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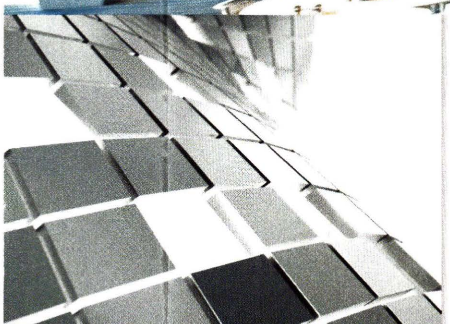

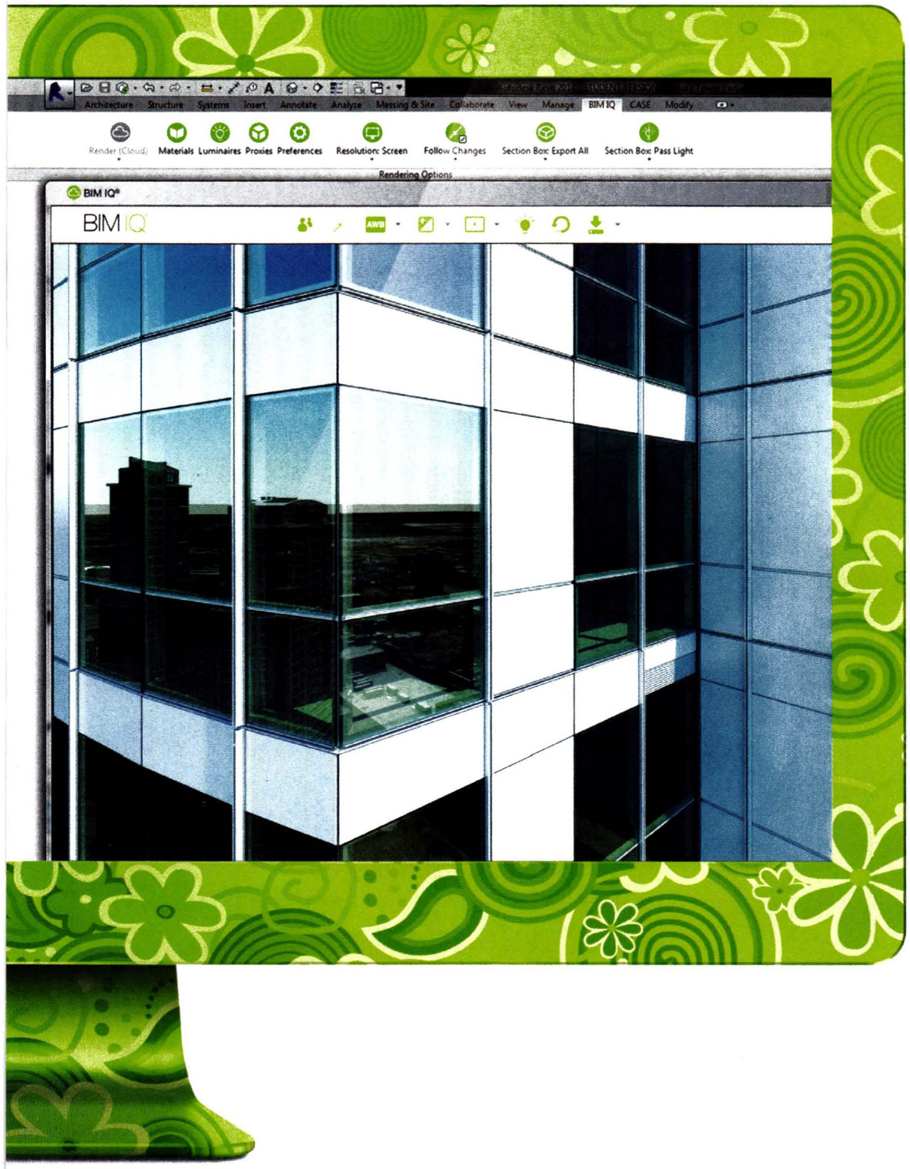

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ART DIRECTOR Helene Silverman, *helene.silverman@mhfi.com*
ASSOCIATE ART DIRECTOR Travis Ward, *travis.ward@mhfi.com*

CONTRIBUTING ILLUSTRATOR, PRESENTATION DRAWINGS Peter Coe

EDITORIAL SUPPORT Monique Francis, *monique.francis@mhfi.com*

CONTRIBUTING EDITORS Sarah Amelar, Fred A. Bernstein, Robert Campbell, FAIA, C.J. Hughes, Clare Jacobson, Blair Kamin, Jayne Merkel, Josephine Minutillo, Robert Murray, David Sokol, Michael Sorkin, Ingrid Spencer

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EDITORIAL OFFICES: 212/904-6229. Editorial fax: 212/904-4256. E-mail: *monique.francis@mhfi.com*. Two Penn Plaza, New York, NY 10121-2298. **WEBSITE:** ArchitecturalRecord.com.

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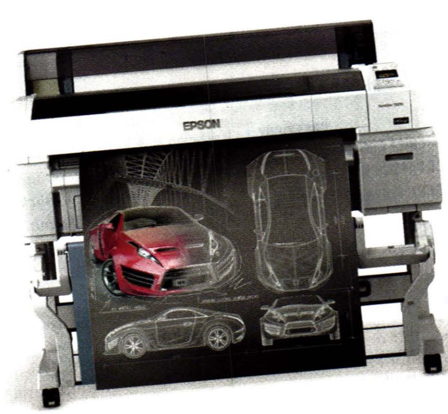
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FINANCE MANAGER
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ASSISTANT TO MEDIA DEPARTMENT
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ADVERTISING SALES

NEW ENGLAND AND PA: Joseph Sosnowski
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ITALY: Ferruccio Silvera
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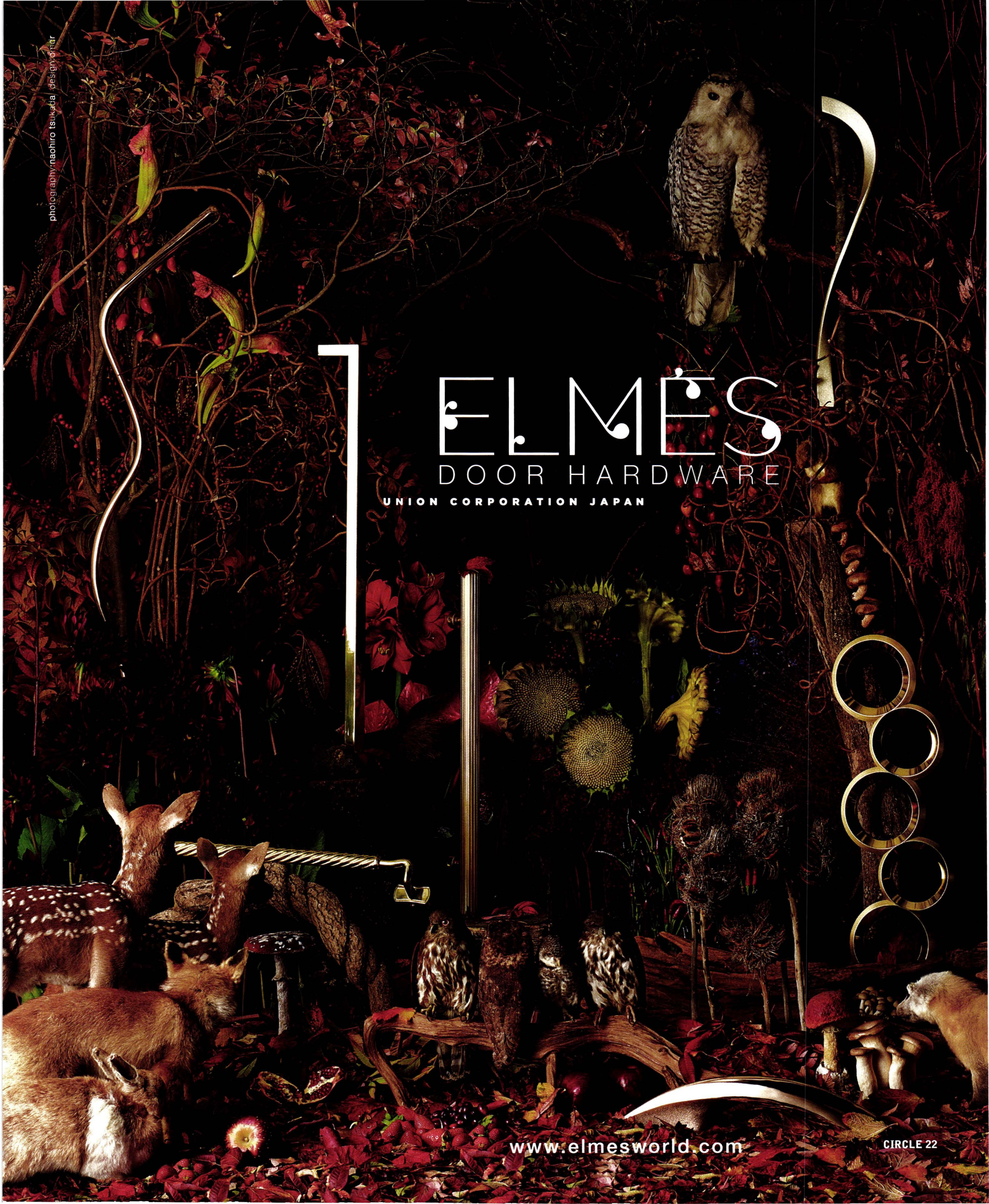
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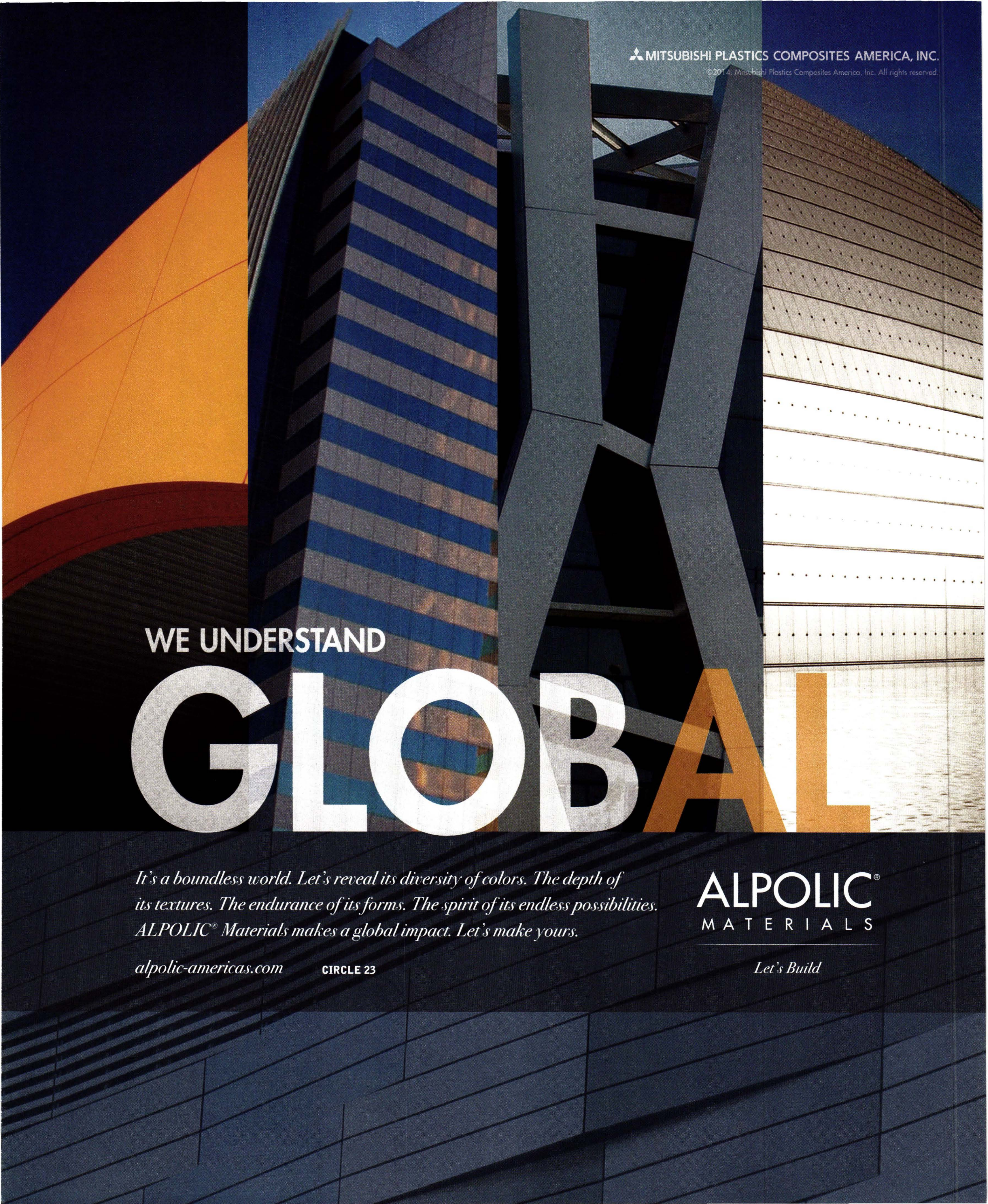

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THIS PAGE: THE ARCUS CENTER FOR SOCIAL JUSTICE LEADERSHIP, MICHIGAN, BY STUDIO GANG ARCHITECTS. PHOTO BY IWAN BAAN.

ON THE COVER: RIBERA DEL DUERO HEADQUARTERS, SPAIN, BY BAROZZI/VEIGA. PHOTO BY MARIELA APOLLONIO.

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editor's letter

When More Is Less

As arts institutions evolve, building bigger is not always better.

WITH THIS ISSUE of RECORD, we celebrate the 15th edition of Design Vanguard, our annual selection of 10 of the most promising architecture firms emerging on the global stage. The magazine has an excellent track record in discovering the profession's future leaders while they are still in the early stages of their careers—Jeanne Gang (2001), David Adjaye (2002), and Bjarke Ingels (2009) are just a few of RECORD's past Vanguard luminaries. Visit archrecord.com for a complete list of all 150 winners.

We also explore in this issue two performing-arts centers and a new museum (page 82). Arts facilities are compelling building types; they give architects an opportunity to experiment with creative solutions—see Dominique Perrault's Albi Grand Theater (page 88)—and their designs often have a powerful impact on the urban realm. As arts institutions evolve, we tend to focus keenly on how the adaptation or expansion of such significant buildings will affect the public and the city.

Among museums, the trend is to expand or build anew—think of the Los Angeles County Museum of Art (RECORD, November 2014) or the Whitney, which has just closed its historic Marcel Breuer building to move into a Renzo Piano–designed building in downtown Manhattan next spring. But bigger is not necessarily better. For some arts organizations, expansions run counter to both their core mission and the larger public good. That's why a controversial proposal to add significantly to the Frick Collection in New York is gaining heated opposition.

The Frick is a rare gem of a museum—a world-class collection of art, housed in an unusually calm and intimate setting. Designed by Carrère and Hastings (architects of the New York Public Library) in 1914 for the Gilded Age tycoon and collector Henry Clay Frick, the mansion remained in his family after his death in 1919, opening as a museum in 1935, as he had intended. To transform the house for the public, it was adapted and somewhat expanded by John Russell Pope (architect of Washington's National Gallery of Art), who used space once occupied by a carriage pavilion to create the serene interior courtyard that is the centerpiece of the museum. Overall, its elegant and subdued atmosphere—famously, children under 10 are not allowed—makes it an extraordinary setting in which to contemplate masterpieces by Vermeer, Constable, Ingres, Turner, and Bellini, among the 1,100 works in the collection.

Since the Frick's trustees unveiled a proposed expansion in June, nearly 3,000 people have joined to oppose it by signing an online petition (unitetosavethefrick.org). Designed by Davis Brody Bond, the six-story addition, in a style meant to ape Carrère and Hastings's neoclassical mansion, is clunky and overscaled and would loom over the landmarked museum. It also would mean the destruction of an exquisite small viewing garden, created by the great British landscape architect Russell Page, which Charles Birnbaum of the Cultural Landscape Foundation has called "a master class in restrained minimalism." Too often in the fight for architectural preservation, significant landscapes are overlooked (the highly lauded redesign of the public spaces of Lincoln Center in New York, for example, included ruining the beautifully serene North Plaza by Dan Kiley that was integral to the original architecture).

Just as important as such tangible losses is the more elusive threat to the visitor experience. Should the intimacy of the Frick be risked to create the de rigueur amenities of a mega-museum? Does this unique place really need a better café and bigger bookstore to sell more Vermeer mugs and Turner tote bags? Is there another imaginative way to gain gallery space without such an insensitive expansion?

To get some ideas, just look 20 blocks north along Fifth Avenue, to the mansion built in 1902 by Frick's business friend and rival, the steel magnate Andrew Carnegie. Since 1976, the landmarked mansion—highly innovative in its day, as the first steel-framed private residence in America—has been home to the Cooper Hewitt, Smithsonian Design Museum. This month, after a three-year-long renovation and restoration, it will reopen with more gallery space—and, yes, visitor amenities—that did not require expansion into the beautiful garden that has existed since Carnegie's day and is now open to the public. The Cooper Hewitt, though a very different type of museum, made some hard choices that the Frick is grappling with, including moving some back-of-house functions off-site or to adjacent townhouses. The museum has maintained the integrity of the Carnegie landmark while enhancing the visitor experience—an object lesson in how to create more room for art while keeping alive the enduring spirit of a historic place. ■

Cathleen McGuigan

Cathleen McGuigan, Editor in Chief

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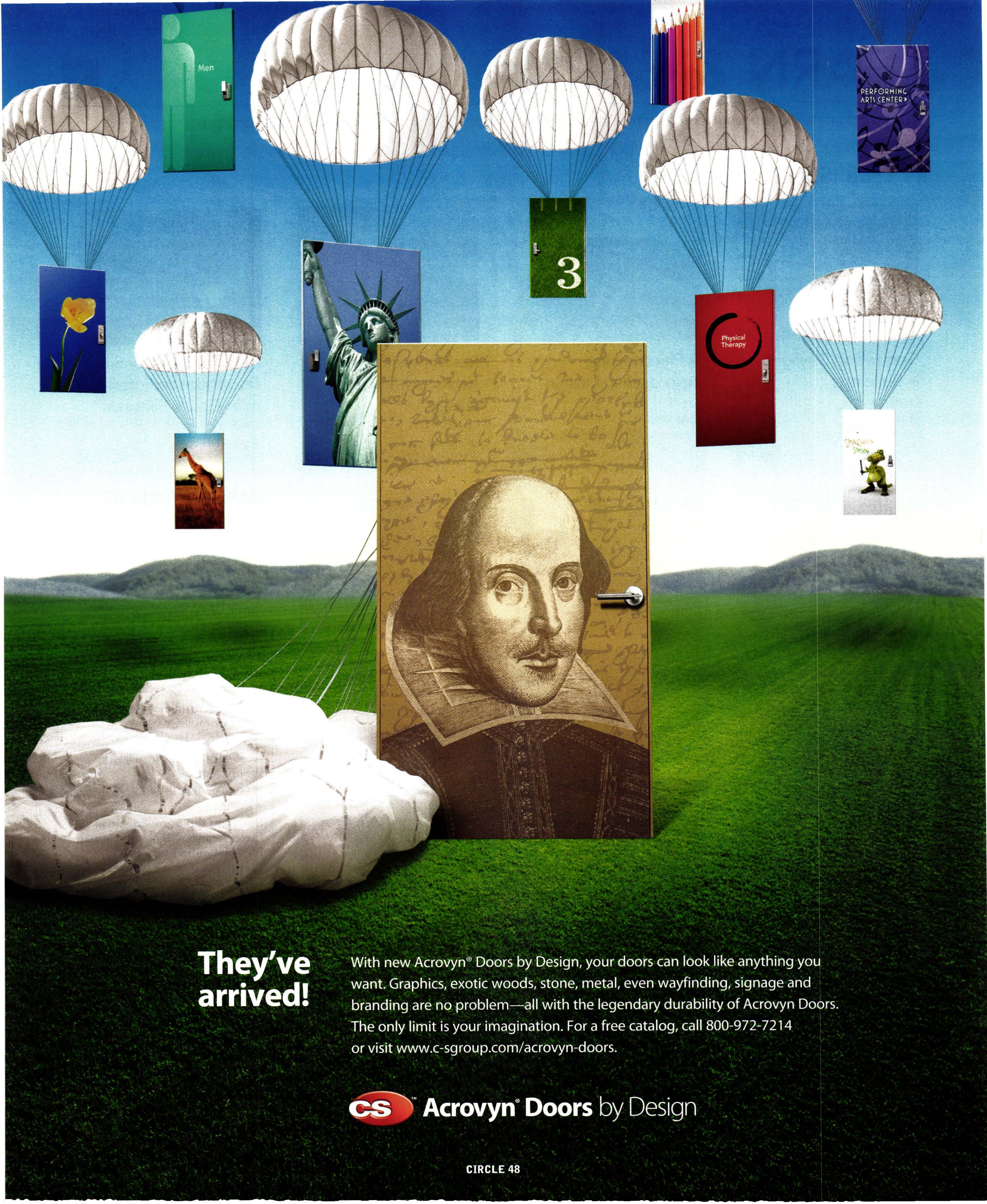
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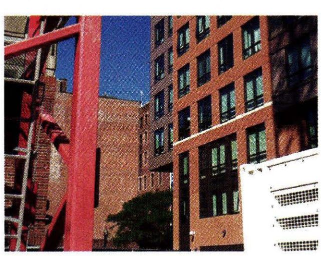

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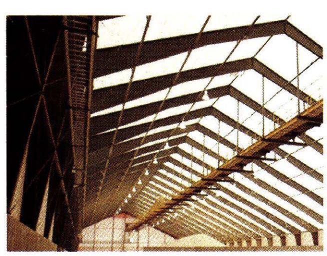

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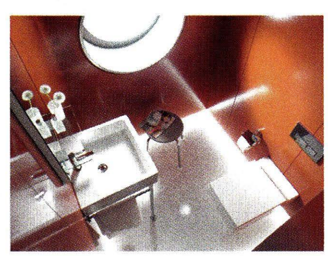

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perspective

This was a crime against humanity. It's such a mythical building, and it is being destroyed by somebody who is a good architect.

—Beatriz Colomina, Princeton University architectural historian, on Le Corbusier's Carpenter Center for the Visual Arts at Harvard and its new neighbor, Renzo Piano's addition to the Fogg Art Museum, ARTnews, *October 19, 2014.*

Lower Manhattan's New Front Door

BY JOANN GONCHAR, AIA

FOR MONTHS, commuters have been traveling through the almost complete Fulton Center, the transit hub conceived for Lower Manhattan in the wake of the September 11 attacks. But much of the $1.4 billion complex was off-limits, hidden by temporary partitions and construction tarps as final construction and systems-testing wrapped up. But the tarps and partitions have come down and, nearly a decade after the first construction contracts were awarded, the Metropolitan Transit Authority (MTA), the operator of New York's subways, declared the station officially open as of November 10.

At its most basic level, the project's primary aim was to bring order to the jumble of stations for the subway lines that crisscross each other in spaghetti fashion in the city's financial district. It was confounding to transfer among the lines, since they were originally built—some more than a century ago—by competing entities. "There was just loads of friction in the system," explains Craig Covil, a principal at engineering firm Arup, the project's prime design consultant.

But, at a ribbon-cutting ceremony on November 9, officials pointed to ambitions bigger than making the commute less arduous for the 300,000 people expected to travel through Fulton Center daily. Thomas Pendergast, MTA chairman, welcomed the audience to "New York's next great public space." His greeting echoed the sentiments of architects from Grimshaw who were responsible for the three-story-high glass-and-steel pavilion that is Fulton Center's primary above-ground component. They refer to the new station as "Lower Manhattan's front door."

Grimshaw's structure, approximately 140-feet square in plan, houses the stairs and escalators that lead to the subway platforms 40 feet below street level. And overhead is the complex's defining element: a conical oculus, roughly 70 feet high and about 50 feet in diameter, created in collaboration with James Carpenter Design Associates. It comprises 952 diamond-shaped perforated aluminum panels held in place by a doubly curved cable net tensioned between a compression ring at the top and the second-level floor plate at the bottom. The device, called the sky-reflector net, harnesses daylight and reflects

PHOTOGRAPHY: © DAVID SUNDBERG/ESTO

Created with James Carpenter, the oculus, with its perforated aluminum panels, draws daylight into the station.

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the sky's constantly changing colors. The intent, described by Carpenter, "was to bring the image of the sky directly into the space." (On a more mundane level, the oculus also functions as part of the building's smoke evacuation system.)

Happily, the station provides multiple vantage points for viewing the oculus, including an intermediary floor plate between the street level and the platforms that the architects refer to as the "lily pad" because of its circular shape, and two glass-enclosed floors that surround the sky reflector, dubbed the "doughnut." The latter element, which is lifted off the ground plane on Y-shaped columns, houses some of the complex's 63,000 square feet of commercial space that shopping center giant Westfield Group is in the process of leasing. According to Michael Horodniceanu, MTA capital-construction president, the tenants will probably be restaurants, and are expected to move in sometime next year.

Over the course of the project's long history, the scope underwent some fairly significant changes. One of the first was the integration of the 125-year-old Corbin Building, which sits just south of the pavilion, into the station complex. The eight-story masonry and iron structure designed by Francis Hatch Kimball was originally slated for demolition. However, it was landmarked in 2003, after preliminary design for the Fulton Center was already under way. Corbin was deemed historically significant because it was a "proto skyscraper"—at just over 141 feet high, it was briefly Manhattan's tallest building, according to Page Ayres Cowley, whose eponymous architecture firm was charged with Corbin's rehabilitation. In addition, it is also one of the first to use Guastavino-tiled vaults.

Now, after a renovation that included structural reinforcement, restoration of the facade's terra-cotta and cast-iron ornament, and a complete revamp of building systems, Corbin features ground-level retail space with offices above, both of which Westfield will sublet to commercial tenants. The building also provides another point of access from the street to the subway platforms by way of a set of escalators that dramatically descend 20 feet below Corbin's original foundations (they required underpinning in order to insert the escalators).

Along the way to the Fulton Center's completion, there were also numerous value engineering changes, including the simplification of the oculus, which was intended to be bigger, dome-shaped, and completely clad in glass. Remarkably, neither the oculus nor sky-reflector net seems to have suffered. With the colors of the sky shifting across the aluminum panels' surface and reflected daylight animating the station's interior, they make a powerful architectural statement just as they are. ■

The metal-clad oculus can be seen emerging from Grimshaw's steel and glass station. The 125-year-old Corbin building is visible to the right of the station (top, right). The "doughnut," above, will contain retail and restaurants.

PHOTOGRAPHY: © DAVID SUNDBERG/ESTO

perspective**news**

LEED Adds Social Equity to Scope

BY DAVID SOKOL

IF SUSTAINABILITY is a three-legged stool of environmental, economic, and social performance, then LEED is a bit wobbly: historically, the rating system has not taken on community welfare with the same breadth and depth as it has climate change and resource conservation. "It's not as if social-equity benefit was absent from LEED," says U.S. Green Building Council (USGBC) vice president of LEED Brendan Owens, citing how power-plant emissions disproportionately impact marginalized communities. "But we knew we could do more."

To begin righting the imbalance, USGBC posited social equity as one of seven system goals for LEED v4, and formed a Social Equity Working Group to, as Owens puts it, "encourage and reward project team actions that delivered it." Three pilot credits for LEED v4 have now been introduced.

One credit, Social Equity in the Community, allocates a LEED point to projects that support vulnerable populations, by way of a thorough assessment process. A supply-chain pilot credit promotes sourcing materials manufactured under humane conditions. The third credit rewards teams whose members are certified for human rights and social-impact practices, or whose projects promote development of the construction workforce through apprenticeship programs, GED test preparation, and similar efforts.

"You could ultimately have a LEED rating system for social impact that's as large and elaborate as the one created for environmental impact," says Raphael Sperry, president of the advocacy group Architects/Designers/Planners for Social Responsibility and cochair of the subcommittee that drafted Social Equity Within the Project Team. Yet Sperry says the Social Equity Working Group wanted to keep the pilot credits to a manageable number as people test them out. "This is our first step," he notes.

A LEED rating system for social impact could become as large as the one created for environmental impact.

In order to make the credits easy to achieve, architects can also use existing programs for proving social responsibility. Completing parts 1 and 2 of the SEED Evaluator, or achieving Enterprise Green Communities Certification, another green building framework, qualifies a project for a community social-equity credit, for example. "We have tried to evaluate what is out there and, where another program is equivalent to what we are trying to accomplish, we will allow teams to use it as an alternative path to credit," says BuildingWrx principal Susan Kaplan, who cochaired the Social Equity Working Group with environmental consultant Joel Ann Todd. She adds, "We also don't want to require project teams to fill another set of templates over and above what they are doing to incorporate social equity into their projects."

According to Owens, the credits "will evolve based on project feedback over time." In addition to officially adding them to LEED v4, the USGBC is open to "threading issues like social equity through LEED, making them a much more fundamental piece of the rating system, instead of calling them out as separate." ■


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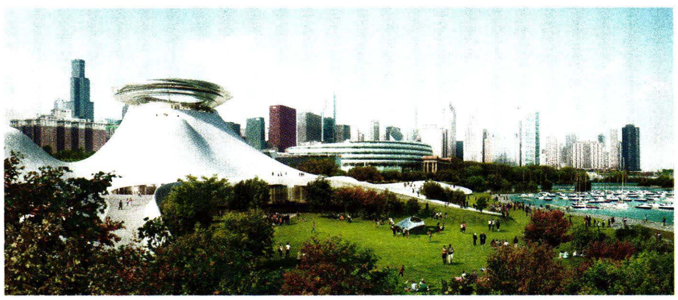
On the Boards: Lucas Museum

BY FRED A. BERNSTEIN

MA YANSONG, the 39-year-old founder of MAD Architects, is best known for his Absolute Towers, a pair of curvy condo buildings near Toronto. But his design for the Lucas Museum of Narrative Art, commissioned by *Star Wars* creator George Lucas for a prominent lake-front site in Chicago, could take him to another level of fame, and perhaps notoriety.

The building Ma has proposed, which will house the filmmaker's art collection, resembles nothing so much as a lunar landscape. Its undulating roof culminates in a towering seven-story-high conical form, which in turn supports a cantilevered disk with a hole in its center. That disk, containing a restaurant and a public observation deck, could be a terrestrial version of Cloud City, the gas-mining colony above the planet Bespin in *The Empire Strikes Back*. In an interview, Ma said that Lucas wanted a "21st-century museum that can inspire people." The 400,000-square-foot design is rooted not just in Lucas-ian imagery, but also in earlier visions, including J.R.R. Tolkien's original drawing of the Lonely Mountain. Is form following function when a building meant for artworks that tell stories—the "narrative art" in the name refers to everything from Norman Rockwell paintings to designs for animated films—incorporates so many images from science fact and fiction? Is this, in the Venturi lexicon, more duck than decorated shed? More Hutt than decorated hut?



MAD Architects revealed the first renderings of its Lucas Museum of Narrative Art.

Ma, who has offices in Los Angeles and Beijing, says he has been a frequent visitor to Chicago, where he once interned for Helmut Jahn, and that his goal was to have a dialogue with the city's architectural landmarks. (It is immediately adjacent to two of them, the Miesian McCormick Place and the classically ornamented Soldier Field.) At the same time, he wanted to create a building that "blends into the landscape." The undulating roof, some parts of which will be walkable, is "meant to be an extension of the park," he says. "This can't be a stand-alone object."

Much of the work of integrating the vast building into its surroundings will fall to Chicago's Studio Gang, which Lucas chose as landscape designer. He also selected VOA Associates Incorporated as executive architect. Michael Toolis, the Chicago-based chief executive of VOA, says that much was still to be determined about the building, which is entering the schematic design phase (and has yet to receive city approval).

Toolis says the building presented a number of technical challenges that would be addressed by working in 4-D and 5-D (he was referring to digital modeling, not sci-fi scenarios). A Chicagoan, he says the team "can't control" how people react to Ma's design. "There are going to be lovers and haters," he says, "but at the end of the day we think it's an appropriate building for Chicago." ■

IMAGE COURTESY LUCAS MUSEUM OF NARRATIVE ART

perspective**news**

[NEWSMAKER]

Suzanne Drake

BY ZACH EDELSON

PERKINS+WILL MAINTAINS a Precautionary List, an index of building materials that can harm the human body. While mercury and lead's impacts may be well understood, those of one ubiquitous set of chemicals have not been: flame-retardant chemicals. They are common in many architectural materials, from upholstery to insulation, and they slow the spread of fire in otherwise flammable substances. However, they also tend to escape into the environment and become absorbed in the human body, where they don't break down. What results is a "body burden": a cache of chemicals that has been linked to cancer, loss of IQ, and diabetes. For its inaugural Perkins+Will Science Fellowship program, the firm hired chemist Michel Dedeo to research the subject for an architectural audience. He and Suzanne Drake, Perkins+Will senior interior designer and associate, recently wrote a white paper with their findings.

How did this project begin?

It's the firm's philosophy that bringing information to our clients is the best way to practice. Previously, it was difficult to understand the information on flame retardants, as all the studies were written for a science audience. That's how the idea for the fellowship program came about—a short-term project where we could engage someone's science expertise. Michel was such a great fit, thanks to his tremendous background as a Ph.D. in chemistry and his extensive work with the Healthy Building Network.

Flame retardants can lead to cancer. How did they come to be so prevalent?

There are a few jurisdictions in the country with stringent flame-resistance requirements, which tend to become the default requirements for everybody. New York and Boston are very strict, but California's Technical Bulletin (TB) 117 was the most stringent. It stated that exposed foam in a fully upholstered piece of furniture had to pass an open-flame test and withstand bursting into flames for 12 seconds. However, it's not a realistic test. You don't have exposed foam in most finished buildings. The cheapest way to pass that test is to load the common polyurethane foam with halogenated flame retardants. That's how the chemical became so prevalent in furniture upholstery foam. Studies showed that levels of flame retardants in the blood and urine samples of Californians rose higher than the national rate after the regulation's passing in the mid-1970s.

Why has policy been slow to catch up?

The presence of the toxins is so broad, so dependent on an individual's response and their preexisting body burden. It's very easy to get people to change their ways when there's a direct connection, but [flame retardant is] more insidious. That's why Perkins+Will has taken a stance. It's our way of saying, "We don't need to wait for that direct connection to be drawn, because it may never happen."

Insulation seems to be the biggest challenge, as the paper indicates.

There have been some changes in legislation. The California TB117 was recently changed such that it may be easier and cheaper to put flame retardants in the fabric instead of the foam. There are more low-flame-retardant fabric alternatives, and we can now specify furniture with flame-retardant-free foam. From our research, I know that there are a lot of alternatives. The Safer Insulation Solutions website has an extensive chart comparing different kinds of insulation.

What can architects do now, not just in terms of specifying alternatives, but tackling the issue in the long term?

Educating the client is a good starting point. In the long term, building codes could go a long way by being updated. It all goes back to the flame test: most of the "stronger" flame retardants, such as the halogenated ones, are applied to plastic materials. But the actual test they must pass, developed in the 1930s, was based on wood burning and isn't accurate for plastic. Yet we still use it as a standard. Regulators worry about liability issues if we change it. There are also a lot of deep pockets involved: you can look at the *Chicago Tribune* investigative reporting series and the film *Toxic Hot Seat* to see how invested these chemical companies are in maintaining the status quo. Changing regulations will allow us to produce solutions that are right for the project, the client, and the health and safety of the occupants. We have sprinkler systems for fires that occur once in a blue moon—meanwhile, I'm being exposed to these chemicals every day for years on end. Which is more dangerous? ■

PHOTOGRAPHY: COURTESY SUZANNE DRAKE

noted

Benedetta Tagliabue Joins Pritzker Prize Jury

Tagliabue directs EMBT Miralles Tagliabue, founded in 1994 with Enric Miralles, based in Barcelona and Shanghai. Among the firm's most notable built projects are the Scottish Parliament in Edinburgh and the Santa Caterina market in Barcelona.

Alvar Aalto's Viipuri Library Wins Knoll Modernism Prize

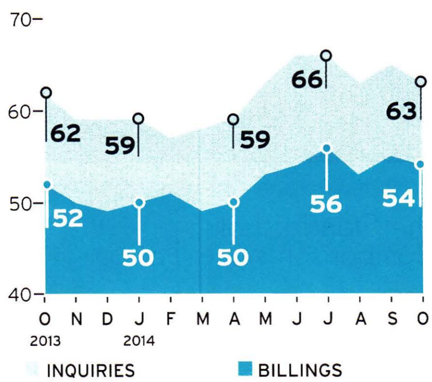
The 20-year project to restore the library in Vyborg, Russia, has been awarded the 2014 World Monuments Fund/Knoll Modernism Prize. Designed and constructed between 1927 and 1935 in what was then the Finnish city of Viipuri, the library reflects the emergence of Aalto's distinctive style.

Terrance Sargent Dies at 66

Terrance "Terry" Sargent, a founding principal of the architecture and design firm Lord Aeck Sargent, died on November 3. Sargent cofounded Lord & Sargent in Atlanta in 1983, and that firm merged with Aeck Associates in 1989. The firm now has six offices nationwide, and Sargent practiced from the Ann Arbor office.

Mies Crown Hall Americas Prize Winners Announced

The inaugural winners were announced at a dinner held at S.R. Crown Hall on the campus of Illinois Institute of Technology in Chicago: Iberê Camargo Foundation in Porto Alegre, Brazil, by Álvaro Siza and 1111 Lincoln Road in Miami Beach, Florida, by Herzog & de Meuron.



Pace Slows, But ABI Still Strong

The October ABI score was 53.7, down from 55.2 in September (any score above 50 indicates an increase in billings). The new projects-inquiry index was 62.7, down from 64.8. "We're finally seeing some momentum develop in design activity for nonprofits and municipal governments," says AIA chief economist Kermit Baker.

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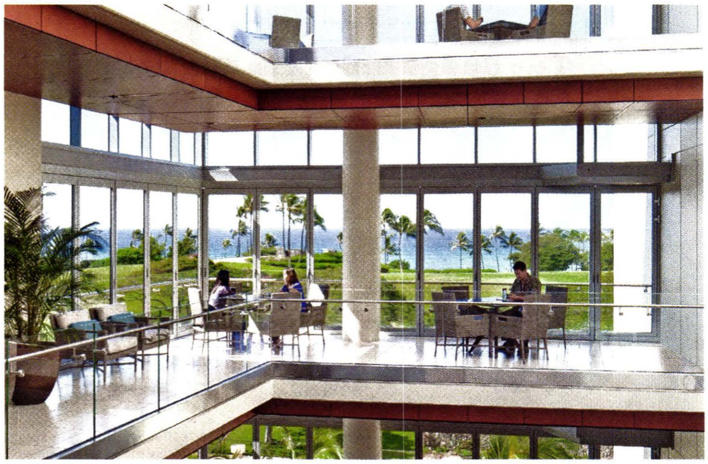

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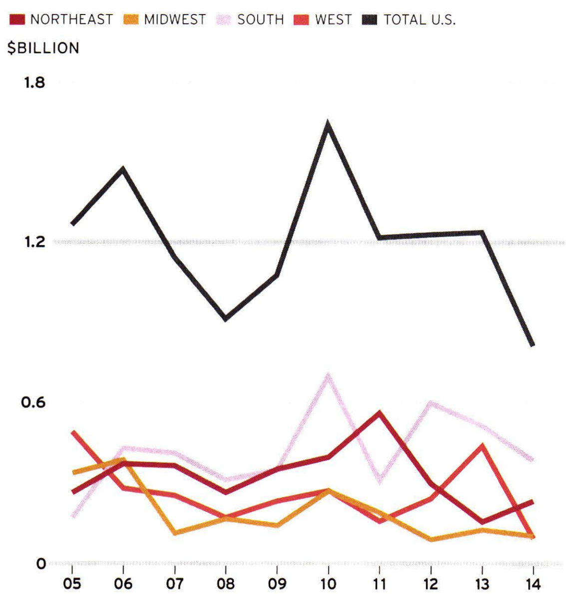
Data from McGraw Hill Dodge Analytics

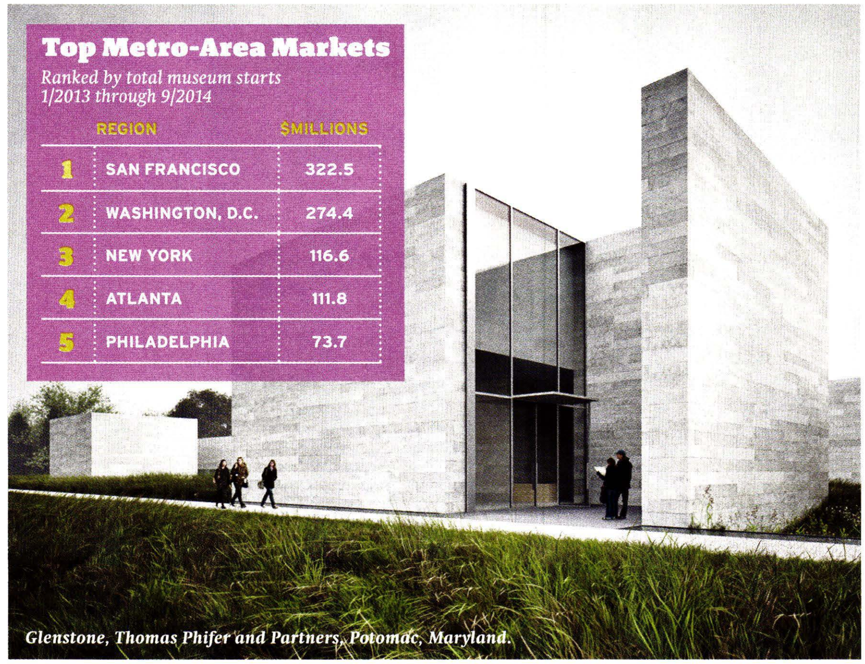
MARKET FOCUS
MUSEUM CONSTRUCTION

Museum expansion and new construction projects are as few and far between as they are glamorous. But, while such projects are far from plentiful, they tend to have generous capital budgets relative to their size.

Museum Starts by Region

In addition to U.S. total





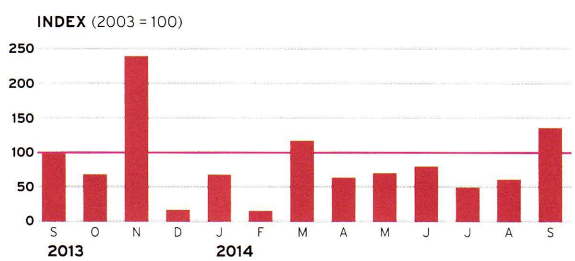
Top Metro-Area Markets

Ranked by total museum starts 1/2013 through 9/2014

	REGION	$MILLIONS
1	SAN FRANCISCO	322.5
2	WASHINGTON, D.C.	274.4
3	NEW YORK	116.6
4	ATLANTA	111.8
5	PHILADELPHIA	73.7

Glenstone, Thomas Phifer and Partners, Potomac, Maryland.

The Dodge Index for Museum Construction 9/2013–9/2014



The index is based on data for museum-construction starts that have not been seasonally adjusted. The average dollar value of projects in 2003 serves as the index baseline.

Top 5 Design Firms

Ranked by museum construction starts 1/2011 through 9/2014

1 **Cooper, Robertson & Partners**

2 **Perkins+Will**

3 **EHDD**

4 **Renzo Piano Building Workshop**

5 **Snøhetta**

Top 5 Projects

Ranked by museum construction starts 1/2013 through 9/2014

$250 MILLION

PROJECT: SFMOMA Expansion
ARCHITECTS: Snøhetta, EHDD
LOCATION: San Francisco

$125 MILLION

PROJECT: Glenstone
ARCHITECT: Thomas Phifer and Partners
LOCATION: Potomac, MD

$65 MILLION

PROJECT: Berkeley Art Museum and Pacific Film Archive
ARCHITECTS: Diller Scofidio + Renfro, EHDD
LOCATION: Berkeley, CA

$48 MILLION

PROJECT: College Football Hall of Fame
ARCHITECTS: tvsdesign, Turner Associates
LOCATION: Atlanta, GA

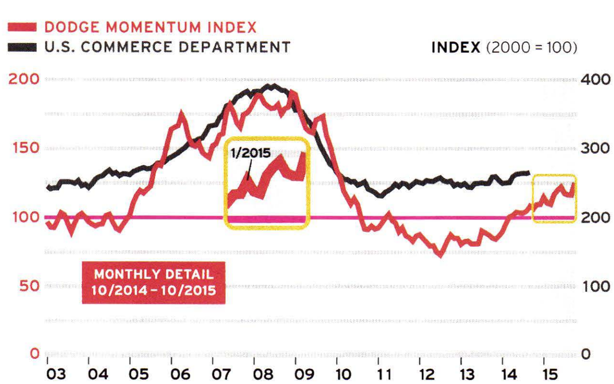
$45 MILLION

PROJECT: The Do Seum: San Antonio's Museum for Kids
ARCHITECT: Lake|Flato
LOCATION: San Antonio

MOMENTUM INDEX REBOUNDS

In October, the Dodge Momentum Index rose 7.6%, to 116.6. With this gain, which follows losses for three consecutive months, the index is up 18% versus the same time last year.

The Dodge Momentum Index is a leading indicator of construction spending. The information is derived from first-issued planning reports in McGraw Hill Construction's database. The data lead the U.S. Commerce Department's nonresidential spending by a full year. In the graph to the right, the index has been shifted forward 12 months to reflect its relationship with the Commerce data.



RENDERING: COURTESY PETER GUTHRIE/GLENSTONE

McGraw Hill Dodge Analytics tracks projects from predesign through construction to capture hard construction costs, square footage, and other key statistical information.

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CIRCLE 68


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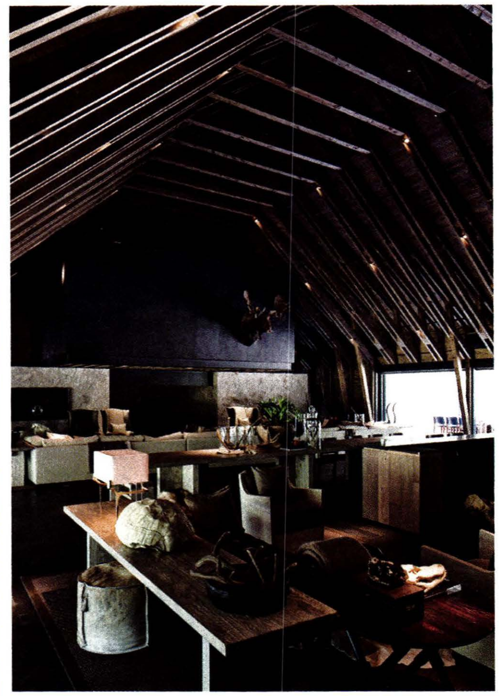
perspective house of the month

FOR A MEXICAN COUNTRY HOME, CC ARQUITECTOS POSITIONS LIVING QUARTERS AND STABLES SIDE BY SIDE TO FORGE A CLOSER BOND BETWEEN HUMAN AND HORSE. **BY JOSEPHINE MINUTILLO**



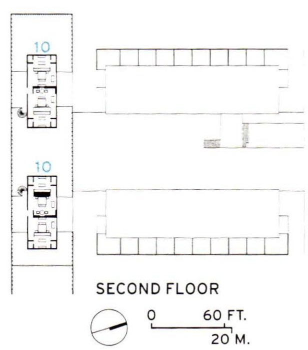
ONE MAN'S passion for horses inspired the design of his family's vacation home, set in the mountains two hours from Mexico City. The linear, gable-roofed wood structure contains four bedroom suites that float above the ground floor's reception hall and the expansive living and dining area, finished in wood and stone and outfitted with furniture by renowned French designer Christian Liaigre. Additional quarters for the household help are also included in the elongated volume. Partially depressed on one side of the house is a riding ring, while on the other are horse stables with roofs covered in vegetation. "The concept was to mix horses and people, landscape and architecture," recalls CC Arquitectos principal Manuel Cervantes Cespedes. "Pedestrian and horse paths flow together."

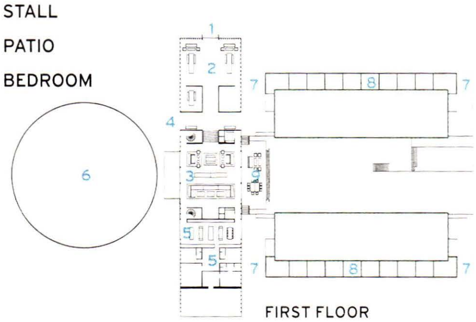
An obvious concern was the odor such close proximity to horses would produce inside the residence. To address that, the design relies on passive ventilation, with stables oriented to create a cross-flow of air between the open corridor and the house it segregates from the 20 open-air horse stalls. Says Cespedes, "It's amazing how we eradicated that issue." ■

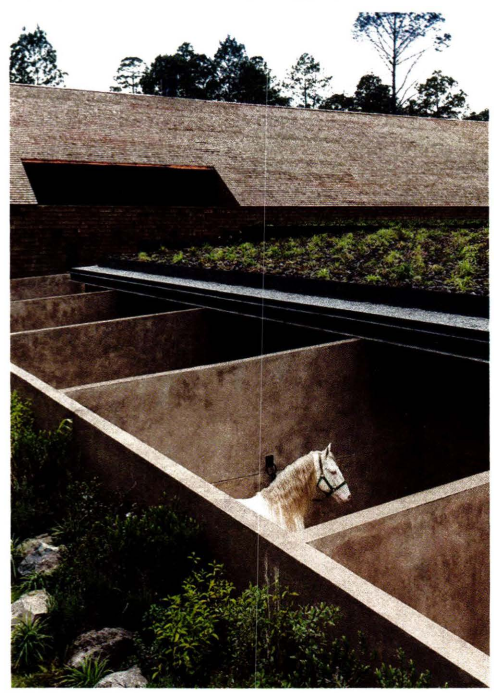
PHOTOGRAPHY: © IWAN BAAN

The 30,000-square-foot complex includes a freestanding main house flanked by stables and a riding ring (above). The 40-foot-high family room occupies the center of the house (top, right). The main entrance, at one end of the gabled structure, opens onto a reception hall (right). The stables feature outdoor stalls of brick covered in earth and concrete (bottom).

1 MAIN ENTRANCE
2 RECEPTION HALL
3 LIVING/DINING
4 RING ENTRANCE
5 HOUSEKEEPERS' ENTRANCE
6 RIDING RING
7 HORSE/PEDESTRIAN ENTRANCE
8 STALL
9 PATIO
10 BEDROOM





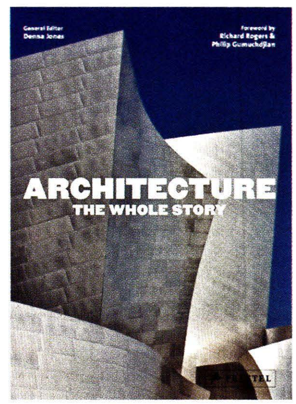


View additional images at architecturalrecord.com.

Architecture: The Whole Story, *edited by Denna Jones. Prestel Publishing, November 2014, 576 pages, $35.*

Reviewed by Zachary Edelson

HISTORY LOOMS over architects. In few other professions is there such a defined canon of masterpieces, such a tradition of reviving old styles. Yet, as Richard Rogers and Philip Gumuchdjian observe in their forward to *Architecture: The Whole Story*, "architecture is surely one of the most optimistic art forms." Each generation searches for "new utopias, new ideals" and finds inspiration "from all our innovations and all expressions of harmony and beauty," they say. Architecture always looks forward, but does revisiting the past offer new inspiration? That tension is at the heart of this hefty tome: how to translate the richness of history into a tool for the present.



This is no history book in a traditional sense. With more than 1,000 illustrations and hundreds of entries on individual buildings, *The Whole Story* is a "look-book" of architectural history. Articles on particular buildings, each a double-page spread, sit between slightly longer chapters that discuss historical or regional styles such as Indian sacred architecture or Brutalism. The graphics are minimal, and a simplified timeline of historical events runs through these chapters. The single-building entries frequently feature one large photograph and smaller ones or drawings to explore the design's finer points. The vast majority of these images are of high quality; the few fuzzy or poorly color-balanced photos stand out. Each entry is written by one of 42 professors, lecturers, and architects, all experts in their field. The editor, Denna Jones, is an architecture and design writer in London. While Jones organizes the book's progression by historical eras and architectural styles, most curation melts away as we flip through the pleasantly digestible entries. But the book's breadth isn't its strong suit. Instead, it excels when its selection of architecture becomes strange and unfamiliar.

Certain entries jump out. One explores the startling *mudhif* villages that rest on artificial islands in Mesopotamian rivers. Using reeds alone, villagers have crafted structural columns and permeable walls that ventilate the interiors. Another showcases a little-known Art Nouveau masterpiece in St.-Gilles, Belgium. Designed by Paul Hankar in 1894, the five-story apartment building features beautiful Japanese-inspired decorations and sinuous wrought-iron framing on its facade. Examples such as these, known mostly to the book's specialized contributors, are what will especially delight readers. Ironically, in its quest to distill and document history, the book's most interesting chapters are the ones that disrupt your preexisting historical ideas.

These architectural surprises may also leave the reader thirsting for more. Where are Vauban's *ex nihilo* geometric fortress towns? Or Wallace Neff's instant concrete homes cast with inflatable formworks? The history of architecture is full of strange experiments and buildings that were forgotten or neglected. The editor has made a valiant effort to condense history, though it is the unexpected and unseen that will ignite new visions—and show that no one's idea of what was, or what could be, is written in stone. ■

Zachary Edelson is an art and architecture journalist in New York.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The answer to the July issue's Guess the Architect is Louis Kahn, who designed the Erdman Hall Dormitories for Bryn Mawr College in Bryn Mawr, Pennsylvania, in 1965. For more details, including the winner, go to archrecord.com.

By entering, you have a chance to win an iPad mini.
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PHOTOGRAPHY: © TODD A. SMITH PHOTOGRAPHY; ROBERTO SCHEZEN (BOTTOM)

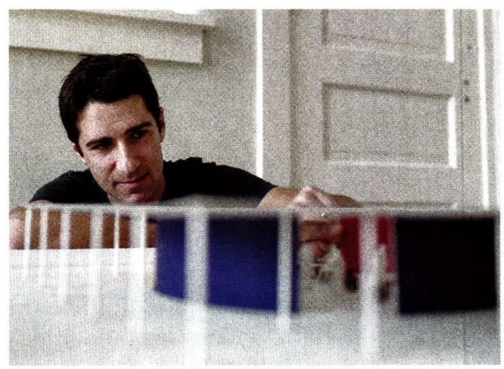
Jonathan Muecke

A designer greets visitors to this year's Design Miami/ with a walk-in color wheel.

BY WILLIAM HANLEY

JONATHAN MUECKE designs furniture that is both simple and inscrutable. But before settling into his current practice, the 31-year-old designer received a B.Arch. from Iowa State University and worked for Herzog & de Meuron in Basel. His desire to create at a smaller scale led him to study at Cranbrook in Michigan and then establish a studio in Minneapolis, where he now produces furniture as one-off pieces and in small editions. His objects use a limited palette of familiar materials and typical furniture typologies but combine them in unusual, sometimes willfully awkward ways that make them difficult to read at a glance. A bench from 2011 made from carbon fiber and epoxy works the usually molded industrial materials into what looks like a hand-formed sculpture made from wet fur. His aluminum Mezzanine table from 2013 demands that sitters consider the structure holding up its elongated oval surface as they navigate its five staggered legs.

Muecke's latest project is a temporary entry pavilion for the Design Miami/ fair (December 3–7). The annual event, which celebrates its 10th iteration this year, brings a roster of design dealers—including Chicago's Volume Gallery, which represents Muecke—to the city to set up shop during Art Basel Miami Beach. ARCHITECTURAL RECORD spoke with Muecke about his design for the installation as well as his path from architecture to furniture and (at least temporarily) back again.



Jonathan Muecke with a study for his pavilion for the 10th iteration of Design Miami/, which runs December 3-7.

Your Design Miami/ pavilion has two arcing steel walls enclosing a circular space that is 45 feet in diameter. The walls are high, but very thin and painted in vivid colors, so that their material recedes into the background, leaving a series of abstract colored planes. How did you arrive at the design?

I wanted to work with the qualities involved in architecture that are not objects; for me, that means color and scale. The walls are made from rolled-steel plates that are half an inch thick at their widest but taper down to one-tenth of an inch at the vertical edges. You can't see over them either—they are 10 feet tall—so we have almost eliminated any perception of their third dimension On the interior, the walls are painted in complementary colors, with one side red and the other green. The exterior is painted with primary colors, yellow and blue.

So the relationship between the colors, in addition to physical walls, distinguishes the interior from the exterior?

Yes. Even before I came up with the shape, I had an idea about color. I wanted to make a pavilion that retained traditional notions of interior and exterior, but I also wanted to give that relationship a sense of slipperiness by [taking away the material boundaries] and relying on color alone—the pavilion doesn't have any other details. In a way, you're left in a kind of limbo between inside and out.

That's an appropriate state for a threshold space. Do you see yourself taking a similar approach in your furniture design?

When I start a project, I like to think about the variables—color, shape, material—and then draw links between them. The idea is to have all of the characteristics of the object in balance, so that one does not dominate the other—material does not dominate shape or color does not dominate scale. When those factors are equalized, then you find a kind of freedom. Early on in my practice, I decided that each project should ideally have only one material. That way, rather than worrying about putting 100 things together, you're only adding one to the mix.

Why did you stop working on architectural projects in favor of furniture?

I was looking for a way to work out architectural ideas with objects that I could conceive of as a whole, that I could hold in my mind all at once. That's very hard to do with a building—in fact, it's impossible.

Has this pavilion rekindled an interest in working on an architectural scale?

Of course it has. I've always been interested in this kind of work, and it's nice to confirm that my ideas are capable of going bigger. ■

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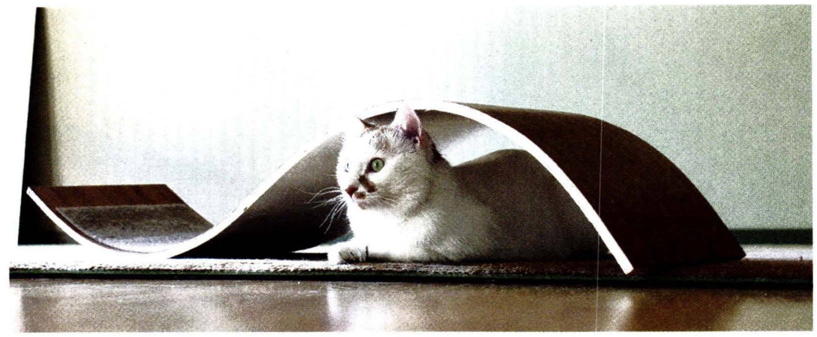

Oscar Cat Rest

Neo-Futurist architecture inspired the simple S-curve of this cat rest, created by designer Tom Davies. Constructed of molded plywood with a sapele wood–veneer finish, its shape and generous size allow pets to curl up or stretch out on top of or underneath it. A patch of carpet on one side, made from 100% post-consumer plastic, adds the finishing touch. $99.00 daviesdecor.com

Balloon Banks

An authentic Jeff Koons sculpture may be out of reach for most shoppers, but this coin bank from Made By Humans 2 Designs is an affordable–and useful–smaller-scale alternative. It's available in a dog, bunny, or monkey version, in a variety of colors, through online retailers including Fab. $60.00 fab.com

Structo

Drawing on the same technology used in the light guides of scanners and copiers, Curio designed this stick-form table lamp with a slim LED pipe that provides precise, glare-free lighting. The luminaire is assembled without any visible hardware, and integrated Bluetooth allows for wireless control and dimming with a smartphone or tablet. $250.00 curiodesign.com

Iced-Coffee Maker

Zoku–which specializes in designer kitchenware that makes chilled and frozen treats–has a new offering: a travel cup that transforms hot beverages into iced ones without diluting the drinks. It comprises a stainless-steel mug, freezable insulating sleeve, lid, and straw. $29.95 zokuhome.com

Hex Box

Founded by an architecture school graduate, IN.SEK designs and produces objects and furnishings that straddle the art and architecture realms. Among its offerings are lidded geometric concrete containers, such as this new hexagonal version, which measures 4¼" x 5". The box is cast in three tints–charcoal, gray, and white–and topped with a solid American walnut lid. $50.00 insekdesign.com

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CIRCLE 31

CIRCLE 43

The Arcus Center for Social Justice Leadership at Kalamazoo College | Kalamazoo, Michigan | Studio Gang Architects

AGAINST THE GRAIN

For an academic center, a former RECORD Vanguard architect revives a centuries-old building method to create a new archetype.

