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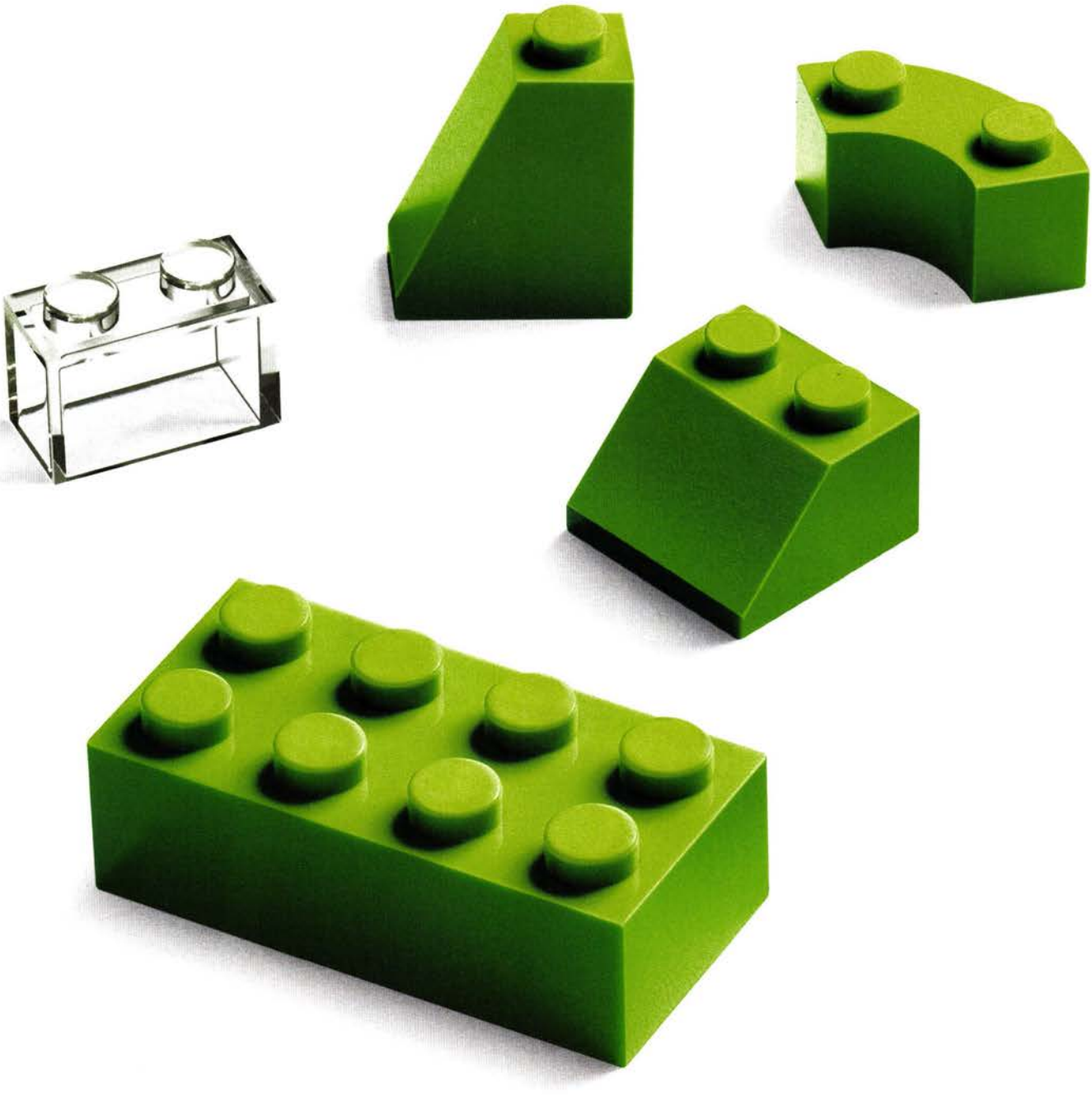

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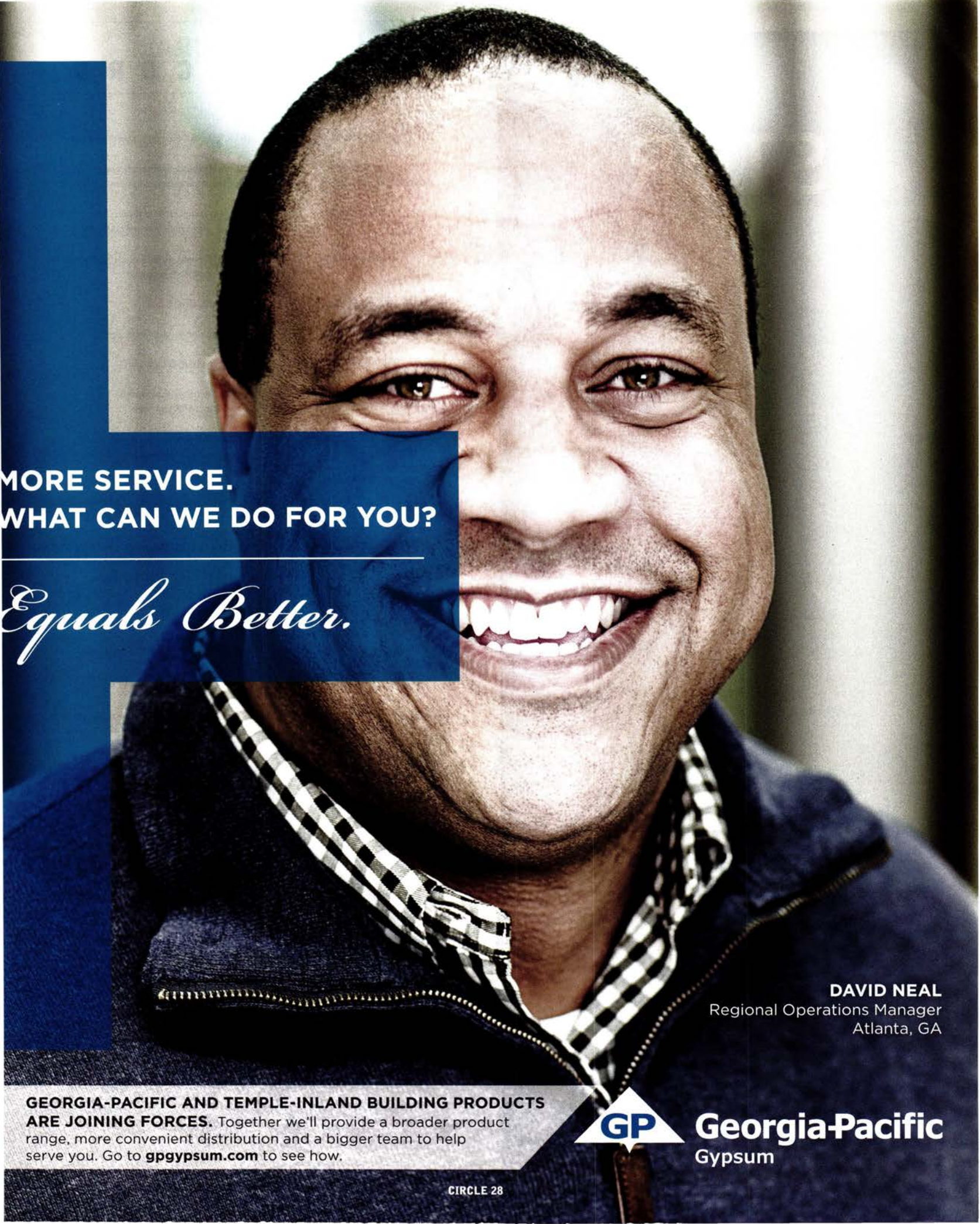
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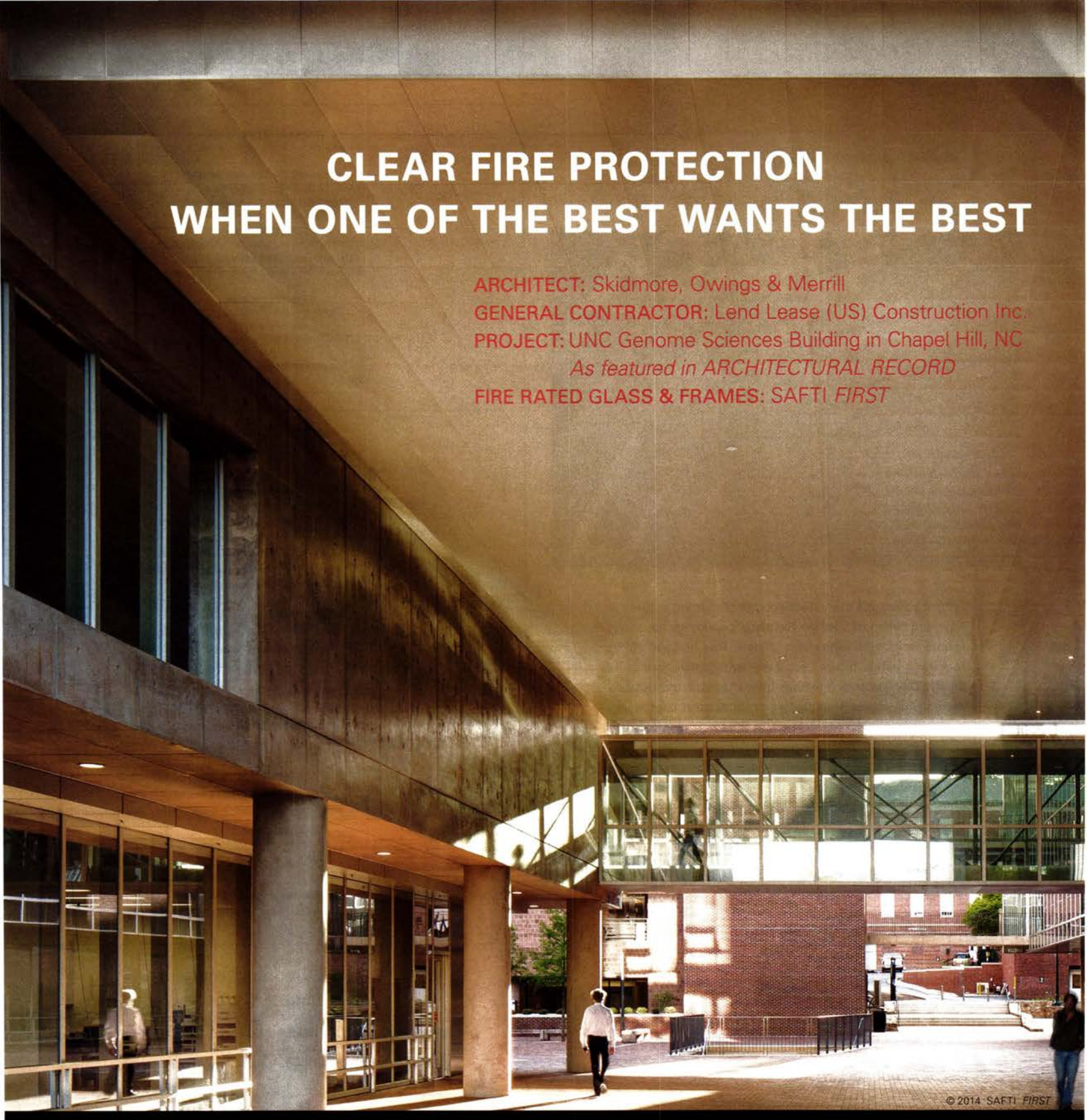

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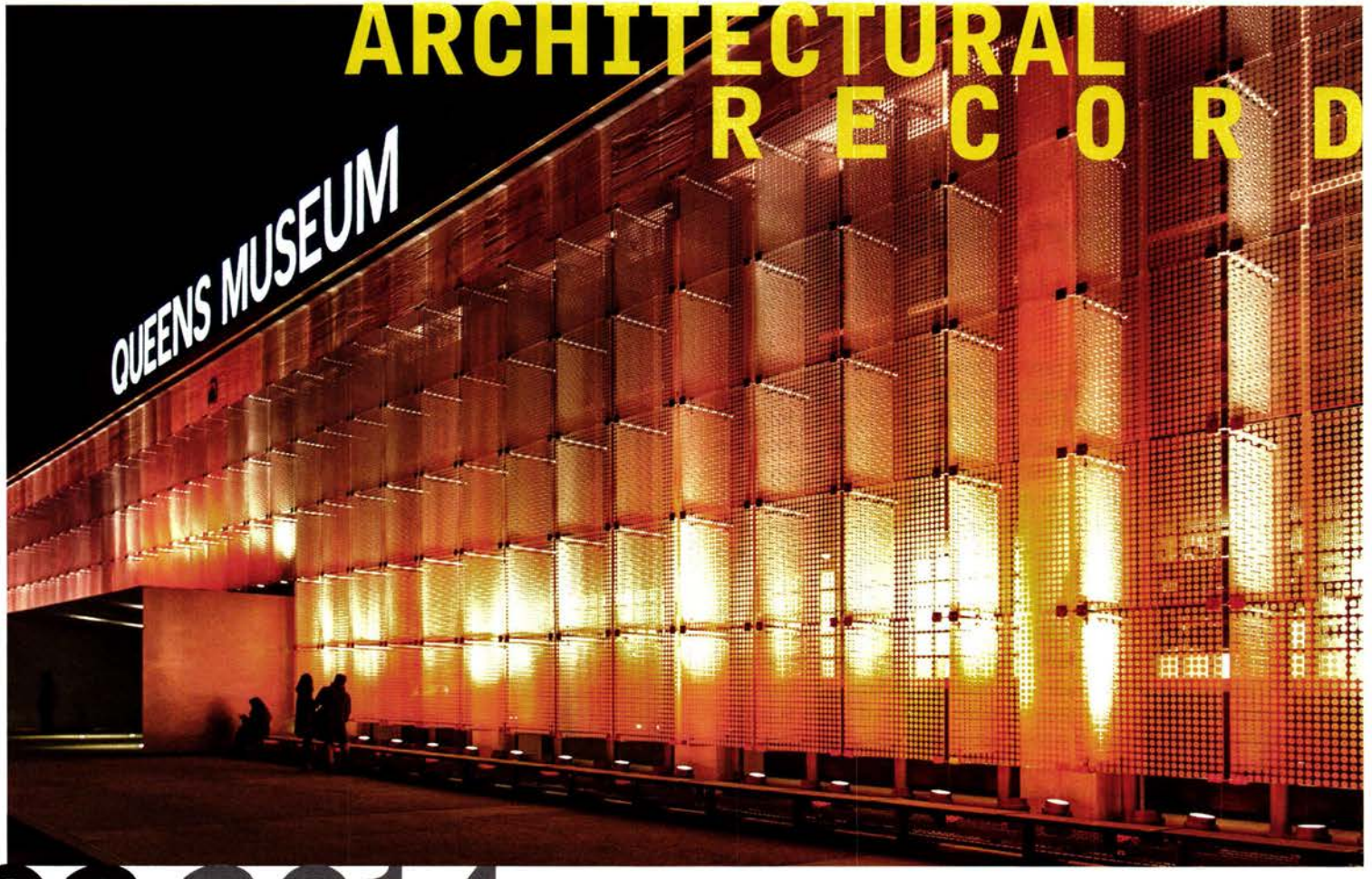

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R.I.P., Folk Art Building

MoMA rushes to raze Midtown Manhattan gem.

IN THIS ISSUE, RECORD features projects by architects who give new life to old buildings through thoughtful renovation or adaptive reuse. Unfortunately, that kind of creative thinking wasn't brought to bear to save the acclaimed former home of the American Folk Art Museum from demolition. Designed by Tod Williams Billie Tsien Architects, and opened in late 2001, this little gem in Midtown Manhattan—six stories high and only 40 feet wide, echoing the scale of the townhouses that once lined the block—is in the way of a planned expansion of its mega-neighbor, the Museum of Modern Art. To bail out the debt-burdened American Folk Art Museum in 2011, MoMA bought the building, with its tough and stunning facade of bronze panels—and then announced, last April, that it would tear it down. The news unleashed a firestorm of outrage from critics and design fans. MoMA officials, apparently taken by surprise, backed off—temporarily—and hired Diller Scofidio + Renfro (DS+R) to study how the museum could expand and possibly incorporate the Folk Art building into its future plans.

Last month, at DS+R's New York office, the architects announced it was "not a logical possibility" to save the building (page 19). MoMA plans to expand galleries into three floors of a future commercial skyscraper down the block, designed by Jean Nouvel, and if the Folk Art building stays put, it would make linking the museum's current complex to the new galleries too difficult, DS+R and MoMA maintain, and inadequate for the hordes of expected visitors.

MoMA officials may have thought that DS+R's deft display of drawings and graphics to back up their decision would take the sting out of the news, especially as delivered by Elizabeth Diller, one of the profession's most artful presenters. And surely they trusted that unveiling DS+R's designs for the future MoMA—which target some of the problems that currently bedevil the museum—would be greeted so enthusiastically that the blow of losing a significant work of contemporary architecture would be softened.

But almost no one is applauding. Nearly every major architecture critic has excoriated MoMA—the first museum in the world to establish a department of architecture and design—for its failure of stewardship in maintaining the Folk Art building in some form.

Beyond that, DS+R's bland, corporate-looking designs have come under attack. In fairness, these images are early schematics that attempt to address the museum crowds (3 million visitors a year), the circulation bottlenecks, and the long trek to get from the front door to the art. The architects are pushing a more urbane, public-friendly agenda: already MoMA is opening its sculpture garden free of charge beginning next summer (though the plan could backfire if this sanctuary in the city becomes jammed and littered with cardboard coffee cups).

Having concluded that the Folk Art site should be swept clean, DS+R had a proposal at the ready to put in its place: the Art Bay, a lofty, flexible space for free exhibitions, performances, and what Diller described as spontaneous events. That space and another unprogrammed one above it are intended to break down barriers across art disciplines at MoMA and further promote an antielitist culture.

For architects to provoke an institution into new ways of thinking is a good thing. But as cool and current as these ideas seem, have they been thoroughly explored for MoMA's long-term future? Despite the supposed limitations of its existing facility, the museum has been able to present such major multimedia events as Doug Aitken's *Sleepwalkers* in 2007 and Marina Abramović's *The Artist is Present* in 2010. Should opportunities for more audience-building and communal spectacle take precedence over the far more complex challenges of improving the visitor experience for deeply engaging the artworks in the unsurpassed collection?

MoMA doesn't have a great track record for planning its future. The $500 million expansion designed by Yoshio Taniguchi—now considered so flawed—has been open less than ten years.

Most important, the new undercooked plans don't begin to justify destroying Williams's and Tsien's building, whose intimate interior conceivably could be adapted for small exhibits, study, or archives.

Meanwhile, though no construction timeline or fundraising plan has been announced, MoMA is rushing to tear down the Folk Art Museum building—as early as this spring, according to director Glenn D. Lowry. That seems rash. Surely some of MoMA's trustees are surprised and troubled by the powerful criticism mounting against the museum. MoMA should hit the pause button and reconsider such irrevocable action. ■

Cathleen McGuigan

Cathleen McGuigan, Editor in Chief

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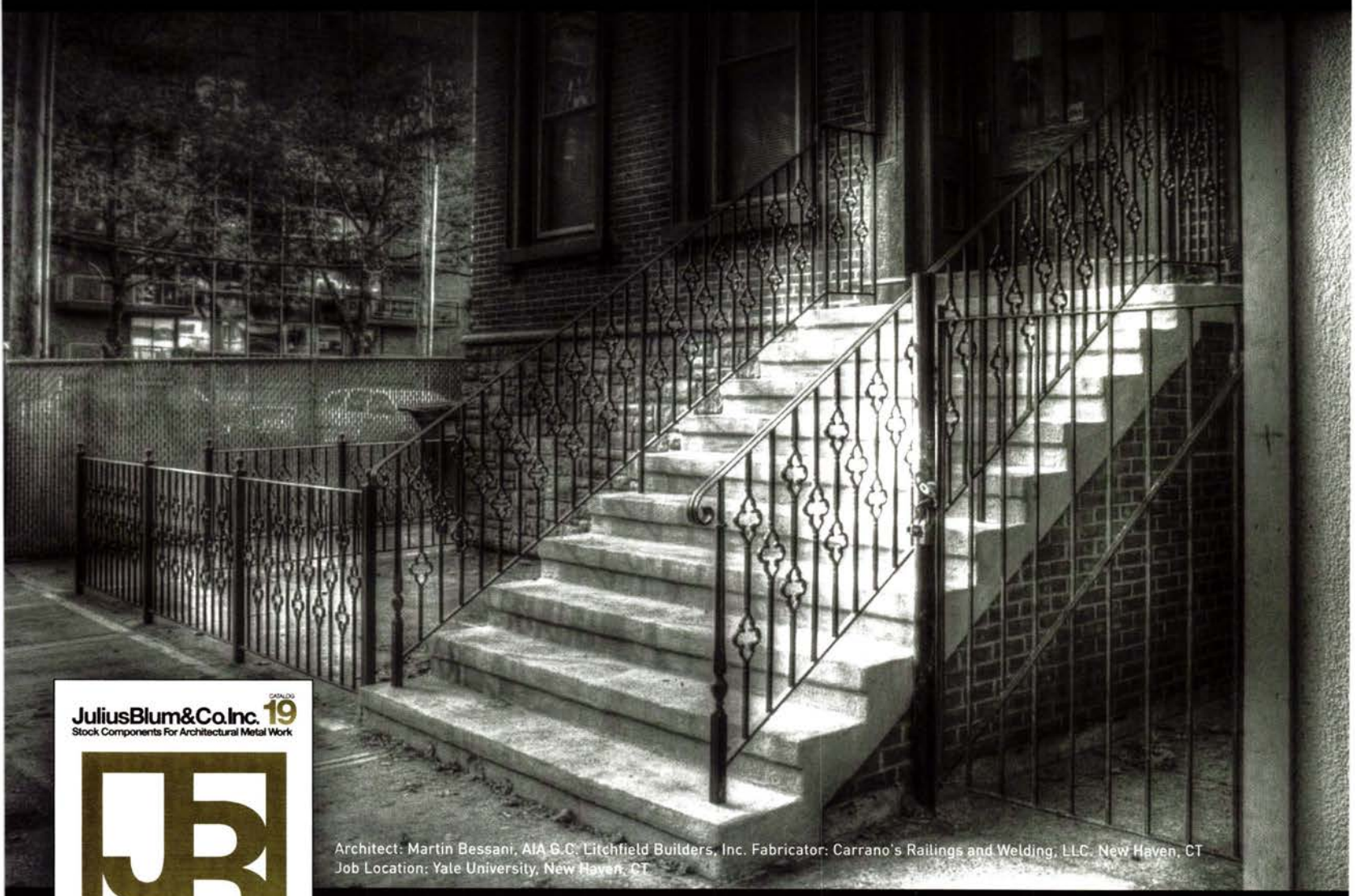

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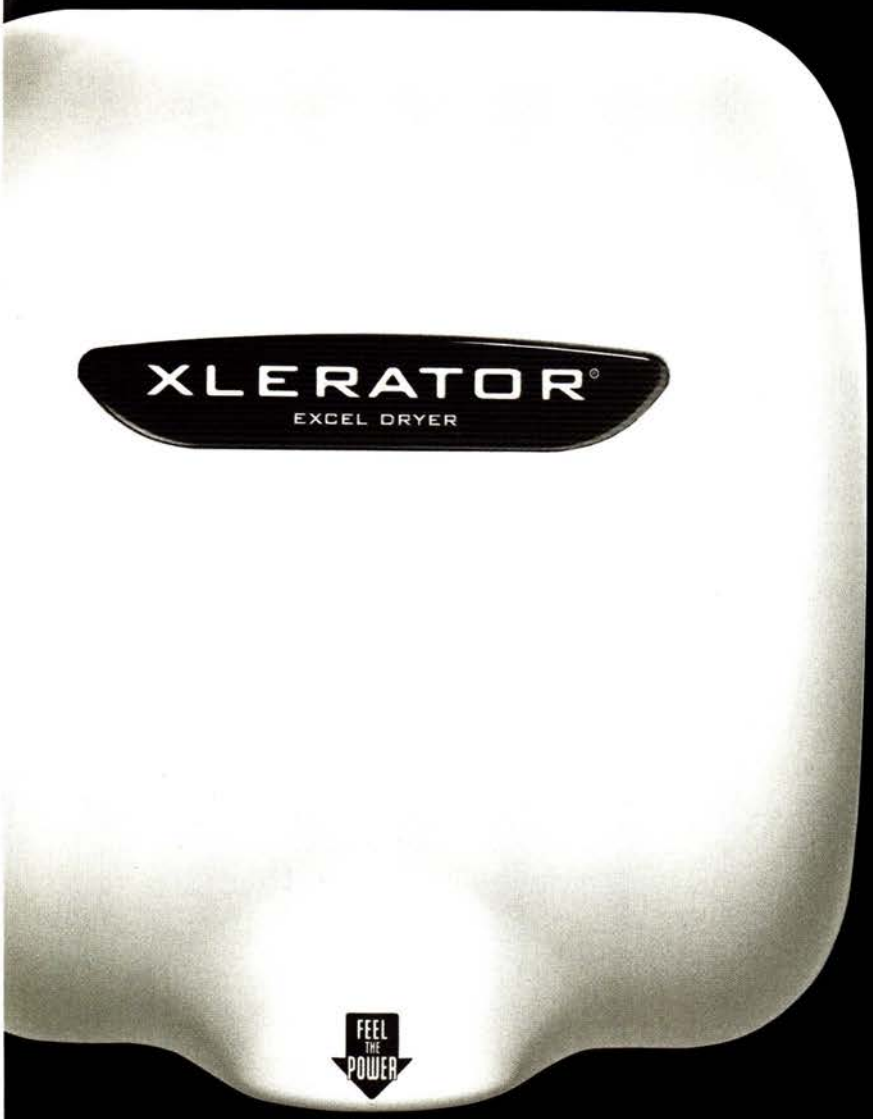

