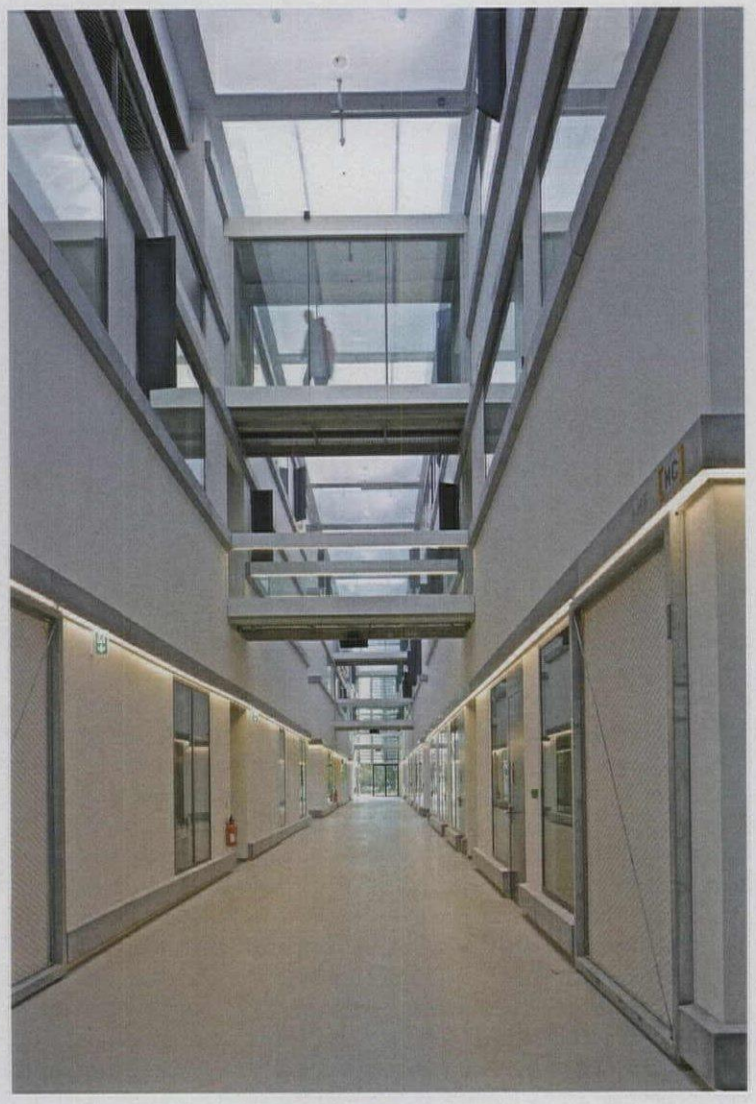
BY ANDREW AYERS

PHOTOGRAPHY BY PHILIPPE RUAULT

"France remains very special in that it still believes in *grands projets*," commented OMA partner Ellen van Loon at the unveiling of the Rotterdam office's latest French opus, the 645,000-square-foot "Lab City." The *grand projet* she was referring to is the 30-square-mile Saclay Campus, an industrial and higher-education "cluster" 12 miles southwest of Paris, to which the French government has committed nearly $6 billion to turn it into a world-class research-and-development hub. Currently a giant building site, Paris-Saclay will group together institutions that have long been located there—including the Commissariat à l'énergie atomique, the École supérieure d'optique, and the École Polytechnique—alongside new education-sector arrivals that are being encouraged to relocate. On the industry side, many companies have been attracted to Saclay over the years—Renault, for example, who built their Technocentre there in 1998—and newcomers are likewise being encouraged, such as energy giant EDF which last year opened a research center at Saclay (by architect Francis Soler). Within a decade, the campus will be connected to central Paris by a new metro line, and more than 18 million square feet of new building will have been added to the existing fabric.

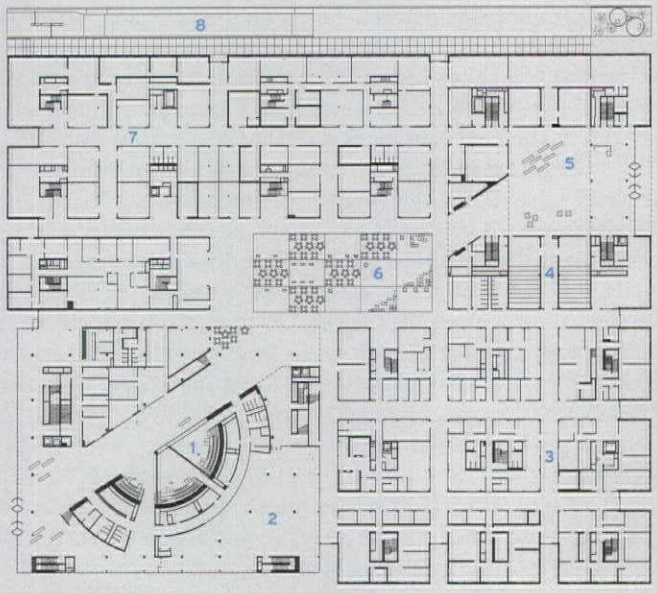
One institution that was historically present at Saclay was the École supérieure d'éléctricité (Supélec), which in 2015 concluded its merger process with another engineering school, the École centrale Paris, to form CentraleSupélec. In 2012, OMA won the master plan competition for the future school's new complex, which now comprises four buildings: Supélec's two old structures and two brand-new edifices, one by Swiss firm Gigon/Guyer and the other, Lab City, by OMA. Occupying an enormous, almost-square plot of 508 feet by 400 feet, Lab City combines chemistry and engineering laboratories, classrooms, a lecture theater, a student cafeteria, a staff restaurant, and a language school (tomorrow's engineers will be trilingual globetrotters, according to Hervé Biausser, CentraleSupélec's director). Perhaps unsurprisingly, given not only this deep site but also Rem Koolhaas's historic obsession with Manhattan's urban grid (as his early book *Delirious New York* demonstrates) OMA's Lab City is laid out on a lattice of internal streets. A convenient way of organizing a large number of disparate activities that are obliged to cohabit under the same roof, the grid could have been monotonous, but OMA has manipulated both its plan and section to produce a building of surprising—and arresting—spatial complexity.

One of the brief's stipulations was that Lab City should be capable of



expanding in the future should student numbers grow. "But I think that, if you don't have the growth, you should be able to take advantage of the extra space you have," says van Loon. Toward the center of the grid, the "blocks," or interior volumes, are lower than those at the perimeter—one or two stories as opposed to three—so that if student numbers increase, new labs and classrooms can easily be added on top (all the blocks have a central service core). In the meantime, the lower blocks' "roofs" provide informal lounge and study areas within the mega-network of internal streets and are connected to the other blocks via footbridges, all sheltered under a giant oversailing roof that unites the interstitial spaces. Realized in two layers—ETFE beneath a PTFE tensile membrane—the roof ensures abundant natural light, as do glazed louvers at the extremities of each street; the latter also provide natural ventilation. (The streets are not air-conditioned and are only heated when the weather gets very cold.) In plan, the grid has been manipulated by merging some blocks to form bars, and also by the introduction of a diagonal main thoroughfare that divides the complex in half and connects its two principal entrances at opposite corners. (Lab City is intended to be porous, with around 14 points of entry all around its perimeter.) At the site's center, the thoroughfare widens into a three-story-high "forum" where the school cafeteria is located. Further spatial complexity is added at each of the diagonal's extremities, one of which comprises administrative office space organized around a courtyard, while the other contains a three-story semicircular lecture theater designed with great bravura, as well as, on a fourth level, the language school, grouped around a glass-roofed courtyard, part of whose floor dramatically opens into the principal thoroughfare below.

Money was tight at Lab City—$140 million, or $217 per square foot. "We made it sober and simple, using materials that France knows how to do—for instance, concrete," explains van Loon. "Essentially, we spent money on the ETFE roof and the auditorium." Used as air-filled cushions, ETFE helps maintain steady temperatures while still admitting abundant light, which is tempered thanks to white fritting on its surface (van Loon says the fritting also makes the interior seem brighter on overcast days). The other element on which OMA spent a certain amount of time and money was furnishings. "We always end up design-



GROUND-FLOOR PLAN

1 MAIN AUDITORIUM
2 LIBRARY
3 MATERIALS SCIENCE DEPARTMENT
4 BIOLOGY DEPARTMENT
5 COURTYARD
6 CAFETERIA
7 ENERGY DEPARTMENT
8 ACCESS TO BASEMENT AND PARKING

credits

ARCHITECT: Office for Metropolitan Architecture – Ellen van Loon, partner in charge; Edouard Pervès, Saskia Simon, project leaders; Mauro Altana, site manager

ENGINEERS: Bollinger+Grohmann (structural/facade); ALTO Ingénierie (m/e/p)

CONSULTANTS: Royal HaskoningDHV (acoustics); Apex (fire safety); D'Ici La (landscape); Ducks Sceno (scenography)

CLIENT: Ecole CentraleSupélec

SIZE: 645,000 square feet

COST: $140 million

COMPLETION DATE: August 2017

SOURCES

EXTERIOR CLADDING PANELS: Hunter Douglas

DEMOUNTABLE PARTITIONS: Skyfold

CARPET: Kasthall

FURNITURE: Steelcase

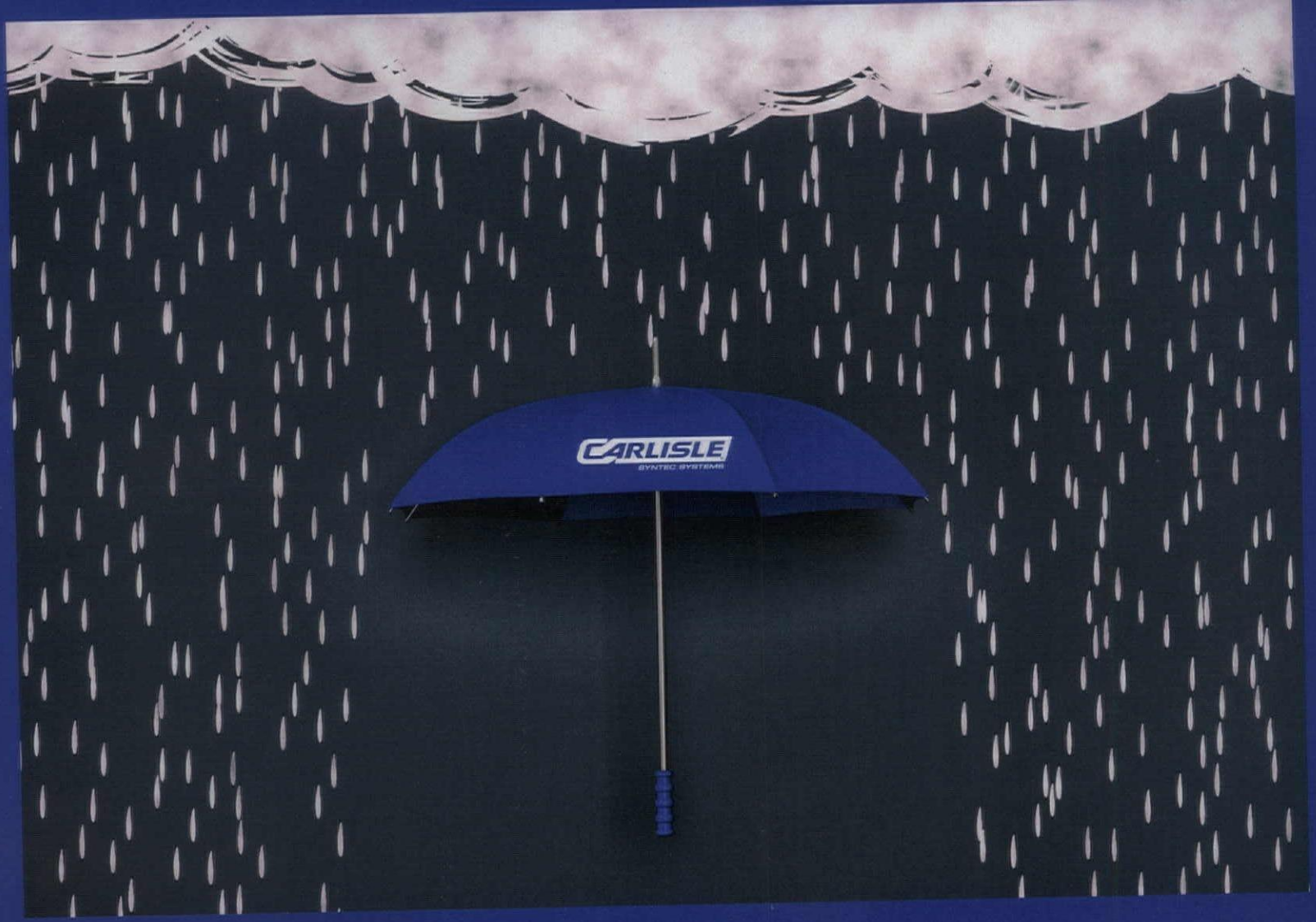
INSIDE OUT The dyed-black concrete facades (bottom) are echoed on some of the interior blocks (above). Footbridges connect the different blocks on upper levels (opposite).

LIGHT FILLED A glass-roofed courtyard opens onto the main diagonal thouroughfare (this image). The oversailing ETFE roof offers daylit spaces throughout the large complex (below).

ing a lot of the furniture for our projects because I can't find what I want," she laughs. At Lab City, OMA produced everything from lounge chairs and reading and dining tables to electrical sockets that can be handily pulled down from the ceiling. Particular attention was paid to the cafeteria, whose furnishings are intended to provide visual animation even when not in use, and which are easily cleared away so that the forum can host student parties, with a suspended technical gantry for sound and lighting equipment.

Externally, Lab City is sober to the point of severity, with black-dyed concrete, string courses, and punched-out windows marching around most of the perimeter ("Black because the existing buildings were white, and I wanted a contrast," deadpans van Loon), set off by brushed aluminum at the lecture-theater corner, where the building fronts on an outdoor plaza. A "city" within a campus within a campus, OMA's building plugs into its context like a piece of sophisticated hardware on a circuit board and joins a growing French trend for what one might term "austerity architecture." Pioneered by firms such as Lacaton & Vassal, it's an inventive approach that aims to do more with less and which, while never taking itself too seriously, achieves a hardnosed dignity and uncompromising aesthetic rigor. ■

Andrew Ayers is a Paris-based writer, researcher, translator, and educator. He is also the chief docent at the Maison de Verre.



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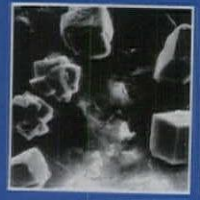

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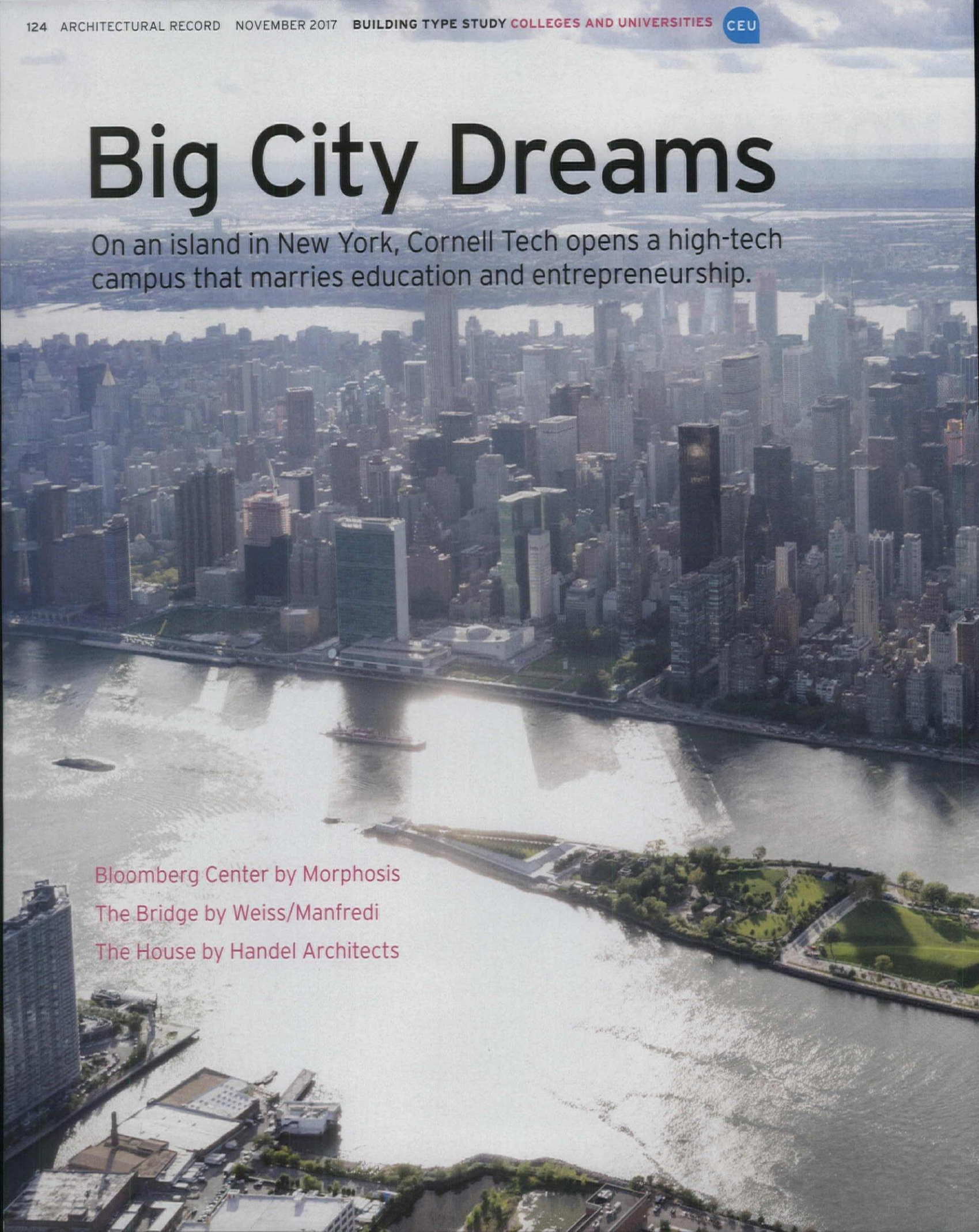
CIRCLE 161

Big City Dreams

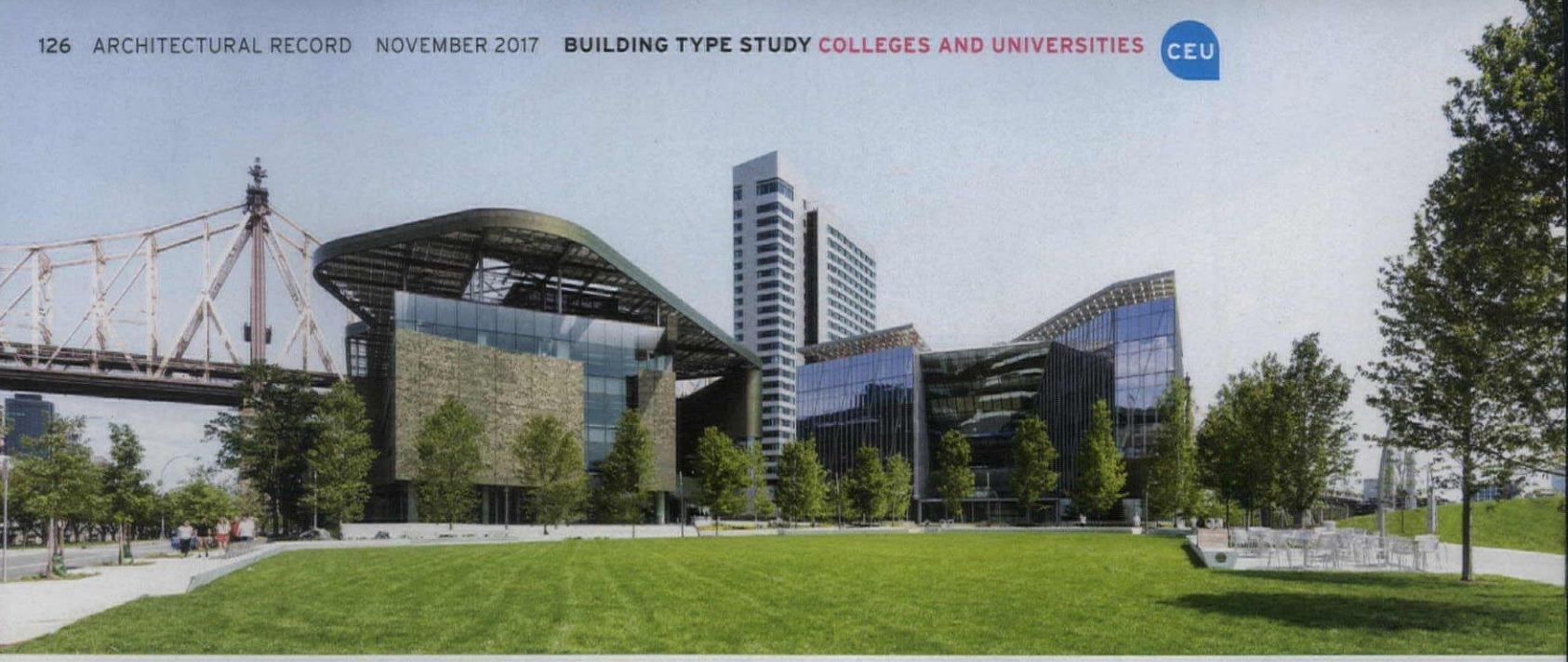
On an island in New York, Cornell Tech opens a high-tech campus that marries education and entrepreneurship.



Bloomberg Center by Morphosis

The Bridge by Weiss/Manfredi

The House by Handel Architects



The concept for what would become Cornell Tech—the new tech-focused graduate school on New York's Roosevelt Island—was born during the last recession. Former mayor Michael Bloomberg was behind the push to accelerate growth of the city's tech sector and make the economy less dependent on Wall Street and the financial-services industry. At the inauguration of the first phase of the campus in mid-September, Bloomberg summed up his sweeping vision. "The companies and innovations spawned by Cornell Tech graduates will . . . help our city compete with tech centers around the world, from Silicon Valley to Seoul."

This new institution, which offers graduate-level degrees in disciplines such as information science, electrical engineering, and connective media, and combines cutting-edge research and education with entrepreneurship, had, since 2012, been housed in Google's building in Manhattan. But now its 300 students and 30 faculty members have a home of their own, with three completed structures: an academic building by Morphosis Architects; a "co-location" facility by Weiss/Manfredi Architects that provides space for collaboration between academia and industry; and a residential tower by Handel Architects. More students, faculty, and buildings are coming, including a Snøhetta-designed hotel and executive-education center set for completion in 2019, and the possibility of a total of 2.1 million square feet of facilities on the 12-acre site by 2037. Ultimately, there could be more than 2,000 students enrolled.

The Bloomberg administration started this ambitious applied-sciences initiative in late 2010 by soliciting ideas and expressions of interest from leading universities, offering them the prospect of developing one of several city-owned sites, a 99-year lease on the land, and $100 million in seed funding. Ultimately, the New York Economic Development Corporation awarded the project to Cornell University and its partner, Technion-Israel Institute of Technology, and their proposal for Roosevelt Island. (Bloomberg's charitable foundation would later donate $100 million for the main academic building. The schools also raised more than $770 million from other private sources.)

Of course, having won the competition, they then faced the real challenge. The Cornell-Technion team had to tackle the hard work of developing a group of structures and a campus for a forward-looking curriculum that was not yet well defined, and one that would probably continue to evolve long after the first facilities were complete. The partners would need to grapple with other tough questions, such as what it means to build an urban campus on a two-mile-long narrow spit of land in the East River in an area that had once been home to a variety of institutions, including a penitentiary, an asylum, and a smallpox hospital. To make way for the campus, Goldwater Memorial Hospital, a late 1930s Modernist complex where chronic diseases were treated for more than 70 years, was razed.

SITE PLAN

0 200 FT. 60 M.

1 TECH WALK
2 CAMPUS PLAZA
3 LAWN
4 BLOOMBERG CENTER
5 HOTEL AND EDUCATION CENTER
6 CENTRAL UTILITY PLANT
7 THE HOUSE
8 THE BRIDGE
9 FUTURE BUILDING

To shape the campus layout, Cornell Tech turned to Skidmore, Owings & Merrill (SOM). The firm's master plan, which eschews the usual collegiate trappings of campus walls and gates, places a series of schematic volumes so that the buildings-to-come would define oblique view corridors of the Manhattan skyline and the Queens waterfront. A pedestrian route called Tech Walk threads through the site, helping to link the mostly residential neighborhood to the north of the site with Four Freedoms Park, the memorial to Franklin D. Roosevelt at the island's southern tip, designed by Louis Kahn (RECORD, October 2012, page 125).

The master plan also delineates open areas that permeate inward from the island's perimeter to form what Karen Tamir, a principal with the project's landscape architect, James Corner Field Operations,

PHOTO BY IWAN BAAN

refers to as "scoops" of public space. These outdoor rooms keep a sizable chunk of the site open and accessible to nearby residents, the Cornell Tech community, and visitors. Together with the circulation route, the amount of public space provided is considerably more than the 20 percent stipulated in Cornell Tech's agreement with the city, according to Colin Koop, a design director for SOM.

Relying on a project-delivery model that is emblematic of the new institution's blend of entrepreneurship and academia, the school selected developer-architect teams for the co-location building and the residential tower: Weiss/Manfredi was paired with Forest City Ratner, and Handel with the Hudson Companies and Related. As for the academic building, which Cornell Tech owns and operates, Morphosis was selected, according to former senior director for capital projects Andrew Winters, in part because the institution well knew the firm's ability to seamlessly integrate digital technology into its design process. (Morphosis designed the Bill & Melinda Gates Hall for the Faculty of Computing and Information Science for Cornell University's Ithaca, New York, campus in 2014 [RECORD, November 2014, page 100].)

As further expression of Cornell Tech's forward-looking values, it has incorporated crucial resilience and sustainability measures into its overall plan. Even before Hurricane Sandy hit New York in October 2012, the school decided to elevate all of the structures above the 500-year flood plane. To meet the building's front doors, the Tech Walk slopes up significantly, but almost imperceptibly, from the island's perimeter roadway. The individual buildings all have their own ambitious green goals, with the Bloomberg Center aiming for net zero energy, the co-location building on track for LEED Gold, and the residential tower slated to become the largest Passive House project in the world.

It is too soon to know if these performance and certification targets will be met. But Cornell Tech's success will also be measured by the answers to larger, and more philosophical, questions about the effectiveness of this unusual experiment in education, economic transformation, architecture, and urbanism. But with only a small portion of what is planned for the campus complete, it could take years or even decades to assess the full impact. At this point, the ensemble looks a bit like a potluck supper with a variety of dishes—some distinct, with exotic ingredients, some not. And they are clustered at the far end of the buffet table awaiting the rest of the meal. *Joann Gonchar, AIA*

ISLAND LIFE The campus plaza and Tech Walk (this page), between The Bridge (at left) and Bloomberg Center (at right), stem from a master plan by SOM for Cornell Tech's Roosevelt Island complex. So far, only three buildings (opposite) are complete.

IMAGES: © ALBERT VECERKA (RIGHT); FIELD CONDITION (OPPOSITE, TOP); COURTESY JAMES CORNER FIELD OPERATIONS (OPPOSITE, BOTTOM)

CORNELL TECH

Bloomberg Center

Morphosis Architects

By Suzanne Stephens

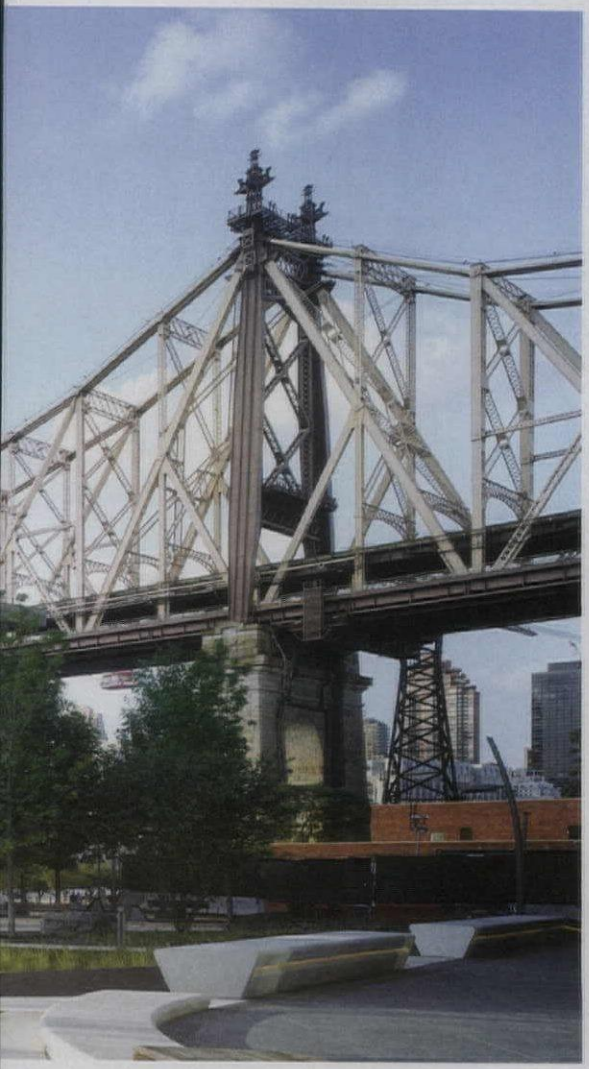
The first academic building at Cornell Tech, the Emma and Georgina Bloomberg Center, is a gleaming, bold statement on the new island campus for Cornell Tech, a partnership of Cornell University and Technion-Israel Institute of Technology. Its muscular, athletic stance, where a solar roof of 1,464 photovoltaic (PV) panels is boosted above four stories of teaching spaces, exultantly declares *we have arrived* about this adventurous step in bringing digital education and entrepreneurship together. Yet Thom Mayne, the design director and founder of Morphosis Architects, a Los Angeles– and New York–based firm, brushes off the implication that an arresting expression was intentional for this graduate computer-science and engineering facility. "I don't design icons," he says without irony—even though academic buildings by Morphosis such as Gates Hall at Cornell's Ithaca, New York, campus (RECORD, November 2014, page 100), or Emerson College in L.A. (RECORD, May 2014 page 100) do stand out forcefully from the crowd.

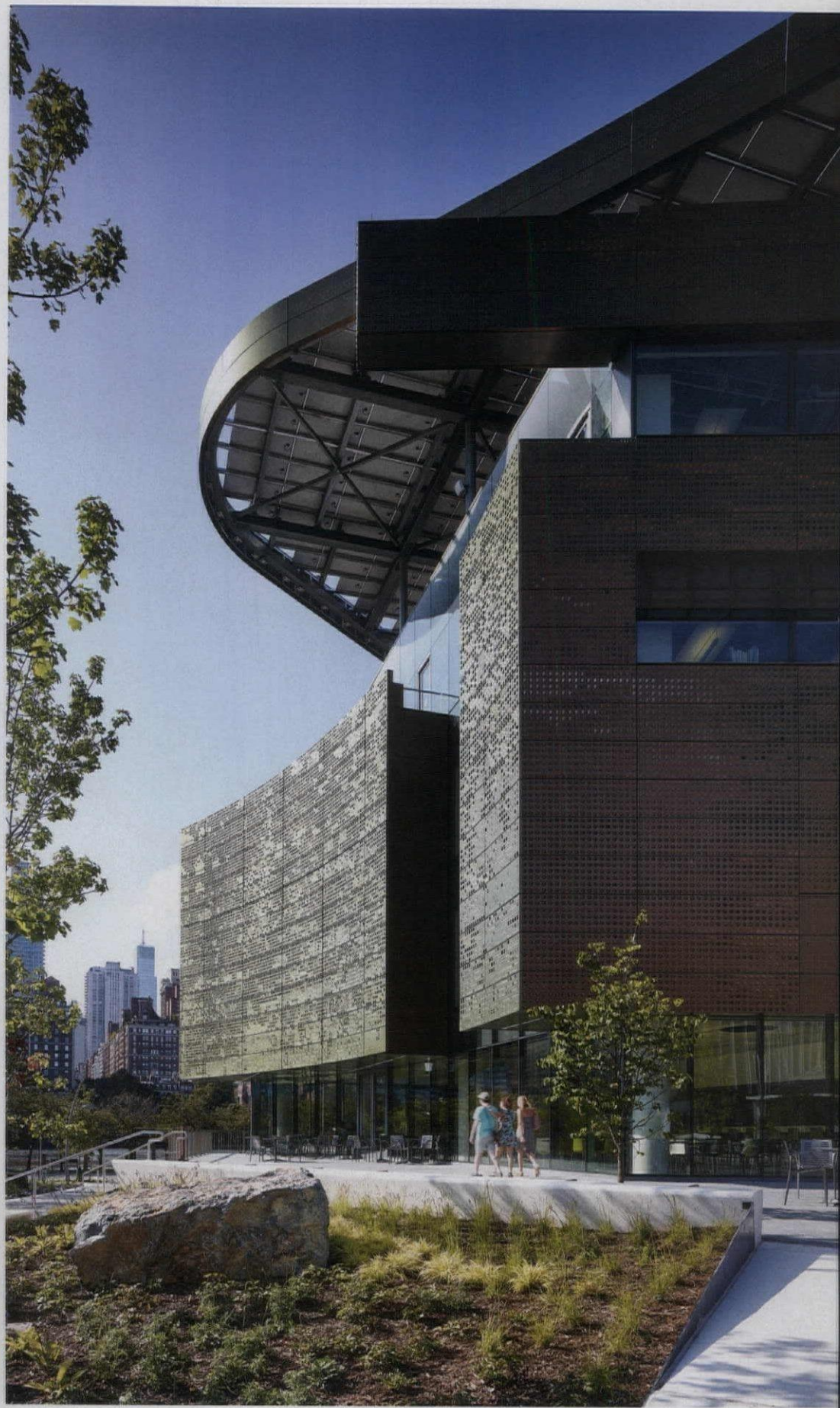
Mayne invokes sustainability—particularly the Bloomberg's lily pad canopy of PVs—as the foremost generator of his scheme. It is only the tip of the hat to an array of green features such as geothermal wells, and a rainwater-collection system for the all-electricity (no combustion) building. The overall desire is to attain net zero energy, with the building producing, over the course of a year, at least as much energy from renewable sources as it consumes. Morphosis originally envisioned a roof of PVs that would float across the pedestrian plaza and central circulation spine to The Bridge building by Weiss/Manfredi on the

FULL METAL JACKET The lily pad–shaped solar canopy, carrying photovoltaic panels, juts like a visor over the southern end of the Bloomberg Center (right). Morphosis has designed an aluminum rainscreen wall system (opposite), which maximizes insulation values and minimizes thermal bridging for the building. The hope is to achieve net zero status.