BY JOSEPHINE MINUTILLO

PHOTOGRAPHY BY STEVE HALL FOR HEDRICH BLESSING

LOG ON
The building's striking facade is composed of locally sourced white cedar logs of varying diameters laid crosswise to expose their many faces. The curving walls terminate in steel.

There is a common thread that runs through all of Studio Gang's work. Each project—whether an 82-story tower, a small open-air pavilion, or the design of a museum exhibition—begins with research into materiality and structure and an emphasis on sustainability; and each results in completely novel and visually striking forms. It is no surprise, then, that the Chicago-based firm led by Jeanne Gang, which has nearly doubled in size over the last couple of years, has taken on those same challenges and aspirations for its latest project. A building without any real precedent, the Arcus Center for Social Justice Leadership creates a new archetype and brings both the pursuit of human rights and a centuries-old, but little-known construction method to the fore.

An initiative of Kalamazoo College made possible by billionaire alumnus and activist Jon Stryker, the Arcus Center is located at the northwest corner of the small liberal arts school's campus in Kalamazoo, Michigan, and borders the city's West Main Hill Historic District. Its position at the highest point of the campus, overlooking a dense grove of trees, is a prized one; the college president's house once stood there but was moved to an unoccupied lot across the street, beside similarly impressive single-family residences, to make room for the new building.

The site also inspired the one-story structure's dynamic form. Taking the shape of a pair of boomerangs facing outward and joined together along one wing, its three low, arcing walls culminate in three large rectangular windows facing onto the residential neighborhood to the north, the forested area to the south, and the college's 20 or so other main buildings downhill to the east. "There's no secret about what goes on inside," says design principal Todd Zima. "The openings figuratively and literally engage the community."

The walls themselves are difficult to decipher. From a distance, their unusual color and texture look almost like a snake's skin—and, on one side, a snake that has swallowed a very large rodent. That wall, which cantilevers over the sloping ground beneath, bulges at its center to accommodate an eyelet window for a conference room. The opening is an awkward sliver, however, since the walls are so massive. Nearly 2 feet thick, they are composed of 11-inch-long white cedar logs laid crosswise, in a building technique known as cordwood masonry (RECORD, July 2014, page 134), and backed by an air cavity, insulation, and a traditional stud wall.

WINDOW OF OPPORTUNITY
The three arcing facades culminate in large windows ranging in height from 10½ to 18 feet. The transparency helps engage the campus and local community and lets them see what goes on inside.

Windows are handled more gracefully on the rest of the wall and the facade to the west—their small, metal-trimmed, circular openings are crisp highlights among the similarly sized log faces. Though the Y-shaped form results in a building with no obvious back or front, the wall that frames the main entrance is the least successful, making it look instead like a service entry. Kept close to the ground, to echo the residential scale of the area it faces, and punctured only with standard entry doors, it is actually too low, dwarfed by the stately homes around it.

The building's less than grand appearance may also have

HEARTH AND HOME
The open, daylight-filled interior features a sunken seating area with a fireplace at its center (above and opposite, right). With no right angles or hidden areas, the flowing spaces of the non-hierarchical design create a welcoming atmosphere.

credits

ARCHITECT: Studio Gang Architects – Jeanne Gang, founder and design principal; Mark Schendel, managing principal; Todd Zima, design principal, project architect; Margaret Cavenagh, interiors director; Claire Halpin, senior project leader; John Castro, Juan de la Mora, Ana Flor Ortiz, Jay Hoffman, Wei-Ju Lai, Lindsey Moyer, Jeana Ripple, Schuyler Smith, Rolf Temesvari, John Wolters, team

CONSULTANTS: Thornton Tomasetti (structural); VIRIDIS Design Group (landscape, civil); Diekema Hamann (m/e/p/fp); Earthwood Building School (wood masonry)

CONSTRUCTION MANAGER: Miller-Davis Company

CLIENT: Kalamazoo College

SIZE: 10,000 square feet

CONSTRUCTION COST: $5.2 million

COMPLETION DATE: September 2014

SOURCES

CURTAIN WALL: Oldcastle BuildingEnvelope

MOISTURE BARRIER: Carlisle, Dow

ROOFING: Firestone

GLAZING: Guardian, PPG

METAL DOORS: LaForce

SHADES: Hunter Douglas

INTERIOR PAINT: Benjamin Moore

OFFICE FURNITURE: Steelcase, Coalesse

SOLID SURFACING: DuPont Corian

PLASTIC LAMINATE: Formica

CARPET: Shaw

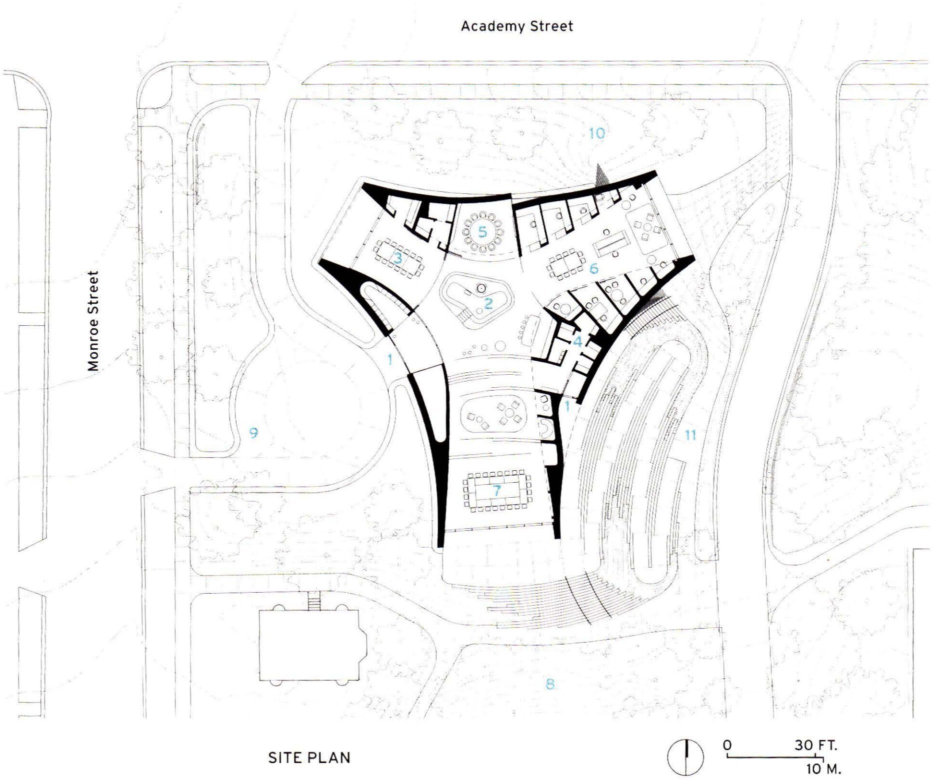
TILE: Daltile

PLUMBING: Elkay, Grohe, Kohler, Toto, American Standard, Sloan

something to do with the choice of construction. Cordwood masonry is low-tech, cost-effective, environmentally sound, and it provides good thermal value, but it lacks the refinement of traditional masonry. Though there are a few examples of its use in larger houses, including one for Willie Nelson, it is popular among back-to-nature, do-it-yourselfers to build small guest houses, barns, and outdoor saunas. The technique is similar to that for constructing a brick wall. But while a typical brick wall features less than 20 percent mortar, Arcus's walls feature up to 40 percent, with mortar joints as wide as 4 inches in many spots—an inevitable outcome, given the irregularity of the logs, whose diameters range from 4 to 14 inches. That much exposed mortar makes cracks and gaps created by log shrinkage more visible. When you take DIY construction and elevate it to the level of architecture with a capital A, those aesthetic and technical flaws cannot be overlooked.

The interior is less hippie chic and more 60s Mod, and the contrast is a bit jarring. All curves and no right angles, the nexus of the 10,000-square-foot open space—which includes a central kitchen, several offices, cozy nooks, and all-gender bathrooms that required city approval—is a sunken seating

OVER THE HILL The campus-facing wing of the Y-shaped structure cantilevers 24 feet out over an entry to lower-level mechanical and storage spaces. The architects took advantage of the sloping topography to create an informal amphitheater on the east side of the building.

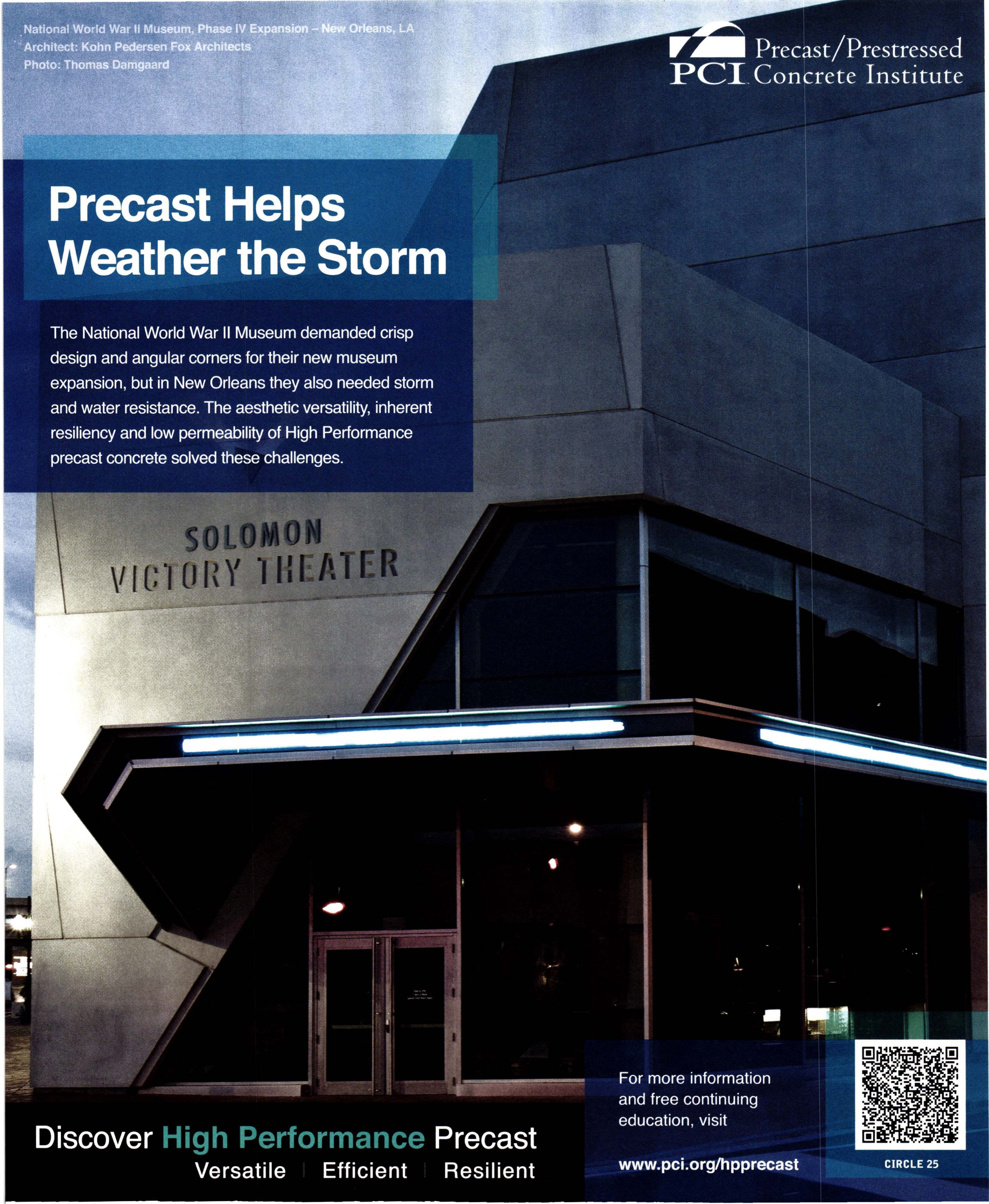


SITE PLAN

1 ENTRY
2 HEARTH
3 WORKROOM
4 WC'S
5 SEMINAR
6 OFFICE
7 FLEXIBLE MEETING
8 GROVE
9 COMMUNITY GARDEN
10 ACADEMY GARDEN
11 CAMPUS GARDEN

area with a fireplace. The building's unique program, to support the act of convening in different configurations, "begged us to explore buildings we don't tend to talk about in architectural history courses," explains Gang. Inspired by Shaker meeting houses, Indian stepwells, and Native American and Oceanic structures, the non-hierarchical interior, accented by earthy colors, accommodates intimate classes and workshops as easily as large conferences attended by hundreds. Though ceilings are as high as 18 feet and feature expansive clerestories, there is a domestic feel to the space. And while the tricky topography was handled masterfully by creating fully accessible ramps for informal amphitheaters, both outdoors and inside, the strong horizontality of the plan gives the building a Prairie-style quality generally associated with flatter Midwestern landscapes.

Studio Gang's biggest achievement at Arcus was crafting a truly welcoming space. Despite the shortcomings of the facade, the building's openness and grass-roots quality, coupled with the warm interiors, speak loudly to the center's mission of creating a more just and inclusive world. ■


National World War II Museum, Phase IV Expansion – New Orleans, LA
Architect: Kohn Pedersen Fox Architects
Photo: Thomas Damgaard
Precast/Prestressed Concrete Institute
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The National World War II Museum demanded crisp design and angular corners for their new museum expansion, but in New Orleans they also needed storm and water resistance. The aesthetic versatility, inherent resiliency and low permeability of High Performance precast concrete solved these challenges.
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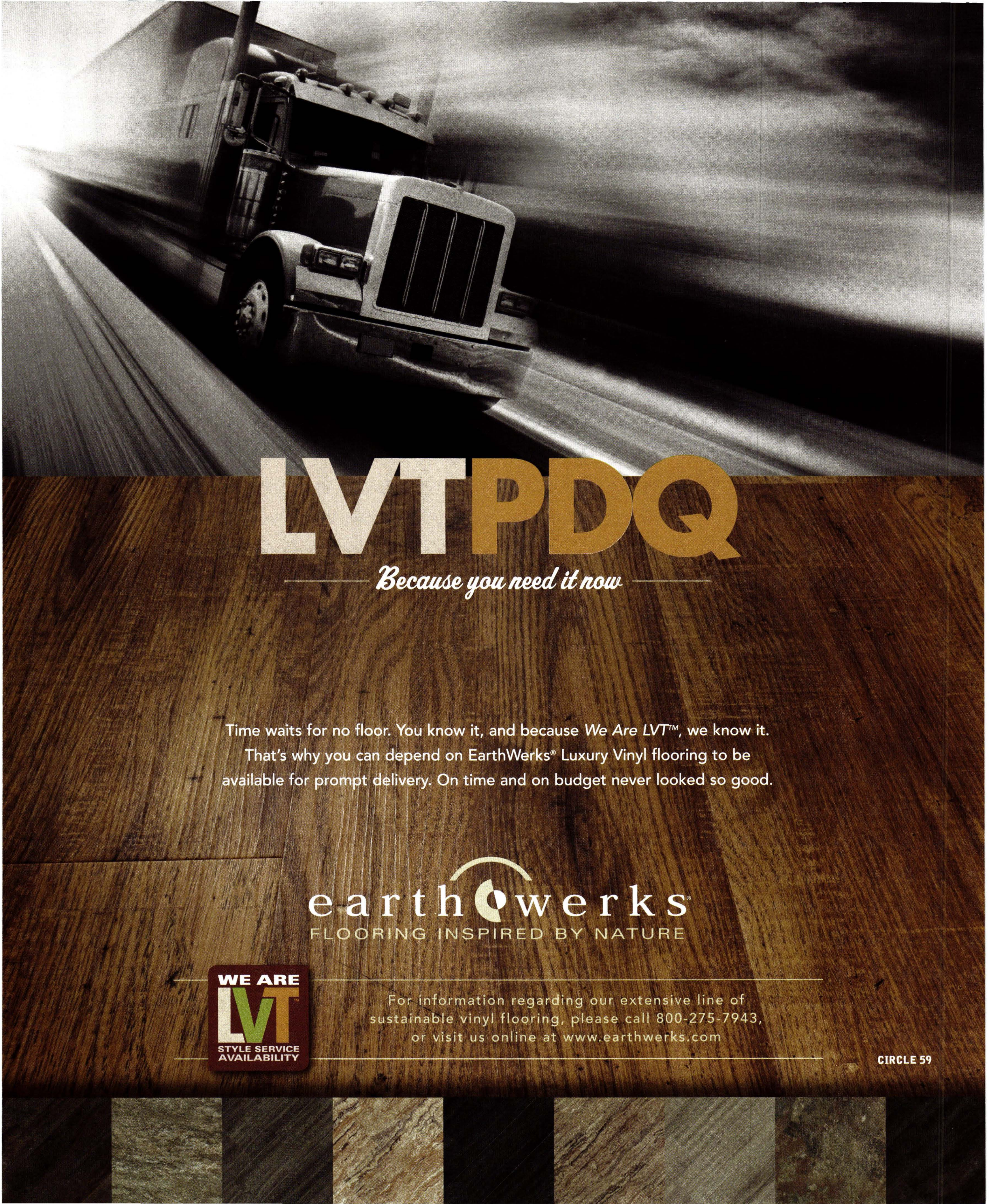
CIRCLE 25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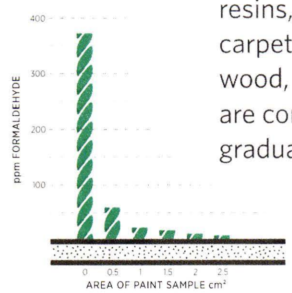
CIRCLE 59

Technology designed to make the great indoors even greater.

Let's go back a few hundred years.
In the past, air circulated freely through gaps in walls, windows and doors. And while we've become better over the years at sealing interior environments, we've also sealed in everything, from aldehydes, to mold and mildew and even unpleasant odors.

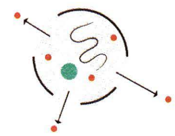
> The bold innovation for reducing interior odors and improving indoor air quality.

Why these problems are such a problem.
Used in producing plastics, synthetic resins, upholstery, carpet and pressed wood, aldehydes are compounds that gradually "off-gas", resulting in emissions. Mold and mildew can irritate skin, eyes and respiratory tracts and cause staining, rotting, and bacterial odors. And while odors from pets, cooking, smoke and other sources may not pose health problems, they can make indoor spaces unpleasant.



Aldehydes are emitted from carpet and other products over time.†

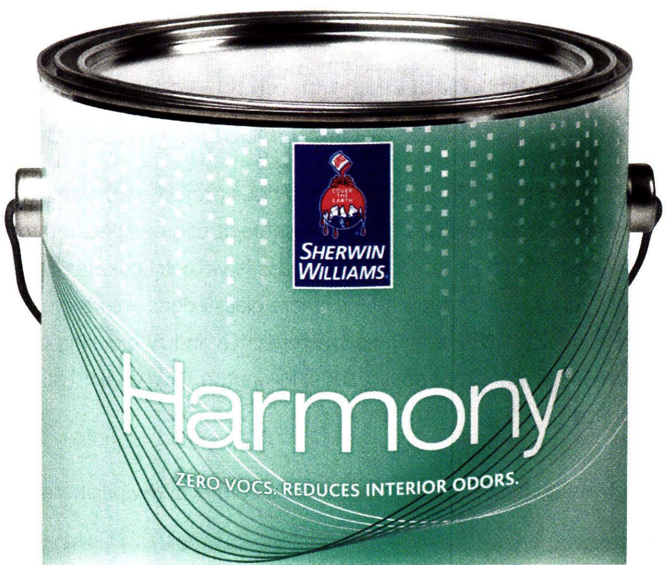
The science behind the technology.
It starts with odor eliminating technology that deconstructs carbon molecules, neutralizing and dissipating odors. Then, new formaldehyde reducing technology* helps to transform airborne aldehydes into water molecules and harmless inert gas, reducing these VOCs from potential sources like insulation, carpet, furniture and fabrics. And finally, antimicrobial agents inhibit the growth of mold and mildew on the paint film and related bacterial odors, addressing these issues before they can become a problem.


Special compounds deconstruct carbon molecules to dissipate odors.

Technology so advanced, all you need is a roller.
Perhaps what's most amazing about this technology is that it comes by the gallon. For more than 147 years, Sherwin-Williams has consistently engineered innovative coatings like this zero VOC product that balances bold ingenuity with aesthetic appeal. And that's why we call it - HARMONY.


Innovation that is the result of more than 147 years of R&D.

And oh yeah, it's paint.



*Formaldehyde Reducing Technology is currently available in flat and eg-shel sheens. The length of time Harmony actively reduces odors and formaldehyde depends on the concentration, the frequency of exposure and the amount of painted surface area.

†Based on methods:
ISO 17226 Determination of formaldehyde content in leather by High Performance Liquid Chromatography
ISO 16000-3 Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air

DESIGN VANGUARD 2014

Now in its 15th year, Design Vanguard showcases emerging firms from around the world that are expanding the role of the architect by championing new approaches to design and practice.

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VECTOR ARCHITECTS
STUDIO MA

PHOTOGRAPHY © SHINKENCHIKU

HOUSE IN SHAKUJIIKOUEN, TOKYO, BY GO HASEGAWA

NAMELESS Architecture
NYC; Seoul

A working couple performs a delicate balancing act that spans far-flung continents and disciplines.

FOUNDED: 2010

DESIGN STAFF: 5

PRINCIPALS: Unchung Na; Sorae Yoo

EDUCATION: *Na*: U.C. Berkeley, M.Arch., 2009; Hongik University, B.A., 2003. *Yoo*: U.C. Berkeley, M.Arch., 2009; Korea University, B.A., 2006

WORK HISTORY: NAMELESS, 2010-present

KEY COMPLETED PROJECTS: Circle, Triangle, Square, Gwacheon, South Korea, 2014; RW Concrete Church, Byeollae, South Korea, 2013; Wind Chamber, Jeju, South Korea, 2013; EPS Grotto, Seoul, 2013

KEY CURRENT PROJECTS: Triangle School, Namyangju, South Korea, 2014; Dongjak Cultural and Community Center, Seoul, 2015; DH Auditorium, Namyangju, South Korea, 2015

WWW.NAMELESSARCHITECTURE.COM

IN MUCH of their work, Unchung Na, 36, and Sorae Yoo, 32, the husband and wife who founded NAMELESS Architecture in 2010, challenge themselves to express contradictions in architecture: take heavy stones and stack them so they appear almost weightless; design a building that seems both closed and open, at once strong and weak. Their projects initiate dialogues between opposites that question the nature of materials and the way we engage with the built environment. At their Triangle School, nearing completion in Namyangju, South Korea, for example, they respond to the different contexts around the building with a trio of elevations that range from mostly opaque to nearly transparent. And by carving out a rotated triangular courtyard from its center, they undermine the school's initial appearance as a solid form.

In other hands, such projects might come across as pedantic, but Na and Yoo have a light and witty touch. Their project called Circle, Triangle, Square at first looks like a bunch of simple geometric objects scattered across a lawn outside the Museum of Modern and Contemporary Art in Gwacheon, South Korea. As you get closer, though, you realize everything is made of hay, and the installation is essentially a playground ripe for climbing on and jumping off. "We try to imagine how people will interact with our work, how it will affect their actions," says Na.

Although both partners were raised in South Korea, they met at the University of California, Berkeley, where they often sat together and collaborated on projects. After graduating, they moved to New York and started their own firm in 2010. With their penchant for contradictions, they named the firm NAMELESS, which also implies an ambiguous identity. Within a year, they had won the Architectural League Prize in New York for young architects and designers and got their first project in Korea, a small café. Today, they operate offices in both Seoul and New York, but most of their work is in Korea. (From 2011 until earlier this year, Kiseok Oh worked as a partner in New York.)

Collaborating with artists is an important part of the practice. "We're inspired more by artists than architects," says Yoo, who mentions Rachel Whiteread as one favorite. "On almost every project, we try to work with someone from a different discipline," says Na. For their installation Wind Chamber, they took data compiled by energy scientists and interpreted it in stone and metal. With Bubble Acts, a project that included 500 inflatable white mattresses, they worked with a choreographer to create a dance for about 20 performers. And on the Triangle School, they brought in a photographer to shoot the building throughout the process of its construction. At Berkeley, they took a photography class together, and their interest in the medium has only grown. For each project now, they tend to make a video, both to document and interpret their architecture.

In terms of architectural influences, they cite Buckminster Fuller and the 1960s Italian collaborative SuperStudio. "We like radical thinking, but also respect everyday realities," says Yoo. As Na and Yoo draw increasing attention from the press and their peers, they may remain NAMELESS, but hardly anonymous. *–Clifford A. Pearson*

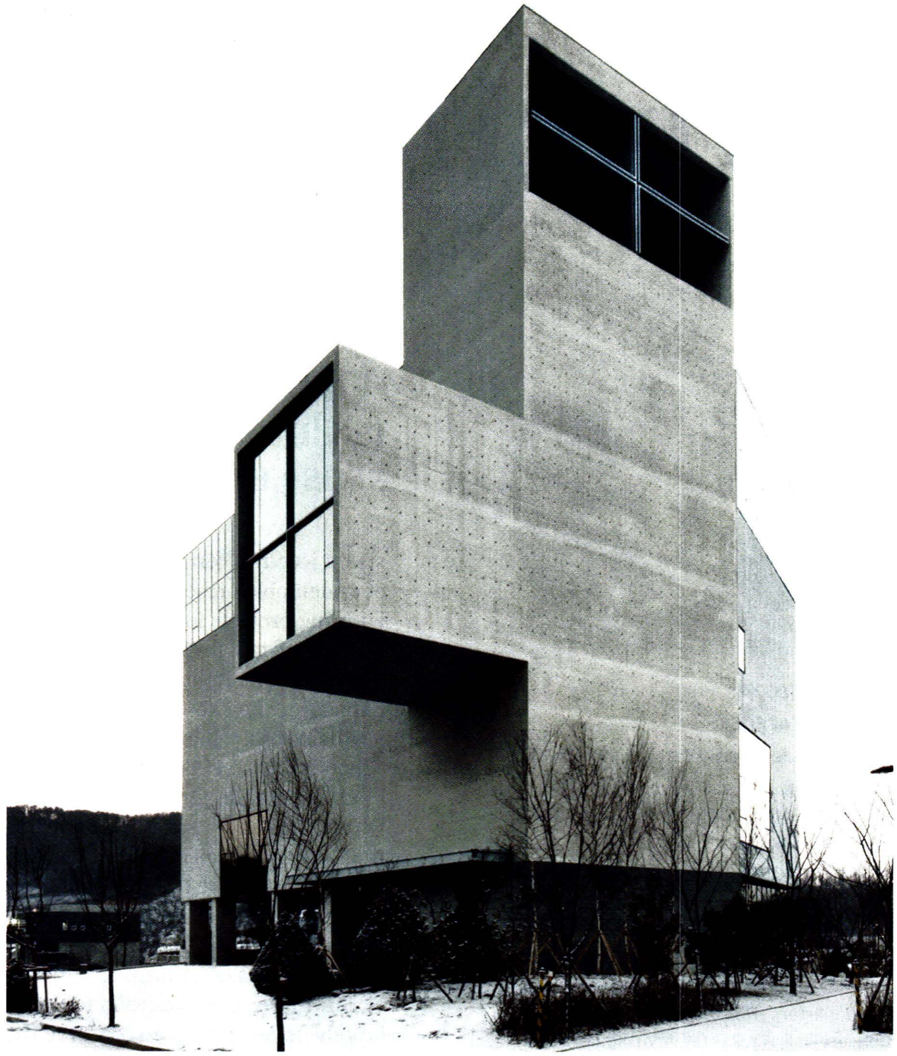
Wind Chamber

For a permanent installation on Jeju Island off the south tip of Korea, the architects collaborated with scientists at the Korea Institute of Energy Research, building a pair of facing walls–one made of rotating metal panels and the other of stacked stones–that help visitors visualize and experience the local winds.

View additional images online.

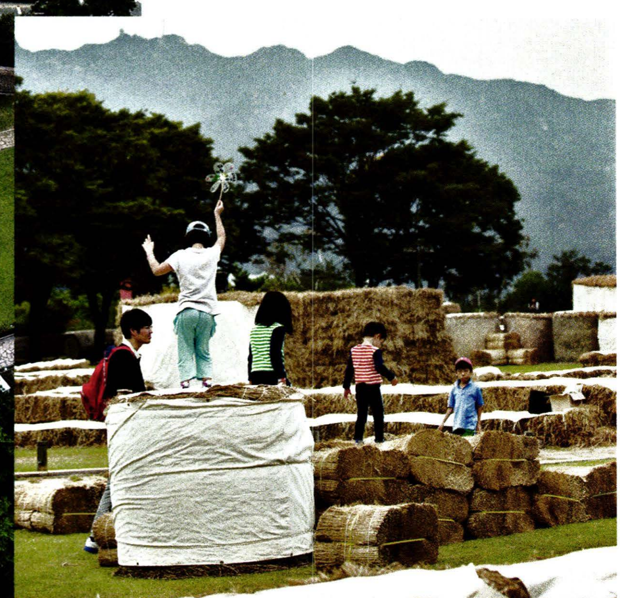
RW Concrete Church

One of the first buildings completed in Byeollae, a new district in northeast Seoul, this church serves as an important landmark in a place that's just beginning to develop an identity. Na and Yoo designed a simple but striking form that has a strong presence in the townscape. Using concrete as both the main structural and finishing material, the architects give the building a unified character that expresses a sense of calmness and permanance. The project's solidity serves as "a metaphor of eternal religious values in an age of unpredictability," says Na.



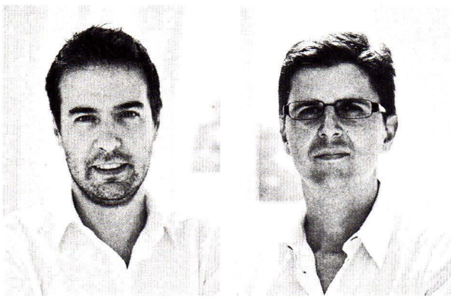
Circle, Triangle, Square

On the grounds of the Museum of Modern and Contemporary Art in Gwacheon, South Korea, the firm created a temporary landscape that serves as a platform for play and relaxation. A veritable alphabet soup of simple geometric shapes, the project uses bales of hay wrapped in white plastic to build outdoor enclosures and low walls for people to climb on, sit on, and jump off. Na and Yoo planned the installation as an instant city, where people could wander about, interact with each other, or find some space to get away from it all. It's a place where the man-made and the natural coexist and play off of each other.



PHOTOGRAPHY: © UNCHUNG NA (TOP); KYUNG ROH (BOTTOM, LEFT AND RIGHT); NAMELESS ARCHITECTURE (OPPOSITE)

Barozzi/Veiga
Barcelona



FOUNDED: 2004

DESIGN STAFF: 15

PRINCIPALS: Fabrizio Barozzi, Alberto Veiga

EDUCATION: *Barozzi*: Università IUAV di Venezia, M.Arch. 2003; *Veiga*: Universidad de Navarra E.T.S.A., M.Arch. 2000

WORK HISTORY: *Barozzi*: Guillermo Vásquez Consuegra, 2003; *Veiga*: Guillermo Vásquez Consuegra, 2001-03; Patxi Mangado, 1997-2001

KEY COMPLETED PROJECTS: Philharmonic Hall, Szczecin, Poland, 2014; Ribera del Duero Headquarters , Roa (Burgos), Spain, 2011; Concert Hall, Águilas (Murcia), Spain, 2011

KEY CURRENT PROJECTS: Graubünden Museum of Fine Arts, Chur, Switzerland, 2012-16; School of Music, Brunico, Italy, 2012-17; Museum of Fine Arts, Lausanne, Switzerland, 2011-17; Tanzhaus, Zürich, 2014-18

WWW.BAROZZIVEIGA.COM

A quiet strength pervades the work of this team, along with a finely tuned sense of detail and context.

SINCE JOINING forces in 2004, Fabrizio Barozzi and Alberto Veiga have forged an architecture of undeniable presence that nevertheless defers to its surroundings. A series of competition-winning projects for cultural venues—from Philharmonic Hall for the Polish city of Szczecin, just completed, to the Museum of Fine Arts of Lausanne, Switzerland, in progress—have catapulted the Italian-Spanish partnership into a busy pan-European practice. Now based in Barcelona, the two first met in the studio of architect Guillermo Vázquez Consuegra in Seville, Spain, where Barozzi had arrived from the Università IUAV di Venezia on an Erasmus Scholarship, and Veiga had moved after working for Francisco Mangado in Pamplona, Spain.

Their early designs are particularly assertive in form, such as the Philharmonic Hall, whose facades of repeated glass-clad gables offer a ghostly, expressionist echo of the steep roof lines of the city. But in subsequent projects, they have given priority to resolving public spaces in response to a building's context. In Lausanne, for example, they "spent a lot of time trying to make a stupendous building," says Veiga. "But finally we understood that the best way to open a conversation with the site was to make a stupendous void." He describes the result as "a plaza with three buildings around it that try to pass unnoticed."

Similiarly, their addition to the Graubünden Museum of Fine Arts in Chur, Switzerland, is largely underground, to conserve the existing garden on the site. They compare their design for a music conservatory in Brunico, Italy, to a thick garden wall, which surrounds the grounds of the existing building. And a dance school in Zurich is conceived as a stepped terrace and covered portico overlooking one of the city's river channels.

To convey the spirit of these quiet volumes for their competition entries, Barozzi, who is 38, and Veiga, 41, spend months preparing exquisite black-and-white renderings, seeking to capture every nuance of light, shadow, texture, scale, and density of mass. Sometimes these drawings recall the stark monumentality of Étienne-Louis Boullée, as in their presentation of the soaring entry hall of the Lausanne project, bathed in daylight. In others, their design recedes into the background, as in their depiction of the shady, arcaded walls of the dance school in Zurich. "In addition to responding in formal terms to a context, we think it's just as important to capture something one might call atmosphere or mood," Veiga maintains. "If architecture is a language, we are interested in how this language is pronounced, its intonations."

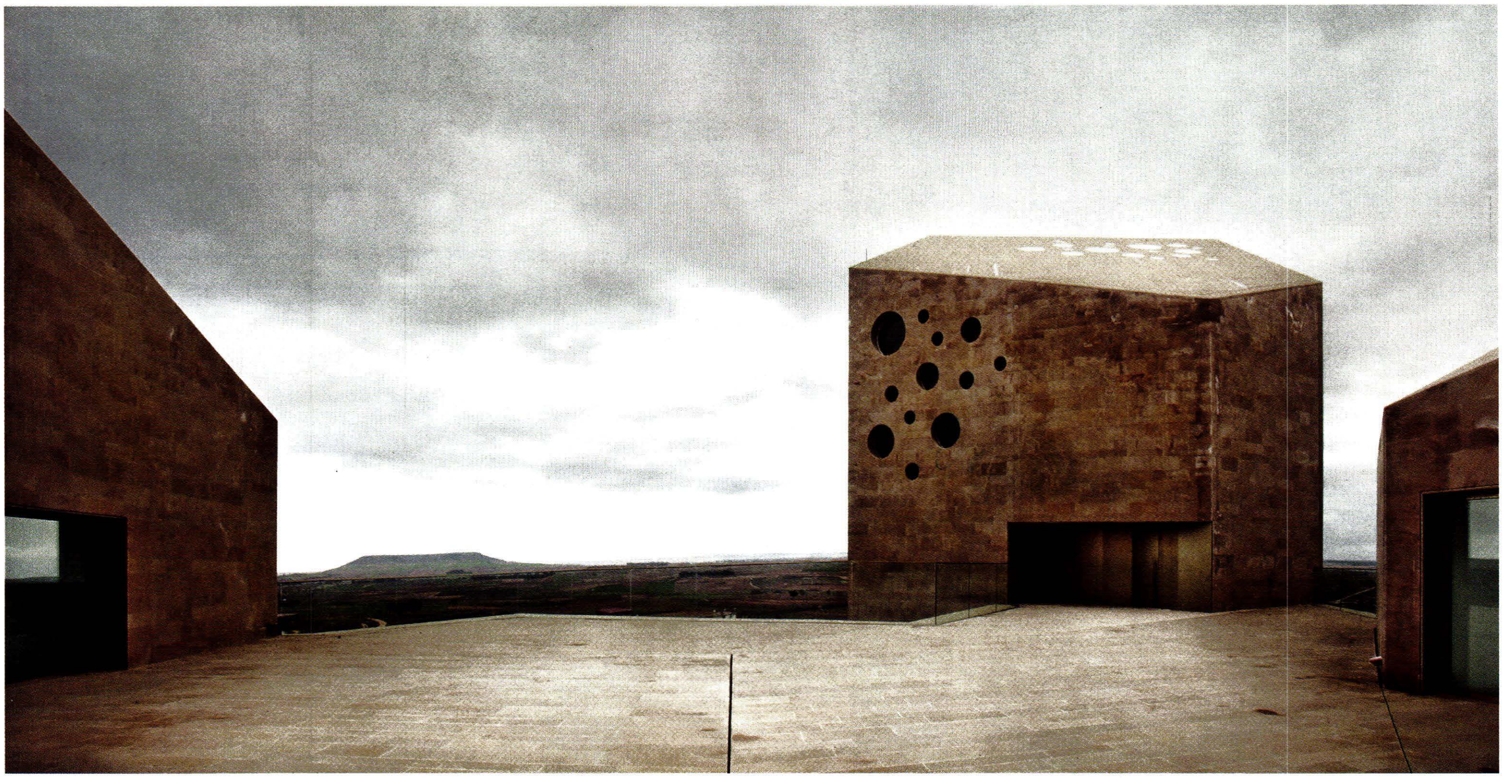
The two partners have won over juries with more than their extraordinary renderings. Their process of design through condensing, reducing the building program to an essential volume, seems to have struck a chord with the general zeitgeist of Europe in its post-economic-crisis retrenchment. After more than a decade of outrageous icon-building worldwide, during which architects have sought to outdo one another in formal experimentation, the times seem receptive to the more recessive intensity that Barozzi and Veiga offer. —*David Cohn*

Graubünden Museum

The galleries for this art museum addition in Chur, Switzerland, are underground, to conserve the existing garden, with its exotic plants and trees. The freestanding new structure houses the entry, offices, and technical spaces. The architects have clad this volume in concrete tiles inspired by Frank Lloyd Wright's textile blocks, responding to the eccentric ornamentation of the museum's current home, a villa built in 1876 by a local trader in oriental spices and textiles.

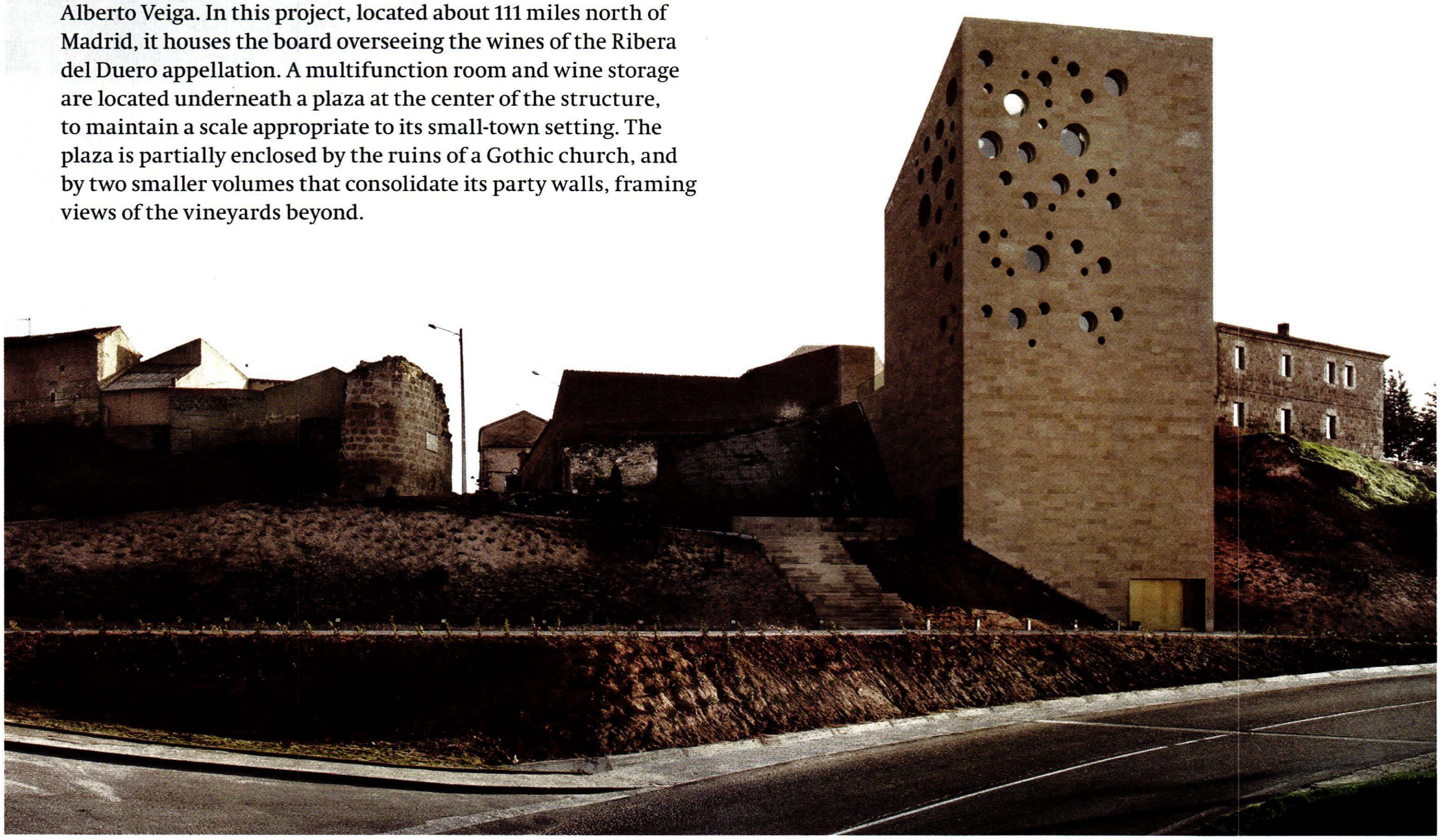
PHOTOGRAPHY: © MARIELA APOLLONIO; COURTESY BAROZZI/VEIGA (TOP, 2)

View additional images online.



Ribera Del Duero Headquarters

The stone tower is "a recognizable type-form in Castille," says Alberto Veiga. In this project, located about 111 miles north of Madrid, it houses the board overseeing the wines of the Ribera del Duero appellation. A multifunction room and wine storage are located underneath a plaza at the center of the structure, to maintain a scale appropriate to its small-town setting. The plaza is partially enclosed by the ruins of a Gothic church, and by two smaller volumes that consolidate its party walls, framing views of the vineyards beyond.



Águilas Concert Hall

For a town on Spain's Mediterranean coast, the architects created a compact volume to minimize its occupation of the waterfront, and to create a point of reference in the landscape. The concave walls, finished in white mortar, are the result of the intersection of two spheres and a cone, so as to model the changing light across their surfaces. The openings relate interior spaces to local landmarks, such as a windmill, a castle, and a mountain.

PHOTOGRAPHY: © MARIELA APOLLONIA

Szczecin Philharmonic

Occupying the site of a concert hall destroyed during World War II in this northwestern Polish city, the building's translucent glass form "appears as a white mass in the daytime," says Alberto Veiga, "but functions like a Japanese lantern at night." The multiple gables are inspired by the city's spires and roof lines, and cover large trusses spanning the interiors. The main concert hall features a long skylight at each end and gold-leafed acoustic paneling, reinterpreting the luxury of classic halls.

ESKYIU Hong Kong

FOUNDED: 2005

DESIGN STAFF: 5

PRINCIPALS: Marisa Yiu and Eric Schuldenfrei

EDUCATION: *Yiu*: Princeton, M.Arch., 2001; Columbia, B.A., 1998. *Schuldenfrei*: University of Cambridge, Ph.D., 2011, M.Phil, 2005; Cornell, B.Arch., 1999

WORK HISTORY: *Yiu*: KPF, 2001-05; Marble Fairbanks, 1997-98. *Schuldenfrei*: Eric Schuldenfrei Animation: Art + Architecture, 2003-05

KEY COMPLETED PROJECTS: POP-UP Studio-X, Shenzhen, China, 2013; Industrial Forest, Hong Kong, 2013; Ido Portal, Hong Kong, 2012

KEY CURRENT PROJECTS: The Tea Academics Café, HK, 2014; Ocean Architecture Aquarium, HK, 2015; MTR Public Art Installation, HK, 2016; Orochen Museum, Inner Mongolia, China, 2017

WWW.ESKYIU.COM

Expanding the definition of architectural work, a husband-and-wife team engages the public in projects ranging from installations to events.

HOSTING A dinner for 2,000 senior citizens or teaching 200 children to plant a garden is not most people's idea of what constitutes architecture. But for Marisa Yiu and Eric Schuldenfrei of the Hong Kong firm ESKYIU, that's precisely the point. "It was about testing the limits of our audience," says Yiu of these and other events that helped to make up the 2009 Hong Kong & Shenzhen Bi-City Biennale of Urbanism\Architecture, which she oversaw as chief curator. "We're interested in architecture that's not just about buildings per se," says Schuldenfrei, "but how architecture affects the society around it."

Hong Kong–raised Yiu and American-born Schuldenfrei met at Princeton's architecture school and formed ESKYIU in 2005 as part of a generation of emerging designers who emphasize architecture as a social, cultural, and curatorial practice. While the husband-and-wife pair have also explored form and fabrication—with a futuristic stage set for movement artist Ido Portal, for example—they see architecture as less a matter of bricks and mortar than about connecting what happens inside a building to the community and world outside. In addition to the 2009 biennale, which took the do-it-yourself theme of "B.Y.O.B." (Bring Your Own Biennale), Yiu, 38, and Schuldenfrei, 40, have mounted an interactive art piece made of metal "bamboo" on the roof terrace of an arts center in a formerly industrial neighborhood of Hong Kong; designed an installation of aquatic plants and "conceptual fishing reefs" to promote marine sustainability; and organized a bevy of talks and workshops tackling topics from cross-border issues in the Pearl River Delta region to the future of architectural education.

Though it can seem that Yiu and Schuldenfrei, who also teach at The Chinese University of Hong Kong and University of Hong Kong, respectively, do everything other than architecture proper, it's not that they don't want to build. "That's something we're, of course, very interested in," says Schuldenfrei, whose involvements include architecture as a communications medium. (He has a book coming out on the films of Charles and Ray Eames.) But the profession is notorious for making designers wait eons before giving them substantial opportunities to build. And while the "paper" architects of the 1970s may have bided their time contemplating theoretical and practical applications of the grid, Yiu and Schuldenfrei are happy, for now, working in the public realm of socially oriented experiments.

In this respect, and in their work across disciplines, they can be seen as part of a broader cultural phenomenon that spans from relational aesthetics (which ties art to social interactions) to the current beyond-the-object emphasis on "social innovation" in design. It's a way of thinking that sees spaces and objects as a means more than an end. For ESKYIU, this notion is manifesting itself in forthcoming projects such as public installations for an aquarium, a mass-transit hub, and a contemporary teahouse where they are designing everything from the interior to the programming and events. "Design isn't just about the static state of something at the time it's built, but how it changes over time," says Schuldenfrei. Adds Yiu: "We want to open architecture up and find more ways for people to participate." —*Aric Chen*

Industrial Forest

Mounted on the terrace of Hong Kong art space Spring Workshop, Industrial Forest alludes to the area's natural, industrial, and postindustrial heritage. Its metal "bamboo" rods respond to the movement of visitors, while mirrored surfaces on the perimeter play with perceptions of space and location.

View additional images online.

Stage for Ido Portal

Constructed of fabric and steel rings, ESKYIU's 2013 stage set for "movement culture" artist Ido Portal played with perceptions of space, scale, and depth. The 40-foot-wide installation in the famous Shaw Brothers studios (established in Hong Kong in the 1950s by the film company) could be lowered onto the stage; its smooth surfaces and ambiguously illuminated elements responded to the artist's movements.

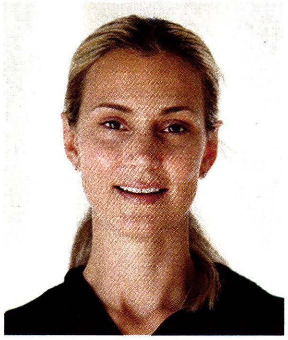
Studio-X Shenzhen

ESKYIU designed both the installation and programming for POP-UP Studio-X Shenzhen, a temporary space for Columbia University's architecture school at the 2013 Shenzhen Bi-City Biennale of Urbanism\Architecture. The project included work surfaces suspended from the ceiling and fold-up chairs that hung from a wall when not being used.

PHOTOGRAPHY: © VIRGILE SIMON BERTRAND (OPPOSITE, TOP); JULI BALLA (BOTTOM); VINCENT TSANG (TOP); ESKYIU (OPPOSITE, BOTTOM)

Merge Architects Boston

A nimble firm builds projects on a budget by immersing itself in the nitty-gritty details of fabrication and construction.



FOUNDED: 2003

DESIGN STAFF: 5

PRINCIPAL: Elizabeth Whittaker

EDUCATION: Harvard GSD, M.Arch., 1999; North Carolina State University, bachelor's, 1991

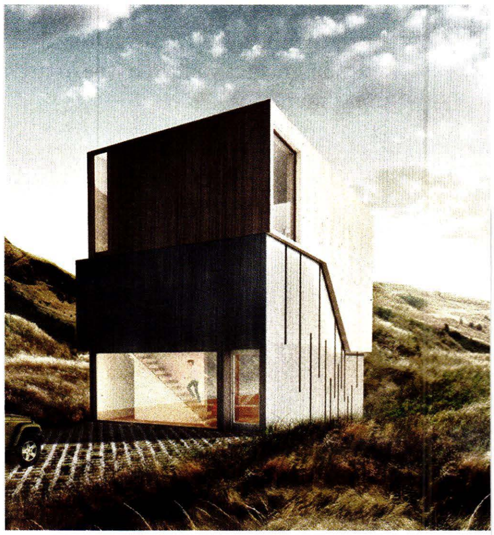
WORK HISTORY: Brian Healy Architects, 1999-2003; Edwardt & Lattermann, 1996-97; Gehry Partners, 1995; Dean/Wolf Architects, 1991-92; Edward I. Mills + Associates, 1991-93

KEY COMPLETED PROJECTS: Marginal Street Lofts, East Boston, 2014; Northeastern University Alumni Building Lobby/Café, Boston, 2014; MIT Beaver Works, Cambridge, MA, 2013; Lightwell-Greater Boston Orthodontics, Waltham, MA, 2013

KEY CURRENT PROJECTS: MiniMed Health Clinics, Panama City, Panama, 2012-present; Grow Box, Lexington, MA, 2015; Fort Hill Townhouses, Roxbury, MA, 2015

WWW.MERGEARCHITECTS.COM

ELIZABETH WHITTAKER, the principal of Merge Architects, doesn't take rejection personally. Working in Boston—a city that has historically lacked an appetite for contemporary architecture—Whittaker is constantly told "It can't be done." So she and her staff of four often take matters into their own hands.



One recent project—a 2,800-square-foot, state-of-the-art orthodontics clinic in Waltham, Massachusetts—is a case in point. The project involved a complicated gut renovation of a crumbling 100-year-old warehouse building. When the general contractor looked at the drawings for the centerpiece of the design—a curving 20-foot-high translucent wall made of wood and polycarbonate—he balked. "He said, 'There's no way I can do this; we don't have the budget,'" Whittaker recalls. "But, when I got up on a ladder, I realized we could make it happen." After the pieces were fabricated off-site, she and her staff borrowed the contractor's equipment and spent a few weeks installing the wall themselves.

For Merge, this is business as usual. "I started my firm because, first and foremost, I wanted to build," says Whittaker, 46, who graduated from the Harvard Graduate School of Design in 1999 and spent three years working for Boston firms before starting her own practice in 2003. The firm frequently makes its own pieces for projects, designing and assembling everything from a hand-stitched felt light fixture above the reception desk in the orthodontics office to a wall adorned with thousands of woven cotton straps for a Nepali/Indian restaurant.

Whittaker's obsession with details and craftsmanship often underlies a project's design concept. She has created a series of interiors based on unassuming items—stacking more than 1,500 water bottles into a wall for a health spa, for example, or inserting 42,000 wooden dowels into an undulating pegboard wall partition in a loft. "I'm interested in taking simple objects—reinventing them, abstracting them, giving them a new scale or even scalelessness," says Whittaker.

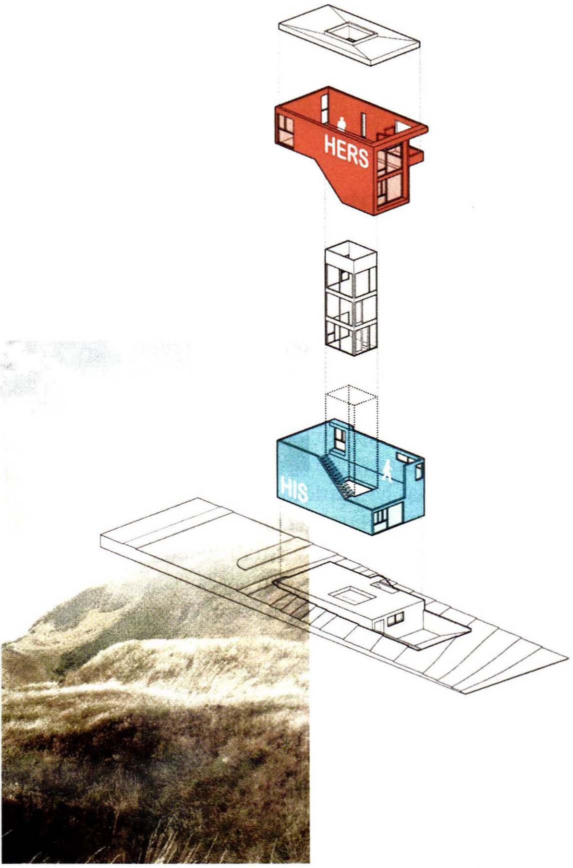
Details are elements she finds worth fighting for. Merge recently completed its second multifamily project—a nine-unit, 12,000-square-foot apartment complex next to a shipyard in East Boston. "It's on the waterfront, where there's very little greenery or vegetation," Whittaker says. Merge designed it with a vertical garden on the facade: metal-mesh screens, planted with vines and honeysuckle, frame each unit. But whenever budget concerns arose, the mesh was the first thing targeted to go. "I had to fight over and over again for that mesh facade, even though it was a very small percentage of the overall budget," she says. "But I knew how important it was to get the vertical garden for the neighborhood, for that corner, for the new residents," she says. Ultimately, the developer signed off. Now that the building is complete, Whittaker says she's gotten several phone calls from developers asking how she did it.

The payoff of Whittaker's persistence shows in her direct involvement in the fabrication and construction process. It is the reason, she believes, why the projects come in on budget, and sometimes why they are built at all. "The mesh, and things like that, would never survive unless we shouted for it," Whittaker says. "We're involved to the bitter end." *—Laura Mirviss*

Lightwell

Completed in 2013, Merge's first health-care project is a 2,800-square-foot orthodontics office in Waltham, MA. At the back of the treatment area, a translucent 20-foot-high wall draws daylight into the space and is lined with polycarbonate and plywood panels.

View additional images online.



His/Hers House

The 1,900-square-foot, three-story His/Hers House was designed for a mother and son in Quincy, MA (here shown in a rural setting) who wanted to share a single-family house but live in separate units for privacy. Except for a shared kitchen, the house is evenly split—her unit stacked on top of his, with his entrance at the front and hers on the side. Organized around an interior courtyard, both units have single and double-height spaces containing a living room, bedroom, and bathroom. The facade also emphasizes the separation, with his part clad in concrete and hers in wood.

Marginal Street Lofts

A new 12,000-square-foot, 3½-story apartment complex on the waterfront in East Boston has a vertical garden growing along a mesh screen on the facade. After a local metal shop cut the mesh into trapezoidal shapes, a metal worker spent many weeks hand-stitching each panel to a cable. Despite the labor for the mesh installation, the overall construction cost for the project came out to $170 per square foot. "We try to be tight in many areas so we can put the money into a special moment like the mesh facade," Whittaker says.

IMAGE: © FRED FIELD (OPPOSITE, TOP); JOHN HORNER (RIGHT AND OPPOSITE, BOTTOM); COURTESY MERGE ARCHITECTS (MIDDLE)

UID Fukuyama City, Japan

FOUNDED: 2003

DESIGN STAFF: 5

PRINCIPALS: Keisuke Maeda

EDUCATION: Kokushikan University, B.Arch., 1998

WORK HISTORY: UID, 2003-present

KEY COMPLETED PROJECTS: Cosmic, Osaka, Japan, 2014; Villa Tomonoura, Hiroshima, Japan, 2013; Peanuts, Hiroshima, 2012; +node, Hiroshima, 2012; Machi-Building, Hiroshima, 2011; Pit House, Okayama, 2011; Nest, Hiroshima, 2010; Atelier-Bisque Doll, Osaka, 2009; Holocaust Education Center, Hiroshima, 2007

KEY CURRENT PROJECTS: Longquan International Biennale, Zhejiang, China, 2015; CASANEIRO, Nara, Japan, 2015; Fukuyama Hondori street project, Hiroshima, 2016

WWW.MAEDA-INC.JP/UID/

An emerging architect mines his roots to explore the universal relationships of architecture and experience.

AN ACRONYM for Universal Innovative Design, UID is an unlikely title for a firm founded by a non-English speaker and located in Fukuyama, a regional city in the hinterlands of Hiroshima Prefecture. Yet there is a clean elegance to its moniker, just as with the architecture of studio founder Keisuke Maeda. “Lots of people name their firms after themselves,” he explains. “But it takes a whole team to bring forth inventive architecture.” Though still a youngster in professional terms, this emerging architect, who is 40, has enough experience to know what he’s talking about.

Maeda has a design staff of four architects, with an office inside MORI x Hako, a commercial building that the firm completed in 2009. Originally the space was earmarked for a small school, but when that arrangement fell through, the owner offered it to UID. Essentially one room spread out over a series of mini-levels, the studio reads as a manifesto of Maeda’s design ethos. His work, though contemporary, is rooted in historic Japanese architecture and its integration with the landscape.