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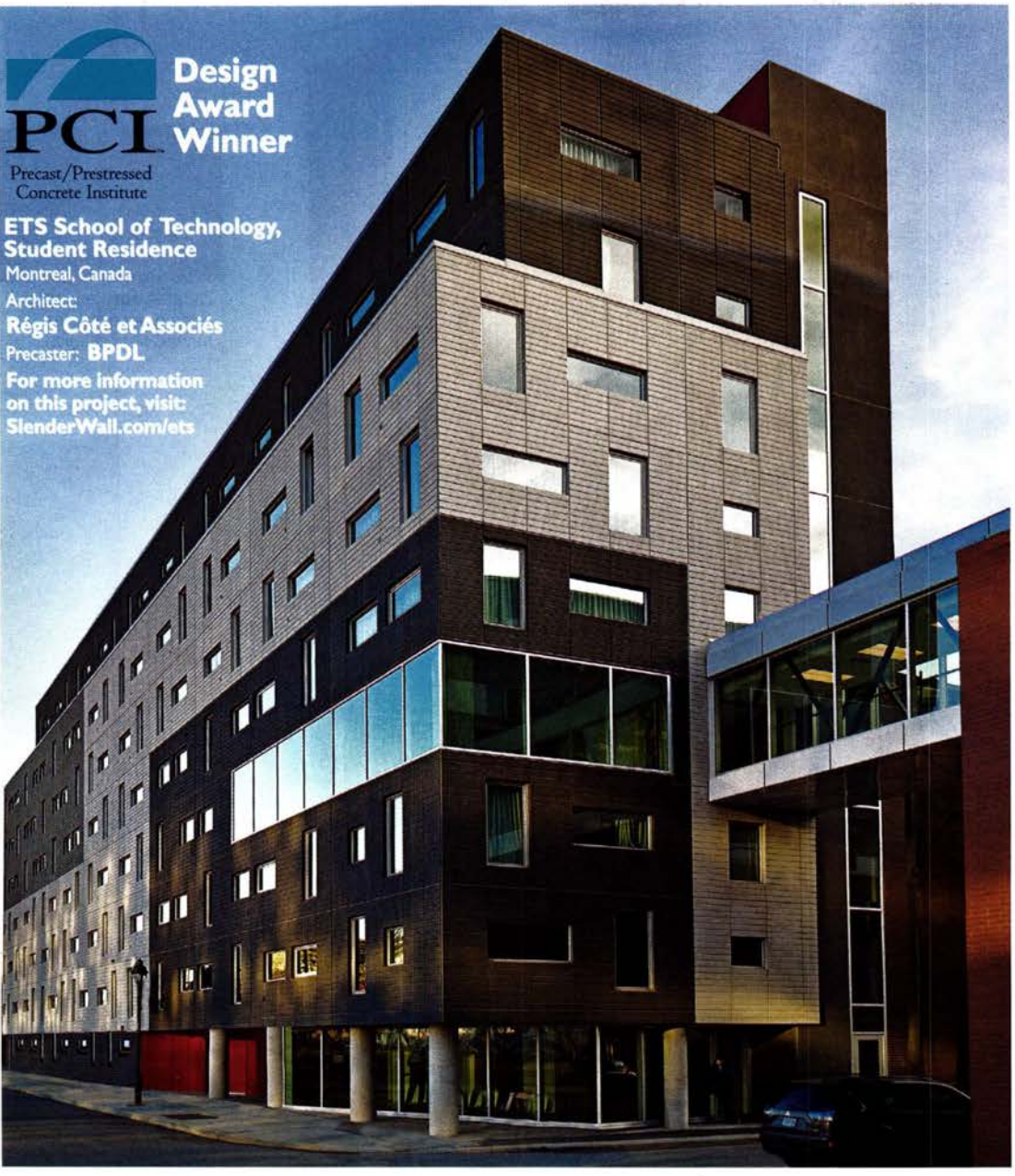

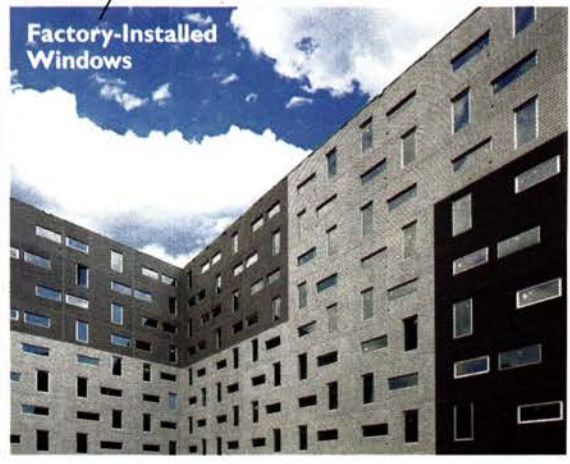

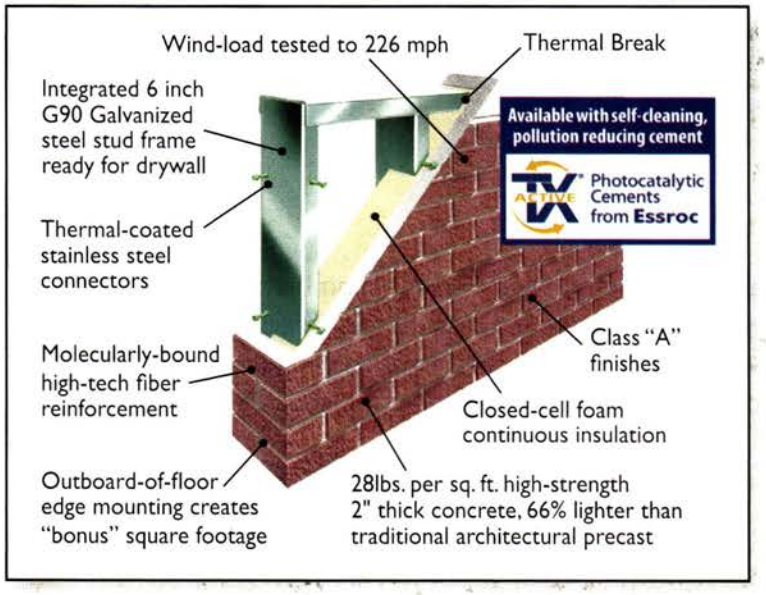

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–Critic Michael Kimmelman, describing Christian de Portzamparc's One57, The New York Times, *December 22, 2013*

MoMA to Demolish Tod Williams Billie Tsien Folk Art Building After All

BY CATHLEEN MCGUIGAN AND LAURA RASKIN

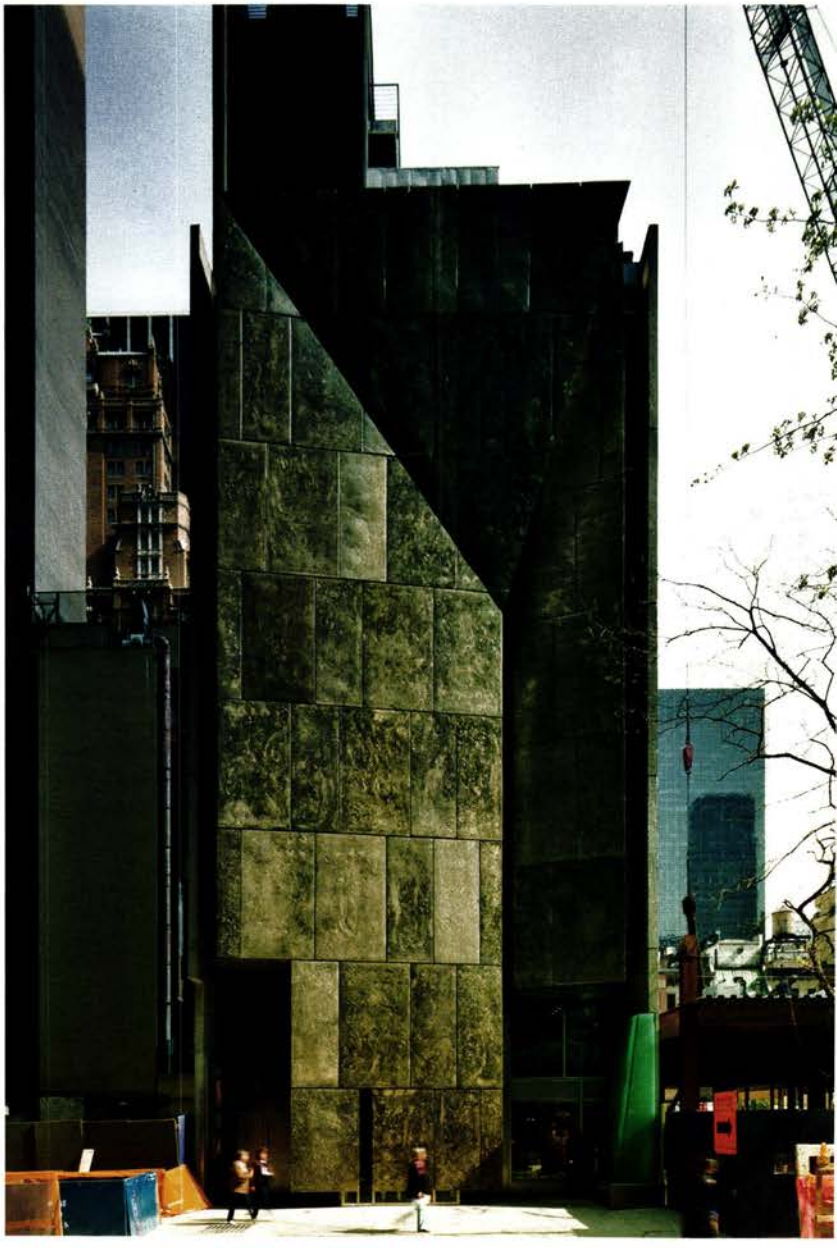
THE MUSEUM of Modern Art (MoMA) announced in January that, in its next phase of expansion, it will tear down the 2001 American Folk Art Museum building designed by Tod Williams Billie Tsien Architects. The Folk Art building, which MoMA bought in 2011, along with the air rights, stands between MoMA's existing facility and the site of the planned expansion, which would extend into a tower slated to rise next door designed by Jean Nouvel and built by the developer Hines.

In a tightly choreographed presentation in January at the Manhattan office of Diller Scofidio + Renfro (DS + R), the architect of the expansion, partner Elizabeth Diller said that when the firm took the job, the architect hoped that Williams's and Tsien's building would not have to be demolished as MoMA had announced in April, inciting widespread outcry from prominent critics, architects, and designers. "We made a critical decision to step in, feeling that we could save the building," she said.

Diller showed an elaborate set of drawings and studies to illustrate the months of analysis that her firm undertook to try to adapt the Folk Art Museum into a place for "alternative cultural programming." But, in the end, the firm concluded that so much of the interior of the building would need to be altered–with many serious structural issues to be resolved–that saving the building wasn't "a logical possibility," she said. "We came to an ethical paradox. In order to save the building, you would have had to lose too much of it. The building will have totally lost its integrity.

"I know the architecture community was hoping the conclusion would be different," added Diller. Indeed, on January 14, the Architectural League of New York announced it is preparing a public forum on the decision and said in a statement, "The failure of MoMA to make saving this significant work of architecture a starting premise of its expansion plan marks a sad day for the city and for a cultural institution that has been known as a steward and advocate for architecture and design." In their own statement, Williams and Tsien said, "This action represents a missed opportunity to find new life and purpose for a building that is meaningful to so many. Demolishing this human-scaled, uniquely crafted building is a loss to the city of New York in terms of respecting the size, diversity, and texture of buildings in a midtown neighborhood that is at risk of becoming increasingly homogenized."

For MoMA, the demolition of the Folk Art building is part of a larger plan to take the institution in a new direction. In the presentation in their office, DS + R went on to show a set of schemes designed to make the museum more friendly and physically transparent. Known for the strong urban-design component of their architecture, they have devised a new space open to the street, called the Art Bay, on the former Folk Art site. It would be a flexible space, possibly with a movable floor, for performances, exhibitions, or "spontaneous" events–all free of charge.



Tod Williams Billie Tsien Architects' American Folk Art Museum opened in 2001. It is shown (above) prior to Yoshio Taniguchi's 2004 addition to the Museum of Modern Art, which now abuts the Williams and Tsien building to the east, where a crane is visible here.

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The Folk Art Museum building's grand stair contained niches for the collection and led visitors through the narrow structure (top). A schematic rendering by Diller Scofidio + Renfro shows how the architects would open up MoMA's existing lobby (bottom).

In addition, they advocated opening up the sculpture garden to the public, with an entrance directly off Manhattan's 54th Street. (A museum spokeswoman said that such all-day free access to the garden would begin this summer.)

DS + R also showed a proposal to expand the lobby of the existing Yoshio Taniguchi building and create "bridges" to the new galleries that will be built on three floors of the Nouvel tower. The aim is to improve circulation throughout the museum's campus. "The current lobby, we feel, is quite mean. There's a banality about it," said Diller. She and her partners also want to make the museum literally transparent by swapping the translucent glass for clear glass on much of the facade. In an e-mail a week after DS + R's presentation, Taniguchi wrote: "Because I am not aware of the details of MoMA's plan for the expansion, I would like to refrain from commenting on this issue at this moment." A spokeswoman for the Folk Art Museum, now located near Lincoln Center in Manhattan, also declined to comment on the decision to tear down its former home, and quickly hung up the phone.

The MoMA campus is no stranger to growth and change on West 53rd Street, with buildings previously by Philip L. Goodwin and Edward Durell Stone (1939), Philip Johnson (1951), Cesar Pelli (1984), and Taniguchi (2004). "We're flirting with a lot of architects," Diller said. "Hopefully, ours will be strong but much more surgical and careful. It's not going to be characterized by spectacularism. It's much more about intervention."

MoMA's board of trustees has approved the preliminary plans for the expansion. "The process of determining a budget for the larger project is currently under way," said Margaret Doyle, MoMA's head of communications. "The costs for the project will be covered by a capital campaign that is currently in its quiet phase."

MoMA director Glenn Lowry defended the museum's need to plan an expansion, only 10 years after the Taniguchi building opened, because of rapidly growing collections and more than 3 million visitors per year. "The Museum of Modern Art is a perpetual work in progress," he said. "It's never been finished."

MoMA is likely to raze the slender, elegantly crafted Folk Art building by June, before Hines begins excavation for the Nouvel tower. When asked whether or not the beautiful white bronze panels would be salvaged, MoMA said no decision had yet been made. "It has a powerful architectural legacy," said the statement from Williams and Tsien. "The inability to experience the building firsthand and to appreciate its meaning from an historical perspective will be profoundly felt." ■

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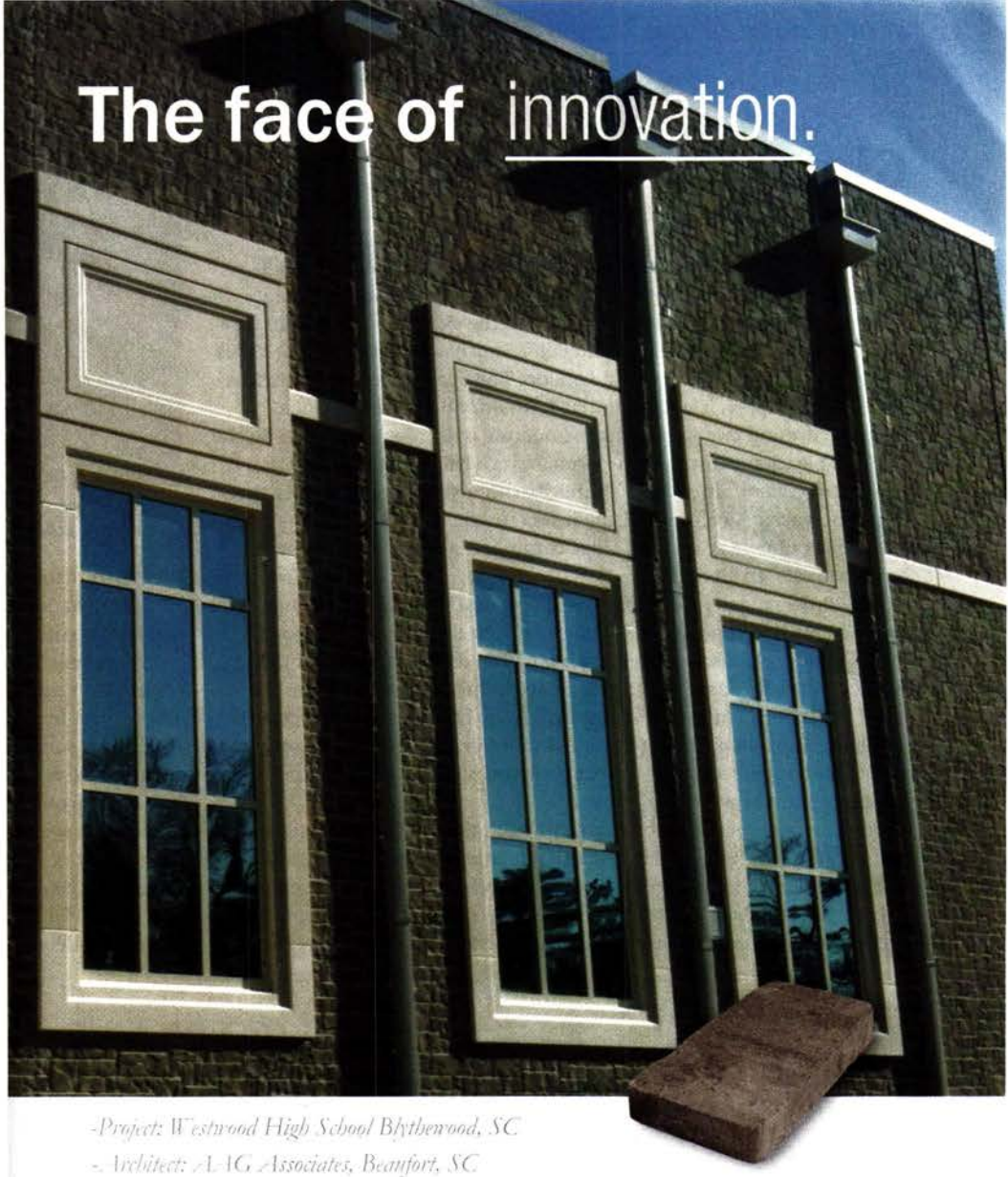

-Project: Westwood High School Blythewood, SC
- Architect: AAG Associates, Beaufort, SC

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CIRCLE 44

Glory of an Icon Restored

BY THOMAS WENSING

THE REVOLUTIONARY Spangen social-housing complex (1919–21) in Rotterdam, by Michiel Brinkman, has recently been immaculately restored. The project pioneered "street in the sky" deck access, an idea that famously inspired Alison and Peter Smithson's design of the 1950s Golden Lane housing project in London. The Spangen estate, or Justus van Effen complex, is a rectangular four-story brick urban block, centered around two large courts. Concrete balconies give access to the duplex apartments on the top floors. In its heyday, the project offered many shared amenities, like a public bathhouse located between the two courtyards. A communal spirit was further promoted by making the decks publicly accessible; large cargo lifts allowed tradesmen to reach tenants' front doors.

In 2006, Spangen's owner, housing corporation Woonstad, embarked on a $30 million renovation of the run-down 194,630-square-foot complex. A previous 1985 renovation, by Leo de Jonge, was cost-driven; in spite of the building's landmark status, the modernization of the units took precedence over maintaining the building's architectural integrity. The 264 units were merged into 164 larger ones, the original interiors stripped, window frames replaced with aluminum, and the masonry painted white and gray.

For the most recent renovation (2010–12), the goal of the design team—Molenaar & Co, Hebly Theunissen, and Michael van Gessel—was to restore the quality of the original architecture while meeting current standards of energy efficiency and comfort. The plan of the original 500-square-foot units was restored, and some units were combined to create 2,000-square-foot town houses (for a total of 154 units). The yellow-and-red-brick facade was cleaned and repaired, and woodwork was painted in original shades of white, green, and ochre.

Rotterdam-based firm Molenaar & Co led a pristine renovation of the Spangen social-housing complex, which pioneered public deck access.

Woonstad offered some units for sale while maintaining others as affordable rentals, placing small businesses in the former bathhouse. The project benefits from the income mix, but the part-privatization of this iconic social housing project also reflects an unfortunate development in the once-progressive housing policies of the Netherlands. The housing corporations were privatized in 1994 and can no longer afford to add new social housing, let alone drive urban regeneration as they used to. A tax initiated in 2013 on the assets of the housing corporations will result in higher rents for lower-income tenants and is likely to bring building of social housing to a close, a reality that mocks the spirit of collectivity in which Spangen was originally conceived. ■

PHOTOGRAPHY: © RAS KOOIJ

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Water pooled up into ankle-deep mud directly in front of Kenan Hall At Flagler College each time it would rain. The City of St. Augustine didn't allow any new tie-ins to its storm sewer system and required all new construction to keep its storm drainage on site. Secondly, the design had to tie in with the historic nature of its surroundings.

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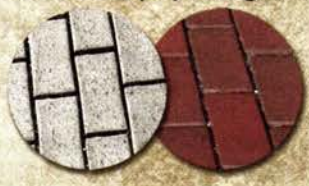

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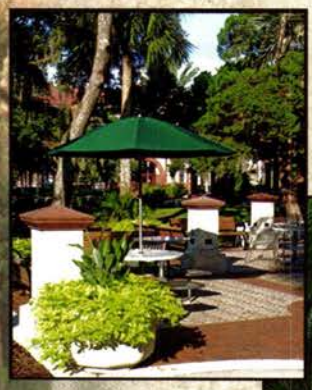

The Plaza at Kenan Hall/Flagler College in St. Augustine, Florida
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CIRCLE 16

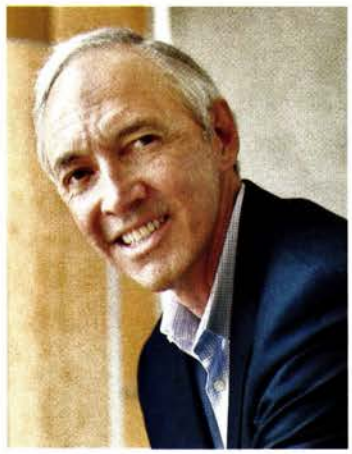
Green Globes Gets New Leader

BY PETER FAIRLEY

THE U.S. GREEN Building Council's (USGBC) LEED standard, long synonymous with environmentally conscious construction in the U.S., is being forced to share some of its limelight, first with the Living Building Challenge, which has certified only a handful of buildings since its 2006 launch, but is steadily gaining momentum now with Green Globes.

The rating system, which advertises cheaper and faster certification, is winning some important backers. In October, the U.S. Government Services Administration (GSA) recommended, for the first time, that federal agencies consider Green Globes in addition to LEED. And last month the organization that controls Green Globes certification in the U.S., the Portland, Oregon–based Green Building Institute (GBI), recruited a new president with significant street cred: Tucson-based green-building consultant Jerry Yudelson, included by the USGBC in its first pick of LEED Fellows.

The USGBC expects LEED Fellows to advance "the vision of green building for all within a generation." According to Yudelson, Green Globes can help deliver on that vision. He says it is just as stringent as LEED, yet cheaper and faster than LEED certification, making Green Globes viable for smaller projects. "There's an awful lot of the world of building design, construction, and operations that LEED simply isn't reaching," he says.



Jerry Yudelson

One of Yudelson's first jobs will be proving GBI's claim. He says a new study shows that GBI's process requires half as much staff time for the applicant, saving about $50,000 on average. He acknowledges, however, that Green Globes needs more than better marketing. One substantive priority is updating its 6-year-old certification program for existing buildings, which Yudelson hopes to complete this year. (GBI updated Green Globes' program for new buildings last year.)

Then there is GBI's leadership and member base, which he says must grow and broaden. One third of GBI's board members hail from timber and chemicals interests, such as the Vinyl Institute. Last month USGBC senior vice president Roger Platt bluntly referred to GBI as an "institution charged with the perpetuation of the status quo for the plastics and timber industries."

Denis Hayes, who runs Seattle's Bullitt Foundation and developed their new headquarters for certification under the Living Building Challenge, says Yudelson has been a friend for over three decades and "a consistent voice for integrity in sustainable building." But he predicts a rough six months ahead for Yudelson as he seeks to make changes at GBI.

GBI chairman Ray Tonjes, a custom-home builder, says, "It's no secret that GBI was founded mostly by the wood industry." But he says Green Globes is a strong system. And, while he feels the GBI board is balanced, he says they are ready to diversify further—a balance Yudelson will help achieve: "Bringing in somebody of Jerry's immense credibility, knowledge, background, and practical experience is a giant leap forward." ■

PHOTOGRAPHY: © JILL RICHARDS

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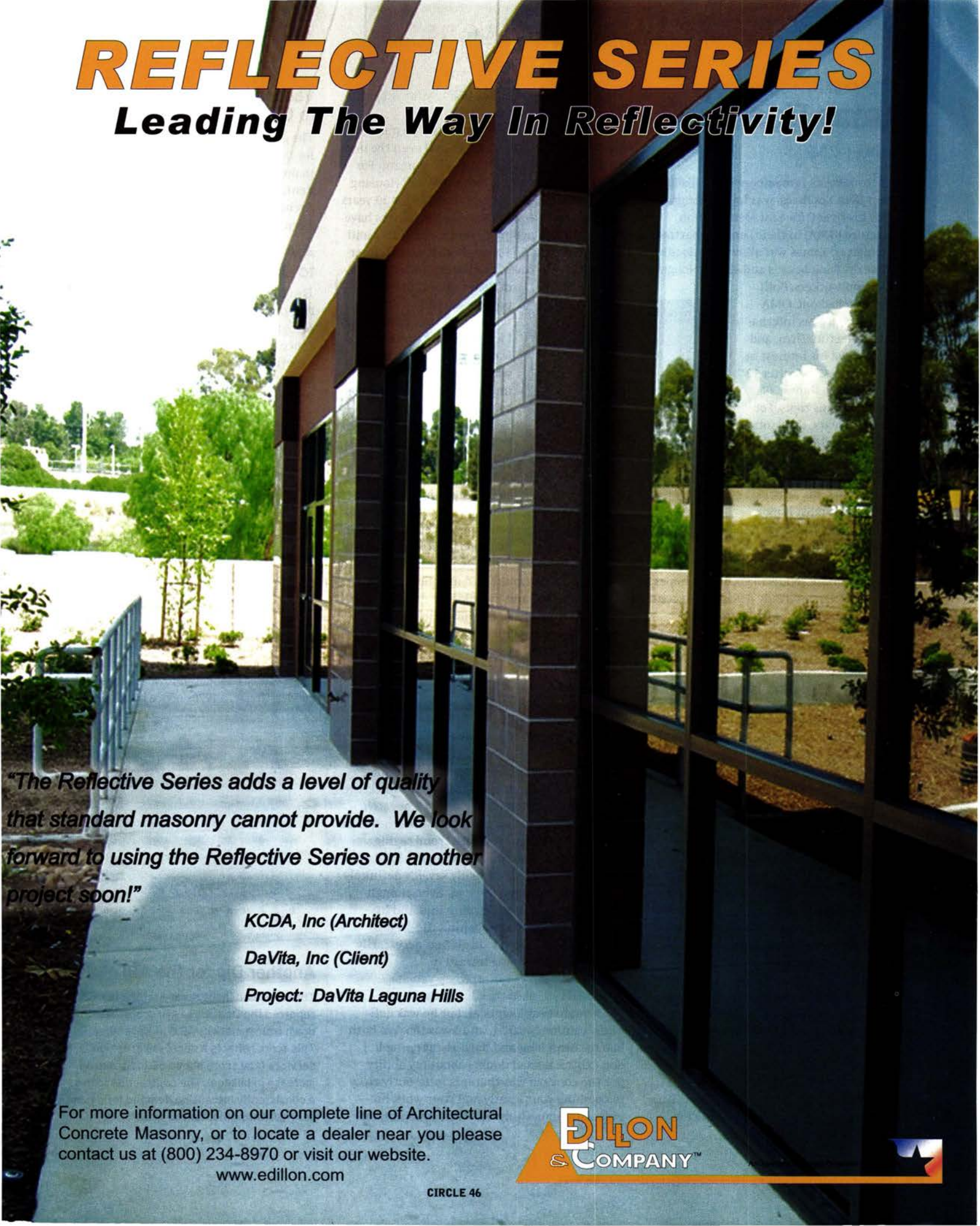

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CIRCLE 46

[NEWSMAKER]

Tomas Koolhaas

BY ANNA FIXSEN

TOMAS KOOLHAAS remembers when his father, architect Rem Koolhaas, was laying the groundwork for his firm Office for Metropolitan Architecture (OMA) in their London apartment. As a youngster, Tomas was allowed to doodle on the office drafting boards and shovel alongside construction workers. Both parties branched out: OMA became a ubiquitous international architecture firm, and Tomas pursued his interest in media and film. Now, after 10 years in cinema, Tomas, 33, is returning to his roots. For the past two years, the Santa Monica–based filmmaker has been piecing together *REM*, a feature-length documentary about his father, his father's buildings, and—most importantly—the people around them. With a grant, a successful Kickstarter campaign, and only two more shoots to go, Tomas hopes to have the final version ready next year. RECORD caught up with Koolhaas the Younger.