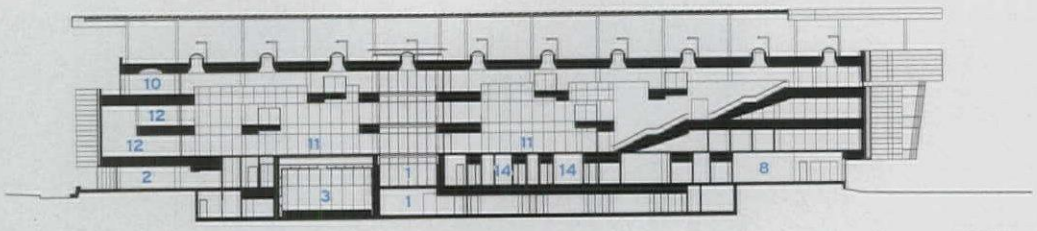
eastern side of the site (page 134) to provide enough energy to meet the goal. Ultimately the idea was scaled back so that each structure has its own solar canopy: the Bloomberg Center's is 40,000 square feet. Taken with The Bridge's, the two arrays create the equivalent of a 900-kilowatt system. Whether the center proves to be "zero" or only "lite" will be answered by future monitoring.

To cut energy consumption, however, Morphosis clad the Bloomberg Center in a rainscreen wall system that maximizes insulation values and minimizes thermal bridging. In addition, the outermost layer is punched with 2-inch circular tabs and coated in an iridescent polymer film. "We wanted a dynamic facade," says Ung-Joo Scott Lee, Morphosis principal. To get the full optical effect, the





PHOTOGRAPHY: © MATTHEW CARBONE



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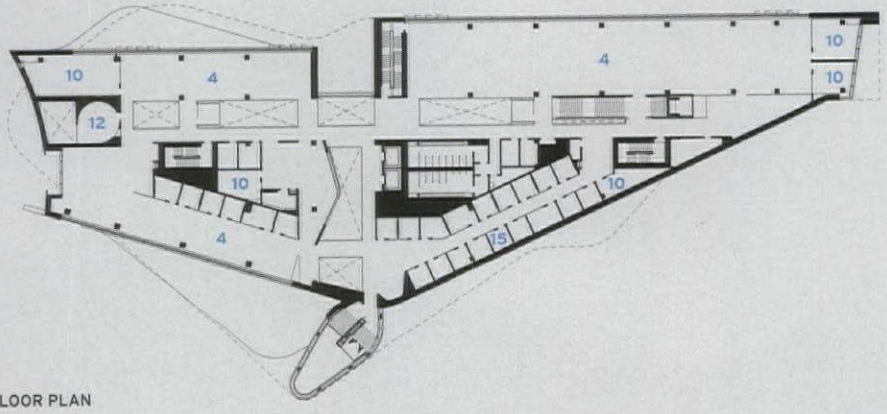
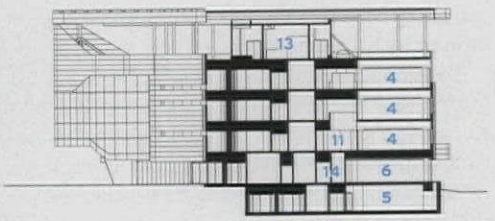
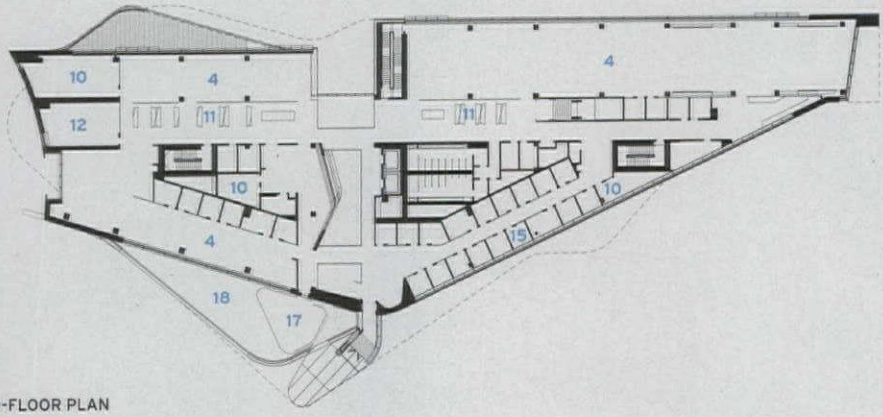


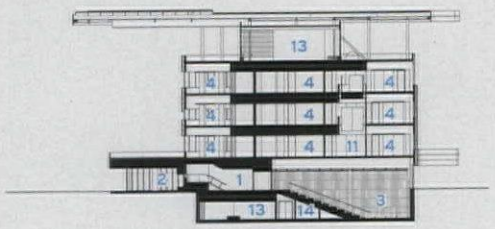
THIRD-FLOOR PLAN



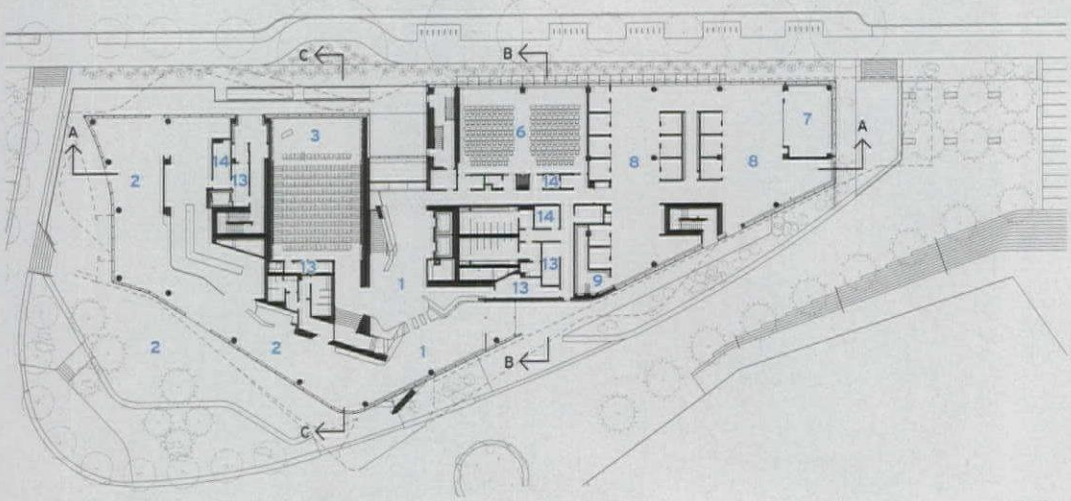
SECTION B - B



SECOND-FLOOR PLAN



SECTION C - C



GROUND-FLOOR PLAN

1 ENTRANCE LOBBY
2 CAFÉ
3 LECTURE HALL
4 OPEN OFFICE SPACE
5 SEMINAR ROOM
6 DIVISIBLE SEMINAR ROOM
7 QUIET ROOM
8 MASTERS STUDIO
9 LOCKER ROOM
10 CONFERENCE ROOM
11 READING LIBRARY
12 MULTIPURPOSE ROOM
13 MECHANICAL ROOM
14 STORAGE
15 HUDDLE ROOM

WELCOME TO OUR WORLD The café at the entrance to the Center is open to the general public. Highlighting the swerving counter and soffit is an expansive artwork by Michael Riedel. Titled *Cornell Tech Mag*, the piece is a black-and-white inkjet print on acoustical ceiling panels and is also silkscreened on the café's tabletops.

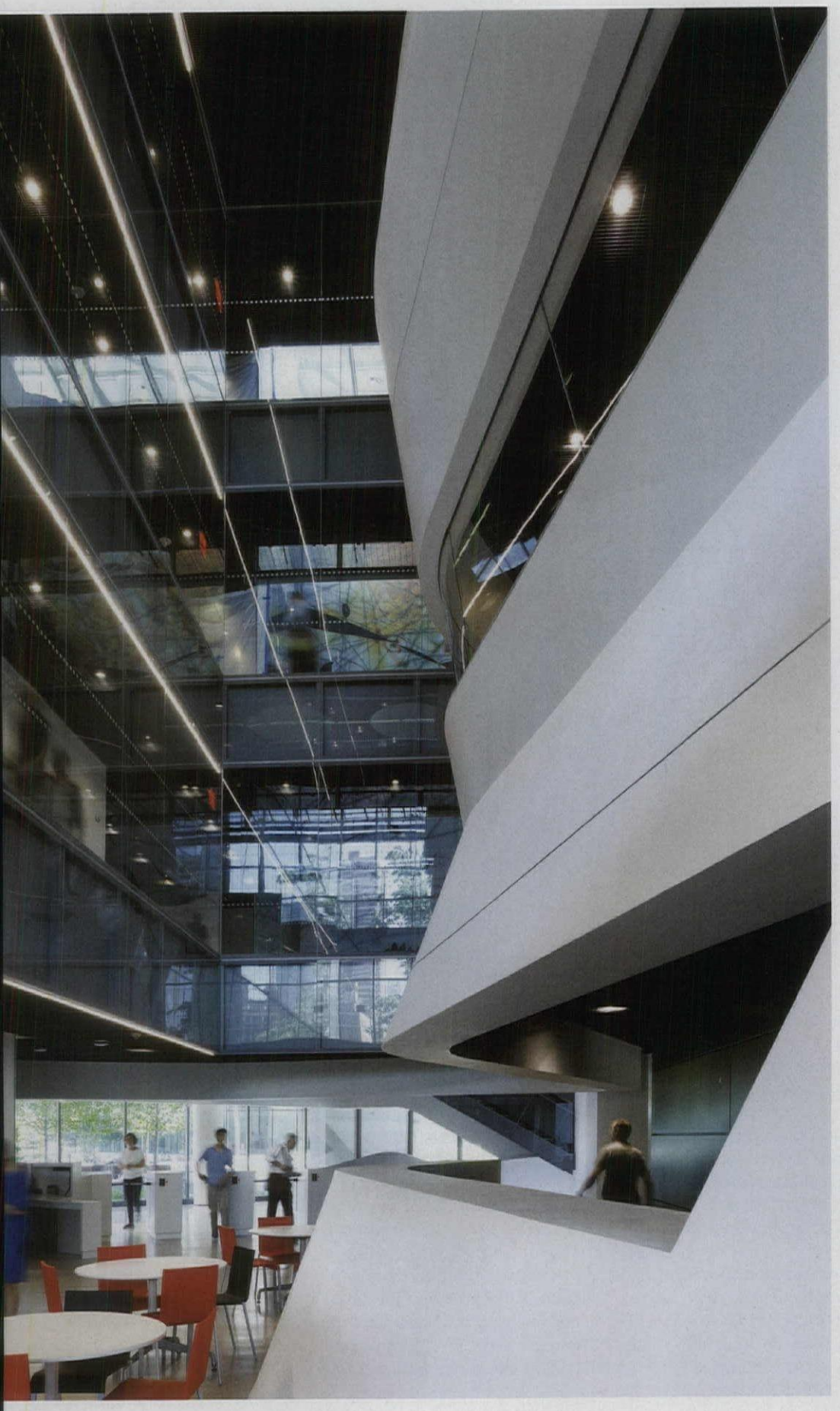
architects worked with Zahner, the architectural-metal fabricator, and received digital input from Cornell and MIT students.

The iridescent, sparkling exterior skin is cut away so that bands of glazing do admit light to an array of educational spaces but maintain the recommended 60:40 ratio of wall surface to glass. Open classrooms are located on the western side of the building, facing Manhattan, and 76 small "huddle" rooms, where three or four people can meet, are on the east, oriented toward Queens. The huddle rooms evolved out of the desire by Daniel Huttenlocher, Cornell Tech dean and vice provost, to encourage an improvisatory exchange of ideas among the students and faculty. Whether these remain unassigned spaces or are appropriated by faculty members is unclear.

To ensure a fluidity of space that might spark spontaneous interaction, Morphosis placed a four-story atrium (five-story along the west) at the center of the building, anchored by an expansive stairway. At the second level, ancillary stairs take over the circulation. One veers into a curved appendage that protrudes outside the main volume of the building; its steel structure helps prop up the solar-canopy roof, which otherwise depends on the extension of the Center's steel columnar grid for support.

The atrium's curvilinear walls, plus a stair's glass enclosure, along with artist Matthew Ritchie's resin, glass, and ink, 80-foot-high mural create an active core for the Center. In addition, a long galleria cut north–south through three stories of the western portion of the building offers another opportunity for casual encounter. Here five glass boxes for collaboration appear to float high in the void. (They are actually cantilevered from the steel frame.) Although the interior is more crepuscular than The Bridge across the plaza, skylights introduce illumination, while the white solid surfaces of the lockers on the second floor and polished concrete floors help bounce light.

The café, at the main entrance facing the plaza and Tech Walk, is open to the public. Its swooping, white, serpentine counter and the lowered ceiling soffit are handsomely offset by an inkjet artwork by Michael Riedel printed on the acoustical panels of the ceiling and silkscreened on the café tabletops. Adding an unusual note, a series of "discovery rooms" contain art installations by Alison Elizabeth Taylor and Matthew Day Jackson. But the most surprising one has a striking 50-foot-long mural by Ilya Bolotowski from 1941 that was painted for the WPA program and salvaged from the Goldwater Memorial Hospital formerly on the site. (Another mural from Goldwater by Albert Swinden has found a home in The Bridge.)



If art seems unusual for a high-tech school, so are the grassy terraces, the variegated plantings, and the contoured lawns by James Corner Field Operations. They unite the exterior spaces around the Center with its neighbors, creating numerous places for socializing in good weather. With its glinting skin that turns different colors in the sunlight, the Bloomberg Center is a strong and welcome presence for the approximately 300 master's and Ph.D. students and 30 faculty members now using it. In deference to the architect, let's not call it an icon. But it helps that a by-product of functional and environmental concerns is a magnetic work of architecture. ■

credits

ARCHITECT: Morphosis Architects – Thom Mayne, design director; Ung-Joo Scott Lee, principal; Edmund Ming-Yip Kwong, Jerry Figurski, Debbie Chen, Stuart Franks, Farah Harake, Cory Brugger, team

ENGINEER: Arup (structural, m/e/p)

CONSULTANTS: Arup (facade, lighting, acoustic, fire, audiovisual, BMS controls, sustainability); Mueser Rutledge Consulting (geotechnical); Pentagram (graphic)

CLIENT AND OWNER: Cornell University

SIZE: 160,000 square feet

COST: withheld

COMPLETION DATE: July 2017

SOURCES

STRUCTURAL STEEL: Beauce Atlas

PV STEEL SUPPORT: Koenig

METAL CLADDING: Zahner

MISCELLANEOUS METAL: Crystal Metal Works

UNITIZED FACADE/RAINSCREEN: Island Exterior Fabricators

EXTERIOR GLAZING: W&W Glass

CURTAIN WALL/METAL WINDOWS: YKK

FLAT AND CURVED IGU: Cristacurva

BUILT-UP ROOFING: Sarnafil/Sikesland

TILE: Sarnatherm Heavyguard

INTERIOR GLAZING: Infinite Glass and Metal

SKYLIGHTS: LineEl

DOME SKYLIGHTS: Wasco

ACOUSTICAL CEILINGS: Lindner, Baswaphon, Armstrong

PAINTS AND STAINS: Benjamin Moore, Idea Paint

SOLID SURFACING: Dupont Corian

SPECIAL FINISHES: 3Form Varia Eco Resin Wall Paneling

INTERIOR SHADES: Mechoshade

GYPSUM PREFABRICATED PRODUCTS: Plasterform

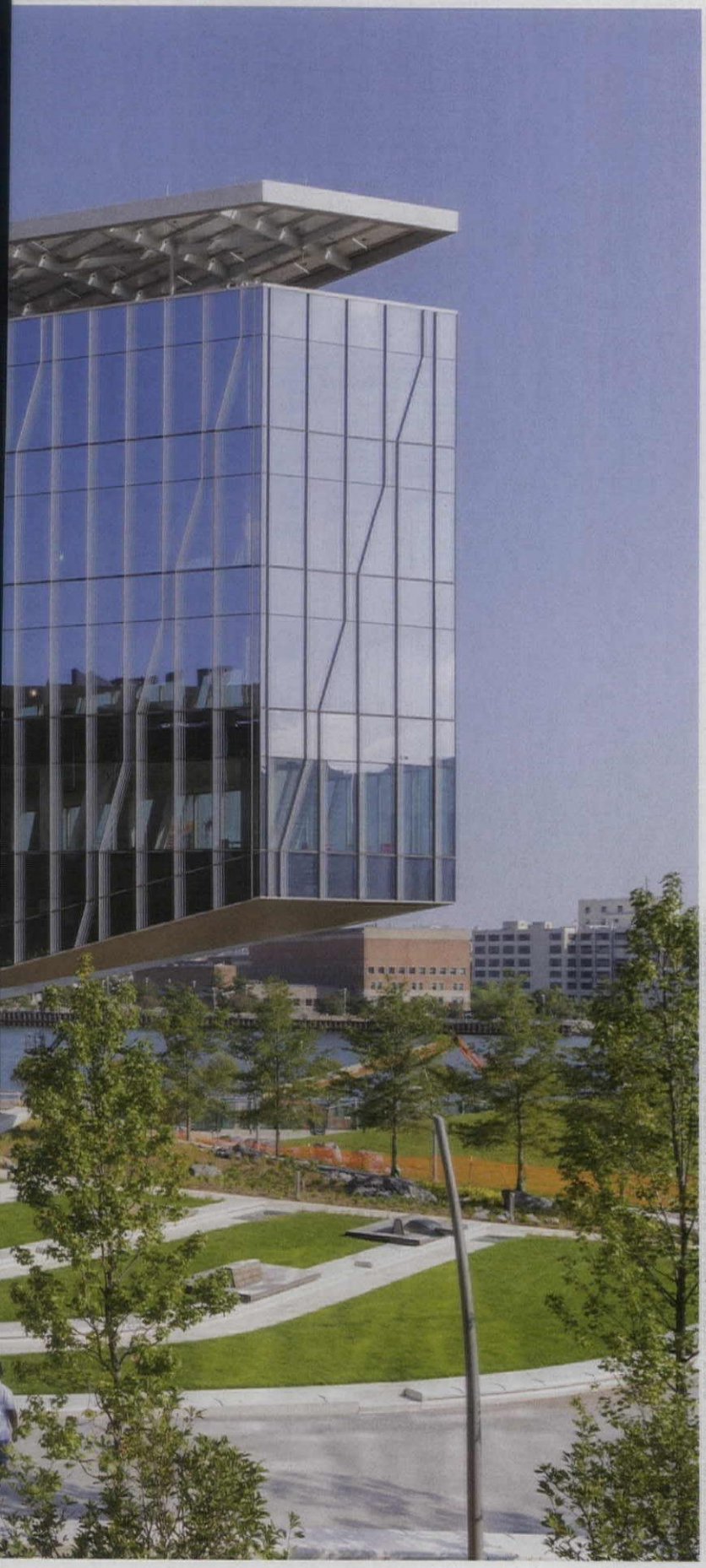
OFFICE FURNITURE: Teknion, Herman Miller, Vitra, Wilkhahn, Andreu World, Allermuir

INTERIOR AMBIENT LIGHTING: Lucifer Lighting, HE Williams, Linear Lighting

PHOTOVOLTAIC PANELS: Solaria

PHOTOVOLTAIC SYSTEM: Entresolar

INTO THE VOID
A long, three-story-high galleria (this page) extends along the western portion of the Center. Here glass boxes on the third and fourth levels seem to float in the space, overlooking the locker pavilions adjoining reading tables below. At the entrance, a four-story part of the atrium (opposite) is given drama by the curving balustrades and bowed walls.



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CORNELL TECH

The Bridge

Weiss/Manfredi

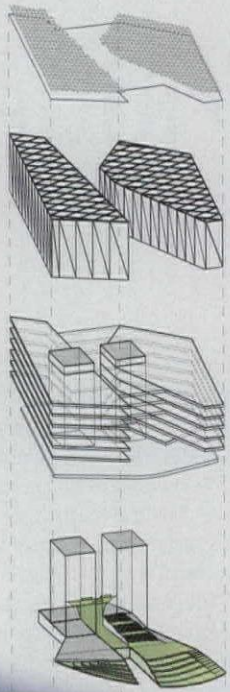
By Suzanne Stephens

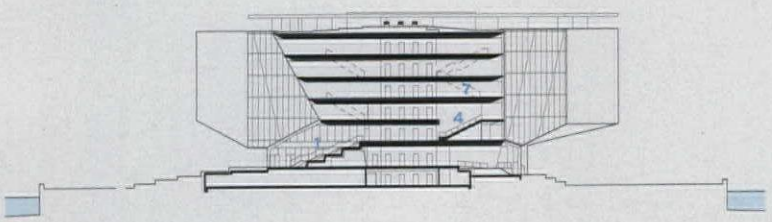
In designing The Bridge for the new Cornell Tech campus in New York, Weiss/Manfredi faced several architectural challenges. As part of the first phase of creating this engineering and computer-science complex for Cornell University and Technion-Israel Institute of Technology, the project was one of three new buildings on Roosevelt Island in the East River. Accordingly, it needed to strongly express its identity. At the same time, it had to acknowledge its neighbors: Morphosis's prominently placed four-story Bloomberg Center across the way (page 128) and Handel Architect's The House, a 26-story academic residence just to the north (page 140).

But perhaps the most challenging was the relatively untried program—a co-location space. Here in a 235,000-square-foot building, graduate students would be encouraged to mingle with entrepreneurs to generate start-ups. One-third of the space would be filled with students, while two-thirds would accommodate workplaces for tech businesses. The developer, Forest City Ratner Companies (FCR), actually owns the facility, leasing space both to the school and to tech-related companies.

Yet there was no "co-location" building typology on which the architects could model a design: "The new program was both liberating and terrifying," says principal Michael Manfredi. FCR had invited Weiss/Manfredi to submit an RFQ based on the firm's past institutional work,

LIGHT LIFT The cantilevered wings of The Bridge frame views for those passing by on the main promenade; landscaping by James Corner Field Operations softens the building's base. Fritted-glass strips activate the facades, while solar canopies and terraces do the same for the roof.





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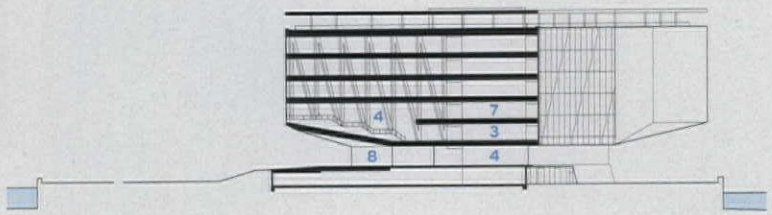

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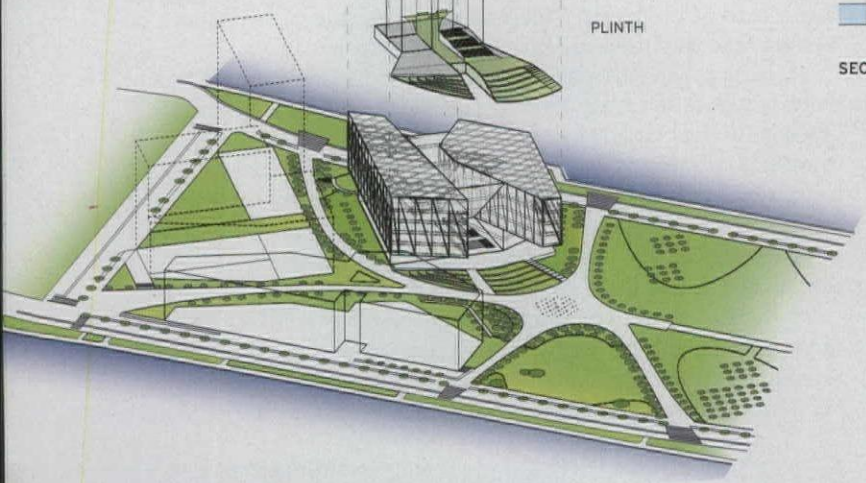
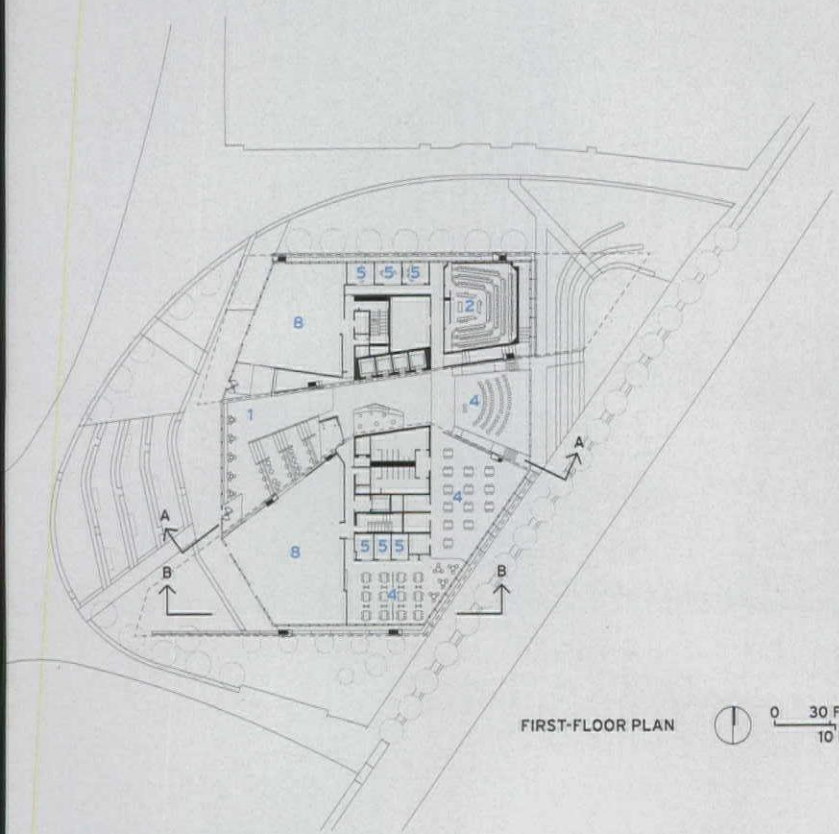


SECOND-FLOOR PLAN



FIRST-FLOOR PLAN

0 30 FT.
10 M.

1 ENTRANCE LOBBY
2 CLASSROOM
3 LAB
4 STUDIO
5 HUDDLE ROOM
6 CONFERENCE ROOM
7 OFFICE
8 CAFÉ/RETAIL

WALK RIGHT IN An expansive stadium stair (above) fills the lobby, interrupted with interior landings that complement the landscaped terraces outdoors. Another stair (right) links the second and third levels of floors on the east side of the building, where views of the Queensboro Bridge dominate.

particularly the nanotechnology center at the University of Pennsylvania (RECORD, November 2013, page 140) and the architecture and arts building for Barnard College (2010).

To create an open, flexible environment where students and entrepreneurs could spontaneously interact, Weiss/Manfredi split a rhomboid-like block into two prisms divided by an atrium and generous circulation space. The fissure "is our biggest single move," says principal Marion Weiss about the parti: "We cut through the middle of the block on an east–west axis that takes in river-to-river views." Loft spaces and an "inefficient core," as Weiss refers to this expansive atrium, could foster unexpected encounters. Cornell Tech occupies the first and second floors and part of the third, while the rest of the six levels are leased to business groups such as Two Sigma, an investment firm involved in tech activities,

as well as Citicorp's securities division, and Microsoft.

The mostly steel structure rests on a poured concrete base (clad in precast concrete panels where exposed), which is raised 7 feet above the elevation recommended for severe flooding. The Bridge's entrance opens onto an expansive pedestrian plaza with cascading grassy terraces designed by James Corner Field Operations. Two wings, which dramatically cantilever in northeast and southwest directions, lift off the ground to shelter outdoor spaces for classes and sitting areas. More important, the space under the cantilevers allows unobstructed views—of the East River on both sides, and cityscapes of Manhattan and Queens.

The entrance to The Bridge draws passersby into the almost column-free lobby. Here café tables and a broad stadium stair, interspersed with three expansive interior terraces, offer ample opportunities for impromptu schmoozing, studying, or discussion. Sectional cuts through the atrium provide glimpses of both upper and lower levels, and glazed perimeter walls of each polyhedral wing amplify the opportunity for different kinds of light and glimpses of the water and urban shoreline.

IN THE PROW In the second-level studio space (above, at left), which follows the lift of the cantilevered wing, tenants can work or confer in a variety of settings. A 1942 WPA mural by Albert Swinden from the razed Goldwater Memorial Hospital is installed on the inner wall (above, at right).

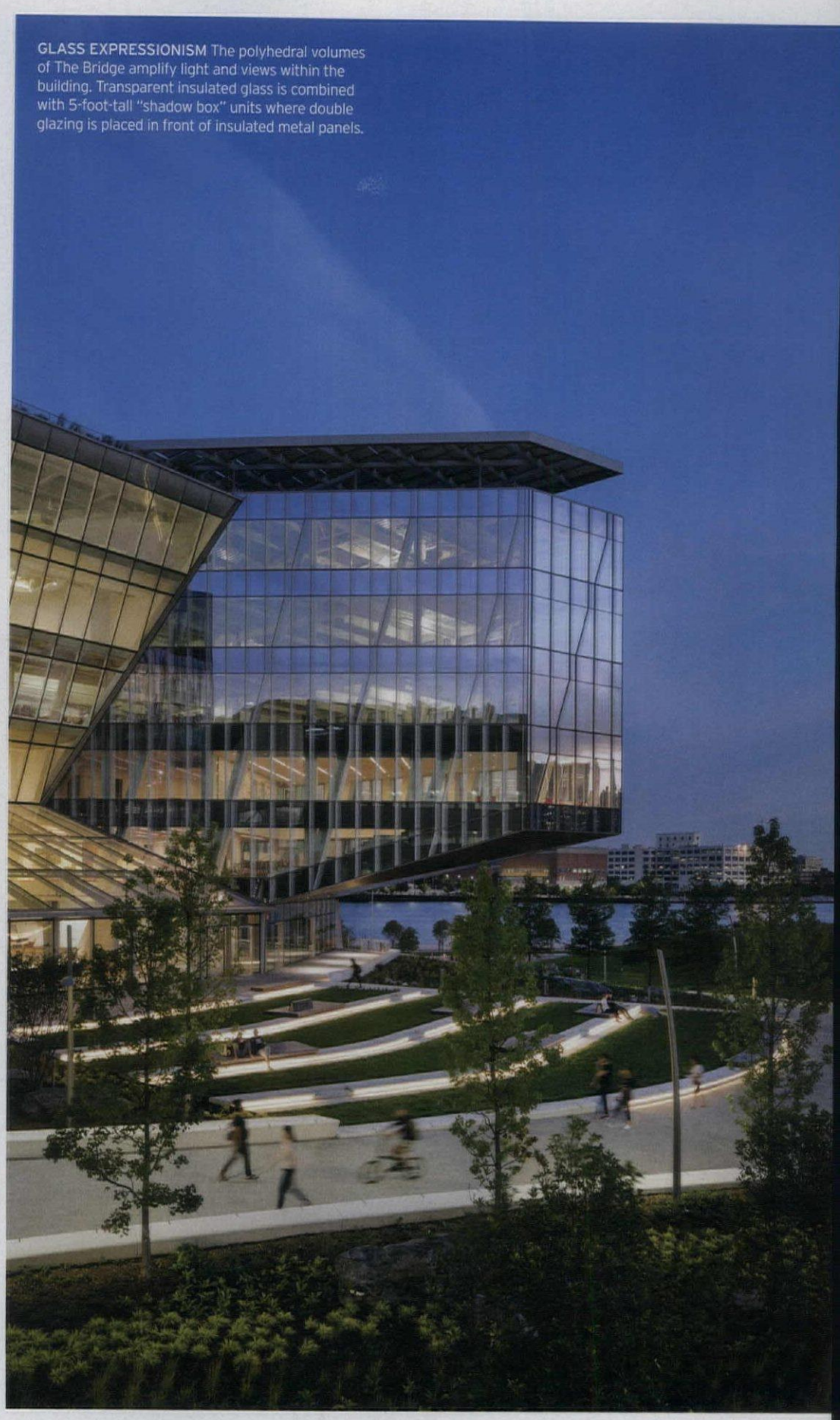
Since the energy-code requirements called for a 60:40 ratio of wall to window, the glass-skinned Bridge might seem to not comply. However, Weiss/Manfredi combined thermally efficient, transparent insulated glass with 5-foot-tall "shadow box" units, where double-glazing is placed 3 inches in front of insulated gray metal panels. Reflective coatings give the impression of a continuous surface of glass and reduce heat gain and glare, while diagonal fritted-glass strips, zigzagging across the facades, further mitigate the solar load and add an active pattern to the vitreous surfaces.