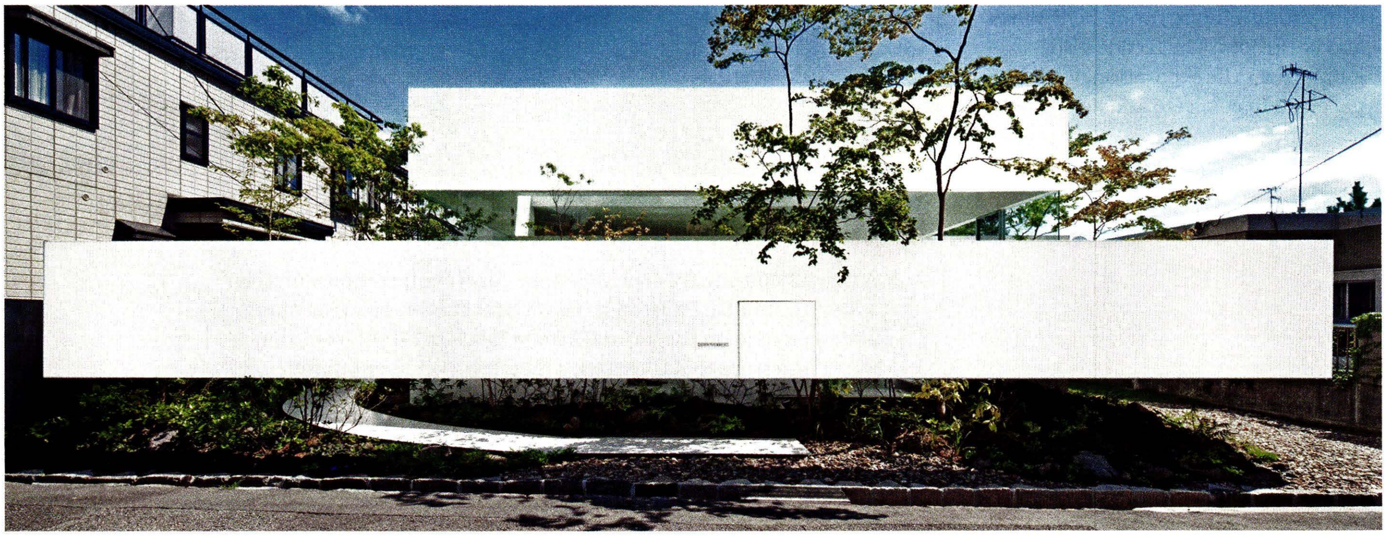
“Out of old things, new ones are born,” Maeda explains. With that in mind, he fitted out his firm’s office with movable wooden partitions inspired by *fusuma* sliding doors, plain wooden furnishings intended to age over time like traditional *tansu* chests, and a window wall opening on to a planted inner courtyard reminiscent of a *nakaniwa* interior garden. “The Western idea of architecture is to shield the space with walls and floors, while Japanese architecture connects to nature,” he says.

Maeda’s design priorities did not emerge immediately. After graduation from architecture school, he joined a local construction company in Fukuyama. From his perch in the contractor’s job-site offices, he helped realize many buildings, including gyms, nursery schools, factories, and residential renovations. By interacting with the workmen, he mastered the nuts and bolts of basic construction.

After five years, he left to open his own business and to design a residence for a couple in their 50s. The completed project was awarded a prestigious Good Design Award by the Japanese government. It also caught the attention of the founder of Fukuyama’s Holocaust Education Center, who commissioned UID to design his organization’s 2,300-square-foot building.

While maintaining his hometown connection, Maeda has his sights set on bigger projects farther afield. In addition to participating in China’s International Bamboo Biennale, he is currently working on a large multigenerational home for a family in Osaka, located on a 6,600-square-foot site that once housed the client’s family’s sugar factory.

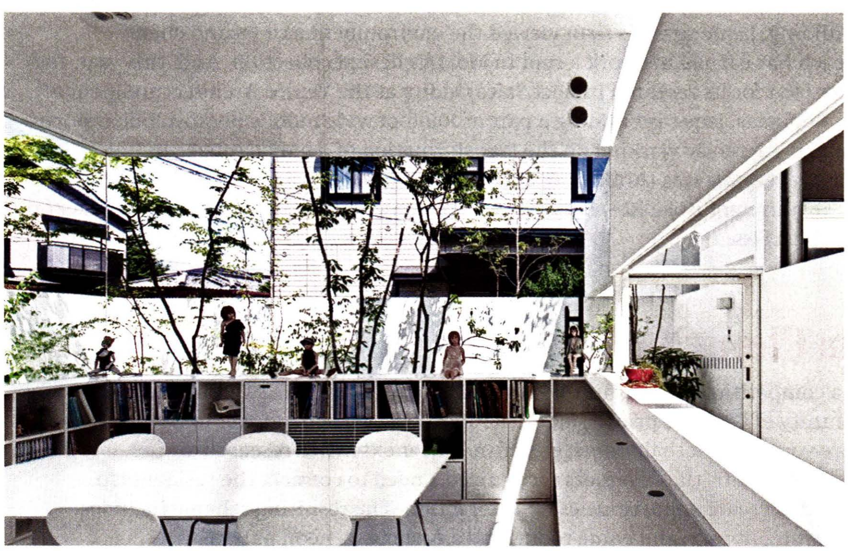
As his practice grows, Maeda’s completed works are adding another dimension to the firm name. The architect may have started with local commissions, but growing interest in his work—its connection to nature and the sensitivity to materials—indicates that the appeal of UID’s architecture is universal. —*Naomi R. Pollock, AIA*



View additional images online.

Nest

Located in foothills near the town of Onomichi in Hiroshima Prefecture, Japan, Nest is a house for a mother, her two daughters, and their cat. Sitting comfortably on the woodsy site, the timber-clad house is perforated by generous windows and skylights. These openings enable the clients to enjoy the greenery surrounding their home, and animate the interior with the play of sun and shadow throughout the day. While an indoor garden brings the forest inside, warm wood built-ins blend the natural with the man-made. The 400-square-foot interior is essentially one room divided by floor level and function, enabling family members to sense each other's presence.

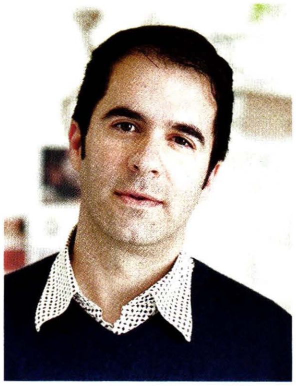


Atelier-Bisque Doll

Commissioned by a doll-maker, the Atelier-Bisque Doll project (opposite, bottom) is a combined home and studio located in Osaka. Working with the site's natural topography, Maeda created a sunken studio facing the street and placed the residence above and behind its entrance to the south. To preserve privacy without severing the tie between inside and out, Maeda wrapped the building with three overlapping white bands (or "belts") that appear to float. While one "belt" blocks direct sight lines into the client's space, a wide ribbon of transparent glass beneath it wraps the atelier (left), enabling passersby to view a collection of dolls displayed on a shelf surrounding the work area.

PHOTOGRAPHY: © HIROSHI UEDA; COURTESY KEISUKE MAEDA / UID (PORTRAIT)

Andrés Jaque Madrid; NYC



This enfant terrible upends conventional definitions of architectural practice.

FOUNDED: 2002

DESIGN STAFF: 12

PRINCIPAL: Andrés Jaque

EDUCATION: Escuela Técnica Superior de Arquitectura de Madrid ETSAM/UPM, M.Arch., 1998

WORK HISTORY: Office for Political Innovation, 2002–present.

KEY COMPLETED PROJECTS: Diocesan Clergy House, Plasencia, Spain, 2004; House in Never Never Land, Ibiza, Spain, 2009; Phantom, Mies as Rendered Society, Barcelona, 2012; IKEA Disobedients, New York, 2013; Las Arenas de Hänsel y Gretel, Madrid, 2013; Sales Oddity, Venice, 2014; Two Shadow Devices, Masdar, Abu Dhabi, 2014.

KEY CURRENT PROJECTS: Weizmann Square, Holon, Israel, 2015; Eco bathroom equipment for Bauhaus Dessau, Dessau, Germany, 2015; Chocotalks pavilions, Madrid, 2015.

WWW.ANDRESJAQUE.NET

ANDRÉS JAQUE is a polymath. He spent two years investigating the banal contents of the basement of Mies van der Rohe's Barcelona Pavilion for an exhibition and book. In other exhibitions, he has debunked the domestic ideal peddled by IKEA, and critiqued the ethical underpinnings of the fairy tale "Hansel and Gretel." But whether moonlighting as an activist, artist, or urban anthropologist, Jaque makes one thing clear: "I am an architect. I run an architecture firm."

Jaque and his firm, Office for Political Innovation, are part of a generation of architects redefining the discipline as a practice linked to politics, embedded in a complex system of social networks, and blurring the boundaries across various fields. "We live in a time where interdisciplinarity is the rule, not the exception," the Madrid- and New York–based architect says. "Architecture now is not about forcing everyone to accept what you are doing, but about creating a space for conversation."

From a young age Jaque, now 42, associated large construction projects with geopolitics: his great-grandfather, a well-known engineer and ship designer, founded a naval engineering school in Madrid. After graduating from that city's Escuela Técnica Superior de Arquitectura in 1998, Jaque spent a year in Dresden to study an early-20th-century planned community. There he lived in an artists' collective and witnessed his gritty neighborhood gentrifying. "It was like a second university," Jaque says.

After returning to Spain, Jaque considered joining a firm, but instead opted to strike out on his own. In 2002, he won his first significant competition, with an unorthodox brightly colored renovation of a clergy house in Plasencia, Spain. "From that moment, I committed to doing things with my own practice," he says.

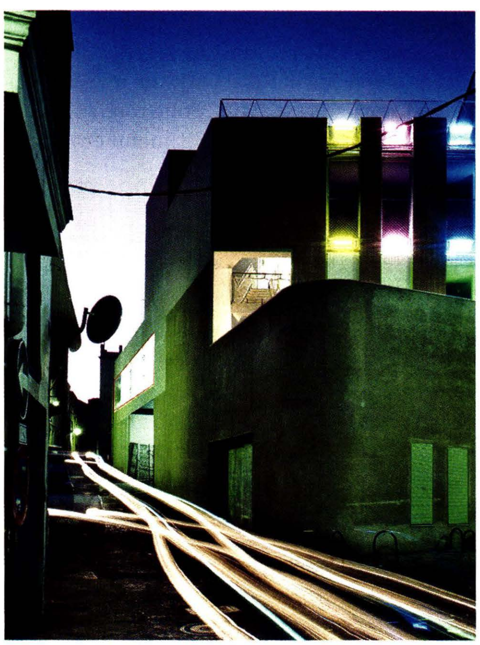
Office for Political Innovation's philosophy is that architecture is the mediating force between public and private interests. The firm begins each project with an intense research process, counts sociologists and a journalist among its dozen staff members, and maintains an expansive international network of associates and partners in many different disciplines.

Inspired by spaces such as SESC Pompeia by Lina Bo Bardi and the Interaction Centre by Cedric Price, Jaque's projects are meant to foster inclusivity—whether social or environmental. "We do buildings, but they are not the final result. They are not the most important goal," he explains. "We do buildings as a means to produce situations."

A recent project in Madrid, for example, transformed mobile crop-irrigation equipment by outfitting the vehicles with sound, light, and projection systems for public performances and gatherings. His best-known work, House in Never Never Land, a residential project with a series of cascading volumes, on Ibiza, Spain, strove to accommodate the surrounding ecology by elevating the building. Jaque says his firm viewed the environment as a second client.

Jaque's approach has earned his work a spot in MoMA's design collection. And, this year, the firm won a Silver Lion for its research project Sales Oddity at the Venice Architecture Biennale, curated by Rem Koolhaas. Jaque is building a pair of 100-foot-wide mobile photovoltaic canopies in Abu Dhabi, and is currently working on the transformation of a public square in Holon, Israel.

"Fifty years ago, everyone was thinking of their buildings—that was it," Jaque says. "Now we know that buildings are not isolated—that what we are doing is going to have a huge impact on many things." —*Anna Fixsen*



Plasencia Clergy House

After winning a competition to revamp an old seminary in Plasencia, Spain, to house an aging community of Catholic priests, Jaque thought, "OK, you don't want to have a graveyard before you die, so let's do something fun." After extensive research and dialogue with the residents, the designers recognized a need to connect the residents to the environment and create opportunities for interaction. The resulting scheme includes a garden, gymnasium, library, and game room, and a surprising neon palette.

PHOTOGRAPHY: © ANDRÉS JACQUE/OFFICE FOR POLITICAL INNOVATION (TOP; OPPOSITE, TOP); MIGUEL DE GUZMÁN (BOTTOM; OPPOSITE, BOTTOM)

View additional images online.

IKEA Disobedients

Mounted at MoMA/PS1 in New York last year, IKEA Disobedients combines architecture and performance art in a sculptural mishmash of IKEA furniture activated by ordinary people, invited to perform their quotidian activities. The piece is both a sharp critique of the company's idealized depiction of domestic space—"everything IKEA manufactures is aimed at turning the sphere of domesticity into a sunny, happy, apolitical space," the narrator of an accompanying video declares—and a manifesto for Jaque's own architectural practice. The work is the first architectural performance added to MoMA's collection.

House in Never Never Land

Completed in 2009, this Ibiza vacation house was designed for Spanish art fair director Enrique Polanco. While Jacque acknowledges that this is a seeming conflict with his quest for inclusivity in architecture, he argues that private residences are never totally isolated: "You really need to take into consideration other communities, and some of them are not human, like the ecosystem," he says. To accommodate the surrounding flora, the designers raised the house's three neon-green volumes on steel stilts. Existing trees were allowed to grow through the structure. "We need to seriously reconstruct who our client is," Jaque says.

Go Hasegawa Tokyo

Finding inspiration in quirky, leftover urban sites, an architect makes the job of fitting in a defiant act of design.

FOUNDED: 2005

DESIGN STAFF: 5

PRINCIPAL: Go Hasegawa

EDUCATION: Tokyo Institute of Technology, M.Arch., 2002

WORK HISTORY: Taira Nishizawa Architects, 2002–04

KEY COMPLETED PROJECTS: House in Shakujiikouen, Tokyo, 2013; House in Kyodo, Tokyo, 2011; House in Komazawa, Tokyo, 2011; Pilotis in a Forest, Gunma, Japan, 2010; Apartment Building in Nerima, Tokyo, 2010; House in Gotanda, Tokyo, 2006; House in Sakuradai, Nagoya, Japan, 2006

CURRENT PROJECTS: Apartment in Okachimachi, Tokyo, 2014; House in Yokohama, 2015

WWW.HSGWG.COM

TOKYO MAY be among the world's largest cities, but it has some of the smallest buildings. At critical nodes such as Roppongi and Shinjuku, the city has plenty of skyscrapers and hulking commercial complexes, yet its character is mostly defined by dense, low-scale neighborhoods where the majority of buildings are no more than five stories high. Here, in this paradox of big and little, Go Hasegawa, 37, is finding his design foothold. For Hasegawa, this process is taking place in his modest office atop a five-story walk-up in Harajuku, Tokyo's pop-culture epicenter. Gazing out from his studio, he can survey the complex cityscape that inspires his architecture but contrasts with the suburban scenery in neighboring Saitama Prefecture, where he grew up.

A typical two-story wooden house, his family home had the usual blend of Japanese and Western elements. "My room was covered with *tatami*, but I dreamed of flooring," says the architect with a grin. No doubt having a naval engineer for a father and a painter for a grandfather had an influence on Hasegawa's decision to study architecture. So, following high school, he entered Tokyo Institute of Technology (TITECH), where he got his undergraduate and master's degrees.

Under the aegis of Atelier Bow-Wow partner Yoshiharu Tsukamoto, his academic advisor, Hasegawa took part in the investigation of the tiny Tokyo buildings that his mentor terms "pet architecture." Together with his classmates, Hasegawa biked around town, seeking out and documenting the city's smallest structures. Through this research, he came to understand the play of scale in the city. Following graduation, he entered the firm of fellow TITECH alum Taira Nishizawa (Design Vanguard 2005). After three years, Hasegawa left to open his own office when family friends asked him to design their weekend getaway. Located in a vacation community in Nagano Prefecture, his clients' property is sandwiched between a picturesque river and a heavily trafficked pedestrian pathway. Keen to take advantage of the tree-studded site, the architect answered with a house-within-a-house whose partially glazed pitched roof keeps prying eyes out but lets in light and leafy views. "I wanted to use the scale of a house in a new way," he says.

Be it in the country or the city, Hasegawa often proposes solutions that unite urban, architectural, and furniture elements under a single roof. "In school, we learn about different scales, but I have discovered that we can combine them all in one building," he says. Creating a house as tall as adjacent apartment buildings, as he did in Shakujiikouen, for example, enabled him to fit it on a narrow site. And incorporating an empty lot effectively augmented the tiny footprint of his House in Gotanda, making it seem bigger. "I want to build positively in such small spaces," remarks Hasegawa.

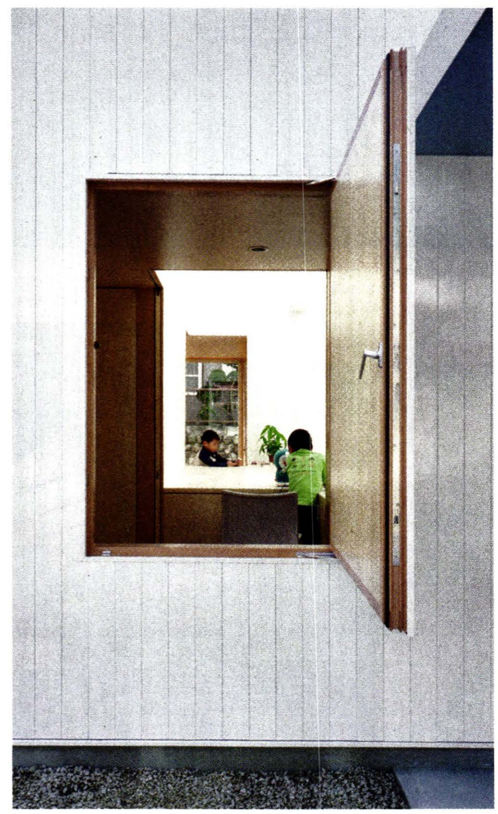
Like Tsukamoto, Hasegawa sees potential in urban conditions that others might deem problematic. Instead of trying to conquer a site's irregular geometry or ignore an area's architectural vernacular, he works these qualities into his buildings. Though he is still waiting for that large commission, Hasegawa's small buildings have already begun to have a big impact. —*Naomi R. Pollock, AIA*

House in Shakujiikouen

Facing a two-lane street in Tokyo, this house belongs to a professional photographer and her family. While the local vernacular inspired the three-story height and pitched roof, the wedge-shaped footprint maximizes the narrow site. Flanked by off-street parking and a garden, the facade measures a mere 4 feet across.

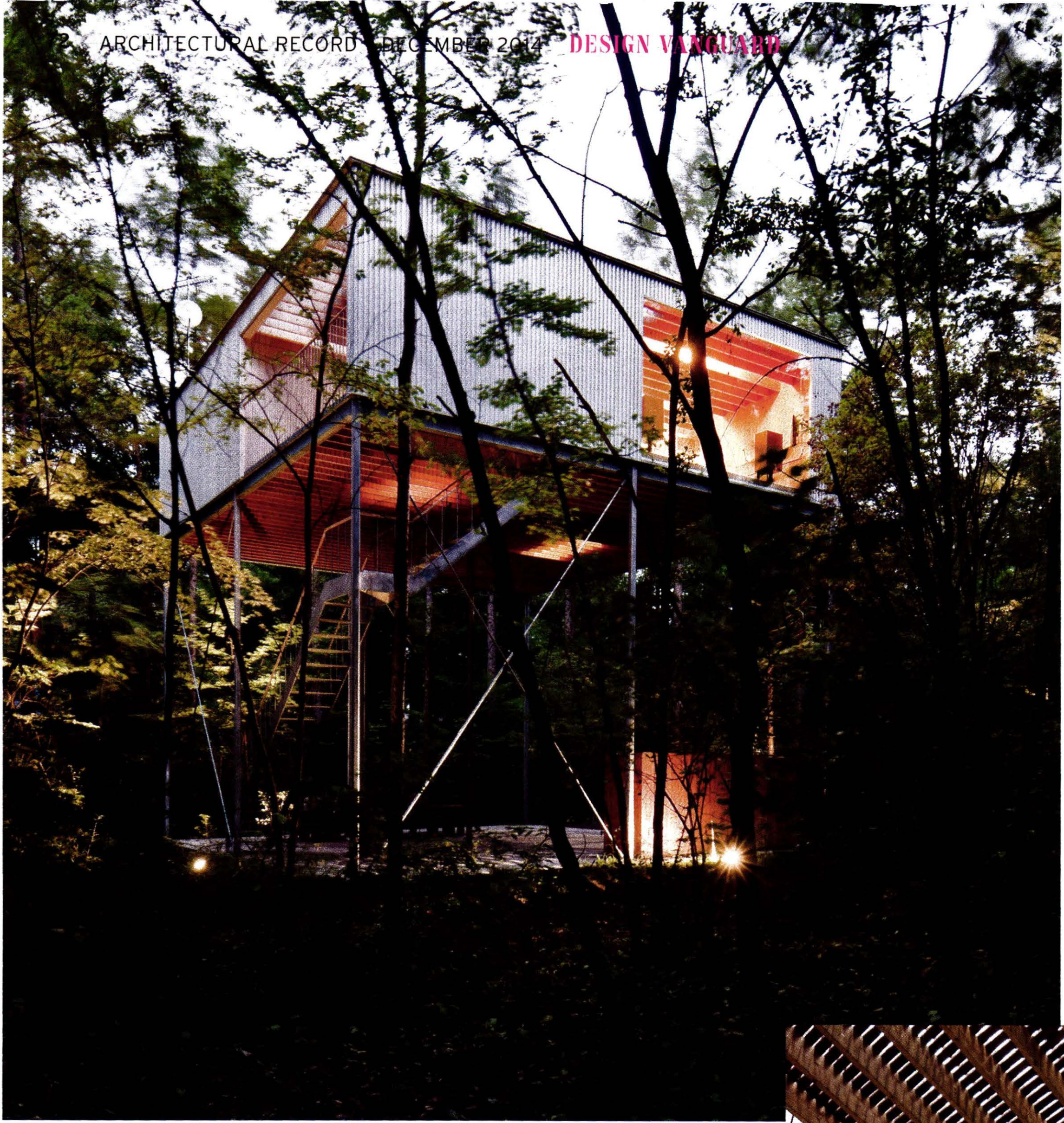
PHOTOGRAPHY: © SHINKENCHIKU (THIS PAGE AND OPPOSITE); COURTESY GO HASEGAWA (TOP, LEFT)

View additional images online.



House in Sakuradai

Designed for the architect's sister and her family, this house is located in a quiet residential neighborhood in Nagoya, Japan. Standing in the center of the property, the square two-story house is surrounded by a slot of space containing the entrance path, off-street parking, and gardens. The first floor holds the bedrooms, storage, a study, and a washroom, while the second floor has the living, dining, and kitchen areas in addition to a guest room. All the rooms ring a skylit, double-height void forming the heart of the house. Situated 29 inches above ground level, its floor doubles as a giant table.



Pilotis in a Forest

A tree house to top all others, this is a weekend home in densely wooded Nagano Prefecture, Japan. Perched on 21-foot-high columns evoking the surrounding tree trunks, the single-story home contains a combined dining-living-kitchen area, a bedroom, and a bathroom, all arranged in a simple, square plan. While a picture window faces Mount Asama in the distance, the terrace below functions as an outdoor room where the clients can relax in the middle of the forest.

PHOTOGRAPHY: © IWAN BAAN (THIS PAGE AND OPPOSITE)

House in Kyodo

The Tokyo home of a pair of editors, this modest dwelling is a study in contrasts. To house the couple's extensive library, Hasegawa placed floor-to-ceiling bookshelves on the lower level, between programmatic elements such as the entrance, lavatory, study, and bedroom. But upstairs, books are out of sight and daylight bathes a covered terrace, a kitchen, and dining and living areas, thanks to a wafer-thin steel roof that reflects the sun's rays inside. Cement-panel walls alternate with full-height windows to preserve the clients' privacy.

Aranda\Lasch NYC; Tucson

FOUNDED: 2003

DESIGN STAFF: 6

PRINCIPALS: Chris Lasch, Benjamin Aranda

EDUCATION: *Lasch*: Columbia University, M.Arch., 1999; University of Illinois, Urbana, B.S., 1995. *Aranda*: Columbia University, M.Arch., 1999; University of California, Berkeley, B.A., 1995

WORK HISTORY: Aranda\Lasch, 2003-present

KEY COMPLETED PROJECTS: Palm Court Event Space, Miami, 2014; *This Garden at This Hour*, permanent art/furniture installation with Matthew Ritchie, U.S. Food and Drug Administration, Silver Spring, Maryland, 2014; *Reconfigurable Furniture*, public installation at the Phoenix Office of Arts and Culture, Phoenix, 2013; *Modern Primitives*, installation, Venice Architecture Biennale, Venice, 2010

CURRENT PROJECTS: Art Deco Project, Miami, 2015; Palais des Arts, Libreville, Gabon

WWW.ARANDALASCH.COM

Two architectural designers, inspired by fractal geometry, scale up their designs—and their practice.

MOST YOUNG architects start off with small projects (kitchen, baths) or art installations before getting meatier commissions. Aranda\Lasch's methods for scaling up are a little different. Benjamin Aranda and Chris Lasch, trained as architects, created the short video *The Brooklyn Pigeon Project* when they launched their studio in New York in 2003. This ambitious experiment centered on a (shaky) bird's-eye view of the city, starring Reuben, a slightly freaked-out pigeon who had a small camera strapped to his neck. In 2005, their book, *Tooling* (Pamphlet Architecture 27) explored computational methods and algorithmic codes that would guide them in their designs for furniture, installations, and collaborations with artists such as Matthew Ritchie.

Now Aranda\Lasch's first building, the Art Deco Project, is due to open in March 2015 in the Miami Design District. The 44-foot-high rectangular volume houses four luxury retail shops for LVMH, with a Tom Ford boutique anchoring one corner. Its pleated surface of lightweight glass-fiber-reinforced-concrete (GFRC) panels evokes the linear bas reliefs of Miami's Art Deco architecture. "We wanted to harness this history in a more systemic way," says Aranda, who worked with SB Architects on the execution.

The project's client, Craig Robins, CEO and president of Dacra, a Miami real-estate company, became interested in Aranda\Lasch in 2007, when he bought their Quasicabinet, a chest of lacquered wood in a crystalline-CNC-milled pattern. Robins had been transforming an 18-block area north of downtown into the Miami Design District by investing in art galleries, restaurants, and shops. Aranda\Lasch had made its debut in the city in 2006, showing exotic furniture in the Design Miami exposition (held annually with the Art Basel fair) through the New York–based Johnson Trading Gallery. In 2008 and 2009, they created tent-like structures to contain the fair before it moved from the Design District to Miami Beach. Now the two have just completed a permanent venue in the district, the Event Space at Palm Court, where Dacra and LVMH are creating a retail complex. A block from the Art Deco Project, Aranda\Lasch's single-level structure of poured post-tensioned concrete with a crystalline pattern sits atop a two-story building they are renovating for more shops.

The two architectural designers met as students in the late 1990s at Columbia University's Graduate School of Architecture, Planning and Preservation. Both found dean Bernard Tschumi's "paperless studio" curriculum transformative. "We began developing a computational rule system," says Aranda, "that would automate the process of our design."

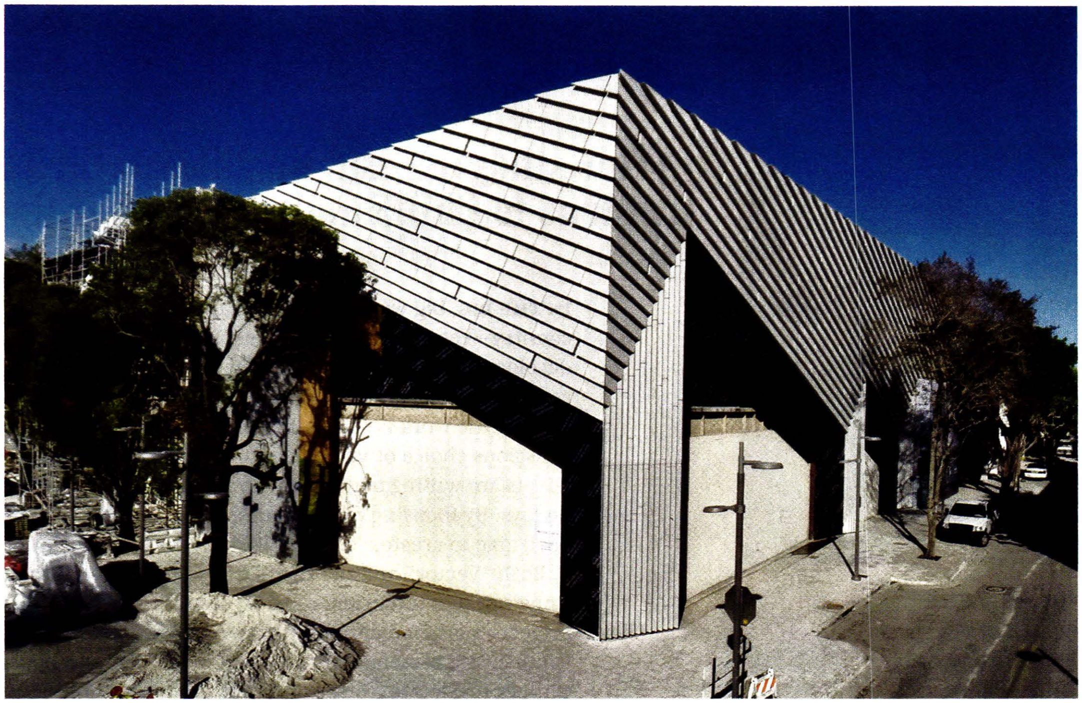
After they graduated, their evolving design approach led to their inclusion in the Museum of Modern Art's (MoMA) exhibition *Design and the Elastic Mind*, in 2008. Asked by MoMA curator Paola Antonelli to address the problem of scale, Aranda\Lasch conceived *Rules of Six*, executed with scientist Matthew L. Scullin. The team's wall-mounted piece explored fractal geometries to generate three-dimensional hexagonal forms.

Like the fractals represented in that work, the firm is going from small to larger construction in its practice. In addition to the Miami buildings, Aranda\Lasch won a competition in 2013 in Libreville, Gabon, for the Palais des Arts (a performance and event venue), which it is currently developing with architects Westlake Reed Leskosky and London engineers AKT II. And it now has two offices, the newer one being in Tucson, where Lasch moved with his family in 2010. The ample workspace there lets him oversee much of the prototyping and fabrication for the firm. But Lasch admits the process requires close attention. "Scaling up in design is one thing, but the larger challenge is managing the office as it takes on bigger projects," he says. —*Suzanne Stephens*

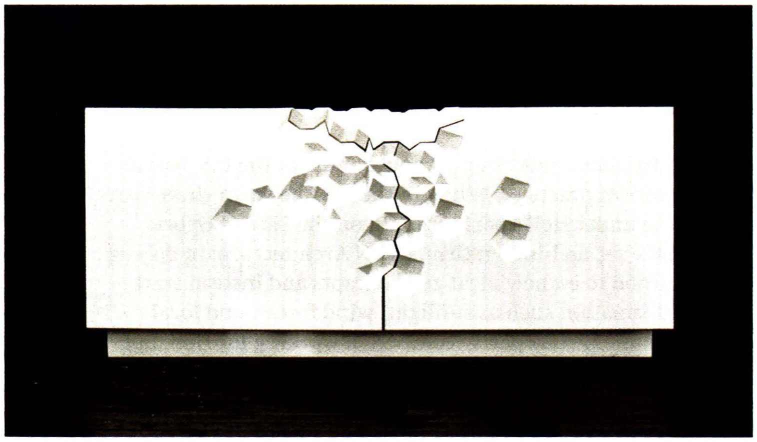
Camouflage View In 2005, the two architectural designers won a competition for the International Garden Festival sponsored by Jardins de Métis (also known as Reford Gardens) in Grand-Métis, Quebec. Their installation in a forest focuses on the idea of camouflage. Aranda and Lasch designed a 20-foot-long corrugated mirror-finish-stainless-steel screen wall that reflects the garden around it, while concealing and revealing portions of the garden through the cuts and placement of bent vertical fins.

View additional images online.

Art Deco Project Miami Design District



The Art Deco Project, which Aranda\Lasch (with SB Architects) designed for Dacra and LVMH, will house four boutiques, including one for Tom Ford. The building—44 feet high, 153 feet long, and 70 feet wide—is a rectangular volume with a fair share of non-orthogonal angles. Its pleated surface of glass-fiber-reinforced-concrete panels, which cant out and up to the roof line, is supported by a light steel frame. The manipulation of the geometry yields angular recessed storefronts.

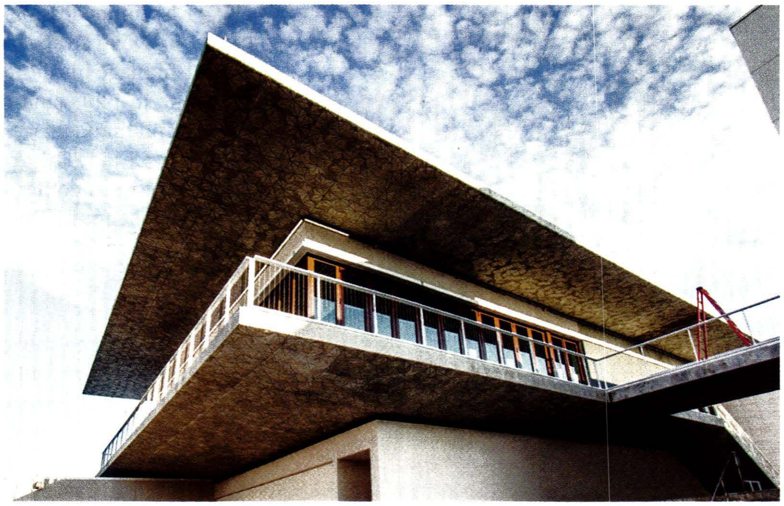


Quasicabinet

A lacquered wood cabinet designed by Aranda\Lasch is 30 by 72 by 18 inches in size, with a crystalline-CNC-milled motif. Craig Robins, CEO of Dacra, the Miami real-estate firm, purchased the limited-edition item at a furniture showing in Miami in 2007. Aranda\Lasch's exotically turned furniture had been brought to the Design Miami fair under the auspices of the Johnson Trading Gallery.

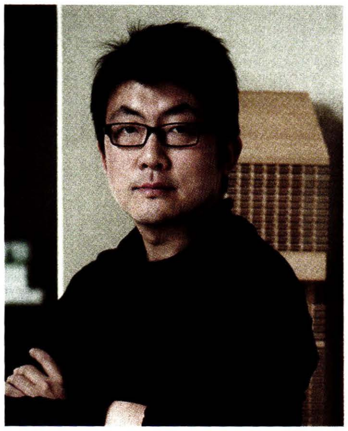
Palm Court Event Space Miami Design District

Opening this month is an event space, in the Design District, north of downtown. The one-story-high, 5,000-square-foot multifunction hall, commissioned by LVMH and Dacra real estate, on top of a two-story building, is contained between two cantilevered concrete slabs featuring a crystalline pattern. Folding hardwood doors retract to seamlessly join interiors to outdoor balcony spaces sheltered by a deep overhang. The dramatic aerie is one of several projects in this complex by others, including a building by Sou Fujimoto and the Fly's Eye Dome by Buckminster Fuller, now being completed, with SB Architects as architect of record.



PHOTOGRAPHY: © NOAH SHELDON (OPPOSITE, TOP); LALA PEREIRA (BOTTOM RIGHT); ALL OTHERS COURTESY ARANDA\LASCH (3)

Vector Architects Beijing



After studying and working in the U.S., an architect returns to China and stays out of the mainstream.

FOUNDED: 2008

DESIGN STAFF: 20

PRINCIPAL: Gong Dong

EDUCATION: University of Illinois, Urbana-Champaign, M.Arch. 2001; Tsinghua University, M.Arch. 1999 and B.A. 1994

WORK HISTORY: Steven Holl Architects, 2005-08; Richard Meier & Partners, 2004-05; Soloman Cordwell Buenz & Associates, 2001-04

KEY COMPLETED PROJECTS: Bayuquan Vanke Exhibition Centre, Yingkou, 2013; Zhangjiawo Elementary School, Tianjin, 2010; Momentary City-CR Land Hefei Dongdajie Sales Pavilion, 2009; CR Land Guanganmen Green Technology Showroom, Beijing, 2008

KEY CURRENT PROJECTS: Alila Hotel, Yangshuo, 2015; Seashore Library, Nandaihe, 2015

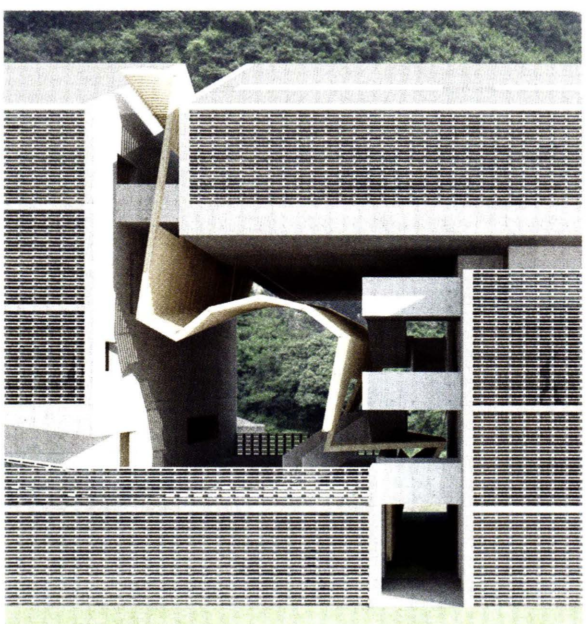
WWW.VECTORARCHITECTS.COM

IN THE BIG, big world of Chinese architecture—big projects, big sites, big firms, big country—Vector Architects is keeping it small. In six years, the Beijing-based firm has developed a rich portfolio filled with sales centers, a school, a hotel, a community center, and more, with nary a skyscraper or residential complex in sight. While the scale of the work is certainly affected by the economics of starting a firm, it is also a conscious choice of Vector's founder, Gong Dong, 42. "We choose projects for which clients are willing to do something special or meaningful, rather than just make money," he says. By focusing on small and midsize projects that have attentive clients, Dong has been able to create a body of work with more depth than its scale would suggest.

Both "Vector" and the firm's Chinese name (Zhi Xiang, or "strict direction") suggest Dong's design intention: to be "straightforward and simple," he says. Vector's first project—a green-technology showroom in 2009 for developer China Resources (CR) Land—was a rectangular sales center that fronts a housing complex in Beijing. While China's residential towers are typically standardized, unadventurous buildings cranked out by large design institutes, the structures built to attract buyers need to have more sizzle. So developers often hire talented young firms and give them a surprising amount of design freedom. For this project, Vector built a long, elevated steel tube punctuated by a painterly composition of windows and covered with a living green roof and walls—a design that is at once simple and complex. Vector has since completed two additional sales centers: a tranquil, inward-looking building that thwarts the surrounding construction in Hefei (opposite, top) and a private building with a public observation tower in Liaoning.

Dong is one of many Chinese architects who studied and worked in the U.S. before returning home to establish their own practices. While in the U.S., he spent three years at Steven Holl Architects, working under Holl's partner Li Hu on the Linked Hybrid complex in Beijing. (Li Hu has since set up his own firm, OPEN Architecture, in Beijing.) Dong says that in the U.S., he learned to eschew idealized concepts and instead start each design from site-specific information such as sunlight, wind forces, and local culture. This interest in phenomenology may partly come from working for Holl, but Dong notes the influence of Henry Plummer, his advisor at the University of Illinois at Urbana-Champaign, who specializes in daylighting. Plummer's hand can be seen in Vector's Seashore Library in Nandaihe, which functions almost as a sundial. A broad eastern window and a low slit on the west bring dramatic morning and afternoon light into its main reading room, while a skylight in a windowless meeting room turns midday sun into a work of art in light.

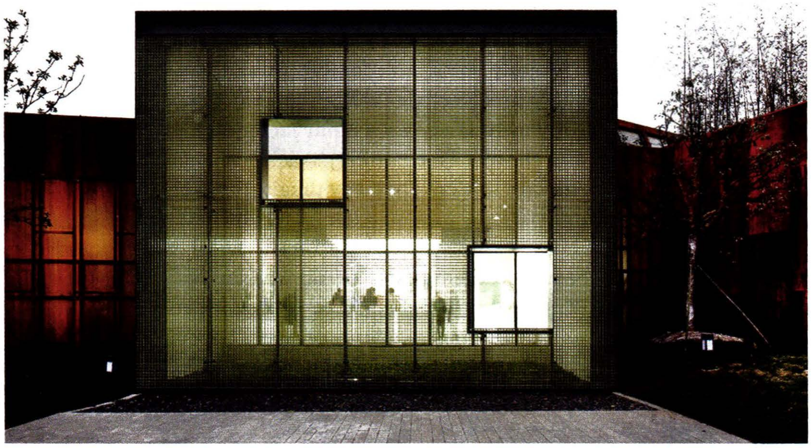
Dong studies ideas such as these through sketches and physical models. To manage his design-intensive work, he keeps his staff of international employees to just 20—small by Chinese standards. He sends an architect to live on-site and manage each project, which is an atypical (and usually unbillable) practice in China. The great amount of effort that Dong puts into the little details is not what comes to mind when one thinks of Chinese architecture. But it is one of the main reasons for Vector's success. —*Clare Jacobson*



Alila Hotel

Inspired by the mountainous topography of southwestern China, which is strikingly different from the flat coastal locations of much of Vector's work, the architects borrowed features from the local landscape in the design of this luxury hotel now under construction. Ancient man-made trails carved into the faces of karst gave them the idea for a continuous walkway along the exterior of the long complex, while natural caves prompted them to create three public spaces along this walk.

View additional images online.



CR Land Sales Pavilion

In Hefei, a city 250 miles west of Shanghai that is quickly emerging from its industrial past, Vector aimed to provide a small respite from the onslaught of construction activity. "When you go into the space," says Dong, "you can feel the quality of traditional living." Enclosed courtyards, live bamboo, and natural ventilation provide venerable qualities within a contemporary setting. He calls the project Momentary City, to suggest the pace of change in Hefei in general and at this site in particular. After the pavilion was built in 2009 and served its purpose as a sales center for an adjacent residential compound, it was demolished.

Seashore Library

"Letting people enjoy the setting and feel the light and wind were important factors," says Dong about his design for this poured-concrete library now under construction on an idyllic site on the Bohai Sea, 180 miles east of Beijing. A skylight, operable windows, and a ground-floor portico help bring the environment inside. But a more prosaic consideration lies behind these measures: the library has no air conditioning. Dong sums up the inspiration for a scheme that uses passive systems: "On one hand, it's a poetic expression of architecture; on the other hand, it's the mechanical requirement."

IMAGES: © SHU HE (MIDDLE AND TOP); IMAGES COURTESY VECTOR ARCHITECTS (OPPOSITE AND BOTTOM)

Studio Ma Phoenix

FOUNDED: 2003

DESIGN STAFF: 8

PRINCIPALS: Tim Keil, Dan Hoffman, Christopher Alt, Christiana Moss

EDUCATION: *Keil*: University of Oregon, B.Arch., 1999. *Hoffman*: Cooper Union, B.Arch., 1976. *Alt*: Cornell University AAP, B.Arch., 1994. *Moss*: Cornell University AAP, B.Arch., 1994

WORK HISTORY: *Keil*: LPA, 1999–2006. *Hoffman*: Cranbrook Educational Community, 1987–2001; Edward Larrabee Barnes, 1983–87. *Alt*: Wendell Burnette, 1998–2001. *Moss*: Jones Studio, 1999–2003; McCoy and Simon Architects, 1998–99

KEY COMPLETED PROJECTS: Manzanita Hall, Arizona State University, Tempe, Arizona, 2013; Sun Devil Fitness Complex, ASU, Tempe, Arizona, 2013; PRD845, Phoenix, 2007; Whispering Hope Ranch, Payson, Arizona, 2005

KEY CURRENT PROJECTS: Lakeside Graduate Student Housing at Princeton University, Princeton, New Jersey, 2015; Museum of the West, Scottsdale, Arizona, 2015

WWW.STUDIOMA.COM

A sustainability-focused firm draws from the desert environment for its economical, innovative designs.

"KINDRED SPIRITS" is how the four partners at Studio Ma describe themselves, and their affinities can be broadly divided into two camps: their respect for and love of the American Southwest, where they are based, and the drive to produce good design on tight budgets.

With a staff of only eight in their Phoenix office, the partners have been building elegant, substantive projects at many scales for the last decade—all defined by an acute sensitivity to context, the environment, and construction. One of their first projects, Whispering Hope Ranch, is a year-round camp in Arizona's Ponderosa Pine Forest that serves children and adults with special medical needs. The lodge, cabins, and barns—mostly asymmetrical shed-roof volumes with wood frames—sit delicately in the forest, and the master plan takes into account the area's risk of fires and of summer monsoons.

More recently, Studio Ma has been designing significant projects for Arizona State University (ASU)—no small feat for a small firm. Their cement-paneled Sun Devil Fitness Center occupies a tight site on the crowded Tempe campus and is targeting LEED Platinum. The architects also restored and reconfigured a 1960s dormitory with a gorgeous but complicated Y-shaped plan and structural-concrete lattice (RECORD, November 2014, page 120).

Looking back, Studio MA's collective sensibility and partnership seem inevitable. Married partners Christiana Moss, 43, and Christopher Alt, 44, met at Cornell while earning their Bachelor of Architecture degrees. It was the early 1990s, and "theory was thick" in academia, says Moss. She and Alt were drawn to making architecture rather than talking about Jacques Derrida, and they fled for a semester to Norway to study with Einar Jarmund and Sverre Fehn at the Oslo School of Architecture and Design. That country's rich history of craft stayed with Moss and Alt when they moved to Phoenix in 1997. "Norway taught them the importance of a region and place in architectural culture," says partner Dan Hoffman, 63.

Moss was working at Jones Studio in Phoenix when Alt met Hoffman at ASU, where the two were teaching a third-year studio. "I could immediately see [Alt] was someone who knew what he was doing," says Hoffman. "His students' projects had clearly tectonic responses to sites." Hoffman had moved to Phoenix from Cranbrook Academy of Art, where he was the campus architect. "Arizona was and still is a very active local architectural scene," he says. He was drawn to the design community's straightforward and inventive way of working in the desert and his peers' engagement with each other.

Tim Keil, 38, joined Studio Ma in 2006 with a strong training in craft, having studied at the University of Oregon. He brings "a rigorous background in terms of institutional clients," says Moss. Keil worked for seven years at LPA Sacramento on offices, retail, senior housing, community colleges, and more. His deep technical and management skills have allowed the firm to work on larger projects. Studio Ma also has a history of tackling developer-driven and design-build projects. "The Southwest was booming [when we started], and things were happening very fast," says Hoffman. "To do work of quality was very challenging, but formative."

The name Studio Ma comes from the Japanese concept of *ma*, for which there is no direct English translation. Roughly, it suggests the experiential space between elements, and their exchange with each other. "We place ourselves in between our buildings," says Moss. "What you smell, hear, the way you move through that space—we really do think about that." —*Laura Raskin*

Museum of the West

Located in Scottsdale, Arizona's historic downtown and housing artifacts and art that embody the "old" and "new" West, this design-build project is slated for completion in 2015. Horseshoes tossed around a stake were the plan's inspiration: the museum's public spaces are arranged around a courtyard. Made of board-formed, tilt-up concrete wall panels and an exposed steel-frame structural grid, some of the geometric volumes are clad in rusted metal panels bent to look woven.

IMAGES: COURTESY STUDIO MA (LEFT; OPPOSITE, TOP); © MICHAEL WESCHLER (RIGHT)

View additional images online.

Lakeside Graduate Student Housing

This graduate-student housing at Princeton University is comprised of townhouse and mid-rise apartments, common facilities, and parking. The 15 structures are arranged as a community within a community, interspersed with wooded areas, meadows, rain gardens, pedestrian paths, and vehicular streets. Clad in terra-cotta tile and brick, with folded roofs, the wood- and metal-frame structures nod to the Gothic precedents on campus.

PRD845

"Urbanity in the desert" was the goal for this infill project of 12 condominiums in downtown Phoenix, partly inspired by the indoor-outdoor living achieved by Al Beadle in his local residential projects. Three rows of units, clad in corrugated fiber-reinforced-cement panels and galvanized metal, include live-work spaces with up to three bedrooms.

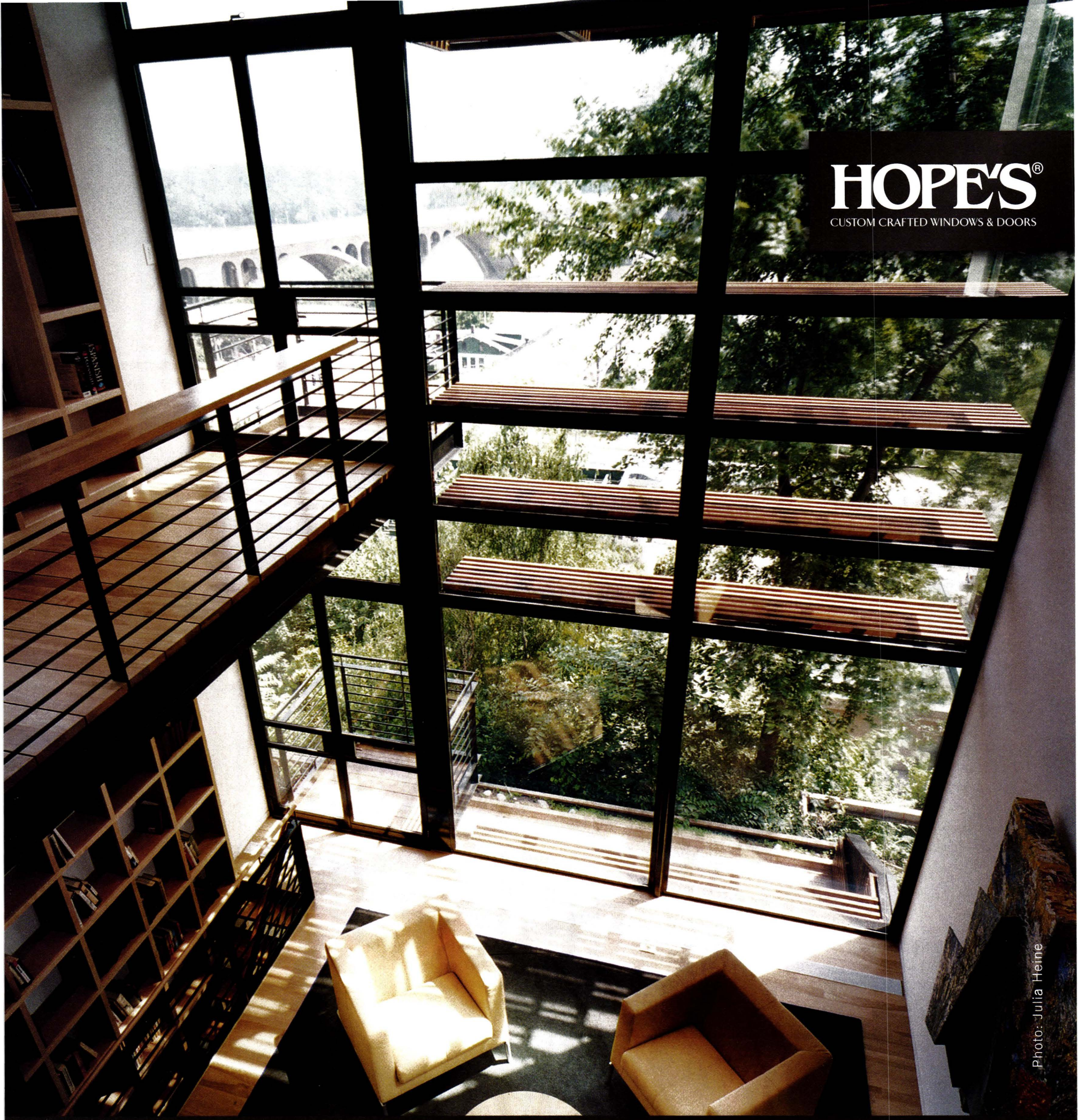

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Photo: Julia Heine

Everyman Theatre | Liverpool, United Kingdom | Haworth Tompkins Architects

DRAMATIC REVIVAL

With its first theater built from the ground up, a firm brings the spirit—and the bricks—of the past into a modern performance space.

BY HUGH PEARMAN

PHOTOGRAPHY BY PHILIP VILE


everyman

Liverpool's new Everyman Theatre, which just won this year's Stirling Prize for the top building in the UK, shows Haworth Tompkins Architects doing what it does best. The London-based firm excels at theater renovations in which the distinction between new and old becomes happily blurred rather than sharply defined. But with the Everyman, the architects applied their approach to an entirely new building, managing to make a modern theater feel long established.

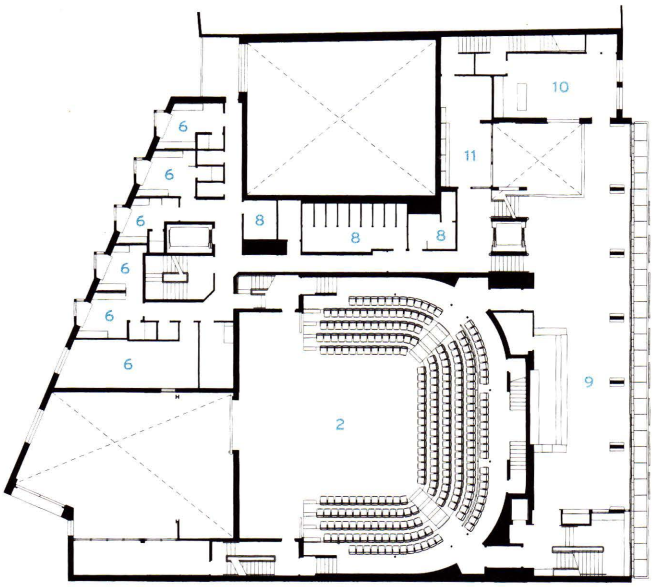
Partner Steve Tompkins understands the dark arts involved in designing a theater building, the need to let the drama inform the architecture rather than vice-versa. "It's about the language of shadows, the glint in the darkness," he says, and he approached this commission by summoning up ghosts. The first of these was the previous theater on the site—a unique location, on Liverpool's long and lofty Hope Street. The original Everyman, with its spacious open stage and intimate dive-bar basement café was founded in 1964, right at the start of Beatlemania, in what was then a bohemian area of the city. A nucleus of writers and poets had taken to meeting in the former Hope Hall cinema there, and the theater was a natural progression. But the building hid other spirits: before its cinema phase, Hope Hall had been a church and—as built in 1837—a chapel for Roman Catholic Dissenters.

The Everyman was updated in the mid-1970s, but by the early 21st century, the facilities were inadequate (especially deficient in backstage areas) and structurally dubious. In 2007, Haworth Tompkins won a competition to rebuild it from scratch. The brief from the client, artistic director Gemma Bodinetz, was consciously paradoxical: she wanted a total transformation of what the theater could do, but she also wanted her loyal patrons to feel that they recognized the place.

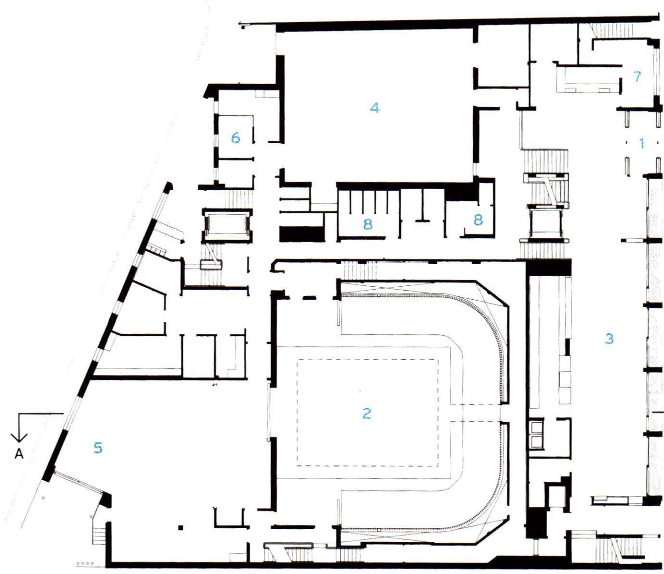
The theater acquired two adjoining sites, and from the exterior, you feel as if somehow the old theater has just been expanded into the new 50,500-square-foot, concrete-and-steel building. Even the former 1970s sign displaying its name in lowercase red letters appears to be present and intact, though neon has been replaced with LEDs and it is much larger, subtly tweaked by artist and typographer Jake Tillson. Above that is the key facade move, in which each of the 105 cast-aluminium sun-shading shutters on this west-facing building is adorned with a water-jet-cut image of a person. These are the everyfolk of Liverpool, the result of drop-in photo sessions open to the public, from which a selection of images was made. Each shutter is manually operable from inside, which randomizes the appearance of the facade according to weather and pattern of use. Above the shutters, a row of brick cylinders rises above the roof like a ship's smokestacks. Stack-effect chimneys for the auditorium's natural ventilation system, which promises to keep the space comfortable for most of the year, they helped the project achieve a BREEAM Excellent rating.

Inside, the public spaces felt used, familiar, even before they opened. On the street side is the main lobby and café, which open up via a double-height entrance space to a large upstairs bar on one side and a writers' studio on the other. The pale, board-marked concrete of the structural beams and columns has an industrial quality—and it contains a high proportion of cement-replacing slag, which helps the building's sustainability credentials. In the center of the plan, a steel frame allows for the large span required by the

STAGECRAFT
The new Everyman Theatre replaces its former home, a 19th-century church on Liverpool's Hope Street (above). The front facade contains aluminum sun-shading shutters water-jet cut with portraits of everyday Liverpudlians (previous spread). The basement bistro (left) recalls the old theater's subterranean bar. Stack-effect chimneys (above) and the building's rear and side elevations (top, right) are clad in a hard red brick—a familiar material in Liverpool. The public spaces (right) had a lived-in feel even before they opened.



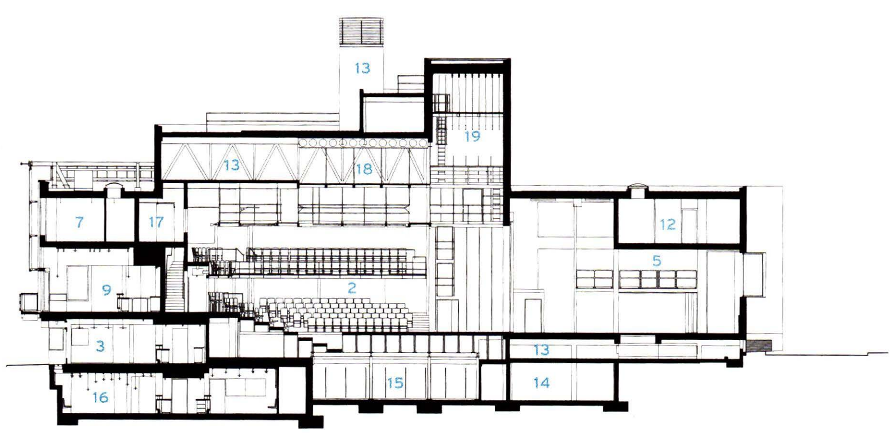
SECOND FLOOR



GROUND FLOOR

0 20 FT.
6 M.