Tomas Koolhaas

Why was this the right moment to make this film?

I think this was a really good time to make a film about Rem; he is working in a lot of different cultures and conditions and doing projects now that are unlike what he has done before. The film's been something that has been coming together in my mind for a long time. I have, of course, been exposed to Rem's buildings since I was a kid.

Could you tell us about the central theme of the film?

I am trying to convey something that has really been missing from a lot of architecture documentaries, and that is people. In most films, 80 percent is made up of talking-head interviews, and the other 20 percent is made of graphic images or empty shots of the buildings. They have some useful, interesting intellectual information in them, but they are quite one-dimensional and dry. I never felt that they were touching, or very evocative, or very visually stimulating. What I set out to do was show all of these things, which I have seen at every one of Rem's buildings. I have heard loads of touching human stories, and seen beautiful images, beautiful scenes, beautiful shots. I think it's a shame and a waste for everyone else to miss those.

How did you go about choosing your subjects—both buildings and people?

I went to pretty much every single one of the big and important buildings, and even the ones that people don't think are as important. For instance, I went to the Nexus [World] Housing in Japan, which has been inhabited for 20 years or so. Twenty years of stories and changes have been going on in and around the building and to the building. So I thought that was an interesting story to cover, even though it's not one of Rem's most famous or popular projects. I didn't select anything beforehand; I just went and saw what was there, and then used what I could. I tried not to impose some kind of preconceived narrative on it.

Your encounters with these buildings started from a very young age.

People's parents' professions are obviously very much a part of their upbringing. When I was small, Rem had a very small office in London, and I would go to OMA, and they would give me one of those drafting tables, and I would just draw on that. I remember going to the House in Bordeaux when I was very young and actually helping the construction guys build—carrying bags of sand, digging stuff up. So I have had a physically direct relationship with these buildings.

Was there pressure for you to go into architecture?

Definitely not. If anything, it might have been the opposite. People ask me that all the time, and I can't really explain it, but I have never had any inclination to be in architecture whatsoever. And obviously not in a negative way—it just wasn't anything I was interested in doing. To what degree [that's from] seeing Rem's professional life unfold—what kind of effect that had—I can't really say. It's definitely a difficult profession to be in. Even though Rem's been successful, seeing him and his work, and the real raw, behind-the-scenes version of that, I don't think that necessarily would have drawn me toward it.

What was Rem's reaction when you approached him with the idea of the film?

I wouldn't say skeptical, but he was definitely cautious at first, and I was too. We both had to think long and hard about doing it. I don't think he had doubts about my ability, but the concern was that it is inherently risky to combine your family and your work life—especially something like this, you know? ■

Read the entire interview with Koolhaas at architecturalrecord.com/news.

noted

Vancouver Art Gallery to Choose an Architect

The gallery has shortlisted five architects for the design of its new museum building in downtown Vancouver: Diller Scofidio + Renfro; Herzog & de Meuron; KPMB Architects; SANAA; and Tod Williams Billie Tsien Architects.

AIA Gives 25-Year Award to D.C. Metro Rail System

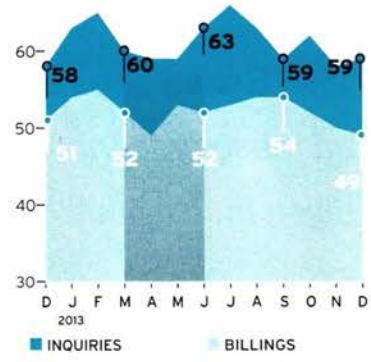
The Washington, D.C., transit system, designed by Harry Weese in the 1960s, is recognized as a scheme of enduring significance. Each day, nearly a million people experience Weese's architecture in the Metro, either in stations he designed or those derived from his common-design kit-of-parts.

Crystal Bridges Museum Buys a Frank Lloyd Wright House

Crystal Bridges Museum of American Art has acquired Wright's Bachman Wilson House (1954), located in New Jersey on the Millstone River. The Usonian house will be disassembled, moved to Bentonville, Arkansas, and reassembled on the museum's grounds.

The Shard Will Have a Renzo Piano Companion Tower

Renzo Piano will be his own new neighbor. Another tower designed by the architect is planned near the base of his Shard in London. The 27-story residential tower will replace the Fielden House, a 1970s office building.



Another Dip for the ABI

The American Institute of Architects (AIA) reported the December ABI score was 48.5, down from a mark of 49.8 in November. This score reflects a decrease in design services (any score above 50 indicates an increase in billings). The contraction follows a consistently increasing demand for design services throughout most of 2013.

PHOTOGRAPHY: © TOMAS KOOLHAAS

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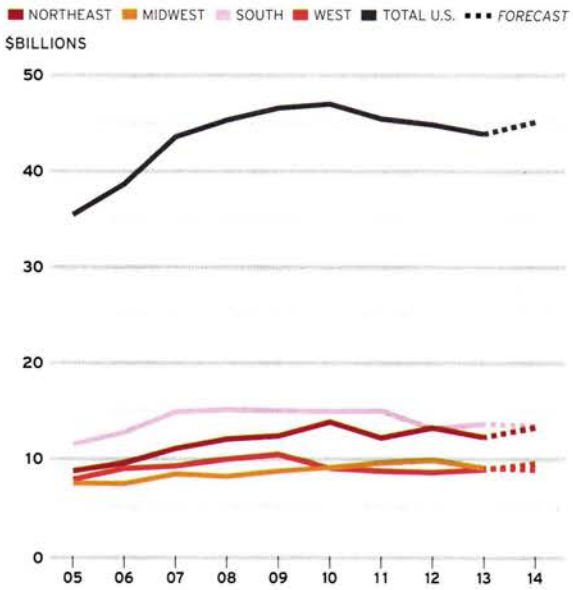
CIRCLE 17

MARKET FOCUS
RENOVATION

The renovation market has historically been more stable than new construction. Now that the demand for new buildings is reviving along with the economy, renovation work should still be strong but not so dominant.

Renovation Starts by Region
In addition to U.S. total and 2014 forecast figures

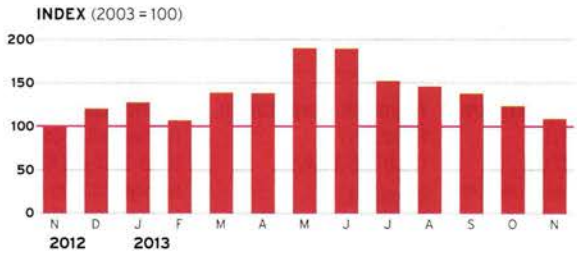


Top Metro-Area Markets
Ranked by total renovation starts 1/2013 through 11/2013

	REGION	$BILLIONS
1	NEW YORK CITY	11.53
2	CHICAGO	4.29
3	LOS ANGELES	3.52
4	HOUSTON	2.75
5	WASHINGTON, D.C.	2.39


Market Square, San Francisco, RMW Architecture & Interiors and Page & Turnbull, page 40.

The Dodge Index for Renovation Construction 11/2012 – 11/2013



The index is based on data for renovation 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 nonresidential renovation starts 1/2011 through 11/2013

1. **Gensler**
2. **Perkins+Will**
3. **HGA**
4. **AECOM**
5. **Skidmore, Owings & Merrill**

Top 5 Projects
Ranked by nonresidential renovation starts 1/2012 through 11/2013

$415 MILLION

PROJECT: **SLS Hotel and Casino**
ARCHITECTS: **Philippe Starck; Gensler**
LOCATION: **Las Vegas**

$400 MILLION

PROJECT: **Macy's Herald Square**
ARCHITECTS: **Studio V Architecture; Highland Associates**
LOCATION: **New York City**

$250 MILLION

PROJECT: **International Monetary Fund Headquarters Renewal Project**
ARCHITECT: **Skidmore, Owings & Merrill**
LOCATION: **Washington, D.C.**

$250 MILLION

PROJECT: **Brookfield Place New York**
ARCHITECT: **Pelli Clarke Pelli Architects; Spector Group; Morrison Dilworth + Walls; Omniplan; BCV Architects; AvroKO**
LOCATION: **New York City**

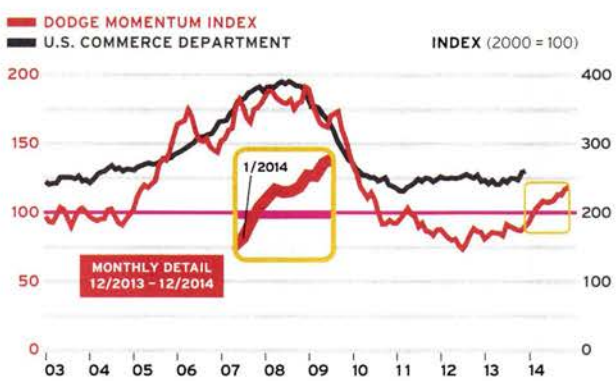
$228 MILLION

PROJECT: **LAX Terminal 5 Redevelopment Program**
ARCHITECT: **Corgan**
LOCATION: **Los Angeles**

MOMENTUM INDEX SHOWS STEADY GROWTH

In December, the Dodge Momentum Index rose 1.2%, to 118.3, its highest reading since early 2009. The index steadily improved in 2013, and it is now up 32% compared to 12 months earlier.

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 Dodge Reports 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.



McGraw Hill Dodge Analytics tracks projects from predesign through construction to capture hard construction costs, square footage, and other key statistical information. These data for renovation construction starts include commercial, institutional, and multifamily residential projects, except as noted.

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CIRCLE 33

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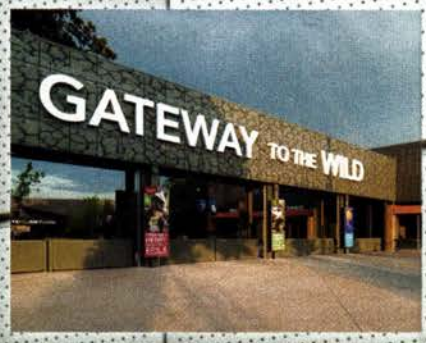
CIRCLE 64

INSPIRATION THROUGH PERFORATION



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CIRCLE 34

perspective **house of the month**

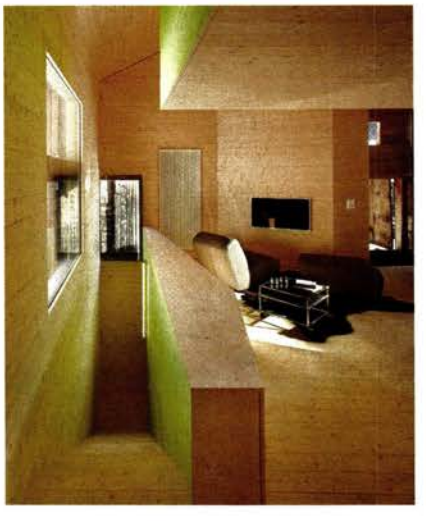
ARCHITECT BENJAMIN KRAMPULZ CONVERTS A FORMER BARN INTO A SNUG ALPINE RETREAT. BY ANNA FIXSEN

FOR HIS FIRM'S first project, Swiss architect Benjamin Krampulz of Bkarch gave new meaning to a barn-raising. A pair of avid cross-country skiers asked the architect to convert an 80-year-old livestock barn—once the home of sheep, cattle, and mounds of hay—into a modern getaway for themselves and guests.

The barn is located on a plateau in the alpine village of Gluringen, Switzerland. Due to the resiliency of the original larch-wood frame, Krampulz found the abandoned shed in remarkable condition; only the roof demanded repairs. But to comply with the local fire code, Krampulz moved the building away from adjacent ones by an additional 16 feet. The architect also elevated it on a concrete base to augment the ceiling height on the ground level.

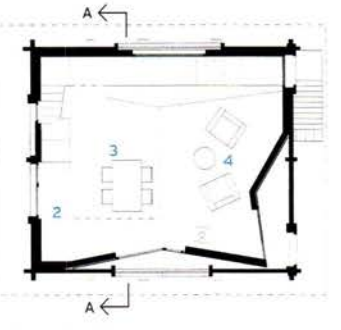
While maintaining the building's integrity, Krampulz nestled an inner, irregularly shaped shell in the square barn for both insulation and to create unique functional spaces. "It's like a box in a box," he said, "except you can experience the voids where needed."

The original entryway leads into a space between the new and old structures and provides an area for skiers to shed their gear. The lower level also contains the bathroom, the master bedroom, and storage. Upstairs, the former hayloft was transformed into living, dining, and kitchen spaces. A loft above is used as a guest bedroom.

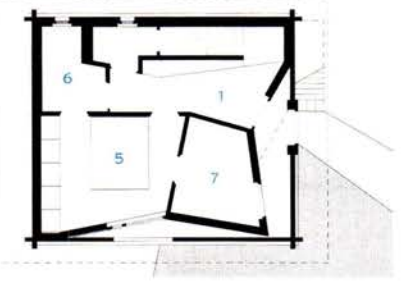


To maximize the pint-sized floor plan (about 500 square feet), Krampulz cleverly integrated storage into the inner skin. The architect brought in light with existing openings, but also added strategic cuts where appropriate. "I love working with the existing framework because constraints generate the project," Krampulz said. "For me, it's more evident to give reason to things, rather than do things because the end result is beautiful." ■

The barn (above, left) has been lifted, making room for the master bedroom. A stair leads to the main level's living spaces and a mezzanine that doubles as a guest bedroom (above). For panache, the architect stained the interior fir cladding in acidic hues of green, orange, and yellow (left).



SECOND FLOOR



GROUND FLOOR 0 10 FT. 3 M.

SECTION A - A 0 10 FT. 3 M.

1 ENTRY HALL
2 KITCHEN
3 DINING ROOM
4 LIVING ROOM
5 BEDROOM
6 BATHROOM
7 LAUNDRY

PHOTOGRAPHY: © ROLAND HALBE

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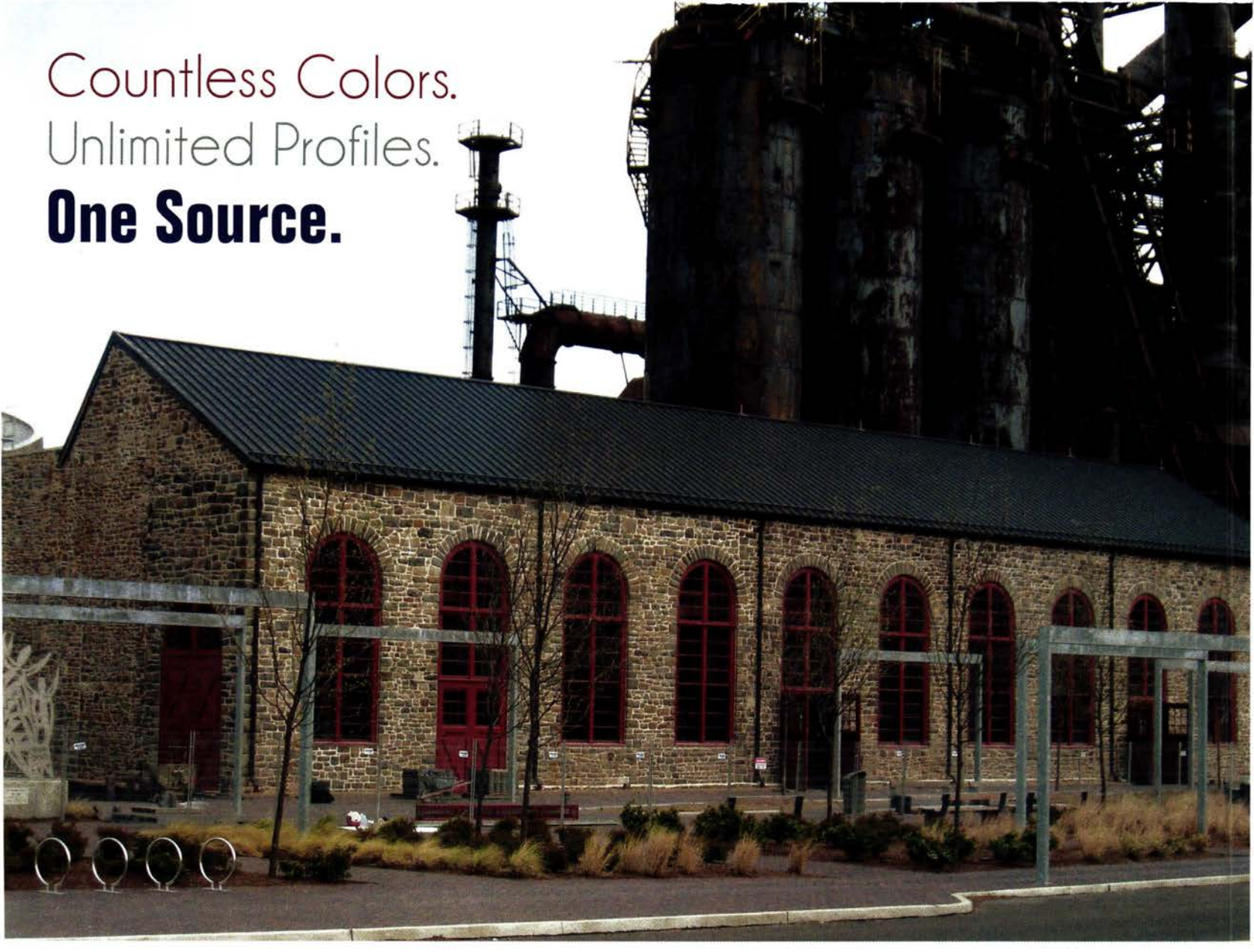

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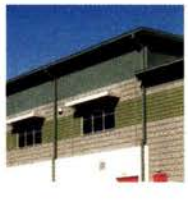


Above
Bethlehem Visitor Center; Bethlehem, PA
Dutch Seam; Classic Bronze

CIRCLE 58

Second Lives for Old Structures

Old Buildings, New Forms: New Directions in Architectural Transformations, *by Françoise Astorg Bollack. Monacelli, 2013, 224 pages, $50.*

Reviewed by Hicks Stone

FACED WITH the prospect of the gradual degradation of the buildings that are our architectural heritage, designers need to reconsider their focus on the heroic model of practice, with its emphasis on idiosyncratic form-making and new construction. Instead, they should look to "the creative possibilities of preservation," says Françoise Bollack. Pursuing these possibilities while celebrating modernity and producing conceptually powerful work is the focus of her book *Old Buildings, New Forms*. In it, Bollack posits that, "an old building is not an obstacle but rather a foundation for continued action." The author is a professor at Columbia University and a practicing architect specializing in historic preservation.

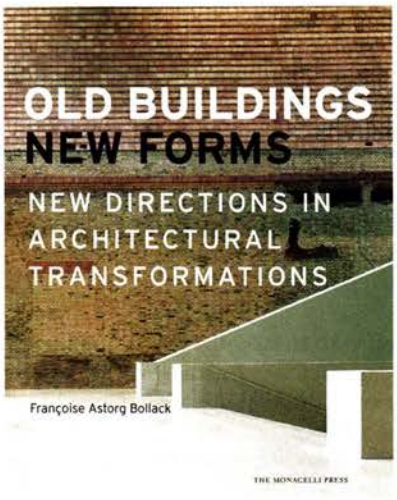
Her book groups 28 renovation projects into five types—insertions, parasites, wraps, juxtapositions, and weavings—based on their interactions with the parent structures. Each type is discussed in its historical context, and then the salient features of individual contemporary projects are presented. Some of the projects—David Chipperfield's Neues Museum in Berlin and Miralles-Tagliabue's Santa Caterina Market in Barcelona—will be familiar to readers of ARCHITECTURAL RECORD. But many others are modest in scale, done by lesser-known architects like Stefan Eberstadt/Urban Drift Productions and FNP Architeckten. All are emphatically modern.

In her introduction, the author cites Robert Venturi's *Complexity and Contradiction in Architecture* and the conceptual art of the 1960s and 1970s, particularly that of Sol LeWitt, as crucial elements in the formation of the contemporary renovation strategies represented here. Venturi freed architects from the need to conform to prevailing orthodoxies, and LeWitt stressed the primacy of conceptual expression. The author's introduction is both elegant and illuminating, as are the introductory notes to each of the five types. However, the text's effectiveness begins to diminish in the discussion of the individual projects that forms the core of the book.

At times the project descriptions are poetic; at other times they strain under the weight of an excessively rhetorical style. The photographs, many taken by the author, effectively amplify the text, though the drawings, frequently reductions of working drawings, lack legibility on the page.

The chapter on "parasites," while featuring an intriguing title, offers an unfortunately erroneous definition of parasitism, which, with every use of the word, spoils the impact of the text for knowledgeable readers. The word that eludes Bollack here is symbiosis.

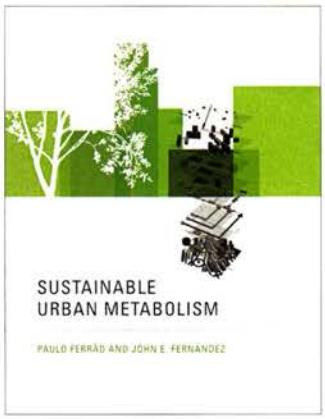
These quibbles aside, Bollack's book opens readers to the "creative possibilities of preservation." It gives us a vivid reminder that we can embrace modernity while respecting the past. ■



Helping Cities Go Green

Sustainable Urban Metabolism, *by John Fernández and Paulo Ferrão. MIT Press, 2013, 264 pages, $35.*

Reviewed by David Sokol



IN 2012, officials in Dubai asserted that their city would rank among the most sustainable metropolises in the world by 2020. About the same time, Washington, D.C., Mayor Vincent Grey trumpeted greenest-city status by 2032. A glimpse of the cities' sustainability plans shows two different approaches to the same goal. For Dubai, it means supplying five percent of electricity photovoltaically and outlawing energy-hog buildings. While Washington also aims for renewable-energy use and efficient structures, it prioritizes cleaning up the Anacostia River and increasing urban agriculture.

In concept, tailoring one city's sustainability initiatives to reflect its climate, culture, and stage of development should benefit all cities—or at least maximize the environmental benefits. But even the best intentions will not necessarily yield positive results. What if Dubai's photovoltaics are sourced irresponsibly upstream? What if urban farming in Washington causes a spike in the insecticides and fertilizers that wash into the Anacostia? Because the causes and effects of environmental management are complex and far from linear, urban-scale sustainability is littered with possible backfirings: electrical vehicles that draw their power from coal-fired plants, local manufacturing initiatives that lead to transit inequity, and so on.

In this book, the authors shed light on the inconsistent terms and blind spots that plague urban sustainability initiatives. Professors of mechanical engineering and building technology, respectively, Ferrão and Fernández want to arm municipal stewards with data that are currently unavailable to them. Without an accurate portrayal of environmental inputs and outputs, decisions may lack impact or do more harm than good.

The first step in measuring and analyzing the resources a city consumes and the waste it emits is to establish a methodology. Employing the metaphor of urban metabolism, the authors show how to measure the environmental systems that converge in a city. They set criteria, weight them according to different city typologies, and identify the data sources to quantify those terms. Watching this framework unfold is like witnessing the creation of an algorithm. One can imagine this book spawning the next round of Code for America fellowships.

For readers who are not smart-cities acolytes or app programmers, this narrative may seem more technical than compelling. Its potential usefulness, on the other hand, should thrill anyone: standardized data could help planners from Dubai and Washington form a mutual understanding of what it means to be green (or greenest). Perhaps more important, it could help planners from cities similar in resource flows or physical form compare policies for mutual improvement. *Sustainable Urban Metabolism* applies the management adage, "What gets measured gets done" to the 21st-century game of planetary survival. ■

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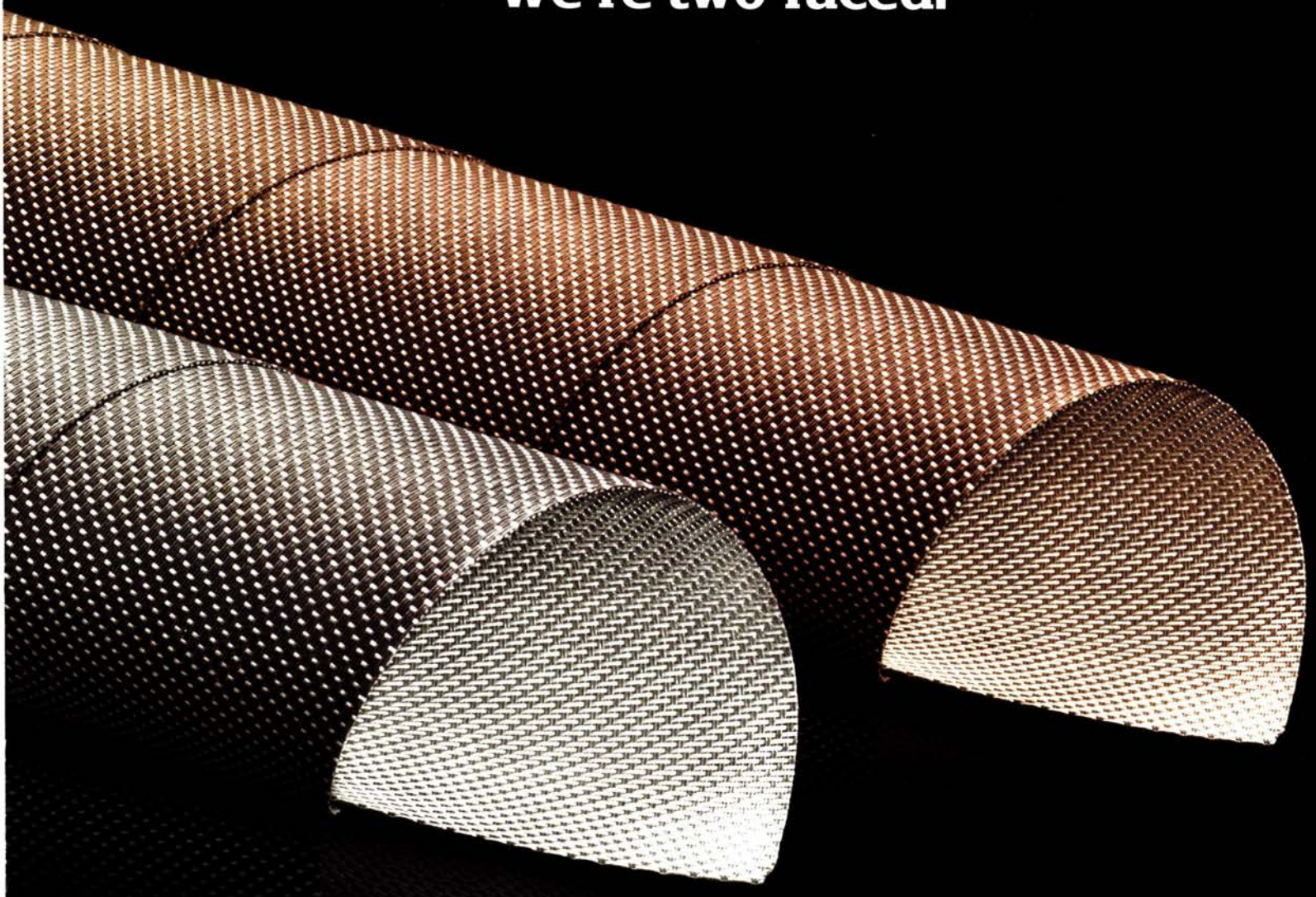

CIRCLE 61

ARCHITECTURAL
RECORD

Guess the Architect Contest

ENTER NOW!