The architects planned the spaces so that 75 percent of the learning, working, and socializing areas are within 30 feet of the windows, keeping the need for electric light lower than normal. Another energy savings comes from the 761 photovoltaic (pv) panels in the 24,000-square-foot array on the rooftop canopy. Although the electricity generated by those pvs goes toward the neighboring Bloomberg

Center's net zero goal, the canopy itself shades outdoor terraces overlooking mesmerizing, panoramic views of the East River and the New York skyline.

The gigantic full-height elevated trusses that support the cantilevers hardly look economical. But the architects argue that they make the structure 40 percent lighter than a typical steel frame and cut down the need for more interior columns. The lavish use of gypsum board to cover the trusses does diminish the drama a bit, even if its white color keeps the light level high.

Gauging the success in how The Bridge does (or doesn't) meet its goals—in terms of encouraging interaction and creativity between students and businesspeople, not to mention energy efficiency—should be instructive and fascinating to follow as it reaches its full occupancy in the coming months. Already, the building is on track for achieving LEED Gold status and is a remarkable addition to the ensemble: its geodic features, gleaming glass, and dramatic cantilevers exhibit a frank optimism about Cornell Tech's educational significance and its own contribution to the ensemble. Its crystalline surfaces stand out from the metal-paneled The House hovering behind it. And, while The Bridge is lighter, if sharper-edged, than the brawnier Bloomberg Center by Morphosis, it complements the dynamism of its neighbor with its own shimmering, bravura statement. ■



GLASS EXPRESSIONISM The polyhedral volumes of The Bridge amplify light and views within the building. Transparent insulated glass is combined with 5-foot-tall "shadow box" units where double glazing is placed in front of insulated metal panels.

credits

ARCHITECT: Weiss/Manfredi Architecture/Landscape/Urbanism – Marion Weiss, Michael Manfredi, design partners; Mike Harshman, project manager; Joe Vessell, Pierre Hoppenot, project architects

ENGINEERS: Thornton Tomasetti (structural); Jaros, Baum & Bolles (m/e/p/fp)

CONSULTANTS: Heintges (glazing); Renfro Design Group (lighting); Arup (acoustics); Arup, Jaros, Baum & Bolles (AVIT and security)

OWNER: Forest City Ratner

CLIENT: Forest City Ratner and Cornell Tech

SIZE: 235,000 square feet

COST: withheld

COMPLETION DATE: September 2017

SOURCES

METAL/GLASS CURTAIN WALL: W&W Glass; Erie Architectural Products

METAL PANELS: Jobin Organization; Sobotec

GLASS: Interpane, Viracon

ACOUSTICAL PLASTER CEILING: Baswa Acoustic, Sonakrete

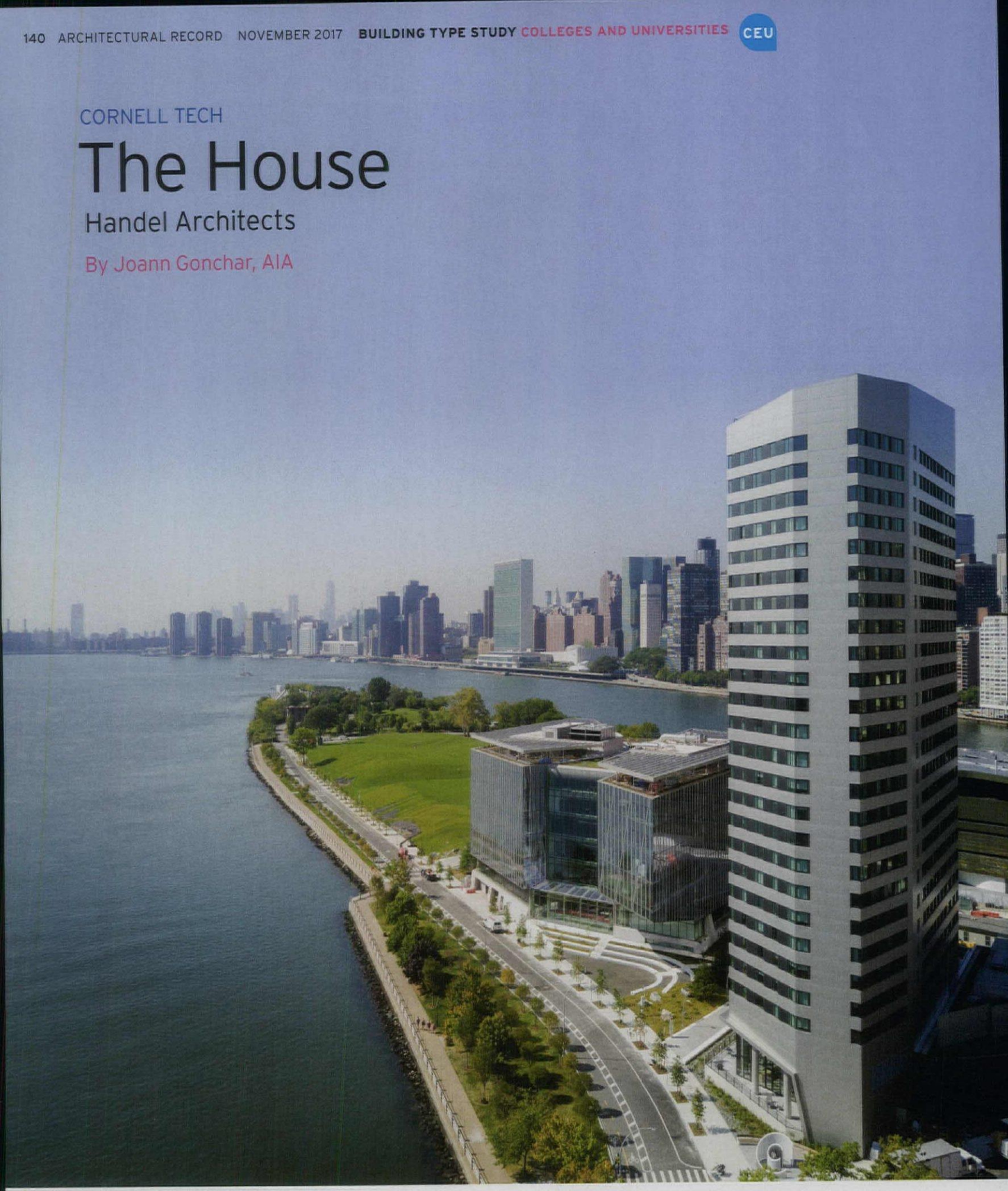
CLASSROOM/STUDIO FURNITURE: Herman Miller

CORNELL TECH

The House

Handel Architects

By Joann Gonchar, AIA



Not every structure should shout for attention: there's nothing wrong with a well-designed background building. Handel Architects' latest project, The House at Cornell Tech, a $115 million residential tower on the new computer, information, and engineering-sciences campus on New York's Roosevelt Island, could have been a fine example of this notion. Heralded for its pioneering energy-conserving strategies, its form—a shaft extruded from a roughly rectangular footprint—is straightforward, if plain. Its windows are slightly inset, giving the facade's alternating bands of light and dark gray metal some depth. And this skin has other subtle refinements, including its expression as a wrapper, with a louvered vertical "reveal" that extends from the entrance almost to the roof.

There's one problem, however: The House is too tall and too prominent for such a simple response. It sits at the northern end of the 12-acre campus, which could eventually include up to 2.1 million square feet of facilities, and it rises next to the picturesque trusswork of the Queensboro Bridge. The 26-story-tall, 273,000-square-foot building is highly visible from the Manhattan and Queens riverfronts, part of an ensemble with the far more sculptural—and low-rise—Cornell Tech facilities built so far: Morphosis's four-story academic building (page 128) and Weiss/Manfredi's six-story "co-location" building (page 134). It is also significantly taller than the 17-story Snøhetta-designed hotel and executive education center under construction just to the west. Because of its height and placement it dominates its neighbors, but looks flat-footed in their company.

If The House is a missed opportunity for formal invention, it still represents a milestone for green multifamily development. As Handel partner Blake Middleton points out, the 352-unit apartment building for graduate students and faculty is expected to save 882 tons of CO_2 per year, the equivalent of planting 5,300 trees. It is designed according to the principles of Passive House—an ultra-low-energy certification system for all building types, not just residential construction.

As part of its aspiration to create a state-of-the-art campus, Cornell included the Passive House goal in its request for proposals issued in 2012. But the developers—the Hudson Companies and Related—were under no contractual obligation to pursue it. Nevertheless, the team embraced this vision and expects official notice of certification shortly. This would make it the tallest and largest Passive House to date anywhere in the world. That is no small achievement.

The main tenets of the program, known as "Passivhaus" in Germany, where it originated, include proper solar orientation; an extra-insulated, airtight building envelope that avoids thermal bridging; high-performance windows; and mechanical ventilation with heat recovery. Handel and its consultants designed to an energy budget that allowed no more than 4.75 kBtu/ft² be expended for heating and 5.39 kBtu/ft² for cooling each year and permitted a total energy use intensity (EUI) of no more than 38.1 per year. This figure represents a 73 percent reduction over the median EUI for New York buildings of similar type and size.

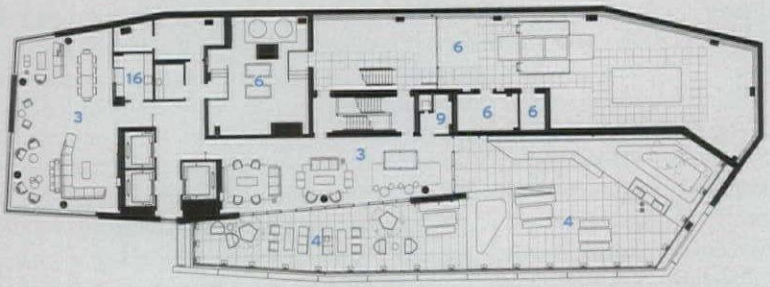
The qualities that contribute to these sustainable targets are mostly invisible. The interior looks more like a sleek extended-stay business hotel than an ubergreen dorm. Amenities include a gym and a rooftop lounge with a terrace and grilling area. A ground-floor lounge and coffee bar, which contrasts the exposed concrete structure and terrazzo floors with warmer wood accents, is light-filled and looks out onto the East River and the landscaped campus. The apartments, which range in size from micro studios to three bedrooms, have features like full kitchens with engineered-stone counters. Although glass makes up less than 25 percent of the facade area (a key conservation strategy), the units feel bright, and many offer stunning views of the Manhattan skyline.

Surprisingly, those involved with the project say that designing a very large Passive House is not necessarily more difficult than one at a smaller scale, such as a single-family residence. From a building-envelope perspective, a larger structure can be easier due to its low surface-to-volume ratio, says Lois Arena, the director of Passive House services at Steven Winter Associates. The density of occupancy means there are more internal heat gains, allowing for a reduced amount of insulation than might otherwise be needed to meet the standard's stringent energy requirements.

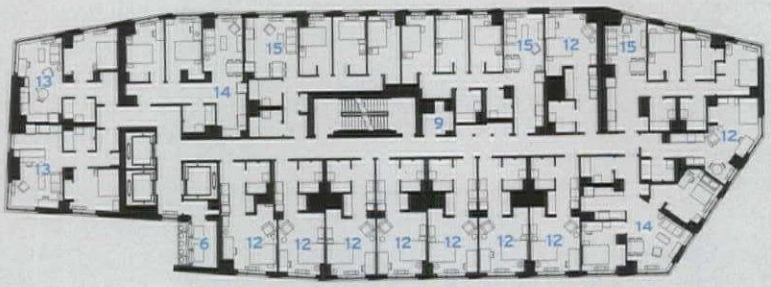
But despite these advantages, the exterior envelope still needed a

STANDING TALL The House (opposite), a 26-story residential tower, is slated to become the tallest and largest Passive House building in the world. Its superinsulated metal skin is expressed as a wrapper, with a vertical louvered reveal (above) that encloses mechanical equipment and extends from the entrance almost to the roof.

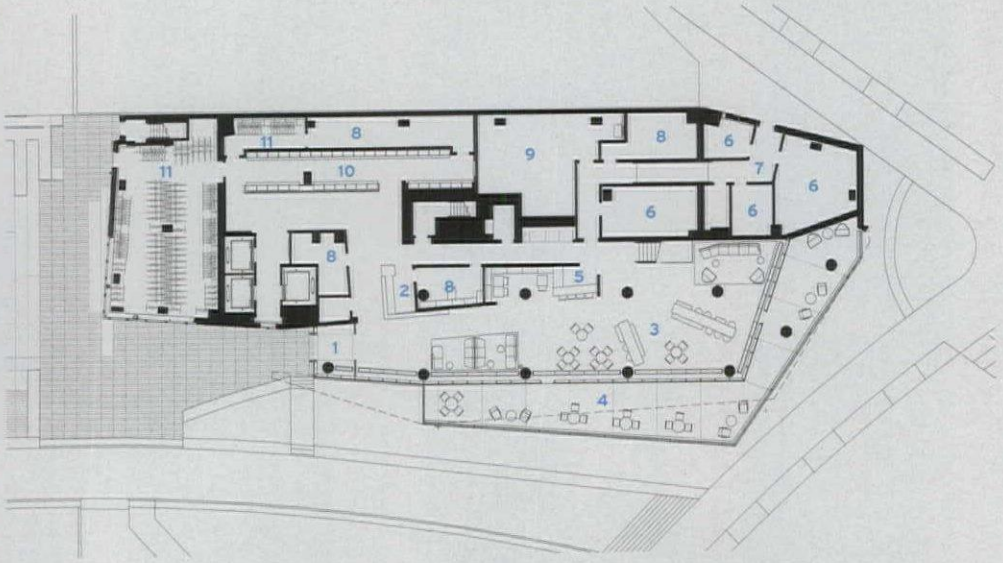
PHOTOGRAPHY: © FIELD CONDITION, EXCEPT AS NOTED; PAVEL BENDOV (OPPOSITE)



ROOF PLAN



TYPICAL-FLOOR PLAN



GROUND-FLOOR PLAN

0 16 FT. 5 M.

1 ENTRY
2 RECEPTION
3 LOUNGE
4 TERRACE
5 COFFEE BAR
6 MECHANICAL
7 SERVICE ACCESS
8 STORAGE
9 TRASH ROOM
10 MAIL ROOM
11 BIKE ROOM
12 STUDIO
13 ONE-BEDROOM
14 TWO-BEDROOM
15 THREE-BEDROOM
16 PANTRY

unique approach. "There is just a tremendous amount of area to cover with high-performance materials and details," says Deborah Moelis, a Handel senior associate. These materials and details included a custom exterior-wall system prefabricated in a Pennsylvania factory in 9-foot-tall by 36-foot-long sections. The panels arrived at the site complete with air and vapor barriers, mineral wool insulation, and the triple-glazed, operable windows already installed. The strategy helped speed construction but also improved quality by minimizing the number of joints that had to be sealed in the field. This in turn contributed to the building's airtight properties, which were confirmed with a post-construction blower door test required for certification. According to Arena, the building passed with flying colors, with infiltration 75 percent below the Passive House limit of 0.6 air changes per hour at 50 pascals of pressure. "We smashed it," she says.

The design of the mechanical system was also tricky, since equipment appropriate for Passive House buildings of this size was difficult to find. The team devised a customized central ventilation system, with two energy-recovery ventilators (ERVs) on the roof supplying tempered fresh air to the apartments. For heating and cooling, they opted for a low-energy variable refrigerant flow (VRF) system with individual evaporators in each living room and bedroom. These wall units are tied to condensers located on small balconies on each floor, hidden behind the vertical louvered reveal. But the evaporators have

credits

ARCHITECT: Handel Architects – Gary Handel, Blake Middleton, Deborah Moelis, Ryan Lobello, project team

CONSULTANTS: BuroHappold Engineering (structural, m/e/p/fp, lighting); Steven Winter Associates (Passive House, accessibility); Vidaris (exterior wall); Future Green Studio (landscape)

GENERAL CONTRACTOR: Monadnock Construction

CLIENT: Hudson Companies and Related

SIZE: 273,000 square feet

COST: $115 million

COMPLETION DATE: September 2017

SOURCES

METAL WALL PANELS: Eastern Exterior Wall Systems

CURTAIN WALL: Oldcastle BuildingEnvelope

MOISTURE BARRIER: Intesana

INSULATION: Roxul

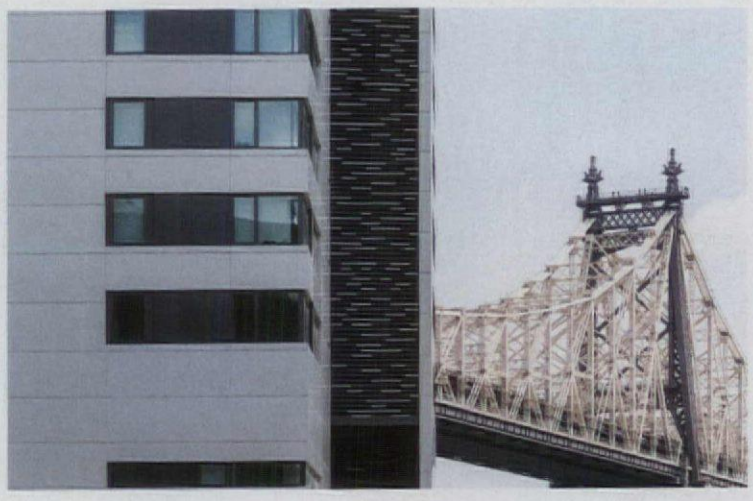
WINDOWS: Shüco

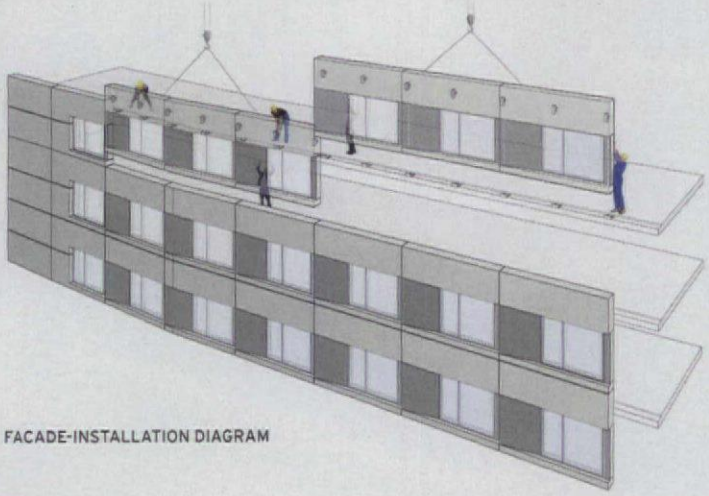
VRF SYSTEM: Mitsubishi

ERV SYSTEM: Daikin

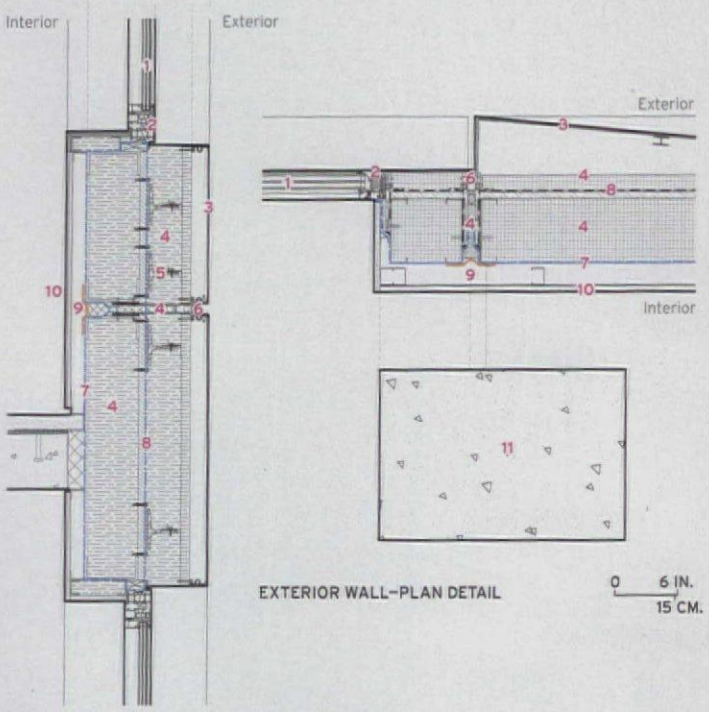
CREATURE COMFORTS The building's amenities include a lounge and coffee bar (above) in the lobby. The space offers views of the East River and the campus and combines exposed concrete structure and warmer wood accents. The apartments, such as a studio (right), have ample daylight, even though the skin is only 23 percent glass.

ZIPPED UP
To speed construction and reduce the number of joints that would need to be sealed on-site, the facade panels (right and below) were fabricated in-factory and delivered to the site in 9-foot-tall, 36-foot-long sections with insulation, air, and vapor barriers, and triple-glazed windows already installed.





FACADE-INSTALLATION DIAGRAM



EXTERIOR WALL–PLAN DETAIL

EXTERIOR WALL–SECTION DETAIL

1 HIGH-PERFORMANCE GLAZING
2 THERMALLY BROKEN ALUMINUM WINDOW FRAME
3 RAINSCREEN METAL CLADDING
4 MINERAL WOOL INSULATION
5 THERMALLY BROKEN SUPPORT CLIP
6 PANEL JOINT
7 CONTINUOUS VAPOR RETARDER
8 CONTINUOUS AIR/WATER BARRIER OVER EXTERIOR SHEATHING
9 SITE-INSTALLED VAPOR-PERMEABLE TAPE
10 DRYWALL
11 CONCRETE COLUMN

about twice the capacity that consultants from BuroHappold Engineering determined was necessary, simply because smaller units were not available.

Hudson and Related paid a premium for Passive House construction and are said to be crunching the numbers to figure out exactly how much. "It depends on what you select as your baseline," Arena explains. "For a developer that usually builds to LEED Gold, the premium isn't that big." Sources expect that the cost will come down as demand grows and more suitable products and equipment become available.

And demand does seem to be growing: Handel and Steven Winter Associates are working on several Passive House projects, including one that will be even larger than The House—a mixed-use complex for New York's East Harlem neighborhood, with 655 affordable rental apartments. The two firms are also collaborating on an 18-story office building in Boston that will be designed according to Passive House principles. These projects will be a good thing for those cities and the planet—and even better if designers can demonstrate that "Passive House" need not be synonymous with plain vanilla. ■

Continuing Education

To earn one AIA learning unit (LU), including one hour of health, safety, and welfare (HSW) credit, read the entire Cornell Tech section (pages 124 through 144), review any supplemental material found at architecturalrecord.com, and complete the quiz at continuingeducation.bnpmedia.com or by using the Architectural Record CE Center app available in the iTunes Store. Upon passing the test, you will receive a certificate of completion, and your credit will be automatically reported to the AIA. Additional information regarding credit-reporting and continuing-education requirements can be found at continuingeducation.bnpmedia.com.

Learning Objectives

1 Discuss how the strategies for energy and water conservation and resilience are deployed at the new Cornell Tech campus.

2 Define the term "net zero energy."

3 Explain the principles of Passive House and outline its certification requirements.

4 Describe some of the design and construction challenges faced by the team behind The House residential tower, slated to be the largest Passive House building in the world.

AIA/CES Course #K1711A

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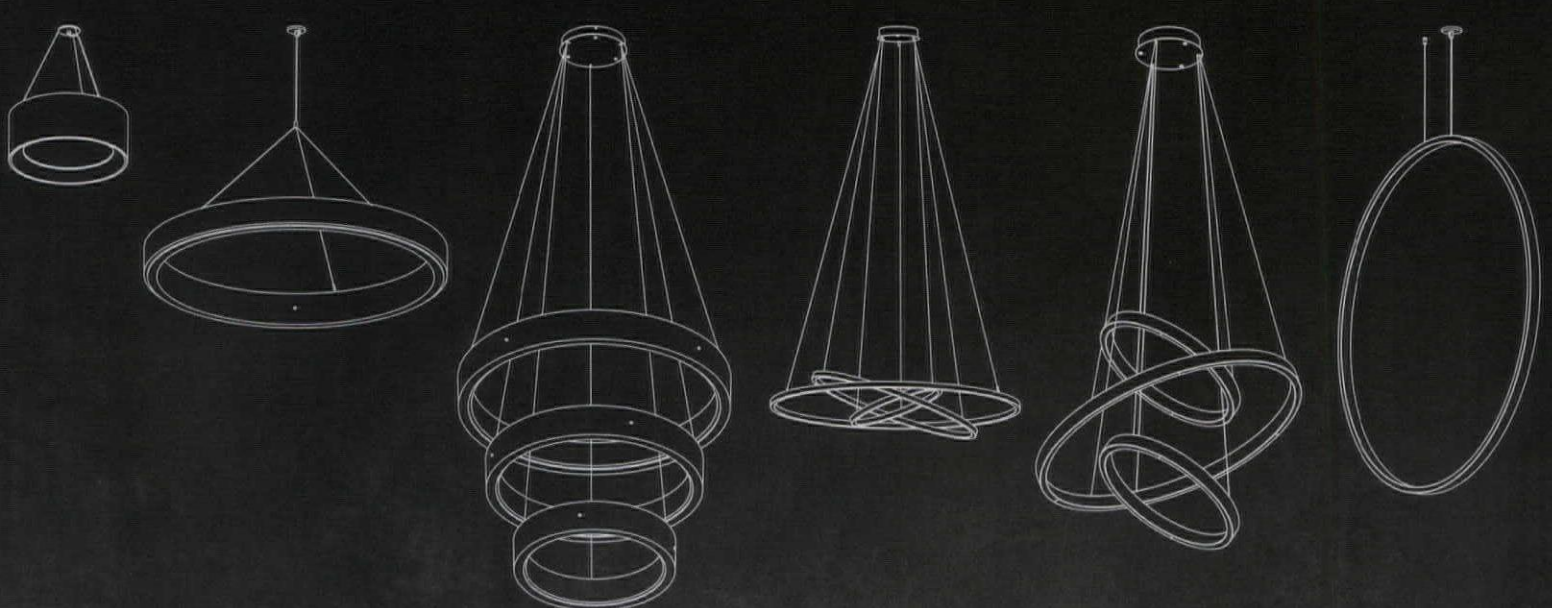

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Moelis Family Grand Reading Room

PHOTOGRAPHY © BRAD FEINKNOPF

THE MOELIS FAMILY GRAND READING ROOM

Moelis Family Grand Reading Room

Gensler

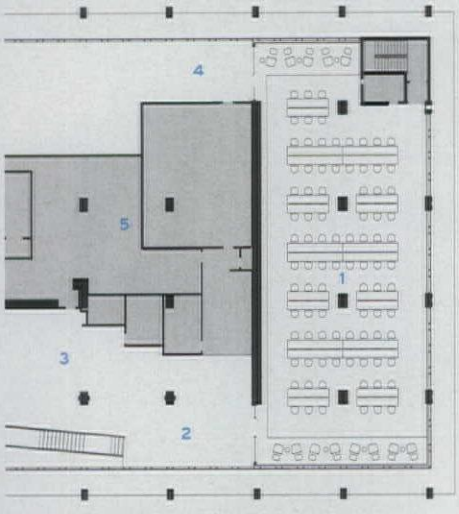
The Lighting Practice

By Pilar Viladas

THE NEW Moelis Family Grand Reading Room, part of the Van Pelt-Dietrich Library Center at the University of Pennsylvania in Philadelphia, lives up to the adjective in its name. The 5,500-square-foot space, formerly occupied by a periodicals library, is a place for focused study, in the tradition of grand European reading rooms. Its setting—in a 1962 Modernist brick building (by Harbison, Hough, Livingston & Larson, now known as H2L2 Architects/Planners) that houses the larger library center—provides grandeur of its own, with 20-foot-high ceilings and double-height windows on three sides that offer abundant natural light and views of the campus.

With a rich but understated palette of materials and forms, Gensler sought to create an atmosphere of luxurious calm when asked to reimagine the existing space. In collaboration with the Philadelphia firm The Lighting Practice, the architect devised a lighting scheme tailored simultaneously to the large space, to individual readers, and to a monumentally scaled, three-panel wool-and-silk acoustical mural, *Fields of Transformation*, by the Dutch artist Claudy Jongstra. Additionally, given the sound-reflective quality of the windows, it was crucial that the space was adjusted to be "pin-drop quiet," says Peter Stubbs, Gensler's design director for the project.

Pendant LED downlights, nestled unobtrusively in the room's walnut-slat ceiling (which also conceals additional sound-absorbent material), twinkle subtly above the space. An array of linear LED grazers, set into a channel between the ceiling slats and the mural wall, specifically illuminates Jongstra's artwork. "The beauty of LEDs is that there are no shadows," says Michael Barber, a principal at The Lighting Practice. And individual LED task lights set into the walnut reading tables are customized so that the user can tilt the shade for optimal illumination of reading matter, both printed and digital. As mandated by university standards, all the LEDs in the space are 3500 Kelvin, a fairly neutral color temperature. Barber says that while he and project manager Ryan Conover had hoped to use something warmer, the



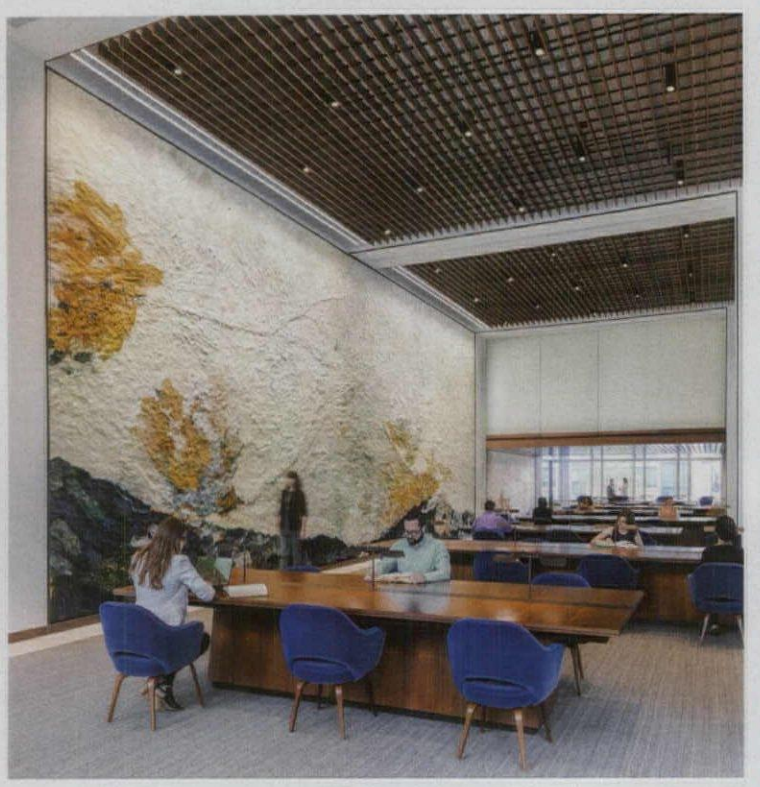
1 GRAND READING ROOM
2 MAIN LOBBY
3 CIRCULATION DESK
4 STUDY CARRELS
5 OFFICES

VAN PELT-DIETRICH LIBRARY CENTER FLOOR PLAN

0 20 FT. 6 M.

PHOTOGRAPHY: © BRAD FEINKNOPF

LIGHT BOX The reading room's abundant daylight is balanced by LED downlights in the walnut-slat ceiling, while LED grazers illuminate Claudy Jongstra's three-panel, wool-and-silk acoustical mural *Fields of Transformation*.



SILENCE, PLEASE Walnut reading tables (above) have integrated LED task lights. Jongstra's mural panels (left and above) as well as carpeting and fabric upholstery on the chairs, help keep the 20-foot-high space quiet.

more neutral option "works well at all times of year," especially with the space's generous daylight, and given the fact that the room is sometimes in use at late hours. A system of photo-cell sensors within the space regulates the amount of electric light throughout the day, and ensures a threshold of 50 footcandles at the reading tables and 25 in the circulation areas. (The lighting at the tables is dimmable, but only from a central system, to maintain a uniform appearance.) Digitally programmed window shades provide sun control when needed.

The room's general airiness and reflectivity are amplified by the light tone of the lime plaster on the columns, soffits, and walls framing the panels of Jongstra's mural, and the strip of pale terrazzo floor that "frames" the carpeting in the study area and defines two casual reading areas, each with a row of lounge chairs, at the north and south ends of the space. The upholstery on these chairs and those at the reading tables picks up the colors of the mural, the dyes for which are all made from the plants, vegetables, and flowers that Jongstra grows on her biodynamic farm in the Netherlands. (She also, for her works, cards and felts the wool, which comes from Drenthe Heath sheep, the oldest breed in Western Europe.)