1 ENTRY
2 PERFORMANCE HALL
3 CAFÉ
4 STUDIO
5 WORKSHOP
6 DRESSING ROOM
7 OFFICE
8 RESTROOM
9 BAR
10 RECEPTION
11 WRITER'S ROOM
12 WARDROBE
13 VENTILATION
14 STORAGE
15 SUB-STAGE
16 BISTRO
17 CONTROL ROOM
18 MECHANICAL
19 FLYTOWER



SECTION A - A

0 20 FT.
6 M.

credits

ARCHITECT: Haworth Tompkins Architects – Steve Tompkins, creative director; Roger Watts, associate director; Will Mesher, project architect

ENGINEERS: Alan Baxter & Associates (structural); Watermans Building Services (m/e/p)

CONSULTANTS: citizens design bureau (interior design); Gillieron Scott Acoustic Design (acoustics); Charcoalblue (theater design); GVA Acuity (project management)

GENERAL CONTRACTOR: Gilbert-Ash

CLIENT: Liverpool and Merseyside Theatres Trust

SIZE: 50,500 square feet

CONSTRUCTION COST: $21 million

COMPLETION DATE: December 2013

SOURCES

CONCRETE FORMWORK: Mastercraft

BRICKWORK: Daas Baksteen

PORTRAIT SCREEN: James & Taylor

ACOUSTICAL CEILINGS: Quietstone

LIGHTING CONTROLS: Lutron

HISTORIC PERFORMANCE
New backstage areas, workshops, and dressing rooms face a narrow street, some looking out through a row of protruding angled windows (opposite). Lining the auditorium (above) are bricks salvaged from the demolished 1837 building.

400-seat theater and fly tower above it. The thrust stage juts into two horseshoe-shaped levels of seating.

The firm's most dramatic act of resurrection involved salvaging 177-year-old bricks, 25,000 of them, from original chapel walls and reusing them in plain sight. They are especially effective where they form the back wall of the auditorium—again, you could easily think you were in a converted building, not a new one. "There was a strong public attachment to the Everyman as a carrier of cultural memory, and a consequent urge to maintain some physical manifestation of the old theater," says Tompkins. "Our task was to find the right opportunity to achieve this without resorting to sentimentality." The dull gold fabric used in the auditorium seats also recalls the color of the seating in the previous theater.

Balancing the auditorium, on the opposite side of the plan, is a full-size rehearsal stage on the ground floor and a reception area above—all vast improvements on the previous facility's cramped quarters. At one point, more land became available, and the theater could have grown still bigger. Tompkins persuaded his client to keep things compact. As it was, he set back a portion of the main frontage lest the facade appear disproportionately long.

This, then, is a relatively small theater with a high profile —all the more so now that it has won the UK's top architecture prize, against stiff competition. The Stirling citation summed it up well, calling the Everyman "groundbreaking as a truly public building" and "an extraordinary contribution to both theater and the city." ■

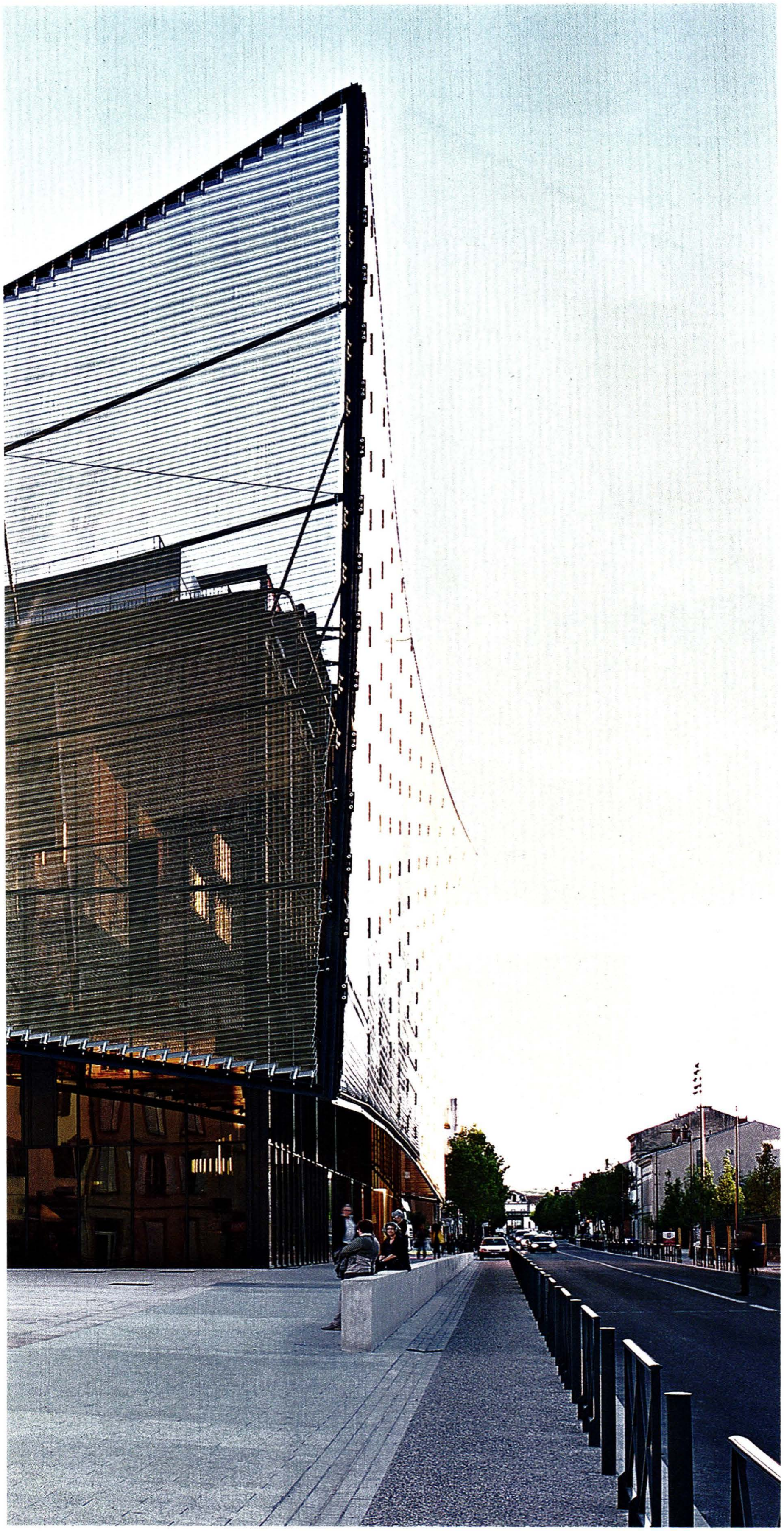
Hugh Pearman is architecture critic at the Sunday Times, *London, and editor of the* Journal of the Royal Institute of British Architects.

Albi Grand Theater | Albi, France | Dominique Perrault Architecture

CURTAIN CALL

A simple box, dressed up with a curving metal screen, gives an ancient city a modern monument.

BY WILLIAM HANLEY

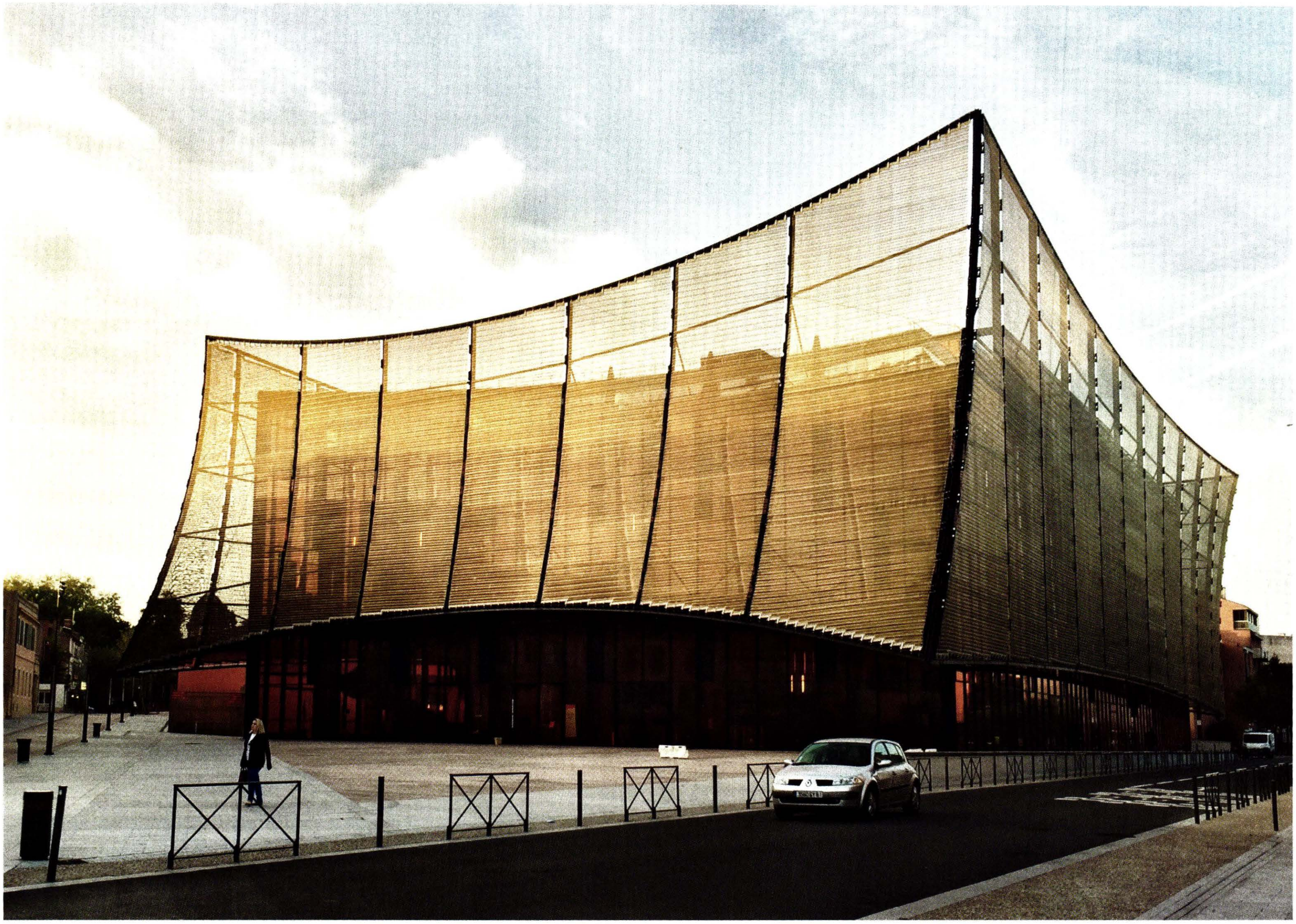


PHOTOGRAPHY: © GEORGES FESSY/DPA/ADAGP, EXCEPT AS NOTED

For more than a thousand years, the building material of choice in Albi, a small city on the Tarn River in southern France, has been a pinkish Languedoc brick. Even the imposing 13th-century cathedral there, with its gigantic nave and 250-foot-tall bell tower, was built from the distinctive masonry, giving it an appearance that's more fortress than church. But just beyond Albi's historic quarter, a new building by Paris-based Dominique Perrault Architecture defies the city's traditional heft. The Albi Grand Theater, a simple box that the architects have wrapped with a curving metal screen, appears to float over a plaza. The scrim's four sides, which measure 38 feet at their tallest, look like stretched lengths of fabric suspended over each of the building's elevations. As you emerge from the old city's warren of crooked Medieval streets, the curtain-like form comes into view with a surprising weightlessness.

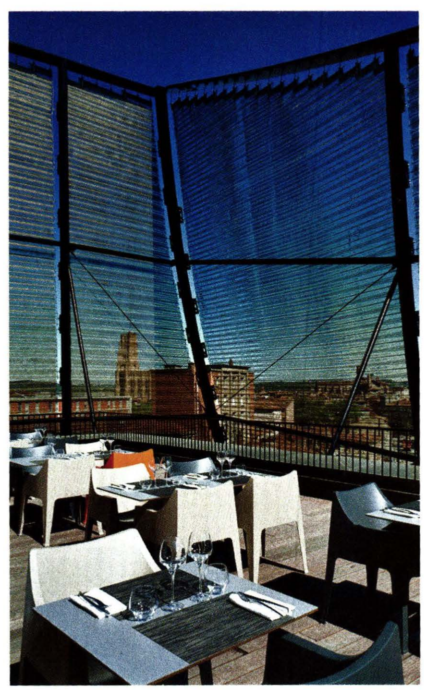
The building's lightness is all the more striking, given how much the designers had to fit onto the site. The Scène Nationale d'Albi never had a permanent home. For decades, it hosted performances at a group of small theaters around the town of just over 50,000 people. But five years ago, city officials decided to construct a purpose-built facility for the organization, along with a commercial cineplex—and ample public parking—in what they envisioned as a new cultural complex. Dominque Perrault beat out Kengo Kuma and Christian de Portzamparc in an invitational competition for the commission. The firm's design adeptly organizes the program and, in a city without much showpiece contemporary architecture, it ends up being unexpectedly harmonious with its historic neighbors.

SCREEN PLAY Dominique Perrault Architecture wrapped the Albi Grand Theater in a metal mesh screen (left). It curves to catch sunlight at different angles and appears to change color throughout the day. The screen is attached to the boxlike building with a black steel armature (above).



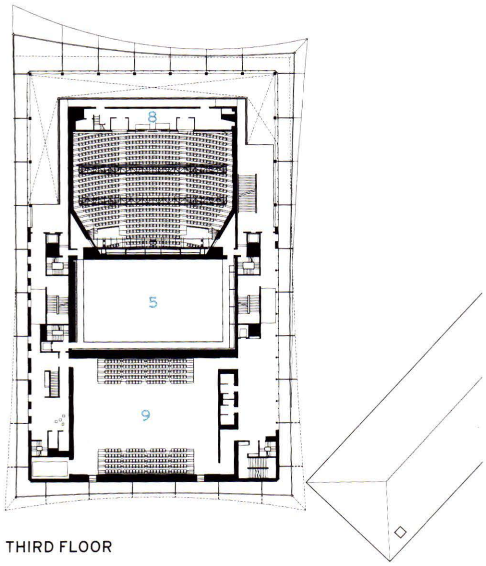
The architects strove to keep the project from overwhelming the site, a 2.5-acre triangle that housed surface parking next to a 19th-century convent-turned-theater and an unremarkable two-story brick building from the 1980s. They buried a three-level garage and 10 movie theaters below grade and converted the 1980s building, which the city wanted to preserve, into an aboveground lobby for the cineplex (which the operator has decorated with typical popcorn kitsch). For the building housing the performance hall, the architects replaced the surface parking with a five-story, 101,000 square-foot concrete structure. They placed a 900-seat auditorium in the center of the volume and flowed everything else—including a lobby, a black-box performance space, and offices for the Scène Nationale—around it, capping it with a rooftop restaurant. Packing the building tightly allowed the architects to reserve the rest of the former parking lot for two public plazas—though connection between one of them and a newly pedestrianized street is marred by the cinema's fire stair rising from below.

The firm conceived the screen to dress up the boxlike theater and to soften its profile in the city. "I wanted to create a lighter presence for a big volume, so I put a scarf around it," says Perrault. "It's not exactly a piece of architecture; it's more like a fashion design, or a hybrid of the two." But the screen is more than an attractive accessory. The designers gave the anodized-aluminum mesh a reflective greenish-gold finish and hung it on a black steel armature that projects a few feet out from the facades. The concave curves of each panel were calibrated to reflect daylight in a way that makes the screen appear to change

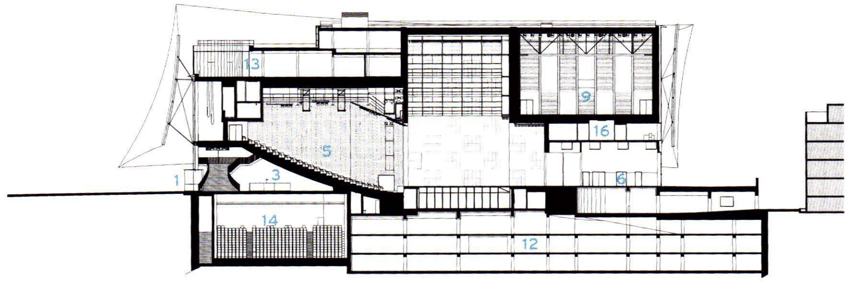


THE BEST FORM OF FLATTERY
The shifting color of the theater's metal screen (above) mimics the way that light moves across the brick buildings in Albi's historic district (opposite, top) throughout the day. The old city is visible from a rooftop restaurant (left), where the screen also serves as a windbreak. Inside the performance hall (opposite, bottom), the designers and acoustician played off the color of the city's brick in the seating, and its texture in walls made from variegated wooden "bricks."

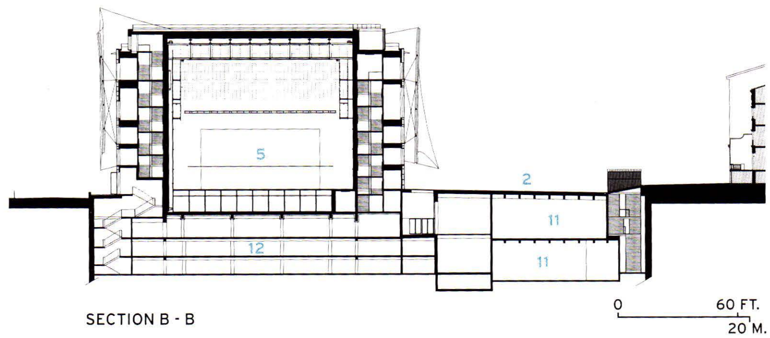
PHOTOGRAPHY: © VINCENT BOUTIN/DPA/ADAGP (THIS PAGE); ARCHITECTURAL RECORD (OPPOSITE, TOP)



THIRD FLOOR



SECTION A - A



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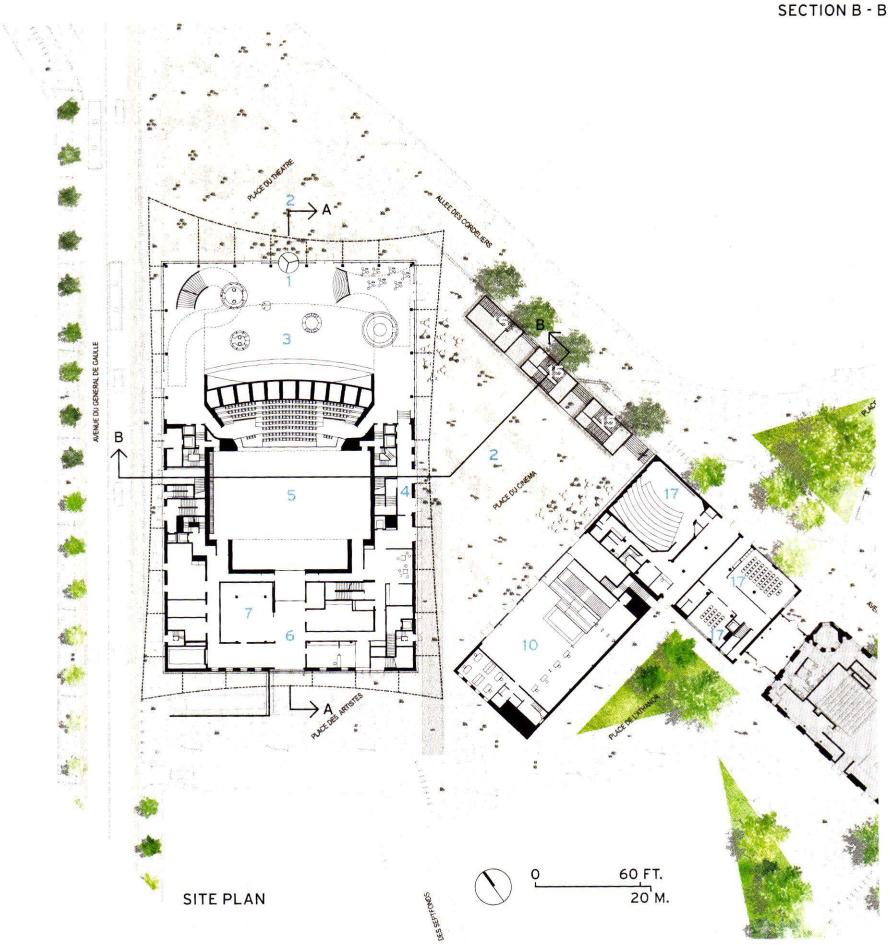
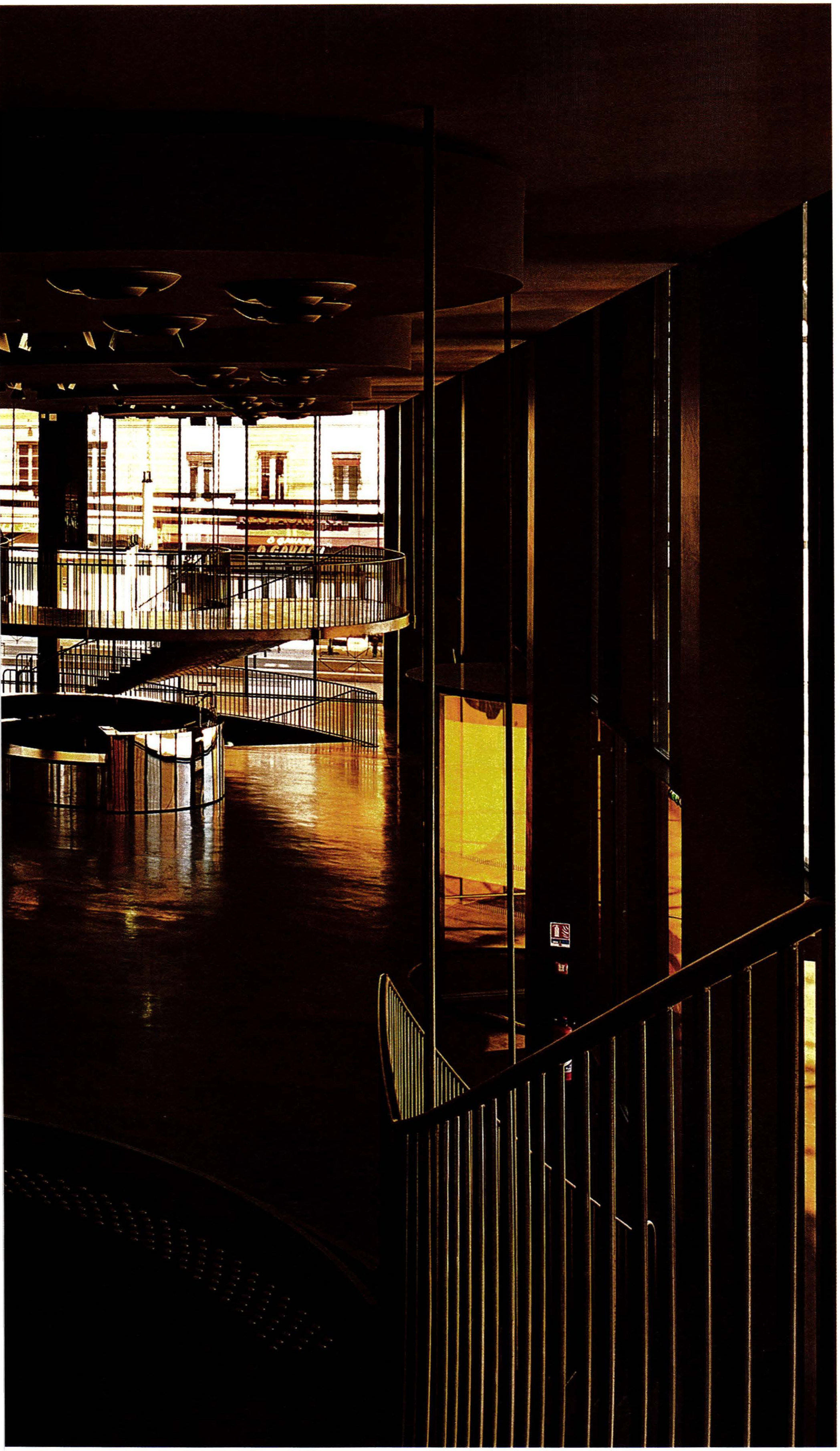


SITE PLAN

1 ENTRY
2 PLAZA
3 THEATER LOBBY
4 RESTAURANT ENTRY
5 PERFORMANCE HALL
6 LOADING DOCK
7 STORAGE
8 CONTROL ROOM
9 BLACK-BOX THEATER
10 CINEMA LOBBY
11 FILM THEATER
12 PARKING
13 RESTAURANT
14 MECHANICAL
15 FIRE EXIT STAIR
16 OFFICE
17 CONFERENCE ROOM

LIGHT BOX The theater's public spaces are enclosed by fully-glazed walls. The panes are laminated in a checkerboard pattern in two shades of orange that reference Albi's historic brick buildings. Chandeliers have vertical glass tubes and exposed wires that give them a refined industrial aesthetic.

BIG ENTRANCE The volume of the performance hall protrudes into the lobby. There, light streaming through the colored window walls bounces off a series of mirrored circular kiosks that can be configured as ticket counters or concession bars. One of the highlights of the project, stairs on either side of the lobby mimic the grand stairs of a traditional opera house and a Modernist theater respectively, but in a thin, black-pigmented concrete that makes them resemble pencil drawings, suspended in the dazzling, kaleidoscopic space.



color in sync with the city's historic buildings as the sun tracks across their brick. On a recent autumn day, the panel above the theater's entry looked like a golden sheet in the morning, a black veil at noon, and a yellow-orange scrim in the early evening. "The idea was to respect the color of the brick," says Perrault, "but also to create a facade that is alive."

That dynamism continues inside, where all of the interior spaces seem to shift and bleed together. The volume of the main performance hall protrudes into the lobby like the prow of a ship breaching a wall. Black-stained oak floors, black-painted walls, and stage lights in the public spaces blur the line between backstage and front-of-house. Inside the main hall, the designers pair a prim minimalism with references to Albi's historic architecture. The walls, designed with acoustician Jean-Paul Lamoureux, are covered in black wooden "bricks," some solid and others hollow, which project and recede to conceal lighting and to temper sound in the auditorium.

The theater accommodates touring performances, from drama to dance to contemporary circus, on a scale impossible before the space was built; the 2014 season has seen attendance rise by 50 percent over previous years. If Albi's imposing brick cathedral represents the city's heritage, Perrault's shimmering scarf gives it an emblem for its contemporary cultural life. The theater is an unapologetically alien presence, but it's also a sensitive foil for the old brick structures, and a new kind of monument for the city. ■

credits

ARCHITECT: Dominique Perrault Architecture – Dominique Perrault, principal; Gaëlle Lauriot-Prévost, interior design; Mathieu Neufville, Nam Le Toan, Giovanna Chimeri, Julien Fuentes, Elke Stoerl, Nicoletta Pramaggiore, Guy Morisseau, Francesco Vinci, Nanako Ishizuka, Guilhem Menanteau, project team

ASSOCIATE ARCHITECTS: Astruc Architectes

ENGINEERS: VP Green (structural); ETCO (mechanical)

CONSULTANTS: Jean-Paul Lamoureux (acoustics)

CLIENT: Albi Town Council

SIZE: 101,000 square feet (theater); 84,000 square feet (cinema)

CONSTRUCTION COST: $58 million

COMPLETION DATE: February 2014

SOURCES

METAL MESH: GKD Metal Fabrics

COLORED GLASS: Vanceva

FACADE PANELS: Alucobond

WATERPROOFING: Coveris, Marty

INTERIOR WOODWORK: Battut

THEATER SEATING: Saviex

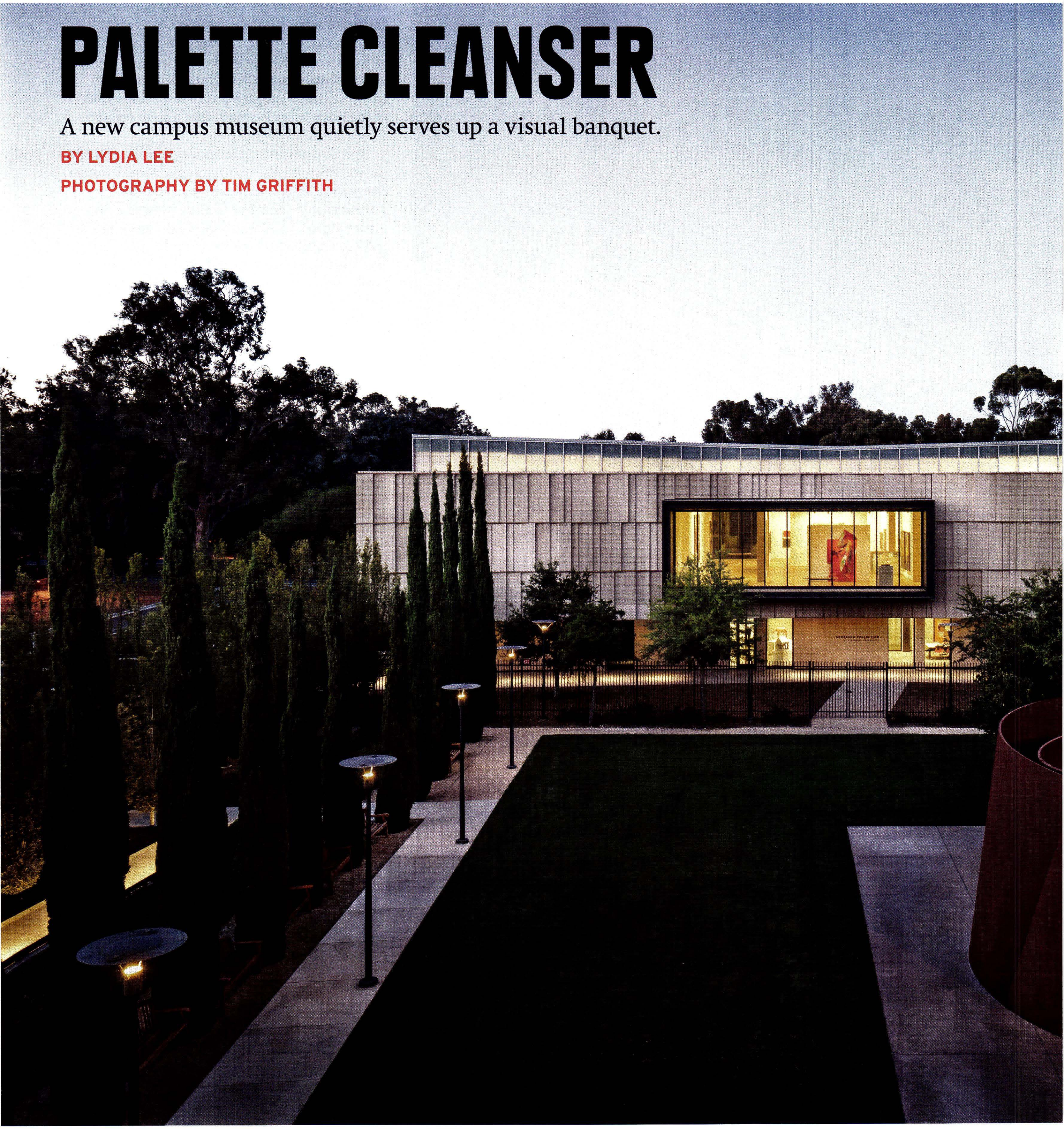
Anderson Collection at Stanford University | Stanford, California | Ennead Architects

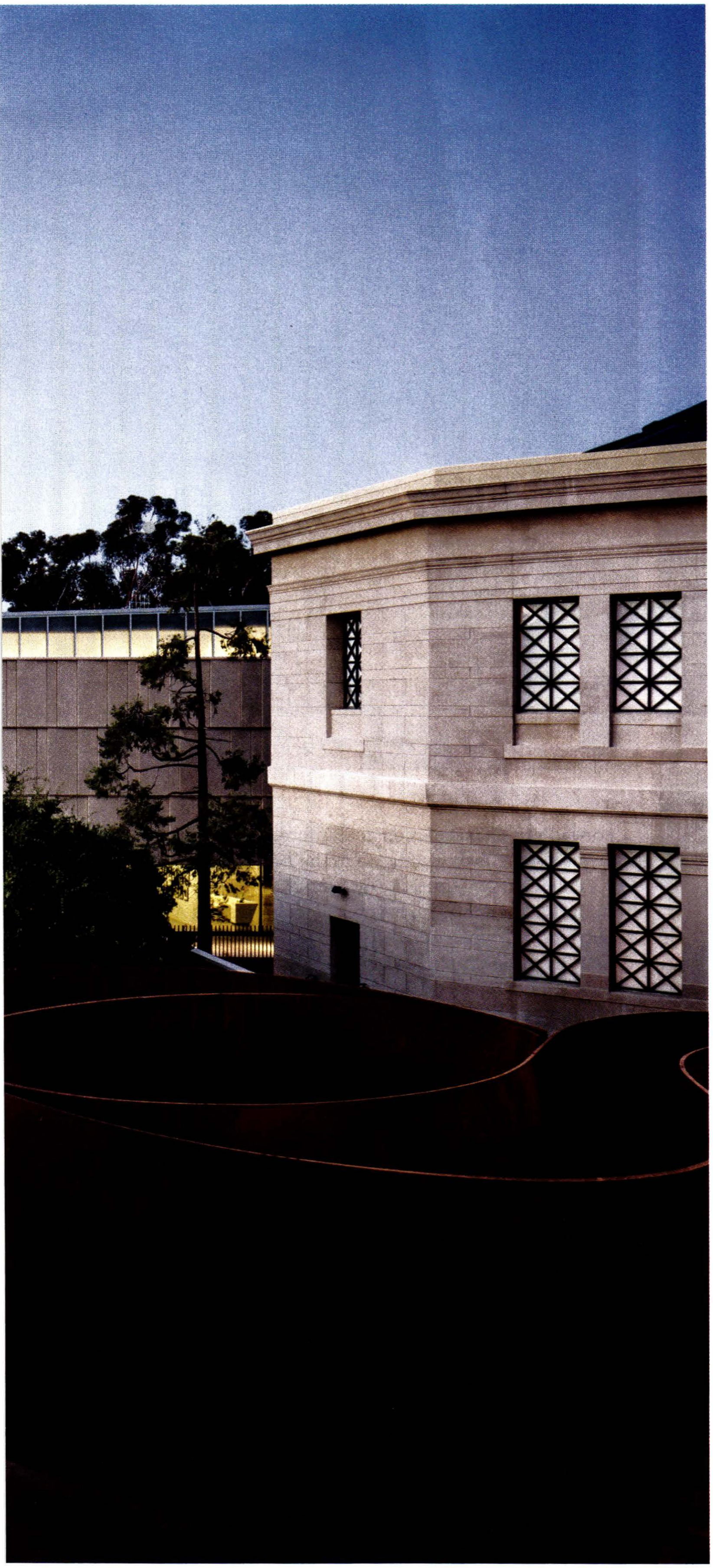
PALETTE CLEANSER

A new campus museum quietly serves up a visual banquet.

BY LYDIA LEE

PHOTOGRAPHY BY TIM GRIFFITH

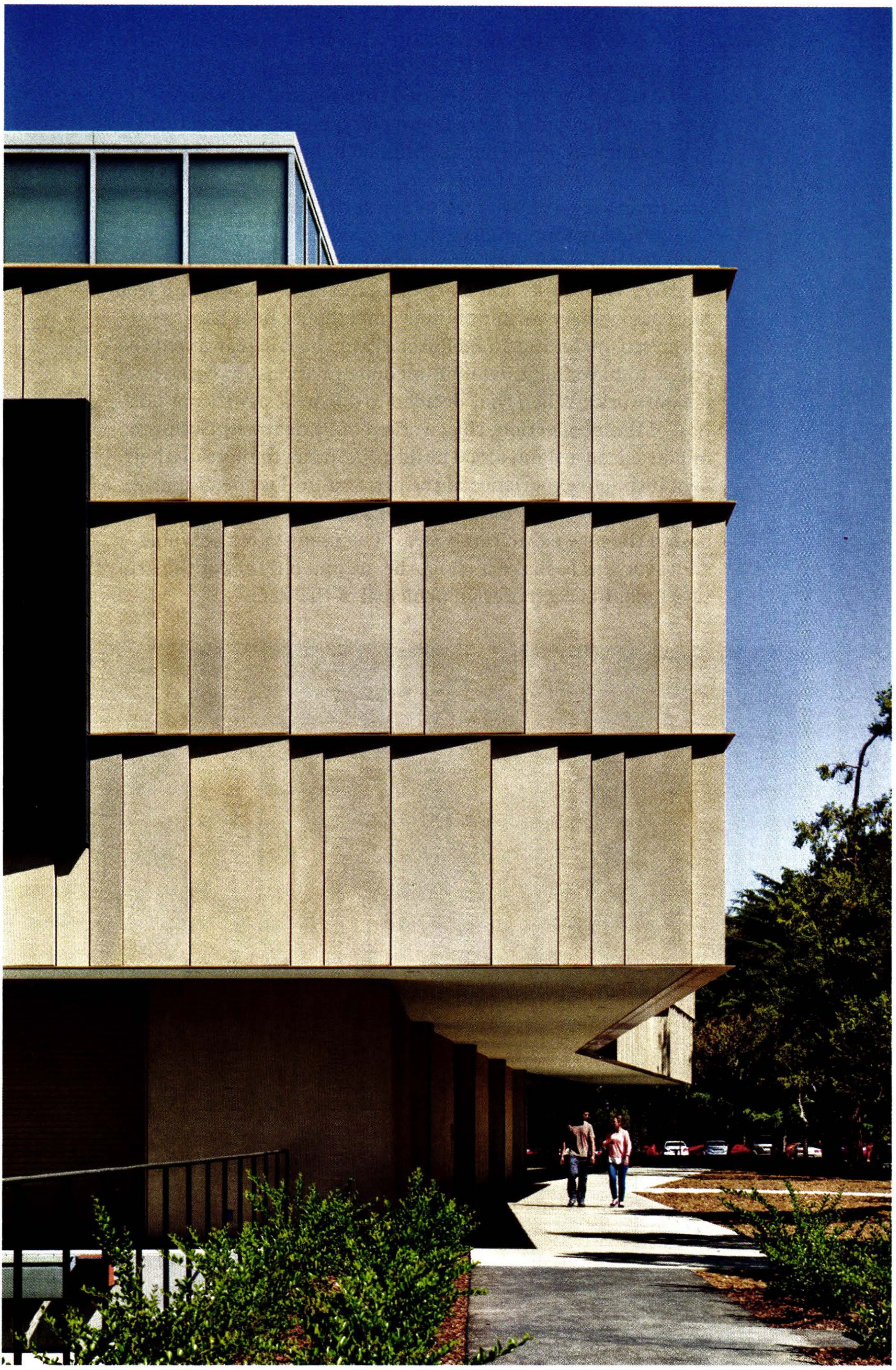


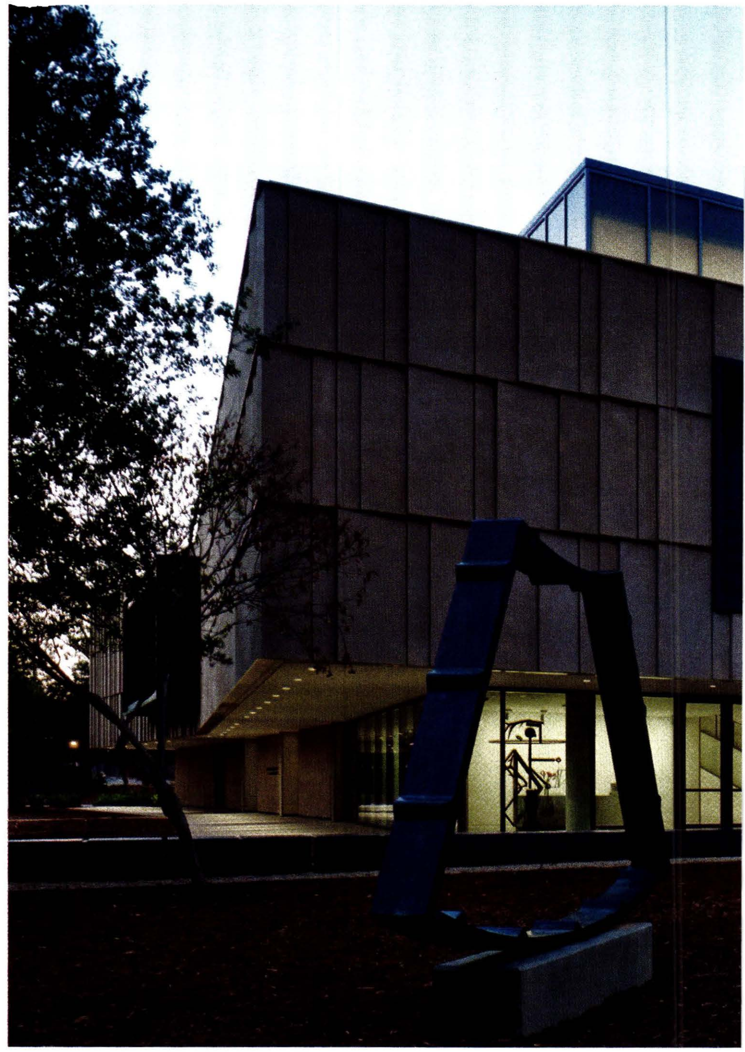


It's tempting for designers to try to turn art museums into works of art themselves. But what if the client's directive is just the opposite? A new campus museum in the Bay Area by the New York–based firm Ennead Architects may disappoint those hoping for a bigger architectural statement. However, as designed to house the 121 works of the Anderson Collection, a choice selection of postwar American art recently given to Stanford University, the 33,500-square-foot building does a good job at hiding in plain sight and allowing the art to command the attention.

Harry W. "Hunk" and Mary Margaret "Moo" Anderson, who have art in every corner of their ranch house near San Francisco, including an Ed Ruscha over the fridge, wanted the public to have that kind of immediate relationship with these masterworks. When they decided to donate a significant portion of their collection, they worked out a deal with Stanford to house it in a stand-alone building, aiming to recreate their own intimate experience of the art. Stanford tapped Ennead, which had recently completed a concert hall on campus, to design the new exhibition space. "The premise of the whole endeavor was to make it about the art and only about the art," says Richard Olcott, design principal at the firm.

ARTSY NEIGHBORHOOD The Anderson Collection (left) stands across from the Cantor Arts Center, a Greek Revival building only 40 feet away. The rainscreen (above) is composed of panels of just four different shapes, but by mixing them, the architects were able to create the illusion that there is no regular pattern.





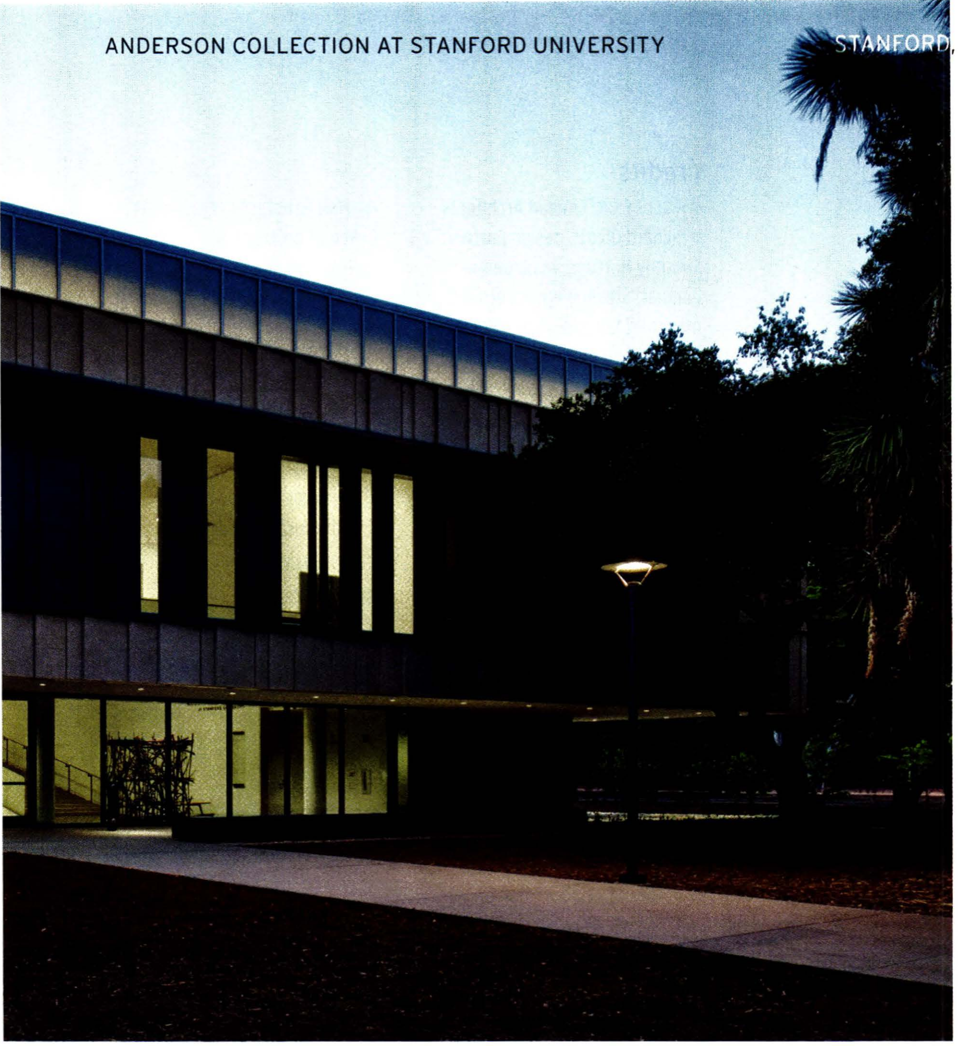
CATCHING RAYS
The building's angled cladding (above) picks up the California sun differently throughout the day. Rows of windows framed with zinc panels (top) are set into each side of the structure. The gentle curve of the ceiling (opposite, bottom) bounces daylight from the row of clerestories that cap the building down into the galleries.

Ennead's first commission at Stanford, more than 15 years ago, was a self-effacing addition to the neighboring Cantor Arts Center, a heavy Greek Revival building. Just 40 feet away from the Cantor and its imposing Ionic columns, the Anderson Collection, by comparison, keeps a low profile. The building appears as three simple horizontal bars. The central volume, a neutral tan box, is cantilevered over a glazed ground level and topped with a small row of clerestory windows. "The massing is sympathetic to the site, and the larger second-story volume creates a covered walkway that is a modern interpretation of the campus' traditional pedestrian arcade," says Olcott. In plan, the building has a subtle bow-tie shape.

The cladding kicks the impact of the unassuming form up a notch. Inspired by the strong California sun, the architects used folded glass-fiber-reinforced concrete (GFRC) to create an articulated surface whose shadows change during the course of the day. Looking like shingles installed horizontally, the panels have an appealing randomness.

Ennead interrupted the facade with bands of windows recessed into each side of the middle volume. Framed by zinc panels intended to play off the neighboring museum's black mullions, they help to break up the building's massing. But, unfortunately, interspersed with the windows above the main entry, the panels make it look almost as if it's boarded up.

By contrast, the interiors are open and inviting. The double-height entry is expansive and bright, thanks to a gently convex ceiling that reaches upwards to the clerestory windows around the perimeter. A grand staircase with deep treads subtly tapers up to the galleries. All the mundane

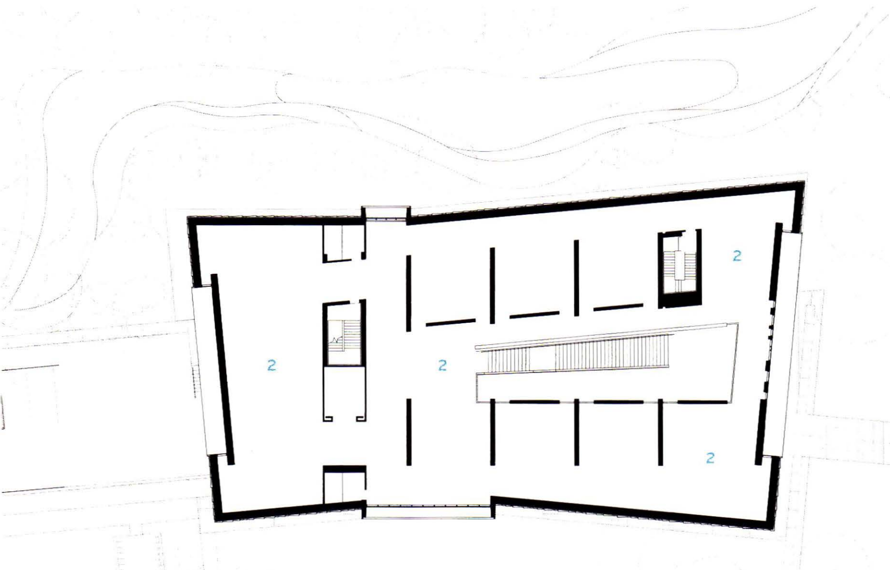


functions—the lobby, administrative offices, a resource center, and bathrooms—are on the ground floor, saving the upper floor for just enjoying art.

The wall along the stair continues beyond floor level to form a balustrade for the second-floor galleries and is covered with a gray finish, to add a quiet variation to the otherwise white space. The museum director purposely kept the stairwell free of any artwork, allowing the anticipation to build as you ascend. It's rewarded by a 9-by-12-foot painting by Clyfford Still at the top. (The Andersons wanted to squeeze it into their home, but, as Olcott put it, it was already "jam-packed.") Upstairs, there is no designated circulation route, allowing visitors to wander and follow what catches their interest. From various points, you can see across the double-height space and catch glimpses of works in other galleries. The large canvases by artists such as Mark Rothko, Jackson Pollock, and Richard Diebenkorn have plenty of room to breathe, but the galleries themselves are modestly sized and intimate.

The free-flowing interiors have a casual quality that is heightened by the daylighting. Obviously, none of the paintings at the Anderson Collection are exposed to direct sunlight: most of the light enters high overhead through the clerestories, which modulate the sun through mechanical louvers and frosted plexiglass. The arc of the ceiling is calibrated to bounce light down into the galleries. It is lowest at the top of the stairs (13 feet) and goes up to 23 feet at the sides, making room for the 7-foot-tall row of windows. Outside, a flat white roof reflects additional light onto the bowed surface.

Olcott and his team visited the Andersons' home as part



SECOND FLOOR

credits

ARCHITECT: Ennead Architects – Richard Olcott, design partner; Timothy Hartung, management partner; Steven Peppas, project manager; Sean Baumes, project designer; Yu Inamoto, project architect

ENGINEERS: Degenkolb Engineers (structural); Taylor Engineering (m/p); Cornerstone Earth Group (geotechnical); BKF Engineers (civil); Engineering Enterprises (electrical)

CONSULTANTS: Brandston Partnership (lighting); Atelier Ten (sustainability)

CONSTRUCTION MANAGER: Devcon Construction

CLIENT: Stanford University

SIZE: 33,500 square feet

PROJECT COST: $36 million

COMPLETION DATE: September 2014

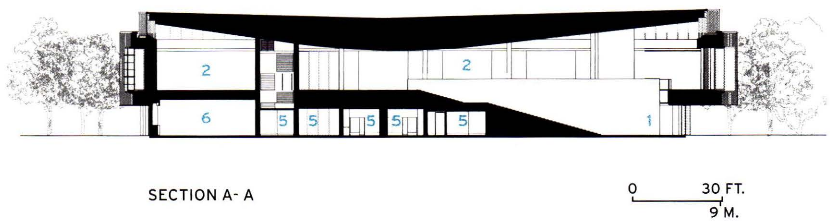
SOURCES

RAINSCREEN: Imperial Architectural Finishes

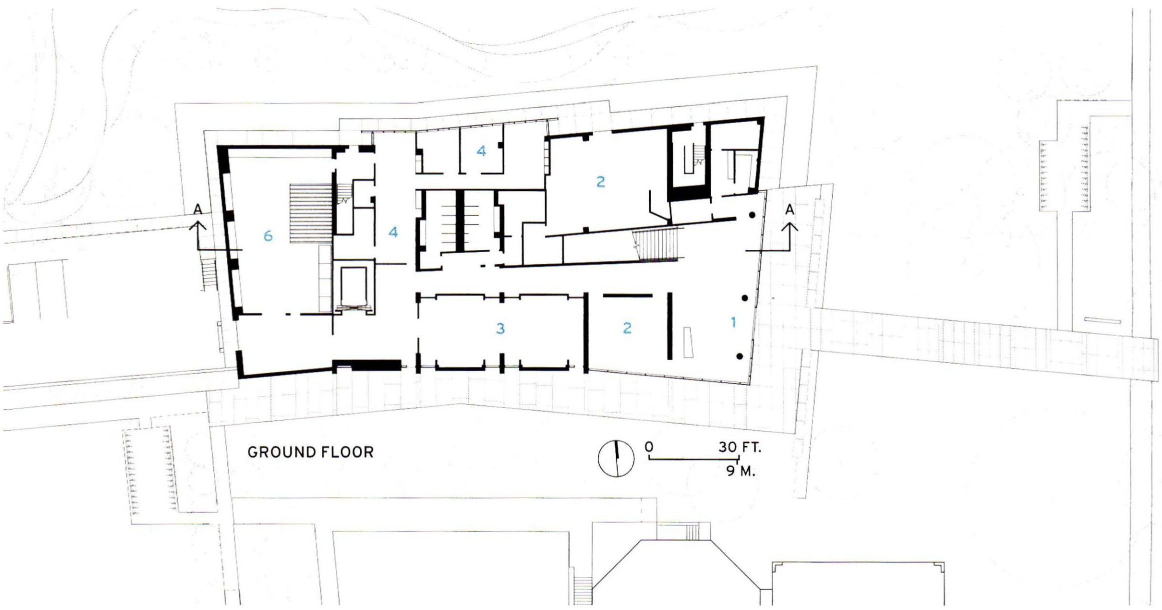
CURTAIN WALL: Kawneer

ENTRANCES: Arcadia

STAIR WALL FINISH: Armourcoat



SECTION A- A



GROUND FLOOR

1 ENTRY LOBBY
2 GALLERY
3 RESOURCE CENTER
4 ADMINISTRATION
5 MECHANICAL
6 STORAGE

of the design process. "We were in the dining room, which was filled with fantastic art," he recalls, "and Hunk said to us, 'This is a room where you can have a feast without having a meal.'" Currently under construction next door is yet another art building, the McMurtry Center, which Diller + Scofidio + Renfro designed with dramatic twisting wings. Between that piquant project and the heavy Greek Revival meal next door, the comparatively neutral Anderson Collection will undoubtedly serve as a palate cleanser. ■

Lydia Lee is a San Francisco–based journalist who writes about architecture, design, and urban development.

CASUAL AFFAIR
The entire second floor is dedicated to gallery space with no set circulation, and open sight lines among the galleries. Visitors can wander freely, taking in the postwar American masterworks on view.

2015 CALL FOR ENTRIES Record Houses

The editors of **ARCHITECTURAL RECORD** announce the **2015 RECORD HOUSES** awards program. Entry is open to any architect registered in the U.S. or abroad. Of particular interest are projects that incorporate innovation in program, building technology, materials, and form. Projects must be built and inhabited. They may be new construction or renovated and adaptive-reuse projects.

The fee is US$75 per submission. Download the official entry form at architecturalrecord.com/call4entries. E-mail questions to arcallforentries@construction.com. Please indicate **Record Houses** as the subject of your e-mail. SUBMISSION DEADLINE: **JANUARY 7, 2015**

Good Design Is Good Business

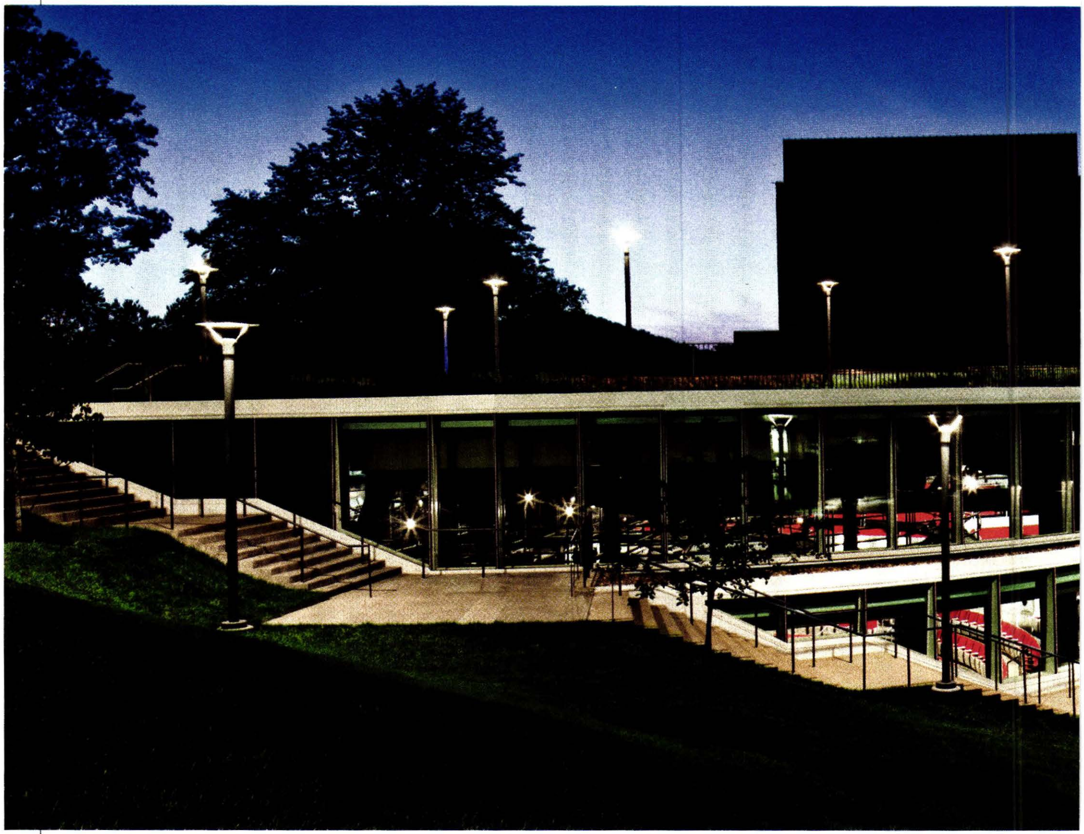
CALL FOR ENTRIES

The editors of **ARCHITECTURAL RECORD** are currently accepting submissions for the **2015 ARCHITECTURAL RECORD GOOD DESIGN IS GOOD BUSINESS** awards program (formerly the BusinessWeek/Architectural Record Awards). Good design is a priority for leaders of business and industry looking to boost productivity, rebrand, and attract customers. The Good Design Is Good Business awards honor architects and clients who best utilize design to achieve such strategic objectives. Winners will be published in the May 2015 issue.

The fee is US$150 per entry and $50 for each additional project. Download the official entry form at architectural record.com/call4entries. E-mail questions to arcallforentries@ construction.com. Please indicate **GDGB** as the subject of your e-mail. SUBMISSION DEADLINE: **January 15, 2015**.

Can You Hear Me Now?

COPIOUS AMOUNTS of glazing can be problematic, especially when it is used to enclose spaces where the quality of sound is paramount. But with the help of acousticians, architects are demonstrating that the benefits of glass, such as a glittering building skin, daylighting, and views, need not come at the expense of intelligibility of speech or the clarity of music. A trio of current projects—an intimate theater at the University of Virginia by William Rawn, an auditorium inside Frank Gehry's sculptural Fondation Louis Vuitton in Paris, and a renovation by Johnson Fain of Philip Johnson's legendary Crystal Cathedral, near Los Angeles—reveal that design teams can successfully incorporate generous quantities of glass into acoustically sensitive spaces. These projects do so by combining glazing with other elements to reflect, scatter, or absorb sound and by exploiting the material's own physical properties.