A new monthly contest from the editors of RECORD asks you to guess the architect for a building of historical importance.

CLUE: THE ORIGINAL ARCHITECT OF A MIDWESTERN MUSIC CONSERVATORY (RECENTLY RENOVATED AND EXPANDED) WAS WELL KNOWN FOR GIVING A GOTHIC TWIST TO MID-CENTURY MODERNISM.

The answer to the January issue's Guess the Architect is **ELIEL SAARINEN**, who designed the Cranbrook School for Boys (1925–30) as part of his larger campus for Cranbrook Educational Community in Bloomfield Hills, Michigan. For more details, including the winner, go to archrecord.com.

By entering, you have a chance to win an iPad mini.
See the complete rules and entry form online at archrecord.com.

PHOTOGRAPHY: © KEVIN G. REEVES, COURTESY OF WESTLAKE REED LESKOSKY; MARK SCHATZ, FAIA/FIELD PAOLI ARCHITECTS (BOTTOM)

BUILDING BLOCK Originally a wholesale furniture mart (left), the Art Deco building has been converted into a mixed-use structure with retail and commercial tenants. Its terra-cotta facades have been restored (opposite).

Urban Game Changer

Having attracted Twitter, upscale retail, and a food emporium as key tenants, a renovated Art Deco building is kick-starting the transformation of a once-seedy part of San Francisco.

BY LAMAR ANDERSON

WITH A PRIME location near San Francisco's Civic Center and downtown shopping corridor, one of the city's few subway stops, and wide brick sidewalks fit for throngs of pedestrians, Mid-Market has had all the makings of a sought-after neighborhood. Though it was a thriving theater district in the early 20th century, this mile-long stretch of Market Street never recovered from a spiral of disinvestment and blight that began in the postwar years, even as the tech booms of the late 1990s and beyond sent real-estate values soaring nearly everywhere else. With a storefront vacancy rate around 30 percent in 2011, the neighborhood was caught in a catch-22 that plagues both redevelopment efforts and dull parties: no people means no action, and no action means no people.

Then, one day in June 2012, 800 people showed up. Twitter, having outgrown its old quarters in the South of Market district, had leased three floors in a former wholesale furniture mart at 1355 Market, an L-shaped block-long Art Deco complex from 1937 with a 1975 addition in the rear. The 863,000-square-foot, 11-story Deco building, with a monumental terra-cotta facade featuring Mayan motifs, spans an entire block, from Ninth to Tenth streets. Attracted by the concrete structure's enormous footprint and a payroll-tax holiday offered by the city, Twitter enlisted Lundberg Design and Interior Architects to design its new headquarters space. At the same time, the building—now christened Market Square—and its original lobby were renovated by RMW Architecture & Interiors, with Page & Turnbull serving as the historic-preservation architects.

Fast-forward a year and a half, and the majority of Market Square's remaining office suites are rented, Twitter has added 700 more employees and captured four more floors, and an upscale eatery and marketplace are scheduled to move into the ground level later this year. In April, RMW will finish reskinning the precast-concrete-clad 1975 addition in glass; much of that building (now called 1 Tenth) is reserved for another Twitter expansion. And CMG Landscape Architecture will finish the conversion of a former alley separating the two buildings into a pocket park, called the Commons, with a zigzagging canopy of LED tube lights and a fire pit.

Meanwhile, the sky above Market Street is full of cranes. More tech companies have moved to the area, and 5,000 apartments in new towers are either approved or under construction (26 percent of them below market rate), according to the city's Office for Economic and Workforce Development. "A lot of these units were [planned] and on the boards, but no one could pull the trigger," says RMW principal Terry Kwik. "Twitter's lease got done, and everything got dusted off." After decades, can the urban desolation of the neighborhood be reversed by a tech company hatched in 2006?

For now, Market Square is an office building. Until the retail tenants move in, the project's effect on street life remains unknown. But if all goes well, Market Square will become a destination in its own right. The developer,

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PHOTOGRAPHY: © BRUCE DAMONTE (EXCEPT AS NOTED); MOUI IN STUDIO ARCHIVES (1 FEET)


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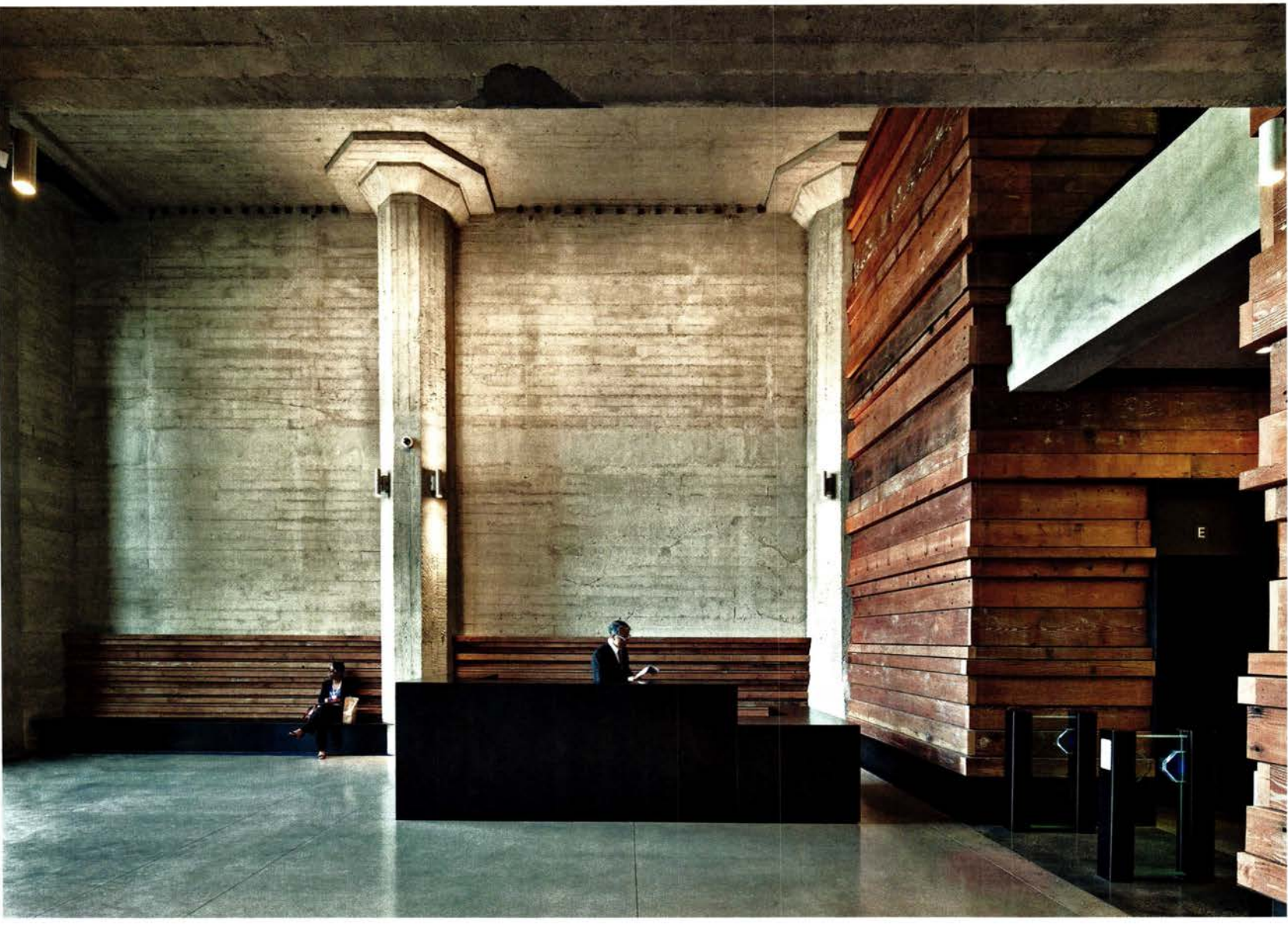
355
355

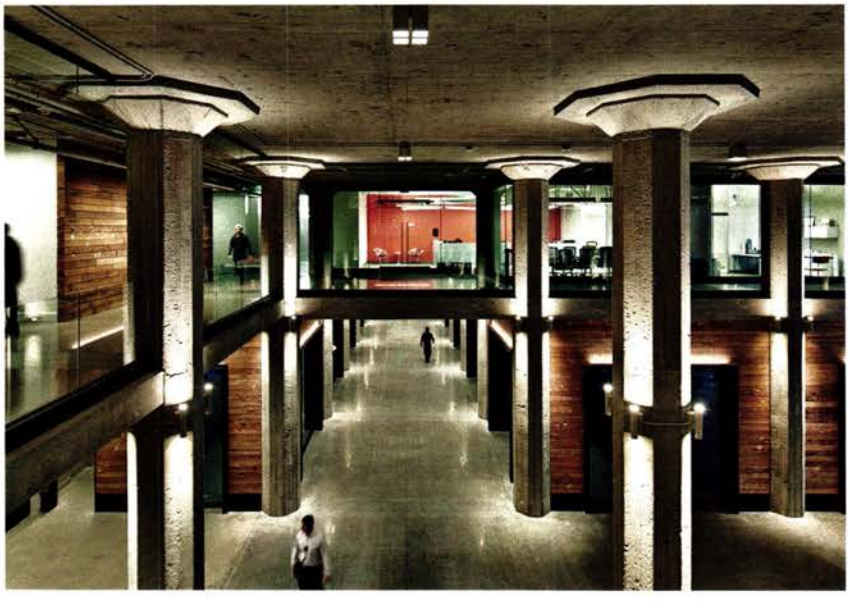
GROUND FLOOR

1 NEW LOBBY
2 RESTORED ART DECO LOBBY
3 RETAIL
4 THE COMMONS
5 1 TENTH

Shorenstein Properties, hired Baldauf Catton von Eckartsberg Architects (BCV)—the firm that designed the retail areas of the Ferry Building, San Francisco's beloved local-food emporium—to transform, with RMW, the fortresslike furniture mart's ground floor into a soaring, wood-paneled market hall.

When RMW and BCV began work in 2011, many of the building's concrete columns had been masked by ad-hoc showroom partitions and, after a misguided 1980s renovation, encased in mirrors. Underneath all that, "It was this amazing, Lou Kahn–like structural system," says BCV prinicpal Hans Baldauf, referring to the dramatic column grid and use of concrete as a defining material. The architects stripped the interior, sandblasted the columns, and carved out a new double-height lobby at Market and Ninth to mimic the scale of the Art Deco lobby at midblock. They paneled everything but the original marble-walled lobby in Douglas fir reclaimed from a rooftop addition taken down by Shorenstein. But this isn't your typical rough-refined

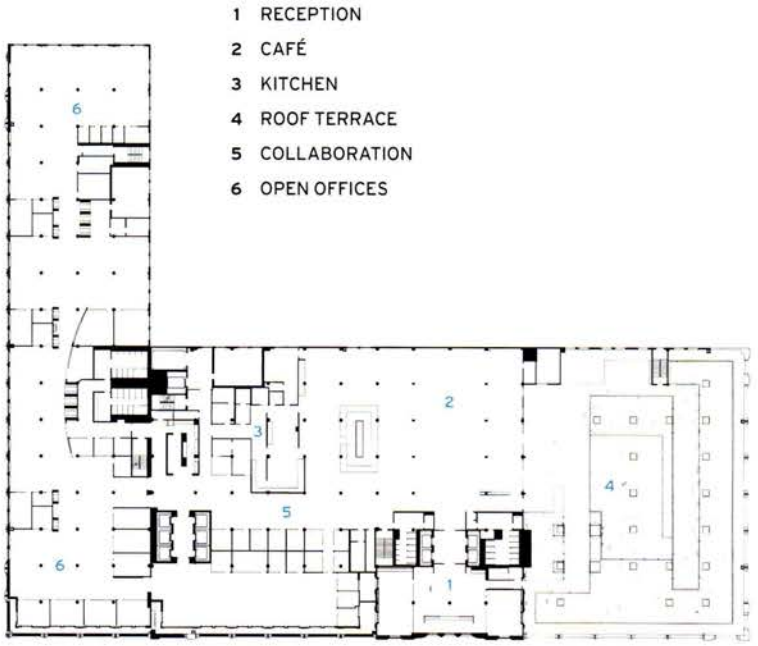




GRAND ENTRANCES RMW renovated the original Art Deco lobby (opposite) with preservation architect Page & Turnbull, and created a new lobby down the block that pairs board-formed concrete walls with reclaimed Douglar-fir cladding (above and right).

industrial-chic revamp. All that warm wood brings out the texture of the board-formed concrete structure, and slim up- and downlights on the columns emphasize the height of the retail corridors, lending them classical proportions.

Twitter's regrettable interiors—an avian-themed maze of bright blue and green that several square miles of feather-patterned carpet tile do nothing to clarify—are, thankfully, tucked away on the upper floors, hidden from most people's view. The company's real contribution to Mid-Market lies in its choice to integrate itself into the neighborhood with a building open to the public. Unlike Silicon Valley's tech industry, which grew up in and then swallowed the suburbs, Twitter is embracing a more urban approach. "Twitter as a culture is very public," says Kelly Flannery, the company's global head of facilities and security. "We want to be part of



SOCIAL MEDIA
Lundberg Design created Twitter's offices and social spaces, including a dining facility (right), while Andrea Cochran designed the roof-deck landscape (above).

credits

ARCHITECT (CORE & SHELL): RMW Architecture & Interiors

PRESERVATION ARCHITECT: Page & Turnbull

RETAIL ARCHITECT: BCV Architects

INTERIOR ARCHITECT FOR TWITTER OFFICES: Lundberg Design

ENGINEERS: Murphy Burr Curry (structural); CSW/Stuber-Stroeh (civil); ACCO (mechanical)

CONSULTANTS: CMG Landscape Architecture (the Commons)

GENERAL CONTRACTOR: BNBuilders

CLIENT: Shorenstein Properties

SIZE: 863,000 square feet

CONSTRUCTION COST: $90 million (Market Square) $35 million (1 Tenth)

COMPLETION DATE: June 2014

SOURCES

FLOOR UNDERLAYMENT: Ardex

LED DOWNLIGHTS: Borden

the people." Of course, with far greater numbers of employees, Apple and Facebook would have a hard time squeezing themselves into a city block. But the inward-focused new campuses they're building—Apple's spaceship by Norman Foster in Cupertino, Facebook's green-roofed island on stilts in Menlo Park, by Frank Gehry—suggest that they prefer a suburban relationship to the landscape.

The architects envision Market Square in its finished form as a mixed-use tech campus, anchored by an all-day restaurant called Bon Marché and an Eataly-like assemblage of food stations dubbed the Market. Crucially, pedestrians will be able to enter through the retail storefronts without going through reception and security. To make the building more inviting, the design team negotiated with the city's historic-preservation commission to bring the windows along Market Street closer to the sidewalk. And on the rear wall facing the pocket park, they installed glass airplane hangar doors, which double as canopies that give the back of the structure an airy, porchlike feel. "We wanted the transparency to suck you through the building," says Baldauf.

With restaurants, a bank, and a gym on the way, and residential towers rising all around, Market Square and 1 Tenth are poised to help rekindle the street life that disappeared sometime during the Eisenhower Administration. Performing arts are returning to Market Street too: two blocks north, Skidmore, Owings & Merrill is renovating the old Strand Theater for the American Conservatory Theater, to open next January. In its new incarnation, Mid-Market has the potential to blend the best of the city's past and present, with a mix of technology, housing, food, and culture fit for the 21st century. ■

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Torsion Fan

Modern Fan Co. modernfan.com

Torsion is a minimalist ceiling fan with three plywood blades—finished in mahogany, maple, black, white, or nickel tones—that are complemented by metal hardware in dark bronze, gloss white, or bright nickel. The fan is available in three spans—42", 52", and 62"—with the 62" version using only 76W of electricity while moving up to 6,958 cubic feet of air per minute. A halogen light attachment is optional. CIRCLE 216

Incognito Ventilation Hood

Miele mieleusa.com

Just as its name suggests, the Incognito ventilation hood by Miele was designed to conceal. In this case, it hides grease filters using three stainless-steel or glass panels, offering a cleaner, sculptural appearance when viewed from all angles. With four fan speeds and double-sided blowers that make the hood efficient, it comes in a wall-mount or island version, and with a stainless-steel finish or the manufacturer's 200 RAL powder-coat colors. CIRCLE 217

Exterios HVAC System

Panasonic panasonic.com

Combining two of its own innovative technologies, Panasonic has introduced Exterios, a ductless HVAC system with a Seasonal Energy Efficiency Rating (SEER) of 28.8. Its Econavi technology detects activity and occupancy in the room, decreasing heating or cooling when movement is minimal and switching to a lower power mode when it senses complete absence. The second system it employs is an Inverter Technology, which constantly adjusts the compressor rotation speed, resulting in reduced power consumption. Two indoor and two outdoor models are currently available. CIRCLE 219

OmniTouch 7

Leviton leviton.com

Home automation controls influenced by the sleek touchscreens of iPads are gaining popularity. Leviton's OmniTouch 7 has a 7" glass-fronted high-resolution screen that can be used to control security systems, irrigation, and light levels, as well as multiple thermostats. Available with Leviton's intuitive user interface. CIRCLE 218

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products **briefs**

CONCRETE FURNITURE AND A BI-LEVEL SINK ARE AMONG RECENT OFFERINGS INJECTING VISUAL INTEREST AND HIGH FUNCTIONALITY INTO HOMES AND OFFICES. **BY SHEILA KIM**

Airblade dB Hand Dryer

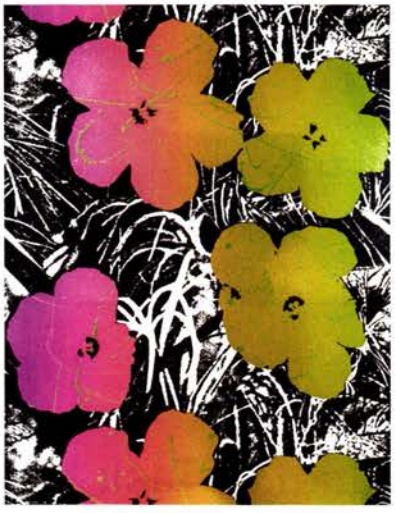
Popular and effective, but also a noisemaker in commercial restrooms, the Dyson Airblade has just become 50% quieter, thanks to engineering and design tweaks. These include a double-scallop design that increases the distance between the two colliding sheets of air that the reshaped ends dispense, an overhanging lip on the aperture's front that changes the angle at which the air exits, and a silencer that eliminates specific motor tones. The enhanced design has an estimated noise level of 82 decibels. dyson.com **CIRCLE 210**

Olithas Outdoor Table and Bench

This table and bench series from Landscape Forms (above) reimagines concrete as a light and fluid material. The slim tabletops and seating are cast of MeldStone, a high-performance, environmentally friendly concrete developed by Meld USA, and are defined by fluting on the undersides. Rounding out the design are steel-tube bases that are perfectly sized for precision welding into the fluting's grooves.
landscapeforms.com **CIRCLE 211**

Andy Warhol x Flavor Paper Collection

Through a partnership with the Andy Warhol Foundation for the Visual Arts, Brooklyn-based wall-coverings company Flavor Paper brings nine works by the legendary pop artist to walls everywhere. The Andy Warhol x Flavor Paper Collection includes both iconic and rare images such as Flowers (right), Shoes, Do It Yourself, and Queen Elizabeth, remixed through surface treatments, scale, arrangment, or colors.
flavorpaper.com **CIRCLE 214**



Ayse Birsel Collection

Award-winning product designer Ayse Birsel adds playful touches to wool felt for her eponymous home and office accessory line for FilzFelt. The collection consists of drapery, floor mats, table mats and runners, and hanging panels. The panels, a substantial 5 mm thick, can be used as space dividers. Designers can also source their own track hardware to mount the panels to the floor. The Polka 120 panel (left) comes in a standard size of 5' 8¾" x 8' or custom dimensions, and 43 colors.
filzfelt.com **CIRCLE 212**

Precis Cascade Sink

A happy medium between the aesthetic of a wide designer bowl and the functionality of a double-sink, Blanco's Precis Cascade is a minimalist undermount fixture that features a tiered design to create a second compartment. The raised platform offers a 5½"-wide area for food prep, while the main sink measures 7⅞" wide. Composed of Blanco's scratch- and stain-resistant Silgranit II material, the unit is available in eight different colors.
blancoamerica.com **CIRCLE 213**

Good Design Is Good Business

CALL FOR ENTRIES

The editors of **ARCHITECTURAL RECORD** are currently accepting submissions for the **2014 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. Winning entries will be shown in the June 2014 issue.

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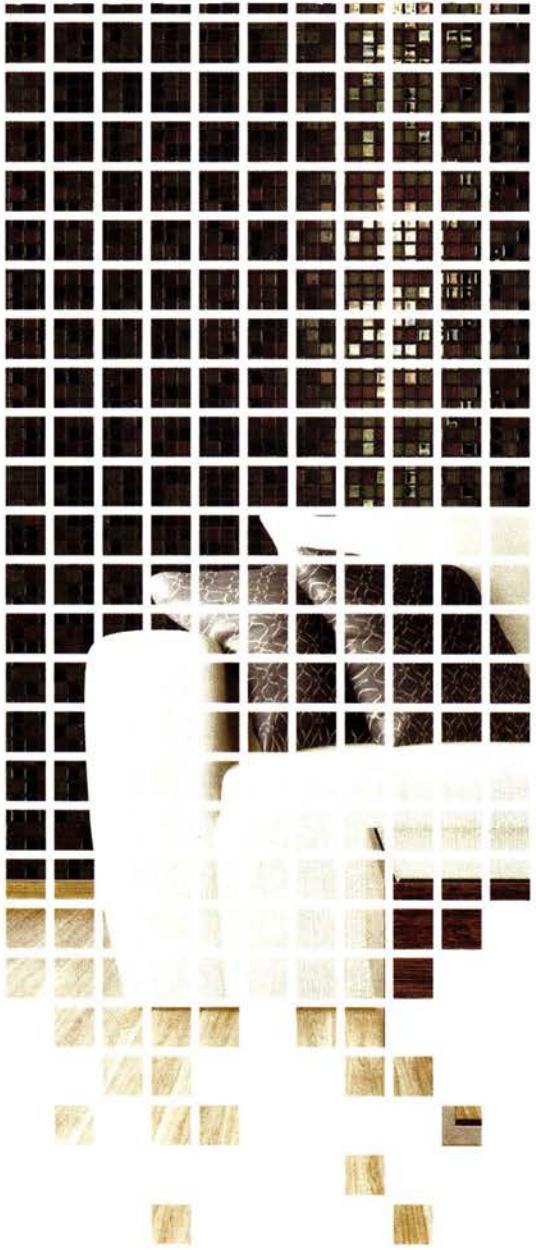

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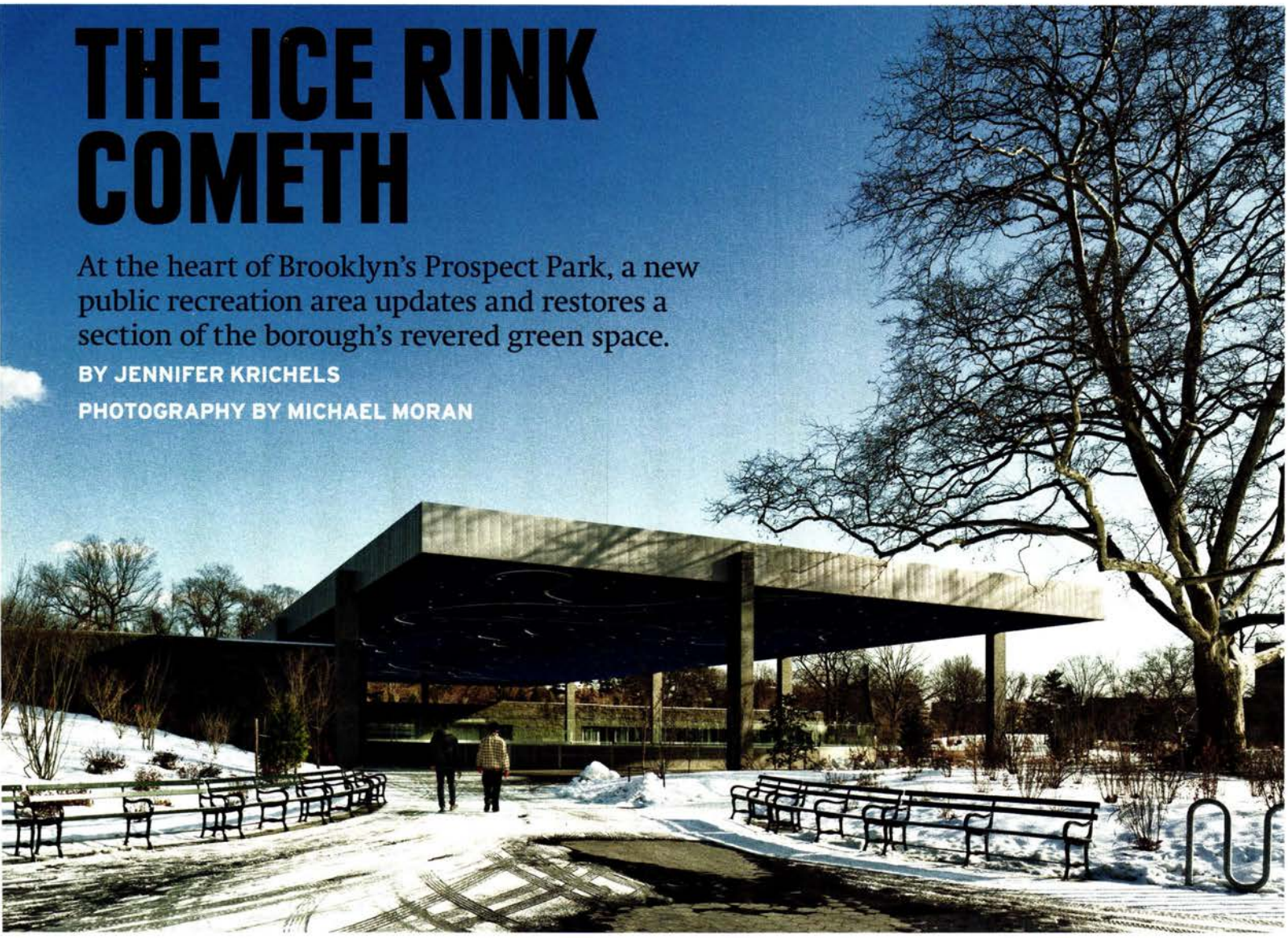
CIRCLE 19

Lakeside | Brooklyn, New York | Tod Williams Billie Tsien Architects

THE ICE RINK COMETH



At the heart of Brooklyn's Prospect Park, a new public recreation area updates and restores a section of the borough's revered green space.

BY JENNIFER KRICHELS

PHOTOGRAPHY BY MICHAEL MORAN

IN HIS FINAL days of office last year, former New York Mayor Michael Bloomberg cut the ribbon on the Samuel J. and Ethel LeFrak Center, a Tod Williams Billie Tsien–designed skating facility in Brooklyn's Prospect Park. Standing nearby, the architects waited for a crowd of invited children to dash onto the ice, but when the rink's gate finally opened, "You saw one little kid creeping out slowly, holding like mad to the edge of the wall, and then the next one and the next one," remembers Tsien. "It was like a line of little ants."