The refined, handcrafted finishes used throughout the room by Stubbs and Bridget Elizabeth Abraham, the project architect, create an elegant backdrop for the mural but also stand on their own, adding a tactile quality and human scale to the soaring space without trying to upstage it. The lighting, too, helps make this special place both functional and uplifting, skillfully and unobtrusively inserting modern technology into a space that evokes a timeless stateliness. ■

Pilar Viladas, a design and architecture writer, has an essay in Ward Bennett, *a monograph to be published by Phaidon in November.*

credits

ARCHITECT: Gensler – Peter A. Stubb, design director; Bridget Elizabeth Abraham, project architect

LIGHTING DESIGNER: The Lighting Practice

ENGINEERS: Keast and Hood (structural); AHA Consulting Engineers (m/e)

GENERAL CONTRACTOR: Clemens Construction Company

CLIENT: University of Pennsylvania

SIZE: 5,500 square feet

COST: withheld

COMPLETION DATE: May 2017

SOURCES

LIGHTING: USAI, V2Lighting Group (downlights); Flos, Lukas Lighting (task); Lutron (controls)

GLASS: McGrory Glass (windows, doors)

CEILINGS: Norton (acoustical)

HARDWARE: Rixson; Rockwood

CARPET: Interface

SURFACES: Sherwin-Williams (paint); Terroxy (terrazzo)

FURNITURE: Knoll, Halcon, Davis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A WAY OF LIGHT

PHOTOGRAPHY: © HUFTON+CROW

Sky Central

PLP Architecture and AL_A

Arup

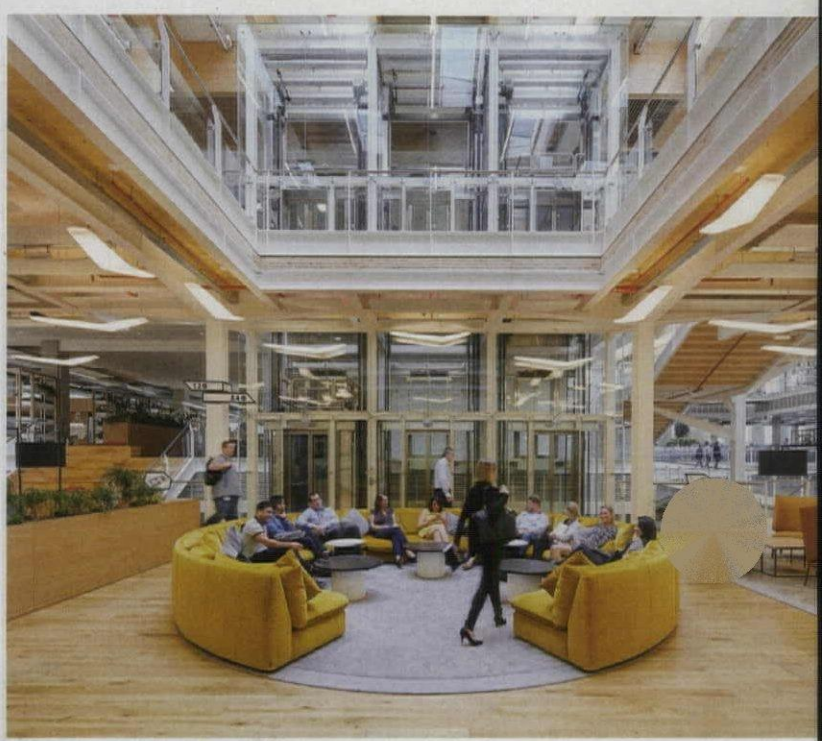
By Chris Foges

DAYLIGHT IS the magic ingredient of Sky Central, a vast new building on the London campus of media giant Sky. It has been built by PLP Architecture and engineer Arup, with concept design by AL_A and workplace design by HASSELL. Natural light bathes a café-lined "street" that runs through the center of the building, floods the lofty atria, and bounces through high-ceilinged offices. Its prevalence helps to achieve two principal ambitions for the building: that it should have exemplary energy performance and enhance the wellbeing of occupants. "Humans respond better to daylight than artificial light," says Arup lighting consultant Nick MacLiammoir. "We don't truly know how to use electric light to entrain the circadian rhythms as daylight does. Wherever you can use it, you should."

Doing so at Sky Central was complicated by the client's program, and by the scale of the building. Sky wanted an "agile" office in which 3,500 laptop-toting staff can work almost anywhere, enhancing flexibility and collaboration. So daylight had to be brought into the deepest recesses of the three-story groundscraper, whose 530-by-325-foot plan is equivalent to three football fields. The building's form reflects its setting among suburban warehouses.

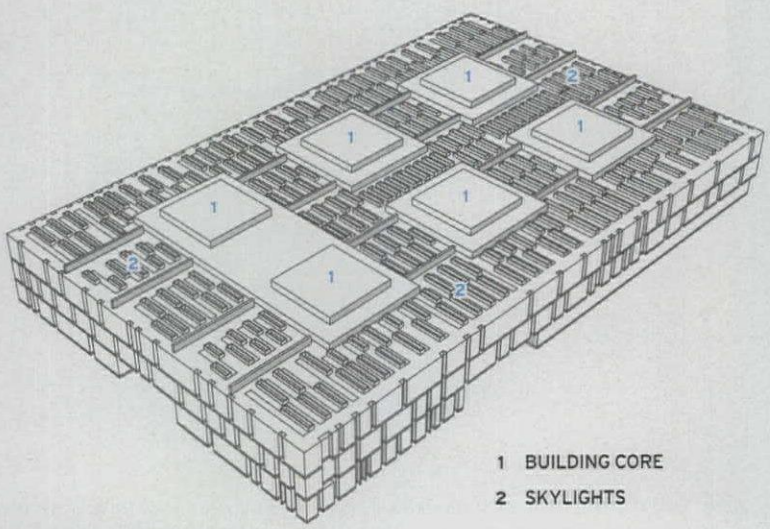
Daylight penetrates the building's facade glazing just 30 feet into the interior, so most of the illumination comes from above and is carried down to the lower floors through an H-shaped void in the center of the plan and two more atriums.

The roof is studded with 400 skylights, which are inclined slightly to the north but otherwise have no solar shading. Direct sunlight



OPEN PLAN Top light floods the cafe-lined "street" and atrium (left). Accent fixtures, such as the wing-shaped pendants (above), add visual texture to the steel and engineered-wood structure.

UPS & DOWNS Overlapping mezzanines in the daylit atrium provide diverse workspaces (above). Ramps connect surrounding floors, which are arranged as 18 "neighborhoods" of about 200 desks.



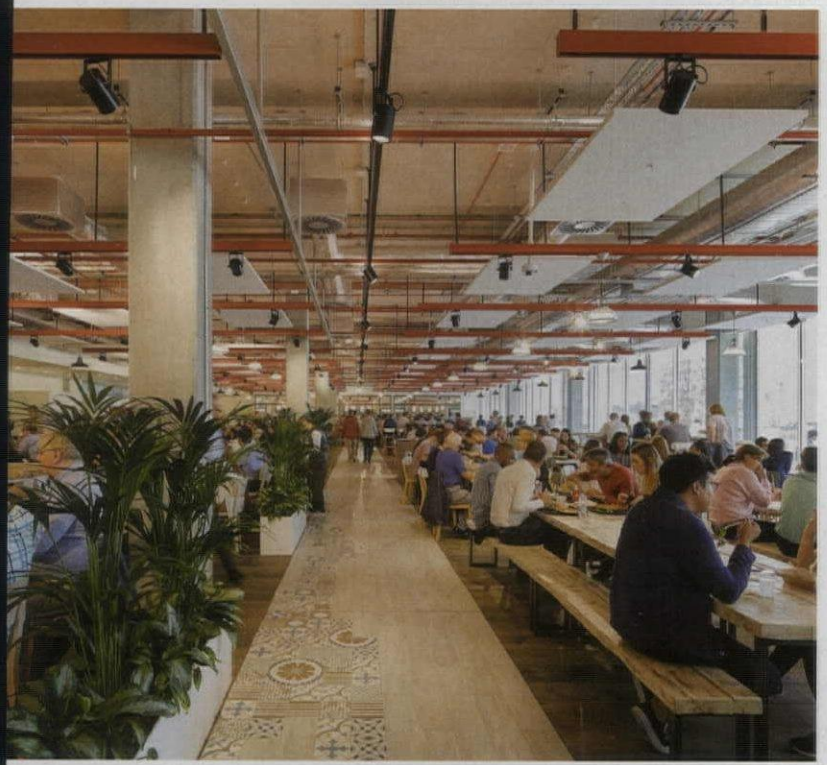
ROOF CONCEPT DIAGRAM

"articulates space in a way that you don't get from a given level of ambient daylight," says MacLiammoir. Deep glulam beams act like the diffuser of a giant light fixture, screening the light sources from view to reduce glare and visual distraction. Only skylights almost immediately overhead are visible.

Daylight bounces off the natural finish of the engineered wood, setting up a play of light and shade within the coffers. Brightness increases where the structure is densest, over a cascade of mezzanines and floating circulation ramps in the central atrium. By aiding orientation and encouraging movement through the space, the distribution of light fosters chance encounters that are a goal of agile offices.

That approach to work—with 14 workspaces for every 10 people—also allowed the designers to accept occasional trouble spots caused by unfiltered sunlight. "If a solar patch hits a particular workspace, you can just move," says PLP director Wayne McKiernan. "Working practices informed the building design."

Staff can work by natural light in most areas, but supplementary electric light ensures a consistent ambient light level of 300 lux. Two types of fixtures predominate. Above



BRIGHT SIDE Amenity and social spaces include a large restaurant (above) and five additional cafés, located so as to encourage movement. The electric lighting is dimmed here: the daylight is strong due to the location at the perimeter of the building.

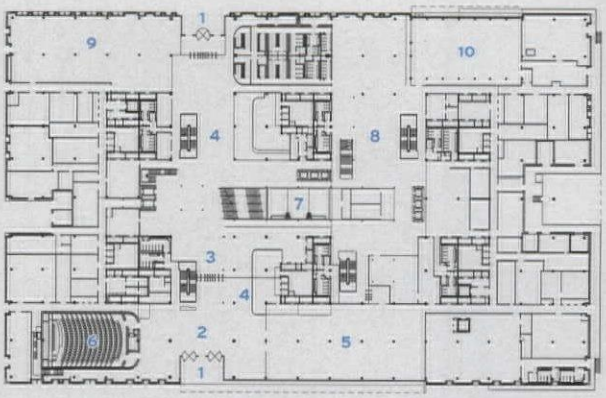
the voids, wing-shaped pendants emit a warm glow—though a cooler color is used for fixtures visible from a glass-walled television news studio.

Pendants set at three different heights create an informal effect that contrasts with regular lighting arrays over the office areas. Fluorescent fixtures are grouped with services such as red sprinkler pipes in straight runs that follow the building's 5-foot structural grid. They lend an industrial character while maintaining an orderly appearance, notes McKiernan, and add a texture that "helps to break down the vast ceiling."

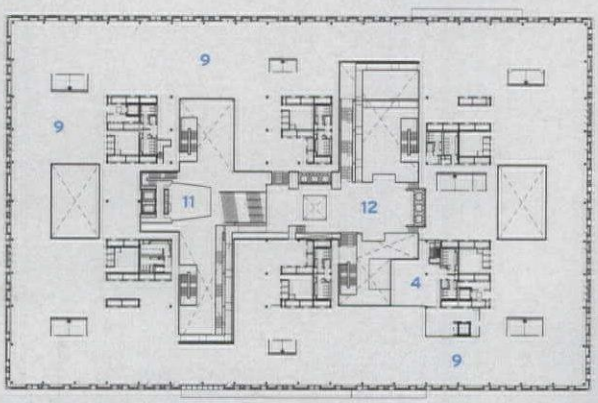
Electric lighting is dimmed where daylight is strongest, on the top floor and around the perimeter, "but we tend not to switch it off altogether because that looks as if it's not working," says MacLiammoir. Staff seeking more light can move to the atria, or boost levels using personal desk lamps.

In some parts of the building, however, softer light and even darkness are welcomed. "Because of its scale, we approached this building almost like an urban design project," says PLP partner Bernard Storch. Large, bright spaces akin to streets and squares aid wayfinding—and contain amenities including a supermarket and dry cleaner—while modestly scaled back routes and cozy kitchens attached to 18 working "neighborhoods" foster a sense of belonging. In narrow passages at the base of atriums, "the layers of structure above hide some of the light, or filter it," says Storch. The engineered-timber soffits of floors above are left in shadow, helping to create "a level of intimacy that you sometimes need in a building like this."

In these darker areas, getting around is aided by accents of light from fixtures concealed behind acoustic panels and steel beams. Elsewhere, a panoply of task and feature lighting serves specific needs in diverse spaces, from restaurants and meeting rooms to a movie theater. But these installations remain unobtrusive. It is abundant and richly varied daylight that gives the space its life. ■



GROUND-FLOOR PLAN



SECOND-FLOOR PLAN

0 60 FT.
20 M.

1 ENTRANCE
2 RECEPTION
3 SKY STREET
4 CAFÉ
5 RESTAURANT
6 MOVIE THEATER
7 CONFERENCE HUB
8 SHARED WORK
9 NEIGHBORHOOD
10 EVENT SPACE
11 BROADCAST STUDIO
12 BREAKOUT

credits

ARCHITECTS: PLP Architecture (interior and executive architect); AL_A (building concept design)

ENGINEER: Arup (structural, m/e/p/f)

GENERAL CONTRACTOR: Mace

CONSULTANTS: Arup (daylighting, lighting design, accessibility, acoustics); HASSELL (workplace design); DP9 (planning); KLH (sustainability); AECOM (quantity surveyor)

CLIENT: Sky UK

SIZE: 406,000 square feet

COST: withheld

COMPLETION DATE: July 2016

SOURCES

ARCHITECTURAL/CUSTOM WOODWORKING: B&K (roof); CMF (mezzanine and circulation)

GLAZING: Interpane (external); Planet Partitions, Custom Crafted, CMF (internal)

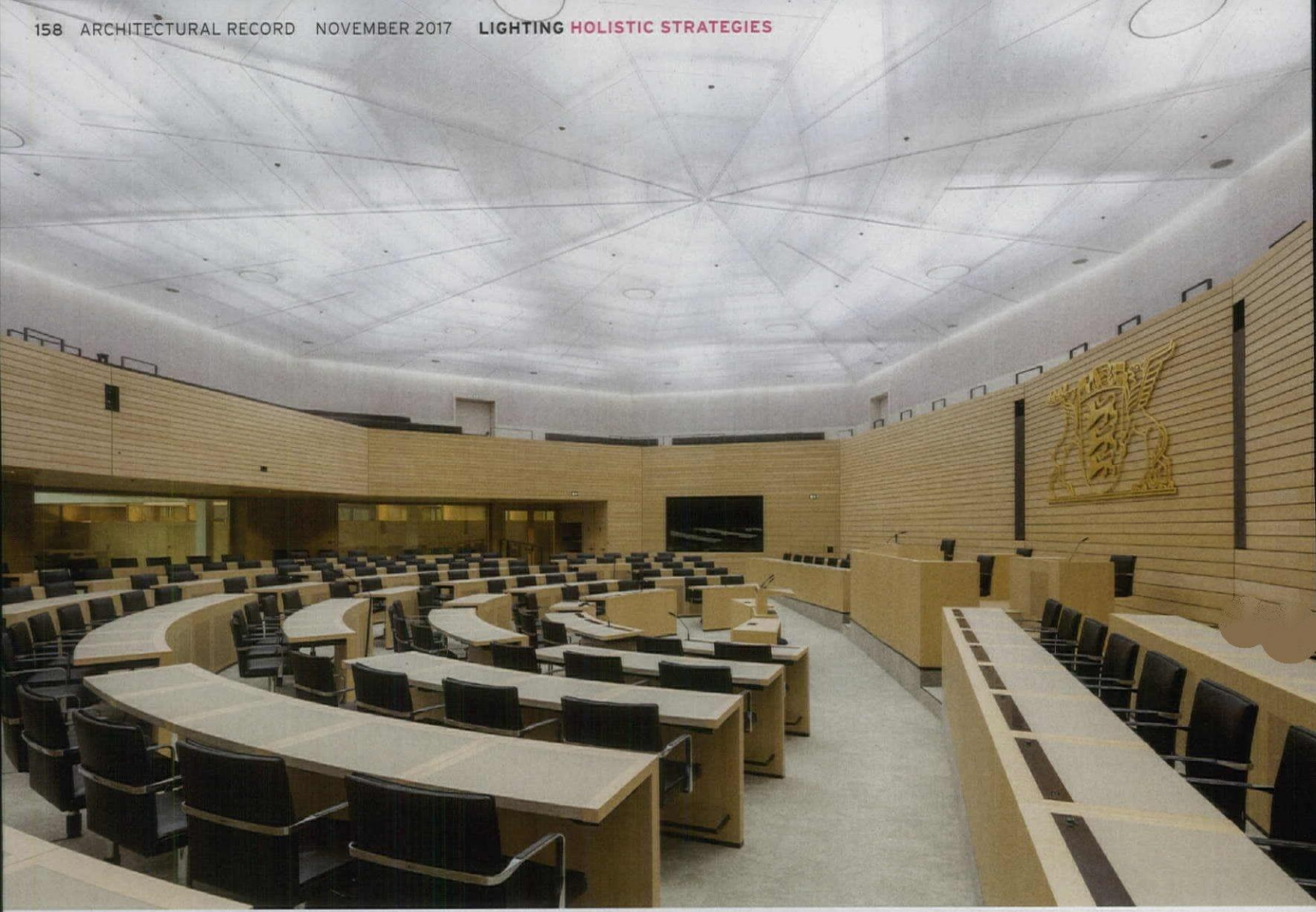
LIGHTING: Zumtobel, Flos, iGuzzini, Erco, Lamp Gras, Whitecroft, Zeitraum, Wästberg, Artemide (architectural)

FLOORING: Domus, Ted Todd, Reclaimed Floor Company, Forbo, Interface, Desso, Kingspan, Lindner

FURNISHINGS: Fritz Hansen, Bend Goods, Billiani, Vitra, Mava, Arflex, Muuto, Skeie, LIM, Koleksiyon, Isomi, B&B Italia, Maxalto, Karl Andersson and Söner, Zeitraum, Fritz Hansen, Herman Miller

MOVABLE WALLS: Dorma

ELEVATORS: Otis



State Parliament of Baden-Württemberg

Staab Architekten
Licht Kunst Licht

By Linda C. Lentz

SEEING THE LIGHT
The ca. 1960 building in Stuttgart by Kurt Viertel (left) was protected by landmark status. At its core, the parliamentary debating chamber (above) has been infused with daylight and given views through a unique daylighting system using skylights.

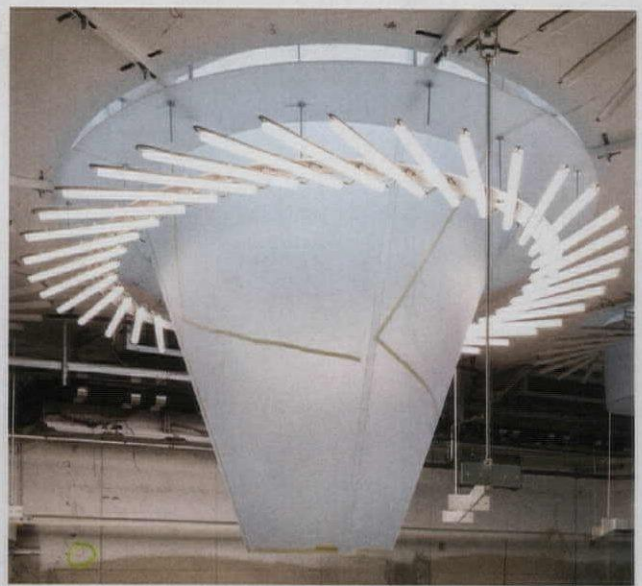
IT OFTEN SEEMS as if there are few bright spots in politics these days, but the enlightened renovation of a regional government building in Germany is offering a sunnier outlook due to an ingenious daylighting strategy devised by the Berlin-based Staab Architekten and the lighting-design firm Licht Kunst Licht (LKL).

When the Administration for Property and Construction of the Federal State of Baden-Württemberg set out to renovate its parliament building in Stuttgart, the State capital, its chief goal was to upgrade the modernist, reinforced concrete structure designed by Kurt Viertel (circa 1960) to meet 21st-century standards for energy, accessibility, acoustics, security, and safety. As part of the overall brief, the authority also aimed to improve conditions for the 143 sitting members of parliament, stipulating that daylight and views penetrate their Debating Chamber, a windowless assembly hall with a shallow balcony located at the core of the building's second and third floors.

"The scheme sounds easy," says LKL lighting designer Benjamin Dorff. But, in fact, he notes, it was a challenge, due to the protected status of the three-story building, which sits on a site measuring 177 by 177 feet. Considered an icon of postwar modernity and optimism, the historic property was the first parliament building to be erected in Europe after World War II, and its existing bronze and glass facade could not be compromised.

Without changing the appearance of the exterior, the architects devised a strategy for bringing light into the building's core. By reconfiguring media booths within the nine-sided, oak-clad Debating Chamber, they were able to punch openings along its rear, beneath the balcony. The result is a series of glass walls and doors that filter sunlight into the space from an adjacent double-height lobby that faces a rose garden. To illuminate the center of the room, they collaborated with Dorff and his team to develop a unique daylighting system by inserting 48 circular skylights into the flat roof above the chamber. These openings are

PHOTOGRAPHY: © MARCUS EBENER



OPENING UP New glazed walls borrow daylight from a lobby (top, left); skylights above the chamber (left and top, right) provide diffuse and direct daylight into the space. Light cones (above) are ringed with LED strips.

PHOTOGRAPHY: © MARCUS EBENER (TOP, LEFT AND BOTTOM, RIGHT); MICHAEL TÜMMERS (BOTTOM, LEFT AND TOP, RIGHT)

arranged above a translucent dropped ceiling made of satin-finished PolyEthleneTerephtalate Glycol (PETG) thermoplastic sheets, which serves as a giant diffuser.

Thirty-eight of the skylights measure about 2½ feet in diameter. Outfitted with electrochromic glass, they darken as the sun gets brighter and vice versa, assuring thermal and visual comfort, and reducing cooling costs during warm weather. Attached to the base of each of these is a 1½-foot-long PETG cylinder, treated for even light distribution. The remaining 12 skylights are 8½ feet in diameter and affixed to large cones in a similar thermoplastic material, which span the depth of the 6½- to 8-foot-high plenum. The cones narrow to a diameter of 2 feet, piercing the dropped ceiling to create a dozen apertures faced with clear glass that fill the room with daylight and provide the legislators with views to the sky.

Alternating warm and cool LED strips, 2700 and 6500 Kelvin respectively, positioned around the neck of each skylight supplement the daylight and can be controlled and mixed to achieve a broad range of dynamic or static color temperatures and light levels. Additionally, tunable-white LED downlights in the underside of the balcony coordinate with the color and intensity of the system for a balanced effect throughout the space. During normal use, the average luminance in the chamber is 500 to 600 lux. And as activities here are often broadcast for television, it can be boosted to over 1000 lux.

While much of the State Parliament's $59 million renovation, completed in 2016, is so subtle that the building appears largely unchanged, the renewal of the Debating Chamber, at its heart, is a bold intervention—transparent and full of light—that illuminates the legislative process and speaks to hope for the future. ■

credits

ARCHITECT: Staab Architekten – Thomas Schmidt, project manager; Jens Achtermann, Marco Ullrich, Noah Grunwald, Ivan Kaleov, Sandra Herzog, design team

LIGHTING DESIGNER: Licht Kunst Licht – Andreas Schulz, principal; Benjamin Dorff, project designer

ENGINEERS: Müller & Bleher (electrical); Leonhardt, Andrä und Partner (structural); Drees & Sommer Advanced Building (hvac)

CLIENT: Federal State of Baden-Württemberg/ State Administration for Property and Construction

SIZE: 4,400 square feet (Debating Chamber)

COST: $2 million (gross, lighting)

COMPLETION DATE: May 2017

SOURCES

LIGHTING: Trilux (linear LEDs); WILA (downlights)

Touch and Glow

Design details make these tech-driven fixtures more user-friendly.

By Kelly L. Beamon

The Wally

This wall sconce can function as can't-miss corridor signage or as wall-mounted path lighting. Illuminated, the 5" diameter face provides from 25 to 200 lumens of warm white LED glow. Made from powder-coated high-grade aluminum, the luminaire can be used with standard or custom decals.
juniper-design.com

Perch Light Branch

This dimmable 2700K LED fixture from Moooi has recently become available in the U.S. The polypropylene bird is a mobile, with weights on its beak and tail that allow it to rock gently; feet can be locked into slots along the aluminum "branch" with the push of a button at the end. This playful fixture delivers up to 560 lumens of light. Perch comes as a floor lamp, light table, and a suspension with a branch that can measure up to 39" long.
moooi.com

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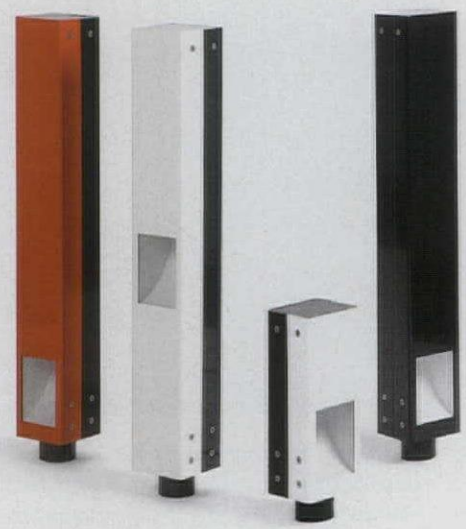

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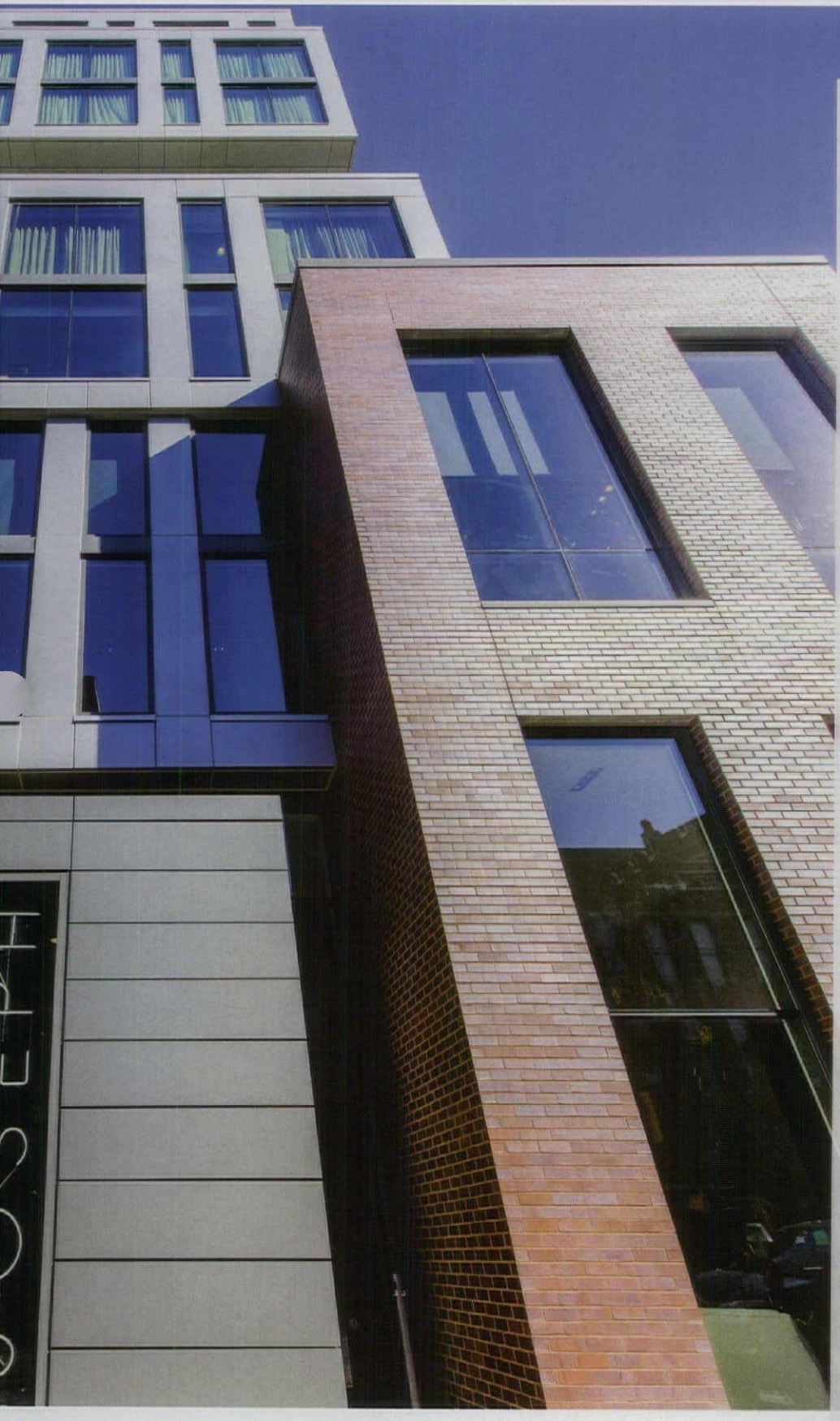

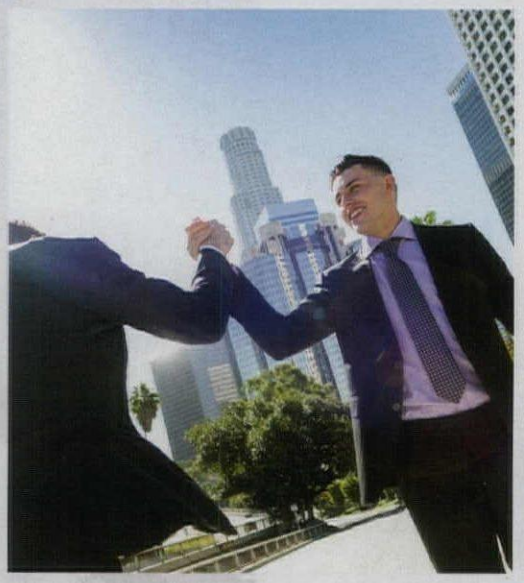

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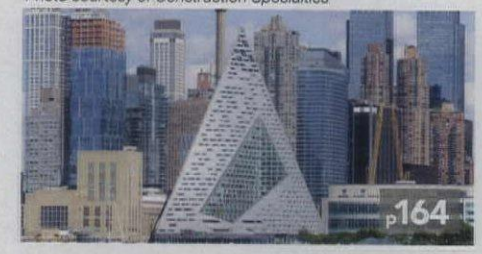

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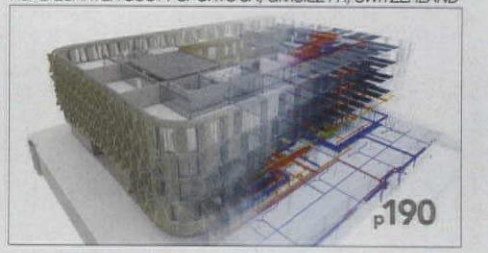

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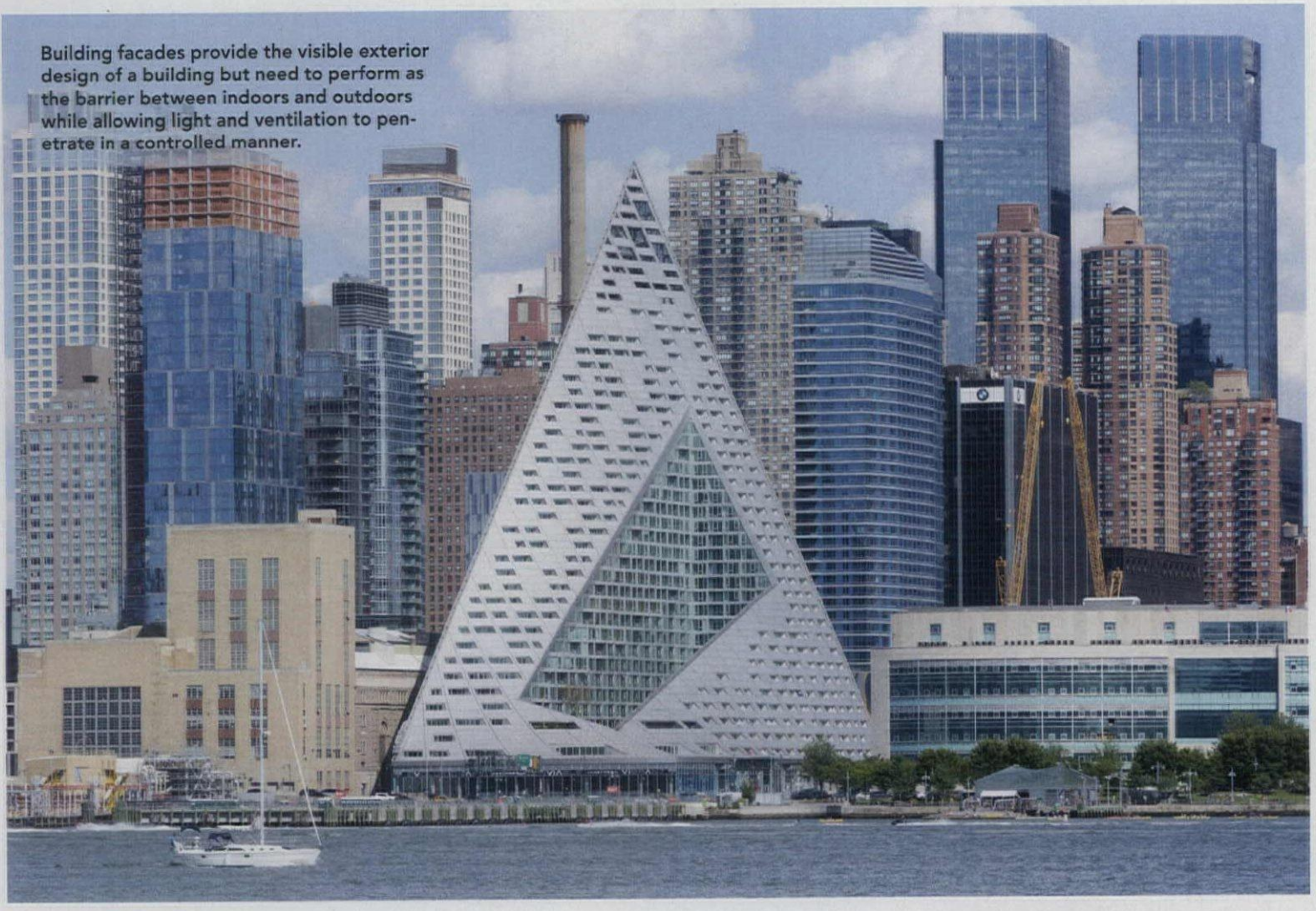

Building facades provide the visible exterior design of a building but need to perform as the barrier between indoors and outdoors while allowing light and ventilation to penetrate in a controlled manner.