PHOTOGRAPHY: © ROBERT BENSON

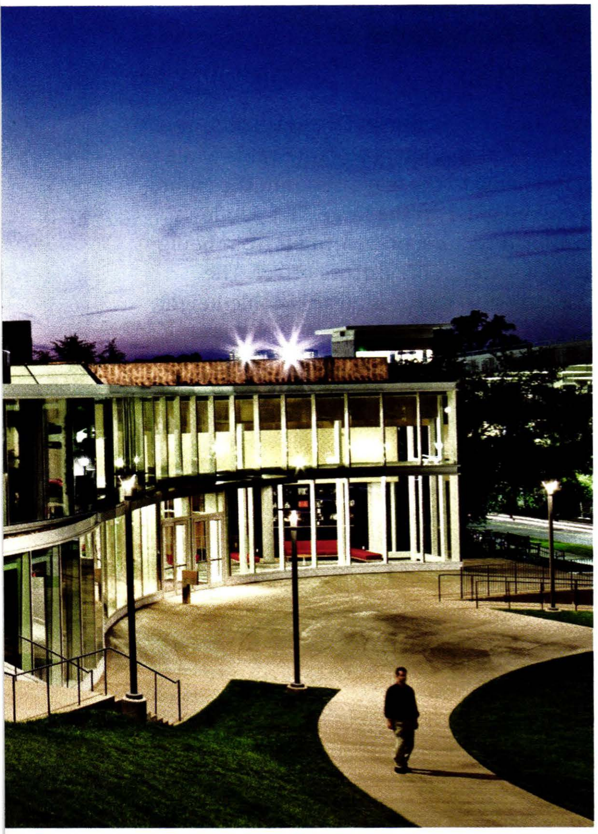
Ruth Caplin Theatre, University of Virginia Charlottesville
William Rawn Associates
Threshold Acoustics

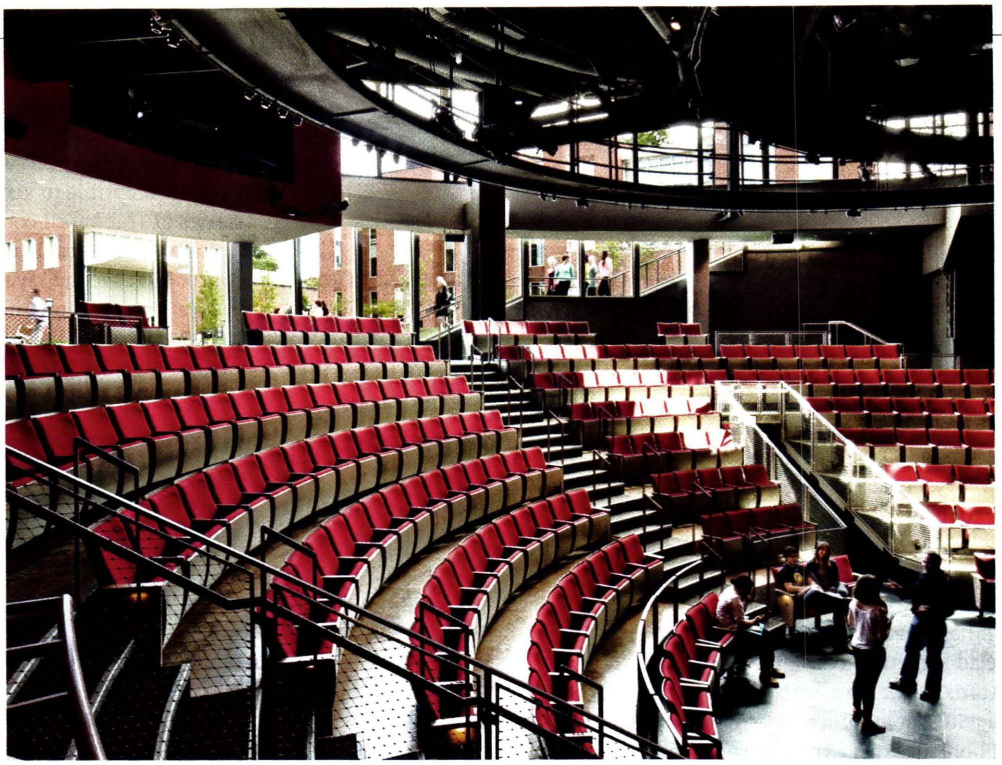
ARCHITECT WILLIAM RAWN is often asked about the 85-foot-long undulating glass facade at his recently completed Ruth Caplin Theatre on the campus of the University of Virginia (UVA), in Charlottesville. People wonder, he says, if it was inspired by Thomas Jefferson's serpentine brick walls that are part of the so-called Lawn—the complex of 18th-century structures and grounds at the university's historic heart. But Rawn insists that the ribbonlike curtain wall enclosing the 300-seat performance space, which is partially submerged in the steeply sloping terrain of the school's arts quad, takes its cues from the topography of its site rather than Jefferson's garden walls. "It isn't that literal," he says.

Instead, the Jeffersonian elements that most informed the new thrust theater were the tall triple-hung windows found in many of the pavilions surrounding the Lawn and at Monticello—the home that Jefferson built for himself just a few miles from UVA. "Transparency was one of the lessons we took from Jefferson," says Rawn.

Transparency, and accompanying daylight, may seem like odd features for a theater. Yet much of the time that the space is in use—for rehearsals, dance classes, or when sets are being built—controlled theatrical lighting is not necessary, points out Clifford Gayley, a principal of William Rawn Associates. What's more, with students passing Caplin on the new set of stairs that serves as one of the main pedestrian routes through this part of campus, the glazing provides a direct view of the stage. It "puts theater on display," elevating the drama program's presence, says Gayley. And for those times when darkness is required, the daylight coming in through the north-facing curtain wall is easily blocked with motorized black-out shades.

One aspect of the space that was trickier to control was its acoustics. "Glass is specular," and not just in the visual sense, says Carl Giegold, a partner at Threshold Acoustics, the project's acoustician. "It is almost purely reflective of sound," he says.





SECOND SKIN The sinuous curtain wall of William Rawn's Caplin Theatre at UVA provides a direct view of the thrust stage (above) as students walk by the building on a set of stairs (left) that serves as one of the main pedestrian routes through the school's arts quad. The wall's assembly (below) includes a layer of canted laminated glass that directs sound toward absorptive finishes on the ceiling.

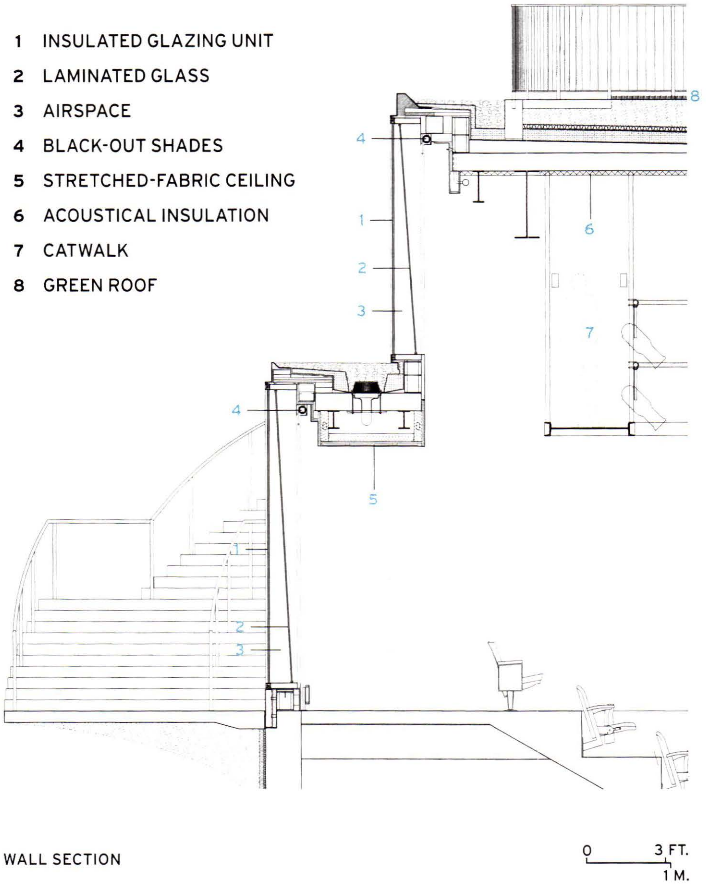
Used in the right place, glass can be advantageous, since reflection is important for musical clarity and the intelligibility of speech, especially consonants. But if used incorrectly, it can garble sound, he says.

At Caplin, where the glazing is at the perimeter of the 5,500-square-foot, semicircular room, it could send the sound back toward the stage with a delay, causing an echo. To mitigate this undesirable effect, the project team devised an inner wall of laminated glass canted at 2 or 4 degrees, depending on location, and set a few inches away from the exterior insulated glazing units (IGUs). The tilted glass directs the sound toward the underside of the roof deck or ceilings, which are covered in absorptive materials such as sprayed-on cellulose or stretched-fabric panels. "The goal is to send the sound somewhere where it doesn't do harm," explains Giegold.

The extra layer of glass has additional acoustical benefits. Its thickness—¾ inch—keeps low-frequency sounds, like those from the bottom registers of a typical male voice—from escaping. It also helps isolate the room from outdoor noise, such as the rumble of the freight trains that pass Caplin on tracks that are only about 150 yards away. This ability to keep unwanted noise out is enhanced by the cavity between the laminated glass and the IGUs, according to Giegold. In addition, the cavity's varied depth, which ranges from 7¾ to 2 inches, prevents the curtain wall system from resonating at a uniform frequency. Otherwise, says Giegold, sounds like the drone of a lawnmower could cause the assembly to vibrate, producing a discernible hum.

Naturally, unwanted sound can also be generated from within. A typical culprit is mechanical systems. But at Caplin, the ducts are all oversized, so that air moves through them slowly and quietly. The room's silence, along with its intimacy (no seat is farther than 25 feet from the stage), allows the audience to focus on the performers. The acoustics are so good, says Gayley, that "you can even hear the actors' slightest whispers," without amplification. *—Joann Gonchar, AIA*

1 INSULATED GLAZING UNIT
2 LAMINATED GLASS
3 AIRSPACE
4 BLACK-OUT SHADES
5 STRETCHED-FABRIC CEILING
6 ACOUSTICAL INSULATION
7 CATWALK
8 GREEN ROOF



WALL SECTION

Fondation Louis Vuitton Auditorium Paris

Gehry Partners
Nagata Acoustics

THE BUCOLIC backdrop of the recently opened Fondation Louis Vuitton (RECORD, October 2014, page 80), set within Paris's Bois de Boulogne park, inspired a garden building in the tradition of Joseph Paxton's long-destroyed Crystal Palace. Like that famous structure, erected in London's Hyde Park in 1851, Frank Gehry's billowing new museum features vast expanses of glass.

Glass, however, is not ideal for sheathing spaces that house light-sensitive art, nor is it a particularly friendly acoustic material. The galleries are instead set within a concrete-clad structure behind the building's 12 large translucent glass sails. But, on the lower level, a 350-seat auditorium—surrounded by a large pool—features expansive windows to take advantage of views to the cascading water feature and the park beyond.

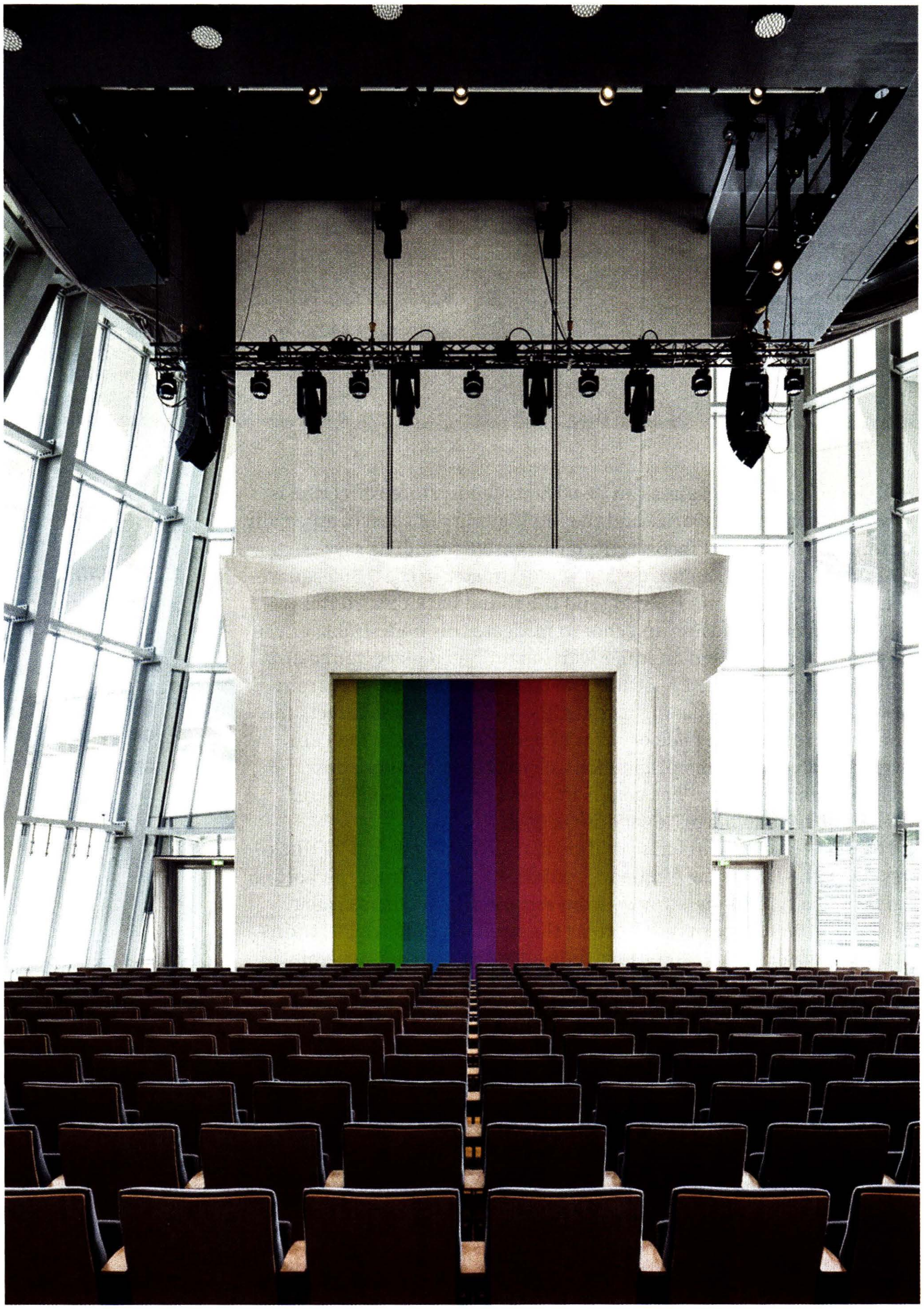
Originally conceived as a venue for lectures and films, the room's program morphed over the course of the project. The auditorium opens up to two adjacent galleries, setting the stage for fashion shows. (Luxury brand LVMH Moët Hennessy-Louis Vuitton, headed by CEO Bernard Arnault, held its first Louis Vuitton show there during Paris Fashion Week in October.) "Later on, the ambition to perform chamber music and solo recitals in the room came along," says Craig Webb, design partner at Gehry Partners. "At that point, it became much more challenging acoustically."

Yasuhisa Toyota, of Nagata Acoustics' Los Angeles office, the acoustician for all of Gehry's performance spaces, including the Walt Disney Concert Hall in Los Angeles and Miami's New World Symphony, was brought on board. Together they developed a scheme that would maintain the extensive glass and views from the 6,000-square-foot room, but also accommodate a flexible program and the superior acoustics required for recital spaces.

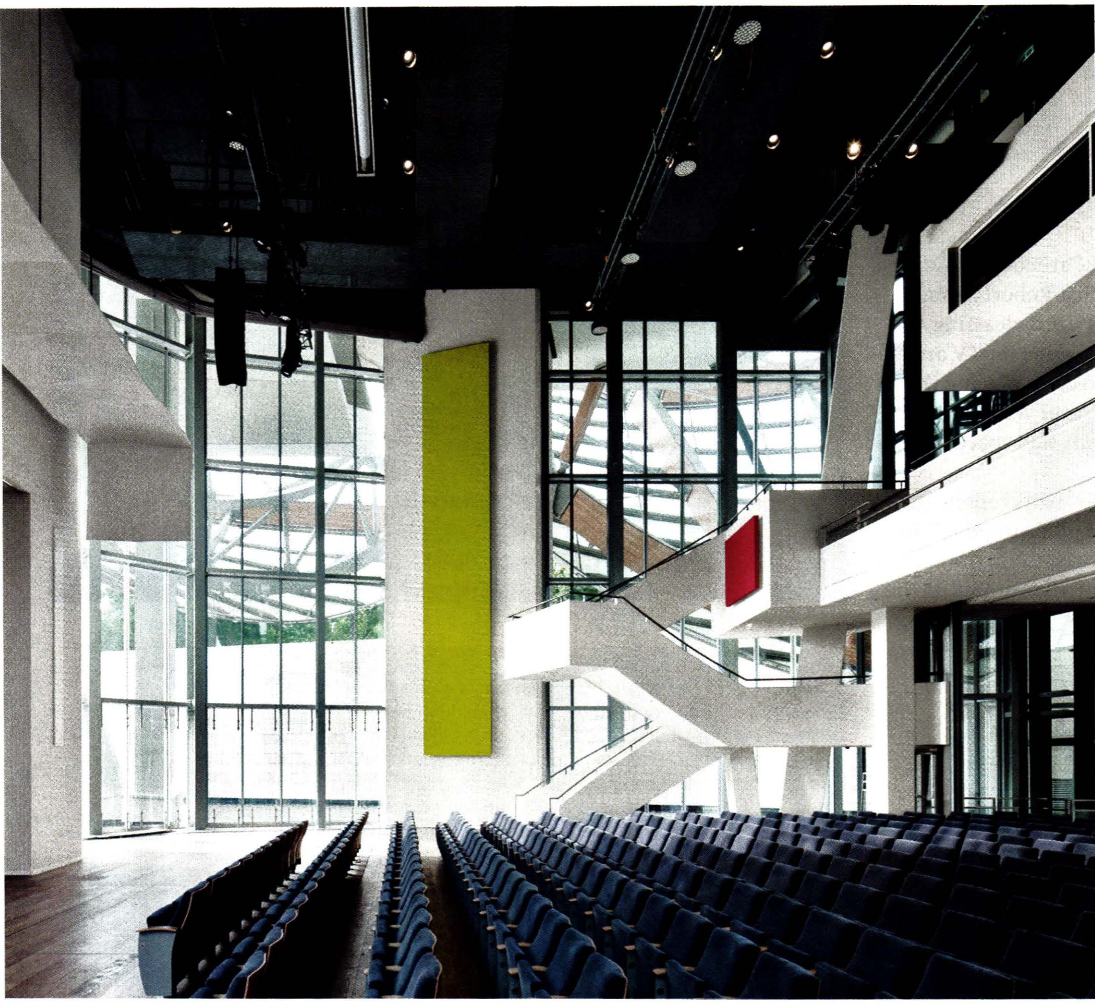
Nagata had experience working on other performance spaces that feature generous amounts of glass, including Arata Isozaki's Nara Centennial Hall—a 1,700-seat shoebox-style concert hall completed in 1999. Its four walls are covered in glass panels, but the room has carpet, highly absorptive seat cushions, porous panels, and glass-wool batts to counteract the reflective nature of glass. Toyota took a different approach at the Fondation's auditorium, where there are few soft surfaces. (Even the seats can fold down into the engineered-wood floor for a flat configuration.) "Although glass is challenging, not using it on the ceiling and most of the back wall helped," says Toyota.

Imperceptible to visitors, a major intervention included adding a series of 11-foot-tall convex glass panels along the canted side walls to mitigate undesirable reflection back to the stage and into the auditorium. That second layer of curved glass on the large, flat windows scatters sound along non-uniform vectors, preventing it from being too sharp or bright in favor of a softer, more diffuse effect. The space—50 feet tall in some areas—also features an adjustable-height,

SINUOUS SURFACE To improve onstage acoustics, designers created a wavy cast-aluminum canopy.



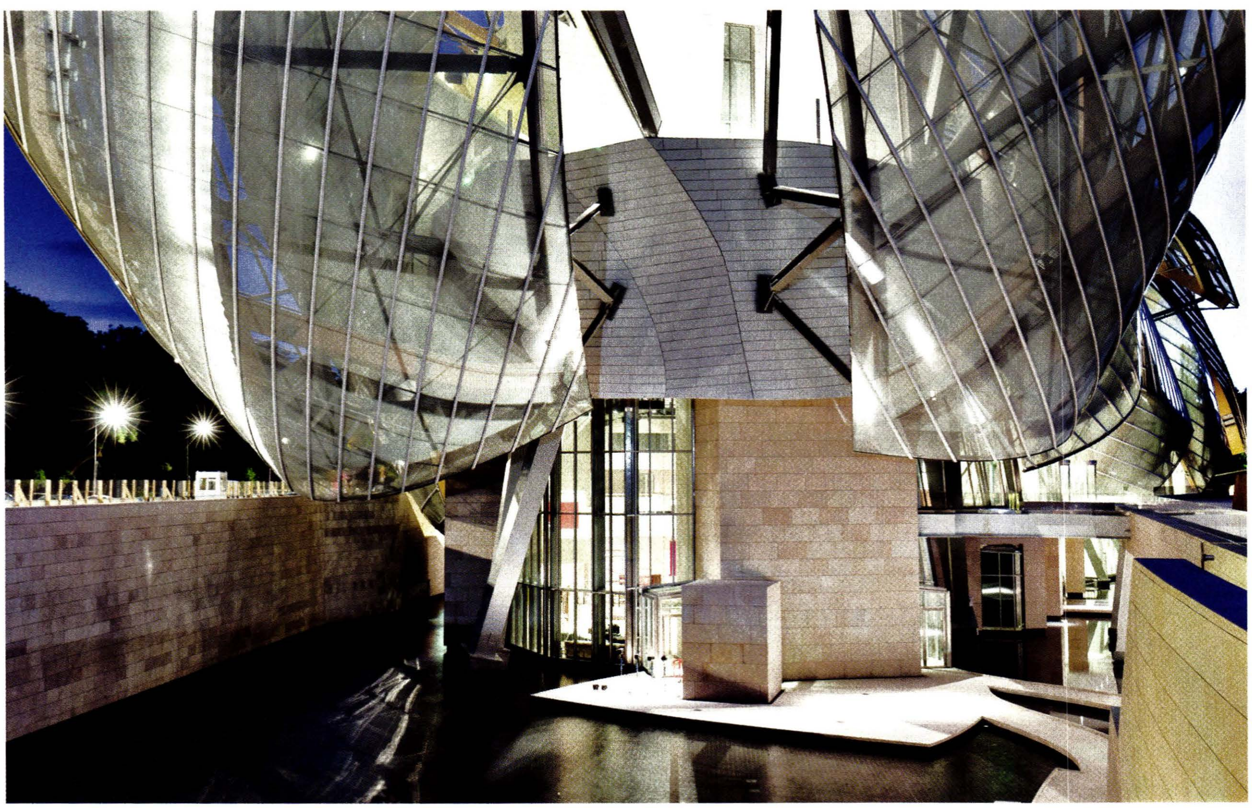
PHOTOGRAPHY: © IWAN BAAN



cast-aluminum canopy with a resin-compound finish just above the stage. It provides a reflective surface, creating better onstage acoustics for varying performance types. "The main issue was to have enough mass to reflect the sound," says Webb. "We needed a very dense material that allowed us to achieve the nearly 2-inch thickness and sculpted shape we were after." The same material was used to create an acoustic reflector for the rear of the stage and for the proscenium aperture, which can be opened and closed.

Since a reverberation time that is optimal for a music program could be disastrous to the intelligibility of the spoken word—whether live or as part of the audio in film—the auditorium includes a series of curtains and black acoustical banners that come down out of the ceiling to completely cover all the glass. They convert the room, which during the day is typically flooded with natural light, into a dark, acoustically drier space that works well for film and amplified sound. While it is not certain how often the auditorium will be used for musical performances, Webb thinks it could be a frequent occurrence, especially since Arnault's wife, Hélène Mercier, is a concert pianist. For the opening in October, jazz pianist Herbie Hancock performed in the space, and, according to Webb, "It sounded quite good." —*Josephine Minutillo*

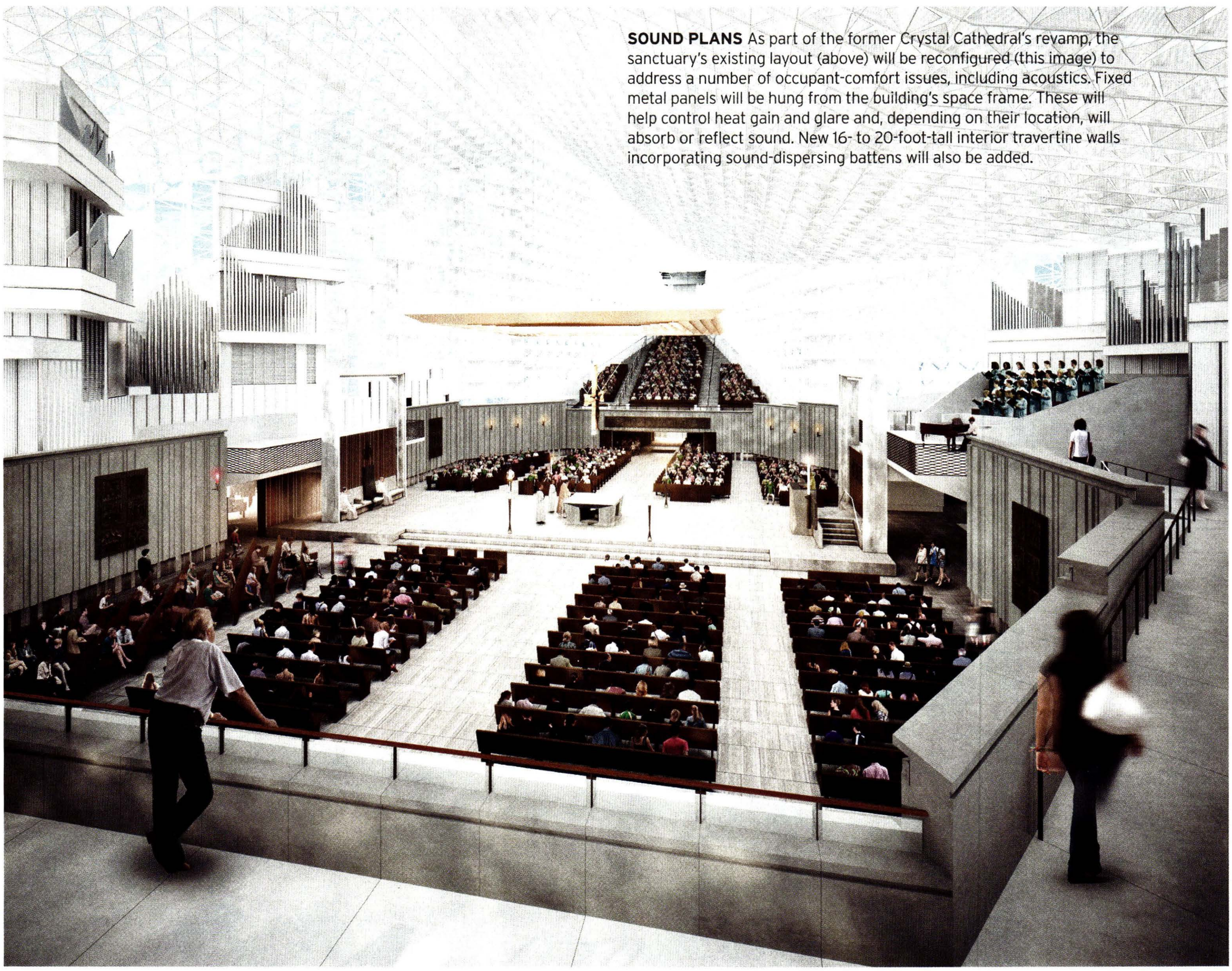
ALMOST INVISIBLE
The auditorium's generous windows overlook a water feature (right). Inside the space (above), the primary acoustical feature—convex glass panels that cover the windows—is practically imperceptible. The panels help scatter sound and make it more diffuse.



Crystal Cathedral Renovation
Garden Grove, California
Johnson Fain
Idibri

FOR YEARS, Philip Johnson's glass-skinned Crystal Cathedral in Garden Grove, California—completed in 1981 for televangelist Robert Schuller and his Reformed Church in America—operated as a broadcasting venue as well as a house of worship. Services were filmed for TV and more than 2,000 congregants sat in rows of padded chairs facing the interior's north side, which featured a pulpit, the Hazel Wright Memorial pipe organ (one of the largest in the world), and space for a choir and other performers.

In 2012, two years after Schuller's church filed for bankruptcy, the Roman Catholic Church bought the cathedral with plans to turn it into the seat of the Diocese of Orange. Now renamed Christ Cathedral, its almost 80,000-square-foot interior is in the midst of an overhaul at the



SOUND PLANS As part of the former Crystal Cathedral's revamp, the sanctuary's existing layout (above) will be reconfigured (this image) to address a number of occupant-comfort issues, including acoustics. Fixed metal panels will be hung from the building's space frame. These will help control heat gain and glare and, depending on their location, will absorb or reflect sound. New 16- to 20-foot-tall interior travertine walls incorporating sound-dispersing battens will also be added.

IMAGES: COURTESY JOHNSON FAIN

MIRROR FINISH Johnson Fain's renovation focuses on the cathedral's interior. Except for sealing shut the building skin's operable glass panels, the exterior appearance of the cathedral and its 237-foot-tall bell tower (right), will remain largely unchanged. The project does, however, include implementation of a landscape master plan devised by another Los Angeles design firm, Rios Clemente Hale Studios.

PHOTOGRAPHY: © ANKE MESKENS

hands of Los Angeles firm Johnson Fain. The renovation will make the space suitable for Catholic services and will also improve interior comfort, including acoustics, says Scott Johnson, firm principal. (Scott and Philip are not related, but early in his career Scott worked on the Crystal Cathedral project as a design associate at Philip's firm, New York–based Johnson Burgee.)

With thousands of single-glazed panels supported by a steel space frame, the iconic building envelope creates a greenhouse-like effect. Excess solar gain is common, and the interior, which has no mechanical air conditioning, is cooled passively via operable panels, resulting in widely fluctuating temperatures, air velocities, and humidity levels. These microconditions affect the way sound travels, leading to big variations in the space's reverberation time, or the number of seconds it takes for a sound to decrease by 60 decibels. The cathedral's asymmetrical floor plan and ceiling heights that range from about 50 feet to 120 feet exacerbate the problem. In addition, the glass skin reflects high-frequency sounds (e.g., bouncing high musical notes into the interior, resulting in a bright and echoey sound) but resonates, or vibrates, at low frequencies, allowing deep notes to escape the envelope. "Sound quality was unreliable in the old configuration," says Jeff Miller, senior consultant at Idibri, the renovation project's acoustician. "Our goal is to narrow the range of reverberation times so that people will understand and enjoy spoken liturgy, music, and singing."

The project team, seeking a streamlined solution, has conceived a system of perforated metal quatrefoil panels to be hung from the space frame. (Since new building systems, including mechanical cooling, will be installed as part of the renovation, the operable glass panes will be closed and sealed.) The metal panels will be static but tilted at varying angles depending on their location, to reduce heat gain and glare and improve sound quality. These angles are being determined with the help of parametric software.

Material choices and detailing will also help improve the acoustics. In areas where the quatrefoils should reflect sound, such as above the organ or choir (which will face each other across a new centrally placed altar, on the north and south portions of the sanctuary, respectively), the panels will be hung a bit lower to form a "sound cloud." To close off the perforations, these panels will be backed with a rigid material, possibly acrylic. In areas where sound absorption is required, the design team is considering a fiber-mesh backing. New 16- to 20-foot-tall travertine walls on the interior will be made up of vertical stone battens that vary in their plan orientation to help disperse sound. Whenever possible, audio components such as microphones and speakers will be disguised or embedded in architectural elements. "We always want technical solutions to be spatially integrated into a design, but it feels especially important here, since a spiritual space should encourage contemplation and reflection," says Johnson.

The project is slated for completion in 2016. Once the interiors are finished, the Hazel Wright Memorial organ—currently being refurbished by its original builder, in Italy, Fratelli Ruffatti—will be reinstalled and tuned for its new surroundings, a process that can take four to five months. —*Deborah Snoonian Glenn*

A former senior editor for RECORD, *Deborah Snoonian Glenn lives in Los Angeles and writes about design and other topics.*

Continuing Education

CONTINUING EDUCATION AIA

To earn one AIA learning unit (LU), including one hour of health, safety, and welfare (HSW) credit, read "Can You Hear Me Now?" and complete the test at architecturalrecord.com. 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 online at ce.construction.com.

Learning Objectives

1 Outline the acoustical properties of glass and glazing assemblies.

2 Describe how glass is incorporated into the three projects featured: a university theater, a museum auditorium, and a place of worship.

3 Discuss the strategies for mitigating the undesirable acoustical characteristics of glass in each of the above projects.

4 Discuss the strategies for exploiting the advantageous acoustical characteristics of glass in each of the above projects.

AIA/CES Course #1412A

FOR CEU CREDIT, READ "CAN YOU HEAR ME NOW?" AND TAKE THE QUIZ AT CE.CONSTRUCTION.COM, OR USE OUR ARCHITECTURAL RECORD CONTINUING-EDUCATION APP, AVAILABLE IN THE ITUNES STORE.


kick™
CONTEMPORARY URBAN LUMINAIRES
Two sizes: 4" and 5" ▲ Up to 12,800 lumens ▲ Up to 103 lumens per watt ▲ Zero uplight
architectural arealighting
HUBBELL
HUBBELL Lighting
CIRCLE 56

Record Products 2014

A jury of six professionals selected the best new products of the year from among 500 entries submitted for ARCHITECTURAL RECORD's annual competition. Jurors were asked to rate the entries on the criteria of innovation, usefulness, and – where applicable – aesthetics. The results are showcased on the following pages.

PAGE 139

Best in Category *BEST IN CATEGORY denotes the winner that received the highest total score in the group from the jurors.*

Editors' Choice *EDITORS' CHOICE denotes the RECORD staff's selection from among the category's top-scoring entries.*

Edited by **Sheila Kim** and **Linda C. Lentz**
Jurors' portraits by **Axel Depeux**

Jurors *All jurors are based in New York City*

Lance Amato, IIDA, LEED AP
As a director at Vocon, Amato is involved in design, construction coordination, and project management, and has worked with notable clients such as Colgate-Palmolive and Citigroup. A registered architect in New York State, he is also a former president of the IIDA's New York chapter.

Ginger Gilden, IIDA
Gilden is a senior project designer, at IA Interior Architects, whose notable interiors projects include a renovation for Amazon, multiple renovations for KPMG, and a conference center for the American Payroll Association. She holds a Bachelor of Science from Louisiana Tech University and is NCIDQ Certified.

Erik Kath, Assoc. AIA
A senior project designer at NBBJ, Kath has led design teams for projects ranging from large-scale commercial and high-rise mixed-use to master plans, both domestically and internationally. Currently, he is working on a 1 million-square-foot hospital in Shanghai. He is a graduate of Kent State University.

EJ Lee, IIDA
Lee, a principal and design director at Gensler, has overseen work at several of the firm's offices. In addition to completing projects for some of the world's most influential companies, from financial to retail markets, the interior designer is also an adjunct professor at Pratt Institute.

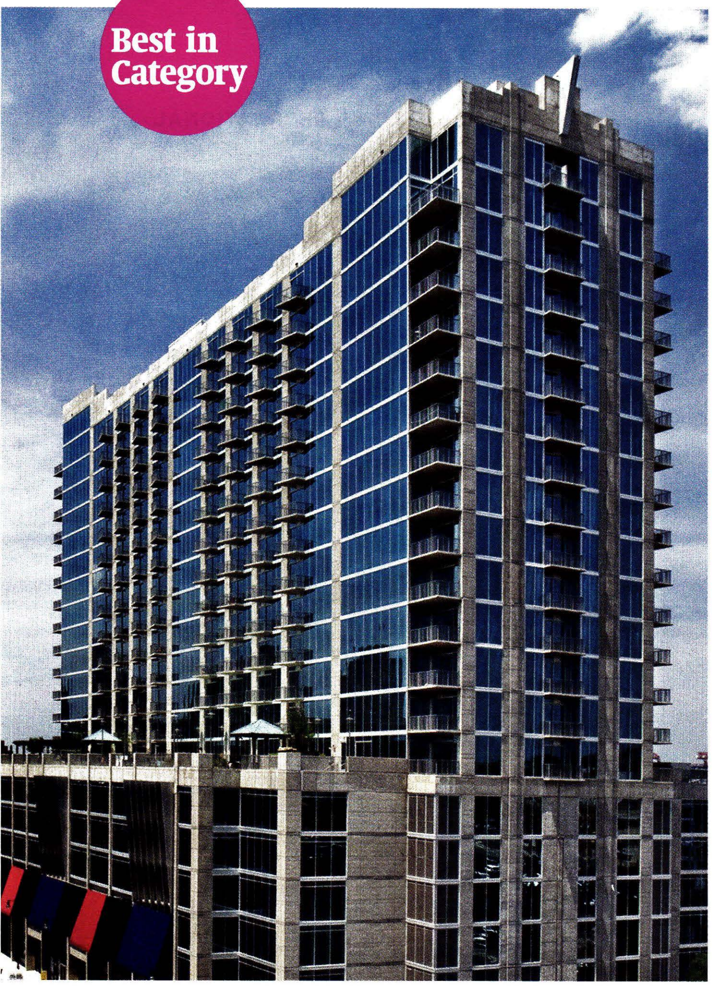
Gustavo Rodriguez, LEED AP
Rodriguez is a registered architect and principal of FXFOWLE Architects. His work varies in scale and runs the gamut from educational to hospitality projects. Currently, he is leading the design for two high-rise buildings in Brooklyn, New York. He holds a Master of Science from MIT.

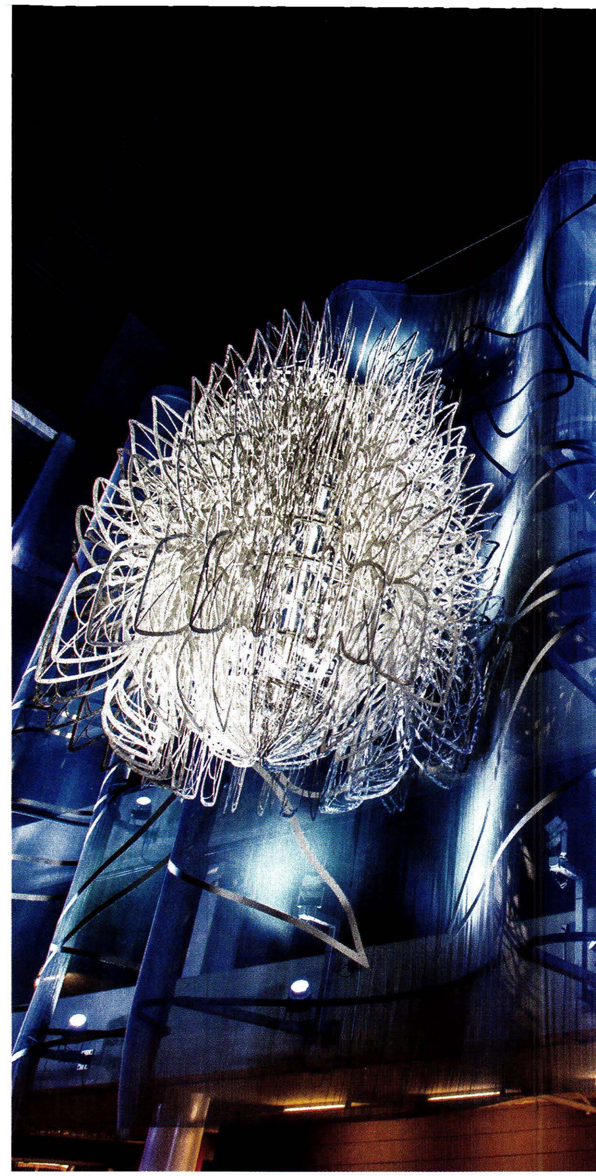
Casimir Zdanius
Zdanius is the head of industrial design and an associate principal at Grimshaw Architects. Work includes the central gallery of the Queens Museum in New York and Poltrona Frau seating for the Miami Science Museum. He holds a Bachelor of Applied Science in landscape architecture from Melbourne's RMIT.

Facades

Window Walls | Glazing | Cladding | Thermal & Moisture Barriers

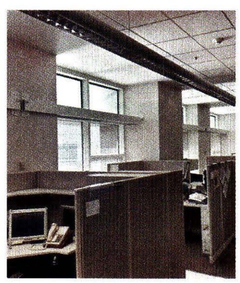
Best in Category





Unit-Glazed Window Wall System

Reducing field labor by as much as 50%, CRL-U.S. Aluminum's extruded-aluminum system, made of 50% post-consumer recycled content, allows contractors to fabricate window wall and storefront units in the shop rather than at the job site. Special components facilitate installation by snapping sections together. crl-arch.com
CIRCLE 200

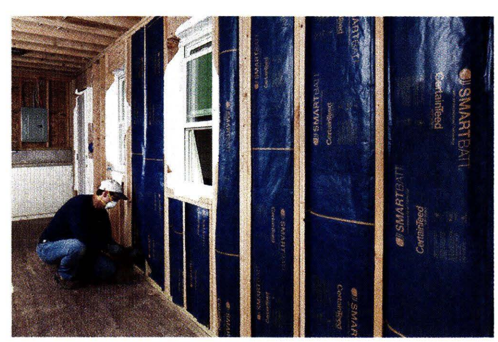


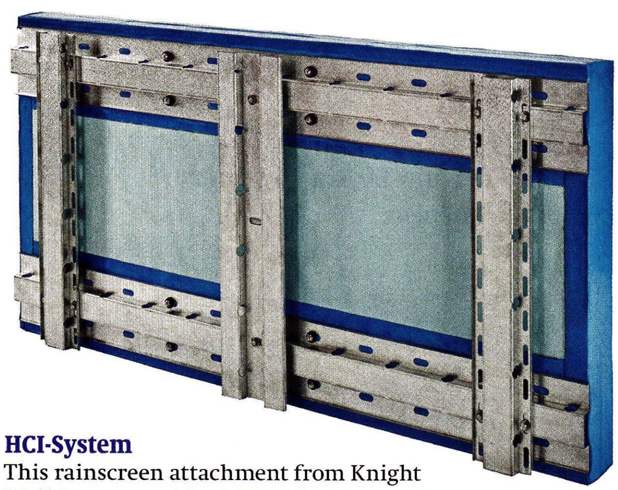
Daylight Redirecting Film

Contained within a glazing system, 3M's thin, micro-replicated film—made of PET—blocks 99% of ultraviolet rays and redirects sunlight to the ceiling, increasing daylight penetration into a space and reducing glare. It all adds up to a comfortable environment with reduced electric lighting requirements. solutions.3m.com
CIRCLE 207

SMARTBATT Insulation with MoistureSense Technology

CertainTeed's kraft-faced fiberglass batt insulation reduces the potential for mold and mildew growth by adapting to moisture levels within an exterior wall cavity. certainteed.com
CIRCLE 206





HCI-System

This rainscreen attachment from Knight Wall System enables ASHRAE 90.1–compliant continuous insulation with numerous vertical cladding systems and materials (fiber cement, metal panels, aluminum composite material, etc.). Pre-assembled off-site, the system is ready to install at delivery and can span 32" on center. knightwallsystems.com CIRCLE 208

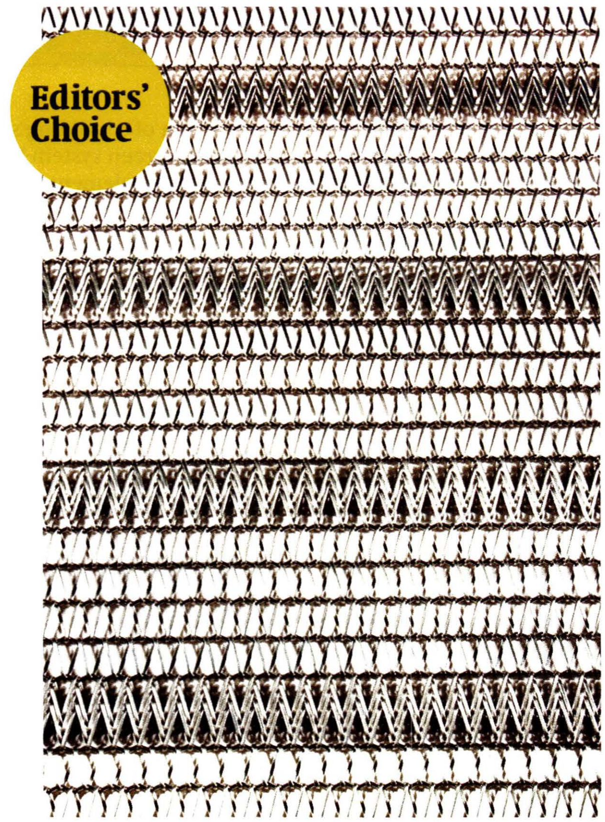
Fabricoil

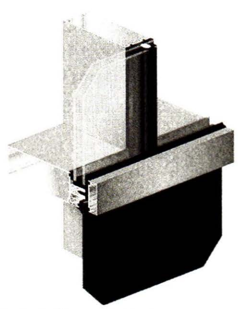
A flexible "fabric" made with interlocked strands of coiled wire, Cascade Architectural's textile-like alternative to woven metal mesh offers modest installation costs and accepts engineered embellishments for eye-catching building facades and interior applications. Available in a variety of metals, gauges, scales, finishes, and colors, Fabricoil is 100% recyclable and serves as an effective exterior shading device.
fabricoil.com
CIRCLE 201

"CRL-U.S. Aluminum's Unit-Glazed System is exciting because it helps solve a basic problem in residential construction: exposed slab edges. For budgets that don't allow for curtain wall construction, this offers an affordable alternative."
Erik Kath

Windsor Metal Mesh

The latest member of Cambridge Architectural's Build-A-Pattern series, this woven metal mesh integrates existing patterns, combining both tight and open weaves, creating a variable passage of light and shading—along with the benefits of each—for facades and interior applications.
cambridgearchitectural.com CIRCLE 202



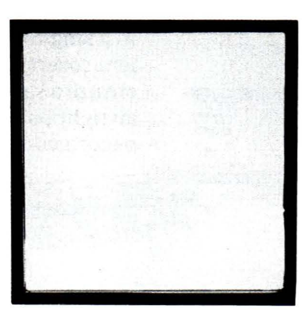


1620/1620 SSG Curtain Wall System

Kawneer's structural silicone glazed (SSG) curtain wall system has a slim 2" sight line, yet doesn't skimp on performance. Designed for low- to mid-rise applications, it can accommodate double-pane insulating glass. Options include a fiberglass pressure plate for improved thermal performance.
kawneer.com
CIRCLE 204

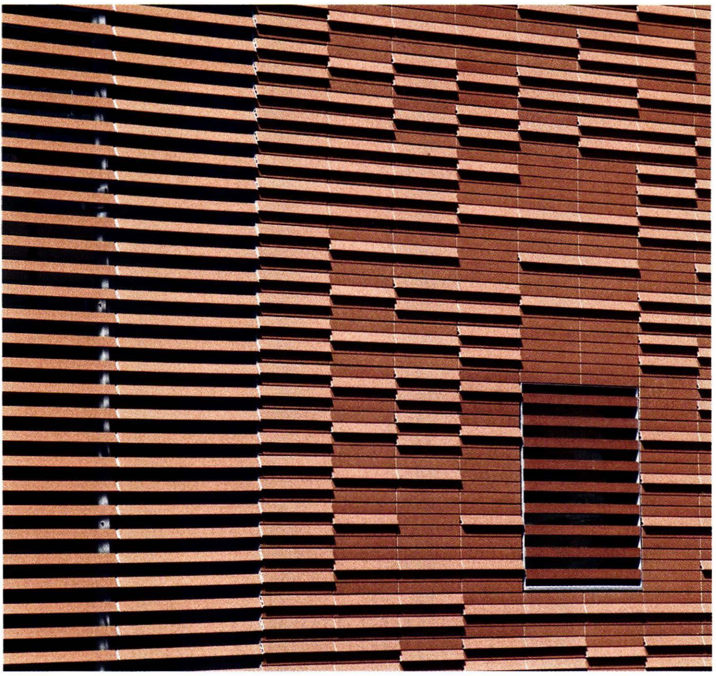
UniQuad

This insulated unitized daylighting system by CPI Daylighting comprises a double layer of translucent, quad-glazed, Nano-Cell polycarbonate panels (made up of 10% postindustrial content) held by recycled-aluminum framing. Features include long-span capability, bicolor and scalable performance options, and an easily removable and replaceable exterior skin.
cpidaylighting.com CIRCLE 205



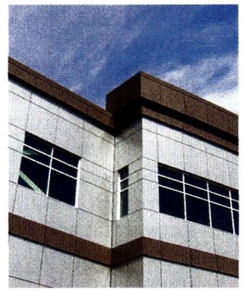
Solarban z75 Glass

PPG's cool-gray-tinted glazing offers a pleasing mix of visible light transmittance (VLT) and solar/glare control. A 1" insulating glass unit has a 48% VLT and a solar heat gain coefficient of 0.24 for a light-to-solar gain ratio of 2.0.
ppgideascapes.com CIRCLE 203



TERRART-Light

Ideal for the renovation and reconstruction of a building's cladding, this ventilated curtain wall/rainscreen system by NBK consists of lightweight terra-cotta facade elements in medium and small formats, manufactured according to specified dimensions. Options include natural or grooved finishes, as well as a wide selection of standard and custom colors. nbkterracotta.com CIRCLE 209



Intercept Modular Metal Panel System

This versatile rainscreen by Centria is custom-fabricated and designed for limitless configurations. The system has concealed fasteners and monolithic metal skins made of .060" aluminum, .059" zinc, or .050" copper. Options include formed corners, wing walls, soffits, fascias, and curved radial walls. centriaperformance.com CIRCLE 210

SunGuard SNX 51/23

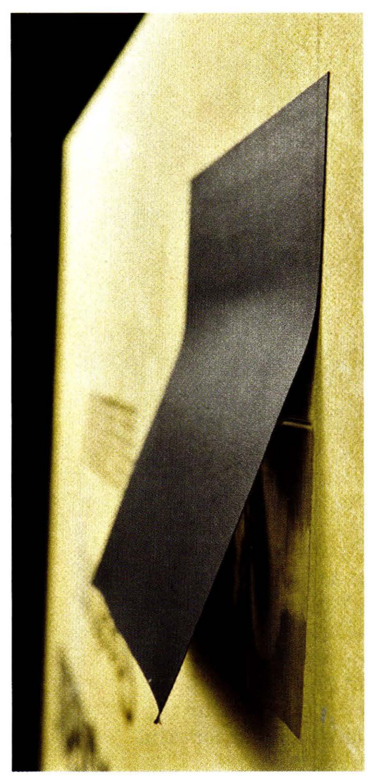
Offering a combination of high light transmission (51% VLT), a low solar heat-gain coefficient (0.23), and low reflectivity, Guardian's SNX 51/23 surface coating for insulated glass units uses triple-silver low-E technology and features a neutral blue appearance. It is available on six of the company's float-glass substrates, including tints. SunGuardGlass.com CIRCLE 211

ProSeal

Icynene's ProSeal is a spray foam insulation that offers an R-Value of R7 per inch. Approved for commercial construction types I, II, III, IV, and V, the all-season formulation allows for a higher initial pass of 3" to achieve R21. Additionally, it is a Class II Vapor Diffusion Retarder at 1.5". icynene.com CIRCLE 214

XL-Perm Air, Vapor, and Water Barrier System

The Pecora elastomeric weatherproofing membrane is applied in a single coat and offers excellent coverage and elasticity, to ensure a seamless, durable, and airtight building envelope. pecora.com CIRCLE 213



VaproShield RevealShield SA

A black, UV-stable, water-resistive, vapor-permeable air-barrier membrane for open joint rainscreen cladding, the zero-VOC RevealShield installs in a single layer in temperatures as low as 20° F. The Class A fire-rated material has a Flamespread Index of 0, and is highly vapor permeable, reducing incidence of mold, mildew, and rot. vaproshield.com CIRCLE 212

Openings

Windows | Doors | Hardware | Daylighting Tools

Best in Category

Sky-Frame Frameless Sliding Doors and Windows

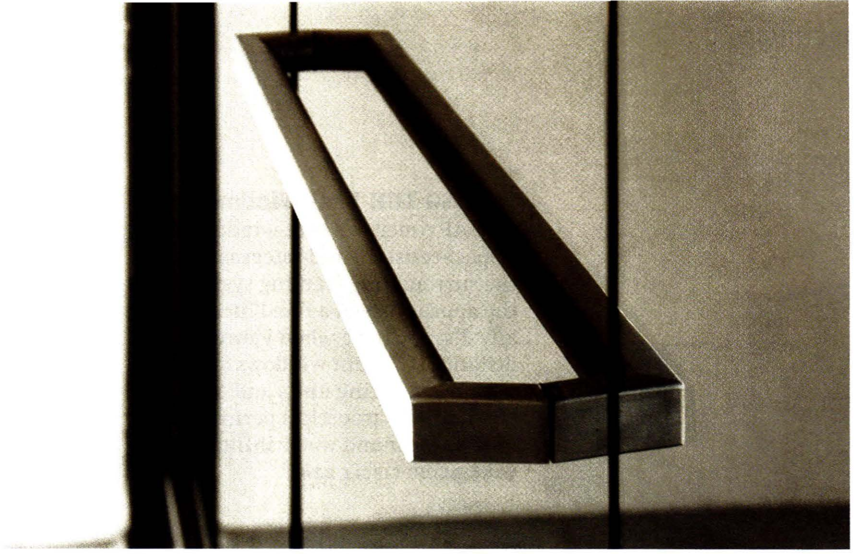
Available in rectilinear, curved, and sloped configurations with single-, double-, or triple-glazed insulating glass units, the Sky-Frame fenestration system was designed to maximize views. Mounted in aluminum frames that fit flush with floors and ceilings, the sliding units operate smoothly, come with a multipoint locking system, and drain via a recessed channel. Options include an automatic drive, insect screen, integrated blinds, and additional security devices. sky-frame.com CIRCLE 215

Coltlite Louvered Ventilator

Bilco's louvered ventilating units provide attractive smoke control and natural ventilation for institutional, commercial, or apartment buildings. Made of corrosion-resistant aluminum frames with glazed (shown right) or insulated-aluminum louvers, Coltlite products meet high performance standards and can be ordered with pneumatic, electronic, or manual controls. bilco.com CIRCLE 222

B. Rubber Pull

Designed by Seattle-based architect Tom Kundig, the B. Rubber door pull by 12th Avenue Iron is a 2" x 24" metal pipe with a neoprene grip. It comes in blackened steel (shown), sand-blasted stainless steel, oil-rubbed solid bronze, and powder-coated finishes. 12thavenueiron.com CIRCLE 221



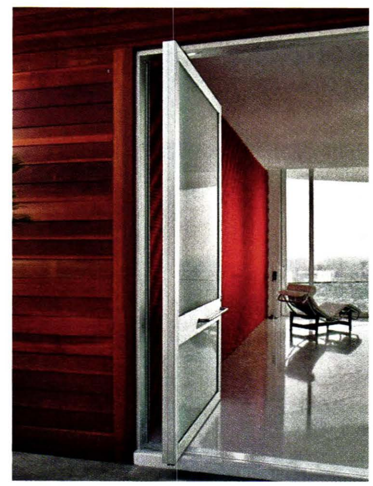
"The minimal frames and hardware on Sky-Frame's doors (more like walls, actually) make them practically invisible."
Gustavo Rodriguez

Designer Series Panic Handles

CRL-Blumcraft's stylish D-shaped panic handles are made of 316 brushed or polished stainless steel from a minimum of 65% post-consumer recycled content. Designed to meet exacting performance standards for glass doors, these handles have a sleek, contemporary aesthetic that would integrate into a variety of discriminating installations. crlaurence.com CIRCLE 216

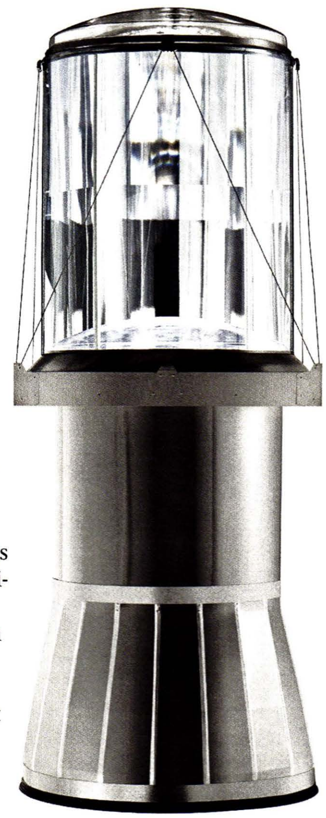
Performance Pivot Door

Weiland's newest pivot door has ADA-compliant sills and rotates on a pivot box that enables it to swing in, out, or both in and out. Made of recyclable aluminum on the exterior side, the doors are available with the client's choice of wood species on the interior. weilandslidingdoors.com CIRCLE 217



SkyVault M74 DS with Collector

Solatube's advanced optical daylighting system for commercial buildings employs a specially designed vertical lens that boosts light output under less-than-optimal conditions (without the aid of electric lamps) for spaces with high-bays or high ceilings. SkyVault M74 also blocks UV radiation and controls solar heat gain, so there are no significant increases to a building's cooling load. solatube.com CIRCLE 219



ZNC Window

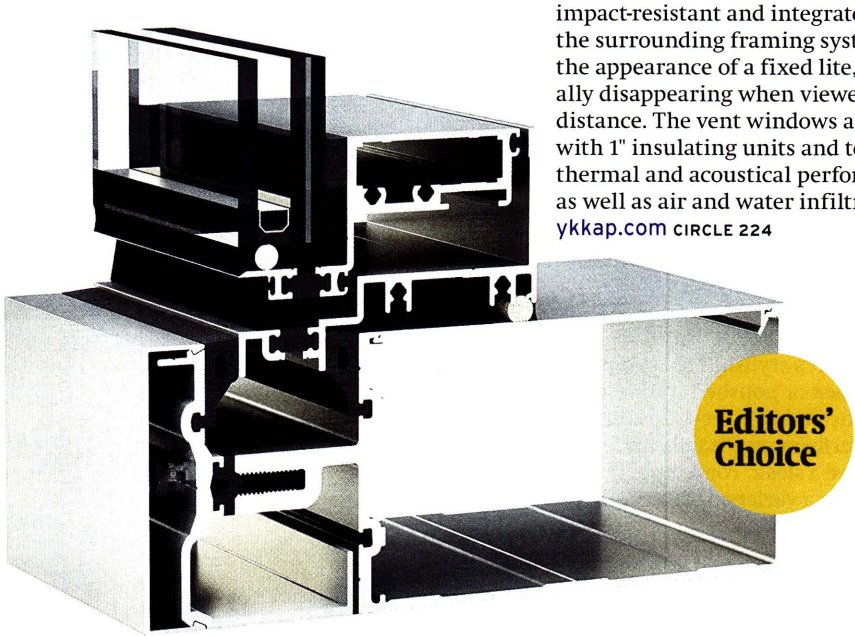
This beautifully crafted window by Zola is certified by the Passive House Institute and Passive House Institute U.S. Available with R-15 quad glazing, the ZNC (an acronym for Zola No Compromise) has a slim profile, an FSC-certified wood frame with a powder-coated aluminum exterior, and rail-mounted rainscreen cladding. Fixed windows range up to 8' x 10'; Tilt & Turn, up to 5' x 9'. zolawindows.com CIRCLE 220

Multi-Slide Door System

LaCantina Doors' multi-slide system is all about design continuity, providing the same door panels used in the company's folding and swing offerings. In addition, the doors stack flush when open, and have consistent-width stiles and rails, and a self-draining, weather-resistant sill. lacantinadoors.com CIRCLE 218

FoldFlat Door Panels

Designed to maximize views, NanaWalls' latest folding glass door panels have been engineered to fold and then pivot all the way back to stack out of and parallel to the opening. The FoldFlat panels are available with either aluminum or wood frames, and span up to 9' or 18' when paired, one on each side of an opening. nanawall.com CIRCLE 223