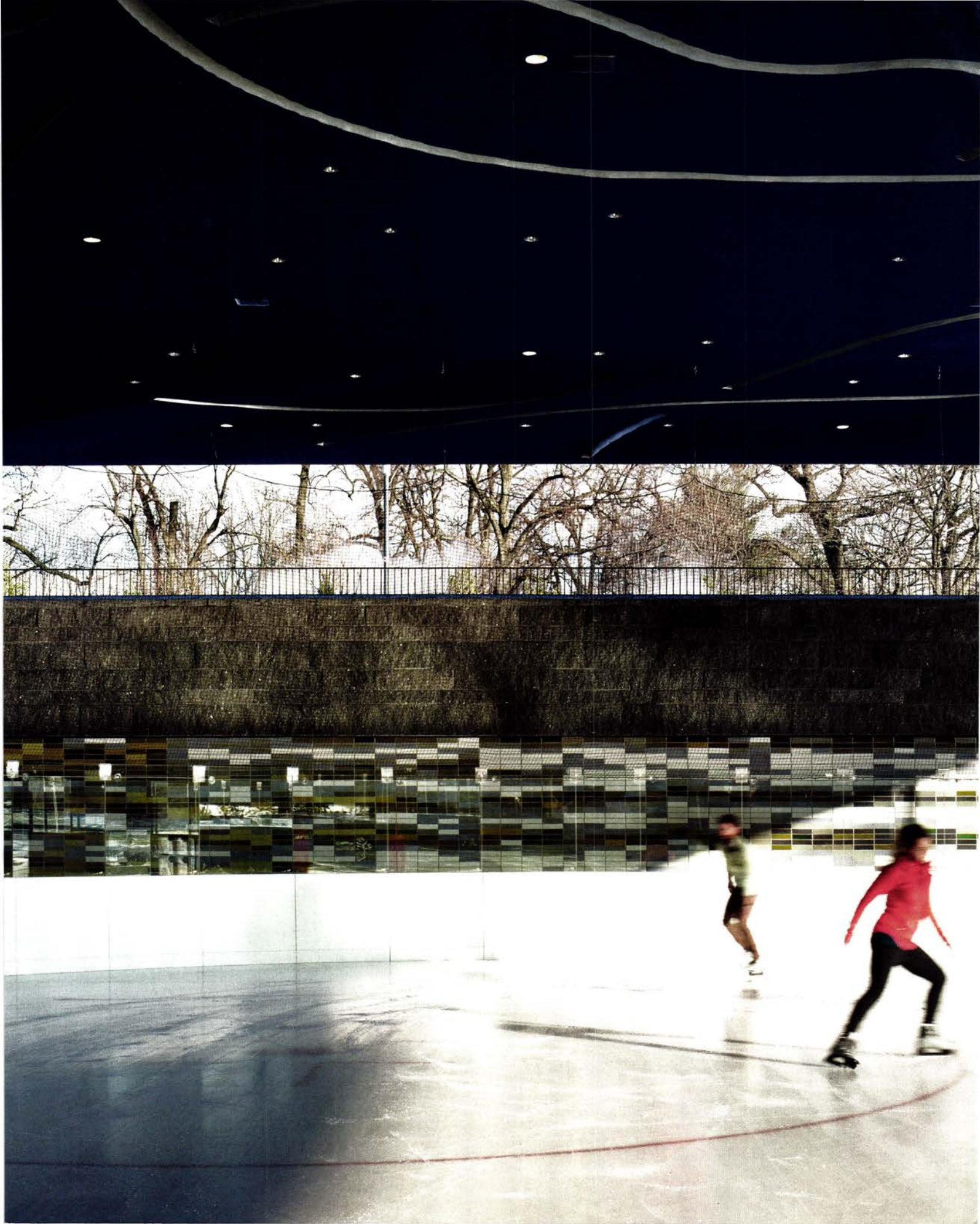
Since those first hesitant kids, skaters of all ages have warmed to the ice, with visitors waiting in long lines to buy tickets. The center's two rinks, along with the restoration of the adjacent landscape, are part of Lakeside, an ambitious $74 million project to restore and reinvigorate 26 acres of the sprawling and beloved park, designed by Frederick Law Olmsted and Calvert Vaux in the 19th century.

They originally planned the site to stage a formal moment, as they famously did by the water's-edge at Bethesda Terrace in Manhattan's Central Park. A carriage concourse terminated near the shore of Prospect Park's lake, where visitors could listen to performances by musicians stationed across a small channel on Music Island. In a 1961 overhaul, the channel was filled in to make way for a shedlike ice-skating facility and—in typical Robert Moses–era fashion—a parking lot replaced the carriageway.

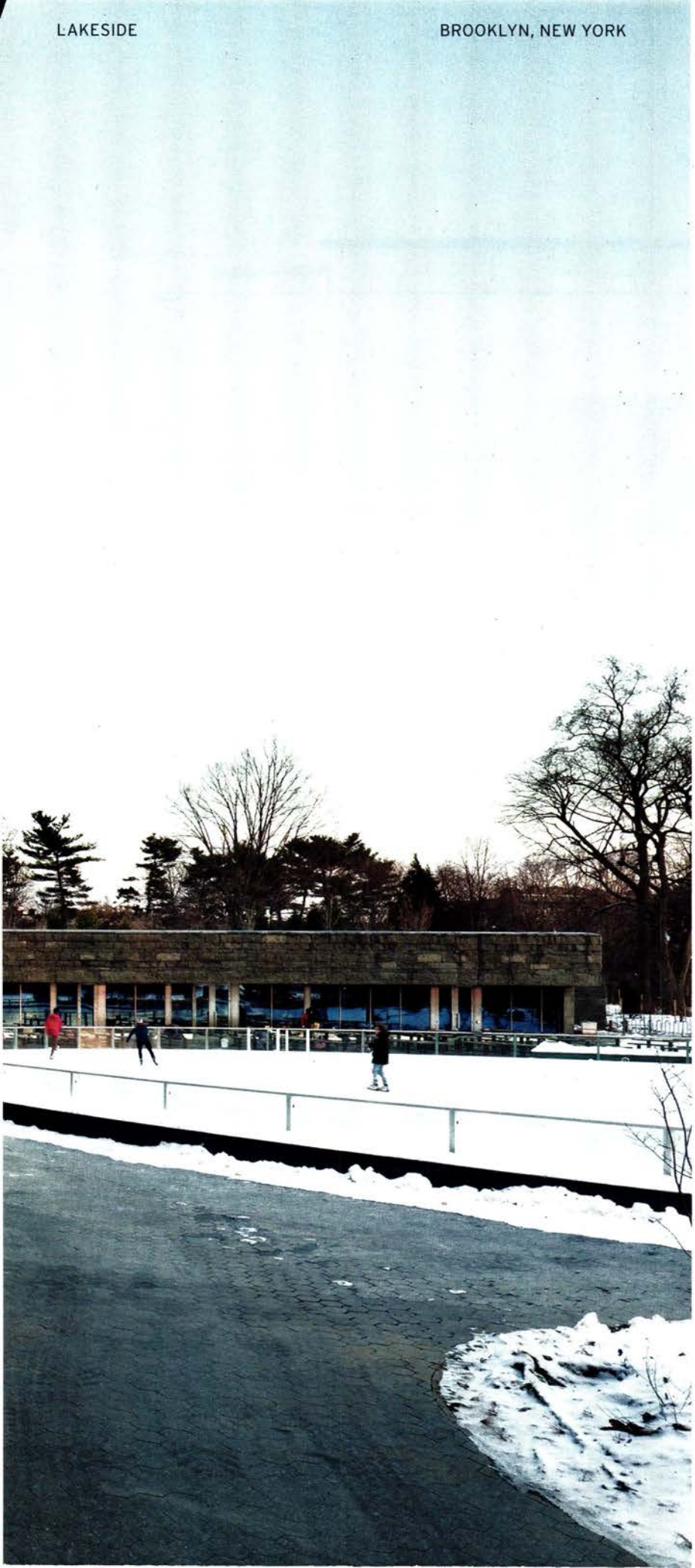
Williams and Tsien worked with landscape architect Christian Zimmerman,

GRACEFUL MOVES Several paths through the park lead around the berm that conceals the skating center (above) as well as the ammonia-based chilling system (more efficient than a Freon process) used for making ice, which the architects cleverly concealed inside a concrete well and behind earthen walls that dampen the air handler's thunder. Roof terraces on each building look down on the rink level, where a 90-foot-long tile mural is pixelated with the colors of changing seasons (opposite).

View additional images at architecturalrecord.com.



ALWAYS IN SEASON In summertime, visitors can roller-skate on the hockey rink's vast concrete slab, while the elliptical rink will become an interactive water feature when perimeter hoses send nearly 10-foot arcs over a nonslip surface.



vice president of capital and landscape management for the nonprofit Prospect Park Alliance (PPA), to restore if not replicate Olmsted and Vaux's vision, reviving the green space while retaining the site's role as a gathering place. The center's two rinks, an uncovered ellipse and a canopied hockey rink, are both open for public skating in the winter, and the hockey rink will host roller-skating in the summer, filling a void left by the closure of the Empire Roller Skating Center, an institution in the nearby Crown Heights neighborhood. (The new plan even revives Music Island—but replaces the once awkwardly marooned musicians with a wildlife habitat.) "I feel that this is the most important piece we've ever done, because it's the most public," says Tsien. "It's the one that everybody can go to."

Only visitors who want to skate need to pay; anyone else may walk freely through the facility, which has no fences (it has nearly doubled the number of public restrooms in the park). The overall project was realized through a public-private partnership between the PPA and the New York City Parks Department that persevered through years of bureaucratic snags and financial challenges.

When Lakeside opened in December, the public was introduced to two single-story rectangular buildings topped by roof terraces that bound the rinks in an L-shaped plan. One building contains an ice-making plant, mechanical facilities, a café, and storage areas, and the other houses skate rental, lockers, a shop, and offices. Vegetated berms conceal these structures from the park's main path—visitors can be on top of the center and almost unaware of the crowds twirling below to a soundtrack of pop songs. At a serendipitous (and unplanned) point while crossing a bronze and reclaimed-teak footbridge connecting the terraces, the top of the Verrazano Bridge comes into view in the distance. "It's not unlike what Olmsted and Vaux had designed," says Zimmerman. "They didn't want you to see everything all at once. They wanted that illusory feel that things disappear and come back and disappear again."

To achieve this effect, the architecture is deferential to the park's landscape and historical character. While the hockey rink's 25,000-square-foot canopy—its rooftop planted with sedum—appears massive from below, it barely registers from the park's East Drive, and will be even less noticeable as the landscape matures. The 10 granite-clad structural

credits

ARCHITECT: Tod Williams Billie Tsien Architects – Tod Williams, Billie Tsien, principals; Andy Kim, project manager; Elisa Testa, project architect; Erin Putalik, Nate Petty, Shengning Zhang, team

ENGINEERS: Stantec (civil); ICOR Associates (m/e/p); Robert Silman Associates (structural); Van Boerum & Frank Associates (ice rink refrigeration)

LANDSCAPE ARCHITECT: Prospect Park Alliance Department of Design and Construction

GENERAL CONTRACTOR: Sciame

OWNER: City of New York, Department of Parks and Recreation

CLIENT: Prospect Park Alliance

SIZE: 26 acres (park renovation); 75,000 square feet (building project)

COST: $74 million

COMPLETION DATE: December 2013

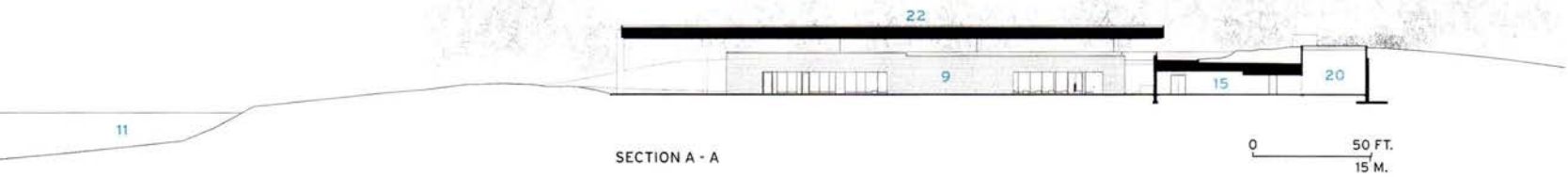
SOURCES

GRANITE MASONRY: Polycore

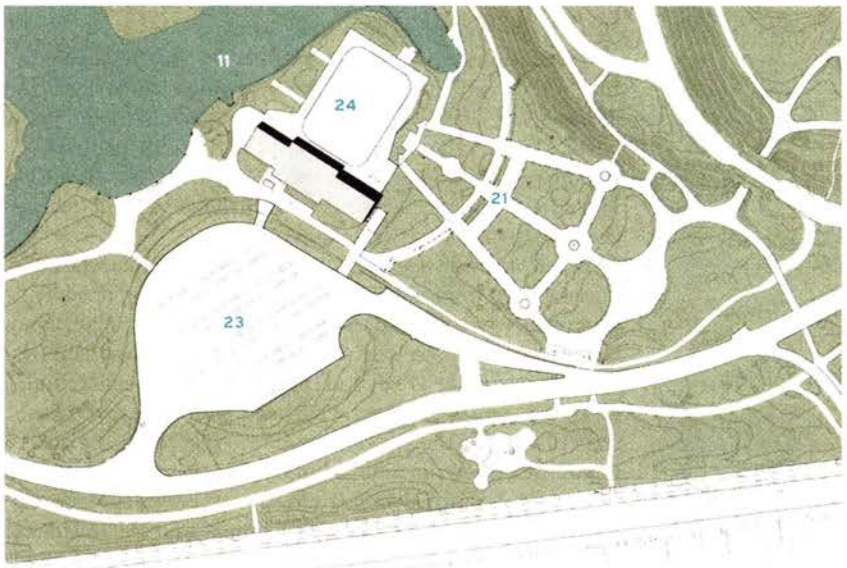
STOREFRONT: Tajima

GLAZING: Viracon

ROOF MEMBRANE: Johns Manville

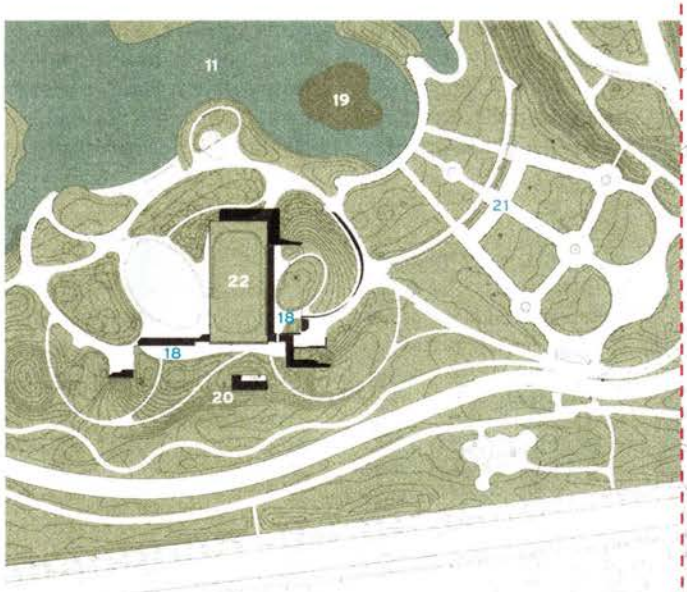


SECTION A - A

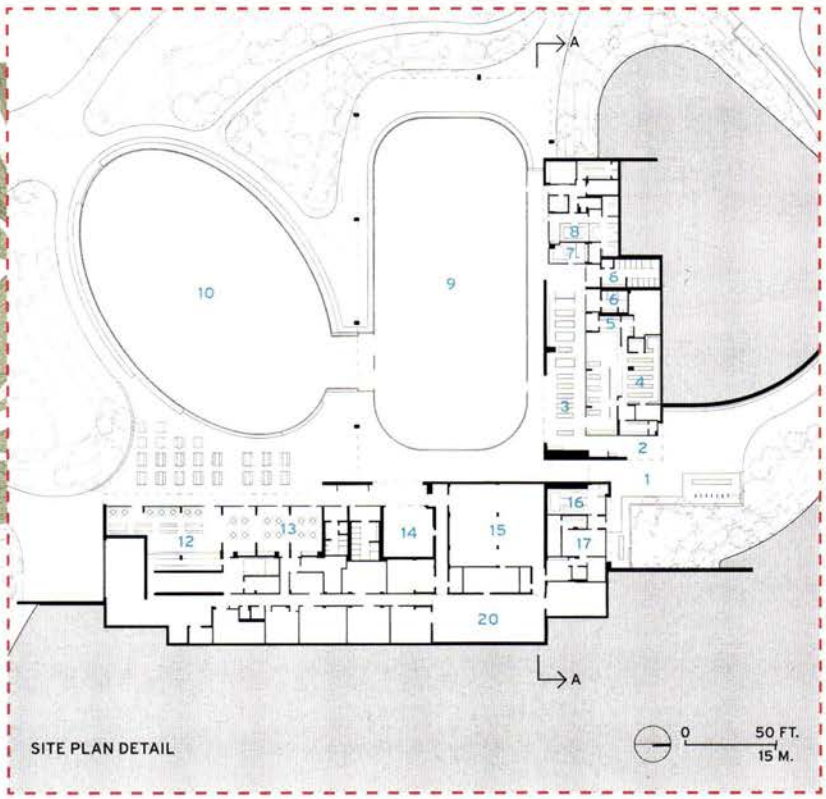


SITE PLAN BEFORE RENOVATION

1 ENTRY
2 TICKET WINDOW
3 SKATE CHANGING AREA
4 SKATE RENTAL
5 GIFT SHOP
6 RESTROOM
7 SKATE SCHOOL
8 OFFICES
9 HOCKEY RINK
10 ELLIPTICAL RINK
11 PROSPECT PARK LAKE
12 CAFÉ
13 PARTY ROOM
14 ICE-RESURFACER GARAGE
15 RINK MECHANICAL
16 RENTAL OFFICE
17 LUNCH ROOM
18 ROOF TERRACE
19 MUSIC ISLAND
20 AIR-HANDLER WELL
21 ESPLANADE
22 CANOPY GREEN ROOF
23 PARKING LOT (DEMOLISHED)
24 ORIGINAL RINK (DEMOLISHED)



NEW SITE PLAN



SITE PLAN DETAIL

steel columns that support the canopy are irregularly spaced to leave corners open, giving skaters unobstructed sightlines to the lake. Everywhere, Williams and Tsien echo the park's original architecture with granite, bluestone, and bronze, among other materials.

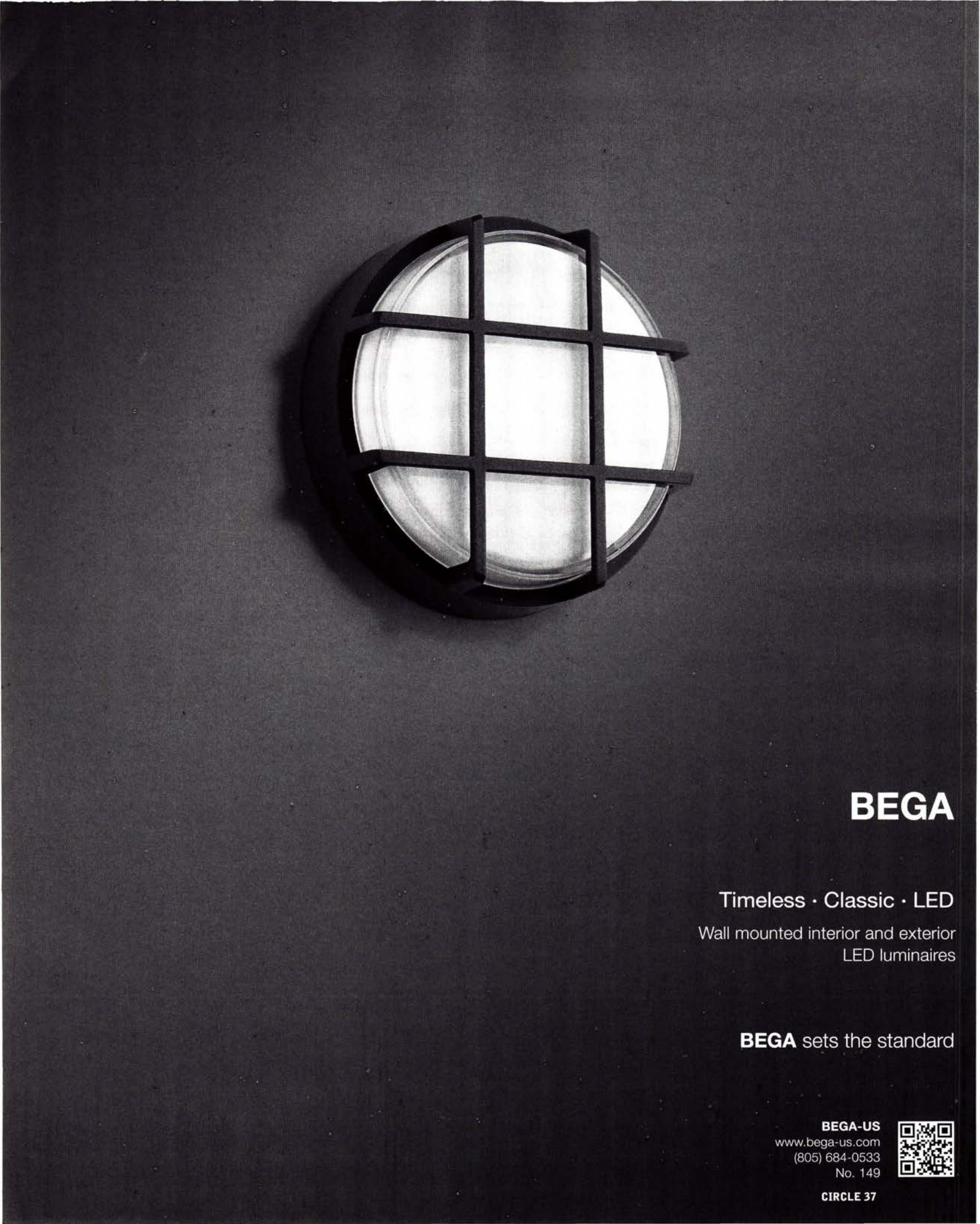
Their bolder gestures are appropriately playful. The midnight-blue stucco ceiling of the hockey rink canopy is as striking in person as it is in the Instagram photos frequently posted by skaters, though carved silver markings styled after blade marks on ice could look kitschy in a few years next to the more timeless lighting, which resembles a starry sky. At times, the old and new clash, such as when the rink's contemporary luminaires come into view from the neighboring esplanade, with its old-fashioned lampposts.

Ultimately, the structures aren't the focus. "The experience of being there is the point," says Tsien. Among the project's achievements are the varied opportunities it creates for viewing. Onlookers can watch the action from the terrace above or from several comfortable rinkside perspectives.

On a sunny day in early January, spectators included parents of skating children and park visitors who happened upon the new rinks, all watching a stream of people whirl around the ice. With the wrongs of previous decades erased, the site has become a busy center of activity stitched into the fabric of the park with a deftness worthy of Olmsted and Vaux's masterpiece. ■

Brooklyn, NY–based Jennifer Krichels writes about architecture and design for various national and international publications.

SLOW REVEAL
A curving wall of Laurentian Green granite from Quebec, selected for budgetary reasons but bearing a resemblance to dark-gray New York schist, creates a semi-elliptical path along which the ticket counters eventually emerge (right). Inside, visitors progress from a skate-rental counter to changing benches (above) to lockers before hitting the ice.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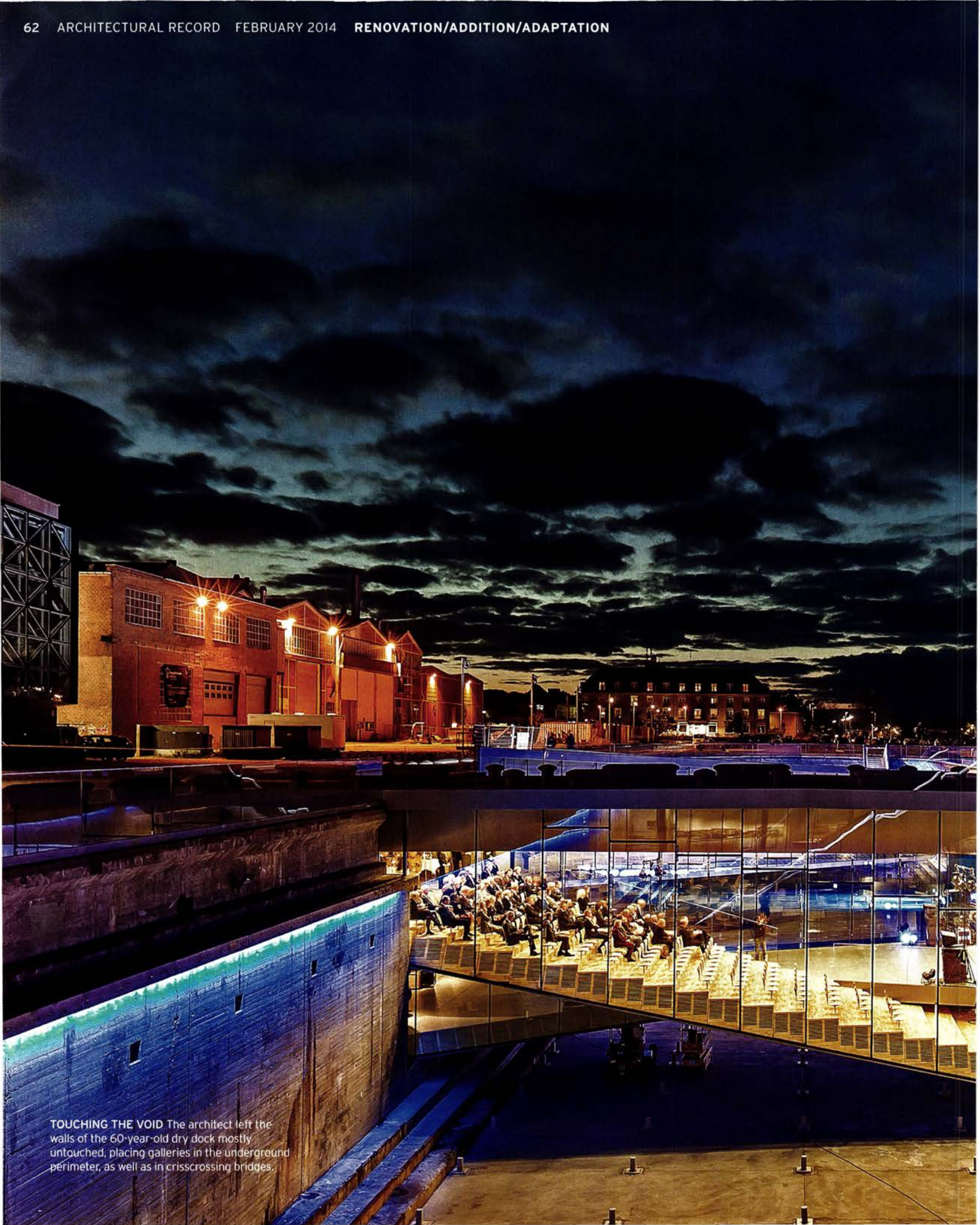
CIRCLE 37

RENOVATION, ADDITION, ADAPTATION

PHOTOGRAPHY: © GIACOMO FLAIM

When architects expand, renovate, or restore buildings of the past, they often feel compelled to create a grand statement. Others make the mistake of being too respectful of history and merely replicating it. The projects featured in this issue avoid such architectural aggression or timidity; instead, they seek to create new interventions using modern materials and technologies that establish a balanced dialogue with the old. From a dry dock in Denmark to an underground school in Italy, from a former World's Fair structure in the U.S. to a 1980s postmodern housing complex in the Netherlands, the guiding ethos seems to favor identifiable changes that don't overwhelm but still intrigue. Paradigms of architectural, urbanistic, and programmatic invention, these works serve as exercises in honesty and subtlety. Here, time—past and present—is revealed through imagination and restraint.