Photo courtesy of Construction Specialties

High-Performance Facade Solutions

First impressions are important, but it's what's on the inside that counts.

Sponsored by Construction Specialties, EXTECH/Exterior Technologies, Inc., New Millennium Building Systems, and SAFTI FIRST Fire-Rated Glazing Solutions

By Peter J. Arsenault, FAIA, NCARB, LEED AP

Building facades are the most publicly visible design aspect of a building and at the same time they are most vulnerable to performance issues. They need to enclose the building and control the flow of heat, light, air, and water, but they also need to look good doing it—typically for a long time. When they are well-designed and constructed properly, they can meet these needs by providing stunning exteriors that allow light and ventilation into interior spaces creating delightful places to live, work, or play. At the same time, well-designed facades can perform with long-lasting durability that meets or exceeds a variety of code requirements related to structural integrity, weather resistance, seismic forces, energy efficiency, and fire ratings. However, when done poorly, facades may deteriorate slowly until their original beauty degrades and performance declines noticeably to the point of needing replacement. Given this broad significance of facades, it is not surprising that they are the focus of considerable design efforts, fastidious construction methods, and sophisticated manufacturing techniques. In this continuing education course,

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Learning Objectives

After reading this article, you should be able to:

1. Identify and recognize the range of performance requirements of a facade as part of the overall exterior design and building enclosure.
2. Assess the fire and safety performance aspects of building facades, particularly when construction is near the property lines.
3. Explain the integration of facade materials and systems as they relate to green and sustainable building design.
4. Determine ways to incorporate the principles discussed as related to the design and performance of buildings as shown in case studies.

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we cover some of the latest materials and products that are available to help create distinctive and attractive building facades that can perform as well as they look.

DAYLIGHTING FACADES

The use of natural daylighting in buildings has always been a desirable trait in building facades, and in recent times it has become the focus of designs that seek energy efficiency and good interior light quality. This focus has led to increased consideration of other glazing choices besides glass. Cellular polycarbonate glazing has emerged as one of the preferred materials for daylighting in many buildings due to its durability, glare reduction capabilities, occupant comfort benefits, and sustainability. Polycarbonate is lightweight and clear enough to transmit light while possessing the strength to withstand hurricane-force winds and blown debris. It isn't affected by yellowing or "fiber-bloom," as is common in fiberglass reinforced panel (FRP) glazing. Because of these traits, plus its fire-resistance rating capability, higher insulating potential, recyclability, and its ability to be shaped and formed, polycarbonate has been used in a wide range of buildings, from industrial structures that demand resilience to cultural institutions that prefer softer, more refined aesthetics.

From a practical standpoint, new advancements in manufacturing technology have further enhanced the benefits of polycarbonate glazing including the following:

- **Ultraviolet (UV) Light Resistance and Blocking:** New coating technology has been developed to resist the damaging effects of UV light such that polycarbonate panel manufacturers now offer 10-year weatherability warranties. The ability of the glazing to further block the transmission of UV light waves into the building means that interior finishes are protected from accelerated fading.
- **Anti-Reflective:** In cases where the reduction of exterior reflective glare is needed for a building's design, anti-reflective polycarbonate glazing is available. Such systems facilitate a better distribution of light throughout a building's interior while reducing reflections and glare. This option is also ideal for entertainment venues that want to project high-resolution images and lighting effects onto a translucent backdrop.
- **Infrared (IR) blocking:** When providing high daylighting levels and solar thermal control are equally important, polycarbonate glazing is available with an external surface that filters unwanted infrared radiation to reduce the solar heat gain of a building. Thus, it promotes comfortable interior temperatures, reduces demand on the HVAC system, and saves on energy costs.

Photos courtesy of EXTECH/Exterior Technologies, Inc.

- **Anti-Graffiti Surface:** When a project is in a high-traffic area and is at risk of damage or vandalism, polycarbonate glazing can be specified with an anti-graffiti surface that resists vandalism and scratching. Anti-graffiti glazing is also resistant to natural weathering and typical chemicals, and it is easier to clean.

Of course, a robust daylighting facade system is not dependent on the glazing alone—it must also possess superior framing to withstand water and air infiltration and deliver long-lasting value. In this regard, there are several things to look for in a coordinated, manufactured system. The first is deep glazing channels. Since polycarbonate has a high coefficient of thermal expansion, normal glazing channels (like those used with glass-glazed systems) can lead to panel disengagement. When disengaged, the glazing comes loose from the framing, causing air and water leakage, and compromising the structural integrity of the glazing. To prevent this, deep glazing channels are necessary. Second is the use of low-friction gaskets. Daylighting systems require gaskets with low-friction surfaces which are securely glued in place. If gaskets are not glued into well-designed gasket tracks, and if they do not have low-friction surfaces, then they will become disengaged over time. Further, they will create noise as the glazing expands and contracts. Third is a panel setting seat for the glazing panel to sit on. These are necessary to keep the glazing panels from falling to the bottom of the sill profile, making them vulnerable to water penetration, interior condensation, and decay. Further, these seats must be designed so as to allow air to enter the cavities in the cellular polycarbonate. Some manufacturers don't recognize the importance of these features, but they are essential for robust system performance.

Cellular polycarbonate translucent glazing can provided daylighting facades for a variety of building types, including an integrated facade at Otterbein University (top) and Metro Tower III (bottom) which emulates the look of a frameless channel glass wall.

It is also possible to specify and work with pre-fabricated systems as the best way to ensure quality control and avoid installation delays. Not all daylighting manufacturers offer this option, instead relying on field installers to cut, fit, and secure all of the parts and pieces together on the project site. In the interest of better quality control, systems created in controlled factory conditions are available in several types. Some, for example, offer beauty, durability, and economy with vertical panels up to 54 feet long, eliminating horizontal joints and leak potential. Employing tongue and groove joinery, they create a clean, unbroken appearance with an insulation value of up to R-5 for 50mm-thick panels. Other translucent wall systems can deliver daylighting in long spans with minimal structural support using

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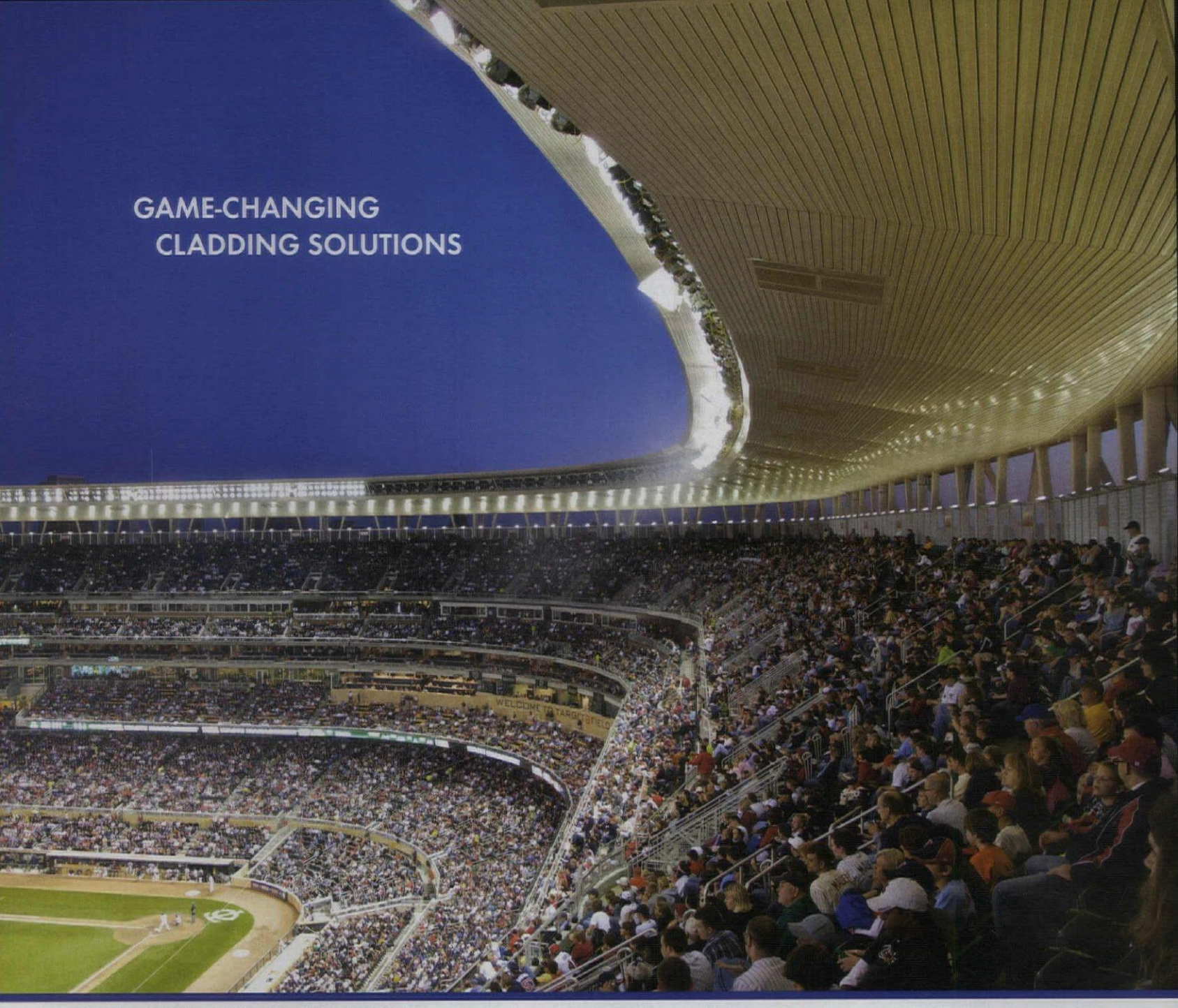

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an interlocking clamping structural mullion designed for high wind load and long span conditions. This approach provides a continuous wall of daylight that replicates the external appearance of a channel glass system but at a fraction of the cost. There is even a curtain wall system that can properly accept glass polycarbonate, and metal panels in the same system. All of these polycarbonate systems use deep glazing channels, low-friction gasketing, and controlled gasket to pressure deliver superior resistance to air and water infiltration as tested by AAMA criteria.

Bill Voegele is the president and founder of EXTECH/Exterior Technologies, Inc. He has seen, firsthand, the growth of daylighting in buildings in recent years. He observes, "Daylighting has become popular for good reason—it works. Several studies have proven that people are healthier, happier, and more productive when they work in naturally lighted environments." Regarding the use of cellular polycarbonate, he reflects on the role the industry is playing. "Cellular polycarbonate systems are probably the most economical way to incorporate massive daylighting while still addressing all of the questions that arise regarding spanability, weatherability, light diffusion, and, in some cases, solar heat gain and glare reduction." It is clear this material is poised for use in many more buildings going forward.

STEEL FACADES

Opaque portions of facades are needed in addition to the portions that allow in daylight, and often the question arises as to what material should be used to skin or clad those opaque areas. Here, there are seemingly limitless approaches with different products used to articulately detail facades in innovative ways that can transform buildings. While there are numerous choices, one that is being looked at creatively is the use of pre-finished steel panels.

Steel is one of the most commonly used materials for a structural system in buildings. A variety of components such as wide-flange beams, tube steel columns, and steel angles are prevalent in design and construction. Steel joists, roof, and floor deck round out a comprehensive structural steel package. Going beyond the constituent elements, a system-based approach helps to maximize efficiency. When all of the elements work together, the structural system meets engineering, economical, and aesthetic requirements. This holistic design strategy creates designs that are more cost-efficient since they use less material and, summarily, less waste. But those systems need to be coordinated with the design of the facade too, particularly since it is common for current building designs to take advantage of more integrated structural-steel systems. This approach moves beyond the practice of simply specifying individual steel elements and instead allows architects to engage more engineered, holistic ways to achieve cost, performance, and aesthetic goals.

Consistent with this approach, architects and building owners have begun to investigate and create some novel cladding and canopy solutions. One of the ways to do this is by using structural-steel decking (i.e., found in specification Division 5) for facade cladding in lieu of the typically more expensive architectural metals (i.e., found in specification Division 7). Such structural-steel decking is engineered for strength and durability and comes in a variety of profile shapes and depths that are often exposed to the interior as an exposed ceiling in many steel buildings. The attachment and field installation processes are well known and can produce a consistent, controlled performance related to loading conditions. Further, the appearance can hold up well over time. It should not be a surprise, then, to realize that this steel decking is being used not only for the underside of horizontal canopies on building exteriors, but also for vertical facades.

Standard profile deck along with long span deck can be readily installed vertically, minimizing joint lines and creating an attractive exterior cladding. The engineered corrugations in the decking can be sized to hold up against wind, weather, and usage as appropriate to the project location—making it suitable for a permanent or sacrificial skin or a rain screen on a facade. The same material can serve as a sun screen or solar shading device where appropriate. Steel deck is typically galvanized, and there are even options for variations like using stainless steel. Coatings can also be introduced to contribute to the durability of the material and longevity of the facade.

Recognizing the suitability of steel deck in exposed exterior locations, manufacturers can offer a range of pre-finished options using a variety of coatings. The coating systems are as attractive as they are performative. These coatings can handle aggressive conditions like swimming pools with corrosive chlorine, saline environments, or areas of high humidity. They are also effective at handling extreme environments such as marine locations and full ultraviolet exposures. Even in these situations, the pre-finished coating systems can carry warranties and withstand chalk and fade over the years.

These pre-finished products also give architects a broader design palette allowing color, pattern, and texture to be selected to suit particular aesthetics. Regardless of the final look, these new pre-finished deck options eliminate on-site painting or finishing—thus saving time during the construction process. The pre-finishing also helps to assure a consistent and uniform appearance.

Regarding sustainability, pre-finished materials eliminate the need to paint on the job site. Applying coating systems in a controlled setting reduces the risk of exposure to volatile organic compounds (VOCs) on the project site. Durable, pre-finished solutions lead to longer service life and minimal maintenance; longer service life leads to favorable life-cycle assessments. Further, steel is one of the most recycled building products in construction.

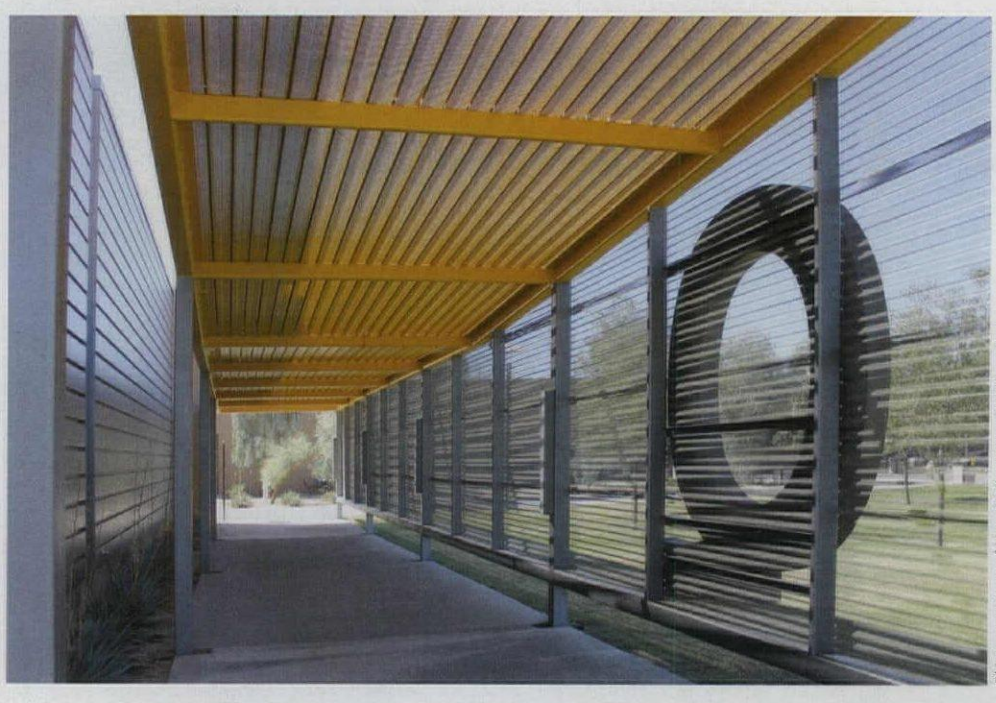

Photo courtesy of New Millennium Building Systems

Pre-finished or stainless-steel deck can be used for a variety of building exterior applications, including vertical facades, horizontal canopies, or sunscreens and shades.

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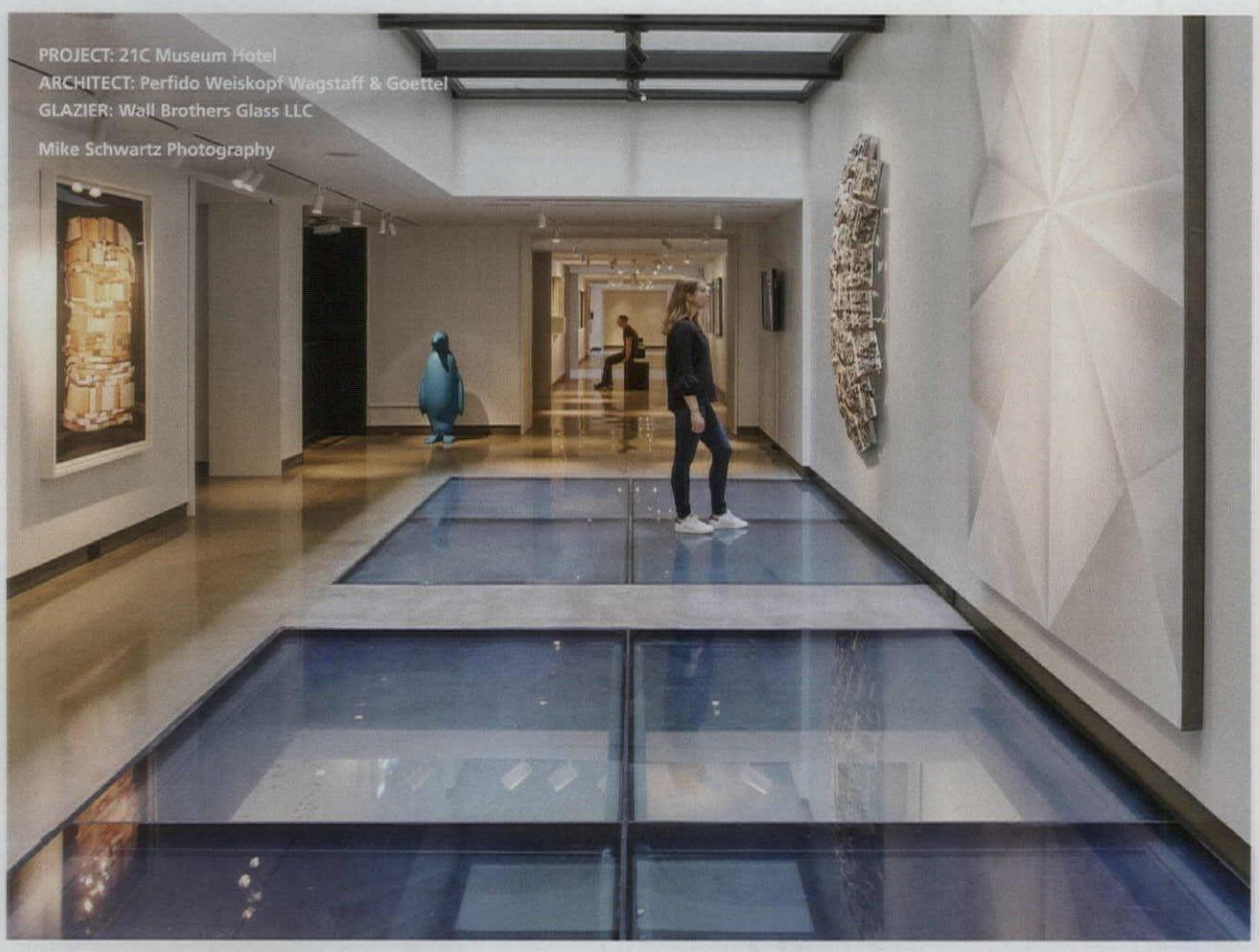

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Alex Therien, AIA, LEED AP, is the market development manager for New Millennium Building Systems and works with integrated steel decking and cladding. He points out, "These structural products and coating systems were developed to address a design team's aesthetic goals meeting their necessary criteria. By effectively eliminating extraneous materials, this creative facade approach is helping designers achieve their vision without sacrificing aesthetics, performance, or budget."

FIRE-RATED CURTAIN WALL FACADES

A common means of creating a commercial building facade is to use a curtain wall system that spans vertically across multiple floors. Such systems provide a variety of options for appearance, glazing, and performance to suit a variety of building conditions. In some cases, the curtain wall is also required to meet fire rating requirements, usually because the building is close to or directly on the property line triggering the building code to dictate a minimum fire resistance in the interest of public safety. In that case, the entire curtain wall assembly must be shown to carry a fire-resistive rating as evidenced by independent testing and certification.

The type of products available that can meet this need are those that can show they comply with the requirements of ASTM E119 "Standard Test Methods for Fire Tests of Building Construction and Materials." Following this standard, transparent barriers such as glazed curtain walls that use fire resistive glass and aluminum framing have demonstrated fire-resistive ratings of up to 120 minutes (2 hours). Because it is the whole system that needs to comply, not just any component, manufacturers of such systems are often involved directly with architects and other design professionals by providing a full array of technical services before, during and after a project. They may also be able to assist in code interpretation, product selection and design assistance all before a project is let for bid.

The primary function of fire-rated curtain wall systems is to enhance the safety of the building's design and ultimately that of the building's occupants in the event of a fire. However, they are also multi-functional in that they can be used to enhance the energy performance of the overall building envelope too. Such products are typically more robust than non-rated products and when combined with high-performance glass coatings, they can offer excellent overall U-Factors, Solar Heat Gain Coefficients (SHGC) and Visible Light Transmission (VLT). As a design resource in this regard, some glazing and framing products and systems can be researched as part of a program by the National Fenestration Rating Council (NFRC). This national organization provides the Component Modeling Approach (CMA) Software Tool (CMAST) for determining the predicted energy performance of fabricated fenestration of all types, including curtain walls. They also provide the CMAST Certified Products Directory (CMAST CPD) for Non-Residential Fenestration Energy Certification and Rating as a resource for designers to identify products that have been pre-tested and approved for stated energy-related performance characteristics.

The same attributes that make these curtain wall systems suitable for fire protection and energy efficiency also contribute to ready customization to include characteristics suitable for protection in other conditions too. This can include impacts from severe weather such as hurricanes or tornadoes, resistance to impact from projectiles or even bullets, and blast resistance where needed. In cases where sound attenuation is a concern, the glazing and the system can be designed to meet Sound Transmission Class (STC) or Outdoor Indoor Transmission Class (OITC) sound ratings. Overall, they can produce a well-rounded, code-compliant, high-performing fenestration and facade system.

Photo courtesy of SAFTI FIRST Fire-Rated Glazing Solutions

At the VA Medical Center in Orlando, Florida, a 2-hour fire-resistive, hurricane-rated curtain wall that meets HVHZ (high velocity hurricane zone) testing requirements was incorporated into the design.

From a design standpoint, architects do not have to choose between meeting design or performance requirements—they can have both. The fire-resistive curtain walls can mimic the appearance and performance of their non-rated counterparts and blend in seamlessly. As fire-resistive walls, it is worth noting that these products are appropriate for interior applications as well as exterior ones. They can enable architects to keep a consistent design intent and clear views while meeting fire-rated code requirements for interior or exterior conditions.

Tim Nass is vice president of national sales with SAFTI FIRST, a manufacturer of fire-rated glazing and curtain wall systems. He points out that "Architects will often inquire about ancillary performance levels like sound attenuation, U-Factor or Visible Light Transmission. They are often unaware that these products have been fabricated to match specifications for specific projects and are tested under dynamic conditions for total performance." In that regard, the performance is less about looking things up on a table and more about working with a fabricator to achieve the performance levels desired. From an appearance standpoint, Nass points out "These systems also have the ability to match the non-rated products to maintain a consistent aesthetic between the exterior and the interior." In all, such systems are fully customizable to meet the needs of specific projects.

Photo courtesy of SAFTI FIRST Fire-Rated Glazing Solutions

At this private office building in New York, a 1-hour fire-resistive curtain wall system was used to bring natural light into the stairwell while creating a fire separation between the building and the adjacent parking lot.

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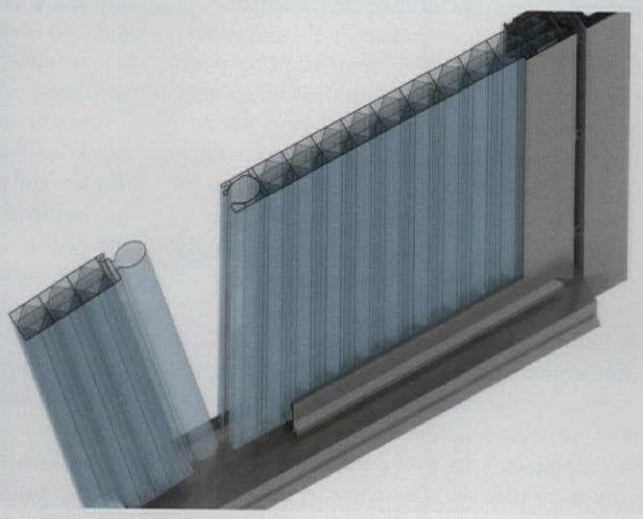

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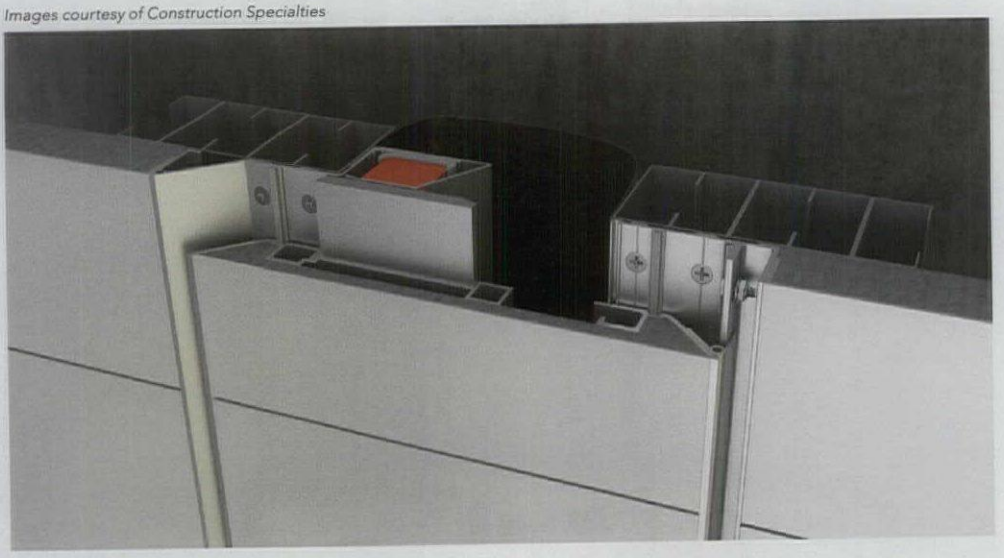


Expansion joints in a building facade are often necessary but need to be protected with an expansion joint cover. Selecting the best product involves meeting the performance needs of a project but can also involve selecting one that allows matching facade material to be inserted in the face of cover to blend with the overall design.

FACADE SPECIALTY DETAILS

When it comes to facade design, the one thing that is certain is that there will be design and construction details to address. Those details can include connections, attachments, joints, or other conditions. Two things in particular deserve some attention here which are very common elements of many commercial building designs—expansion joints and architectural louvers in openings. Both of these elements can have a significant impact on the successful functioning of a facade in terms of the purpose they are intended to serve plus their integration with the surrounding facade materials. Additionally, they can have either a positive, negative, or neutral impact on the overall building design scheme depending on how they are handled. With the above in mind, let's take a closer look at each of these specialty conditions.

Facade Expansion Joint Covers

Most commercial buildings of any size require expansion joints between sections of the structure to allow a building to expand, contract, or shift laterally due to imposed forces. Those movements can come from temperature changes causing materials to expand or contract, winds that move or sway the building, settlement over time, or seismic events. A well-designed series of expansion joints will allow sections of the building to move independently of each other without damaging either the structure or the finish materials.

Of course, leaving an expansion joint open to the elements on a facade is not a realistic solution. Hence, those joints need to be covered in a manner that maintains the integrity of the joint and the facade, both for appearance as well as performance, while still allowing for independent building movement on either side of the joints. Metal expansion joint covers are typically manufactured to allow for the anticipated building movement by using components that are designed to slide or otherwise pass by each other or adjacent building portions. The means to do that will vary by manufacturer and by type of expansion joint cover, and manufacturers typically provide a range of product offerings to suit different conditions. Selecting the proper one will help assure that the building and the facade are protected from damage when, or if, building movement occurs.

In addition to allowing for movement, these expansion joint covers also need to be able to insulate and protect the joint opening from outside elements. If water or moisture make their way into the joint opening, then the building could be susceptible to leaking, moisture damage, mold, or other deterioration which could cause failure. Therefore, metal covers with a water and vapor barrier installed behind the cover are common, as are fully watertight solutions that fit into a joint opening. Similarly, if airborne dust, dirt, or other objects get in behind the expansion joint cover, then it may not function properly since the anticipated movement or sliding of components could be impaired. Hence the expansion joint cover needs to seal against such penetration of foreign matter as well.

While the need for expansion joints and covers is clear, there is a design aspect that needs to be addressed. Often, the architect's main design concern is focused on concealing expansion joint covers so as not to have a significant impact on the overall building facade design. Manufacturers have responded with multiple options for covers that can be infilled with whatever facade materials are specified for the rest of the building, thus creating a rather continuous appearance. The metal of the expansion joint cover itself can also be custom colored to match a building's facade and become virtually undetectable.

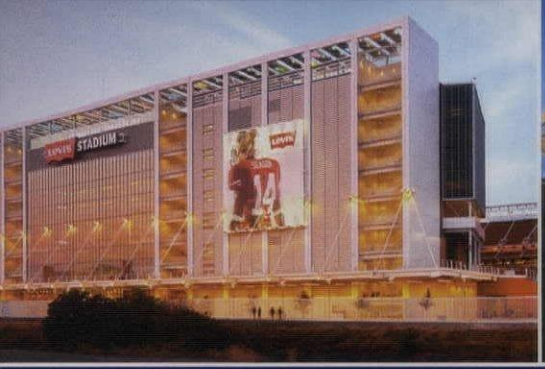
When an expansion joint cover type is identified that meets the aesthetic criteria for a project, architects can then work with manufacturers to verify that the performance criteria is met. Some provide considerable technical assistance and, when applicable, they can conduct cycle testing on a joint cover to verify their performance. From that standpoint, architects should have confidence that the solution they specify will both perform well and blend into the overall facade design in a minimally invasive way.