YES SSG TUH Vent Window

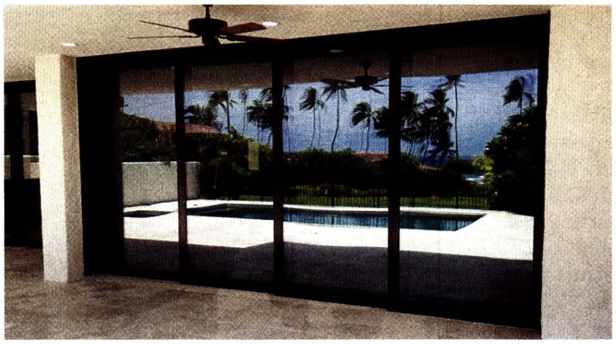
YKK AP America's vent window is impact-resistant and integrates into the surrounding framing system with the appearance of a fixed lite, virtually disappearing when viewed from a distance. The vent windows are glazed with 1" insulating units and tested for thermal and acoustical performance, as well as air and water infiltration. ykkap.com CIRCLE 224

INvent.PLUS Windows

These Wausau windows meet stringent thermal performance standards with innovative composite frames–made of 55% engineered polymers and 45% aluminum extrusions–able to accept triple glazing. wausauwindow.com CIRCLE 225

Vision Control Integrated Louvers

A hermetically sealed system that combines louvers within glass, Vision Control by Unicel Architectural adapts for any interior or exterior glazing application. This updated version features fire-rated trims, possibly an industry first. It also operates faster and more easily, contains Argon gas to improve thermal performance, and has a curtain wall adapter to eliminate modifications. unicelarchitectural.com CIRCLE 227

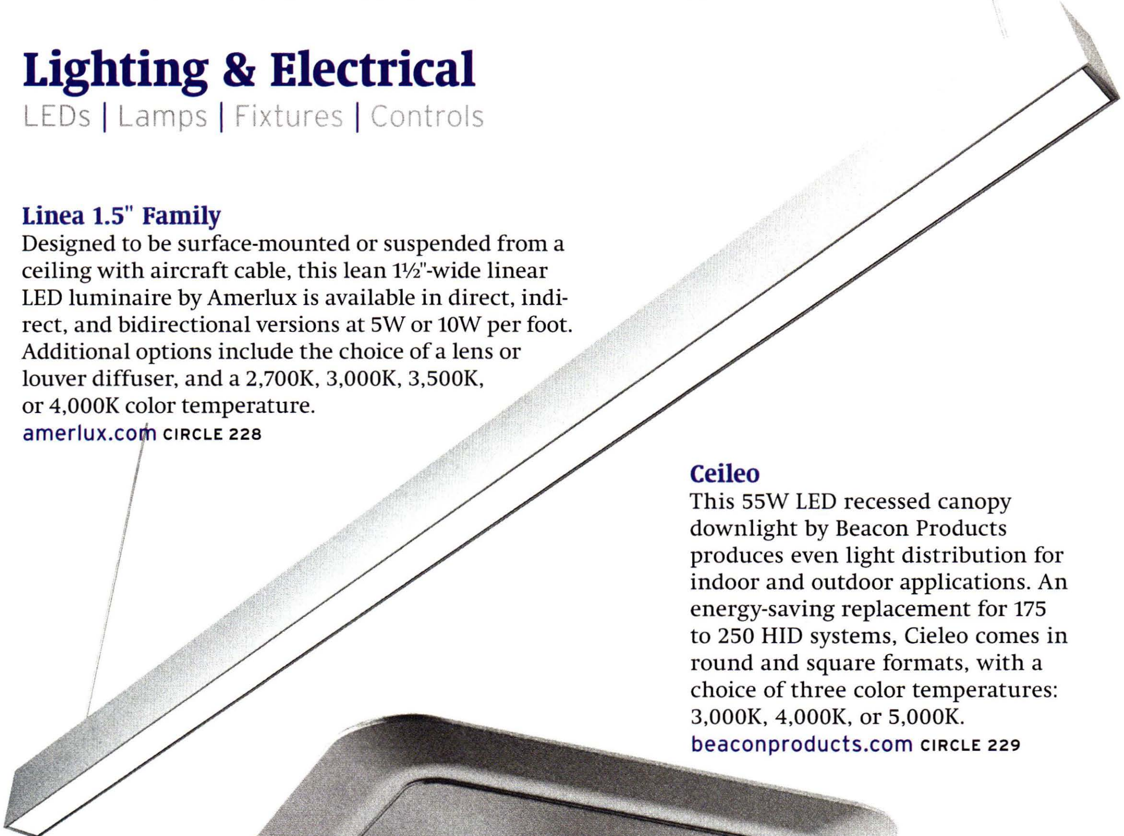


IMPACT IS.14 Lift & Slide System

Hurricane- and impact-resistant, the IS.14 from Panda Windows & Doors can also stand up to coastal corrosion, humidity, and salt. The units comprise aluminum frames with laminated, impact-resistant glazing and can be configured in sizes up to 5' wide x 12' high. panda-windows.com CIRCLE 226

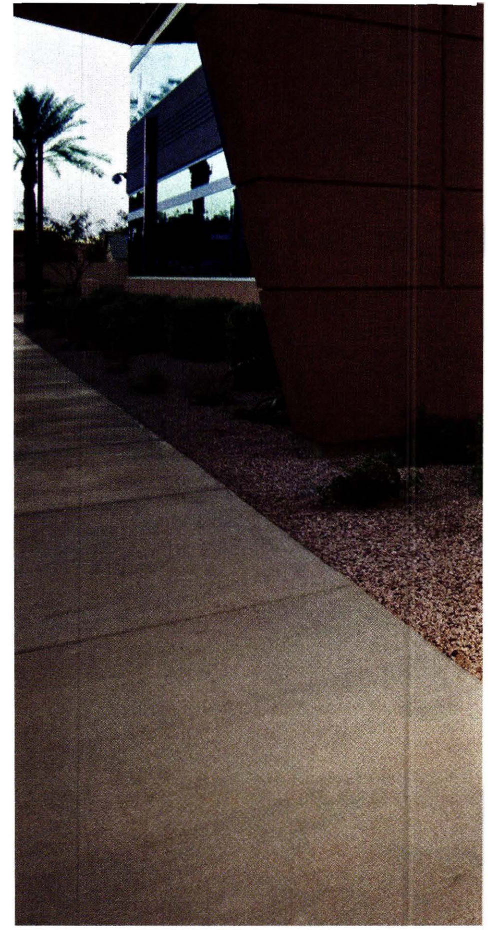
Lighting & Electrical

LEDs | Lamps | Fixtures | Controls



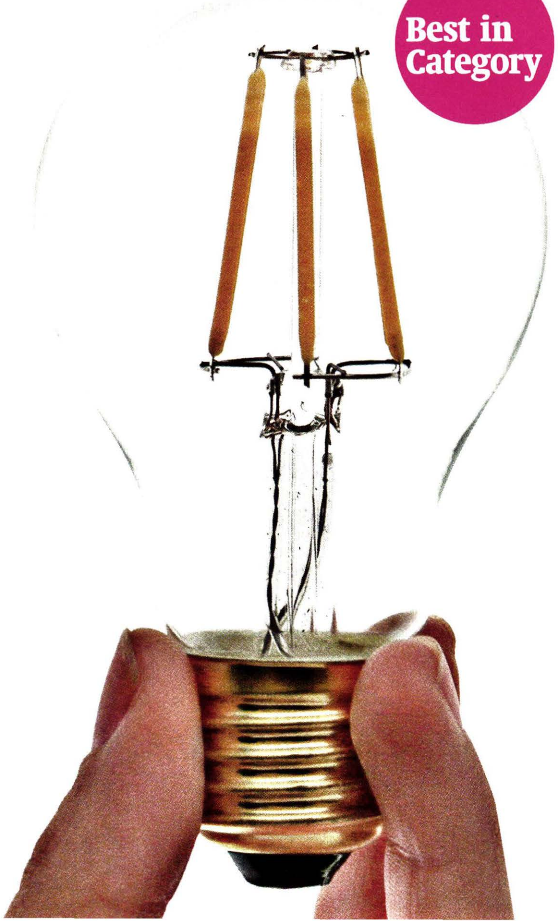
Linea 1.5" Family

Designed to be surface-mounted or suspended from a ceiling with aircraft cable, this lean 1½"-wide linear LED luminaire by Amerlux is available in direct, indirect, and bidirectional versions at 5W or 10W per foot. Additional options include the choice of a lens or louver diffuser, and a 2,700K, 3,000K, 3,500K, or 4,000K color temperature.
amerlux.com CIRCLE 228



Ceileo

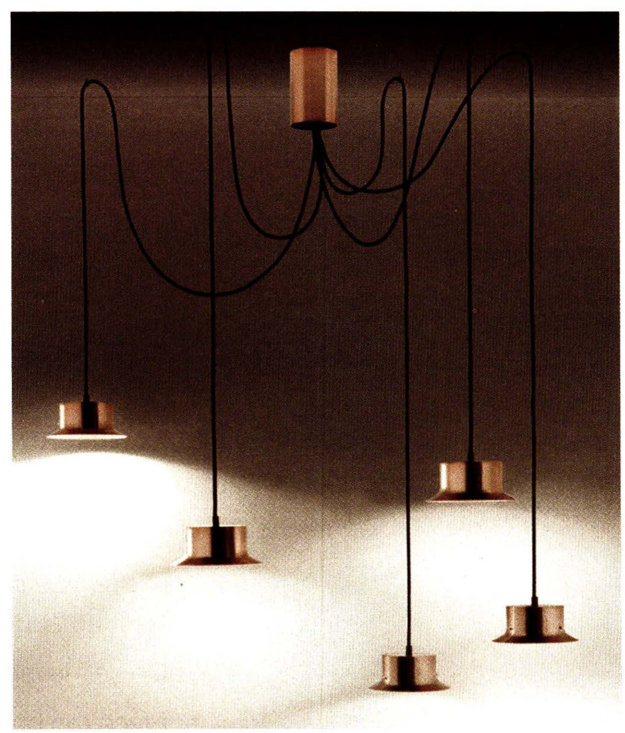
This 55W LED recessed canopy downlight by Beacon Products produces even light distribution for indoor and outdoor applications. An energy-saving replacement for 175 to 250 HID systems, Cieleo comes in round and square formats, with a choice of three color temperatures: 3,000K, 4,000K, or 5,000K.
beaconproducts.com CIRCLE 229



Best in Category

All-Glass Dimmable Hybrid LED A-Lamp

Aamsco has developed a very credible 2,700K stand-in for the beloved filament incandescent light bulb, in 4W and 6W versions, using chip-on-board (COB) technology. A ceramic substrate with high thermal conductivity acts as the heat sink, eliminating the bulky base of similar LED alternatives. Additionally, the proximity of the chips evokes the look of a single light source.
aamsco.com CIRCLE 236

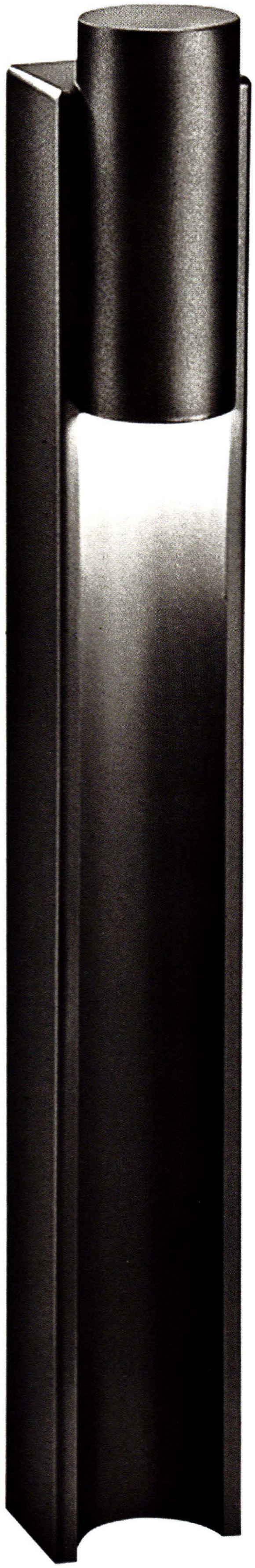


Maine Luminaire

The Barcelona-based industrial design firm Goula/Figuera Studio took its cues from details found on 19th-century steel ships when it designed this elegant collection for Estiluz. Available in copper, black, nickel, and satin gold finishes, in a variety of sizes for LED or CFL lamping, individual units can be clustered from a central canopy or installed as a single pendant ceiling fixture or wall sconce. estiluzusa.com CIRCLE 235

Rincon LED Bollard

Illuminated by Cree LEDs, this 4½"-square x 36"-high outdoor fixture by Forms+Surfaces is composed of a virtually seamless satin stainless-steel body and ¼"-thick white frosted-acrylic lens. All of its metal components are 100% recyclable. forms-surfaces.com CIRCLE 230



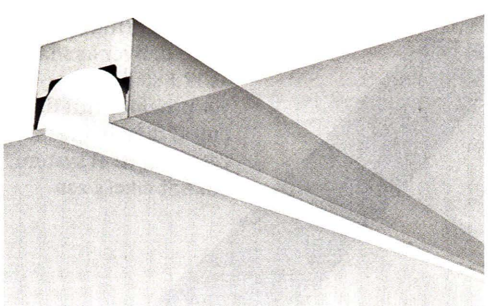
Padua

HessAmerica's dark-sky compliant LED bollard (left) and sconce feature a cylindrical aluminum housing cradled by a concave aluminum shaft/wall-mounting bracket that helps shield the glow, so that it emits zero uplight. Suitable for LEED lighting zones 1 through 4, Padua is available in 3,000K and 4000K versions, and matte silver, dark gray, or graphite. All hardware and fasteners are stainless steel. hessamerica.com CIRCLE 231

"Aamsco's Hybrid LED overcomes the aesthetic challenges of prior LEDs' technicalities, offering options to meet today's designs in both commercial and residential markets. The diverse range of sizes and styles provide options for all required fixture types."
Lance Amato

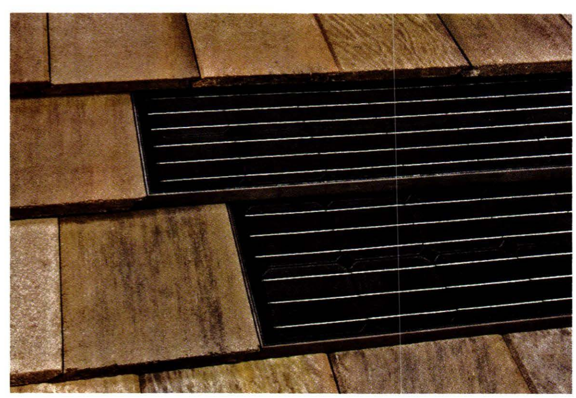
Grafik T dimmer

This playful lighting control by Lutron marries the company's minimalist design aesthetic with touch-dimming technology, and controls a wide range of light sources–screw-in LED, CFL, halogen, and incandescent–with the touch of a finger on its LED light bar. lutron.com CIRCLE 232



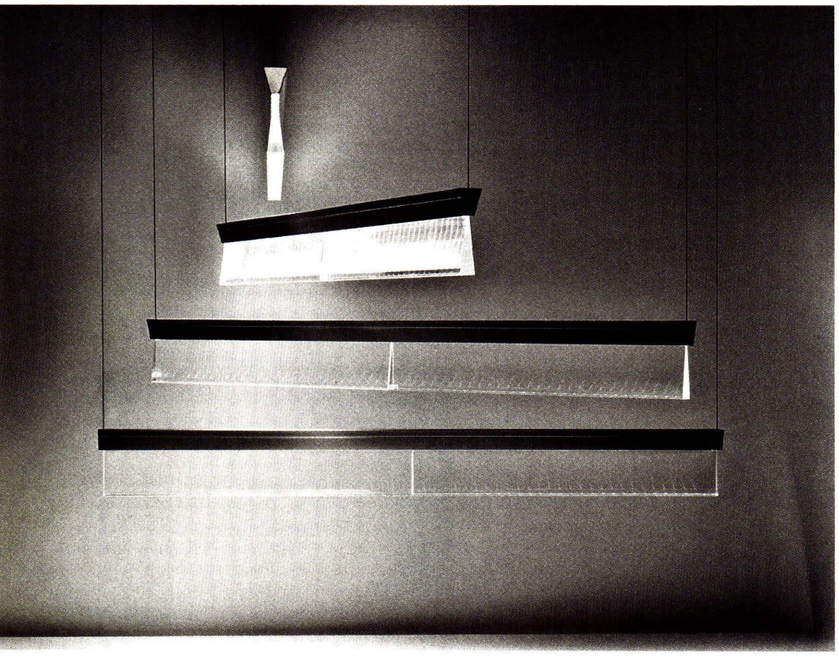
Stream

This innovative lens-free recessed luminaire by Prudential Lighting creates an uninterrupted line of light that can extend to whatever length is specified. Configured with an indirect 90-lumens-per-watt LED light source (3,000K, 3,500K, or 4,000K) and a flexible high-diffuse reflector film, Stream recedes into the ceiling plane, thanks to its trimless mud-over flange. prulite.com CIRCLE 234



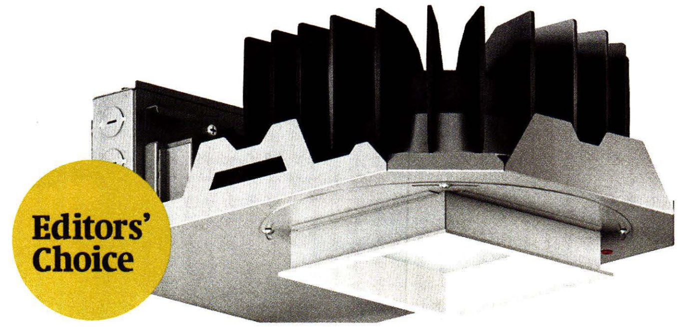
Apollo II Solar-Roofing System

CertainTeed's enhanced system features photovoltaic panels that combine greater electricity-generating efficiency with easier wiring. The panels have also been refined so that they integrate into the roofing shingles for a cleaner, more homogeneous appearance. Each module features 14 high-efficiency monocrystalline-silicon solar cells for a power rating of 56W per module. certainteed.com CIRCLE 233



Sheer

Taking advantage of its proprietary film technologies, 3M has created a bold LED pendant that maintains its transparency even when illuminated. Made of clear acrylic, the linear fixture is available in 4' or 8' lengths that can be ganged with optional connectors to form a longer luminaire, and with the option of narrow, medium, or wide beam spreads radiating approximately 800 lumens per watt. 3m.com CIRCLE 237



BeveLED 5.0 Max Output

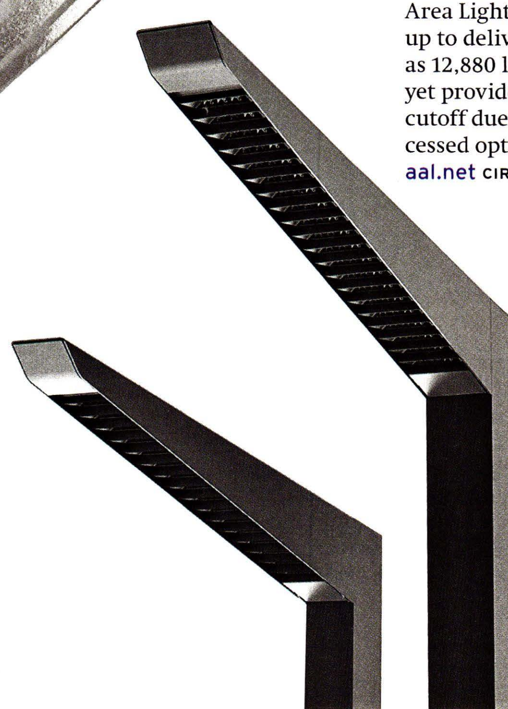
USAI has ramped up its offerings with a new downlight that delivers up to 5,765 lumens at 80W from a 6" aperture. Providing low-maintenance lighting for high-ceiling spaces such as airports, theaters, and lobbies, this powerful fixture is available with 30° to 60° beam spreads, and 2,700K to 4,000K color temperatures. usailighting.com CIRCLE 238

Ultra-High-Power PAR38 LED Lamp

Lattice Power's 27W, 3,000K GaN on Silicon LED PAR38 lamp for commercial applications has an extremely high lumen output–2,000 lumens per watt. Even more notable: it has been engineered with a thermal pipe heatsink that provides efficient heat dissipation to offset the need for active cooling. lpglighting.com CIRCLE 241

KicK

An effective low-glare solution for walkways, paths, and building entrances, this ingenious luminaire by Architectural Area Lighting angles up to deliver as many as 12,880 lumens, yet provides full light cutoff due to a recessed optical system. aal.net CIRCLE 239



AR111 LED Lamp with SNAP System

Built with GaN on GaN technology, Soraa's AR111 LED MR16 has a color rendering index (CRI) of 95, equal to the quality of halogen lamps. It is also available with the company's versatile system of magnetic, self-centering filter and lens attachments that snap on and off to allow for quick and easy modifications at the job site. soraa.com CIRCLE 240

Lighting that goes where your imagination takes it.
Up a wall, across a ceiling, down to a pendant right in front of you.
All in a single, clean line. amerlux.com/commercial
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amerlux
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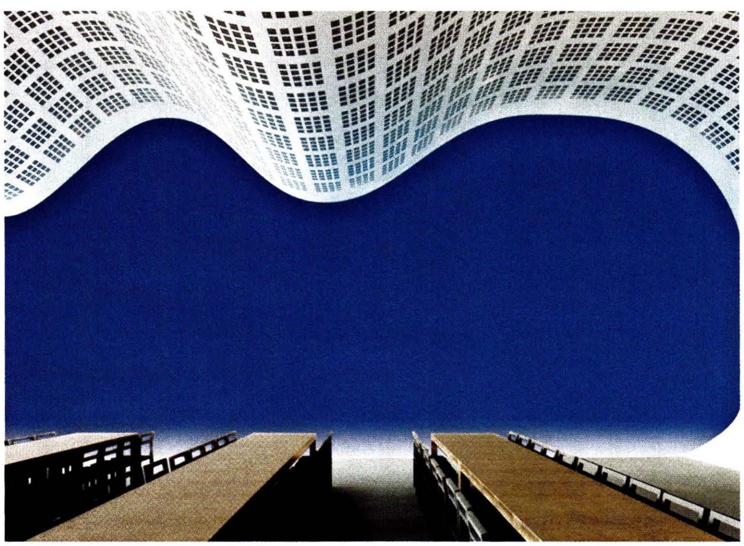
CIRCLE 28

Finishes & Surfacing

Ceilings | Flooring | Paints & Coatings | Surfacing | Wall Treatments

Sabi Cladding

Inspired by the Japanese aesthetic of *wabi-sabi*, which is defined by transience and imperfection, Windfall Lumber's Sabi Cladding highlights the weathered patina of its wood: Douglas fir and hemlock reclaimed from deconstructed buildings. The ½" thick x 4½" wide panels are available in random lengths of 2' to 8' and in four finishes. windfalllumber.com CIRCLE 242

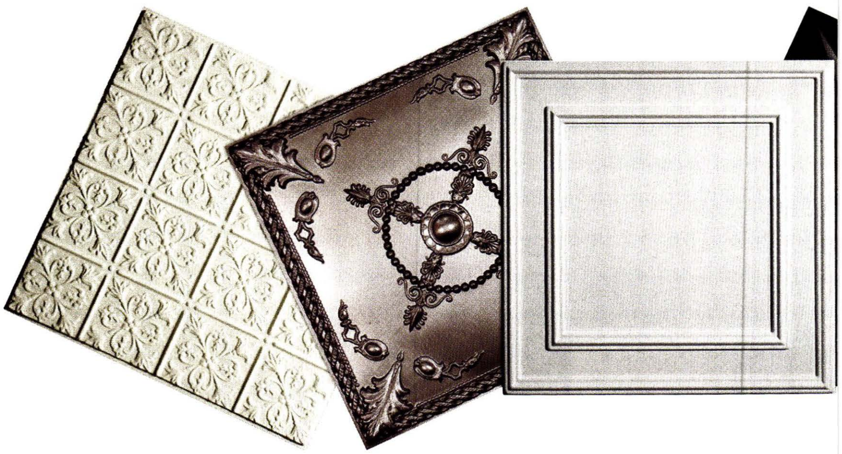


Gyptone Big Curve

Easily bent to achieve sweeping arcs, CertainTeed Ceilings' Gyptone Big Curve is a 47¼" x 94½" perforated gypsum board filled with acoustical tissue. Three perforation patterns are offered: Line 6 features ¼" x 3⅛" rectangles; Quattro 41 has ½" squares; and Sixto 63 incorporates ½" hexagons. All styles are prefinished in white but can also be roller-painted. It is made of 85% recycled content and is low-VOC. certainteed.com CIRCLE 248

Thermoformed Drop-Out Ceiling Panels

These rigid vinyl panels by Ceilume—installable in most conventional ceiling suspension grids—are meant to conceal fire sprinklers to create an uninterrupted plane. Upon exposure to fire, the panels soften and drop out of the grid, allowing the sprinklers to activate. They are available in more than 40 decorative styles, are highly cleanable, and come in 24" square or 24" x 48" sizes. ceilume.com CIRCLE 247



Acropon 2605 Extrusion Coating System

Valspar's Acropon 2605 system provides extruded-aluminum products with a high-gloss finish that is formulated for both exterior and interior environments. Capable of withstanding abrasions and chemicals, the two-coat finish is smooth to the touch, easy to clean, and offered in a wide color palette. It is well suited to storefront, cladding, panel, and window frame applications. valsparcoilextrusion.com CIRCLE 243

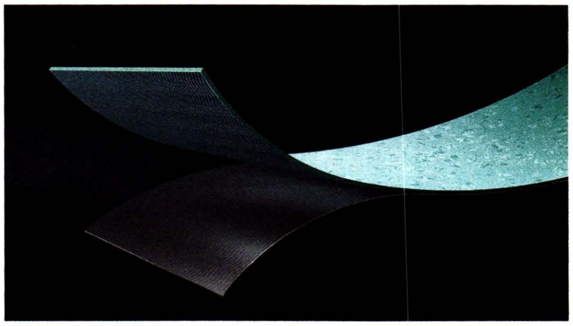
"I appreciate the philosophy of *wabi-sabi* and the idea of aged beauty in Windfall's Sabi cladding. Using reclaimed and salvaged wood to create something new and beautiful is not an easy task, but this product achieves both."
EJ Lee

MirroView 50/50

Television and video display screens are no longer the focal point in a space when concealed using Pilkington's MirroView 50/50. The product—consisting of a highly reflective pyrolytic coating on a clear, annealed float-glass substrate—looks like any other mirror glass when the display is off; when the display is powered on, its images appear clearly without revealing the screen's frame.
pilkington.com CIRCLE 244

European Union

Interface's European Union carpet tile collection is about simplicity. Devoid of pattern (though it can be mixed with other tiles if pattern is desired), it combines one of three subtle textures with a monochromatic gray palette to complement a range of aesthetics. The tiles are produced using 65% recycled content in a facility that uses 100% renewable energy and almost no water in the manufacturing process, and that sends zero waste to landfill. interface.com CIRCLE 246

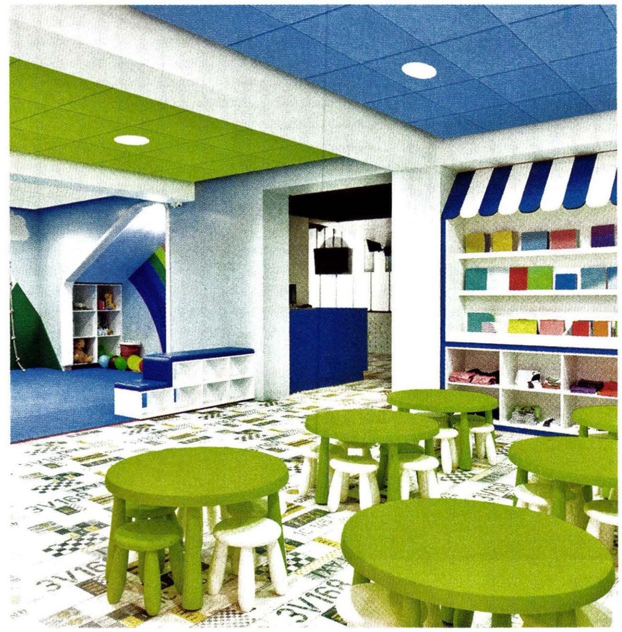


noraplan nTx

Nora Systems developed this resilient sheet-flooring product to cut installation time by as much as 50%, as compared with standard PVC-sheet installation. The key is a pre-applied, solvent-free adhesive that reduces prep work and eliminates drying time. The PVC- and plasticizer-free flooring is composed of rapidly renewable natural rubber, raw mineral materials, and color pigments.
nora.com CIRCLE 245

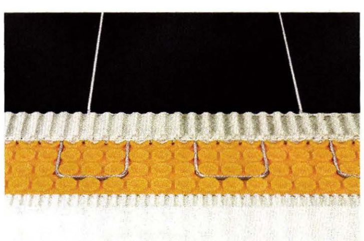
Rinceau

Trove draws on rinceau, a style of ornamentation involving scrolls of foliage, for the three panel designs that make up this wallcovering series. Available in six colorways, the patterns are created with water-based ink on a choice of PVC-free wood veneer; window film; or Type I or Type II commercial-grade covering. Two of the panel designs measure 3' wide by up to 12' high, while the third panel option spans 6' wide by 12' high. troveline.com CIRCLE 249



Colorations Integrated Ceiling System

An acoustical ceiling solution by Armstrong, Colorations offers coordinating panels, a suspension system, and trim in 13 factory-finished standard or custom colors, affording architects more freedom and ease in designing spaces that require sound control. The panels are constructed of 68% recycled content. armstrong.com CIRCLE 250



Schluter-Ditra-Heat

The installation of uncoupling membranes is recommended in heated tile floors to prevent the tiles and grout from cracking. However, Schluter Systems created a product that combines the heating and uncoupling in the same layer. Schluter-Ditra-Heat consists of a polypropylene membrane with fleece laminated to its underside; 120V or 240V wires can be placed where needed within the membrane's grooves. schluter.com CIRCLE 252

Rockfon Island

These frameless stone-wool ceiling panels by Rockfon are ideal for controlling noise in settings where drop ceilings are not suitable. Offered in square or rectangular formats, the units feature crisp edges with a subtle beveling, a smooth surface, and bright white finish to optimize light reflection. As an added benefit, they are 50% to 70% lighter in weight than many typical ceiling products, making them easier to install. rockfon.com CIRCLE 251


FlexLouver™
Rack Arm Louver Systems
ARCHITECTURAL RECORD
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BEST IN CATEGORY
Choose the FlexLouver Rack Arm System when you need precise light control. The non-retractable louvers can be installed inside or outside the glass, and open and close to control solar energy, light and glare. FlexLouver can cover any opening shape—even circular, triangular, trapezoid, and arches—and any orientation—vertical, horizontal or inclined. FlexLouver can be manually operated, but the maximum benefits of energy savings and occupant comfort are realized when the system is installed outside the glass—keeping the solar heat outside the building envelope—and opens and closes automatically under the guidance of solar tracking software.
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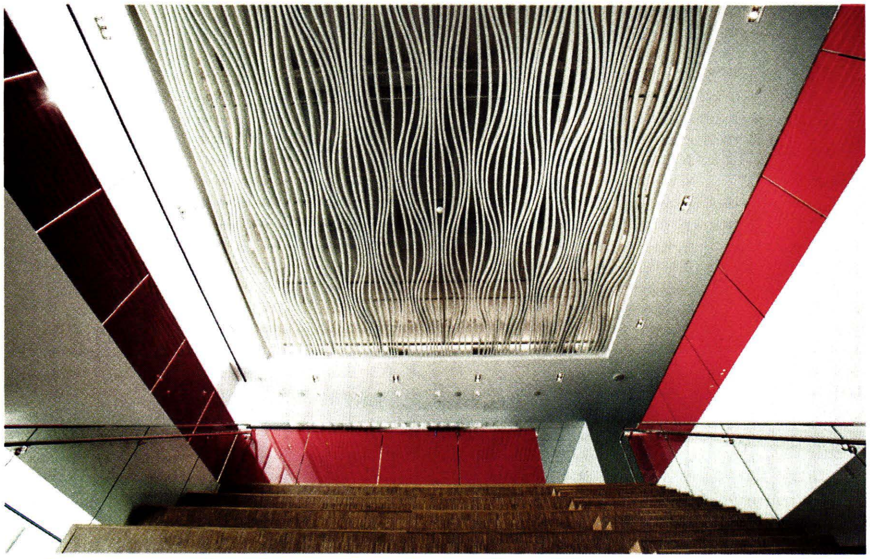
CIRCLE 57

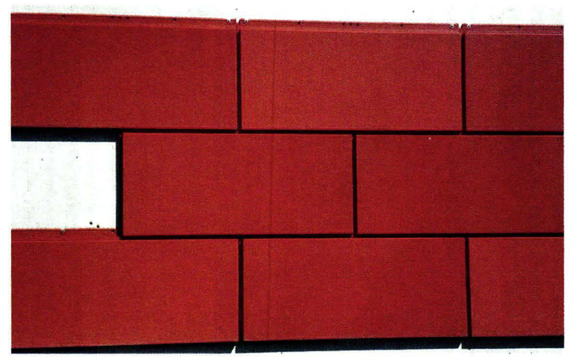


Horizontal Curved High Profile Series Baffle Ceiling System

A series of undulating panels turned on their sides makes up this striking patterned baffle ceiling from Hunter Douglas Contract. The panels, constructed of 100% extruded aluminum, can be combined to form baffles of up to 20' in length, with arcs spanning between 4' and 20'. The Greenguard Gold–certified product contains no VOCs, is Class A fire rated, and is offered in two standard colors (natural or white) or 27 faux-wood powder-coat finishes. hunterdouglascontract.com CIRCLE 253

Terra-Cotta Painted Finish

This finish by Linetec easily transforms economical aluminum wall panels by mimicking the look and feel of terra-cotta. Available in four hues, the 70% polyvinylidene fluoride resin–based coating features high-performing attributes desired in exterior environments, such as resistance to humidity, fading, and chemicals. Additionally, Linetec destroys any VOCs present in the liquid paint prior to deploying it to job sites. linetec.com CIRCLE 254



Neolith: Classtone

TheSize's Neolith: Classtone is a ½"-thick sintered compact surface that can be installed as kitchen counters, but also as flooring and on interior walls. It is composed of a cocktail of natural materials–clay, feldspar, silica, and mineral oxides–and has nearly zero porosity, rendering it a low-maintenance hygienic surface. thesize.es CIRCLE 256

Duranar Gr and Coraflon GR

PPG Industries developed graffiti-resistant versions of its Duranar and Coraflon industrial coatings. Both utilize a factory-applied clear barrier over the pigmented layer. The resulting surface can be field-treated with Duraprep Prep 400 to remove spray paint, pen and marker ink, adhesive residue, and other substances. ppgideascapes.com CIRCLE 257

PlybooSound Architectural Wall Panels

Smith & Fong's PlybooSound is a bamboo product that dampens noise using either standard fiberglass backing or the company's new QuietWall chamber system, which was developed with the Utah-based acoustics firm Real Acoustix and is integrated into the bamboo panels. Available with any of the company's designs. plyboo.com CIRCLE 255

Kitchen & Bath

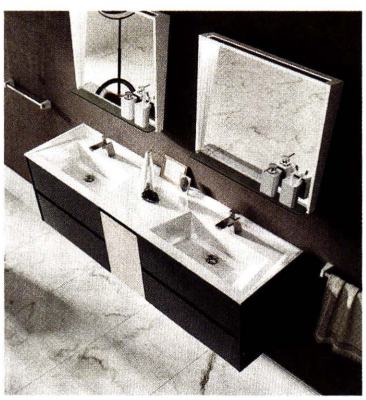
Appliances | Cabinets | Fixtures & Fittings

ADaptek Shower Base

With increasing concerns about future-proofing, manufacturers like Fleurco are developing solutions that can adapt as the end-user's needs change. Its ADaptek Shower Base, made of fiberglass-reinforced acrylic, sits flush with the bathroom floor and features a stainless-steel-covered trench drain that is footstep- and wheelchair-friendly. The decorative drain cover is stylish and easily removable for maintenance and cleaning. fleurco.com CIRCLE 258

Vero Furniture

This bath furniture series from Duravit presents a clean, rectangular design that complements the manufacturer's Vero ceramic sinks. Pieces range from mirror cabinets to wall-mounted, LED-lit sink storage with compartmentalized drawers and integrated towel bars. The solid wood units are available in six finishes. duravit.us CIRCLE 259



Scalene

Not another rectangular sink cabinet, Sonia's Scalene plays on geometry using oblique angles in both the base and integrated sink top. The wall-mounted piece, constructed of marine-grade wood in 12 lacquer or three wood finishes, features hardware-free drawer fronts, measures 27" wide, and can be combined with additional vanity base or add-on storage units to span widths of up to 63". sonia-sa.com CIRCLE 266

Focus 2-Spray High-Arc Kitchen Faucet

This Hansgrohe pull-down spray faucet blends sleek modern contours with functionality. It offers a 150° swivel range, while its hand spray provides two jet types for different rinsing needs. Available in chrome or Steel Optik finish, and in a 2.2 GPM or low-flow 1.75 GPM version. hansgrohe.com CIRCLE 265

HybridCare Dryer with Hybrid Heat Pump Technology

Whirlpool's HybridCare Dryer aims to push the limits of energy efficiency in home appliances. The ventless unit uses the company's Hybrid Heat Pump technology, a refrigeration system that recycles the same air to reduce energy consumption. Three modes are available: Speed, Eco, and Balanced. whirlpool.com CIRCLE 264

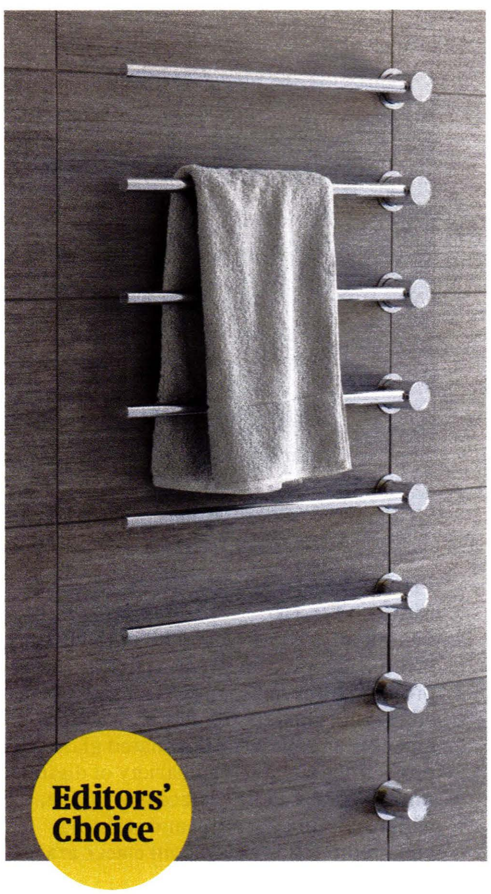
Vela D 2014 Model

A graceful and minimalist arc defines MGS's Vela D single-lever mixer faucet. Its spout is a pullout hand spray that offers an aerated or shower stream with the slide of a discreet switch. The fixture is constructed of stainless steel, approximately 60% of which is recycled content. Available in brushed or polished finish, with a limited edition that is split between brushed and polished finishes. mgstaps.com CIRCLE 260

"Fleurco's ADaptek Shower Base is an attractive accessible-design solution with an elegant drain that clearly shows its ease of maintainability."
Casimir Zdanius

MicroTouch

ThermaSol has integrated capacitive-touch technology into its MicroTouch control for steam showers. Installed inside a steam shower itself, the module powers on or off, controls temperature, utilizes infrared temperature sensing, and recalls the last-used setting. The CNC aircraft-grade aluminum unit is inset with a high-gloss black face, and offered in five framing styles ranging from modern to traditional and transitional. thermasol.com CIRCLE 261



Vola T39EL Electric Towel Warmer

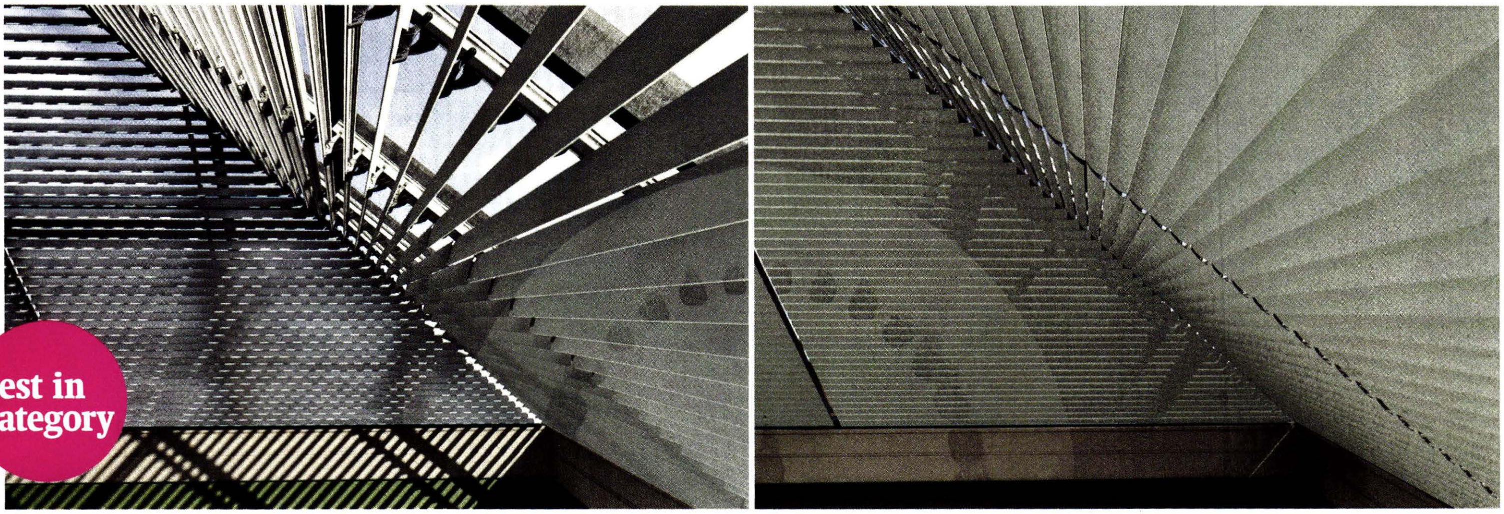
Like all other Vola fixtures, the T39EL Electric Towel Warmer is minimalist and sculptural in design. It consists of three to 20 bars measuring 20¾" wide that can be spaced 4" to 12" apart on the wall. It regulates the temperature from 68°F to 120°F, uses approximately 10W per bar, and has a timer that automatically shuts off the warmer after 2 hours. The system is available in the U.S. through Hastings Tile & Bath. hastingstilebath.com CIRCLE 263

Attika

The antithesis of the discreet undermount sink, Blanco's Attika makes a bold design statement with its elevated, geometric rim, while also helping to reduce splashing onto adjacent work surfaces. Constructed of 18-gauge stainless steel, the deep rectangular basin has softly rounded corners and comes in two sizes: 20½" x 18½" x 8¼" and 26¾" x 17¾" x 10". blancoamerica.com CIRCLE 262

Furnishings

Furniture & Accessories | Textiles | Window Treatments



Best in Category

FlexLouver Rack Arm System

Draper's solution for unique glazing situations—from various window shapes to angled or horizontal glazing and skylights—the FlexLouver Rack Arm System is a non-retractable louver fixture that is custom designed to fit each opening. Powder-coated aluminum slats are manually controlled or motorized for precise solar and glare control, and are available in three widths: 2", 3", and 3½". draperinc.com
CIRCLE 266

Editors' Choice

SOTO II Worktools

The small things can still make a big impact, as demonstrated by Steelcase's SOTO II, a follow-up to its previous SOTO work-tools collection. The line's accessories—designed to address real estate optimization in ever-shrinking office space—are compact multifunctional pieces such as laptop stands, USB hubs, stacking shelves, and monitor bridges with storage underneath. steelcase.com CIRCLE 267

Projectable Magnetic Glass Marker Board

Bendheim accommodates all of today's office collaboration needs with this single product: its exceptionally strong integrated magnets hold notes, fabric swatches, and chip samples; the laminated glass is projection-friendly for a variety of digital multimedia; and its surface is writable, while resisting ghosting and staining. bendheimarchitectural.com CIRCLE 273

Side by Side

This Davis Furniture modular lounge series comprises armed, left- or right-facing, corner, and straight armless units. The pieces can be arranged in side-by-side, back-to-back, and tête-a-tête configurations in rows or clusters. Also available are high-back versions that, for privacy, envelop those seated, as well as add-on, bridging, and freestanding tables. davisfurniture.com
CIRCLE 274

Renew Sit-to-Stand

As office workers continue to favor active over sedentary work styles, some have turned to standing desks. Herman Miller has responded to this movement with its Renew table, which is easily raised and lowered as needed via a user-friendly paddle switch. And it keeps the space underneath clear, thanks to integrated cord management. hermanmiller.com CIRCLE 268

"Draper's FlexLouver is an elegant way to control sunlight without distracting from the perimeter window design. Its customized panel removes restraints of sizes of clearances."
Ginger Gilden

Alphacoustic, Betacoustic, Gammacoustic

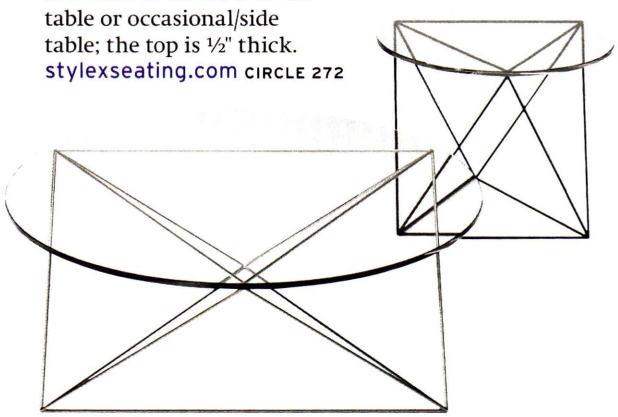
Produced by Carnegie's partner mill, Creation Baumann, Alpha-, Beta-, and Gammacoustic offer acoustical properties in a lightweight fabric. A specially engineered, sound-absorbing clear foil yarn is woven into the Trevira CS polyester textiles, enabling them to reduce noise by up to 65% when installed as drapery or space-dividing curtains. The three styles vary slightly in weave construction and come in a range of colorways. carnegiefabrics.com CIRCLE 269

Bora Lounger

Blue Leaf Hospitality combines sleek, minimalist styling with the warmth of wood in the Bora Lounger. The chaise can be specified with vertical or horizontal recycled-teak slats, while its aluminum frame comes in three powder-coat colors. blueleafmiami.com CIRCLE 270

Dia

Stylex's first table design draws on classic geometry in both its simple and clean round glass tabletop and its playful multiple-triangle base. The latter is formed with metal-wire rods that can be chrome-plated or powder-coated in a choice of 11 colors. The tables are available as either a coffee table or occasional/side table; the top is ½" thick. stylexseating.com CIRCLE 272



Palisade Collection

Following research that suggests that the presence of family significantly improves a patient's experience, Nemschoff created the Palisade line of guest-accommodating furniture for health-care facilities. The suite comprises generous lounge seating with integrated laptop table, lighting, and storage. nemschoff.com CIRCLE 271

HVAC

Heating | Ventilation | Cooling

Editors' Choice

Polished Aluminum Haiku 84

Big Ass Fans launched a polished-aluminum version of its popular Haiku series. The modern design consists of three aircraft-grade aluminum blades and a motor that utilizes rare-earth magnets to triple its torque output while remaining highly efficient, drawing only 63.8W of power at the maximum speed setting. The unit measures 84" in diameter.
bigassfans.com
CIRCLE 275

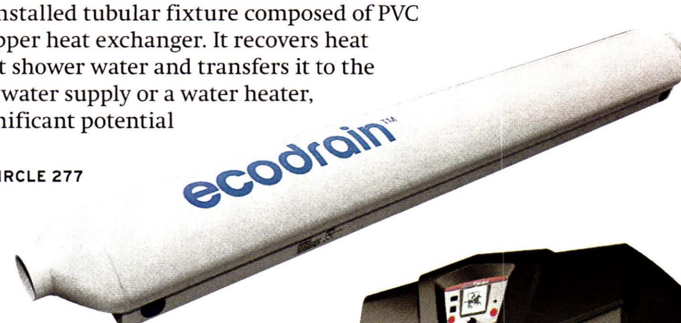
"It's refreshing to see a product such as ATAS's InSpire, which uses common sense to passively heat a building. It's also aesthetically pleasing, giving subtle texture to commercial and industrial buildings."
Erik Kath

H2i R2-Series

Mitsubishi Electric's H2i R2-Series heats and cools using an inverter-driven compressor that adjusts the speed of the refrigerant flow to eliminate energy loss from frequent stopping and starting. It operates at high heating capacities in outdoor ambient temperatures as low as -13°F.
mitsubishipro.com
CIRCLE 276

EcoDrain A1000

Developed for residential applications, EcoDrain's A1000 is a horizontally installed tubular fixture composed of PVC casing and a copper heat exchanger. It recovers heat energy from hot shower water and transfers it to the incoming fresh water supply or a water heater, resulting in significant potential energy savings.
ecodrain.com CIRCLE 277



Best in Category

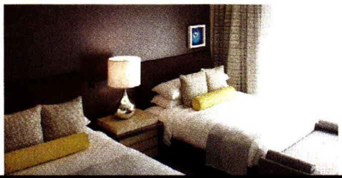
InSpire

ATAS's InSpire perforated aluminum panels provide a building with solar heat or screening. The panels are mounted onto a frame inches from the building's walls, and, as sunlight heats them, a thin layer of warm fresh air forms on the panel surface. The air is then drawn through the perforations by intake fans to distribute inside the building via conventional HVAC systems and ducts. In the summer, the panels provide screening, as the warm air is vented at the top by natural convection. atas.com CIRCLE 279

FTXL Fire Tube Boiler

Lochinvar's FTXL is AHRI-certified as having a thermal efficiency of 98%. It can operate over a wide range of flow rates and with gas-supply pressure as low as 4" of water column. Its Smart System enables it to be monitored and managed remotely when used with the Con-X-Us mobile app.
lochinvar.com CIRCLE 278

SUCCESS STORY:
THE HOTEL WILSHIRE, LOS ANGELES



In 2011, in the heart of Los Angeles' Miracle Mile, something truly amazing was born. Amidst the densely populated streets of Hollywood and Beverly Hills stood a relic. An old 1950s medical building destined to be turned into a pile of rubble. What happened next was nothing short of magical.

When real estate developers Michael Orwitz, Spence Mitchum and Justin Khorvash went looking for a location to create their Four Diamond boutique hotel, The Hotel Wilshire, even they couldn't have imagined the hidden gem they would find in this dilapidated six-story medical building. But, after assembling some of the best professionals in the hospitality business, it was clear that their endeavor was about to become a reality.

After finding a design team that shared their views on the importance of sustainability, they set their sights on making The Hotel Wilshire LEED Silver Certified. Which meant air quality, as well as occupant comfort, would be important factors.

Enter Mitsubishi Electric's VRF zoning systems. Mitchum had experience using the VRF zoning system with a previous boutique hotel. He knew the system's flexibility, performance and efficiency would play an important role in obtaining LEED certification for this 74-room boutique hotel.

The Mitsubishi Electric VRF zoning system proved to be a perfect fit. Twelve months after its opening, The Hotel Wilshire boasted a LEED Silver certification, 17 percent less energy use, and one of the best views in L.A. from its chic rooftop pool. Just the type of epic performance you'd expect from a star in the hospitality industry.

PROJECT SUMMARY

Dilapidated six-story building remodel:
- 55 Guest Rooms
- 19 Suites
- 1 Rooftop Penthouse Suite
- 1 Rooftop Pool Deck w/ 500 Sq Ft Patio

Equipment Installed:
- 4 PLFY Ceiling-recessed Indoor Units
- 47 PMFY Ceiling-recessed Cassette Indoor Units
- 39 PEFY Ceiling-concealed Indoor Units
- 7 PURY R2-Series Outdoor Units
- 7 Branch Circuit (BC) Controllers
- 90 PAC Simple MA Remote Controllers
- 2 AG-150A Centralized Controllers

Results:
- LEED Silver Certification. 17 percent less energy consumption. 19 percent cost savings. Four Diamond Ranking by AAA.

Get more details about The Hotel Wilshire and see how Mitsubishi Electric solved other HVAC design challenges at **MitsubishiPro.com.**

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CIRCLE 64

MITSUBISHI ELECTRIC
COOLING & HEATING

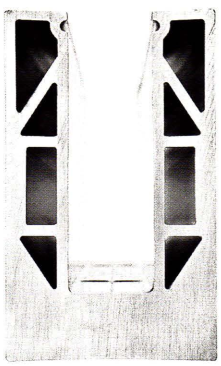
Outdoor & Recreational

Gates | Railings | Shelters | Site Furnishings

"Landscape Forms' Strata furnishings are equal parts sleek and solid. The subtly faceted sculpting of the Meldstone gives a geological feel to the seat and nicely contrasts with the thin steel support plates of the benches."
Gustavo Rodriguez

8B Series Square Base Shoe

This C.R. Laurence square base shoe is engineered for outdoor guardrail and windscreen applications using CRL's Taper-Loc glass railing system. Surface or fascia mountable, it is composed of recycled aluminum, and can easily be cut to desired length.
crlaurence.com
CIRCLE 280

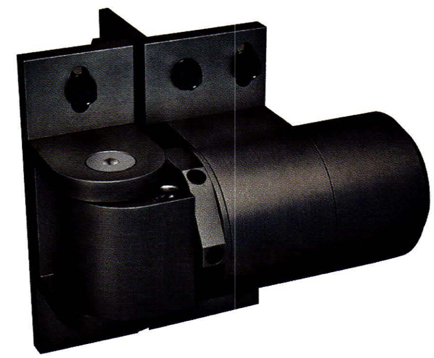


Strata

Developed in collaboration with designer Jess Sorel, Landscape Forms' Strata is a series of mounted or freestanding site furnishings that highlight the manufacturer's proprietary MeldStone concrete. It includes an asymmetric six-sided table, a straight-backed or backless bench with angled metal supports, and a backless asymmetric bench.
landscapeforms.com
CIRCLE 281

Sureclose ReadyFit

This hydraulic gate closer by D&D Technologies combines the closer and hinge in one package. Its self-closing speed and force, as well as final snap-close action, can be adjusted to suit different safety requirements. Tested to 500,000 cycles, it self-closes gates that weigh up to 260 pounds. ddtechglobal.com CIRCLE 282

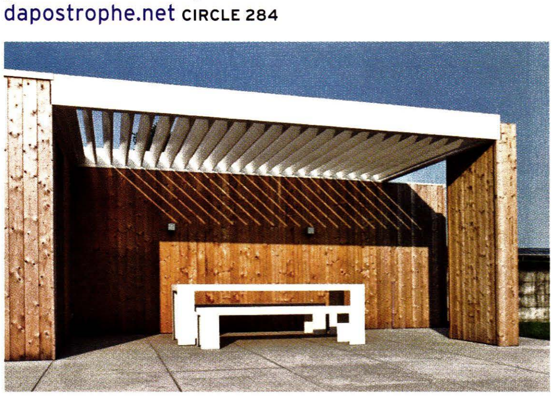


MultipliCITY

Yves Béhar and his firm, fuseproject, created this line, from Landscape Forms, that has universal appeal. It comprises a bicycle rack, benches, solar-powered path lights, and receptacles that share mass-produced structural elements, while some components are locally sourced and produced to evoke regional flavor and reduce carbon emissions.
landscapeforms.com CIRCLE 283

Algarve

Renson's Algarve is a roof system with extruded-aluminum blades that rotate up to 150° to control the amount of sunlight or ventilation; in closed position, they can shut out rain, funneling the water out via a gutter system. It is offered as a freestanding shelter with four corner posts, or integrated into existing structures.
dapostrophe.net CIRCLE 284



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Sculpting the Skyline
FROM ARCHITECTURAL RECORD
By Joann Gonchar, AIA
The article explores the architectural concepts and structural strategies behind Kuwait City's tallest building and discusses the construction methods used to build it.
LEARNING OBJECTIVES
1 Explain how evaluation of programmatic requirements and environmental conditions helped designers generate the form of Kuwait City's Al Hamra Firdous Tower.
2 Describe the key structural elements of the tower and its foundations.
3 Explain the structural and construction challenges presented by the tower's geometry.
4 Describe how construction methods were adapted for the harsh desert environment.
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Controlling Daylight in Buildings

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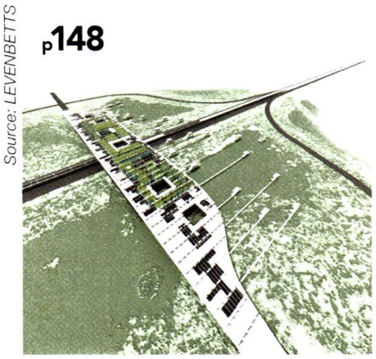

A Placemaking Approach to Design

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Best Practices for Site Preparation and Installation of In-Grade Fixtures

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EM PM SI CREDIT: 1 LU

Architect: Michael Green Architects; photo courtesy of naturally:wood

Tall Wood Takes a Stand

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reThink Wood

LS PM ST SU CREDIT: 1 HSW

An Ecological Basis for Selecting Ceramic Tile

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Tile of Spain

IN PM SU CREDIT: 1 HSW, 1 GBCI CE HOUR

Structural Steel Cast Connections

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LS PM ST CREDIT: 1 HSW

CATEGORIES

BE	BUILDING ENVELOPE DESIGN
EM	ELECTRICAL AND MECHANICAL
IN	INTERIORS
LS	LIFE SAFETY AND CODES
PMD	PRACTICE, MANAGEMENT, DIGITAL TECHNOLOGY
PM	PRODUCTS AND MATERIALS
RE	RESIDENTIAL
SI	SITE INFRASTRUCTURE DESIGN
ST	STRUCTURAL
SU	SUSTAINABILITY

Images courtesy of SAGE Electrochromics, Inc.

Natural daylight can be incorporated successfully in a variety of building types to provide benefits for people and to reduce energy use in buildings.

Controlling Daylight in Buildings

Electrochromic glazing offers a truly dynamic and affordable solution

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

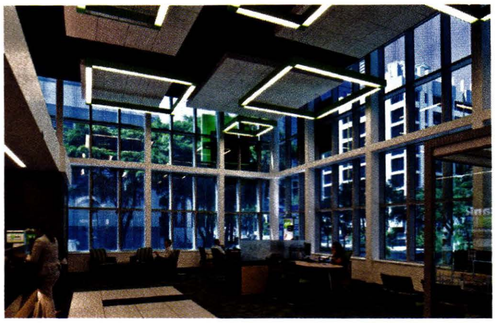
Le Corbusier is attributed with saying "Architecture is the masterly, correct, and magnificent play of masses brought together in light." It would appear this viewpoint on the relationship of architecture with light continues to influence us today. In 2012, an independent media survey of nearly 500 architects showed overwhelming agreement that providing and controlling natural light is an important design concern. When drilling down as to why, the reasons go beyond just the aesthetic into the way people interact with spaces. More than 99 percent of the architects surveyed believe people perform their jobs or activities better in buildings when exposed to natural light. Additionally, almost 98 percent of these architects felt occupants perform better when they have a view and connection to the outdoors.

However, uncontrolled, abundant sunlight can adversely affect building occupants as much as it benefits them, with problems such as glare, heat gain, and fading. Hence more than 93 percent of architects surveyed also agree that sun control is a significant challenge when designing glass into buildings. Finding the balance between the benefits of natural daylight while controlling for the problematic issues is a design challenge on every project. Understanding the principles of lighting and control while finding the right tools to address them allows for "masterly, correct, and magnificent" results to be realized.