THE ENTRANCE STAIR AT THE HANNAH ARENDT SCHOOL IN BOLZANO, ITALY, BY CLAUDIO LUCCHIN & ARCHITETTI ASSOCIATI, FEATURES A SCULPTURE, "THE PRODIGAL SON" (2003), BY LOIS ANVIDALFAREI.



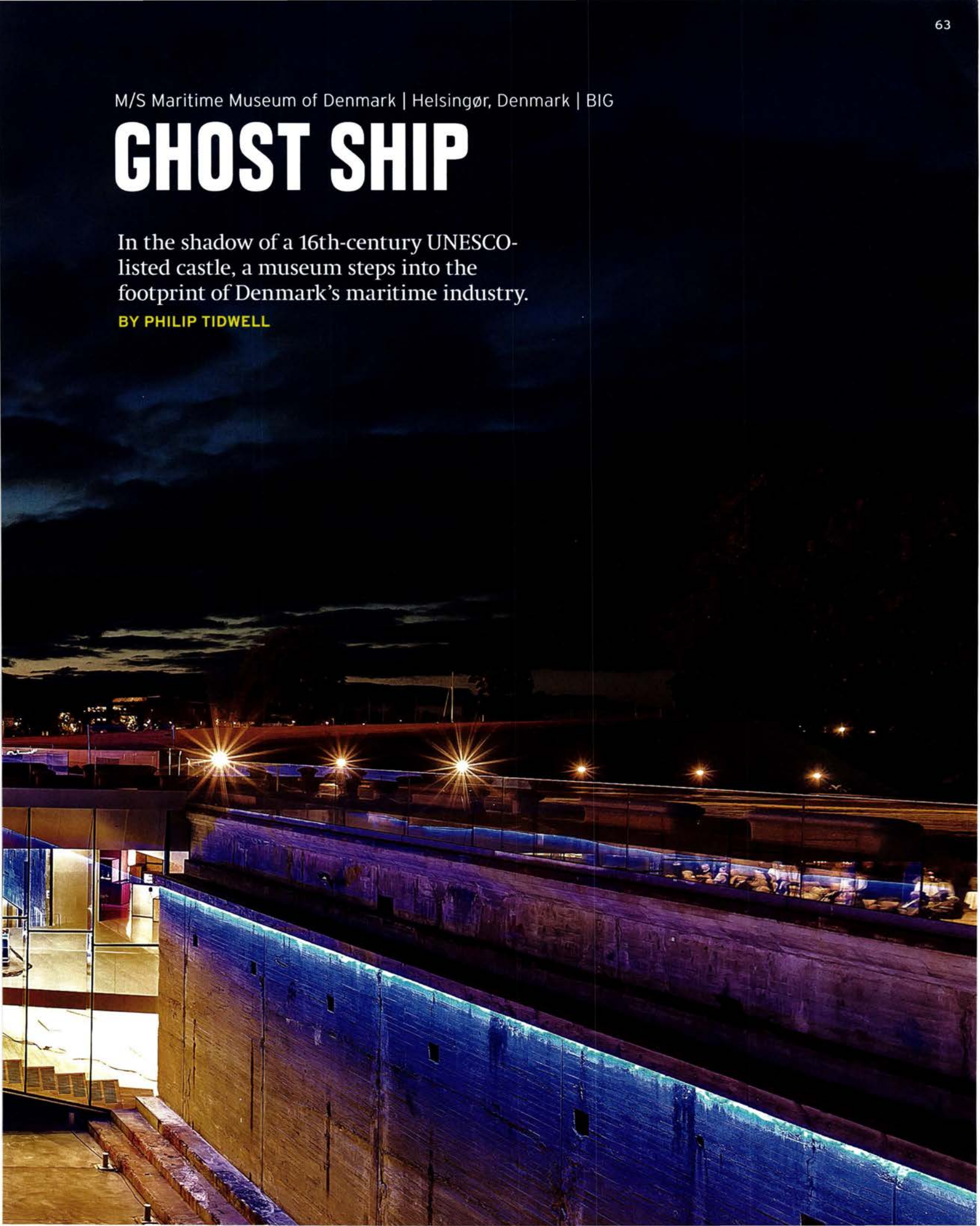
TOUCHING THE VOID The architect left the walls of the 60-year-old dry dock mostly untouched, placing galleries in the underground perimeter, as well as in crisscrossing bridges.

M/S Maritime Museum of Denmark | Helsingør, Denmark | BIG

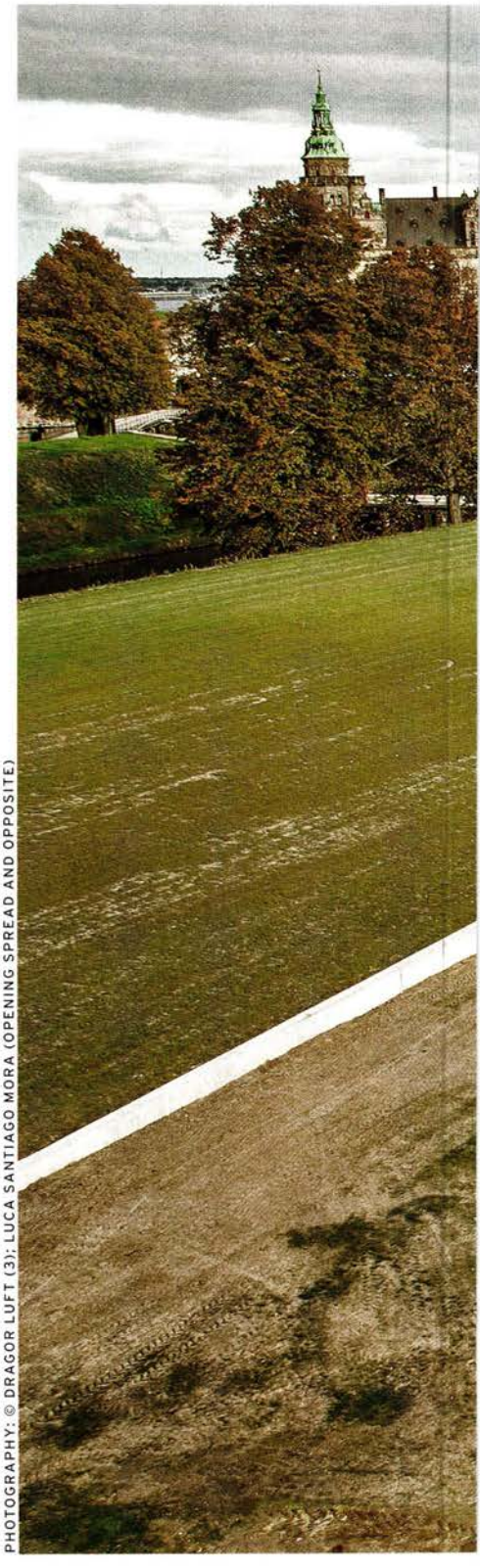
GHOST SHIP

In the shadow of a 16th-century UNESCO-listed castle, a museum steps into the footprint of Denmark's maritime industry.

BY PHILIP TIDWELL



BOW AND STERN
To build the museum (right, top to bottom), all the soil around the flooded dock needed to be excavated, which would have caused groundwater to push up the dock's concrete floor. Anchors were drilled through the slab to a depth of about 148 feet and tied off at the top to keep it pinned in place. Then workers built a slurry wall around the perimeter. Once this was done, the site was drained and excavated. The museum takes an iconic form because the dry dock is conveniently shaped like a boat (far right).



PHOTOGRAPHY: © DRAGOR LUFT (3); LUCA SANTIAGO MORA (OPENING SPREAD AND OPPOSITE)

Over the past decade, Bjarke Ingels's firm BIG has made its reputation primarily by designing some of the most ambitious residential buildings anywhere today. First in Copenhagen and now in New York, Beijing, and other cities, the office has gained international attention by finding opportunities for architectural invention within the tight practical demands of speculative residential development. Over the last six years, as many of those projects have risen, the office has been working to realize an earlier big win: a 2006 competition for the M/S Maritime Museum on the coast of Ingels's native Denmark. With the project now complete, BIG adds to its burgeoning portfolio an impressive public building that negotiates formal and technical constraints to create a public landmark in a footprint of the nation's historic shipbuilding industry.

Since it was founded in 1915, the M/S Maritime Museum has been located in the coastal city of Helsingør, at the northern end of the Øresund Strait, at the entrance to the Baltic Sea. Until 2003, the museum was housed in the Kronborg Castle (1574–1585), known to most visitors as Elsinore from Shakespeare's *Hamlet*, but equally important for its role in Danish maritime history. With its prominent position along a narrow commercial thoroughfare, the castle served for centuries as a point to collect tolls from passing ships. In 2000, the designation of the castle

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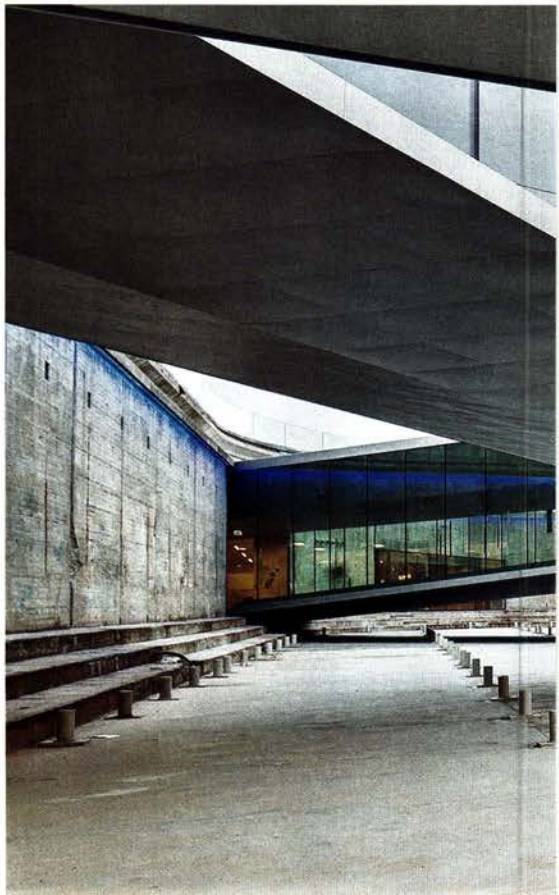
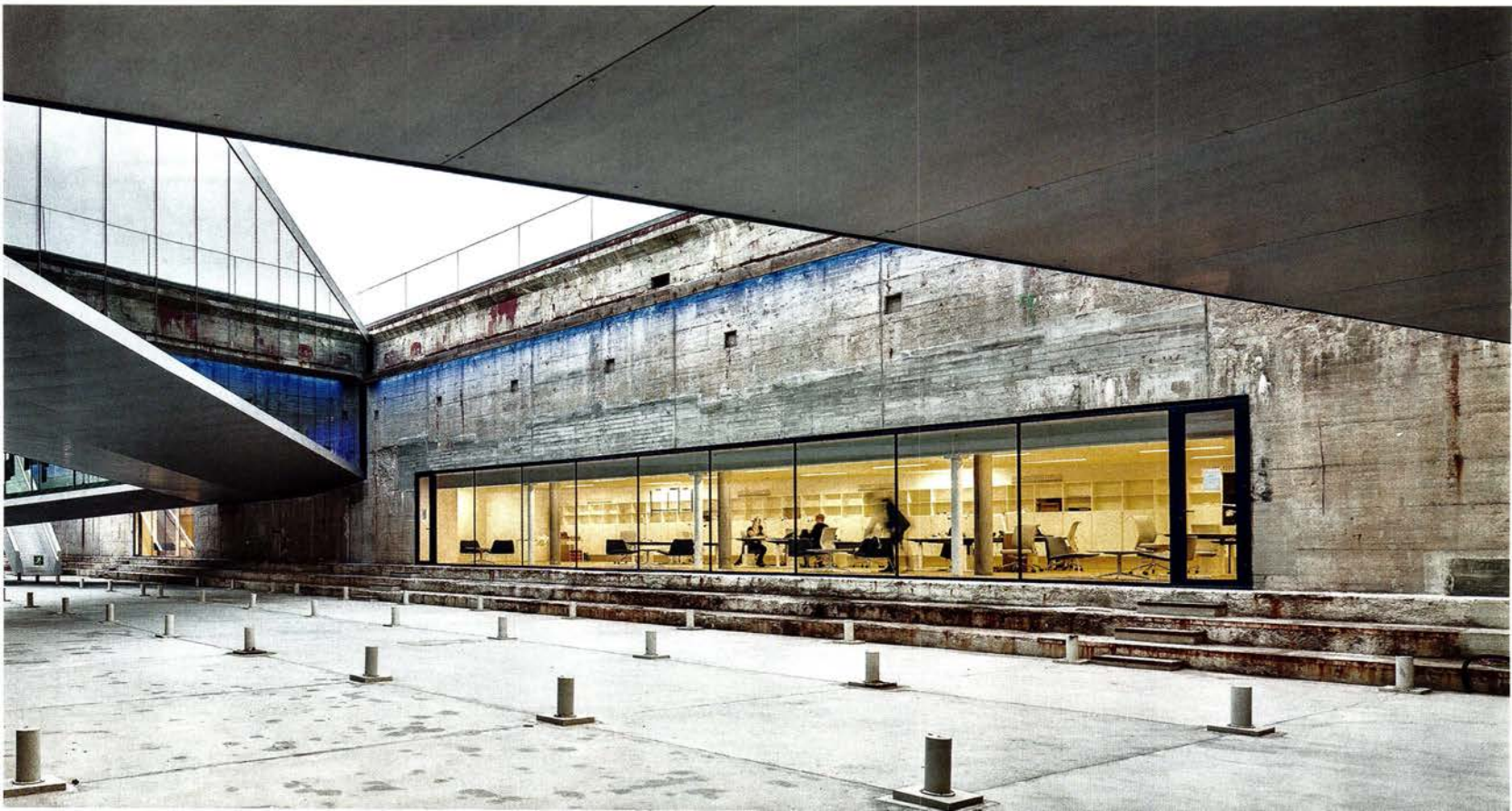
HISTORIC DESCENT
By burying the museum underground, views of Kronberg Castle and other monuments were left undisturbed (above). Three two-level aluminum-clad bridges span the dock's void. They contain auditoriums and gallery space. A café overlooks the floor of the dock (opposite, top). Careful cuts into the old concrete walls bring light into the perimeter galleries (bottom).



PHOTOGRAPHY: © LUCA SANTIAGO MORA (BELOW); RASMUS HJORTSHØJ (TOP AND OPPOSITE, TOP)



SECTION A - A

0 60 FT. 20 M.

credits

ARCHITECT: Bjarke Ingels Group (BIG) – Bjarke Ingels, David Zahle, partners in charge (see complete list online)

CONSULTANTS: Jens Ravnholt (landscape); Delux Denmark, Louis Poulsen Lighting, X Light (lighting); Kossmann.dejong (exhibition design)

ENGINEER: Rambøll

CONTRACTOR: E. Pihl & Son, Jakon, Helbo

CLIENT: M/S Maritime Museum of Denmark

SIZE: 77,500 square feet

COST: $54 million

COMPLETION DATE: October 2013

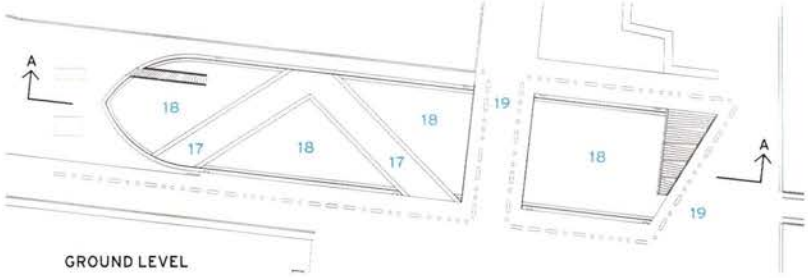
SOURCES

GLASS FACADES: Skandinaviska Glassystem

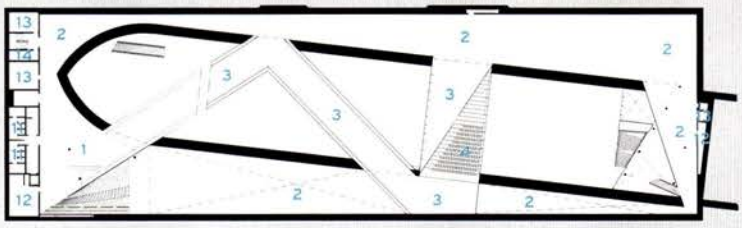
STAIRS: HB Stairs & Steel, PL Concrete

CONCRETE FLOORING: Lodbyg

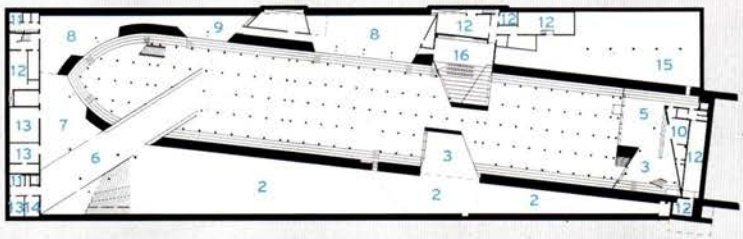
FURNITURE: Paustian



GROUND LEVEL

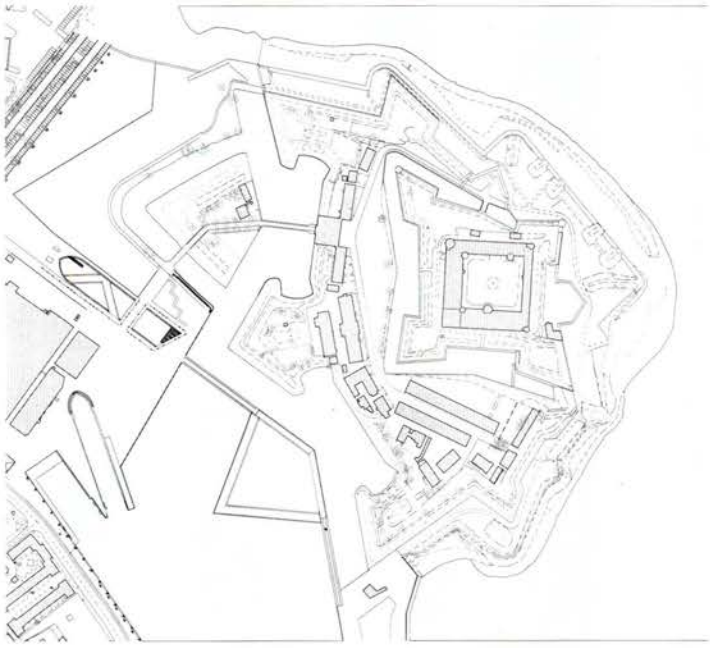


LEVEL ONE BELOW GRADE



LEVEL TWO BELOW GRADE

0 60 FT. 20 M.



SITE PLAN

0 200 FT. 60 M.

1 FOYER/MUSEUM SHOP
2 PERMANENT EXHIBITION
3 TEMPORARY EXHIBITION
4 AUDITORIUM
5 CAFÉ
6 MULTIFUNCTIONAL ROOM
7 AUDITORIUM/MEETING ROOM
8 OFFICES
9 LUNCH ROOM
10 KITCHEN
11 BATHROOM
12 TECHNICAL ROOM
13 STORAGE
14 CLEANING ROOM
15 INSPECTION AREA
16 CLASSROOM
17 ENTRANCE/BRIDGE TO ENTRANCE
18 DOCK
19 BRIDGE

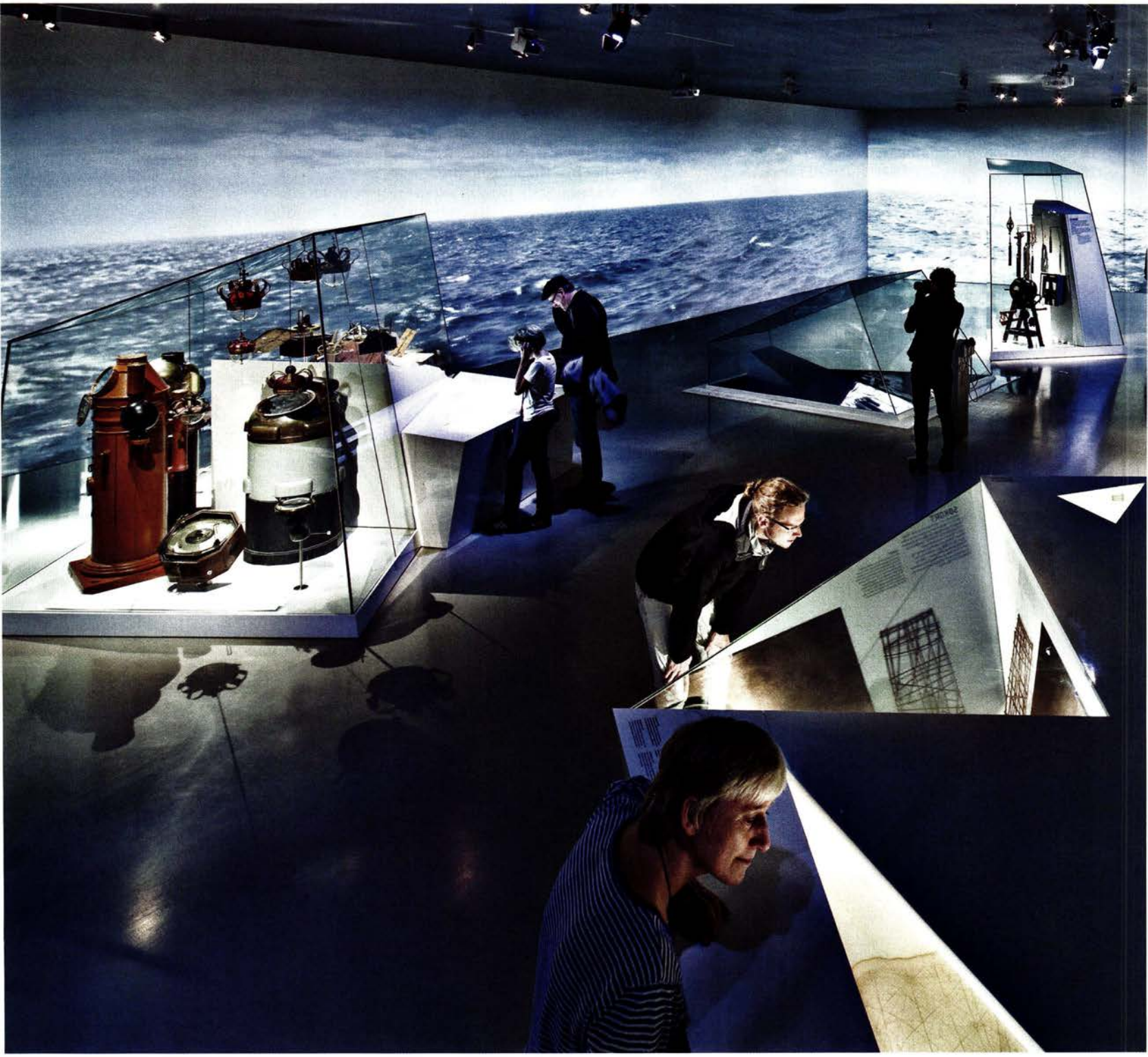
and its surroundings as a UNESCO World Heritage site forced the museum to relocate. To remain close to the castle and waterfront, the museum decided to move to a nearby 32,000-square-foot dry dock, which once served the city's shipbuilding industry but had been abandoned and flooded for over two decades. By placing the new facility below grade, the museum would not obstruct views of the castle or disturb the historic ramparts. And by repurposing an industrial relic, it would preserve part of the city's maritime heritage. The massive concrete structure could not only be saved, but also put to new use presenting the impressive history of which it was part.

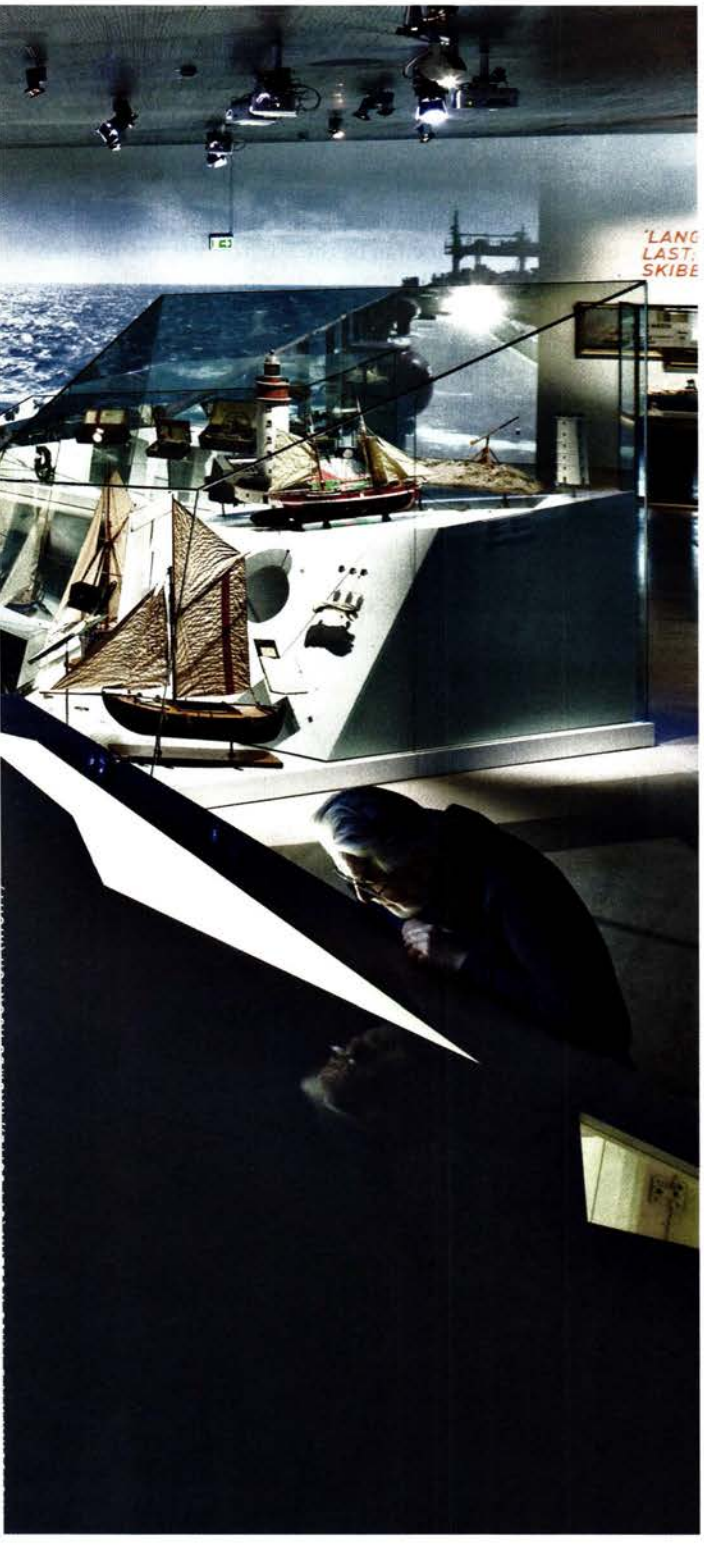
While the solution was mostly effective, the practical demands imposed by such a unique site were not easy to resolve. Galleries and exhibition spaces could be placed in the dock and lit from above, but working spaces and staff offices would require light, views, and circulation that could not be accommodated in the narrow footprint of the sunken space. Recognizing these constraints, the competition brief for the new museum called for over 60,000 square feet of exhibition halls, offices, and conservation facilities to be located partly in the dock and partly in existing structures nearby, effectively dividing the museum into separate buildings. BIG's winning entry radically reconfigured that program by embedding the building around the perimeter of the void rather than within it. This arrangement allowed the dock to be used as an entry and circulation space as well as a sunken courtyard that would provide light to the surrounding galleries, café, and offices 26 feet below grade. More important, it increased the available program area so that all public and administrative functions could remain together in a single structure.