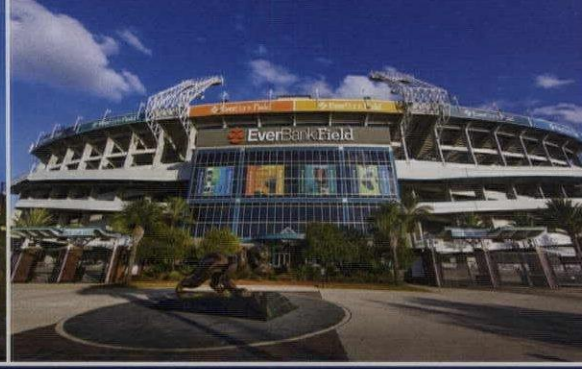
Kevin Smith, PE, is the engineering manager at Construction Specialties and provides technical assistance to architects on a regular basis regarding expansion joint covers. He points out that "Many of our expansion joint covers have been reimagined over the years to accommodate architects' demand for better integration with their designs. Each project that we work on is an opportunity for us to evaluate how to refine our solutions for better performance, resiliency, and concealment." Clearly, then, there is an ongoing interest within the industry to accommodate project specific requirements that address all aspects of incorporating expansion joints successfully into a building facade.

Architectural Louvers in Facades

Buildings require a precise means to provide intake for outside air as well as exhaust for HVAC systems. Some building designs are also allowing the facade to provide natural ventilation so the building can "breathe" or vent. While the size and locations of such intake or exhaust openings are determined in concert with mechanical engineers, it is typically the architect who determines the aesthetics and how the louvers integrate with the facade. Commonly, the solution lies in selecting architectural louvers which allow for proper airflow while preventing water and even wind-driven rain from entering, plus providing frame joinery that is integral to the adjacent facade. Fortunately, architectural louvers, like expansion joint covers, can be designed to meet these performance needs and be readily customized to integrate into virtually any building facade.

Architectural louvers are typically designed and engineered to meet some specific and demanding performance requirements. Louvers are available in a range of performance categories, including storm-resistant, extreme-weather resistant, impact-rated, acoustically rated, drainable, non-drainable, operating, and even blast-resistant selections. But it's not enough to just pick from one of these different louver types when specifying them. The louver system also needs to be in-





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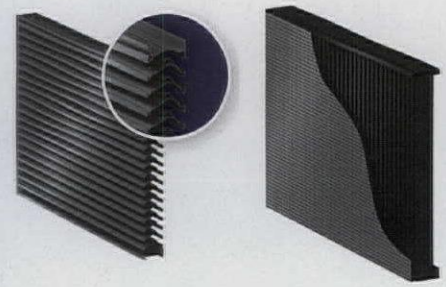
Images courtesy of Construction Specialties



Different types of louvers are available for facades to suit different performance requirements and to provide different design appearances.

dependently tested and certified by the Air Movement and Control Association (AMCA). This is the third-party testing agency for the louver industry that provides a means for manufacturers and products to have consistent and accurate published performance data. No louver model should be used without the appropriate AMCA seal located on the manufacturer's technical data sheet. In particular, AMCA Publication 511 dictates the proper presentation of data and other required technical procedures for certification of air control devices under the AMCA Certified Ratings Program. ANSI/AMCA Standard 500-L1 is the basis of this program and outlines the testing protocols of louvers. Its goal is not to establish minimum/maximum performance ratings but rather to outline a standardized method for testing louvers for different parameters. It includes a laboratory method of testing louvers for ratings in the categories of Air Performance, Point of Beginning Water Penetration, and Wind Driven Rain. In addition, Free Area is included as a calculation, rather than a test, but is also a crucial performance indicator.

Clearly the balance of performance and aesthetics of the louvers is important so they meet the needs of particular buildings, but anytime they are visible on the facade, their ability to blend in or enhance a building design scheme is important too. Aesthetically, architectural louvers offer considerable design flexibility. Louvers can be installed and oriented either horizontally or vertically. They can be custom-curved, outfitted with creative blade color patterns, use varying blade depths, or include asymmetrical blade frequencies and staggered blade placement. LED lights can even be added to create a dramatic or subdued accent. Louvers can be selected and specified in a range of profile styles with different appearances across the louver blade areas. Many are available with a full palette of color options, including color shifting, wood grain, and faux stone finishes. There is even at least one product that offers a louver hidden by perforated sheet, thereby allowing all the air movement, security, and sight screening of standard louvers but with a fresh, modern appearance.

In addition to the louver blades, it is increasingly important for the louver frames to have custom joinery to allow for integration into the adjacent facade system. This allows for consistent envelope performance and consistent framing sightlines. They can be specified in colors or other details to match or complement the louver blades or the surrounding facade material. In this way, louver systems can integrate into metal panel, storefront, or curtain wall along with a variety of other facade systems. Perimeter frame extrusions can be standard or custom created to achieve the desired look while not compromising performance.

While some architectural louver products are standard "off-the-shelf" systems, custom systems are becoming more common too. Architectural louvers are often designed to have custom joinery to integrate into curtain wall and metal panel facade systems for example. And they are available with additional customized accessories such as bird screens, sealed insulated blank off panels, sill pans, and LED lights. Often, a custom application can benefit from working with a manufacturer who can run custom tests in certified test chambers on site. Such testing should address air performance, water penetration, and wind-driven rain penetration of the louver but also test to ensure that the integrity and performance of the curtain wall/louver joinery. It is through this approach to custom designs and applications that architectural louvers can help elevate both the look and performance of the building facade.

Eric Sposito, CDT, is the general sales manager at Construction Specialties, a manufacturer of a wide range of architectural louvers. He says that "Custom-designed architectural louvers allow architects to defy traditional airflow design conventions in order to achieve their true vision, without sacrificing performance." In that regard, they can readily meet all design and performance criteria.

CONCLUSION

Building facades provide a wealth of design opportunities with a wide range of materials and systems to choose from. They also require careful attention to details to be sure that all of the performance needs are met to control wind, water, sun, heat, and normal movement due to expansion and contraction. By keeping up to date with manufactured products, innovations, and creative applications, architects can design buildings that are vibrant, exciting, and long lasting.

Continues at ce.architecturalrecord.com

Peter J. Arsenault, FAIA, NCARB, LEED-AP *is a practicing architect, a green building consultant, continuing education presenter, and a prolific author engaged nationwide in advancing building performance through better design.* ***www.linkedin.com/in/pjaarch***

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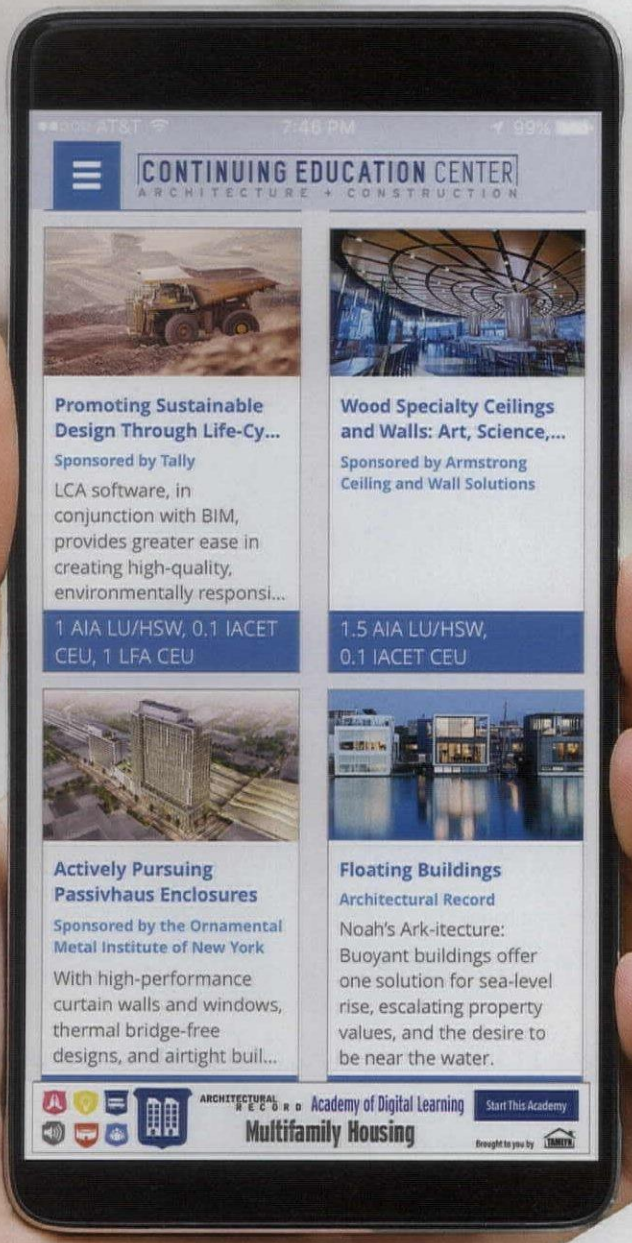

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PRODUCT REVIEW

High-Performance Facade Solutions

Construction Specialties

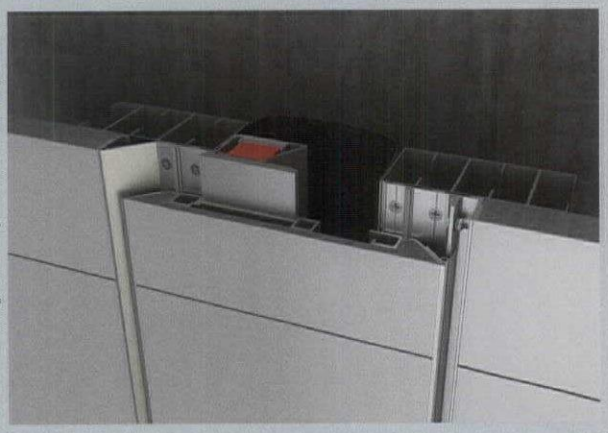

Image courtesy of Construction Specialties

XLS Seismic Exterior Wall Cover

Construction Specialties' XLS covers are designed for applications where concealment is desired and where seismic activity is expected. The system has a structural ladder-frame assembly and can accept materials to match the facade. Each unit has two heavy-duty magnetic closures and a pulley system to ensure the system remains closed.

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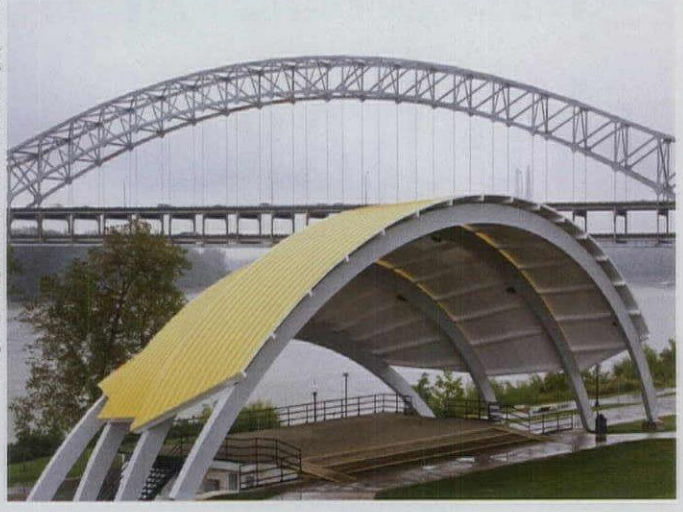

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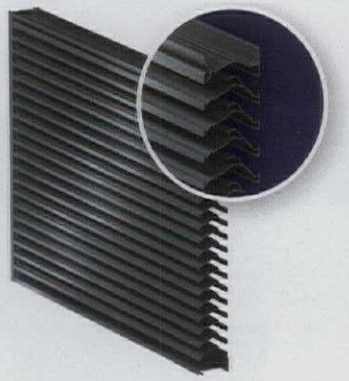

Image courtesy of Construction Specialties

RSH-5700 Storm-Resistant Louver

Construction Specialties' Storm-Resistant Louvers provide the highest level of water protection while also allowing for excellent airflow. In addition to exceptional AMCA-certified air and water performance, model RSH-5700 has the ability to integrtate into metal panel and unitized curtain-wall systems unilizing project-specific custom extrusions.

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EXTECH/Exterior Technologies, Inc.

Photo courtesy of EXTECH/Exterior Technologies, Inc.

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extechinc.com/lightwall

SAFTI FIRST Fire-Rated Glazing Solutions

Photo courtesy of SAFTI FIRST

GPX FireFloor

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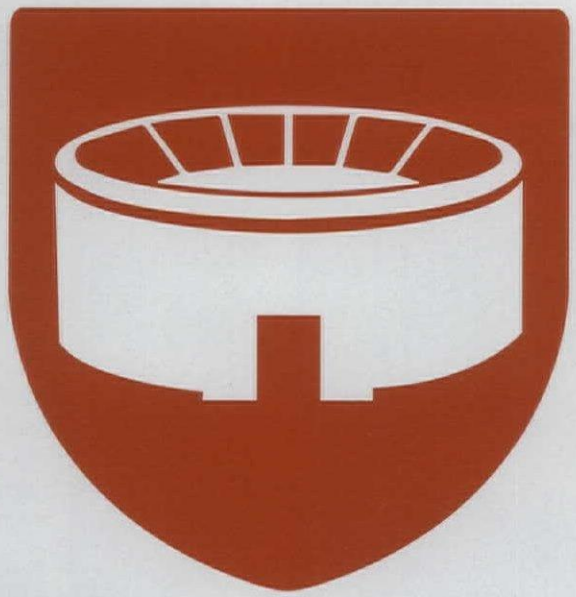

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Designing Beyond Borders

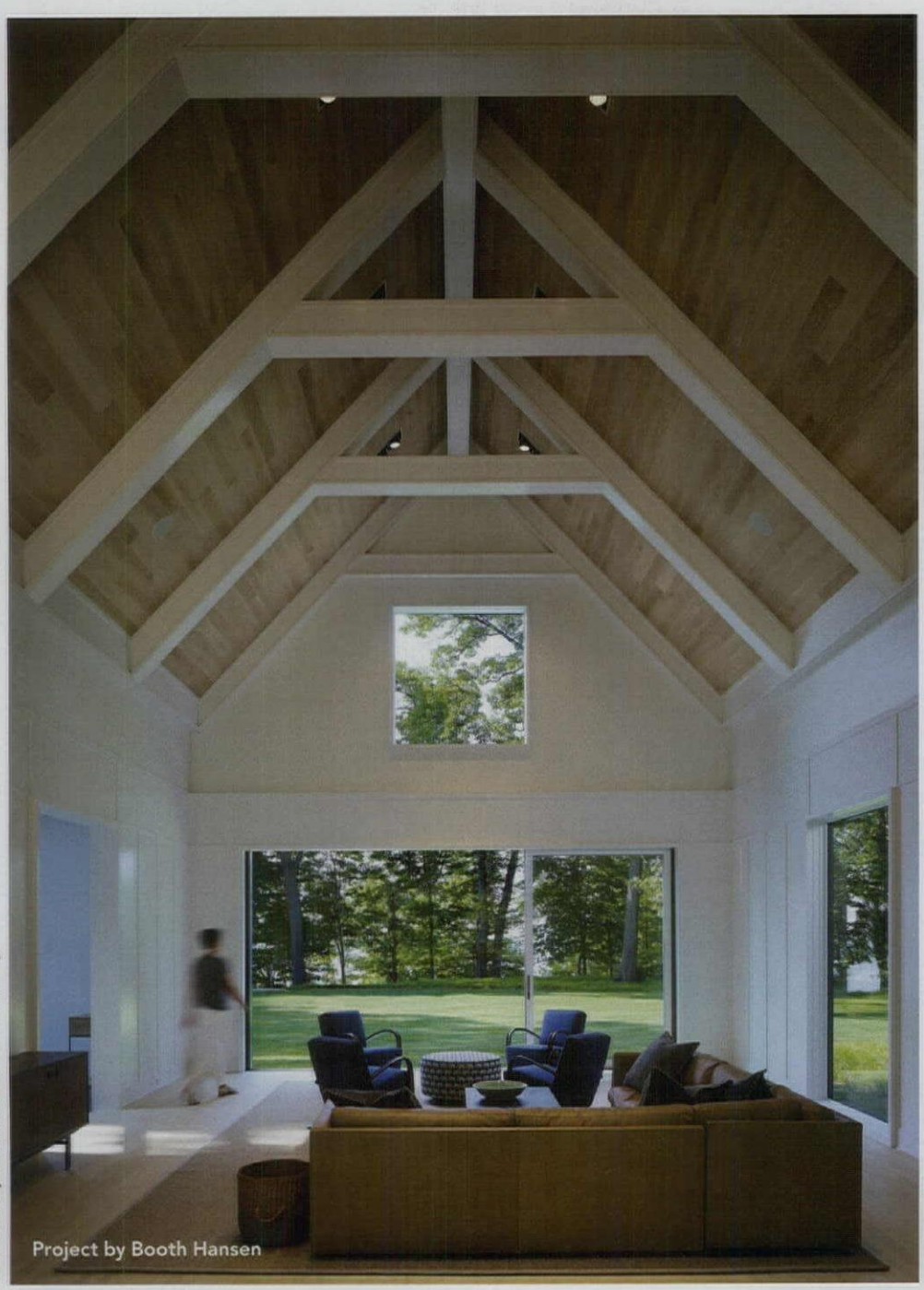
Creating symmetry, sustainability, and enhancing indoor-outdoor living with multi-panel folding and sliding door systems

Sponsored by LaCantina Doors | *By Amanda C. Voss, MPP*

Why must we think of home and nature as distinct, or even opposing, spaces? For the health of both home and nature, a marriage between what lies within the edifice and the space outside is critical. Bringing the outside into a structure enhances indoor air quality (IAQ), ventilation, natural daylighting, and the health of occupants. Taking into consideration the natural surroundings when adding a structure means creating minimal ecosystem disruption and preserving as much of the environmental balance as possible. The best design does not stand in opposition to nature; instead it facilitates cooperation and the elimination of perceived boundaries.

By their very design, multi-panel door systems enable an unbroken engagement between interior and outdoor spaces. A multi-panel door system is a door or window structure with multiple operable panels that open sequentially to create a large opening, spanning an entire wall or beyond. Reaching beyond the capability of a traditional hinged door, multi-panel systems don't just transition between indoors and out. Instead, the wide and seamless openings they furnish blend the exterior space into a room or series of rooms, eliminating the perceived divide.

Not only do multi-panel door systems improve important health metrics, such as indoor air quality and daylight exposure, as enhancements in manufacturing and technology have augmented door and glass efficiency, these systems can occupy a greater area in the building envelope without compromising overall energy performance.



Project by Booth Hansen

Photo courtesy of Steve Hall © Hedrich Blessing

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1.25 AIA LU/HSW

1 GBCI CE HOUR

0.1 IDCEC CEU

Learning Objectives

After reading this article, you should be able to:

1. Understand the health benefits from integrating better ventilation and outdoor rooms with a building's interior.
2. Identify the aesthetic uses of consistent sightlines and product styling in creating a seamless profile for a perfect match.
3. Discuss multi-panel door system materials and components and their environmental, sustainable, and energy benefits for a project.
4. Realize the importance that proper installation has for a building's sustainability.
5. Recognize environmental ratings, such as NFRC and LEED, and how multi-panel door systems can help to meet these standards.

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Photo courtesy of John Ellis

Project by AB Design Studio

A PRIMER ON DOORS: THE COMPONENTS OF MULTI-PANEL DOOR SYSTEMS AND THEIR BENEFITS

Types of Operation

Multiple-panel door systems, or multi-panel systems, are composed—as the name implies—of multiple panels. The way in which these panels operate gives the system type its name. The common types of multi-panel door systems are folding and multi-slide. Multi-slide doors may be further divided into stacking multi-slide or pocketing multi-slide.

Multi-Slide Doors

In a multi-slide door, panels stack together within the opening. They may either stack to one side when fully open, divide and stack to either side of the frame, or be stacked and contained within a pocket framed into the building's wall, out of sight.

Multi-slide glass doors are generally used to create large openings in walls, or to take the place of an exterior wall altogether. The size of the panels and the total door unit can vary and may be custom fabricated to suit a particular building project. Usually, it is the glass itself that imposes limits on the size of each individual multi-slide panel. The number of individual panels can vary to meet the dimensions of the desired opening.

The configuration of multi-slide door panels can be designed so that all panels stack behind each other on one side of the opening or so that panels are split to stack on both sides of the opening. There are two basic options for how the individual panels appear when stacked. The first option is to keep one glass panel fixed, or stationary, and to slide all adjacent panels to stack evenly behind this stationary panel. By using this option, some manufactured designs, when fully stacked, appear to be a single panel when viewed from the inside or outside. The second option is to conceal the sliding panels, when open, in a wall pocket. In this style, the sliding panels disappear altogether, giving the appearance of an unimpeded opening in an otherwise solid wall area.

Photo courtesy of LaCantina Doors

CASE STUDY ON DESIGN USING AESTHETICS TO ELIMINATE THE BARRIER BETWEEN NATURE AND HOME

A home that harmonizes with and complements the landscape in which it is placed is a hallmark of modern, sustainable design. "People are recognizing that the backyard has long been under-utilized square footage," writes D Magazine. "In the quest to make every inch of property useful and livable, indoor spaces are opening directly to the backyard or to patios with pizza ovens and fire pits." (https://www.dmagazine.com/publications/d-home/2014/january-february/latest-trends-in-home-construction-and-renovation/)

Not only do multi-panel door systems create a borderless transition between interior and exterior spaces, certain manufacturers offer perfect match design platform, creating consistent sightlines across all windows and doors regardless of their operation, whether folding, sliding, or swinging. Stile and rail symmetry and consistent sightlines are a critical design element creating balance in large-panel, open-space systems.

In today's evolving home designs, larger openings that maximize space and natural daylight have grown in popularity, making open space products one of the focal points of the design. Narrower frame profiles and taller doors allow for more glass, more light transmittance, and a cleaner aesthetic. In large, sweeping floor plans, different openings that may call for dissimilar products types often fall side by side, unfavorably highlighting the variances in symmetry. Perfect match resolves this design concern by using a single, signature door panel across folding, sliding, and swing door systems, thereby providing a complete and perfectly matching door package that is naturally pleasing to the eye. Innately, people have an instinctual sense to assess the level of balance achieved within a space. Balance and symmetry are vital when creating open space products, allowing the flow of design and borderless transitions to march unbroken between structure and surrounding ecosystem.

By utilizing the same panels throughout, a designer can achieve consistent sightlines and product styling for the perfect match. This unified transition of perfect match profile mirrors the seamless blend between indoors and out.

Photo courtesy of Eric Figge Photography

Furthermore, multi-slide doors need not be limited to a single wall plane. Manufacturers have developed methods to allow doors to meet at a corner location, eliminating the need for a post or frame element. When open, the corner literally disappears, allowing a full visual and physical three-dimensional connection between outdoors and inside. When fully closed, the door panels come together to form the corner.

Folding Doors

In a folding multi-panel door system, panels stack perpendicular to the opening when fully opened. As with multi-slide systems, folding system doors may stack to one side when open or can divide and stack on both sides of the opening. The folding action mimics the expansion and contraction of an accordion. The panels may be inswing or outswing, depending on design preference and use.

Folding glass doors may either be floor mounted or top hung, with top-hung systems the preferred method. In a top-hung folding door system, the top track carries the weight of the doors and the floor track serves as a guide. Precision bearings and rolling hardware are used to operate the door. The frame must be secured to an adequate header with minimal deflection when the doors are installed. The structural support required and header size depends both on the weight of the doors and the surrounding structural conditions.

MULTI-PANEL DOOR SYSTEM MATERIAL OPTIONS

Both folding and multi-slide multi-panel door systems are available in a variety of materials. The material selected for the door has implications for its efficiency and performance. Careful selection of each project's doorframe material should consider use, aesthetics, climate zone, and efficiency goals.

Aluminum

Aluminum systems have a clean, modern appeal, with some manufacturers offering a narrow 2¾-inch stile and rail profile, allowing for maximum glass and light. Aluminum is suitable for use in exterior applications or as interior space dividers. A 10-inch-tall bottom rail and ramp sill meet commercial Americans with Disabilities Act (ADA) code requirements. Aluminum frames are offered in several finish options. White, anodized clear, and dark bronze aluminum match most commercial aluminum window finishes. Selecting aluminum eliminates the need for finishing, and offers low maintenance. That said, aluminum typically has the highest U-factor and is best suited for use in moderate climates where heat loss is not a concern.

Aluminum Thermally Controlled

This system offers improved thermal performance suitable for climates in which it is desirable to prevent extreme weather from impacting the conditioned interior space. Featuring thermal breaks throughout, and narrow $2^{15}/_{16}$-inch stile and rail profiles, aluminum thermally controlled systems are designed for optimal energy efficiency and structural performance that minimizes condensation build up and heat-cold transfer. European thermal struts create a non-conductive bridge between the outside and the inside of the door. Thicker panels (2¼ inches) are suitable for high wind environments and can include impact-rated features. A proprietary panel design by a leading manufacturer allows for split-finish color options for the interior and exterior providing maximum design flexibility.

Aluminum Wood

Better suited to exterior environments than a solid wood door, an aluminum wood system features a low maintenance aluminum exterior with a natural wood interior and a narrow 3⅝-inch stile and rail profile The hybrid panel construction typically consists of a 1¾-inch-thick extruded aluminum exterior and ½-inch solid wood interior. Typically, several wood species options are offered and commonly include vertical grain Douglas fir and mahogany. The exterior aluminum surface can be powder coated for a range of colors or finished for an all-wood look. An engineered aluminum panel construction creates strength and rigidity for larger openings and panels up to 12 feet tall.

Clad Systems

Made using heavy-gauge extruded aluminum cladding as an exterior in combination with a solid laminated wood core construction and a natural wood interior facing, clad systems offer greater durability, efficiency, and ability to withstand the elements than other materials. Clad systems typically have the best U-factor, offering maximum energy efficiency in colder climates. Certain manufacturers offer a newer, contemporary cladding design, which features consistent-width narrow $2^{15}/_{16}$-inch stile and rails, a square profile, and standard paint and anodized finishes combined with the warmth of a wood interior. Contemporary clad complements more contemporary architectural styles and window packages.

Wood

Best for interior space dividers, or exterior applications shielded from weather, all-wood systems lend a distinctive architectural style to a space. Wood surfaces will require ongoing sealing, staining, or painting. Standard wood systems incorporate a 3⅝-inch stile and rail profile, with 7½-inch and 10-inch bottom rail options, and they can accommodate custom panels from 1¾ inches to 2¼ inches thick. Most manufacturers use a solid laminated veneer lumber (LVL) wood core construction to maintain the integrity of the frame. Wood can provide energy efficiency and good thermal performance, and, when FSC certified, earn the project green credits.

Vinyl

High-quality vinyl offers excellent performance in all environments, and is an ideal solution for renovations, offering a match with popular vinyl window packages. Certain manufacturer's feature a narrow $2^{15}/_{16}$-inch stile & rail profile and stainless hardware for more contemporary styling.

Photo courtesy of Pentraprism

Project by Materia/Trace Wilson Design Inc.
Location: Cardiff, California
Architect: Materia, LLC, Principal, Trace Wilson

CASE STUDY: CARDIFF BI-COASTAL RESIDENCE

Architect Trace Wilson set out to blend his clients' East Coast and West Coast backgrounds by building this custom Cardiff, California home mixing both architectural styles. The homeowners also challenged the architect by requesting an open space design that wasn't overwhelming but warm and inviting. Ultimately, Wilson combined traditional Northeast sensibility with modern California Crafstman to create a home with an open, airy environment.

"This was a great project," says Wilson. The site chosen occupied the top of the hill with views to the south and west, down the coast, from Cardiff to La Jolla. Wilson introduced multiple multi-panel folding door systems to modernize the more traditional Eastern design elements and capture the California lifestyle aesthetic. However, the bifold doors played an important role not only in design but also in the health and efficiency of the home.

"Everything I design, I think about passive solar," says Wilson. "How do we keep the sun off of the building and out of certain rooms and how do we bring in sun where desired?" Cross ventilation, getting the home to breath, is also vitally important to a home's health. "With multi-panel doors, you gain the ability to open the entire wall," Wilson explains, "allowing for clear ventilation paths and breezeways. You can opt to essentially open a wall or simply crack the system or open a single panel as needed. From an energy standpoint, whatever we can do to site the structure and place the building in natural spaces, appropriate to the sun's angle, is best." Not only did multi-panel folding doors allow for thorough ventilation, they allowed the home to flow beyond the boundary of its walls. "How do you blur the distinction between patio and interior spaces?" asks Wilson. "I think these systems are very successful in that."

ESTABLISHING A SOLID FOOTING: THRESHOLDS AND COMPONENTS

Sills or thresholds need to be coordinated with the multi-panel door system and should support both the door system and number of door panels. Thresholds should be selected based on weather exposure and floor transition.

Thresholds are available in at least three different profiles and should be specified according to the project design needs. Flush sills are designed to be recessed into the floor, creating a level transition between the finished interior floor surface and the exterior. Flush sills can incorporate the same finish flooring between the sill tracks. Flush sills offer seamless transitions and are a preferred solution where there are covered openings. Raised sills, or weather-resistant sills, are the preferred solution for weather-exposed openings because of their greater ability to repel inclement weather. Raised sills are intended to have a raised profile and sit up above the exterior. Depending on the manufacturer, raised sills come in varying interior leg heights. Ramped sills are commercially compatible and offer ADA compliance when there is less than or equal to a ½-inch change in the sill height compared to the walking surface. Despite the threshold profile, all threshold styles are typically thermally broken. The grade of material for the threshold should be specified, as well as the bearings, hinges, and wheels of the door panels. Acetal and stainless steel are the most commonly seen materials.

To control air leakage and improve energy efficiency, multi-panel door systems also rely on a mix of perimeter seals applied to each door panel. Top seals can be brush type to allow for the smooth operation of the door while still restricting the transfer of air and weather. The bottom or sill seal may be composed of low-friction coated rubber applied to the bottom of the door, creating a full seal yet allowing for the smooth operation of the door panels. Continuous seals along the edges of each door panel may be compression rubber gaskets, fin brush seals, or both. Careful application of high-grade seals provides a tight seal when the doors are closed and helps to maintain pressure and weather resistance.

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***Amanda Voss, MPP,** is an author, editor, and policy analyst. Writing for multiple publications, she also serves as the managing editor for Energy Design Update.*

CONTINUING EDUCATION

Concrete-Filled Hollow Structural Sections (HSS): An Unbeatable Combination

Filling HSS members with concrete offers the most effective way to meet fire-protection requirements while achieving high compression strength, a smaller footprint, and the desirable aesthetics of exposed steel

Sponsored by the Steel Institute of New York

Exposed columns of steel hollow structural sections (HSS) are a striking and cost-effective design option, combining the aesthetics of exposed steel with the structural support and reduced footprint of structural steel.

As exposed elements, HSS eliminate the need to furnish and install column covers, minimizing the column's profile. The tubular form in particular presents a clean, exposed steel surface that exudes a modern appearance.

Exposed steel offers an appearance that is often missing in other types of construction, explains Dr. Venkatesh Kodur, director of the Center on Structural Fire Engineering and Diagnostics at Michigan State University in East Lansing, Michigan. It provides not only the illusion of larger, more uninterrupted space by its slim profile but also a visual cue that the structure is both sound and in good condition.

CONTINUING EDUCATION

1 AIA LU/HSW

Learning Objectives

After reading this article, you should be able to:

1. Explain the structural, construction, and aesthetic benefits of exposed steel hollow structural sections.
2. Identify the fire-protection and structural benefits of concrete-filled HSS as compared to other exterior fire-protection methods.
3. List the variables that will determine the calculated level of fire resistance delivered by the concrete-filled HSS members.
4. Discuss construction efficiencies and best practices for erecting the steel and piping concrete into HSS tubes.
5. Define the benefits of a performance-based design approach over prescriptive design when specifying concrete-filled HSS.

To receive AIA credit, you are required to read the entire article and pass the test. Go to **ce.architecturalrecord.com** for complete text and to take the test for free.