DAYLIGHTING OVERVIEW

In addition to the human benefits of natural light, the ongoing need to reduce energy use in buildings has encouraged increased use of daylighting. By incorporating natural daylight into buildings, the intent is to turn off some, if not all, of the electric lights in a daylit space. This creates a direct reduction in the electricity purchased for lighting but also creates a ripple effect of indirect benefits. Electric lights generate heat which in turn raises the temperature of the spaces where they are installed. If that space is being air conditioned then more energy is being used for air conditioning when the electric lights are on but less when they are able to be turned off. This affects the direct amount of electricity purchased (i.e. kilowatt hours) and the direct cost of that electricity paid for by the owner or occupant. In addition, it can reduce the other part of most commercial electric utility bills, namely the peak demand charge. Utilities base this charge on the highest average spike or peak of total consumption that a customer uses over a prior billing period (i.e. a year or so). In many buildings, that peak is reached when the building is fully occupied, all the lights are on, and it is a hot day, meaning that the air conditioning is running at full capacity. Using some appropriate design strategies, daylighting can be used to turn off the lights, reduce heat build-up, allow the air conditioning to run at a lower level, and ultimately reduce peak demand.

The ability of daylight to produce all of these



LEFT: The shape or form of a building can be used to optimize the exposure of interior spaces to use beneficial daylight.
MIDDLE: Side daylighting is a legitimate strategy for bringing natural light into perimeter zones of a building.
RIGHT: Top daylighting is an effective method to bring abundant natural light into interior building spaces.

positive outcomes first requires attention to the design of the building. The not-for-profit organization known as Architecture 2030, led by architect Ed Mazria, has developed a tool to help architects understand many different aspects of building design that affect its energy performance, including daylighting. The tool is known as the 2030 Palette and is available online at no cost (www.2030palette.org). It is a succinct and useful design resource that offers information broken down by individual topics (referred to as "swatches") ranging from regional scale down to building scale. Each topic contains a summary of the concepts, some rules of thumb for initial design, photos of example projects, a list of publications for additional information, and links to related topics. Some of this information related to daylighting is summarized in this course.

Building Form for Daylighting

The basic shape of a building will impact its ability to use daylighting effectively. Hence, when developing a building shape, consider how best to admit daylight into the building. Building shapes with a narrow floor plate will maximize exterior wall areas to incorporate glazing. These shapes can be elongated, curved, or combinations of multiple shapes. Deep buildings with large floor plates can use atria and courtyards in order to bring daylight into the inner realms of the building. Low-rise and one-story structures have more opportunities for daylighting by using the roof as a daylighting source, thus allowing more shape options.

Some rules of thumb for creating a building form to maximize daylighting include:

- Develop the building shape and floor plates by locating occupied spaces using the 15 / 30 foot rule for typical story heights: Create a 15-foot perimeter zone depth for task daylighting and an adjacent 15-foot zone for ambient daylighting.
- Make the north and south sides of the building longer and more exposed for controlled daylighting by elongating the form in the east-west direction.
- Use high ceilings and windows to allow for greater penetration of daylight into the interior. Sloping the ceiling from the high window side down to the interior may help with penetration and distribution as well.

Side Daylighting

The building shape and size will determine whether side daylighting can be achieved on just one side or on multiple sides. Daylighting spaces from multiple sides provides more even lighting while producing less glare. This can be achieved by providing glazing on adjacent or opposite walls or by providing a combination of side daylighting and top daylighting strategies. Spaces daylit from only one side will need to be assessed to avoid a steep light gradient between the daylit side of a room or space and the unlit side. Spaces improperly daylit from one side may contain excessive differences in brightness, intense contrasts, and uncomfortable glare conditions.

Some basic rules of thumb for successful side daylighting include:

- Acceptable interior task-daylight levels can be achieved at a depth of 1.5 to 2 times the height of a glazed opening in an exterior wall.
- A light shelf added to a glazed opening will reflect daylight deeper into a space, and can increase the daylighting depth to 2.5 times the height of the glazed opening.
- Size the glazing area as a percentage of the floor area of the space to be daylit. For minimum or ambient lighting, use a glazed area that is equal to 10 to 15 percent of the floor area. For more adequate or task lighting, size the glazing to be 15 to 25 percent of the floor area (or 25 to 40 percent of the exterior wall area).
- Make the side walls, back wall, and ceiling a light color to evenly distribute daylight and prevent glare.

Top Daylighting

Allowing daylight to enter a space from above rather than the side of a building is extremely effective. The Romans understood this by incorporating an oculus into roof domes, such as the Pantheon, which adequately illuminated the entire space below. Modern warehouses and big box retail stores use small skylights spread across the roof to effectively illuminate large spaces. All of this works because top daylighting gives access to the entire skydome with brighter and more direct daylighting across the day. It also allows better distribution of light inside the space just as an electric light is more effective on the ceiling compared to being on the wall. Top daylighting creates a more consistent distribution of daylight, sometimes allows for easier glare control, and for penetrating deeper into the interior of a building.

The general rule of thumb for top daylighting is to make the daylighting glazing area a minimum of 10 percent to 20 percent of the floor area to be daylit. Too little area can create

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Learning Objectives
After reading this article, you should be able to:

1. Identify and recognize the common options to design daylighting into a building design.
2. Investigate the factors that increase or decrease energy use by using glazing in buildings for daylighting and other purposes.
3. Assess the technology and operation of electrochromic glazing as used in buildings.
4. Describe the different methods of solar and daylight control that are possible through the use of electrochromic glazing.

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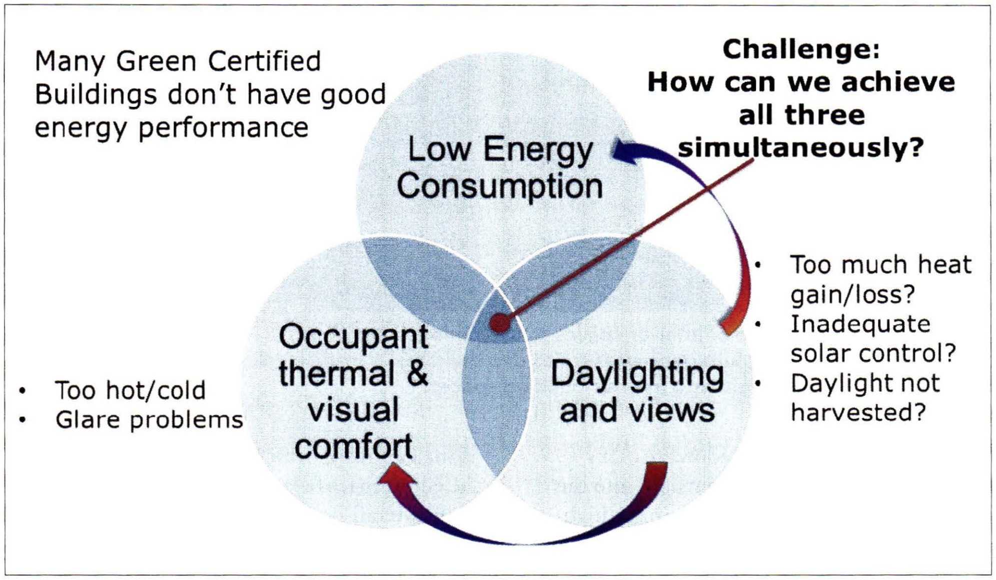


A pictorial representation of the challenge of green building design: how to optimize both energy efficiency and daylighting and views without compromising occupant comfort.

excessive contrast and glare while too much area can overwhelm the space with light. Either way, filtering and distributing the light is beneficial, particularly in critical task areas to avoid direct rays of sunlight from interfering with day-to-day activities.

DAYLIGHTING BALANCE

Whether side daylighting, top daylighting, or a combination is used in a particular building project, the design challenge of balance and control is critical to a successful outcome. Daylighting has direct impacts on things beyond the provision of natural light and views. If the light is too intense or creates too much of a contrast within a space, then it will be regarded as uncomfortable glare that is not welcome by the occupants. The constant exposure of materials and finishes to sunlight can also cause colors to fade and materials to break down. But perhaps the biggest balance issue is the fact that the solar light entering the space also brings solar heat with it, all year long. That solar heat may be welcome in cool weather, contributing to greater occupant comfort while using less purchased energy for a mechanical heating system. However, during warm weather or in buildings that tend to require more cooling than heating, increased daylighting can bring an unintended penalty of too much solar heating, thus making people less comfortable, causing more air conditioning to run, and consume more energy—all the opposite of our original design intentions.

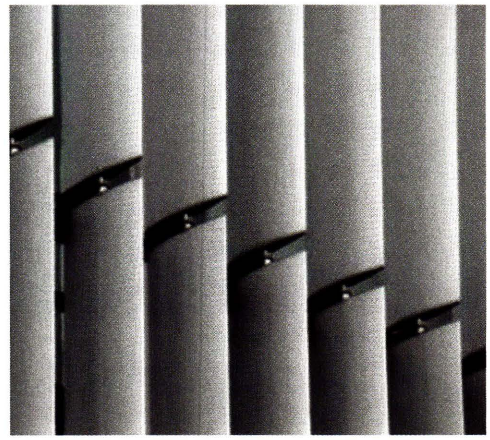
The key to good daylighting design in buildings, then, is to find ways to maximize the positive benefits of daylight and solar gain while minimizing the negative possibilities of glare, fading, and energy penalties. Conventional design approaches to find that balance have included some very specific strategies.

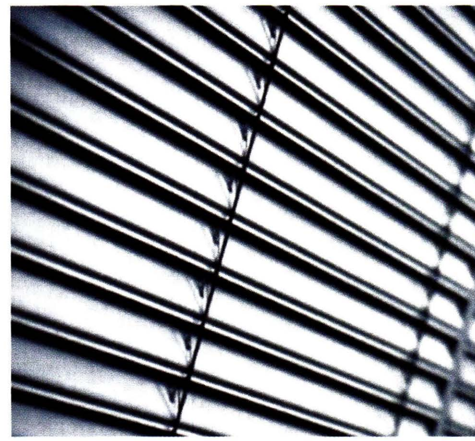
Side Daylighting Control

Direct sunlight coming through a window onto critical task areas (e.g., work areas, desks, TV monitors, computer screens, reading areas, etc.), and the presence of high brightness in the field of view, cause a high degree of unwanted contrast between surfaces or uncomfortable glare. Conversely, shielding the direct line of sight to the sun reduces the contrast between surfaces and prevents glare. In order to block the direct line of sight to the sun the following strategies are common:

- For glazing on the east and west sides of a building, horizontal or vertical louvers can be applied to the building either on the internal or external side of the wall. External louvers are usually fixed in place and fabricated out of aluminum or other durable materials. Internal louvers may include single or multiple light shelves, adjustable blinds, or similar products. Any of these can reflect light into the space and cause it to disperse, however they will likely interfere with the view out of the windows.
- For solar glazing that is facing the equator (for maximum solar heat benefit), horizontal light shelves or horizontal louvers installed either on the internal or external side of the wall work better than vertical ones. An exterior louvered overhang above solar glazing allows more daylight into a space while also blocking unwanted summer sun.
- For other general glazing facing the poles, vertical louvers will work well to disperse the sunlight for most of the day.

For most side daylighting situations, these are the most common strategies even though they add cost to a daylighting project. It is important, of course, to remember that the goal is to disperse and distribute sunlight so louvers and light shelves need to be a light or reflective color in order to do so. Adjustable blinds and louvers allow great flexibility provided they are actually used properly on a day-to-day basis, either manually or automatically. They also need to be cleaned and maintained to reflect and operate properly.





Conventional means of controlling daylight include vertical and horizontal louvers or baffles placed to re-direct and diffuse direct sunlight.

Top Daylighting Control

As with side daylighting, direct sunlight from clerestories, skylights, or roof monitors can create uncomfortable conditions and excessive brightness in critical task areas. Adding reflective architectural elements that act as direct sunlight diffusers will reduce glare and create softer, more uniform daylighting levels. Some common strategies to do this include:

- Incorporate horizontal, vertical, or angled light-diffusing baffles, light shelves, or banners to intercept, soften, and distribute direct sunlight.
- Reflect sunlight onto high portions of an interior wall to eliminate bright patches in the field of view.

- Use diffuse glazing or reflect direct sunlight off the sidewalls of skylights or clerestories.
- Shade clerestory and skylight glazing from direct sunlight in summer to reduce solar heat gain.

High-Performance Glass

There have been a series of advancements in glazing technology in recent years that allow for the selection of glass that has different thermal and light transmittance properties. The key to controlling and balancing the light and heat coming through glazing is found in the characteristics of that glazing. There are two commonly used measures that have been developed and used widely in the glazing industry.

- Visible light transmission (VLT): All glazing reflects or absorbs some light and allows the rest to pass through it. The VLT is simply the percentage of the visible light spectrum transmitted through glazing and perceived by the human eye. Very clear glass could have a VLT of 90 percent or better while dark, heavily tinted glass could have a VLT of 20 percent or less. Standard low emissivity glass (low-e) typically has visible light transmission of about 40 to 60.
- Solar heat gain coefficient (SHGC): All glazing similarly reflects or absorbs some heat and allows for the rest to impact the building as heat gain. The SHGC is simply the fraction of total solar radiation admitted through glazing. It is expressed as a decimal number between 0.0 and 1.0 such that the lower the SHGC, the less solar heat gain allowed by the glazing.

Commonly, the higher the percentage of VLT in glazing, the higher the value of SHGC, or simply put, more light usually means more heat. Conversely, lower VLT reduces solar heat gain, but it also restricts natural daylighting. Hence, building designers need to assess the building conditions to determine the most appropriate values for each of these two characteristics. The challenge is that once the particular glass is selected and installed, it is a fixed or "static" solution. Static solutions are permanently clear or tinted or reflective regardless of changing seasons or sunlight conditions. This static trait means that interior or exterior controls, as described previously, will still be desired in many cases to account for changing light conditions during a day or season. It also means that any given window will likely be designed for an average condition or a worst-case condition and thus not be able to effectively address the full range of variable conditions in the building associated with heat gain, glare, and damage to materials.

At Chabot College in Hayward, California, designers wanted to incorporate as much glass as possible to flood the interior with daylight and keep a connection to the outdoors. Electrochromic glass was used (clear on left and tinted on right) instead of mechanical shades or blinds in order to retain the view and keep the openness of the space.

DYNAMIC GLAZING TECHNOLOGY BREAKTHROUGHS

Given the need to keep the benefits of glazing and overcome the limitations of conventional control strategies, a number of emerging technologies have been applied to glazing that provide "dynamic" rather than "static" control options. Simply defined, dynamic glass can respond to changing light conditions by clearing or darkening as light levels change. Some examples include photochromic or thermochromic glass that respond to UV light or heat and automatically tint the glass accordingly. This type of dynamic glazing requires no electricity and has been used most commonly in products like eyeglasses causing them to darken in bright light and clear in less light. A different type of dynamic glass is privacy glass. Specifically designed for interior applications, privacy glass generally requires 110 volts of AC electricity and is a laminated glass with organic compounds placed between the layers making them either a Suspended Particle Device (SPD) or a Liquid Crystal Device (LCD). In either case the glass is made clear when the electricity is turned on and reverts to its natural opaque state when the power is turned off.

Electrochromic Glazing

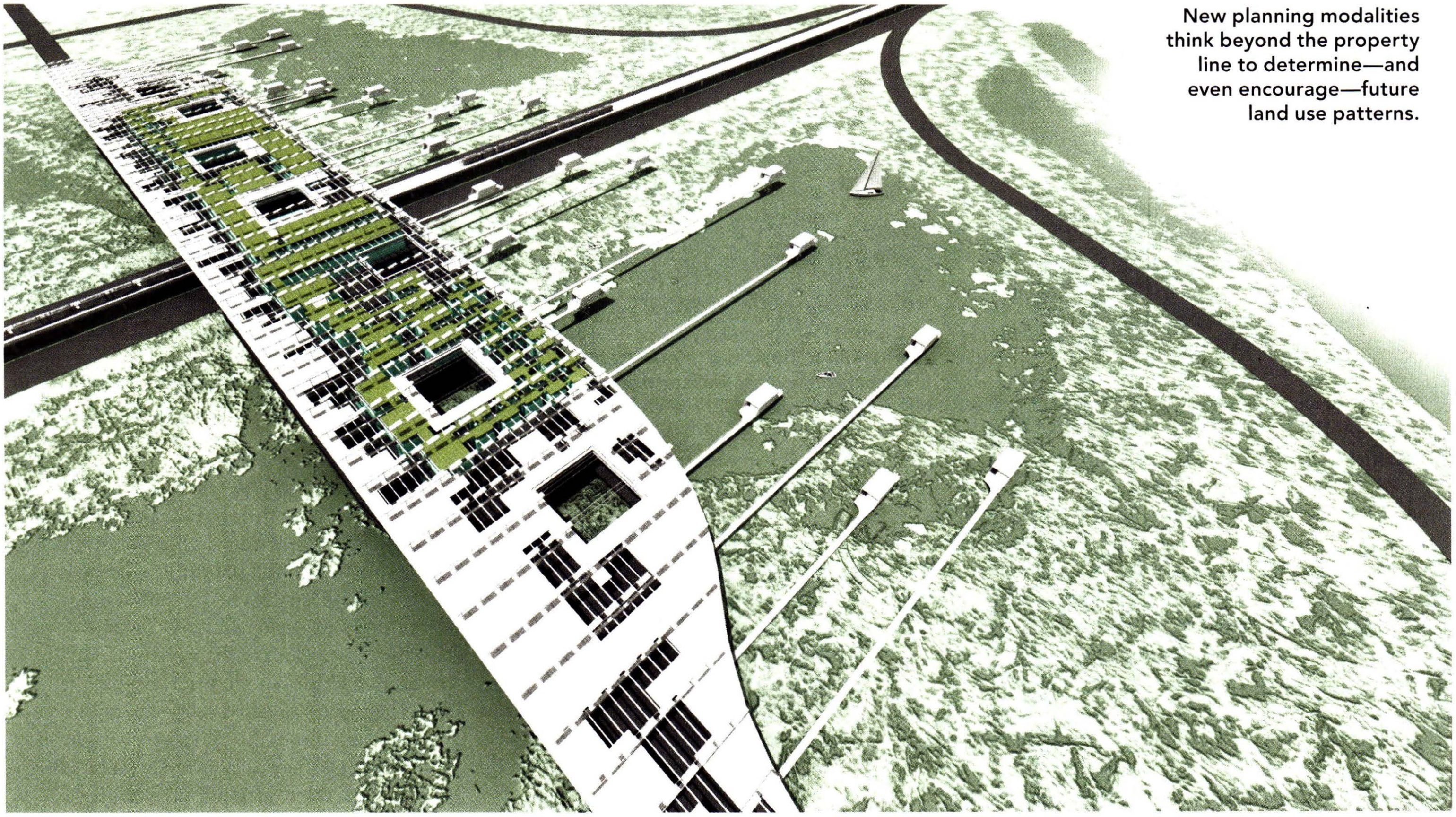
One type of dynamic glazing technology specifically designed for building envelope applications is referred to as electrochromic (EC) glazing. This technology uses a series of thin, non-organic films deposited onto the surface of glass that can be electrically charged to reduce both light and heat transmission through the glass. Unlike SPD or LCD glazing, however, the amount of electricity used is dramatically less, typically at less than 4 volts DC and less than 10 milliamps. Further, the electric charge is only needed to tint the glass, since the natural state of EC glazing is clear. Through variable tint control settings, electrochromic glazing preserves the human benefits of abundant sunlight, views, and connection to the outdoors but without the associated issues and environmental penalties. This makes it one of the most promising forms of dynamic glazing available today for building applications. Electrochromic glass has been installed in hundreds of installations and is gaining significantly more interest from architects and designers due to its highly controllable, "dynamic" nature.

EC glazing is made from panes of conventional float glass that are sputter coated with ceramic layers of metal oxides. The specific processes are proprietary to the manufacturers, but are similar to the way low-e glass is produced. In most cases, nanotechnology is used to control layers to a very fine degree. The total thickness of all the layers of an electrochromic coating is commonly less than 1/50th of the thickness of a human hair. When a small electric charge is electronically applied across the coatings, ions travel between layers, where a reversible solid state change takes place, causing the coating to tint and absorb light. Reversing the polarity of the applied voltage causes the ions to migrate back to their original layer, and the glass returns to its clear state.

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*

Source: LEVENBETTS



New planning modalities think beyond the property line to determine—and even encourage—future land use patterns.

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Learning Objectives
After reading this article, you should be able to:

1. Describe the concept of comprehensive land use planning and how it can enhance the long-term value of a site.
2. Recognize and support new and innovative approaches to site design and master planning that promote the health and welfare of area residents.
3. Analyze how a proper understanding and management of land with urban density can allow for parks, green space, and the creation of public spaces.
4. Discuss the adaptive reuse project of a contaminated industrial brown field claimed by the local community for public use and how the site has kept its industrial heritage by reusing materials and infrastructure.

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A Placemaking Approach to Design

Architects think beyond a project's property line and timeline

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The days of designing for a discrete project are numbered. While creating socially sustainable environments that improve the health and well-being of community members is now a given, today's most forward-thinking architects are finding it their mission to go beyond their project in terms of both space and time—to consider, and even encourage, land use patterns in the surrounding area, and to anticipate, and even influence, future events and unexpected consequences. Best practice has become to design not only for the footprint of the project and its surrounding area, but also for the timeline of the property and the people who will use it in years to come. This article will examine the practices of land use planning, placemaking, and intelligent urbanism as they contribute to these goals by creating benefits at the individual and the community level. Also highlighted will be effective planning in action—three case studies that have embraced these practices.

EFFECTIVE PLANNING STRATEGIES

The fact that cities are compact, walkable, social places designed for people used to be a given. But over time, cities became more oriented to the demands of cars and commerce. As early as the 1960s, however, planners reacted. Thought leaders like Jane Jacobs and William H. Whyte advocated for cities that catered not just to cars and shopping centers but also to people. Lively neighborhoods and inviting public spaces held the key to successful cities, they maintained, with Jacobs cautioning that citizens should be watchful of what goes on in the streets and Whyte emphasizing the need for people-centered urban communities.

These models, as it turns out, have proven to be more humanistic, as well as healthier. In a recent study of the effects of street network design on public health, researchers at the University of Colorado Denver and the University of Connecticut[1] found, not surprisingly, that older, more compact cities promote more walking and biking and are generally healthier than many newer communities. The study, co-authored by Norman Garrick, PhD, associate professor of engineering at the University of Connecticut, focused on 24 medium-sized California cities with populations ranging between 30,000 and just over 100,000, and examined them in terms of street network density, connectivity, and configuration. Researchers then investigated the correlations between street design and the local rates of obesity, diabetes, high blood pressure, heart disease, and asthma. The results showed that "increased intersection density was significantly linked to a reduction in obesity at the neighborhood level and in obesity, diabetes, high blood pressure, and heart disease at the city level."[2]

Today's planners have responded to these influences with mindful approaches to creating developments that support communities on a number of levels. Many contemporary and emerging modalities, from smart growth to new urbanism and transit-oriented development, are turning out the type of sustainable spatial arrangements that make communities walkable and promote the health, safety, and well-being of the populace. Comprehensive land use planning is a process to establish residents' community development goals, the result of which is a comprehensive plan that lays out land use policy over a wide geographical area and a long timeframe.

Placemaking, which is another way planners are more collectively and intentionally shaping the world, is finding its way into mainstream practice to better affect community health, social connectivity, economics, and sustainability. According to Project for Public Spaces, the movement encompasses the planning, design, management, and programming of public places and is strongly tied to community participation. Consequently, placemaking "facilitates creative patterns of activities and connections—cultural, economic, social, ecological—that define a place and support its ongoing evolution."[3]

Intelligent Urbanism—Ten Axioms

Intelligent urbanism, which, at its most basic level, recognizes that cities should be planned for future residents and accommodate the needs of future populations, is making an important contribution to planning philosophy and is worth exploring in more detail. The Principles of Intelligent Urbanism (PIU), a term coined by Professor Christopher Charles Benninger, are the key elements of the planning curriculum at the School of Planning, Ahmedabad, which Benninger founded in 1971. These principles were developed as an enhancement to traditional planning practices and are composed of ten axioms intended to guide the formulation of city plans and urban designs so as to reconcile and integrate diverse urban planning and management concerns.[4] These axioms are summarized as follows:

Source: LEVENBETTS

Balance with nature. In short, intelligent urbanism states that urbanization should be in balance with nature. This axiom emphasizes the distinction between utilizing resources and exploiting them, and promotes environmental assessments to identify fragile zones, threatened ecosystems, and habitats that can be enhanced through conservation, density control, land use planning, and open space design. The ideal development will operate within the balance of nature, with a goal of protecting and conserving those elements of the ecology that nurture the environment.

Balance with tradition. This axiom calls for integrating planning and design considerations with existing cultural assets and respecting traditional practices and precedents of style. Respect for the cultural heritage of a place is important, as is traditional wisdom in the layout of human settlement and the symbols and signs that transfer meanings through decoration and motifs. Attention should be oriented toward historic monuments and heritage structures, and there should be respect for maintaining existing views and vistas.

Appropriate technology. Consistent with "small is beautiful" and the move to locally sourced resources, this principle advocates the use of construction materials and techniques, as well as infrastructure and project management systems that are compatible within their local contexts. For example, labor-intensive methods are appropriate where there are abundant craftspeople or where local economies suffer from high employment. Capital-intensive methods are more suitable in places with a surplus of funds or where the rapid deployment of new infrastructure provides enhanced opportunities to the local population.

Conviviality. The fourth principle espouses social contact through public domains, maintaining that vibrant societies have interactive, socially engaging spaces that offer numerous opportunities for gathering and meeting. Design can realize this goal. Society operates within hierarchies of social relations, which are space-specific. For example, places of solitude can be found in urban forests, hillsides, streams, gardens, or parks that are conducive to meditation and contemplation. Solitary activities in natural settings quiet the mind and help it to sort out the complexities of modern life and attain balance. These types of spaces, which can be defined by ceremonial gates and directional walls, create a place for the individual to mature through self-analysis and self-realization. Equally important are places for other types of interaction, notably those designed for friendship, households, neighborhoods, community, and city life. The axiom of "Conviviality" corresponds most directly with the contemporary planning concept of "Third Place," as envisioned by Ray Oldenburg in his book *The Great Good Place*. Third Place embodies areas of social interaction outside the two primary areas of home and work.

Efficiency. Efficiency and cost-effectiveness are critical, as evidenced by a balance between the consumption of resources such as energy, time, and fiscal resources, and the optimum sharing of public land, roads, facilities, services, and infrastructural networks in order to reduce per household costs, while increasing affordability, productivity, access, and civic viability. Good city planning promotes alternative modes of affordable public transport, as well as medium- to high-density residential development keyed to social amenities, convenience shopping, recreation, and public services in compact, walkable, mixed-use settlements.

Source: Diego Bermudez

Intelligent urbanism advocates planning for future residents and accommodates the needs of future populations.

Human scale. Intelligent urbanism favors the pedestrian over the automobile. Ground-level, pedestrian-focused urban patterns are preferred, and urban villages are encouraged rather than a series of single-function blocks connected by highways.

Intelligent urbanism shares values with transit-oriented development; however, its goal is not restricted to replacing the automobile but to enrich the human condition and to enhance the realm of human possibilities. To that end, intelligent urbanism seeks to advance urban planning as the promotion of people-friendly places, pedestrian walkways, and public domains where people can meet freely in face-to-face contact, particularly in high-density situations with socially and economically diverse groups. Human scale can be a function of building masses that give way to open spaces, possibly using arcades and pavilions as buffers, sensitively mixing buildings with open spaces and employing natural materials.

Opportunity matrix. The city is viewed as an opportunity system that seeks to promote increased access to shared benefits within the urban system and with guaranteed access to education, health care, police protection, and justice before the law, potable water, and a range of basic services. Viewing the city as an opportunity system distinguishes intelligent urbanism from other urban philosophies. If urbanites face a variety of problems, there must be plentiful opportunities for resolution—with numerous channels to resolve problem areas. For example, when housing is a problem, opportunities for shelter could come through lodges, rented rooms, studio apartments, bedroom apartments, and houses, or through ownership, various tenancy arrangements, self-help, or incremental housing. A wide range of solutions should be possible wherever there is any problem. Another aspect of this principle is that the city is viewed in terms of processes. For example, rather than a blight on society, an economically depressed area is viewed as an opportunity for entry into the city by providing affordable shelter for new immigrant households, or as a springboard for self-development, or as a place that can be upgraded with basic services. Destruction of such settlements would create barriers to poor families, who may otherwise prosper and thus be able to make important contributions to the city.

Regional integration. Intelligent urbanism envisions the city as "an organic part of a larger environmental, socioeconomic, and cultural-geographic system, essential for its sustainability." The region is the zone of influence, and it is inextricably linked with the city as the urban population migrates outward in response to opportunities in employment, shopping, entertainment, and other activities. The right planning at the regional level will benefit the city as it grows. Accordingly, intelligent urbanism plays a critical role in planning for the future and situations to come.

Balanced movement/complete streets. A well-functioning city should embrace complete streets, which are designed and operated to promote safety and access for all—pedestrians, bicyclists, motorists, and transit riders of all ages and abilities. A balance of transportation modes should include walkways, cycle paths, bus lanes, light rail corridors, underground metros, and automobile channels with, ideally, more capital-intensive transport moving in denser nodes, interchanging with low-technology options. Dense growth around mass transit corridors and major urban hubs is recommended, interspersed with smaller, though still dense, urban nodes. Besides providing access to services and facilities, modal split points can be social places that offer urban conviviality.

Institutional integrity. Intelligent urbanism recommends government that is transparent and held responsible. Facilitating the execution of honest objectives, intelligent urbanism attempts to streamline the proposal process by reducing mandated documentation and governmental barriers. The movement seeks to further the interests of the public—from upgrades of settlements with inadequate basic services to promoting innovative financing to a range of participants who can contribute to the city's development—and to limit the role of speculators in promoting large-scale urban development schemes for the benefit of limited interest groups.

THE BENEFITS OF VISIONARY THINKING

The integrity of these new planning modalities is all the more obvious when the principles and results are compared to a more limited or less thoughtful view of a project's scope. A limited approach would not take into account planning for the surrounding area or for future events or growth, nor would it embrace the flexibility to accommodate unexpected occurrences, such as changes in the economy, technology, fashion, and popular appeal.

On the other hand, a more inclusive approach would include considerations beyond the footprint of the property, as well as uses by people in years to come. A broader approach would also consider the life cycle of materials, including the flexibility of assembly and disassembly of materials associated with the site, so that the project can be easily adapted to future growth or changes.

Planning for New Orleans—Past and Future

Nowhere are the shortcomings of traditional planning more apparent than in New Orleans, where a combination of legal arrangements, unanticipated pressures, and resource mismanagement contributed to the perfect storm.

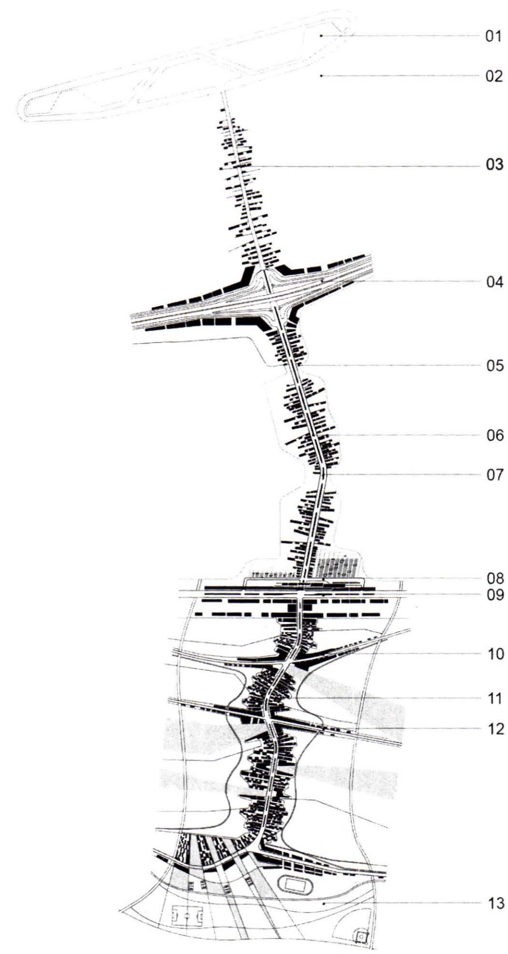
According to the U.S. National Library of Medicine of the National Institutes of Health,[5] New Orleans and its environs are one of the most extensively engineered spots in the United States. The Mississippi River has been controlled almost exclusively to promote navigation. As far back as 1928, Congress authorized major levee improvements, and the U.S. Army Corps of Engineers began shoring up the flood control system, including levees, along the entire lower Mississippi and in New Orleans. While the construction of high levees curbed spring flooding along the lower stretches of the river, it also did away with wetlands, floodplains, and barrier islands, along with the natural wave and storm protection they provided. The Corps and other agencies have diverted significant portions of the river through a labyrinth of navigation lanes buttressed by 2,000 miles of levees that prevent it from sufficiently providing silt to the delta. By the 1950s, the rates of land loss along Louisiana's coast were dramatic. From the 1960s to the 1980s, the oil and gas industry had dredged some 10,000 miles of canals in coastal Louisiana, further compromising wetland areas. Extensive navigation channels support South Louisiana's port complex, one of the most important in the United States, and one from which most of the country's commodities such as corn, wheat, and soybeans are shipped around the world. In retrospect, this activity led to a series of overwhelmingly unforeseen circumstances.

In 2005, Hurricane Katrina hit and the levees failed, flooding some 80 percent of New Orleans and the surrounding area. It was among the five deadliest hurricanes ever witnessed in the United States. Due to failing hurricane surge protections, a lawsuit was brought against the Corps, which had designed and built the system of levees as required by the Flood Control Act of 1965. However, the sovereign immunity granted in the 1928 Flood Control Act made it impossible to hold the Corps financially liable.[6]

It is obvious that this piecemeal system of planning executed over several decades failed dramatically as a result of the outdated legal role of organizations such as the Corps combined with unanticipated pressures such as Katrina and climatic changes. Other contributors include the mismanagement of resources, notably the idea of channeling for ships to access the port and the removal of naturally occurring wetlands in the Gulf.

In the aftermath of Hurricane Katrina, architects and planners began to rethink future scenarios. Innovative architecture firm LEVENBETTS developed a visionary plan for a New Orleans community that had been hit hard by the hurricane. The Wetland City site was proposed for New Orleans East, one of the severely flooded Katrina areas, which was already endangered by the region's rising waters and subsiding land. The storm surge displaced a community of nearly 100,000 African Americans. The firm's Wetland City proposal for the community is based on the recognition that coastal Louisiana has lost significant land every year for the past 50 years and that even more coastline will recede in the future. The U.S. Geological Survey puts that number at 34 square miles annually and estimates that another 700 square miles could vanish over the next half century if no measures are taken to forestall the land loss.[7] "We believed that an understanding of high and low water, how to remove water, and where to go when the flood comes is critical to planning in response to the flooded city," say David Leven, AIA, and Stella Betts, partners at LEVENBETTS, noting that the firm's vision revolves around habitation on high ground and protection of wetlands. Among other elements in the plan, linear neighborhoods are separated by "a dense, productive green infrastructure of wetland agri- and aqua-culture, a continuation of public open space in the neighborhoods, and bioswales that remediate waste and process greywater."[8] While the LEVENBETTS plan was not executed, it demonstrates the kind of sustainable, future-oriented approach that is the hallmark of innovative planning efforts.

Source: LEVENBETTS



Wetland City is New York-based architecture firm LEVENBETTS' plan for a New Orleans community that was devastated by Hurricane Katrina.

See endnotes in the online version of this article.

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Photo by Doug Hyland—Premiere Productions

Residential retrofits of older homes represent a significant source of energy savings.

Residential Retrofits Achieve Net-Zero Energy

An approach to lowering carbon footprints in older homes

Sponsored by Whirlpool Corporation

As climate concerns continue to dominate the global agenda, net-zero energy has become a highly sought after goal in today's buildings. Net-zero energy buildings, which produce as much energy as they use over the course of a year, stand to transform how energy is generated and used in the built environment. Sophisticated construction technologies, renewable energy systems, and rigorous research are increasingly making net-zero energy buildings feasible.

In the residential sector, the move to net-zero energy homes is gaining steam, with states taking regulatory measures to encourage their construction, and national home builders adding net-zero homes to their portfolios. While many homes built today do offer impressive energy savings over years past, net zero is not the exclusive purview of new residential construction. The massive stock of existing buildings has received little in the way of energy retrofits, and represents tremendous potential for significant energy savings and even net-zero targets—important goals both in terms of a sound monetary investment for the owner and a reduction in the structure's carbon footprint and contribution to greenhouse gases.

What better way to examine the potential of residential retrofits than through a real-world example. Researchers and building industry partners involved in a deep energy retrofit of an older Midwest dwelling have shown that the right retrofit actions can reduce energy use by at least 50 percent, and are demonstrating a path to net-zero energy production. This article will focus on that experience, detailing the baseline conditions as well as the model that was developed and compared to collected data at the project site. Finally, the article will show how the model was modified and used to predict the effectiveness of various retrofit practices

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Learning Objectives
After reading this article, you should be able to:

1. Explain the potential for energy-efficient upgrades in existing U.S. housing stock that are consistent with green building codes.
2. Demonstrate how energy simulation programs can model energy usage of homes, both pre and post retrofit with the goal of developing more sustainable older dwelling units .
3. Discuss the potential that various retrofit solutions have in lowering the carbon footprint of existing buildings.
4. Specify retrofit solutions that can lead to a net-zero energy structure .

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through minimizing the annualized energy-related cost in order to select the optimum retrofit package.

EXISTING HOUSING STOCK—A MASSIVE BUT CHALLENGING OPPORTUNITY FOR ENERGY SAVINGS

According to the U.S. Department of Energy (DOE), residential housing units account for 22 percent of the total primary energy usage in the U.S.[1] The average age of a single-family home in the U.S. is 34 years old, meaning that much of the existing housing stock was constructed in an era that offered both relatively inexpensive energy and did not consider carbon dioxide as a form of pollution that contributes to global warming. Consequently, simple energy-efficiency measures are sorely lacking in these homes—a problem with far-reaching consequences, but also an opportunity for substantial energy savings.

Buildings, in general, represent a substantial amount of energy requirements in the economy, making them of critical importance in reducing greenhouse gas emissions. Many experts and studies have weighed in on that point. "Improving the efficiency of buildings, which account for 40 percent of U.S. energy use, is truly low-hanging fruit," maintains former U.S. Secretary of Energy Dr. Steven Chu. Global management consulting firm McKinsey and Company says, "Energy efficiency offers a vast, low-cost energy resource for the U.S. economy, but only if the nation can craft a comprehensive and innovative approach to unlock it."

According to a study by the Regulatory Assistance Project (RAP),[2] a global, non-profit team of experts focused on the long-term economic and environmental sustainability of the power and natural gas sectors, "retrofit improvements to the heating and cooling systems of existing homes and their thermal envelope (e.g. by increasing insulation levels and reducing air leakage) present major opportunities for cost-effective investments in efficiency." In fact, the RAP study maintains that "roughly half of all efficiency and/or carbon emission reduction potential in North American and European buildings is associated with retrofit improvements to existing homes."

General, fundamental rules on retrofitting a house do exist; however, many different improvements can be applied, with the optimum solution typically predicated on the previous conditions of the house and on the climate zone where the house is located. In cold climates with high heating loads, measures that reduce those loads such as air

SOFTWARE BASELINE SCENARIO INPUTS

INPUT PARAMETER	INPUT CHOSEN
Location	West Lafayette, Indiana, USA
Square footage	266 m^2
No. of bedrooms	3
No. of bathrooms	2
Age	86 years
Heating set point	21°C
Cooling set point	24.4°C
Humidity set point	50%
Walls	Wood stud, uninsulated, 40.6 cm
Exterior finishing	Wood, medium/dark
Unfinished attic	Uninsulated, vented
Finished roof	Uninsulated
Roof material	Asphalt shingles, dark
Finished basement	Uninsulated
Carpet	60% of the floor area
Windows	Single-pane, clear, non-metal frame
Air leakage	10 ACH_{50}
Refrigerator	Energy Factor (EF) = 14.1, top freezer
Cooking range	Electric
Dishwasher	None
Clothes washer	Standard, MEF = 1.41 ft^3/kWh-cycle
Clothes dryer	Electric
Lighting	20% fluorescent
Central air conditioner	SEER 10
Furnace	Gas, 80% AFUE
Water heater	Gas standard (EF = 0.59, 151 liters)

sealing, adding insulation, and improving the energy performance of windows may be good first steps. In warmer climates, plug loads such as appliances, electronics, and lighting can be relatively more important, and taking action to reduce these will be more appropriate.

Retrofits are generally classified in two categories. Conventional energy retrofits focus on isolated system upgrades such as lighting and appliance replacement and are typically simple and quick. Actions that include improving the building envelope, such as better insulation or fenestration, are considered deep energy retrofits and they target energy savings of at least 30 percent or more. Deep energy retrofits constitute a whole-building analysis and construction process that uses "integrative design" to achieve much larger energy savings than their conventional counterparts. Most useful on buildings with poor efficiency, deep energy retrofits combine a variety of measures from energy-efficient equipment and air sealing to moisture management in order to attain both savings and performance.

By taking an integrative approach, and thus considering how the building functions as a complete system, the design team can make certain design decisions to optimize the overall energy efficiency at the lowest possible cost. To illustrate this point with an example, consider the task of heating and cooling a building. If the design team analyzes the building envelope choices along with the choice of HVAC system, they might decide to increase the insulation levels and upgrade the fenestration in order to reduce the heating and cooling load. This would then allow for a smaller and more efficient heating, ventilation, and air conditioning (HVAC) system to be specified, potentially at an even lower cost because many times HVAC system cost is proportional to size. In the extreme case, a team might make a building so airtight and insulated that only a small emergency heating system would be needed, essentially eliminating the need for a mechanical system, depending on climate region, building orientation, and fenestration arrangement. This extreme case is very difficult in a retrofit scenario as the building orientation and fenestration arrangement is predetermined.

Sound building science practices must be the foundation of deep energy retrofits. For example, installation of insulation must be considered not just in terms of R-value but its susceptibility to moisture infiltration along with how well the wall will dry should that occur. Location of the dewpoint, detailing, flashing, and sealing of windows and other building penetrations become critical concerns, especially in very warm and humid regions such as the Southeastern United States. In some cases,

Photo courtesy of Whirlpool Corporation

The ReNEWW House in Indiana is serving as a multi-year research project and sustainable living showcase for residential retrofits in older homes.

energy savings on the order of 50 percent or more are possible with a deep energy retrofit,[3] but a rigorous approach is required, and the relationships among energy, indoor air quality, durability, and thermal comfort must be fully understood and accommodated for throughout the retrofit process.

THE RENEWW HOUSE—A CASE FOR NET-ZERO ENERGY

Purdue University researchers along with several industry partners are involved in a multi-year project to transform a 1920s Craftsman-style home in West Lafayette, Indiana, into an ultra energy-efficient, net-zero energy residence.[4] The so-called ReNEWW House (Retrofitted Net-zero Energy, Water and Waste) is being retrofitted to generate as much energy as it consumes over a year, creating a net-zero energy, water, and zero waste to landfill dwelling. Later phases will focus on the water system and waste streams in the home.

In its pre-study state, the home required about 12,000 kilowatt hours (kWh) of electricity and 50,000 kWh of thermal energy per year, costing some $3,000 in annual utility bills. The nearly 90-year-old structure earned a Home Energy Rating System (or HERS index) rating of 177. The HERS index, a standard of energy efficiency not unlike a miles-per-gallon rating for a car, was developed by the Residential Energy Service Network (RESNET) and is the nationally recognized system for evaluating a home's energy performance. Certified RESNET home energy raters conduct inspections to verify the specific features of a home that impact energy performance and use software tools to model the home energy use and generate the HERS index rating. The lower the HERS number, the more energy efficient the home. The DOE has determined that a typical resale home scores 130 on the HERS index, while a standard new home is awarded a rating of 100. For additional perspective, RESNET deems a house with a 140 HERS score "near the very top of the HERS index, a position a homeowner definitely doesn't want to be in," and maintains that it is "performing 40 percent worse than a home adhering to the basic building code requirements. This is probably one of the major reasons for its high energy costs, less than ideal comfort level and, though one might not be directly aware of it, its negative impact on the environment."[5]

At a HERS rating of 177, the ReNEWW House is 77 percent less efficient than a typical new build adhering to code. The objective of the retrofit project was not just to get that HERS rating to equal that of a new home, but to target a HERS index rating of 0, meaning that the home would produce at least as much energy than it uses on a yearly basis.

THE MODEL—SIMULATING USAGE AND RETROFITS

In selecting the proper suite of retrofits, the researchers' aim was to use an energy simulation tool to create a model, verify the model by matching the results with real-time energy usage data before the retrofit, perform an optimization analysis on the home to inform the retrofit actions required, and then use the model to predict the energy consumption post retrofit. The first step was to establish a baseline of the home's energy profile, including measurements of the structure and how much energy it currently consumes—information required to determine the best way to upgrade the home, whether it be window replacement, insulation, the addition of solar equipment, or other measures. After the house was taken over in July 2013, the baseline measurement system was installed and operational in November.

In the recent past, scores of increasingly sophisticated software solutions have been developed to provide energy modeling of residential buildings. Researchers at the ReNEWW House chose the software known as BEOpt (Building Energy Optimization), developed by the National Renewable Energy Laboratory (NREL), in support of the DOE Building America program goal to develop market-ready energy solutions for new and existing homes. BEOpt uses existing, established simulation engines (currently DOE-2.2 and EnergyPlus), and is able to run optimization analyses and recommend the most cost-effective improvements that can be applied. The software produces detailed simulation-based analysis and design optimization predicated on such house features as size, occupancy, age, location, and other factors. The objective of the optimization analysis is to minimize the annualized energy-related cost over a 30-year analysis period. The annualized energy-related cost (AERC) measure accounts for four major household cash flows which are loan costs (principal + interest) for performing the retrofit work, utility bills, replacement costs for when equipment such as a water heater wears out within the analysis period, and residual value of all depreciable equipment in the house at year 30 of the analysis period.

Energy modeling software is widely used to ascertain a home's energy performance, determine retrofit effectiveness, and size HVAC systems. Many experts agree that energy modeling is a solid investment and leads to good decision making. However, residential energy modeling, particularly of older homes, is not without drawbacks, and researchers at the ReNEWW House did acknowledge the limitations of the modeling process. This type of modeling is a complex process, with many required inputs that are often difficult to measure. Further complicating the process, each dwelling is different, increasing the difficulty of using standardized measures, and there is a wide discrepancy in retrofit costs among various markets and time periods. In addition, a key driver of energy costs is occupant behavior, which is extremely challenging to quantify. Even within a family, there can be a significant difference as to how a particular occupant sets comfort criteria, uses lighting, and regulates heating or cooling systems. Energy philosophies of occupants may differ widely, ranging from avid energy savers to ordinary consumers to those who are even wasteful or oblivious to energy usage. Occupant behavior in residential energy modeling, including BEOpt, typically follows the Building America Simulation Protocol which dictates usage patterns such as length of showers, temperature set points, appliance usage, etc. As a result, researchers did not use the model to dictate the outcome; rather, the energy models were used to inform decisions which were ultimately finalized by leveraging intuition. The model was not intended to be a pure retrofit case study.

In developing the baseline, researchers created a 3D model and selected the inputs that closely matched the dwelling's structural characteristics. Inputs that were selected were related to the geometry of the home, the envelope characteristics, the HVAC system, and any other device that uses energy, such as lighting fixtures and appliances.

There are four main factors that affect the energy consumption of a household: the building envelope itself; the HVAC system and hot water heater (collectively the mechanicals of the house); the end use devices, such as lighting and appliances; and human behavior. Inputs for the first three factors were relatively easy to select and represented fairly accurate parameters of the real condition of the existing home. Such inputs can be selected from a large library of predefined options embedded in the software. The fourth factor is human behavior, such as length of a shower, or appliance usage. Because these factors are so difficult to define, the software simulates human behavior from generally accepted assumptions based on NREL studies that sought to describe the average American family energy consumption. As previously mentioned, these behavioral assumptions are documented in the Building America Simulation Protocol. The table on page 154 highlights the main parameters chosen to simulate the pre-retrofit conditions of the test house.

LIGHTER ENERGY OPTIONS

For "lighter" energy savings, many options exist such as a lighting retrofit or early appliance retirement. Homeowners should also stay current on new energy developments in these areas. According to the U.S. Department of Energy, over the past couple of decades, advances in appliances and electronics—microwaves, dishwashers, phones, and computers included—have changed the way people use energy in their homes.[6] Manufacturers have made "great strides" in developing new, more efficient appliances that reduce consumer's utility bills.

Additional advances in this area will come from new ways of thinking. For example, to increase efficiency manufacturers are reconsidering the standalone unit. One new approach is linking kitchen appliances to share energy sources. The refrigerator's heat exchanger, say, can pre heat the water required by the dishwasher. If the dishwasher can use pre-heated water, rather than starting from cold, it becomes more energy efficient. The "appliance suite" may be emerging as a new paradigm that can create significant, rather than incremental, gains in energy efficiency. Another emerging energy innovation is in electrical power distribution. Solar panels, increasingly popular in today's retrofits, generate direct current, or DC. But homes generally utilize alternating current, or AC. Running appliances on DC may link solar energy and appliances directly, cutting out the need for conversion from DC to AC and the associated costs and energy loss.

See endnotes in the online version of this article.

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Best Practices for Site Preparation and Installation of In-Grade Fixtures

Tips for designing a trouble-free installation in outdoor settings

Sponsored by B-K Lighting | *By Jeanette Fitzgerald Pitts*

Some projects demand that designers find a way to distribute light upward from the ground in highly trafficked outdoor areas. Recessed in-grade luminaires are the solution for uplighting features of an architectural structure or landscape, without creating a tripping hazard or maintenance obstacle in the area of intrigue. The in-grade luminaires are recessed into the ground and installed flush with the walking surface, enabling passersby to admire the sculpture, column, or canopy of trees and move safely through the space. Achieving the desired illumination goals with these luminaires requires many of the typical considerations that are made when selecting any luminaire, interior or exterior, such as reviewing the light distribution pattern and evaluating the energy needs and lamp life of the fixture. These recessed in-grade fixtures also require attention to details that are less typical in the sphere of lighting fixture specification, namely, the type of soil available on a project and the drainage it can provide.

Many designers may be surprised to know what a difference good drainage makes on the overall longevity and performance of a recessed in-grade installation. In fact, poor drainage is the predominant cause of water ingress that leads to the failure of an in-grade fixture. This article will provide best practices for matching the type of recessed in-grade fixture with the available soil type, creating adequate drainage, and options for bringing power to the fixtures.

THE DIRT ON DRAINAGE

Recessed in-grade fixtures need drainage, because, despite impressive technological developments, water and electrical components still do not mix. As it relates to recessed in-grade lighting fixtures, relentless exposure to water can rust out the interior hardware or short out a ballast or socket, ultimately causing the fixture to fail. Although electrical products destined to be installed in the ground are often designed to better manage exposure to water and precipitation, best practices suggest that measures be taken to reduce the total soak time of an in-grade fixture.

The natural ability of the soil to drain water away from the surface, and away from the luminaire, is a powerful ally in keeping the recessed in-grade luminaire a little drier, but different types of soil drain water away with varying degrees

Clovis Veterans Memorial, Clovis, California. Recessed in-grade fixtures installed in dirt or in concrete require adequate drainage to protect their longevity and performance.

Photo courtesy of B-K Lighting

of proficiency. It is the texture of the soil, its composition of gravel, sand, silt, and clay, that determines how quickly water will drain through the soil, also referred to as drainage. Sandy and granular soils typically drain water quickly from the surface. Soils with larger compositions of silt and clay tend to drain more poorly and, as a result, remain soggier or constantly saturated, posing more of a threat to the longevity of the recessed in-grade luminaire.

IDENTIFYING SOIL TYPE

Before selecting a specific recessed in-grade luminaire, best practices recommend first identifying the type of soil present at the project site. Soils have been classified into two distinct groups, Type I and Type II, as it relates to a soil's ability to drain.

Type I describes a soil that is an easy or free draining soil. In general, this type of soil has very little or no clays and may have a sandy feel or appearance. Type II describes a soil that has more difficulty draining. In many cases, even small amounts of water will pool and can take hours or days to drain away from the surface. Typically, this type of soil consists of varied amount of clay or hardpan, which inhibits subsurface drainage.

The Soil Type Test

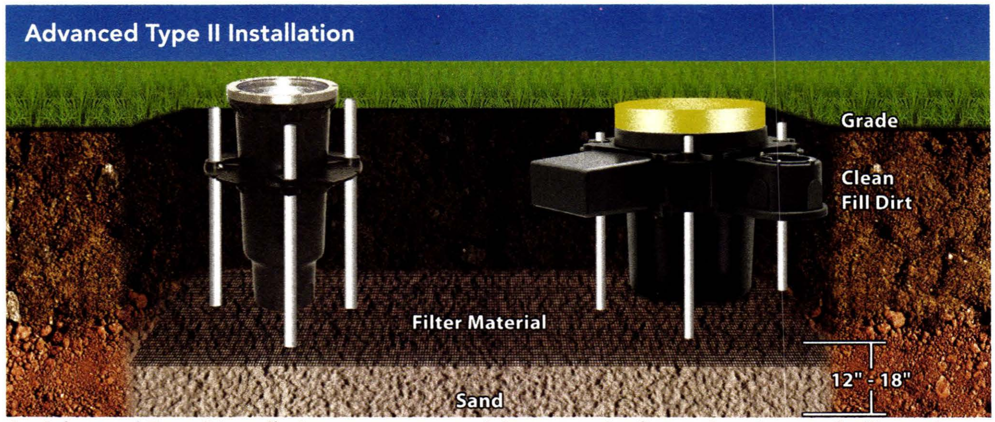
Determining whether the soil on a project is Type I or Type II is a fairly straightforward process. There is a simple test that will reveal the soil type in two hours. First, dig a hole at least 18 inches in diameter and 18 to 24 inches deep. Then fill half of the hole with water and track how long it takes for the water to drain into the soil. If complete drainage occurs in less than two hours, the soil is Type I. If complete drainage takes more than two hours, the soil is considered Type II.

MATCHING INSTALLATION PRACTICES AND SOIL TYPE

The type of soil available on a project heavily influences how the recessed in-grade luminaire should be installed in order to reduce the fixture's exposure to standing water. While it is generally understood that the contractor will need to provide some type of drainage during installation, there are different ways to create drainage and these different approaches can deliver very different results. A technique that provides adequate drainage on one project may provide terribly insufficient drainage in another, ultimately creating a problematic installation. It is critical to match the site-specific drainage needs with the installation technique that will provide the necessary degree of drainage.

Installing In-Grade Fixtures in Type I Soil

Type I soil is considered a preferred site condition with ideal drainage properties. No additional installation practices are required if the project site offers Type I soil. However, review the Other Installation Considerations section on the next page, because different installation practices may be recommended in certain site-specific situations including areas covered in concrete, planter areas and walkways, and areas subject to heavy rainfall.



An Advanced Type II installation creates a trench between the fixture housings to facilitate the drainage of water away from the surface.

Installing In-Grade Fixtures in Type II Soil

There are three different installation practices recommended for installing recessed in-grade fixtures in Type II soil. They are a Standard Type II installation, an Advanced Type II installation, and a Premium Type II installation. Once an installer determines that the project site hosts Type II soil, the degree of drainage support necessary can be determined by assessing the prevalence of water in the location of the installation. Irrigation systems designed to water the area, a downspout draining into the vicinity of the installation, or a topography that slopes down toward the in-grade fixture location would all indicate that greater degrees of drainage should be provided to protect the functionality of the system.

Standard Type II installation. Over-excavating is the critical piece of a Standard Type II installation. This over-excavation creates an opportunity to backfill the excessively large hole with a material that drains better than the Type II soil readily available at the jobsite. Sand is the most highly recommended material. Backfilling with gravel, rock, or crushed rock should be avoided, because geotechnical research indicates that a migration of fine soil particles to this coarser backfill will occur over time, which could cause the ground around the fixture installation to sink, settle irregularly, or shift. Compacted sand does not allow for the migration of adjacent soil particles, preventing problematic soil settlement without compromising the installation of the fixture.

Specifically, the Standard Type II installation recommends that the installer create a hole for the housing that is 12 to 18 inches deeper than required by the fixture. The additional depth is then backfilled with moistened sand that is compacted into the space. The sand is easily adjusted to maintain the proper grade for the installation of the recessed in-grade fixture housing.

Placing an effective filter between the fixture housing and the sand backfill is the second critical component of a Standard Type II installation. Prior to the final setting of the housing, it is recommended that a filter material, such as a porous landscape fabric, be placed between the sand and the bottom of the housing. This filter will help keep sand out of the bottom of the open or vented fixture housing, without inhibiting the self-draining properties of the outer housing.

Advanced Type II installation. The Advanced Type II installation expands the excavation for the in-grade fixture system by pairing the additional depth of the Standard Type II installation with a trench between the fixture housings. The

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Learning Objectives

After reading this article, you should be able to:

1. Explain the importance of soil drainage to in-grade fixtures and determine the type of soil present on a project.
2. Apply best practices when specifying and installing in-grade luminaires.
3. Compare and contrast different types of well lights and direct burial lights to select the right fixture for a project.
4. Explore options for bringing power to the recessed in-grade fixtures.

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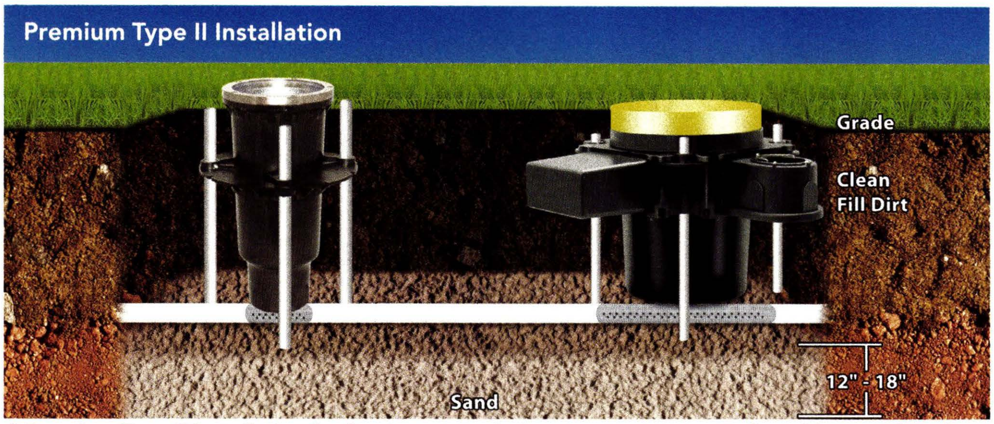


A Premium Type II installation further increases drainage on a project site by adding a subsurface perforated pipe, commonly referred to as a French Drain.

trench helps to facilitate the drainage of water away from the surface by removing the poorly draining soil from the immediate surrounding area of the fixture.

The connecting trenches should also be over-excavated and backfilled with moistened sand. A filter material should also be placed between the sand and the bottom of the fixture housing, allowing water to migrate down through the sand and away from the fixture, without allowing the sand to work itself up into the luminaire, potentially clogging the fixture housing.

Premium Type II installation. The Premium Type II installation, commonly referred to as a French Drain, also requires over-excavation, a sand backfill, trenching and further increases drainage on the project with the addition of a subsurface perforated pipe. The perforated pipe can be PVC or another type of gravity sewer pipe that is used for landscape drainage.