After nearly six years of extensive design and engineering, the building that has emerged from that winning proposal is a subtle yet surprising addition to the historic waterfront. Walking north from the train station, the silhouette of the castle dominates the horizon, and the only visible portion of the museum is a handrail floating above the surrounding wharf. As visitors near the edge of the low glass perimeter wall, they confront the immense boat-shaped void that serves as the public facade. The museum appears not as a monument so much as an inhabited ruin, an archaeological site undergoing excavation beneath the public promenade. A series of cuts in the walls of the dock allow light and access to the spaces below while providing a hint of the extensive facilities. The battered concrete has

IN ELSINORE'S SHADOW The museum's neighbor, Kronberg Castle (the inspiration for Elsinore in Shakespeare's *Hamlet*), can be seen from the promenades created by the bridges that zigzag across the dry dock.

PHOTOGRAPHY: © RASMUS HJORTSH





CULTURAL EXCHANGE
Iceberg-like display cases, by exhibition designer Kossmann.dejong, show off the museum's collection (above). An angled stair guides visitors back up to the galleries from the dock floor (top, right).

been cut with the careful precision of a Gordon Matta-Clark operation to sharpen the contrast between old and new and to reveal the raw beauty of the 5-foot-thick structure. The sharp lines of the aluminum-clad bridges, which guide visitors into and across the sunken pit, heighten the drama of the negative space and provide additional room for exhibitions and events.

In a move characteristic of BIG's design approach, the entire program is organized around a unifying gesture—an elongated ramp—that extends throughout the length of the building. Halfway along the southern edge of the site, the ramp begins its descent into the dock and turns before proceeding through the concrete wall and entry doors. Continuing past the ticket counter, the ramp moves gradually down through the exhibition galleries and around the perimeter of the void until it reaches the dock floor. The return journey is completed via a less elaborate, though slightly dizzying, ascent up an angled staircase.

This continuously flowing route is a familiar motif for museums. Many architects have experimented with sloping exhibition spaces, but here the gesture is executed with remarkable restraint. The gentle descent is at times barely noticeable as it lulls visitors through the continuous exhibition hall. Along the way, the width of the ramp slowly shifts in accordance with the oblique geometries of the plan, altering the scale and proportions of this elongated room. It alternately compresses and expands, creating moments of intensity and providing a variety of spaces for the museum's diverse collection of paintings, posters, artifacts, and scale models of ships from a wide range of historical periods.

The impressive feats of engineering, requiring Danish firm Rambøll to bury a museum deep underground on the shores of the Baltic Sea, have inspired a book documenting the project that will be published later this year. However, most visitors will happily overlook the technical achievements of the project as they become absorbed in the gently shifting rhythm of the galleries and the captivating views from within the sunken void. As in sailing across the open sea, planning is important, but most of us just enjoy the ride. ■

Philip Tidwell is a Helsinki-based architect and designer with a focus on the intersection of climate, culture, and materiality, particularly in the Nordic countries. He earned his master's degree in architecture from Princeton University in 2011. He teaches at Aalto University.

Queens Museum | Queens, New York | Grimshaw and Ammann & Whitney

THE WORLD OF TOMORROW TODAY

A long-span-steel structure cloaked in modern-classical-style architecture has proved to be flexible for reinvention.

BY SUZANNE STEPHENS

PHOTOGRAPHY BY DAVID SUNDBERG/ESTO

Since it was constructed for the 1939 world's fair, the New York City Building in Flushing Meadows–Corona Park, now the Queens Museum, has played assorted unexpected roles. Its staid, modern-classical architecture, designed, ironically, to suit the "Building the World of Tomorrow" theme, has demonstrated a surprising agility in supporting a variety of programs. Planned to be the fair's only structure to remain in permanent use, it was to become a recreation center for roller-skating and ice-skating. Yet it also served as temporary quarters for the United Nations General Assembly in the late 1940s—while the U.N.'s real home in Manhattan was being completed—and then as the New York City Pavilion for the 1964 New York World's Fair. In 1972, the Queens Museum of Art moved into the north half, leaving only the ice-skating rink on the south.

Now, after a $69 million first phase of a renovation by Grimshaw and Ammann & Whitney, and called simply the Queens Museum, the entire steel-framed, long-span structure has been given over to 105,000 square feet of galleries,

GLOSSY MAKEOVER Grimshaw reworked the west facade of the building using a screen of ceramic-fritted glass panels, enlivened at night by LEDs. Inside, the skylit atrium gallery is given a sense of enclosure by a 30-foot-tall glass lantern (opposite).

View additional images at architecturalrecord.com.

performance and event spaces, educational workshops, community activity areas, and a future library branch. It also includes nine studios for resident artists, a café and shop, and the famous Panorama of the City of New York—a 9,335-square-foot model created for the 1964 fair—as well as open-storage vitrines for the museum's collection of artifacts from both expositions.

The original architect, Aymar Embury II, known for his Colonial Revival country houses and later for metropolitan bridges, conceived the restrained monumentality of this colonnaded limestone hall for the city's uber-boss of parks and roads, Robert Moses. The long-span steel trusses Embury employed for the roof allowed flexible-use, column-free spaces unusual at the time, notes Grimshaw's partner in charge Mark Husser. "We wanted to make the most of Embury's rigorous structural frame," he says of Grimshaw's design approach, "and emphasize the large open space."

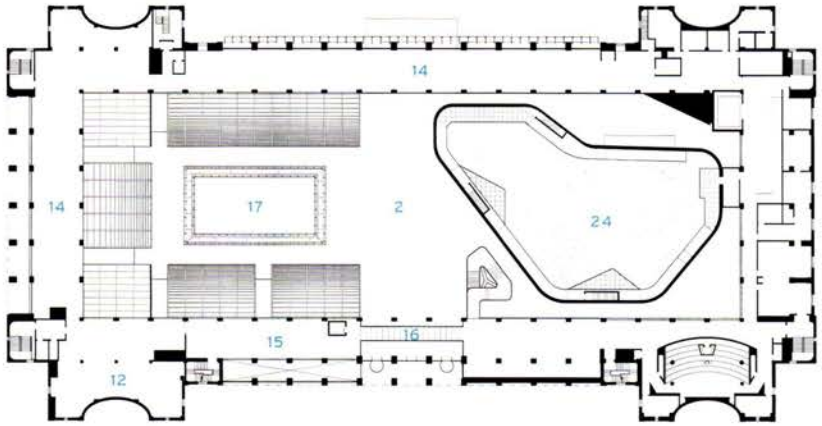
In the years before Grimshaw arrived on the scene, as the program changed, other architects left their mark—or tried to: architect Daniel Chait designed the ameboid setting for the Panorama in 1964; in a 1994 renovation, Rafael Viñoly Architects added glass ramps around the gigantic model and created a 30-foot-high aluminum-and-glass curtain wall for the east facade. By 2001, the city-owned museum had decided to take over the entire building, and held a competition. It was won by Los Angeles architect Eric Owen Moss, who proposed gutting the middle section of the structure and inserting a glass "drape" that bulged out from the east side (looking more like a giant wire bustle). In spite of Moss's West Coast success in using brash, swashbuckling forms to make the once down-at-the-heels Culver City an architectural landmark of sorts, his proposal for Queens encountered increasing opposition and budget questions. By 2005, the museum's executive director, Tom Finkelpearl, along with New York City's Department of Design and Construction (DDC), began searching for another architect. The contract went to the New York office of the London architect Nicholas Grimshaw, and to Ammann & Whitney, an engineering and architecture firm. Perhaps it was a good omen: the latter was founded in 1946 by Othmar Ammann, who had worked with Embury on the Triborough Bridge (1926), connecting Manhattan, the Bronx, and Queens.

The architects decided to grab the attention of passersby on Grand Central Parkway by designing an elegant 200-by-27-foot screen wall of high-performance, ceramic-fritted glass—lit by LEDs at night—on the museum's west facade. It is framed within Embury's temple-like volume, with the entrance placed on an axis that cuts through the interior to the east. There, Viñoly's 1994 curtain wall opens to the park and a head-on view of the Unisphere, the giant latticed steel landmark globe that flamboyantly symbolized the international aspirations of the 1964 fair.

VAULTING SPACES
Various galleries open off the atrium, marked by its flowing open spaces and the diffusion of natural and electric light (above). From the glass bridge and mezzanine on the east (opposite), visitors take in the gigantic Unisphere, created for the 1964 world's fair. The east entrance leads to a plaza and the Flushing Meadows-Corona Park.

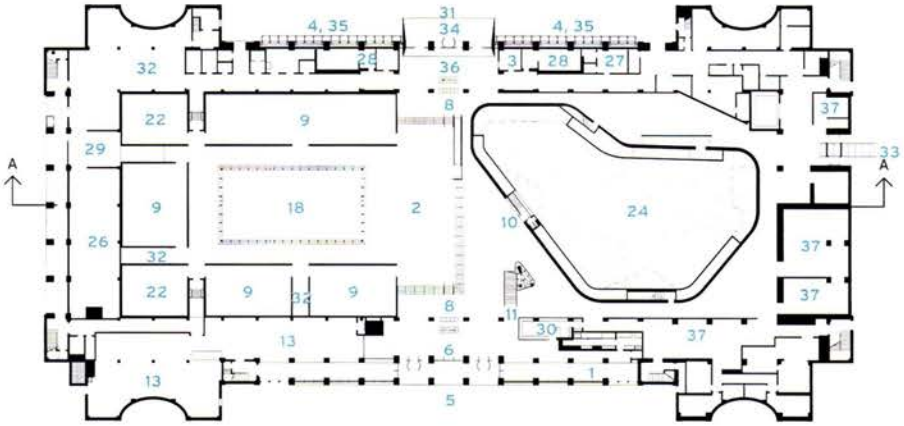
SECTION A - A

0 50 FT. 15 M.



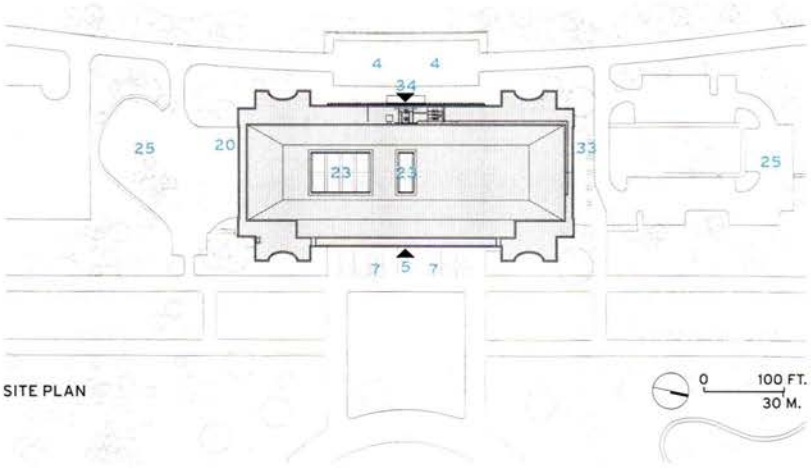
MEZZANINE LEVEL

0 50 FT. 15 M.



GROUND FLOOR

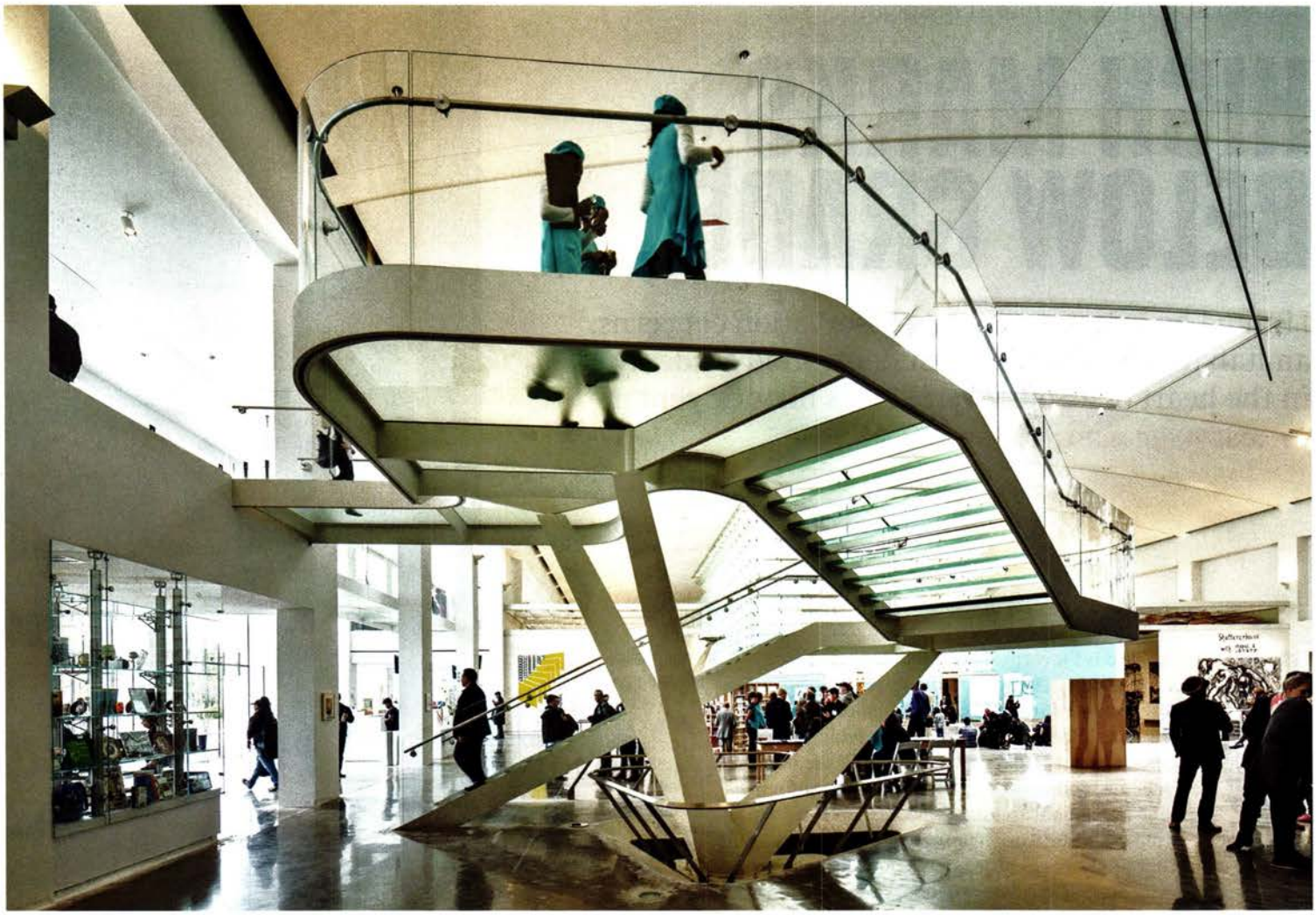
0 50 FT. 15 M.



SITE PLAN

0 100 FT. 30 M.

1 CAFÉ
2 CENTRAL ATRIUM
3 COAT CHECK
4 DROP-OFF PLAZA
5 EAST ENTRANCE
6 EAST LOBBY
7 EAST PLAZA
8 VISITOR SERVICES
9 GALLERY
10 SOUTH PANORAMA STAIR
11 FEATURE STAIR
12 FUTURE CLASSROOMS
13 FUTURE QUEENS LIBRARY
14 FUTURE OFFICE
15 GATHERING SPACE
16 GLASS BRIDGE
17 HANGING GLASS ENCLOSURE
18 LARGE WORKS GALLERY
19 LIGHT DIFFUSING BAFFLES
20 LOADING DOCK
21 MECHANICAL
22 MEDIA GALLERY
23 NEW SKYLIGHT
24 PANORAMA
25 PARKING
26 PERMANENT STORAGE
27 PERFORMERS' GREENROOM
28 PUBLIC RESTROOM
29 RECEIVING AREA
30 RETAIL
31 ENTRANCE CANOPY
32 STORAGE
33 STUDIO RESIDENCY ENTRANCE
34 WEST ENTRANCE
35 WEST SCREEN WALL
36 WEST LOBBY
37 ARTIST STUDIOS



SPIRALING UP
A large open-riser and glass-tread stair twists up to the new glass bridge on the mezzanine level (above). A postcard (opposite) from the 1939 world's fair shows the Pylon and the Perisphere located to the east of the original building, now the location of the Unisphere.

Inside the building, Grimshaw installed a 55-by-40-foot skylight and suspended a 30-foot-tall glass lantern from the building's steel trusses to give a sense of enclosure to a newly formed atrium gallery, which has replaced the ice-skating rink. The lantern's glass fins, along with tensile-membrane ceiling and wall panels covering the roof trusses, help reflect and bounce light to the side galleries around the space (RECORD, May 2008, page 238). In these open galleries off the atrium, the architects employed fixed aluminum baffles on the ceilings to diffuse light. (Only two of the seven galleries are enclosed, one for video works, the other for the Neustadt Collection of Tiffany Glass.)

Grimshaw also made the Panorama more accessible from the central hub, moving the entrance from the exhibition's north end to the main lobby. At the Panorama's old entrance, the museum has created artists' studios in former gallery spaces. A Grimshaw-designed spiral stair supported by a gangly tripod-like structure (intended to echo the base of the Unisphere) takes visitors up to a glass bridge on the mezzanine, where they encounter startlingly close-up views of the symbolic 1964 sculpture before moving on to other activities. Construction quality is rough, and elements of the punch list were left to be finished after the opening, while the second phase of the renovation is expected to be completed in 18 months.

The architectural team has not only reinforced the openness and flexibility of Embury's long-span structure but exploited its Early Modern characteristics with current glass technology. The result dramatizes the sense of light and space inside and out without resorting to pumped-up architectural effects. In this manner, the makeover becomes a palimpsest—manifesting the contributions of Embury, Chait, and Viñoly—by quietly revealing traces of the building's past architectural lives. ■

credits

ARCHITECT: Grimshaw – Mark Husser, partner in charge; Juan Porral, project associate; Nicolas Ryan, project manager; Richard Yoo, project architect

EXECUTIVE ARCHITECT: Ammann & Whitney – Joel Sthmer, project manager

ENGINEERS: Ammann & Whitney (structural); M. Ludvik Engineering (specialty structure); Buro Happold (m/e/p and fire protection)

CONSULTANTS: Mathews Nielsen Landscape Architects (landscape); George Sexton Associates (lighting)

OWNER: City of New York/Queens Museum

SIZE: 105,000 square feet

COST: $69 million

COMPLETION DATE: November 2013

SOURCES

GLASS: Glass and Mirror Craft (west facade); Pulp Studios (interior lantern)

PAINTS AND STAINS: Bollen International

FABRIC CEILING: Newmat

Hannah Arendt School | Bolzano, Italy |
Claudio Lucchin & Architetti Associati

HIGH MARKS BELOW GRADE

Limited by a dense site and preservation concerns, an Italian firm creates an underground academy in the heart of a South Tyrol city's historic center.

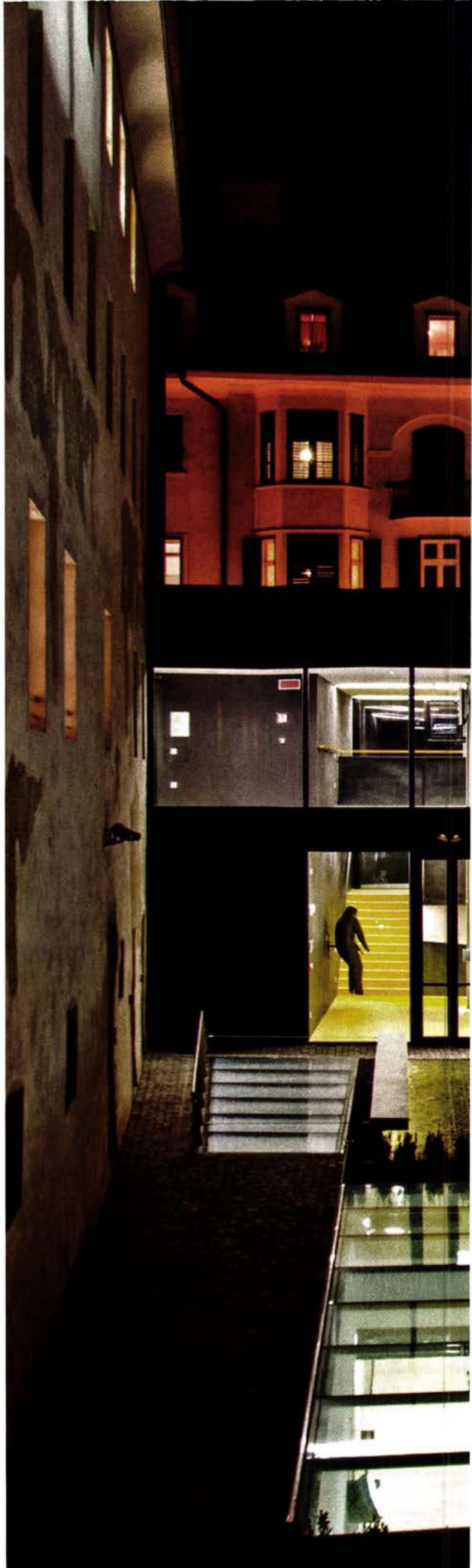
BY JOSEPHINE MINUTILLO

"Underground is for corpses, they told me," recalls Claudio Lucchin of the community's reaction when he proposed submerging a school addition three stories below grade. "They couldn't imagine having young kids spend an entire day down there." But the improbable scheme soon began to gain traction. Lucchin is the kind of regional architect who has produced an impressive body of large-scale work in and around his native Bolzano, in northern Italy, but is little known outside its Teutonic province, bordering Austria and Switzerland. Not surprisingly, he's also the kind of architect who can convince local authorities to do something completely unheard of for the area.

The existing school, owned by the city, split classrooms, lecture halls, and a library between a freestanding 1999 structure—whose construction Lucchin had also worked on after the original architect died—and part of an extant Capuchin monastery adjacent to it. Its already dense site and location, inside the medieval walls that mark Bolzano's historic center, prevented the architect from adequately expanding above grade to accommodate all of the program requirements. When faced with the alternative of building a satellite facility outside the center and having students travel back and forth between classes, the subterranean solution prevailed.

Named for German political theorist Hannah Arendt, the vocational high school trains teenagers for diverse careers in social work. The student population, mostly female, had grown in recent years, with an increased percentage coming from the surrounding Tyrolean countryside. Providing ample classrooms, practice labs, study areas, and a computer lab, the 21,850-square-foot addition—referred to by the architect as an "archaeological dig"—is located behind the existing structures, below what used to be a garden (and beside some unearthed Roman ruins).

While skeptics feared the underground rooms would be dark and claustrophobic, the result is exactly the opposite. Daylight pours through internal glazed walls into every classroom and all the program spaces—even the labs on the bottom floor—thanks to



THE BIG DIG
On a tight site that used to contain a rear garden, architect Claudio Lucchin submerged a 21,850-square-foot addition for the Hannah Arendt School three levels belowground. The glass panels of the 1,775-square-foot skylight over its subterranean atrium double as the rear courtyard's paving and align with the cloister of the adjacent Capuchin monastery.

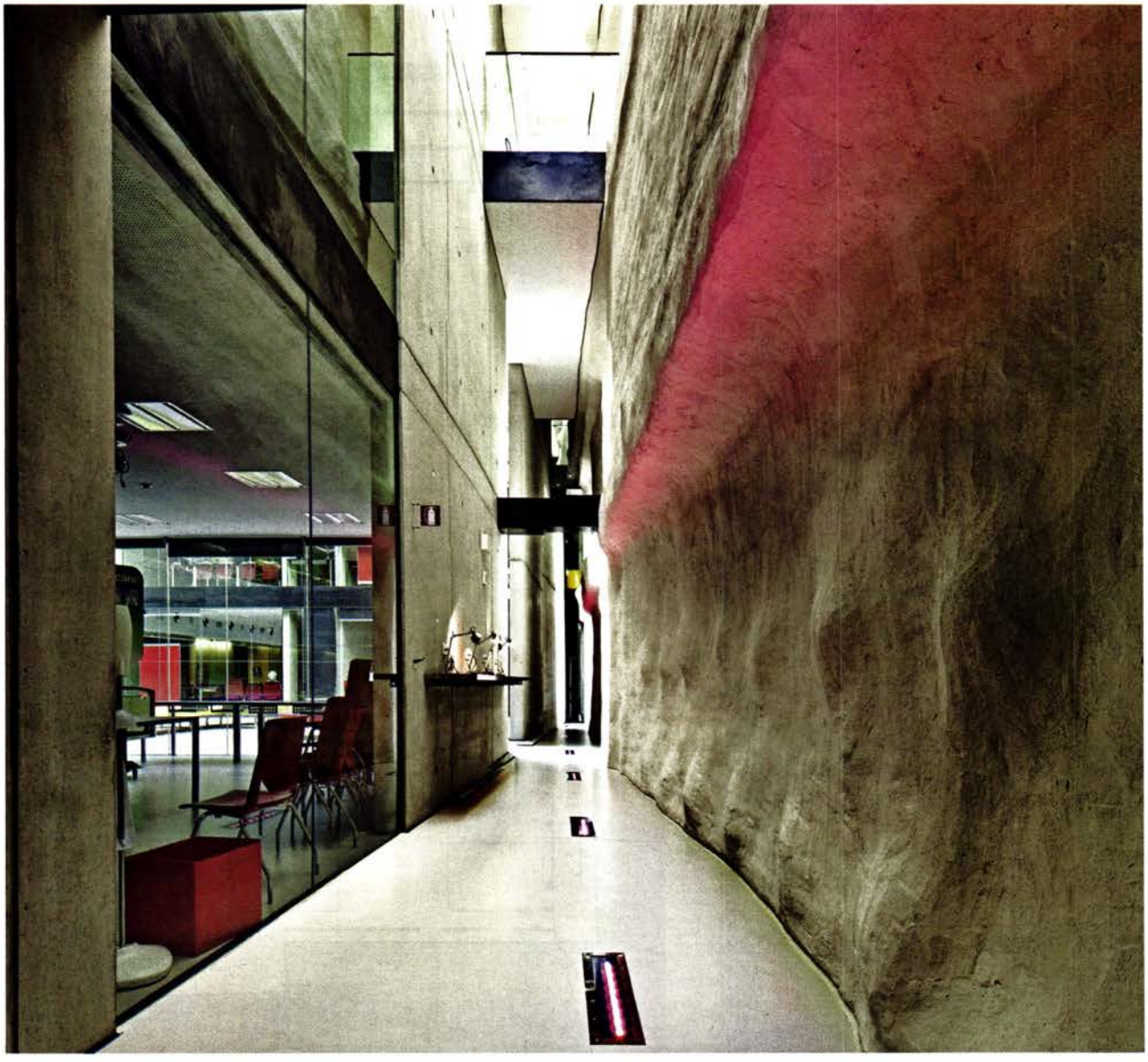
PHOTOGRAPHY: © GIACOMO FLAIM

View additional images at architecturalrecord.com.