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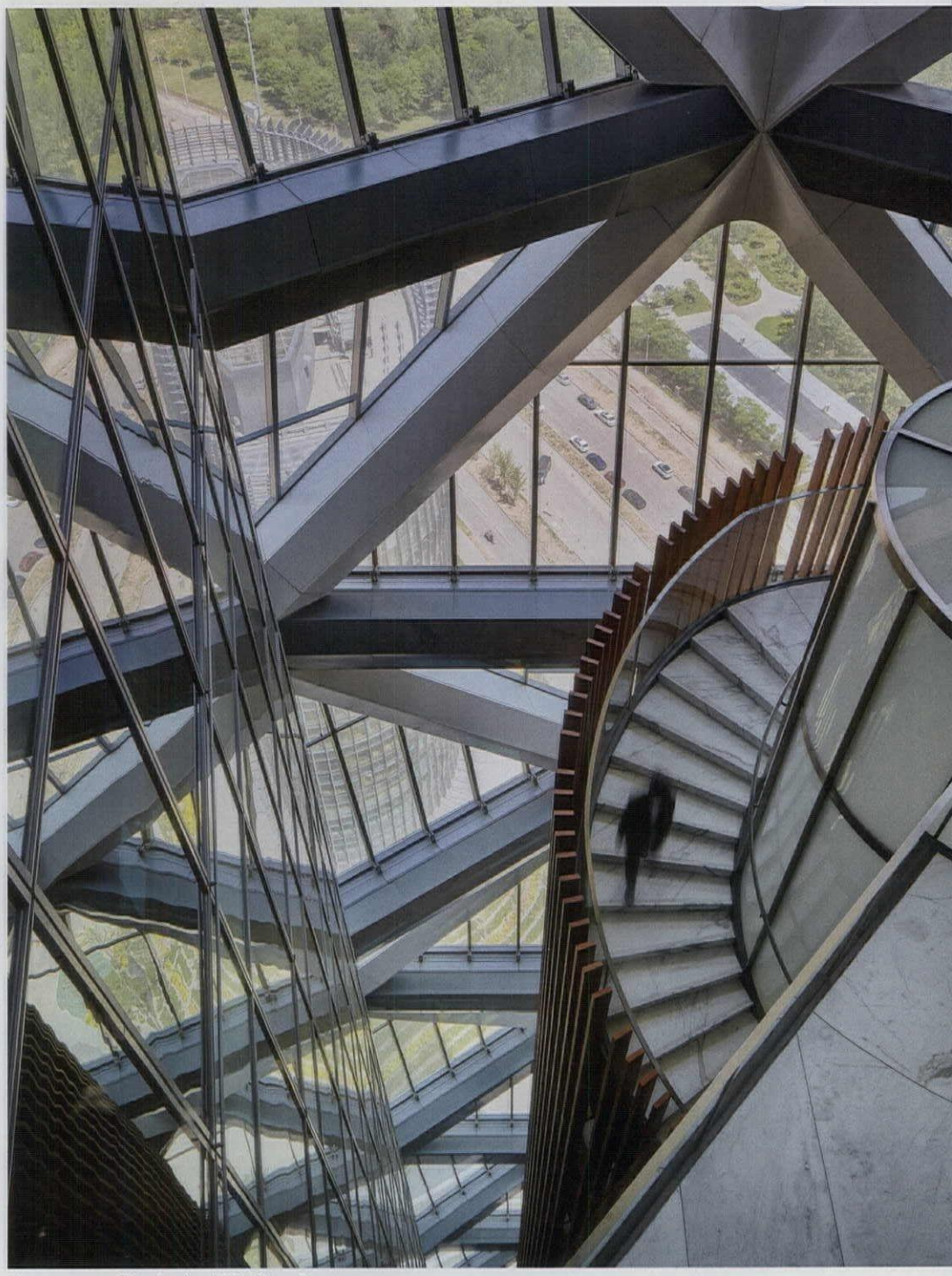


Photo courtesy of Tata Steel and SOM/Bruce Damonte

Available in round, square, or rectangular tubular forms, HSS deliver a clean, simple aesthetic. Each shape has rounded edges that effectively soften its appearance and minimize shadows. "When used as columns, the way light bends around the round HSS shapes in particular can make them appear slimmer," says Andrea Reynolds, S.E., P.E., LEED AP, director of structural engineering, SmithGroupJJR, Detroit. Structural engineers are drawn to the high capacity-to-weight ratio and excellent torque and resistance of HSS, while building owners, architects, and engineers alike appreciate their clean, visual appeal.

"Exposed steel provides a rugged industrial look, providing a sense of authenticity and direct feel for the structure of a building that is appealing to many clients," says Ali Ashrafi, Ph.D., P.E., LEED AP, associate principal, Thornton Tomasetti, New York.

As a torsionally stable member, HSS eliminate the need for other structural bracing members, thereby reducing clutter, simplifying the structure, and producing a more elegant solution, adds Preetam Biswas, P.E., associate director, senior structural engineer, SOM, New York. They also eliminate the need for formwork, which typically accounts for one-third of concrete construction costs.

"Structural hollow sections are particularly suitable for exposed steelwork, as they do not have reentrant corners, are easier to paint, have a smaller perimeter, and give a smoother appearance," explains Yong Wang BA, Ph.D., CEng, FIStructE, professor of structural and fire engineering at the School of Mechanical, Aerospace and Civil Engineering, University of Manchester, United Kingdom.

He adds that circle-shaped sections are the most efficient shape in terms of compression. "This means for an equal steel weight, the column will be smaller, with a reduced footprint, as compared to other shapes, resulting in increased leasable area for building owners," he says.

This is particularly applicable in high-rise construction, which has high compressive loads.

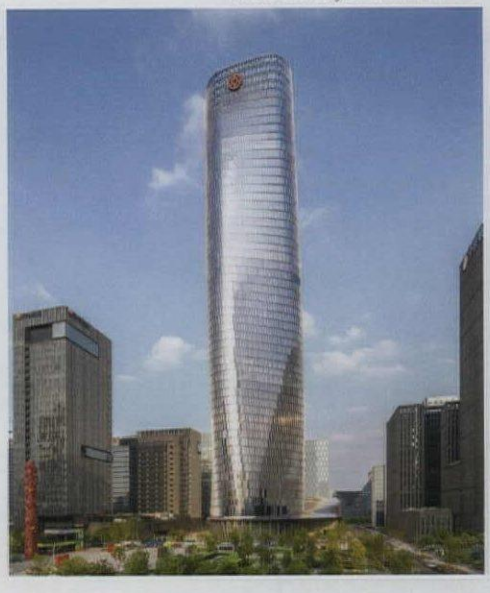
HSS AND FIRE PROTECTION

In fire-rated applications, external fire-protection methods for HSS are not only expensive but also cover up the exposed steel, negating its aesthetic appeal.

Fortunately, concrete-filled HSS offer a solution. In addition to meeting a building's fire-protection requirements, this method retains the beauty of HSS as an architectural element and enhances each structural member's load-carrying capacity.

"These two materials—steel and concrete—complement each other in that the steel section confines the concrete laterally, allowing it to develop its optimum compressive strength, while the concrete, in turn, enhances resistance to elastic local buckling of the steel wall," Kodur says.

Photo courtesy of SOM/Archexist



SOM specified concrete-filled hollow steel sections for the Ningbo Bank of China Headquarters in Ningbo, Zhejiang, China, described as a site-specific tower with the exterior's triangular shape and rounded corners gradually rotating around a vertical axis facing the city, the mountains, and the sea.

Beyond their fire-protection qualities, concrete-filled HSS also "optimize the strength and stiffness of the member by placing the steel at the outer perimeter where it is most effective in resisting bending moment and has the greatest impact on the moment of inertia of the member," explains Reynolds. "The concrete core is ideal for withstanding compressive column forces and prevents local buckling of the steel tube, while the steel tube confines the concrete that can impact the compressive strength and ductility."

Similarly, Biswas points out that, structurally, concrete-filled HSS columns provide the optimal use of materials and smaller member cross sections, as opposed to regular concrete. Yet another benefit is the fact that the concrete fill, protected by the steel, is maintenance free and not subject to any issues of deterioration or detachment that would affect its performance. "This is advantageous because it prevents the spalling of concrete so the entire volume of concrete participates in resisting forces," he says. "Eliminating the spalling of the unconfined outer layer of concrete results in a more optimal use of concrete material for both strength and stiffness."

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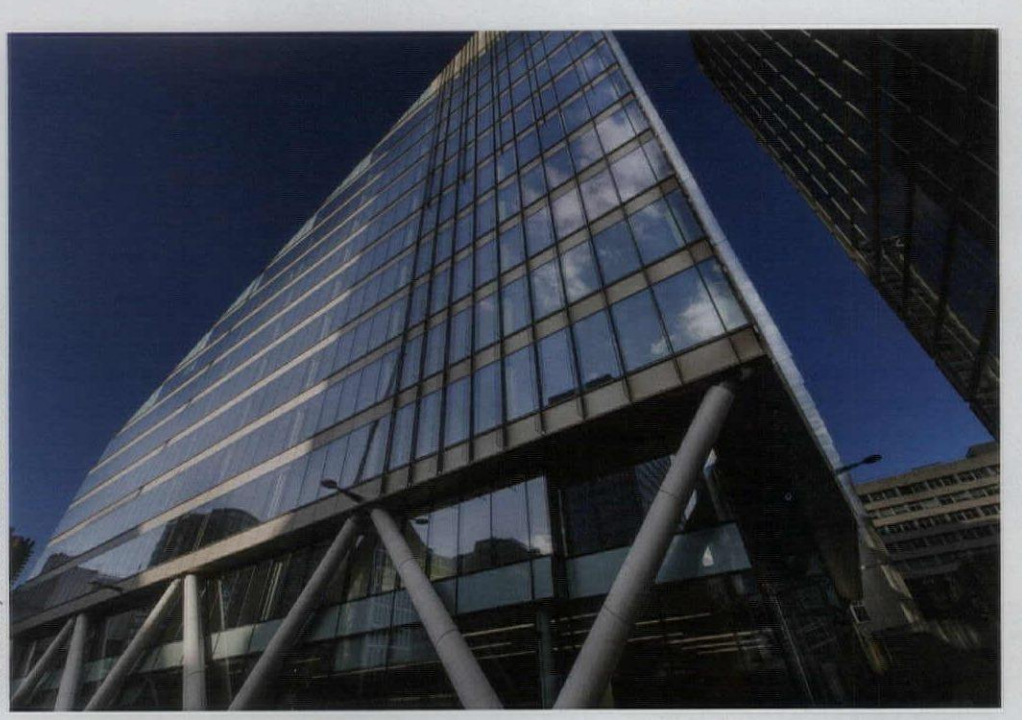
Photo courtesy of Tata Steel and SOM/Bruce Damonte



As pictured here at London's Moorgate Exchange (above) and Beijing's Boy International Plaza (left) concrete-filled exposed steel hollow structural sections present a beautiful aesthetic, a smaller structural footprint, and cost-effective fire protection.

Photo © Eric Laignel

Shades by Lutron

Solar Adaptive Shades
ASID HQ, Washington DC
First space in the world to earn both LEED and WELL v1 Platinum Certification
Architect: Perkins & Will

LUTRON

lutron.com/shadesbylutron

Photo © James Steinkamp Photography

Automated shading systems are powerful tools that contribute toward earning many different green building criteria. The Zurich Headquarters (Schaumburg, Illinois), shown here, is pursuing a LEED Platinum certification.

Green Building with Automated Shading Systems

A closer look at satisfying sustainable criteria in the four leading green building programs

Sponsored by Lutron Electronics | *By Jeanette Fitzgerald Pitts*

One of the most often cited explanations of sustainable design is this: "Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs."

This description first appeared in the 1987 study *Our Common Future*, commissioned by the United Nations. Although there was a growing realization of its importance, the available tools, know-how, and market-driven motivation did not support an explosion of sustainable development at that time. Limited research had been conducted to explore what contributed to a sustainable environment. The first building standard ever focused on reducing energy consumption, ANSI/ASHRAE/IES Standard 90, was still in its infancy. The dearth of information led to some misguided perceptions on what constituted sustainable design. For example, windows were largely regarded as detriments to building efficiency, not vital for human occupancy.

Thirty years later, the industry has created much of the infrastructure necessary to support a real sustainability movement. New technologies have been developed to offer a larger number of more efficient products and building systems. Several third-party certifications exist to quantify and qualify product life cycles, volatile organic compound (VOC) emissions, and material ingredient lists. Extensive research has been conducted since 1987 to dive more deeply into almost every aspect of sustainable design and its impact on the environment, economy, and occupant health. Concluding, for example, that providing building occupants with access to glare-free daylight and views has a positive impact on their mood, pro-

CONTINUING EDUCATION

1 AIA LU/HSW

1 GBCI CE HOUR

0.1 IDCEC CEU

1 LFA CEU

Learning Objectives

After reading this article, you should be able to:

1. Identify green building criteria within LEED v4, WELL Building, Living Building Challenge, and ANSI/ASHRAE/USGBC/IES 189.1 that can be satisfied or supported with the specification of automated shading systems and environmentally friendly shade fabric.
2. Describe how automated shading systems and PVC-free fabrics were used in the new ASID Headquarters, the first project in the world to receive Platinum certifications from both LEED and WELL Building rating systems.
3. Explain how automated shading systems save energy and safeguard comfort and well-being by mitigating solar heat gain and maximizing the amount of glare-free daylight allowed into a space.
4. Specify shade fabric and shading systems that can satisfy various materials and resources requirements across different green building systems.

To receive AIA credit, you are required to read the entire article and pass the test. Go to **ce.architecturalrecord.com** for complete text and to take the test for free.

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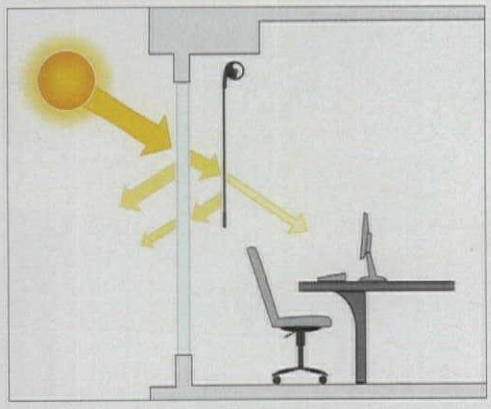
GBCI COURSE #0920014584
IDCEC COURSE #CC-106809-1000

Image © Lutron Electronics



High-performance solar fabric creates an effective thermal barrier at the window by reflecting much of the radiant solar energy back outside or trapping the energy between the glass and the fabric.

ductivity, health, and well-being. Several green building rating systems have emerged to provide a structure, guidance, and a level of standardization to aid the design community in their sustainable design efforts.

These advancements in technology, evidence-based direction, and green building programs better equip designers to achieve the basic goals of sustainable design, which are, as defined by the General Services Administration (GSA), the agency tasked with managing government buildings and real estate (among other things): reducing consumption of nonrenewable resources, minimizing waste, and creating healthy, productive environments. Now it's time for the sustainable rubber to meet the green-built road and examine how designers can use the available products and systems to create projects that meet the criteria in the various green building programs.

Although the specific focus and scope of any particular green building program may differ from another, they all seem to agree that providing occupants with access to glare-free daylight and exterior views is a basic tenet of sustainable design. One product uniquely suited to meet these demands is the automated shading system, and it is a solution that is less-involved, from a design perspective, than the efforts necessary to satisfy many of the other sustainable criteria. "When considering the spectrum of sustainable design solutions, automated shades are an easy yet powerful way to address both indoor environmental quality and energy-efficiency considerations," explains Brent Protzman, director of building science and standard development, Lutron Electronics.

This course will explore how automated shading systems and environmentally friendly solar fabric contribute toward satisfying sustainable design criteria found in four different green building rating systems in use today: Leadership in Energy and Environmental Design v4 (LEED v4), the WELL Building standard (WELL), the Living Building Challenge, and the latest version of ANSI/ASHRAE/USGBC/IES Standard 189.1 (Standard 189.1).

THE SUSTAINABILITY BENEFITS OF SHADES

The intertwined nature of the health of the environment, health of building occupants, and the economic value that must be created in a business venture is one of the aspects that makes sustainable design so compelling. It can also leave designers in a bit of a quandary, as it requires the simultaneous achievement of goals that sometimes seem at odds with one another. For example, providing people with access to daylight and views is an important piece of sustainable design, but that access can cause discomfort and wreak havoc on HVAC system efficiency and productivity if glare and solar heat gain occur.

Luckily, there is a solution that enables designers to balance the demand for more daylight exposure with the need to provide adequate protection from solar heat gain and glare. Automated shading systems are essentially sustainability multitaskers at the window. They actively and automatically manage the presence of daylight in the space, which enables automated shading systems to make a significant contribution to sustainable criteria in many ways. These systems can mitigate solar heat gain and maximize the presence of glare-free daylight on the interior. Beyond providing access to daylight that will not disrupt the performance of employees or cause discomfort, maximizing the presence of daylight in a space can also save lighting energy if the electric lighting system is equipped to reduce light levels when sufficient daylight is available. Solar shades can provide a continuous view to the outdoors regardless of whether the shade fabric is deployed or retracted, and the materials and fabrics used in the system can satisfy many of the materials criteria found in the different green building programs popular today.

Mitigate Solar Heat Gain

Keeping the interior sufficiently cool is, typically, one of the largest energy uses in a nonresidential building. For years, designing a facade with many windows seemed counterproductive to building efficiency because direct sunlight would pass through the windows, pour into the space, and heat it up, requiring the HVAC system to expend more energy to cool the interior down again. The problem, referred to as solar heat gain, occurred because direct beam solar radiation contains a lot of infrared radiation, which becomes radiant heat when it is absorbed. Sustainable design criteria, however, recognize the importance of offering building occupants exposure to daylight and views, forcing designers to add windows in a way that will not eat energy.

Shading systems made from high-performance solar fabric provide thermal management of solar radiation in two ways. When the fabric is deployed, it creates an effective thermal barrier at the window by reflecting a significant portion of the radiant solar energy that passes through the window off of the exterior face of the fabric and back outside and trapping much of the remaining energy in the space between the glass and the fabric. Buildings equipped with shades that have a high solar reflectance have been shown to deliver HVAC energy savings in the range of 3 to 22 percent, depending upon facade design and other project properties.

Maximize the Presence of Glare-Free and Usable Daylight

In 2012, the Rocky Mountain Institute published the *Guide to Building the Case for Deep Energy Retrofits*, in which it explained that while energy costs represent roughly $3 per square foot per year, the cost of people in a building is closer to $300 per square foot per year, putting a premium on the impact that improvements in productivity can make to the bottom line. These findings align with the goals of sustainable design to create healthy and productive spaces, positing that creating spaces that are good environments to work will, in turn, contribute toward good work getting done. Studies conducted by the Heschong Mahone Group and others have shown that providing access to

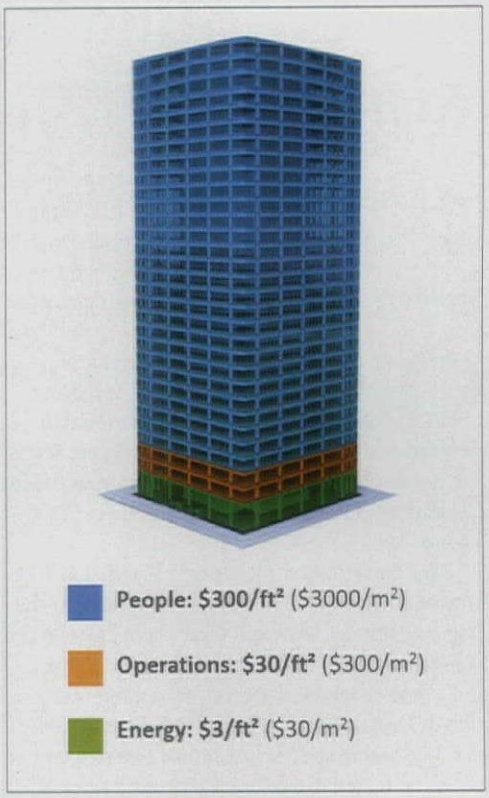


Image courtesy of Lutron Electronics

According to the Rocky Mountain Institute, improving employee comfort and productivity may offer a greater bottom-line benefit than energy savings.

daylight and views throughout the day creates spaces in which employees are more satisfied, students learn faster, and patients experience shorter recovery times. In short, daylit spaces and spaces that offer a view of the outdoors enable the people within to be more productive.

Unfortunately, daylight is an incredibly dynamic light source, and not all daylight is usable or practical in a typical interior environment. For example, on a sunny day, the intensity of daylight may reach up to, or over, 10,000 footcandles (fc). Light with this level of intensity may cause discomfort and distort the balance of the visual environment if it passed freely into a space. The daylighting industry recognizes the different types of daylight and has attempted to distinguish between useful daylight and daylight that should be controlled, coining the phrase "useful daylight" to describe daylight that will not cause glare or discomfort to occupants in a building.

In an office setting, the range of useful daylight illuminance is generally considered to be between 10 fc and 200 fc measured at the workplane. This range of useful daylight aligns with recommendations developed by the IES that define optimal light levels for various visual tasks. The IES recommends that office buildings maintain 30 fc at the workplane in private offices, open office spaces, and conference rooms.

Automated solar shades maximize the presence of usable daylight in the interior space by automatically deploying when daylight is direct or overly intense to protect the interior environment, and then automatically retracting when useful, ambient daylight is available. This automated functionality delivers two important sustainability benefits. It maximizes a building occupant's exposure and access to useful and glare-free levels of daylight because the shades are only deployed when daylight must be managed and are raised whenever possible. And, if the lighting system is equipped to reduce lighting levels or turn off when sufficient daylight is available, an automated shading system will create the greatest potential for lighting energy savings because it allows the greatest amount of usable daylight into the interior.

Made from Environmentally Friendly Materials

Although energy efficiency gets a lot of attention in the sustainable space, green building also emphasizes the use of products and materials that make a limited environmental impact over their lifetime. These life-cycle evaluations consider multiple facets of a product's life, from the materials used during production and the excavation practices of those materials to their presence in an indoor environment and in disposal once the product has served its purpose.

Photos © Eric Laignel of Perkins + Will

The ASID Headquarters in Washington, D.C., is the first project in the world to achieve Platinum certifications in both LEED v3 and the WELL Building standard.

ASID HEADQUARTERS

The American Society of Interior Designers' (ASID) new corporate headquarters in downtown Washington, D.C., is the first project in the world to achieve Platinum certifications from both the WELL v1 Building Standard and the LEED v3 green building rating system. This accomplishment marks the ASID project as a beacon for designers in the pursuit of creating buildings that successfully satisfy the many different facets of sustainable design.

David Cordell, ASID, LEED AP, WELL AP, associate principal, Perkins + Will, Washington, D.C., office, was the senior technical coordinator and project manager of the ASID headquarters project. In an interview, Cordell shared the keys to this dual-Platinum success. "There are a number of areas between the two systems that overlap. There are 16 credits within LEED that correspond, almost directly, to 18 credits within the WELL standard. Many of these overlapping credits address elements of indoor environmental quality, which include providing access to glare-free daylight and unobstructed exterior views, and specifying products that are transparent about their chemical makeup and minimize the use of harmful materials. Working to achieve Platinum ratings in both systems put a priority on achieving the items that would satisfy both systems simultaneously. The automated shading system and PVC-free shade fabric specified on this project contributed toward satisfying these overlapping credits."

The Automated Shading System and Shade Fabric at ASID HQ

At ASID headquarters, the automated shading system is designed to prevent glare and overly bright conditions from interfering with the interior visual environment, while maximizing the amount of ambient daylight allowed into the space and the amount of time that unobstructed views are available at the window. The system meets these three objectives by automatically adjusting the shade to its optimal height based on the exact position of the sun and its relation to the specific facade and elevation of the window, accounting for harsh reflections of the solar orb off adjacent buildings and current weather conditions. The weather is an important feature to consider because cloudy or hazy conditions may allow for the shades to be fully retracted, regardless of the time of the day or position of the sun. The shade fabric on the windows is PVC free.

The Automated Shade Decision

"There is a feature in the WELL standard which specifically requires automated shading systems. Because we wanted to achieve a Platinum rating, we went for every feature that we thought achievable," explains Cordell. "Ultimately, the automated shading system helped the project satisfy glare-free daylight and views criteria and contributed toward some of the energy efficiency and thermal comfort goals by reducing potential solar heat gain."

The PVC-Free Fabric Decision

The PVC-free shading fabric was created by a manufacturer that provided the necessary material disclosure forms to prove that there were no harmful materials in the fabric. "PVC is one of the substances that shows up on human health watch lists and has been proven to be detrimental to health and well-being," said Cordell. "Finding PVC-free shading fabric was an important step in creating a healthy indoor environment that could achieve this elevated level of sustainable design success."

An automated shading system and PVC-free shade fabric helped the project to satisfy many of the credits that overlapped between the two green building systems.

One of the largest challenges facing designers who try to use sustainable materials is that it requires the disclosure by the manufacturers of their processes and secret sauces used to create their various devices, fabrics, paints, finishes, etc. As a result, these sustainable programs encourage and incentivize designers to work with manufacturers taking the extra steps to act in an environmentally responsible way and then take the time to disclose their product information so that the product may be evaluated by a third party.

Shade materials that have been reviewed and certified by a third-party organization, such as the GREENGUARD Environmental Institute (GREENGUARD) or Cradle-to-Cradle, can support sustainable efforts and contribute toward meeting sustainable materials thresholds required by these various rating systems and green building standards.

A CLOSER LOOK AT AUTOMATED SHADING AND SUSTAINABLE DESIGN CRITERIA

Today, there are several green building rating systems and standards being used to help designers create sustainable buildings, including LEED v4, WELL, the Living Building Challenge, and Standard 189.1. While the criteria vary from program to program, automated shades offer impressive contributions in achieving project certifications from each of the identified systems.

LEED v4

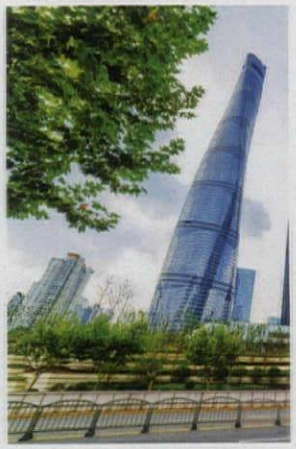
LEED v4 is the newest version of the LEED dynasty, touted as the most widely used green building rating system in the world. It offers a green building rating system for all types of buildings, anywhere on the globe, in any stage of their life cycle. Over 2.2 million square feet is LEED certified every day, with more than 90,000 LEED-certified projects found worldwide.

The LEED green building rating system is organized into eight categories: Location and Transportation (LT), Sustainable Sites (SS), Water Efficiency (WE), Energy and Atmosphere (EA), Materials and Resources (MR), Indoor Environmental Quality (EQ), Innovation (IN), and Regional Priority (RP). Each category contains various prerequisites that must be satisfied for a project to even be considered for a LEED certification and available credits, each assigned a point value. Projects earn points based on the credits they successfully complete.

There are four levels of LEED certification that can be achieved based upon the number of points earned by the project. LEED-Certified projects earned 40–49 points. LEED Silver projects earned 50–59 LEED points. LEED Gold projects earned 60–79 points. The ultimate LEED award is LEED Platinum. LEED Platinum projects earn 80+ points.

While LEED is a voluntary green building program, many state and local governments are adopting LEED requirements into their building codes, which makes satisfying the sustainable criteria mandatory in certain jurisdictions. Federal buildings have been required to comply with LEED practices for some time. The GSA requires that the new construction and substantial renovation of any federally owned facilities meet or exceed the standards for LEED Gold certification.

Image courtesy of Lutron Electronics



The Shanghai Tower, the world's second-tallest skyscraper, also featured an automated shading system and achieved a LEED Platinum rating for Core and Shell.

Automated shading systems can serve as a powerful tool in satisfying sustainable criteria across several of the LEED categories. Many of those potential LEED credits are explored here. Please note that the credit number (example: EA credit 2) may be different depending upon the specific LEED v4 rating system under consideration. The credits referenced in this course correspond to the LEED v4 for Building Design and Construction (BD+C) rating system.

EA Credit 2: Optimize Energy Performance (Up to 20 Points)

The intent of this credit is to encourage projects to achieve increasing levels of energy performance above the baseline compliance with ASHRAE 90.1-2010, required as a LEED prerequisite. Automated shading systems may be included in the whole building project simulation to demonstrate the energy savings achieved by reducing the HVAC load through the mitigation of solar heat gain and reducing the electrical lighting load by maximizing the presence of usable daylight in the interior space, and then reducing electric light levels when daylight is available.

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Photo © Warren Jagger Photography

In the Northeastern University Interdisciplinary Science and Engineering Complex (ISEC), designed by Payette, exposure to useful daylight levels helps to regulate circadian rhythms, improve mood and satisfaction, and create interior spaces where people learn and heal faster.

Jeanette Fitzgerald Pitts *has written dozens of continuing education articles for* Architectural Record *covering a wide range of building products and practices.*

Creating a New Path for Forest Products In Green Buildings

A new pathway to earning LEED points is encouraging more legal, responsibly sourced, and certified forest products to be part of the green building supply chain

Sponsored by The Sustainable Forestry Initiative Inc.

Architects and builders choose wood because it is a superior building material. Wood is a beautiful, renewable resource that is easy to work with. It also offers numerous environmental benefits. Using wood in green building projects supports many of the benefits offered by responsibly managed working forests, including clean air and water, biodiversity, habitat for wildlife, and employment for local communities. Now, a new LEED Alternative Compliance Path (ACP) for forest products will strengthen the positive impact of responsibly managed working forests in the construction sector.

Continues at ce.architecturalrecord.com

CONTINUING EDUCATION

1 AIA LU/HSW

1 GBCI CE HOUR

Learning Objectives

After reading this article, you should be able to:

1. Apply the new Alternative Compliance Path to get LEED credits for using legal, responsible, and certified-sourced forest products in projects.
2. Discuss SFI standards as mechanisms for sustainable forest management, verified supply chains, and responsible procurement of forest fiber.
3. Explain the importance of verifying legal forest products to prevent widespread illegal logging and deforestation.
4. Examine the connections between using forest products as a desirable, renewable resource, and protecting and expanding forests, through research, conservation, and strong community programs.
5. Document SFI forest products for the LEED Alternative Compliance Path.

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AIA COURSE #K1607D
GBCI COURSE #0920009061

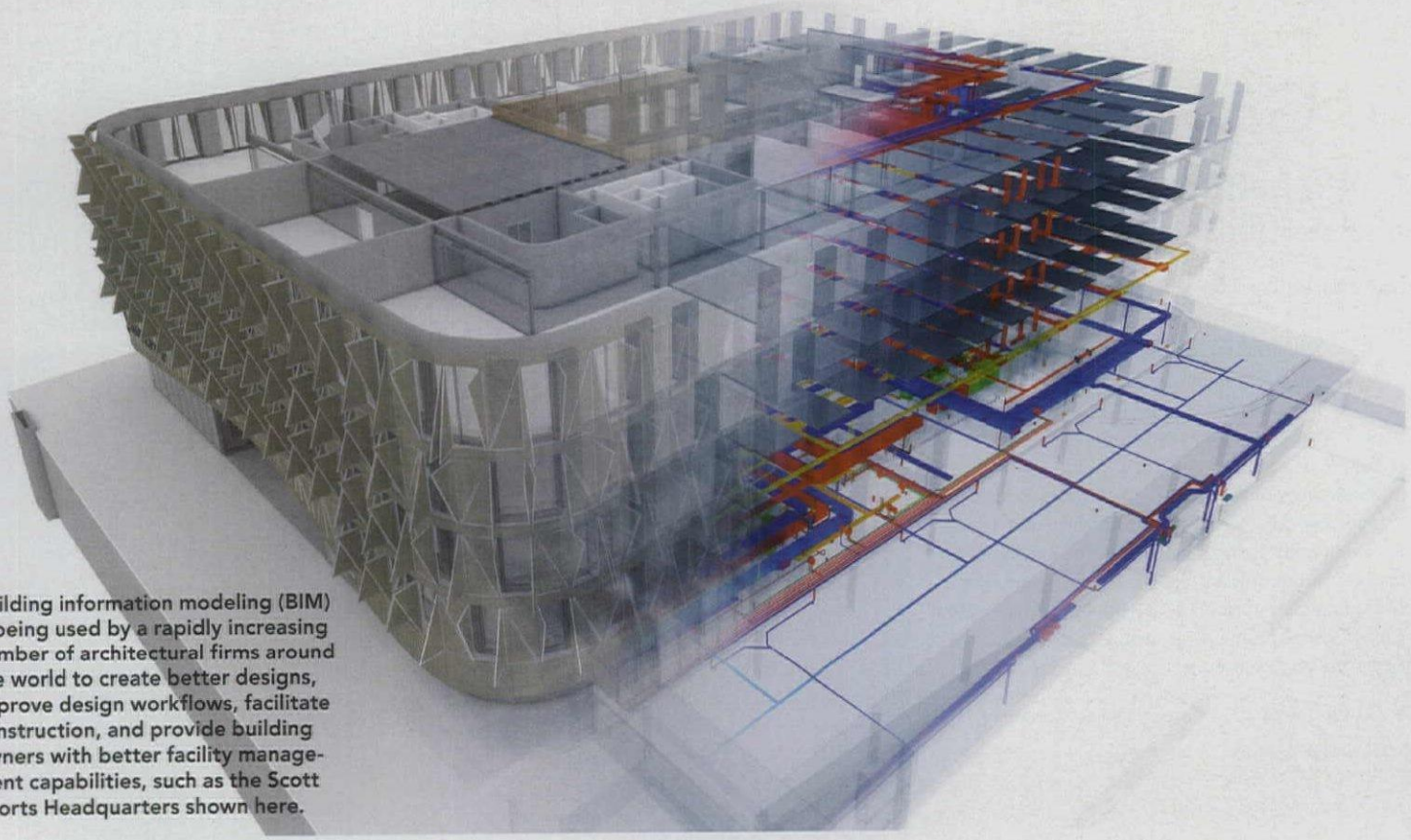
The Kordyban Lodge is the winner of the first SFI Wood Design Award as part of the 10th Annual Wood WORKS! BC Wood Design Awards. The lodge contains wood products from certified sources, the majority of which are certified to the SFI Standard, and provides a comfortable and peaceful home away from home for cancer patients and their caregivers. The stunning wood building spans 25,000 square feet and includes 36 beds, a meditation room, lounge, family room, massage therapy room, and more. Neale Staniszkis Doll Adams (NSDA) Architects.

Photo courtesy of Wood Design & Building Awards

SUSTAINABLE FORESTRY INITIATIVE

SFI® Inc. is an independent, nonprofit organization that is solely responsible for maintaining, overseeing and improving the internationally-recognized SFI program. SFI works at the intersection of sustainable forests, thriving communities and responsible procurement and works collaboratively with conservation groups, local communities, resource professionals, landowners and countless other organizations and individuals who share our passion for and commitment to responsible forest management. SFI Inc. is governed by a three-chamber board of directors representing environmental, social and economic sectors equally. Learn more at **sfiprogram.org.**

Image courtesy of ITTEN-BRECHBÜHL AG, BERN, SWITZERLAND | HEADQUARTER SCOTT SPORTS SA, GIVISIEZ FR, SWITZERLAND



Building information modeling (BIM) is being used by a rapidly increasing number of architectural firms around the world to create better designs, improve design workflows, facilitate construction, and provide building owners with better facility management capabilities, such as the Scott Sports Headquarters shown here.