Drainage pipes can be pre-perforated or perforated in the field, but they should contain perforations at the 8:30, 10:30, 1:30, and 3:30 positions, when the pipe is placed directly under the housing. The perforations allow the water to migrate down through the sand and leach into the pipe for swift evacuation. The pipe should be at least 3 inches from the bottom of the sand backfill or 3 inches from the bottom of the fixture housing. A continuous pipe can be constructed and positioned to aid the drainage of multiple housings. Beyond the perforations, the pipe should also be wrapped with filter material so the sand backfill does not clog the drainage system.

The drainage pipe will need to maintain a sufficient grade difference to ensure that the collected water flows to the outlet and does not remain sitting in the pipe. A minimum slope of 0.15 percent is generally considered sufficient to promote adequate drainage. Optimum drainage will be achieved if the pipe is installed at ½ percent slope (0.5 foot of drop per 100 feet) or greater.

Other Installation Considerations

The presence of concrete, walkways, buildings, and other landscape and architectural features can materially affect how water travels through an environment, regardless of soil type. Some elements, like concrete, for example, may offer the installation area additional protection against super-saturation, while the presence of other items, such as a building's downpipe, irrigation systems, or the rain-heavy climate of the location may warrant additional drainage as a prudent precaution.

Concrete. If the lighting fixtures are being installed in concrete and there is a minimum of 5 feet between the lighting fixtures and nearby soil, Type I installation practices are recommended, because concrete protects the nearby soil from saturation and the presence of standing water may not be an environmental factor.

Planter areas and walkway. If the lighting fixtures will be installed between a walkway and another structure, such as a building or sidewalk, Type II installation practices are recommended to better manage the water that will run off of the pavement and onto the dirt where the fixtures are installed.

Areas subject to heavy rainfall. In areas that receive heavy rainfall, such as Seattle, Advanced or Premium Type II installation practices are recommended unless the existing soil demonstrates good Type I characteristics.

A word about clean gaskets. While poor drainage is the predominant cause of water ingress that leads to the failure of an in-grade fixture, poorly sealed gaskets are the next most common cause of water-related damage. To avoid leaky gaskets, it is critically important that the gaskets and the surface areas they are attempting to seal are clean. The presence of any grit, dust, or grime can interfere with the formation of a watertight seal, compromising the integrity of the gasket. Contractors should clean the gaskets and adhering surfaces before installation to ensure a tight and effective fit.

SELECTING THE RIGHT IN-GRADE FIXTURE FOR A PROJECT

Well lights and direct burial lights are two of the most popular types of recessed in-grade luminaires. Here is a closer look at the similarities and differences between these two fixture types, a few of the features that are unique to in-grade fixtures, and some general recommendations on the types of applications that may be best suited for each.

Well Lights

A well light is designed to allow water to pass through the fixture and drain into the soil below. The optical compartment inside the fixture housing is sealed, keeping water from the electrical components that would be damaged by water exposure, but the outer housing is vented and often referred to as a flow-through housing, because it allows water to drain from the surface and flow through the fixture.

Well lights are often installed in areas that require surface water drainage, such as tree grates. In a tree grate application, the luminaire can be integrated into the drain system and uplight the tree too.

Well lights should never be installed in applications where there is no drainage or poor drainage, because if the water is unable to drain out of the fixture, it will sit in the fixture and eventually cause the fixture to fail. If a well light is to be installed on a project where the soil is not permeable, a draining system will need to be installed.

Direct Burial Lights

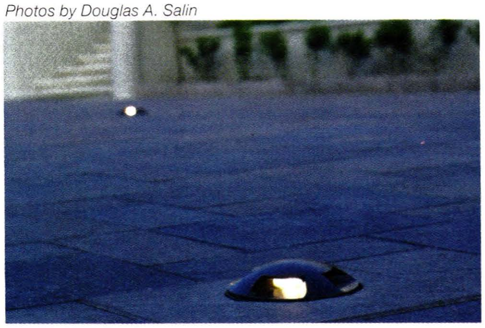
Direct burial lights do not offer a method for draining surface water. These fixture housings are completely sealed and self-contained, designed for installation in concrete or soil. Despite being completely sealed, providing adequate drainage at each fixture is still a recommended practice, because extended exposure to saturated soil or submersion increases opportunities for the fixtures to leak and increases the risk of fixture failure.

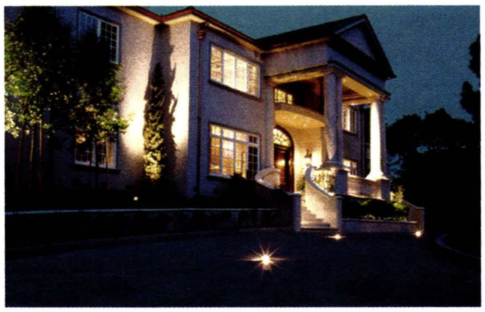
Direct burial lights are often used to illuminate building perimeters surrounded by a sidewalk or to uplight structures such as flagpoles, sculptures, and monuments, because the direct burial lights can be installed into the sidewalk or the concrete base that is often poured to support these elements.

Recessed In-Grade Luminaire Features

Recessed in-grade fixtures are installed in the ground, flush with the grade. This elevation poses unique environmental challenges

Photos by Douglas A. Salin





TOP: Direct burial lights are completely sealed and do not offer a pathway to drain surface water in this San Francisco private residence. BOTTOM: Recessed in-grade fixtures in driveways and parking decks can be drive-over rated to withstand the weight of an automobile.

not faced by a luminaire installed above the ground. Fortunately, fixtures are being developed with features designed to better accommodate the elements. Some well lights and direct burial lights can be designed to withstand complete submersion in water, for short periods of time, to keep the temperature of the lens low enough to touch, and to hold up when driven over by an SUV.

Environmental protection. When fixtures are installed outdoors, in the ground, they will be regularly exposed to water, dirt, and dust. Unfortunately these elements can wreak havoc on electrical components, so recessed in-grade luminaires are designed to provide a certain degree of environmental protection to the more environmentally sensitive electrical items. The degree of protection is quantified by an Ingress Protection (IP) rating. The IP rating of a device typically has two numbers, although some have three. The first number describes the level of protection the enclosure provides against solid objects and dust. The second number denotes the level of protection provided against water.

The first IP number ranges from zero to six. Zero specifies that the luminaire provides no special protection from dirt, dust, and other solids and a six indicates total protection. The second IP number ranges from zero to eight. With zero indicating that the enclosure provides no protection from water and eight designating that the luminaire is suitable for intermittent submersion in water.

As it relates to recessed in-grade fixtures, an IP rating of 68 is the highest rating possible and indicates that the fixture can withstand exposure to dust, dirt, and particles and complete submersion in water over 1 meter in depth for one day. Few recessed in-grade fixtures are available that have achieved an IP rating of 68. In-grade fixtures with an IP rating of 67 are also completely protected against the ingress of dust, dirt, and particles, but are only protected against submersion in water that does not exceed 1 meter in depth. Recessed in-grade fixtures with an IP rating of 66 and lower are not rated for immersion and should not be submerged.

Thermally controlled lens system. Some recessed in-grade fixtures house light sources that generate a considerable amount of heat, such as halogen or metal halide. This can be particularly problematic in an in-grade fixture being used in a pedestrian area, because the lens is accessible to the public. Children can easily touch it. Animals can rub up against it. People can walk over it. If the lens becomes dangerously hot, it has the potential to cause an injury.

Some of these fixtures have been equipped to regulate the temperature of the lens, preventing it from becoming dangerously hot. This temperature-regulating system is referred to as a thermally controlled lens system. In-grade fixtures with a thermally controlled lens system employ a thermal mechanism that prevents the thermal characteristics of the lamp from transferring to the lens.

Drive-over rated. Some applications require that recessed in-grade fixtures withstand the weight of an automobile. Parking decks, circular driveways for restaurants and hotels, and even an entryway for a manufacturing facility or warehouse can benefit from the presence of recessed in-grade fixtures, but the fixtures are positioned in spaces that are designed to be driven over. Recessed in-grade fixtures can be designed to be driven over too.

Some manufacturers design recessed in-grade fixtures with a lens that is drive-over rated. The lens can be rated to withstand the weight of large trucks and SUVs.

BRINGING POWER TO AN IN-GRADE FIXTURE

Deciding how a recessed in-grade fixture system will be powered is another important piece of completing a successful installation. Designers can select line-voltage or low-voltage fixtures and this decision makes a significant difference in how the system will be installed.

Basics in Line Voltage and Low Voltage

At its most basic, a discussion about bringing power to any piece of equipment must begin with a quick explanation of line voltage and low voltage. Line voltage is supplied by the local power company in 120V and 277V. It is carried from the power company through power lines and into a residential or commercial building. Low-voltage fixtures and devices operate at a dramatically lower voltage, 12V or 24V, which is much more energy efficient, but requires a transformer to step down the line voltage to the lower voltage.

Transformer Options: Integral or Remote

Many of the recessed in-grade fixtures available today are low voltage, because of the incredible energy savings that the low-voltage fixtures are able to provide. These low-voltage recessed in-grade fixtures require a transformer to step down the line voltage. The transformer can be integral to the fixture, which means included as part of the fixture, or the transformer can be entirely separate from the fixture, also referred to as remote.

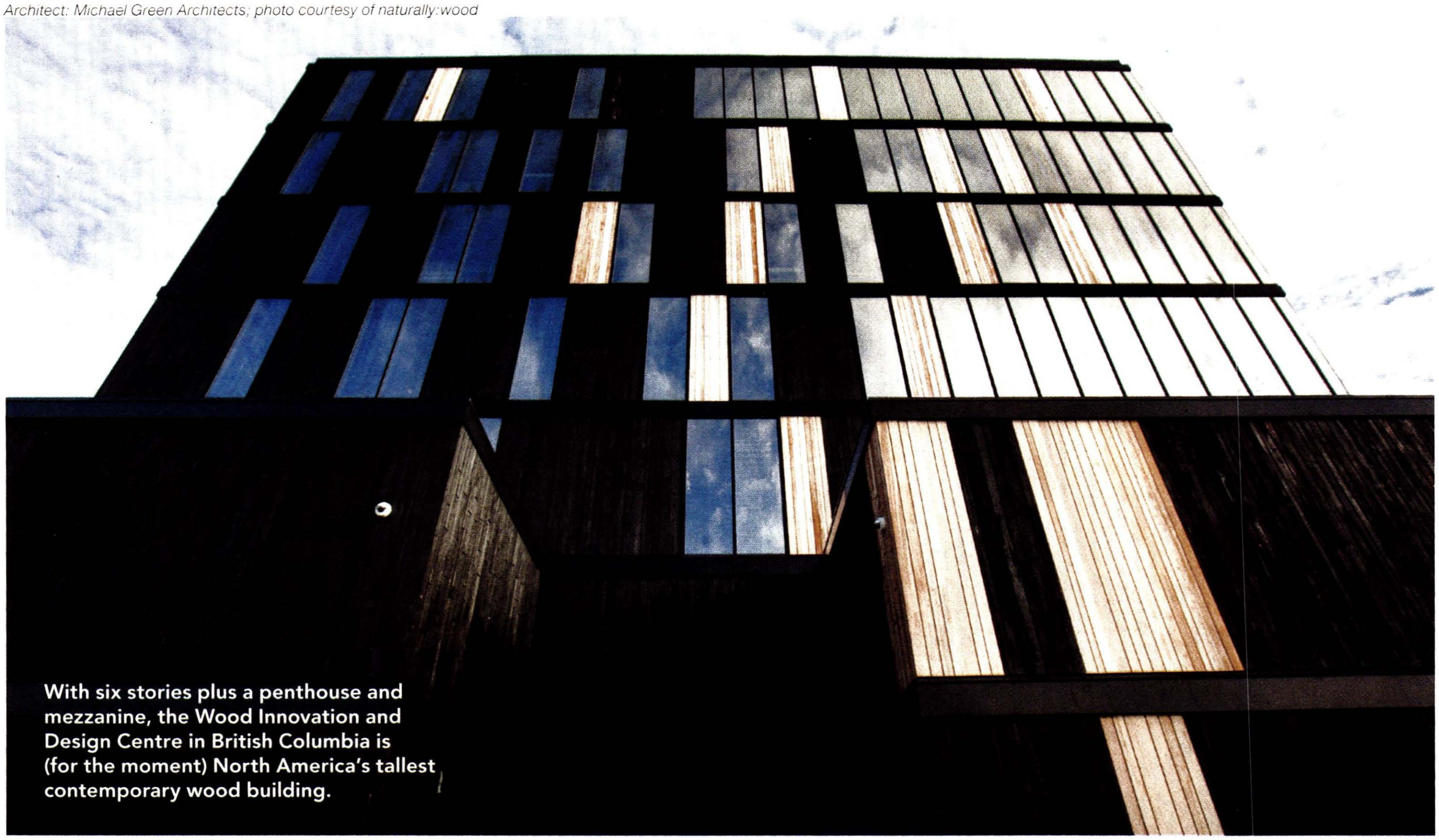
Integral vs. Remote Transformers

Whether the transformer is integral or remote affects how the power needs to be run to the recessed in-grade system. If a recessed in-grade fixture has an integral transformer, then the installer can bring line voltage directly to the fixture, which then steps down the voltage internally. If the low-voltage fixture does not have an integral transformer, it requires that the line voltage be run to the remote transformer and then low-voltage wires must be run out to each low-voltage fixture to power them.

There are a variety of reasons why a specifier may choose a recessed in-grade fixture with an integral transformer over a remote solution and vice versa. Depth constraints at the project site, pre-existing power configurations, project budget, and even the total size of the system design can impact which type of transformer best fits a particular project scenario.

Continues at ce.architecturalrecord.com

Architect: Michael Green Architects; photo courtesy of naturally:wood



With six stories plus a penthouse and mezzanine, the Wood Innovation and Design Centre in British Columbia is (for the moment) North America's tallest contemporary wood building.

Tall Wood Takes a Stand

Examining North America's evolution toward taller wood buildings

Sponsored by reThink Wood

There is a quiet shift on the horizon—one that has the potential to change North American skylines.

Heightened awareness of the environmental benefits of wood combined with advances in wood technology and manufacturing have aligned to make tall wood buildings not only possible but safe and cost effective.

While the increasing number of code-approved, light-frame wood construction projects reaching five and six stories has helped North American building professionals raise their comfort level with wood, a number of forward-looking architects, engineers, and developers have been actively pursuing more.

In 2012, *The Case for Tall Wood Buildings*[1] outlined a compelling argument for building taller wood structures, showing that mid-rise (six to 12 stories) and tall buildings (up to 30 stories) could be safely, efficiently, and economically built using mass timber construction techniques.

Now, the *Survey of International Tall Wood Buildings*[2] demonstrates how these techniques have been successfully used in "tall wood" projects worldwide. Design approaches range from conventional platform-based systems made from cross laminated timber (CLT) to glued-laminated (glulam) timber framing to composite wood-concrete and wood-steel building systems. Examples include (among others) a 10-story CLT apartment building in Australia, a 14-story timber-frame apartment in Norway, and an eight-story CLT apartment in the U.K. Closer to home, a six-story wood building (plus mezzanine and penthouse) was recently completed in British Columbia—becoming, for a moment, the tallest contemporary wood building in North America.

This continuing education course explores the evolution toward taller wood buildings, including motivating factors, fire and life safety, structural performance, and relevant changes to the *International Building Code* (IBC). Examples

CONTINUING EDUCATION

EARN ONE AIA/CES HSW LEARNING UNIT (LU)

Learning Objectives
After reading this article, you should be able to:

1. Recognize that mid-rise and taller wood buildings can be safely, efficiently, and economically built using mass timber construction techniques.
2. Discuss different design approaches to mass timber construction for tall wood buildings.
3. Explain similarities and differences between the structural composite panel and lumber products that allow building professionals to design and construct tall wood buildings.
4. Distinguish the differences between design approaches to achieving the acceptable structural passive fire protection measures in a mass timber building.

To receive AIA/CES 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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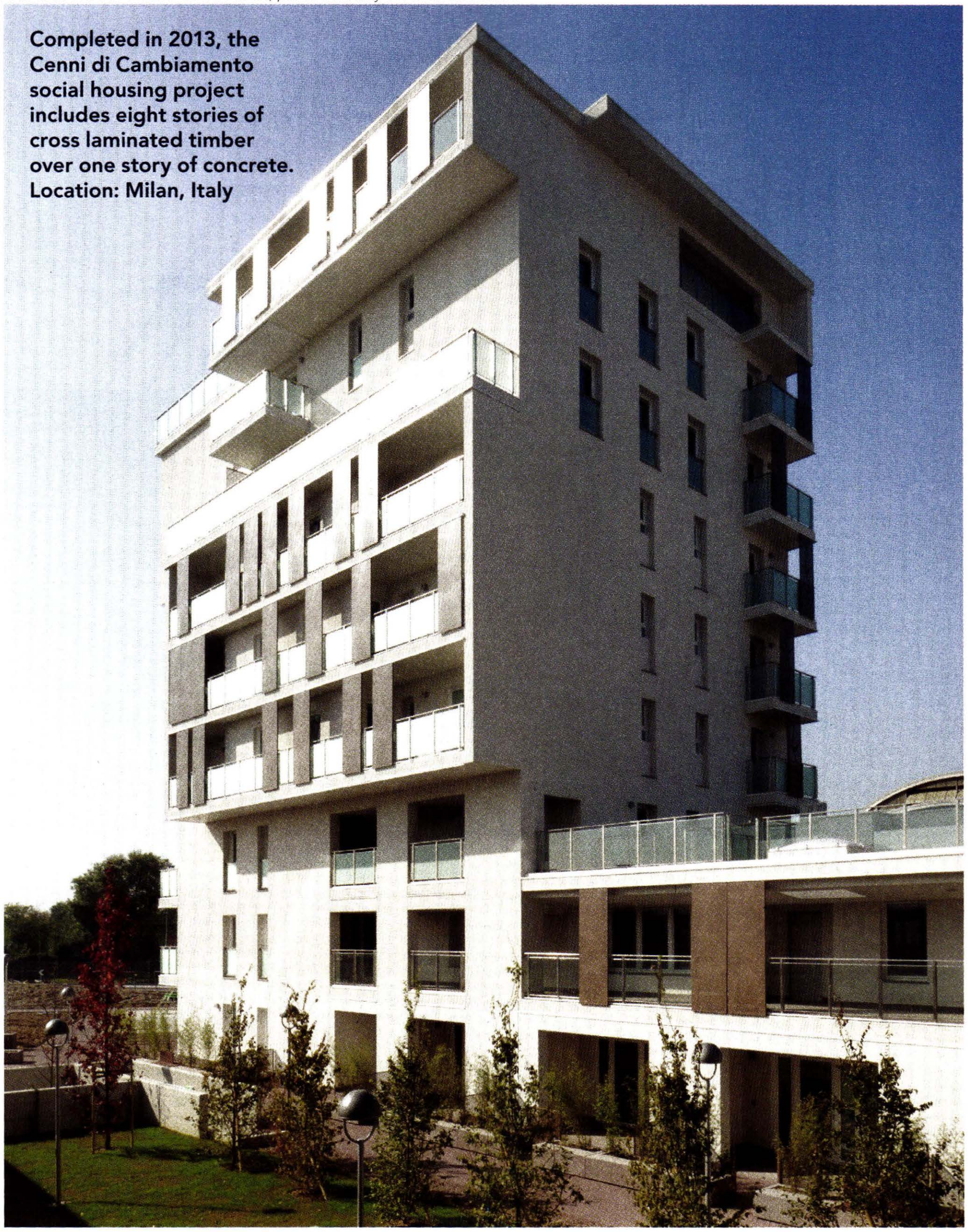
Architect: ROSSIPRODI ASSOCIATI srl; photo courtesy of Riccardo Ronchi



Completed in 2013, the Cenni di Cambiamento social housing project includes eight stories of cross laminated timber over one story of concrete. Location: Milan, Italy

of tall wood buildings are featured throughout, with an emphasis on design approaches and materials used.

THE INSPIRATION BEHIND TALL WOOD

What's driving the move to use wood in taller buildings? While cost effectiveness is usually cited as the number one reason to specify wood-frame construction, the recent *Survey of International Tall Wood Buildings*—undertaken by architecture firm Perkins+Will on behalf of the Binational Softwood Lumber Council and Forestry Innovation Investment—found that designers pushing boundaries with taller wood buildings are doing so because of innovation, market leadership, and carbon reduction. Energy efficiency and healthy indoor environments that promote a sense of well-being were found to be complementary objectives.

From an environmental perspective, wood grows naturally and is renewable. Its carbon benefits derive from the fact that wood products continue to store carbon absorbed by the trees while growing, and wood manufacturing requires less energy and results in less greenhouse gas emissions than the manufacture of other materials. Life cycle assessment studies consistently show that wood outperforms other materials in terms of embodied energy, air and water pollution, and global warming potential.[3]

However, while designers are increasingly driven by the need to find safe, carbon-neutral, and sustainable alternatives to steel and concrete, these new systems must be cost competitive in order to achieve any real market traction over the long term.

WOOD IS ...

- Strong, lightweight, and versatile
- Sustainable, natural, recyclable, renewable
- Carbon efficient, since it sequesters carbon and reduces greenhouse gases in the atmosphere
- Cost effective and abundant—easy to source locally
- Reliable, providing proven performance for seismic, wind, and other loading conditions
- Energy efficient, with lower thermal conductivity
- Warm, visually appealing, and inviting

Cost Competitive

The IBC allows five stories of wood-frame construction (plus a wood mezzanine) for most occupancy types, including multi-residential, and six stories for business. These buildings, which utilize dimension lumber and structural wood panels as well as engineered lumber components, have proven themselves to be cost-effective alternatives to light-gauge steel and concrete.[4]

Taking wood to the next level, mass timber construction uses large prefabricated wood members such as CLT, laminated veneer lumber (LVL), and laminated strand lumber (LSL) for wall, floor, and roof construction. Glulam can also be used in column and beam applications. (For more details on these products, see the online version of this course.)

From a cost perspective, mass timber products cannot compete with light wood-frame construction for most low- and mid-rise projects. Rather, engineered for strength and dimensional stability, mass timber offers an alternative to steel and concrete where light wood framing may not be applicable.

For example, the U.S. CLT Handbook says that CLT becomes more cost competitive at higher building heights or sizes, indicating that mass timber products may be an attractive choice for mid-rise, industrial, retail (one to two stories), and educational (two to three stories) buildings.

To assess the potential for taller wood structures, a recent *Study of Alternative Construction Methods in the Pacific Northwest* by Mahlum Architects compares the cost of using CLT, concrete, and steel for a 10-story building in Seattle, which the authors refer to as "low high-rise." According to the report, "Common assumptions for the Seattle market dictate that concrete is too expensive for building only slightly above midrise. Consequently, lots in certain zones may not get built out to their maximum zoning height potential."

The report concludes that a 10-story CLT building in Seattle offers an estimated 4 percent cost savings compared to a concrete alternative and a 2 percent savings over steel. However, these estimates are conservative as the study assumed cost premiums associated with the newness of CLT in the North American market and lack of familiarity among contractors.

Adding to their cost advantage, mass timber structures can generally be erected much more quickly than structures made from other materials. For example, development company Lend Lease estimates that the 10-story Forté apartment building in Melbourne, Australia (see sidebar), was built 30 percent faster because the CLT was prefabricated. Off-site panelization saves money by speeding installation, which leads to faster occupancy. Wood structures also tend to weigh less than other materials, which can reduce foundation requirements and thus foundation costs. This feature is especially important in areas with poor soil where foundation costs are already high, as was the case with the Forté project.

Project: Forté
Location: Melbourne, Australia
Architect/Developer/Contractor: Lend Lease
Completed: 2012

Photo courtesy of Lend Lease

Rising 10 stories, Forté is Australia's first CLT building and first timber high-rise.

The developer, Lend Lease, chose a conventional platform-based system for the $11-million project, which includes 23 apartments and four townhouses. Speed of construction was a huge priority. Construction began in February 2012, installation of the CLT began in May, and the wood portion of the structure was completed in August—a timeline Lend Lease estimates as 30 percent faster than concrete.

While CLT's ability to meet safety and quality requirements was fundamental to the project, Lend Lease cites its environmental benefits as a key motivation for its use. Forté is expected to be the first 5 Star Green-Star As Built-certified residential building in Australia. By using CLT, the structure is also expected to reduce carbon dioxide (CO_2) equivalent emissions by more than 1,400 metric tons when compared to concrete and steel—the equivalent of removing 345 cars from Melbourne's roads.[5]

Mark Menhinnitt, chief executive officer for Lend Lease's Australian business, says, "CLT will transform the construction industry by introducing a more efficient and environmentally friendly construction process that has never been undertaken in Australia before. By adopting green technologies, materials, and construction processes, we are closer to creating livable, sustainable cities that are climate positive."

Lend Lease reported that costs to build Forté with CLT were comparable to concrete. Going forward, the company plans to develop 30 to 50 percent of its Australian apartment projects using CLT.

SAFETY AND PERFORMANCE

While there are many advantages driving the increased use of wood in tall buildings, it is a fundamental requirement that these buildings meet the same standards for safety and performance as buildings made from other materials.

Tall Wood Fire Safety

Although fire safety is often cited as a barrier to building tall structures with wood, research shows otherwise. Mass timber buildings behave very well in fire, primarily because the wood's thick cross-section chars slowly. Once formed, char protects the structural integrity of the wood inside and prevents further degradation. In addition, mass timber systems are similar to concrete slab, solid wall, and heavy timber systems in that they tend to limit combustible concealed spaces. The solid wood panels themselves essentially form the fire-rated assemblies between building compartments, reducing a fire's ability to spread undetected.

There are two design approaches to achieving the acceptable structural passive fire protection measures in a mass timber building. Encapsulation is used to provide fire-resistance rating to timber structures, but charring is increasingly accepted around the world as a valid means of realizing reliable and safe structural performance in fire.

Encapsulation – Designers can apply one or two layers (depending on the fire assembly required by code) of fire-rated gypsum board to the underside of floors and throughout the building to reach the desired protection level. This method is similar to standard construction techniques used to construct fire-rated floor, roof, and wall assemblies in both combustible and noncombustible building types.

Charring – The solid wood members used in mass timber construction allow a char layer to form during a fire situation. This, in turn, helps insulate the remaining wood from heat penetration. The fire-resistance rating of large-size members can be calculated based on minimum structural thicknesses and the remaining sacrificial thickness available for charring. By combining modern fire suppression systems and compartmentalization, structures can be detailed to safely resist fire without encapsulation, using charring calculation methods. This eliminates the need for the gypsum board, reducing building weight and cost while showcasing the natural beauty of the exposed wood.[6]

For the WIDC project (see the online version of this course), fire protection is provided through a fully engineered approach based on charring. Rather than protecting the wood structure from exposure to fire by covering it with noncombustible material, the wood is left exposed and the required structural sections

CLT FIRE TESTING RESULTS

In October 2012, the American Wood Council (AWC) conducted a successful fire resistance test on a load-bearing CLT wall at NGC Testing Services in Buffalo, New York. The test, conducted in accordance with ASTM E-119-11a (*Standard Test Methods for Fire Tests of Building Construction and Materials*), evaluated CLT's fire-resistance properties. The five-ply CLT wall (approximately 6-7/8 inches thick) was covered on each side with a single layer of 5/8-inch Type X gypsum wallboard and then loaded to 87,000 pounds, the maximum load attainable by the NGC Testing Service equipment. The 10 x 10 foot test specimen lasted three hours, five minutes, and 57 seconds (03:05:57)—well beyond the two-hour goal.

are oversized. As a result of their increased size, these members have a "sacrificial" layer of wood; they've been calculated to char at a predictable rate in a fire in order to provide the needed level of protection.

Similarly, the fire design for the 14-story Treet (see sidebar) was based on the cross-section method of the Eurocode, which determines the residual cross-section after charring. The main load bearing system was required to resist 90 minutes of fire without collapse, and secondary load bearing systems such as corridors and balconies were required to resist 60 minutes of fire exposure. In addition to the charring calculations, fire protection measures for this project include fire painting of wood in escape routes, sprinkler systems, and elevated pressure in stair shafts.

Performance

Wood has a number of properties that make it well-suited for tall structures.

Structural/seismic – In terms of their strength-to-weight ratio, engineered wood products generally match and, in some cases, exceed the performance of reinforced concrete.[7] In addition, timber's weight is just 25 percent of reinforced concrete, placing less gravity and seismic loads on the structure and foundation.[8] Mass timber building components are dimensionally stable and rigid, creating an effective lateral load-resisting system. Extensive seismic testing has found that CLT panels perform well in multi-story applications, with no residual deformation. Tested buildings have shown ductile behavior and good energy dissipation, mainly influenced by their mechanical connections.

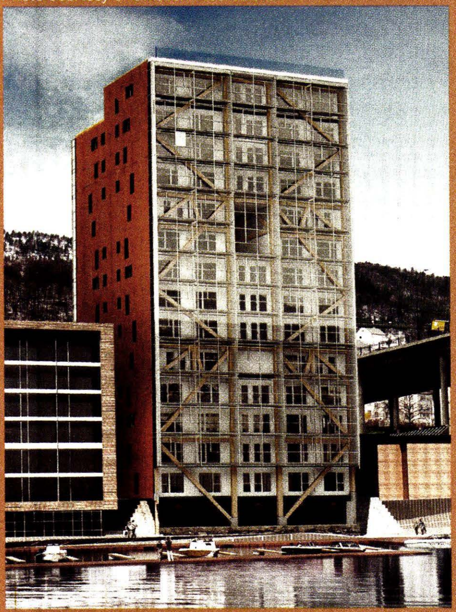
In one study, for example, researchers tested a seven-story CLT building on the world's largest shake table in Miki, Japan. Even after 14 consecutive seismic events, the building suffered only isolated and minimal structural damage.[9] Assuming an actual building performs the same as the test building, the rehabilitation and repair required following an earthquake would also be minimal.

This aspect of CLT's performance is also relevant in the context of sustainable design and, in particular, the growing emphasis on disaster resilience. As noted in the U.S. CLT Handbook, "There is a considerable advantage to having a building with the ability to quickly return to operation after a disaster and in the process minimizing the life cycle impacts associated with its repair. Based on full-scale seismic testing, it appears that CLT structures may offer more disaster resilience than those building with other heavy construction materials."

Thermal – From an energy-efficiency perspective, different materials and exposure conditions for taller buildings will dictate different—and likely more rigorous—approaches to heat, air, and moisture control than for buildings up to six stories. However, it is worth noting the unique characteristics of mass timber building systems that lend them to the design of energy-efficient structures.

Like all wood products, mass timber offers excellent thermal performance. Wood's thermal properties are determined by U-value, or coefficient of heat transfer, which relates to panel thickness. Thicker panels have lower U-values; they are better insulators and therefore require less insulation. The way in which mass timber buildings are constructed also improves its thermal performance. CLT, LVL, and LSL can be manufactured using computer numerical control (CNC) equipment to precise tolerances, so panel joints fit tightly, which can improve energy efficiency. However, while panels may offer an inherent level of air tightness, an additional air barrier is recommended. It is also critical that panel joints

Photo courtesy of Sweco/Artec/3Sekstl



Project: Treet (The Tree)
Location: Bergen, Norway
Architect: Artec
Completion: Fall 2015

While Forté has held the "tallest wood building" record since 2012, Treet—a 14-story timber-frame project in Norway—is under construction and scheduled for occupancy in the fall of 2015.

The luxury apartment building, which includes 62 residential units, a fitness center and rooftop terrace, consists primarily of load-carrying glulam trusses and prefabricated building modules made from traditional timber framing. To address potential wind loads, it also includes concrete decks on floors 5 and 10, and on the roof.

"Even though the glulam trusses are incredibly stiff, the lightness of the wood building meant that it would move more than was acceptable in high winds," says Rune Abrahamsen of the structural engineering firm Sweco. "By adding mass, the total system restricts accelerations to a maximum of 0.04 m/s^2, which is in compliance with the comfort criteria given by the ISO standard."

According to Abrahamsen, the design concept can be explained using the analogy of a cabinet filled with drawers. The glulam trusses represent the cabinet itself, and the modules are the drawers. The modules are stacked in multiples of four, or singly on the strengthened levels—i.e., on stories 1-4, 5, 6-9, 10, and 11-14.

While the interior walls, corridors, elevator shaft, and balconies are CLT, CLT is not part of the main load-bearing system. The building will be clad in glass and metal sheeting to protect the structural timber from rain and sun.

Sweco has previously done feasibility studies on two tall timber buildings in Norway—a 20-story office building and a 15-story apartment building.

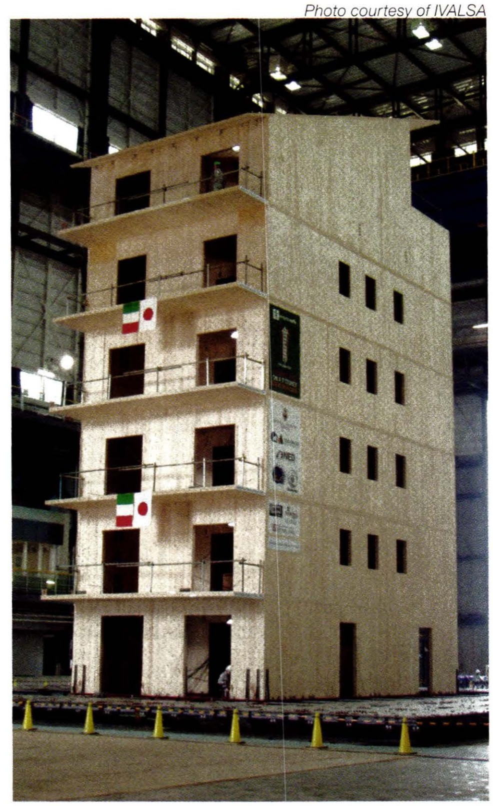
"We have found that timber high-rises are perfectly feasible from an engineering point of view," says Abrahamsen. "They also address the need for sustainable building in urban areas."

According to the project owner, the Bergen and Omegn Building Society, the wood products used in Treet will store approximately 1,000 metric tons of CO_2.

Architect: Arkitektbolaget Kronoberg; photo courtesy of Midroc Property Development

The Limnologen includes four buildings, each with seven stories of CLT over one story of concrete. Location: Vaxjo, Sweden

Photo courtesy of IVALSA



Seven-story CLT building being tested on the world's largest shake table in Miki, Japan

and interfaces as well as penetrations such as windows and doors be properly air sealed.

Acoustics – Tall buildings are often used for apartments or condominiums, where noise control is critical. Because the mass of a wall contributes to its acoustic performance, mass timber building systems provide appropriate noise control for both airborne and impact sound transmission, often without the need to add additional acoustical layers. However, as noted in the U.S. CLT Handbook, a large part of achieving acceptable acoustic performance is simply giving adequate attention to details in the design and construction of the project. This includes proper use of sealants or caulking to seal sound leaks, avoiding rigid contact between building elements where the transfer of vibrational energy between spaces is possible, and using appropriate materials (e.g., materials with sufficient mass).

Building Height Considerations

Because they use engineered wood products, mass timber buildings have minimal shrinkage over time because the moisture content of the wood used in engineered wood is typically just 8 to 10 percent. Therefore, mass timber products experience little shrinkage along the main axis of the material during the life of a building. Slightly more shrinkage can be found across the thickness of CLT material than with LSL or LVL due to CLT's solid wood composition. Therefore, platform-based CLT construction (which includes CLT floors and walls) can result in slightly more accumulative shrinkage over the height of the building than systems that rely more heavily on LVL or LSL, requiring additional consideration in the detailing of the exterior envelope.

Wood-frame structures can also shorten vertically due to loading, so designers must include design considerations to accommodate this, particularly as the buildings get taller. Possible solutions include the use of a continuous rod tie-down system with a shrinkage compensation device to limit lateral deflection and avoid wall separation under wind and seismic forces. Designers can also include expansion joints in the cladding and provisions in the mechanical systems to allow for movement. There are many design support materials that help simplify these calculations for tall wood buildings.

Code Approvals

Code-allowed height for combustible buildings varies around the world. Currently, U.S. and Canadian building codes do not explicitly recognize mass timber systems, but this does not prohibit their use under alternative method provisions.

In the next edition of the IBC, recently approved changes will streamline the acceptance of CLT buildings. In May 2012, APA published *ANSI/APA PRG 320-2011 Standard for Performance-Rated Cross-Laminated Timber*, which details manufacturing and performance requirements for qualification and quality assurance. The 2015 edition of the IBC will recognize CLT products when they are manufactured according to the standard. CLT walls and floors will be permitted in all types of combustible construction, including use as exterior bearing walls in Type IV buildings.

The 2015 IBC will also recognize the 2015 *National Design Specification® (NDS®) for Wood Construction*, which is published by the American Wood Council (AWC) and has been approved as an American National Standard by the American National Standards Institute. Available as of December 1, 2014 on the AWC website (www.awc.org), the 2015 NDS includes a number of changes relevant to mass timber, such as a new product design chapter for CLT and new provisions that explicitly permit the use of structural composite lumber (e.g., LVL and LSL) to meet fire protection requirements.

One of the primary challenges facing tall wood designers is the fact that residential buildings over six stories (and exceeding a certain total building area) are required to be of noncombustible construction; taller projects will require well-proven fire performance. Fire resistance testing confirmed that CLT exterior walls exceed the requirements for heavy timber construction. Because CLT construction typically eliminates concealed spaces, this enhances its ability to meet Type IV construction requirements.

See endnotes in the online version of this article.

Continues at ce.architecturalrecord.com

Photos courtesy of Tile of Spain

Modern ceramics easily create the look of wood in areas where natural woods might not fair the best, such as wet environments like bathrooms or kitchens.

An Ecological Basis for Selecting Ceramic Tile

Evaluating ceramic tile for use in green building projects

Sponsored by Tile of Spain

Definitions of sustainable design and green building are hardly stagnant. Every year, as the architectural profession and industrial leaders learn more about building performance, environmental challenges, and the effects of our choices on people and the planet, we add to the body of knowledge on sustainability. In this way, our standards and definitions change accordingly, hopefully getting more "ecological.

While green building tends toward many novel solutions—building integrated photovoltaics (PV), for example—the recent evolution of green thinking is playing into the hands of architects who favor time-tested and even traditional building methods. This includes niche products—rammed-earth and straw bale construction leap to mind—but also classic materials and systems including natural ventilation, brick masonry, and ceramic tile. Even the traditional manufacturing centers, such as the tile-making operations clustered in Castellón near Valencia, Spain, showcase long-established methods for more efficient construction material production.

Yet there are other changes in green building that are shifting attention to long-standing construction methods and materials. The emphasis on a more comprehensive approach to the evaluation of materials, including life-cycle analysis (LCA), is just one trend, but perhaps the most significant. Related to this is a growing language among practitioners in understanding material durability and flexibility, also called functional resilience or simply resilience. A second is the emphasis on indoor environmental quality (IEQ), which tends to favor nontoxic and inert building products, which emit fewer volatile organic compounds (VOCs), as well as finishes that physically comfort or safeguard occupants. In addition, interest in better ways to address ongoing repair and maintenance in the use phase of buildings, when most of the energy and environmental impact is felt, is a contributing factor to these revived approaches.

Interest in promulgating better standards and codes for green building is also helping expand the use of long-established and time-honored construction techniques.

One of the materials of particular focus today is ceramic tile, which is seeing a surge in

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Learning Objectives

After reading this article, you should be able to:

1. List the general environmental benefits of ceramic tile based on its technical performance.
2. Review the requirements in green building standards and describe how ceramic tile contributes to those needs.
3. Identify technical advances and innovations in the ceramic tile industry and ways to reduce consumption using ceramic tile
4. Discuss ways to reduce resource consumption, chemical emissions including VOCs, and cleaning and maintenance needs based on the properties of tile
5. Describe the modern development of ceramic tile in terms of building performance and construction benefits.

To receive 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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Advances in digital printing technology make the look of granite and natural stone possible with ceramic tile.

green applications according to trade groups such as Tile of Spain. With surviving examples of its use in construction dating to column claddings in ancient Mesopotamia as early as 900 B.C., ceramic tile is certainly a deeply established, proven construction approach. New findings from the last decade or two, however, have added modern evidence of its vital benefits for green building.

TILE APPLICATIONS AND GREEN CAPABILITIES

While the cone-shaped tiles used in Mesopotamia served as elements of column structures, over the years ceramic panels and various setting techniques have been used for interior surfaces, special occupancies (such as healthcare), and outdoor uses including paving and building cladding.

Interior wall covering and flooring dominates the interior use of ceramic tile and its market dynamic overall. From mosaic tile to subway tiles to large-format, modern ceramic panels, properly installed ceramics provide a strong and lasting finish.

Tile's resistance to water, moisture, and bacteria—thanks to ceramic tile's dense composition and often glazed finishes—has encouraged its use in wet locations such as lobbies, foodservice areas, kitchens, restrooms, gymnasiums, hospitals, natatoriums, and more. Studies of microbiological growth show that ceramic and porcelain tile actually reduce bacteria, mold, and mildew in these areas when properly installed.

The inherent strength of tile surfaces has also opened doors for reuse opportunities. One of the most valuable in recent years is the advent of slim porcelain and ceramic tiles, which range from 3mm to 7mm in depth, some of which are even suitable for flooring installations for tile-over-tile retrofits using the original tile as a substrate. In addition to saving project time and cost, this technique obviates both the heavy tile construction waste as well as the need for new virgin or recycled materials for use in replacing the subfloor. The tile surface is stable and strong enough for point loads as well as typical environmental variations.

As flooring, ceramic tile offers a very resilient and protective finish, making it ideal for high-traffic zones, places where long-term aesthetics are important, and specialty interiors, such as healthcare settings, where cleanability and hygiene are concerns. In locations with direct ultraviolet (UV) exposure from sunlight and the potential for reconfiguration, tile demonstrates its resilience, durability, and flexibility. "Because ceramic tile will not fade due to UV light, the reconfiguration of spaces is much easier since furniture, rugs, or even cosmetic interior walls can be moved without the worry of light and dark patches of flooring," says Ryan Fasan, a consultant to the Coral Gables, Florida-based trade group, Tile of Spain.

The inherent durability of porcelain and ceramic tile has attracted sustainable design adherents to their use in high-traffic, high-use areas. Novel tile designs that mimic wood and stone finishes offer the look of another natural surface with today's expected engineered performance. Other finishes may have a lower initial cost, but a tile installation can be amortized over a very long lifespan. An LCA study by the Tile Council of North America (TCNA) comparing popular finish materials showed ceramic tile to be the lowest cost option for timeframes up to 40 years.

GREEN REASONS FOR CERAMIC TILE

Specialty contractor Studio Tile & Stone of Melbourne, Florida, lists ceramic tile's positive impacts in a number of areas, including:

INDOOR ENVIRONMENTAL QUALITY
Resistant to fungus, mold, and mildew.
Inherently nontoxic and inert.
No emissions or off-gassing.
Uses nontoxic adhesives.
No sealing or stripping required.

ROBUST, DURABLE MATERIALS
No absorption of water.
Used in hygienic locations.
Resists fire, flame, and heat.
Resists chemicals, caustics, and corrosives.
Moisture and freeze resistant.

REDUCED OPERATIONAL IMPACTS
Cleanable using water only.
Does not require professional cleaning.
Not affected by ultraviolet (UV) light.
Retains color permanently.
Resists insects and pest damage.

OCCUPANT COMFORT AND HEALTH
Cool surface for warm climates.
Improves thermal comfort (TC).
Increases thermal mass.

RESOURCE BENEFITS
Made of plentiful materials, such as clay.
Can be made with recycled materials.
Recyclable at end of use.
Very good life-cycle analysis (LCA) profile.

Continues at ce.architecturalrecord.com

Edited by C.C Sullivan in collaboration with Tile of Spain

Originally published in the October 2012 issue of Architectural Record


this architecturally exposed cast steel node
supports a load of more than 20-Million pounds in the
Queen Richmond Centre West, Toronto
CASTCONNEX®
innovative components for inspired designs
CIRCLE 52

Photo courtesy of CAST CONNEX

Architecturally exposed structural steel used on buildings of all types can now also be true design statements due to the availability of cast steel connectors in the U.S. and Canada.

tructural Steel Cast nnections

gant solution for architecturally exposed structural at can also provide cost savings

CAST CONNEX | *By Peter J. Arsenault, FAIA, NCARB, LEED AP*

el has been a material of ide variety of building er 100 years due to its ight and excellent he industry ion of structural steel n and erection of steel 's time and created a y accessed network and individuals. benefits of this t allows a certain freedom while s. This has ng design design ires special able not nbers, but particularly at the connection points. Those connections can often be characterized by an array of bolts, stiffener plates, welds, and other structurally necessary elements which produces an aesthetic that, if left unspecified, is more utilitarian than artistic. Happily, that is no longer the case when the decision is made to use cast steel components. Standardized or custom cast connectors are readily available which provide dramatic geometric freedom in structural steel shapes, thereby enabling artistic designs to be realized.

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. Investigate the design potential and innovative opportunities that steel castings can contribute to architecturally exposed structural steel (AESS) applications.
2. Identify and recognize the various steps involved in the casting manufacturing process including industrial design, detailing, tooling, casting, and machining, and to understand and accommodate the lead times associated with custom castings.
3. Differentiate between the various common types of cast steel connections and their appropriate uses in different settings.
4. Assess through case studies how steel castings have been used in structural design to maximize architectural benefits, simplify fabrication, and speed erection.

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anniversary this year. For
...n, visit grahamfoundation.org.

...es Paintings:
...and Still Lifes

...City
...ecember 31, 2014

...w for the first time in New York, over 60 ...rks by renowned architect and designer ...nael Graves comprise the inaugural exhibi-...on at Studio Vendome, a new gallery for ...rchitecture and design. Graves gathers inspi-ration for his landscapes from his travels, memories, and the built environment, and then explores his personal perceptions through experimentation with form and color on canvas. From sprawling vistas and floral arrangements to classical architecture and antiquities, Graves paints from present and imagined realities. For more information, visit studiovendome.org.

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New and Upcoming Exhibitions

One Way: Peter Marino
Miami Beach, Florida
December 4, 2014–May 3, 2015
American architect Peter Marino has been celebrated over the past four decades for his forward-thinking work, which exists at the intersection of art, fashion, and architectural design. Curated by Jérôme Sans, this exhibition, at the Bass Museum of Art, explores the interplay between Marino's iconic architectural designs and his personal collection of contemporary art, which includes pieces by Loris Gréaud, Keith Haring, Richard Serra, Rudolf Stingel, and Andy Warhol. A handful of artists, including Gregor Hildebrandt, Guy Limone, Farhad Moshiri, Jean-Michel Othoniel, and Erwin Wurm, will also present new work commissioned for the exhibition. For more information, visit bassmuseum.org.

Sink or Swim: Designing for a Sea Change
Los Angeles
December 13, 2014–May 3, 2015
Through the work of a select group of architectural, fine art, and news photographers, *Sink or Swim* casts an eye on both the problem of climate change in densely populated coastal regions and contemporary design as a means to navigate the changing landscapes. It explores the story of resilience, from adaptation for human survival to ambitious infrastructure planning, in some of the world's richest and poorest coastal communities. Curated by architecture writer and radio host Frances Anderton with the Annenberg Space for Photography, *Sink or Swim* features newly commissioned and archival works by photographers Iwan Baan, Stephen Wilkes, Paula Bronstein, Jonas Bendiksen, and Monica Nouwens. Images show highly complex coastal flood mitigation in the Netherlands, controversial sea walls in Japan, and innovative homes and community buildings by leading architects including Thom Mayne, Toyo Ito, and Shigeru Ban. For more information, visit annenbergspaceforphotography.org.

Ways to Modernism: Josef Hoffmann, Adolf Loos, and Their Impact
Vienna
December 17, 2014–April 19, 2015
With *Ways to Modernism: Josef Hoffmann, Ad Loos, and Their Impact,* legendary works o Hoffmann and Adolf Loos offer an imp portrayal of the development of Vien modernism into a global brand. Th designers developed contrary alte modernity in art, architectu and their work will be shown in t lowing viewers to draw comparisons be their approaches. *Ways to Modernism* not only focuses on the thinking and key works of these two visionaries, but also the historical background of their ideas and their continued resonance in works by internationally renowned architects and designers to this day. In addition to the late œuvre of Hoffmann and Loos, the exhibition features works by Oskar Strnad, Josef Frank, Margarete Schütte-Lihotzky, Atelier Singer-Dicker, Bernard Rudofsky, Hans Hollein, Hermann Czech, Lacaton & Vassal, Werner Neuwirth, and Anna Heringer. For more information, visit mak.at.

Ongoing Exhibitions

Experiments in Environment: The Halprin Workshops, 1966–1971
Chicago
Through December 13, 2014
In the late 1960s, American landscape architect Lawrence Halprin and avant-garde dan pioneer Anna Halprin organized a series experimental, cross-disciplinary worksh San Francisco and along the coast of n California that brought dancers, arc environmental designers, artists, a together to facilitate collaboratio creativity through new approac mental awareness. Organized Architectural Archives of th Pennsylvania, this exhibit documentation of the wc for the first time, as we and original photogr sites at Kentfield an celebrates its 50th more informatio

Michael Grav Landscapes
New York
Through D
On vie artwc Mic' tic

Olson Kundig: Anthology
Omaha
Through January 3, 2015
This exhibition at Kaneko focuses on Olson Kundig Architects' creative process, showcasing the artistic, historic, and cultural influences and the explorations that have shaped their practice. *Olson Kundig: Anthology* provides a sampling of the design efforts of the firm's partners—Jim Olson, Tom Kundig, Kirsten Murray, and Alan Maskin—and highlights more than 50 years of production and the thinking behind the practice through displays that portray the values, methodologies, and attributes that characterize the firm's work. For more information, visit olsonkundig.com.

Drawing Ambience: Alvin Boyarsky and the Architectural Association
St. Louis
Through January 4, 2015
As longtime chair of the Architectural Association in London and one of the most influential figures in 20th-century design education, Alvin Boyarsky argued that architecture was not only a profession but also an artistic venture—an open, wide-ranging practice that comprises drawing and publication as much as it engages design and construction. The Mildred Lane Kemper Art Museum at Washington University presents the first public exhibition of drawings from Boyarsky's private collection. For more information, visit wustl.edu.

Mackintosh Architecture
Glasgow
Through January 4, 2015
The result of a four-year research project led by The Hunterian at the University of Glasgow, *Mackintosh Architecture* is the first major exhibition devoted to Mackintosh's architectural work, featuring more than 80 architectural drawings, films, models, and archival material from The Hunterian and collections across the UK. The exhibition features three displays that showcase Mackintosh's skills as a draftsman and designer, including his travel sketches and still lifes. At the Hunterian Art Gallery. For more information, visit glasgow.ac.uk/hunterian.

"Make a Joyful Noise": Renaissance Art and Music at Florence Cathedral
Atlanta
Through January 11, 2015
Three marble panels from Italian sculptor Luca della Robbia's famed organ loft created for Florence Cathedral travel to the High Museum of Art, their first time in the U.S. The High's exhibition places these panels in an environment like that for which they were originally created by displaying them with other musical objects, including hand-decorated choir books from the cathedral and a lectern designed to hold them. For more information, visit high.org.

Assembled Realities: Jeff Chien-Hsing Liao's New York
New York City
Through February 15, 2015
A portrait of New York as seen through more than 40 large-scale panoramic photographs of the city's urban landscape, *Assembled Realities* features work by Taiwanese artist Jeff Chien-Hsing Liao, who came to New York at age 18 to study photography. Pushing the boundaries of traditional documentary photography, Liao creates large-scale panoramas by combining multiple exposures of the same location taken over the course of several hours. At the Museum of the City of New York. For more information, visit mcny.org.

Found in Translation: Palladio–Jefferson
Montreal
Through February 15, 2015
Found in Translation: Palladio–Jefferson presents recent work by the documentary and architecture photographer Filippo Romano. The exhibition presents a visual narrative tracing the principles of 16th-century Italian architect Andrea Palladio

(1508–1580) as they appear in buildings designed by American President and architect Thomas Jefferson (1743–1826), who saw Palladio's work as a model for architecture for the newly independent United States. The project attempts to shape a less conventional perspective on Palladio—whose buildings are among the most photographed in history—while also revealing the conditions of dissemination and translation behind Jefferson's adaptations of Palladio's *I Quattro Libri dell'Architettura* (*The Four Books of Architecture*) two centuries after they were written. Conceived with the architecture historian and director of the Palladio Museum, Guido Beltramini. For more information, visit cca.qc.ca.

The Architectural Image, 1920–1950: Prints, Drawings, and Paintings from a Private Collection
Washington, D.C.
Through May 3, 2015
Between 1920 and 1950, architecture changed more profoundly and more rapidly than during any similar timespan in history. The changing tastes, theories, and obsessions of that era were often documented by prominent artists who found architecture and construction to be compelling subject matter. The National Building Museum is currently presenting an exhibition of 70 prints, original drawings, and paintings from this fertile period in architectural history, all drawn from the collection of David M. Schwarz, a prominent Washington, D.C., architect. The works reveal an enduring fascination with architectural and engineering imagery and offer glimpses into the artists' personal impressions of the built environment. Included in the exhibition are works by artists Howard Cook, Louis Lozowick, and Charles Turzak. For more information, visit nbm.org.

Sagrada Familia—Gaudi's Unfinished Masterpiece: Geometry, Construction and Site
New York City
Through May 8, 2015
The Bernard and Anne Spitzer School of Architecture at City College of New York is hosting an exhibition of Antoni Gaudi's Sagrada Familia in its Atrium Gallery. The exhibit includes several architectural models and casts used in construction, and showcases the three-dimensional computer-imaging software used to analyze and draw precise tridimensional geometry. For more information, visit ssa1.ccny.cuny.edu.

Uneven Growth: Tactical Urbanisms for Expanding Megacities
New York City
Through May 10, 2015
As the world's population approaches 8 billion, city authorities, urban planners and designers, economists, and many others will have to join forces to ensure that expanding megacities remain habitable. To engage this international debate, *Uneven Growth* at the Museum of Modern Art showcases the work of six interdisciplinary teams who present new architectural possibilities for global metropolises Hong Kong, Istanbul, Lagos, Mumbai, New York, and Rio de Janeiro. The resulting proposals show how emergent forms of tactical urbanism can respond to alterations in the nature of public space, housing, mobility, and other issues in near-future urban contexts. For more information, visit moma.org.

Lectures, Conferences, and Symposia

IIDEXCanada
Toronto
December 3–4, 2014
IIDEXCanada, the National Design and

Architecture Exposition & Conference of Canada, brings together multidisciplinary design and architecture communities. The conference celebrates creativity and best practices in all areas of design, including interior design, architecture, landscape, lighting, textile, and material, and for health care, hospitality, institutions, education, workplaces, retail, and industry. Registration is required for access to the conference and exhibit hall. For more information, visit iidexcanada.com.

Design Miami/
Miami Beach, Florida
December 3–7, 2014
A global forum for design, Design Miami/ brings together the most influential collectors, gallerists, designers, curators, and critics from around the world in celebration of design culture and commerce. More than a marketplace for design, the fair is where international galleries gather to present exhibitions of 20th- and 21st-century furniture, lighting, and objets d'art. Each show balances commercial opportunities with cultural programming. There are panels and lectures from luminaries in the fields of design, architecture, art, and fashion, and commissioned works by emerging and established designers and architects. For more information, visit designmiami.com.

Competitions

Official U.S. Presentation at 2016 Venice Biennale of Architecture
Submission deadline: December 9, 2014
The Department of State's Bureau of Education and Cultural Affairs is sponsoring an open grant competition to organize the official U.S. representation at the 15th International Venice Architecture Biennale, which will take place from June through November 2016. The architecture exhibition is a showcase of each nation's leading ideas in contemporary architecture and planning. Proposals will be accepted from U.S.-based nonprofit organizations, including museums, galleries, visual and design arts centers, and schools of design and architecture. For more information, visit grants.gov.

The Rudy Bruner Award for Urban Excellence
Submission deadline: December 9, 2014
The Rudy Bruner Award for Urban Excellence (RBA), a program of the Bruner Foundation, is a biennial award that celebrates urban places distinguished by quality design, and their social, economic, and contextual contributions. This award supports projects offering creative placemaking solutions that transcend the boundaries between architecture, urban design, and planning, in addition to displaying innovative thinking about American cities. Projects must be realized (site visits are required) and located in the continental United States to be eligible. For more information, visit brunerfoundation.org.

2015 Modernism in America Awards
Early submission deadline: January 9, 2015
DOCOMOMO US invites submissions for the 2015 Modernism in America Awards. The awards recognize building owners, design teams, and advocacy/preservation organizations that have made significant efforts to retain, restore, and advocate for the aesthetic and cultural value of modern buildings, structures, and landscapes built in the United States or on U.S. territory. Awards will be presented in the following categories: design (residential, commercial, and institutional/civic architecture), inventory/survey, and advocacy. For more information, visit docomomo-us.org.

Folly 2015

Submission deadline: January 12, 2015

The Architectural League and Socrates Sculpture Park invite emerging architects and designers to submit proposals for Folly, an annual design/build studio program during March and April 2015 leading to a public exhibition opening in early May 2015 at Socrates, a waterfront park. Applicants are encouraged to visit Socrates, located in an industrial area of Long Island City, Queens; proposals should address the site's rugged urban environment. Both individuals and firms may apply. For more information, visit archleague.org.

International Architecture Awards

Registration deadline: January 15, 2015

This program seeks to reward design excellence from all over the world. Prominent architects act as jury members to choose the most notable built or conceptual work in the fields of architecture, landscape/urban design, and interior design. There are 36 categories, and judges will select three winning projects from each for a total of 108 awards. The categories range from commercial and institutional projects to private residences. For more information, visit architecturepodium.com.

International Wildlife Center Competition

Registration deadline: January 16, 2015

Kruger National Park is the largest game reserve in South Africa and is one of the largest national parks in the world. Architecture students and graduates from 2012 or later, from around the world, are eligible to participate in an ideas competition to design a visitor center and educational space on the grounds of the park. Proposals can be submitted individually or as a team (maximum of four members). The winners will be selected by a jury that includes Nathalie de Vries, Federico Soriano, and others. For more information, visit arquideas.net.

Ceramics of Italy Tile Competition

Submission deadline: February 3, 2015

Now in its 22nd year, this contest is open to North American architects and designers who use Italian ceramic tiles in their institutional, residential, and commercial/hospitality spaces. Ceramics of Italy is looking for all types of inspiring projects featuring Italian ceramics. Domestic and international new construction and renovation projects completed between January 2010 and January 2015 are eligible for entry. Multiple submissions are permitted. Winners will receive $4,000 and a five-day trip to Bologna to attend CERSAIE 2015, the world's largest exhibition of ceramic tile and bathroom furnishings. For more information, visit tilecompetition.com.

E-mail information two months in advance to recordevents@mcgraw-hill.

snapshot

PROJECT **MARKTHAL ROTTERDAM**
LOCATION **ROTTERDAM**
DESIGNERS **MVRDV**

BEYOND ITS demure exterior, which is clad in the same gray stone that paves the adjacent square, the Markthal Rotterdam, like a ripe fruit sliced open, reveals its rich offerings inside. The hall is the result of a city competition to combine housing and parking with a covered market, in hopes of activating the historic Laurenskwartier neighborhood. "The Netherlands has no market culture, so we're trying to breed that and update it," explains MVRDV principal Winy Maas. The team took the model of an emporium flanked by two housing blocks and flipped it, creating an arched concrete volume that holds 228 apartments, some with surprisingly placed windows looking down to the lively market floor below. Animating the 130-foot-high, 400-foot-long vault is *Horn of Plenty* by local artists Arno Coenen and Iris Roskam. The work, a high-resolution digital print, is applied to thousands of perforated aluminum panels and, in referring to 17th-century Dutch still life, depicts a surreal world of supersize produce and insects. "This pop environment was our dream," says Maas. "It's a piece of urbanism more than it is a piece of architecture, because it gives space to the people."
—Beth Broome

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View additional images at architecturalrecord.com.