Building Information Modeling (BIM) as an Investment

Design professionals, firms of all sizes, and building owners are seeing real returns by using advanced computer software tools.

Sponsored by Vectorworks, Inc. | *By Peter J. Arsenault, FAIA, NCARB, LEED AP*

Building information modeling (BIM) has evolved over the last 20 years from its beginnings as a logical extension of computer-aided drafting and design. Originally, many architects, engineers, and other design professionals saw it as a computer-generated three-dimensional model of a building or facility. In fact, it is much more, as defined by the buildingSMART alliance of the National Institute of Building Sciences (NIBS): "BIM is a digital representation of physical and functional characteristics of a facility." This refers to the ability of a model to contain not only shapes, but discrete objects with full specification data related to those objects. In that light, NIBS goes on to say "As such, it [BIM] serves as a shared knowledge resource for information about a facility, forming a reliable basis for decisions during its life cycle from inception onward." This aspect of BIM refers to it as a tool for collaboration between everyone involved in a building or facility including design professionals, construction teams, product suppliers, building owners, facilities management staff, and anyone else that has a role to play in the total life of the building.

Recognizing the far-reaching capabilities and potential benefits to everyone involved, the architecture, engineering, and construction (AEC) sector is quickly transitioning toward full implementation of BIM. What that means is that it is no longer a future trend; rather it has reached the tipping point of being a common, current practice. Private firms, institutional departments, government agencies, construction and development companies are all actively reaping the benefits of modern BIM workflows in terms of time savings,

CONTINUING EDUCATION

1 AIA LU

Learning Objectives

After reading this article, you should be able to:

1. Recognize the growing trend among architectural firms to use building information modeling (BIM) as their primary design and documentation tool.
2. Identify some of the national standards that have been independently developed to help optimize the use of BIM, regardless of any particular software.
3. Assess the multiple ways that BIM can make positive impacts on a firm while contributing to better designed buildings for owners.
4. Investigate specific examples of firms that have been successfully using BIM as part of their overall design and management strategy.

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AIA COURSE #K1711B

increased efficiency, higher quality of design, more streamlined collaboration, and better communication. While there is some investment in training and technology necessary to achieve success with BIM, advances in holistic design software and affordable training options have produced a very favorable return on investment (ROI) for almost everyone involved, regardless of firm size, project type, or organization. This article will look more closely at how the current state of BIM is producing these very favorable results.

BIM USAGE TRENDS AMONG ARCHITECTS

The architectural profession is diverse with architects and emerging professionals practicing in a variety of settings; some in traditional firms and some in other settings such as government, construction, development, and private institutions. Each practitioner, however, seeks to provide the best and most appropriate level of professional services needed for their particular circumstances and in response to the building owner's needs and desires. In that vein, it would seem that architects would be at the forefront of implementing BIM, but in reality, we are just now catching up with the rest of the AEC world. One of the leaders in BIM adoption is a group known as the Construction Users Roundtable (CURT) which is made up of major building owners and construction companies across the United States and around the world. Motivated by a keen interest in improving quality and cost-effectiveness in construction and maintenance projects, they have been advocating for the broad implementation of BIM and collaborative work processes since the year 2000. In fact, some of their construction company members have been taking architect's printed drawings and using those as the basis to create their own building information model, which they use as the basis for construction, purchasing, scheduling, and pricing. These realities are driving more architects and other design professionals to make the full transition to BIM.

How is the architectural profession doing in this regard? The American Institute of Architects (AIA) conducts a nationwide survey of firms regularly and maintains a database of statistics and trends that affect the business or practice side of architecture. The AIA Firm Survey Report 2016 provides some of the most current insights on BIM usage in design firms as follows:

- **Large Firms:** Defined as a firm of 50 or more employees, large firms lead the way in BIM usage, with an impressive 96 percent of them fully engaged in BIM—more than double the percentage of only 43 percent in 2005. It is worth noting that large firms account for the majority of licensed architects in the United States, meaning that a majority of architects are likely exposed to BIM on a regular basis.
- **Mid-Sized Firms:** Defined as 10 to 49 employees, mid-sized firms too are using BIM, with 72 percent of these firms reporting the use of BIM for billable projects. This percentage is up dramatically from only 10 percent in 2005.
- **Small Firms:** Firms of less than 10 employees are discovering that BIM makes sense for them as well, with 28 percent indicating they use BIM for project work, up notably from only 7 percent in 2005.
- **Overall Usage:** The overall share of the total number of firms using BIM for billable projects in the year 2015 was reported at 40 percent representing a positive growth from 37 percent in 2013.[1]

Clearly the trend is for more firms, and more architects, to be using BIM in their project work, but what exactly are they using it for? Once again the AIA Firm Survey Report 2016 provides some helpful insight by listing specific uses among all firms that are using BIM, regardless of firm size:

- BIM is used for design visualization by 92 percent of the firm respondents.
- Coordination of construction documents is done in BIM by 82 percent of the firms.
- Presentations and renderings are created from BIM by 81 percent of the firms.
- 66 percent of the firms share their models with consultants for collaborative work, while 55 percent share their models with the client or owner.
- 55 percent of firms rely on BIM for clash detection of different building systems such as HVAC and structural space conflicts.
- Among the largest firms, more than half of them use BIM for very practical purposes such as quantity takeoffs, cost estimating, and energy performance analysis.

In addition to the AIA Firm Survey, a 2017 SmartMarket Report by Dodge Data & Analytics looked at the business value of BIM for firms involved in infrastructure work.[2] This publication indicates that "BIM implementation for transportation infrastructure projects has seen a big surge in the last two years, and growth is expected to continue." In the United States, they have seen BIM jump from 27 percent usage in 2015 among engineering and construction firms to 55 percent in 2017 and a projected 68 percent in 2018. They also found very similar results in the United Kingdom, France, and Germany.

Continues at ce.architecturalrecord.com

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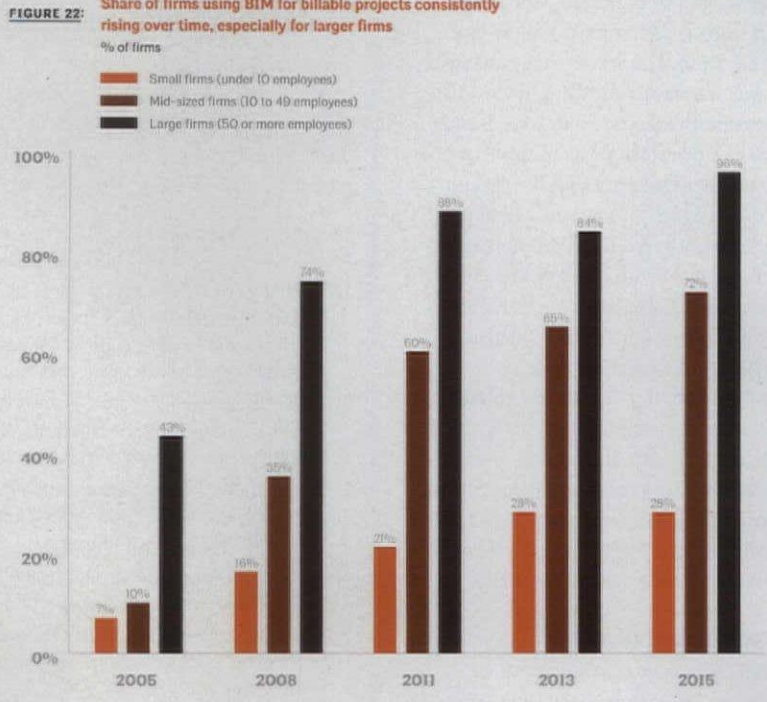
FIGURE 22: **Share of firms using BIM for billable projects consistently rising over time, especially for larger firms**



Source: The American Institute of Architects

This graph summarizes how the overall share of firms using BIM for billable projects has grown significantly in the 10 years between 2005 and 2015.

All images courtesy of Sloan Valve Company

World-class commercial restroom design.

International Restroom Design

Sponsored by Sloan

Designing and installing for the international market can be very different from the United States. There are many factors and challenges to consider that architects, designers, and engineers must educate themselves on such as aesthetics, water conservation efforts, and plumbing regulations.

A growing trend today is for internationally based companies to seek out United States-based A & D firms to design their buildings. Creating the ideal design and function of the building, and in particular the restroom, can be a challenge due to differences in aesthetics, water quality, water pressure, regulations, and plumbing standards. It is important for domestic architects and designers to identify these differences and find viable solutions for every client that fit both their budget and their region's specific plumbing needs. In order to specify the best possible products, architects and designers must educate themselves on the specific cultural trends, regulatory requirements, and water availability and quality of a given region. It is important, however, to keep in mind that even within a particular country, plumbing requirements and needs can vary.

Ted Garcia, vice president of International Business Development with Sloan, has this to say about the importance of the challenges faced when designing and specifying products for the international market: "Architects, designers, building owners, and engineers around the world are challenged by balancing aesthetics and function. This is specifically true in the design of international commercial restrooms. There are many factors to consider when choosing the right products, including design aesthetic, quality, durability, sustainability, and water conservation. The use of high-efficiency restroom products can be very successful in modern restroom designs. With an increasing number of customers around the world, manufacturers need to be committed to providing high-quality products that are as beautiful as they are efficient."

With this in mind, it is important to consult with local architects, designers, engineers, and other experts of the particular region to avoid problems. However, this continuing education course will provide basic instructions on vital aspects to consider when designing a commercial restroom for the international market.

SUSTAINABILITY AND WATER CONSERVATION

Around the world, the commercial restroom industry is always searching for dynamic solutions to improve the quality of life of the customers and communities that it serves. Globally, 2.5 billion people lack access to adequate sanitation services, making commercial restrooms an even greater need. Sustainability and water conserva-

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0.1 IDCEC CEU

Learning Objectives

After reading this article, you should be able to:

1. Identify the variables that affect sustainability and the resulting product specification in countries and regions such as Mexico, South America, India, Middle East, and China.
2. Understand how water quality and pressure can impact the performance of plumbing fixtures within the international commercial restroom.
3. Be aware of differing global standards and regulatory requirements and their influence on product specification and usage.
4. Recognize design trends and aesthetic differences in restrooms around the world.
5. Understand specific qualities of plumbing products that make them a superior choice for the international market.

To receive AIA credit, you are required to read the entire article and pass the test. Go to **ce.architecturalrecord.com** for complete text and to take the test for free.

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tion are important across the globe, especially in developing countries, and it can be a major deciding factor in fixture/plumbing types across the board. India, for instance, is undergoing a major water conservation initiative set forth countrywide by the government.

According to statistics reported by the United Nations, the world's population is growing by roughly 80 million people each year. As a result, global water consumption has doubled in the last 20 years and commercial buildings use 20 percent of the world's water, creating an overwhelming demand for access to fresh water and plumbing. At any given time, close to half of all people in developing countries suffer from a health problem caused by water and sanitation deficits. According to the Global Construction 2020 Report prepared by Global Construction Perspectives, $97.7 trillion will be spent on construction globally in the next 10 years. The rapid increase in population, water usage, and construction around the world, combined with the varying percentages of trained plumbers in each country, means that a simple-to-install, water-efficient plumbing solution is a must for commercial restrooms.

Despite the increasing demands in high-traffic, commercial restrooms, current plumbing solutions can waste water and can lead to unsafe/unhealthy environments. So, what is the perfect solution to help increase access to clean, affordable sanitation in global communities while meeting the needs of water efficiency? World Health Organization (WHO) states in its Health Aspects of Plumbing Report, "Good design of plumbing systems is necessary to ensure that the installations are efficient and safe. Good design will also ensure that the installations are appropriate for the different circumstances they serve. The design of good plumbing services must be based on an understanding of the technical requirements and relevant regulatory restrictions."[1]

High-efficiency products, such as low-flow flushometers for water closets and urinals, water-free and hybrid urinals, as well as low-flow sensor faucets are all water-saving solutions in commercial restroom design. These products can be used in new construction or as retrofits to help existing facilities conserve water. New construction has the advantage of starting with the latest flushing technologies and properly sized and pitched drain lines for both performance and water savings. Plumbing retrofit and renovation decisions are more difficult for existing buildings as the condition of the plumbing infrastructure behind the wall may be unknown. Therefore, getting accurate knowledge about the current infrastructure and green building standards/certifications a region is working towards is vital.

The World Green Building Council (WGBC), a global network of Green Building Councils in more than 70 countries (United States and throughout South America, Middle East, North Africa, Asia Pacific, Africa and Europe), is one entity that promotes sustainability-focused practices in the building and construction industry around the world. A "green" building is one that adopts products and practices to reduce strain on the world's limited resources, such as water. The members of WGBC work together to promote awareness and encourage the use of efficient products like solar-powered faucets.

The Building Research Establishment Environmental Assessment Methodology (BREEAM), is another set of certifications that encourages the use of sustainable and water-efficient products. Created in 1990 by the Building Research Establishment (BRE), awarding a BREEAM certification means that a building makes effective use of resources, measured in 10 categories. These categories include: energy, health and wellbeing, innovation, land use, materials, management, pollution, transport, waste, and of course, water. Adopted in over 77 countries, BREEAM encourages the use of plumbing products that limit the strain on the finite water resource. However, there are other certifications around the world that encourage the use of sustainable water products.

Variables ranging from the economic climate to the social customs to availability of resources will impact how much a region can work toward sustainability and which products it can use. After all, achieving those sustainability goals is just as important, if not even more so, than it is in the United States.

WATER QUALITY AND WATER PRESSURE

Water quality and pressure drastically differs around the world. The most important factors to consider when designing for the commercial restroom are the quality and availability of water in that particular area. These differences are most apparent outside of the United States. Countries with water shortages, aging plumbing infrastructure, or little to no filtration systems will drastically change the types of products specified. Impure water or solid particles within the water compromise performance and the life of the products and infrastructure. A lack of plumbing regulations and filtration systems are the leading causes of these issues.

There are two distinct international markets, the developed world and the developing world. One is characterized by specific water delivery infrastructure and offers consistent pressure and reduced tertiary and particulate matter. The other is prone to intermittent outages, fluctuation or low water pressure, and a higher likelihood of turbid or particulate laden water supplies.

The primary need in a developing market is hygiene, water savings, and product reliability. This involves the ability to work with high turbid or particulate levels as well as fluctuating voltage levels.

High-efficiency products, like water-free and hybrid urinals as well as low-flow sensor faucets, are water-savings solutions in commercial restroom design.

Continues at ce.architecturalrecord.com

Western red cedar is a regional product of the Pacific Northwest, Alaska, and Idaho areas of North America but it is used throughout the United States and around the world to create buildings of enduring natural beauty.

Lakeside at Black Butte Ranch by Hacker; photo by Jeremy Bittermann

How to Design with and Specify Western Red Cedar Siding

Many design choices are available with great performance attributes

Sponsored by WRCLA: Western Red Cedar Lumber Association

By Peter J. Arsenault, FAIA, NCARB, LEED AP

The use of wood for interior and exterior surfaces in buildings is part of a long tradition in North America due to the natural abundance of trees and lumber as well as the acquired skills of woodworking professionals. Among the choices of wood species, western red cedar has been prized for its natural durability and stability (comparable to redwood) plus its natural beauty that comes from a fine grain and pleasing natural color. While western red cedar is a regional product of the Pacific Northwest area of North America, it is used in buildings around the world because of these fundamental attributes. The types of buildings that architects select it for include well-designed custom homes, multifamily buildings, commercial structures, retail settings, hospitality and resort facilities, museums, churches, educational facilities, and most other project types where beauty and durability are sought. Like all wood products, there are best practices borne out of years of experience for how to select, specify, design with, install, finish, and maintain red cedar. This continuing education article will explore some of the specific aspects of how architects can successfully, and elegantly, incorporate western red cedar siding and trim into a full range of new or renovation building projects.

CHARACTERISTICS OF CEDAR SIDING

Architects, interior designers, building owners, and facility managers have been drawn to use western red cedar (WRC) for some specific reasons. These include:

- Appearance – Western red cedar is real wood with the corresponding authentic appearance of wood. Its grain and natural color have

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Learning Objectives

After reading this article, you should be able to:

1. Identify the characteristics of real western red cedar related to appearance, durability, and versatility.
2. Investigate the different types and grades of western red cedar siding and trim products related to appearance and performance.
3. Recognize and select the different common profiles of western red cedar siding and trim for specific project applications.
4. Specify appropriate finishes for western red cedar to create final colors, maintain the surface appearance, and support the natural durability of cedar.

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Seadrift Residence by CCS Architecture, Cass Calder Smith; photo: Matthew Millman; San Francisco, California

Western red cedar siding is known for providing great appearance, natural durability, considerable versatility, and proven sustainability.

helped it to become regarded as a superior aesthetic imbued with decidedly crisp, yet superbly rich, tonal properties. Because of this superior look, it is often used as the basis for other, non-wood products, to imitate wood. Real western red cedar, however, can create sublime outdoor spaces, provoke cutting-edge architecture and inspire innovative interiors making it quite attractive for a range of design styles including traditional, contemporary, arts and crafts, and modern styles.

- Durability – Western red cedar is well known for its longevity and durability due to the natural makeup of the wood. It has been found to be naturally resistant to rot, decay, and insect attacks, which means anything built with it will last longer and require less maintenance.
- Versatility – Unlike some other wood species, western red cedar is pitch and resin-free. This means it's ideal for accepting and holding a wide range of wood finishes including stains, bleaches, traditional solid colors, and naturally beautiful semi-transparent finishes. Western red cedar also offers a wide range of sizes, surface textures, grades, and profiles—both standard and custom. Therefore, it is easy to incorporate into a wide range of design schemes and patterns.
- Sustainability – Independent studies prove that when it comes to environmental performance, natural wood is superior to synthetic products in every way. While other building materials generate greenhouse gases western red cedar trees actually remove greenhouse gases from the atmosphere. Further, unlike many manufactured or composite material, western red cedar is fully biodegradable at the end of its useful life.

Perhaps one of the best-known sustainability attributes of western red cedar is that it is a renewable resource when harvested and replanted using sustainable forest practices. In fact western red cedar in North America is sourced from some of the most sustainably managed forests in the world. Siding and trim comes from the Pacific Northwest including Western Montana, Washington, Oregon, Idaho, Alaska, and British Columbia. The largest single source is British Columbia. The Provincial government owns 95 percent of the forest land. These forests are in turn managed by private companies who participate in sustainability certifications such as the Sustainable Forestry Initiative (SFI), the Forest Stewardship Council (FSC), and the Canadian Standards Association (CSA). The LEED rating system for green buildings now recognizes all three of these certifications.

In all, western red cedar provides a building material that is suitable for a number of uses. For purposes of this article, we will focus on its use as an exterior siding product and explore how to use these benefits to achieve excellence in design and construction.

GRADES OF CEDAR SIDINGS

Wood is known to be as variable as the trees and forests that they come from. Therefore, the only proven way to specify qualities of wood is to base it on an independent, objective grading process that can categorize different grades of wood quality. This is commonly done for dimensional (structural) lumber based on standards by grading agencies such as the Western Wood Products Association (WWPA), West Coast Inspection Bureau (WCIB) and National Lumber Grades Authority (NLGA) with categories such as "Select Structural," "Number 1," "Number 2," and others. However, when it comes specifically to cedar siding, this grading system for structural lumber and the categories used there do not apply. Instead, these agencies use a separate grading system which identify "Appearance Lumber Grades." These grading systems use terms like "Clear Heart," "A Clear," "B Clear," and others. The word "Heart" in the case of grading cedar refers to the inner wood in a tree as opposed to the outer sapwood between the heartwood and the bark. Hence, it is important at the outset to recognize that these different appearance grading categories are used.

The people who actually do the inspection of wood products include organizations like the West Coast Lumber Inspection Bureau (WCLIB) or, in Canada, the National Lumber Grades Authority (NLGA). These organizations publish their own rules for determining how to classify a wood product to a particular grade.

Continues at ce.architecturalrecord.com

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Photo courtesy of ROCKFON

Stone wool ceiling panels are a proven alternative choice for many different and exciting building spaces.

The Value of Stone Wool Acoustical Ceilings

A proven, natural building material is now used in ceilings providing high-performance acoustics and smooth, clean surfaces

Sponsored by ROCKFON | *By Peter J. Arsenault, FAIA, NCARB, LEED AP*

Acoustical suspended ceilings are commonplace across many building types. Since the 1950s, they have been a preferred design choice due to their ability to conceal but still be accessible to HVAC ductwork, electrical wires, plumbing pipes, phone cables, security lines, and other components of commercial buildings. These suspended, interconnected ceiling systems use a metal grid comprised of cross tees and main runners in various profile sizes. Within that grid, acoustical tiles of different types provide the aesthetic and sound properties desired for a particular space. Although architects often think of traditional materials such as mineral fiber or fiberglass for those ceiling tiles, there is another option where the tiles are fabricated from natural stone wool. This product has impressive characteristics for fire rating, strength, acoustics, and sustainability, among others.

Continues at ce.architecturalrecord.com

Peter J. Arsenault, FAIA, NCARB, LEED AP, *is a nationally known architect, sustainability consultant, technical writer, and continuing education presenter.* ***www.linkedin.com/in/pjaarch***

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Learning Objectives

After reading this article, you should be able to:

1. Differentiate between the properties of natural material-based stone wool ceiling tiles and other acoustical ceiling materials.
2. Analyze and explore the fundamentals of interior acoustical design treatment and their relationship to green buildings and sustainable design.
3. Assess the multiple qualities of stone wool acoustical ceilings that can contribute to green and sustainable building design.
4. Recognize and identify the acoustic needs of different design applications and the attributes to look for, including contributions to green building certification.

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New and Upcoming Exhibitions

Obdurate Space: Architecture of Donald Judd
New York City
November 14, 2017–March 5, 2018
The exhibit looks at completed and unbuilt architectural work by artist Donald Judd between 1984 and 1994. Featuring drawings, models, and photos, the display is curated by Claude Armstrong and Donna Cohen, who were both assistants to Judd. At the Center for Architecture. Visit cfa.aiany.org.

Ongoing Exhibitions

Past Forward: Architecture and Design at the Art Institute
Chicago
The new permanent installation in the Art Institute's Modern Wing draws from the museum's collection of architectural drawings, furniture, graphic, and industrial designs. The exhibit includes seminal works of architecture and design from architects such as Ludwig Mies van der Rohe, Armin Hofmann, Studio Gang, Irma Boom, and Yuri Suzuki. For more information, visit artic.edu.

Exhibit Columbus
Columbus, Indiana
Through November 26, 2017
The annual exhibition of architecture, art, design, and community features 18 outdoor installations in and around the city's Modernist buildings. This year's exhibitors explore the past, present, and future of design, and range from award-winning firms such as Aranda\Lasch to local university and high school students. Visit exhibitcolumbus.org.

Noguchi's Playscapes
San Francisco
Through November 26, 2017
This exhibition will revisit sculptor Isamu Noguchi's designs for several playgrounds and stand-alone play structures. Through models, sketches, set designs, and archival images, the exhibition will show Noguchi's visions for new experiences of art, education, and humanity through play. For more information, visit sfmoma.org.

Living in America: Frank Lloyd Wright, Harlem & Modern Housing
New York City
Through December 17, 2017
This exhibit examines racial segregation and socioeconomic inequality through two housing projects designed by Wright—one occupied by predominantly black residents, the other predominantly white. Curated by Columbia University's Temple Hoyne Buell Center for the Study of American Architecture, the exhibition relates to the Museum of Modern Art's ongoing Frank Lloyd Wright exhibition. Visit arch.columbia.edu.

Designing Material Innovation
San Francisco
Through December 22, 2017
The exhibit at California College of the Arts' San Francisco campus consists of five full-scale prototypes built using new materials, fabrication techniques, and/or design approaches. Participating firms include T+E+A+M, using a material made from rock and reprocessed waste plastics; Matter Design, testing prehistoric approaches to installing large stone statues; and APTUM Architecture, with a pavilion built using high-performance concrete. Visit designingmaterialinnovation.org.

Albert Frey and Lina Bo Bardi: A Search for Living Architecture
Palm Springs, California
Through January 7, 2018
Part of a Getty Foundation–led initiative to explore the connection between Latin America and Los Angeles, the Palm Springs Art Museum presents an exhibition that parallels the work of architect Albert Frey and Italian-born Brazilian architect and furniture designer Lina Bo Bardi. See psmuseum.org.

Chicago Architecture Biennial
Chicago
Through January 7, 2018
The second edition of the Chicago Architecture Biennial features works by over 141 architects and designers on the theme of Make New History. Consisting of six community anchor exhibitions, two special-project sites, installations, performances, talks, and films, the Biennial is a citywide event that encourages visitors to explore Chicago with an architectural eye. For more information, visit chicagoarchitecturebiennial.org.

Scaffolding
New York City
Through January 18, 2018
Curated by Greg Barton with installation design by OMA New York director Shohei Shigematsu and graphic design by MTWTF, the exhibition explores the different forms and applications of scaffolding, as well as its relationship to architecture. At the Center for Architecture. Visit cfa.aiany.org.

No. 9
New York City
Through January 19, 2018
Designed and curated by architect Frida Escobedo, the exhibition examines the history of a public sculpture series in Mexico City, La Ruta de la Amistad, commissioned for the 1968 Olympic Games. Escobedo focuses the exhibit on the ninth sculpture, by American artist Rodd Williams. At Columbia University's Arthur Ross Architecture Gallery. For more information, visit arch.columbia.edu.

Ai Weiwei: Good Fences Make Good Neighbors
New York City
Through February 11, 2018
The citywide exhibit by artist and activist Ai Weiwei creates a series of installations using the security fence to examine themes of displacement and migration. Sites in New York include the Washington Square Arch in Greenwich Village, the Unisphere at Flushing Meadows-Corona Park in Queens, and Doris C. Freedman Plaza in Central Park. Presented by the Public Art Fund in commemoration of the organization's 40th anniversary, the exhibit also features images on lampposts and other spaces usually reserved for advertisement. Visit publicartfund.org.

Never Built New York
New York City
Through February 18, 2018
Cocurated by architecture critics Sam Lubell and Greg Goldin, the exhibition features original prints, drawings, models, and installations of unbuilt projects developed by architects including Frank Lloyd Wright; Louis Khan; Venturi, Scott Brown; Rem Koolhaus; Diller Scofidio + Renfro; and Zaha Hadid. The Queens Museum exhibit was designed by Studio Christian Wassmann. For more information, visit queensmuseum.org.

Frau Architekt
Frankfurt
Through March 8, 2018
Presented by the German Federal Cultural Foundation, the exhibition features portraits of 22 women who have influenced German architecture. Beginning in 1907 with Emilie Winkelmann, the founder of Germany's first architecture studio, personal stories and projects showcase the role each woman played in shaping the profession in Germany. At Deutsches Architekturmuseum. For more information, visit dam-online.de.

Found in Translation: Design in California and Mexico, 1915–1985
Los Angeles
Through April 1, 2018
Displaying over 250 objects including drawings, photos, models, and film, the exhibition examines Modern and anti-Modern design movements in California and Mexico, along with their connections to each other. Richard Neutra, Luis Barragán, Charles and Ray Eames, and Clara Porset are some of the architects and designers whose work is on display at the Los Angeles County Museum of Art exhibit. Visit lacma.org.

Alex Schweder and Ward Shelley: Your Turn
Ridgefield, Connecticut
Through April 22, 2018
For this combined architecture and performance-art piece, Alex Schweder and Ward Shelley will build a 24-foot-high living environment that they will then inhabit. They will share nine basic amenities that, while being used by one, cannot be used by the other. Audience members are invited to engage in conversation with the artists, as well as explore an adjacent gallery, which holds the first survey of Schweder and Shelley's reverse paintings on Mylar. At the Aldrich Contemporary Art Museum. Visit aldrichart.org.

Platform: Origin, 135 degrees
Houston
Through May 31, 2018
The first fall season of the new Moody Center for the Arts will feature a series of temporary, site-specific public-art projects on the Rice University campus. Participating artists will respond to student and faculty artwork, archi-

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tectural designs, and research. The series begins with a performance by artist Jarrod Beck in response to Michael Heizer's monolithic sculptural works. Beck will also build a sculpture with students that will be on display for the duration of the academic year. More information at moody.rice.edu.

Lectures, Conferences, and Symposia

Dubai Design Week
Dubai
November 13–18, 2017
The six-day event opens its program with a conversation between architect Sir David Adjaye and local critic Sultan Sooud Al Qassemi. The third annual event features an exhibit of work by 200 graduate students of design and technology from 92 different international universities as well as ABWAB, a pop-up gallery featuring regional designers housed within full-scale temporary pavilions; this year, a singular pavilion designed by Fahed + Architects will hold the event. At Dubai Design District. Visit dubaidesignweek.ae.

Mimi Zeiger: "Intersect, Instigate, Exchange"
New York City
November 14, 2017
Los Angeles–based architecture critic, editor, and curator Mimi Zeiger will be giving a talk at the School of Visual Arts Department of Design Research, Writing and Criticism about exhibition-making and her upcoming role as a cocurator of the 2018 U.S. Pavilion at the Venice Architecture Biennale. Visit designresearch.sva.edu/public.

World Architecture Festival 2017
Berlin
November 15–17, 2017
This 10th annual international event encompasses a series of conference programs, networking events, and an awards ceremony. The festival includes project galleries, product exhibitions, and workshops. For more information, see worldarchitecturefestival.com.

Competitions

Joan B. Calambokidis Innovation in Masonry Design Competition
Registration deadline: November 15, 2017
Open to architects and engineers of all levels, the inaugural competition, run by the International Masonry Institute, is seeking project proposals that reimagine masonry construction. Participants must incorporate one or more of the specified materials into their design: brick, concrete block, tile, marble, terrazzo, stone, or plaster. More information at imiweb.org.

AIANY Design Awards 2018
Submission deadline: December 13, 2017
The annual AIA New York Chapter awards considers projects completed in New York by architects based elsewhere, as well as work located outside of the city that was designed by New York–based architects. The four awards categories are architecture, interiors, urban design, and projects, a category that includes conceptual work such as research or installations. More information at main.aiany.org.

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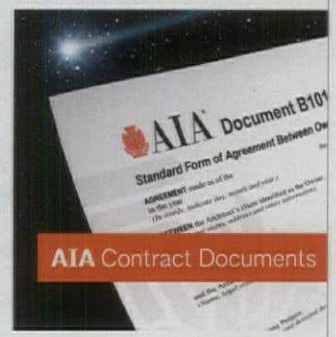

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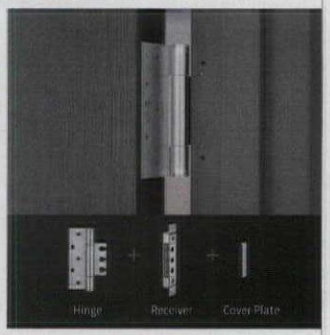

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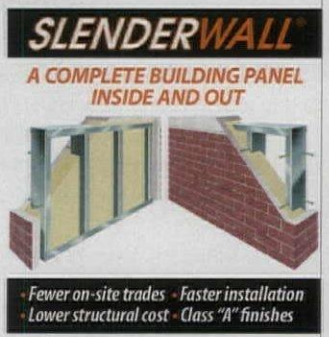

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2018 CALL FOR ENTRIES
Record Kitchen & Bath

The editors of ARCHITECTURAL RECORD are currently accepting submissions for the **2018 Record Kitchen & Bath** competition. Entry is open to any registered architect, as well as any designer working in collaboration with architects, who has completed an innovative residential and/or commercial kitchen or bath project in the last year. We are looking for projects that feature unexpected materials, address unique client needs, or are designed in a manner that allows these utilitarian spaces to be functional, sustainable, and beautiful. Winning projects will be featured in the January 2018 issue.

The fee is US$75 per entry. To enter, visit: architecturalrecord.com/call4entries. E-mail questions to ARCallForEntries@bnpmedia.com. (Please indicate **Record Kitchen & Bath** as the subject of the e-mail.) **Submissions are due November 7, 2017.**

DEADLINE EXTENDED TO NOVEMBER 7
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PROJECT LEGO HOUSE
LOCATION BILLUND, DENMARK
ARCHITECT BJARKE INGELS GROUP (BIG)

WHEN LEGO approached BIG to design an "experience center" in the company's hometown that would foster play with their iconic toy bricks, the architects "went nuts," says founding partner Bjarke Ingels. As a jumping-off point, he and his team filled an entire room with the toy pieces and established a creative limitation for their design. "We challenged ourselves with the dogma that we wouldn't design anything that couldn't be buildable with LEGO bricks," says Ingels. Using the "golden ratio" of a standard two-by-four block, the architects scaled up to create a 129,000-square-foot structure, which resembles 21 giant stacked LEGO bricks. The steel-framed building, clad with ceramic tile, contains four playground-like zones, restaurants, conference facilities, and gallery spaces. As it turns out, remaining faithful to the toy brick's dimensions isn't all that unusual. "The proportions of LEGO already saturate the world around us," Ingels observes. But the conceit, taken to an extreme, transforms a beloved element of fantastical creations into a surreal reality. *Erin Hudson*

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