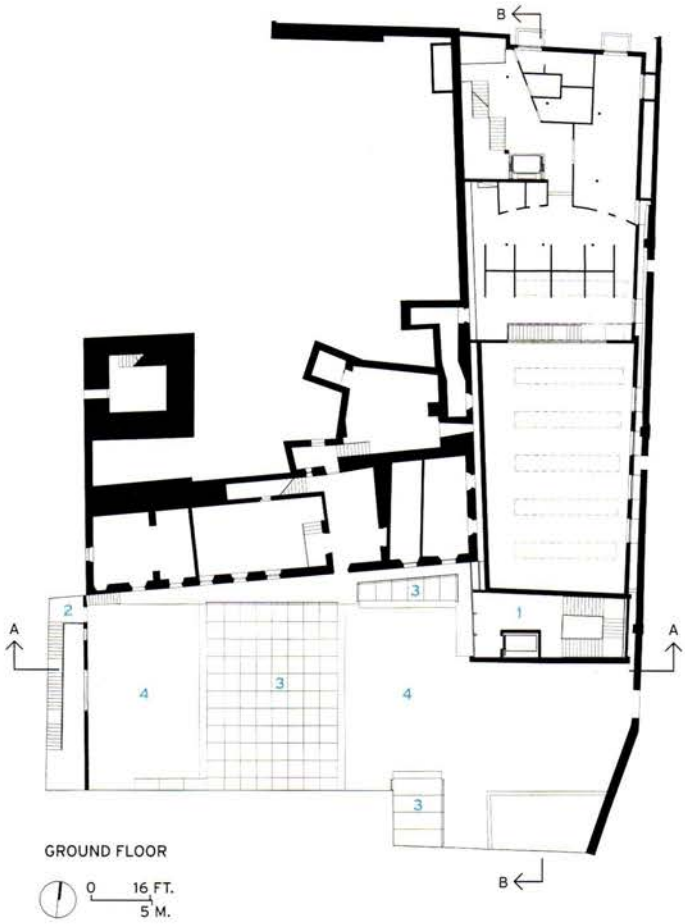
PHOTOGRAPHY: © ALESSANDRA CHEMOLLO (EXCEPT AS NOTED)

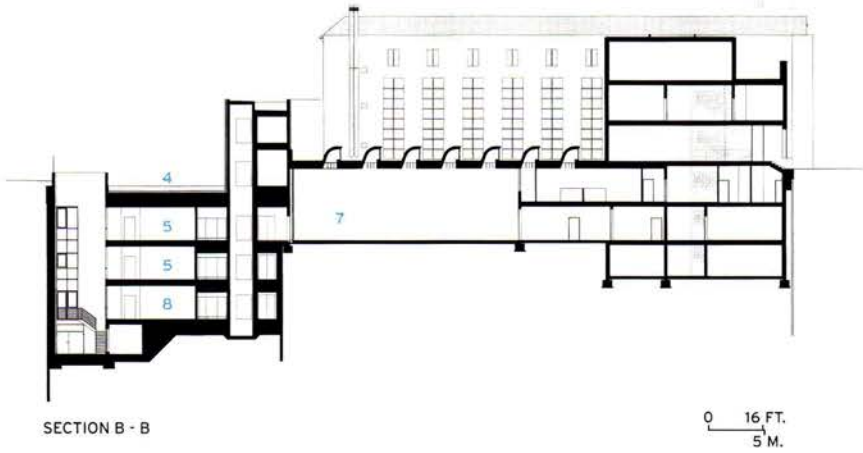
a 44,000-cubic-foot skylit atrium that descends the full depth. Perfectly aligned in plan with the monastery's cloister above, the courtyard, which also serves as a great hall for the students to gather or hang out in, is oriented to receive south light all day. "The monks knew how to design," Lucchin adds. According to the architect–who spent two years during design development researching the implications of inhabiting underground space–vertical light from overhead is three times stronger than horizontal light.

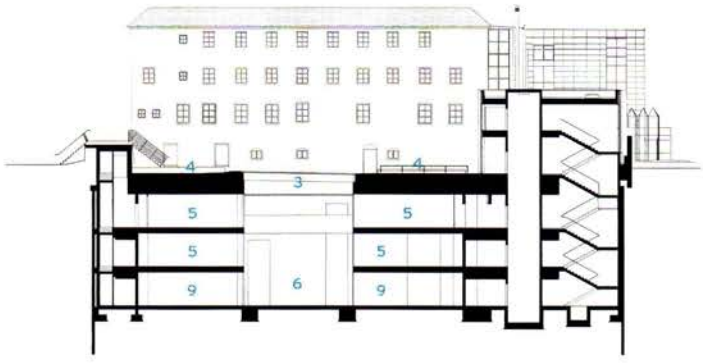
"Visitors are surprised by the quality of light," says Lucchin. "And it is very quiet. There's a serenity to the space." The lack of outside noise and distractions makes the underground academy an ideal space for learning. Another added, if not unexpected, bonus of submerging the building is energy efficiency. "Even on the coldest day in winter, we only need to heat the building for one hour in the morning before students arrive," Lucchin explains. In lieu of air-conditioning, fresh air is cycled through the space year-round. (Because of the lack of windows and greater potential for exposure to radon and similar chemicals underground, air

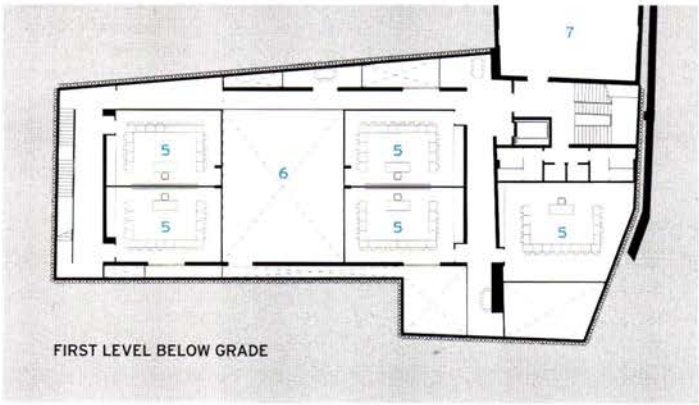


DEEP IN ACADEMIA Glazed interior walls surrounding the skylit atrium bring sunlight into the classrooms and labs stacked on either side of it (opposite). Two small 200- to 300-square-foot skylights illuminate the deepest corners on the building's east side, while polished surfaces reflect the light throughout (above). Bedrock covered with white plaster contrasts with the smooth concrete walls of the addition (left).

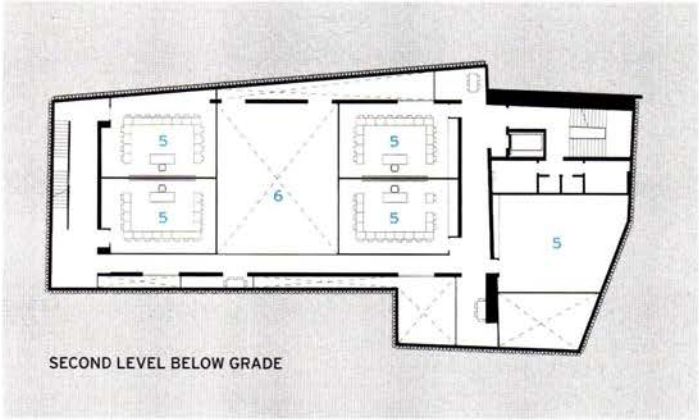


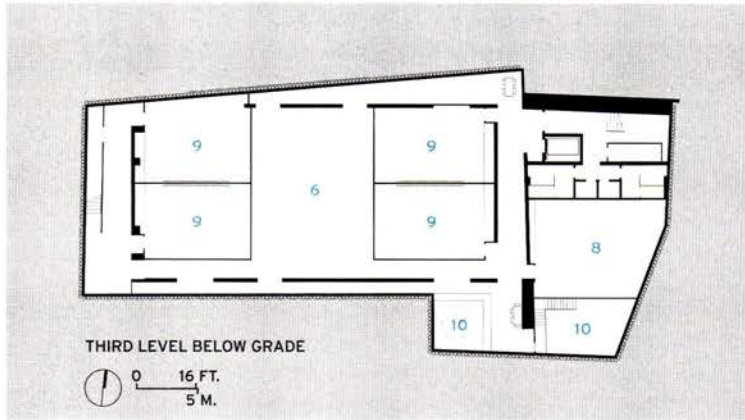






1 MAIN ENTRANCE
2 SERVICE ENTRANCE
3 SKYLIGHT
4 GARDEN
5 CLASSROOM
6 ATRIUM
7 GYMNASIUM
8 COMPUTER ROOM
9 LABORATORY
10 INTERIOR GARDEN





is exchanged three times an hour.) LED lighting on sensors supplements daylighting and mimics the changing color of natural light throughout the day.

Smooth concrete surfaces, bright colors, minimalist furnishings, and bold graphics give the addition, completed in December 2012 following nearly two years of excavation and construction, a contemporary feel that distinguishes it from the rest of the school and could pass for any number of academic or office milieus—with one main exception. Lucchin left the rugged walls of bedrock visible, reminding the building's occupants of the unique setting.

"This school was a real gamble for me," admits Lucchin. "There were lots of people against it." Its success, however—measured by the resounding approval of once doubtful city officials and the students—has allowed the architect to pursue his interest in hypogean structures. Recognizing the scarcity of land, especially in Italy, he is developing plans for an entire underground neighborhood. And while the Hannah Arendt addition is a relatively small project for Lucchin's 10-person firm—which completed two facilities for the 2006 Winter Olympics in Turin—it is a turning point in the perspective the studio takes, aesthetically, environmentally, and practically, in approaching future work. "The addition is not about form or materials–there's no facade," says Lucchin. "It is all substance." ■

credits

ARCHITECT: Claudio Lucchin & Architetti Associati – Claudio Lucchin, Angelo Rinaldo, Daniela Varnier, principals; Roberto Gionta, design team

ENGINEERS: Herbert Mayer (structural); Marina Bolzan (mechanical); Reinhard Thaler (electrical)

CONSULTANT: Roberto d'Ambrogio (construction safety management)

GENERAL CONTRACTOR: ZH General Construction Company

CLIENT: Provincia Autonoma di Bolzano

SIZE: 21,850 square feet

COST: $8.7 million

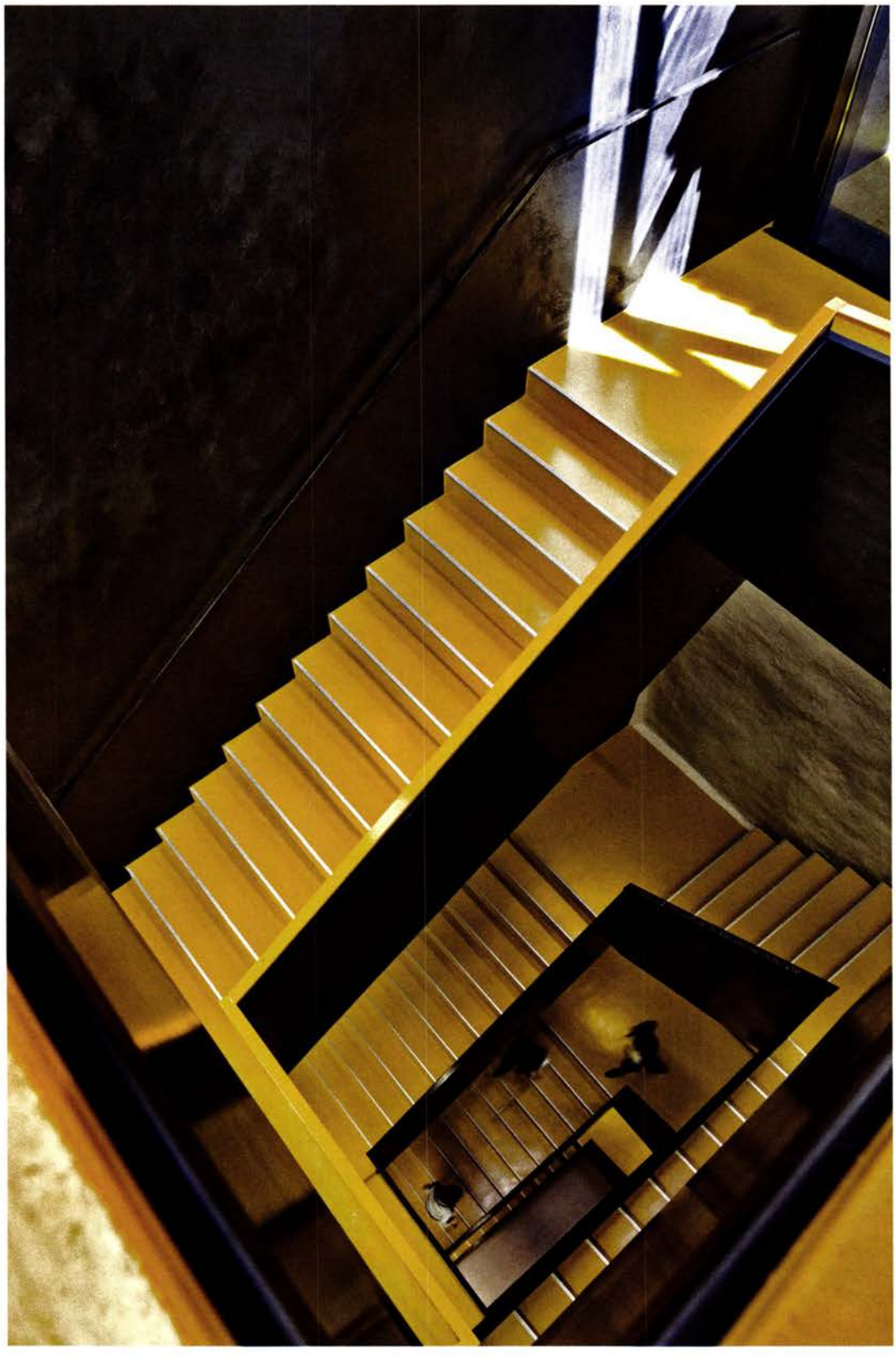
COMPLETION DATE: December 2012

SOURCES

LIGHTING: Artemide, Northlight, Philips

WOOD FLOORS: Junckers

ACOUSTICAL CEILINGS: Knauf

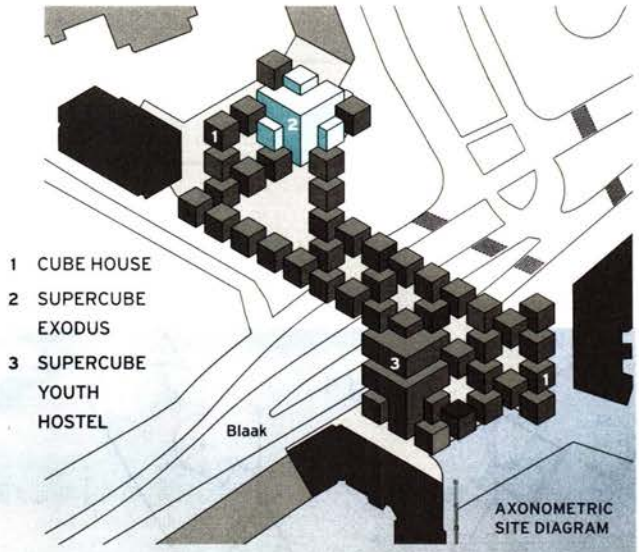


SUN-KISSED Lucchin used bold colors to brighten up the underground spaces. Brilliant bands of yellow are like rays of sunshine in the main stairwell that connects the addition with the existing school building (above).

Superkubus Exodus | Rotterdam | Personal Architecture

REINVENTING THE CUBE

View additional images at architecturalrecord.com.



A young Dutch firm turns a difficult building from the 1980s into a home for a surprising group of residents: ex-convicts.

BY TRACY METZ

PHOTOGRAPHY BY OSSIP VAN DUIVENBODE

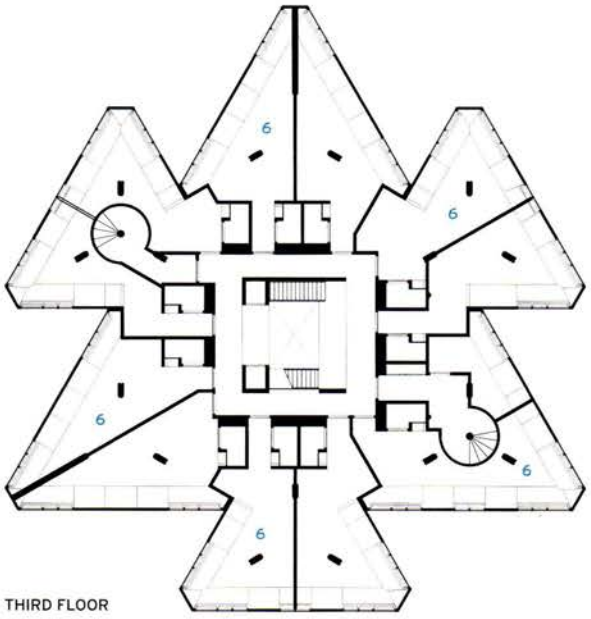
German bombs destroyed the historic center of Rotterdam at the start of World War II, and, ever since, the city has worked to establish a radically new and modern identity. This has led to a sometimes willful emphasis on form-making, but also an openness to experimentation.

Both of these tendencies can be seen in the 38 cube houses designed in the early 1980s by architect Piet Blom in Rotterdam's city center. Angled boxes on columns, the houses stand above and around an elevated street, the Overblaak, which serves as a bridge over the Blaak, a busy road connecting a public market square with the old harbor. Blom intended the elevated street to be a sheltered yet public space for shops, businesses, and play areas. And he designed the angled houses to resemble trees, so he called the complex Blaak Forest.

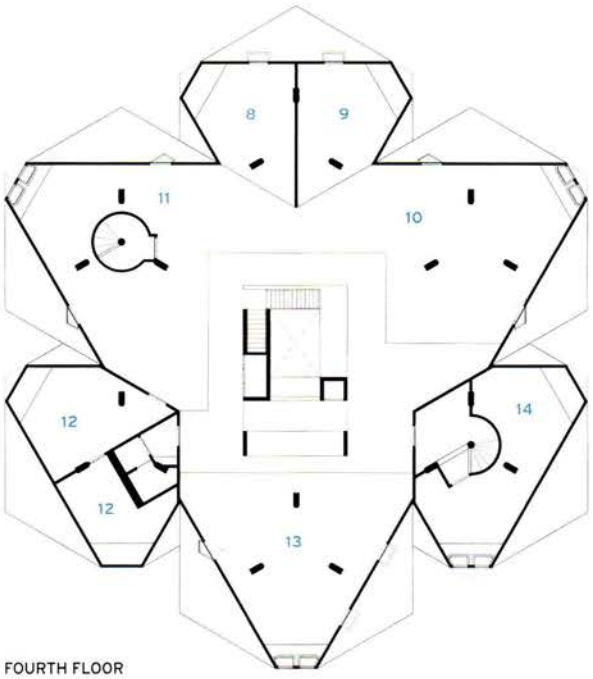
As an intermediate kind of public space, the Overblaak was not very successful. But the cube houses, in spite of their difficult floor plans and slanting walls, fared better. They are single-family homes with 975 square feet of space on three floors. At each end of the complex, Blom placed a *Superkubus* or supercube. The one to the north, on the side of the marketplace, was intended to be commercial space but was never fully used, and its top floor was not even completed. The supercube to the south, on the side of the old harbor, was built to house a school for architects.

Enter Personal Architecture (P-A). In 2009, this young Rotterdam-based firm of Sander van Schaik and Maarten Polkamp refurbished the southern supercube as a Stayokay

MASTER PLAN
The 38 cubic houses and two supercubes sit above an elevated pedestrian street (left) that bridges a busy road (diagram, top), connecting a market square and the port. Built in 1982, the so-called Blaak Forest exemplified an exuberant approach to architecture and urban design. The entrance to Supercube Exodus is on the pedestrian street (above).



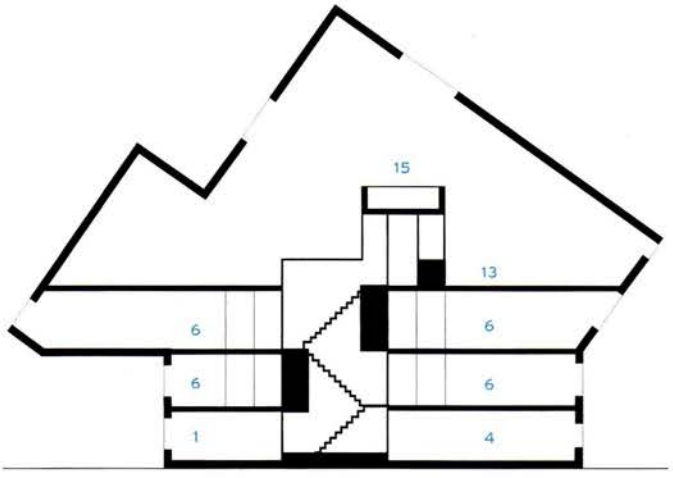
THIRD FLOOR



FOURTH FLOOR

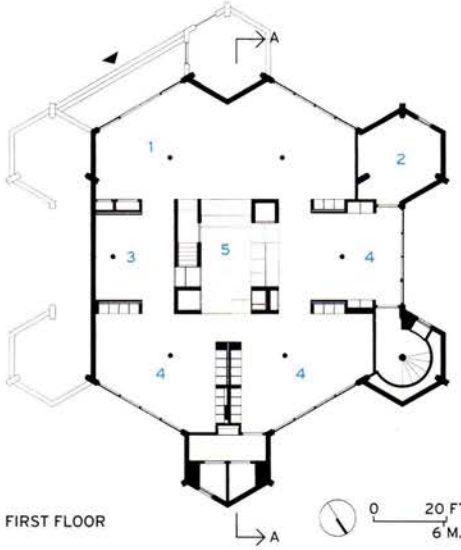
SECOND FLOOR

1 RECEPTION
2 ARCHIVE
3 MEETING
4 OFFICE
5 PANTRY
6 DWELLING
7 LAUNDRY
8 CONSULTING
9 SMOKING
10 LIVING
11 INSTRUCTIONAL
12 STORAGE
13 DINING
14 TECHNICAL
15 LOUNGE



SECTION A - A

0 20 FT.
6 M.



FIRST FLOOR

0 20 FT.
6 M.

credits

ARCHITECT: Personal Architecture – Maarten Polkamp, Sander van Schaik, partners; Froukje van de Klundert, Leendert van Grinsven, Wiepkjen Kingma, design team

ENGINEERS: IMd Raadgevende Ingenieurs (structural); DGMR (building physics)

GENERAL CONTRACTOR: Hijbeko

CLIENTS: Woonbron (building); Stichting Exodus (interiors)

SIZE: 13,000 square feet

COST: $2,185,000

COMPLETION DATE: July 2013

SOURCES

SKYLIGHTS: Velux

SLIDING DOORS: Svedex

STEEL NETTING: Huck

RESILIENT FLOORING: Forbo

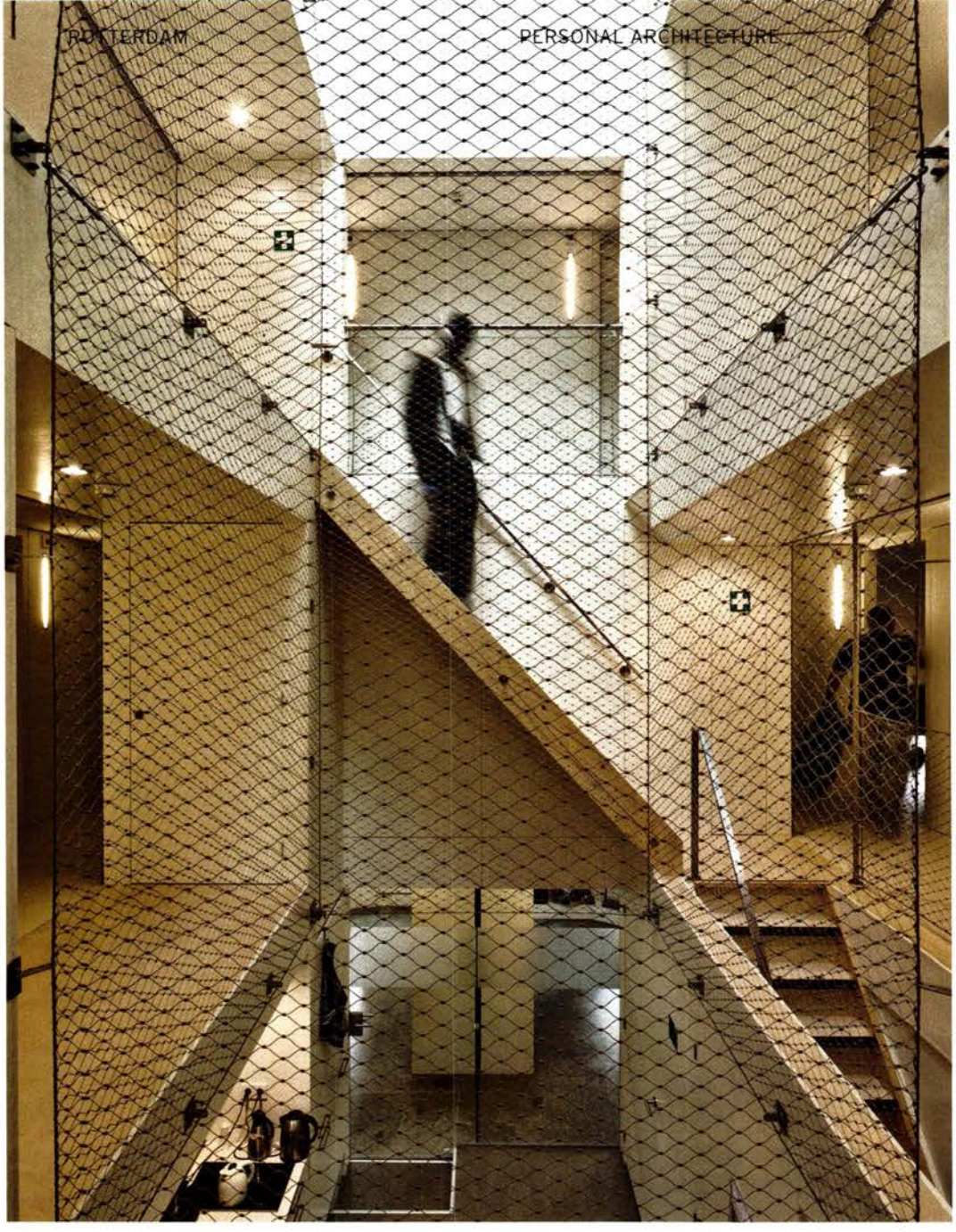
youth hostel. So when Exodus, a foundation that helps ex-convicts on parole, decided to move to the Blaak Forest, it went to the firm that was already familiar with the vagaries of Blom's design.

Concerned about security, neighbors fought the halfway house project in court, but Exodus prevailed. The supercube on the north, owned by the local housing association and rented to Exodus, now provides 20 rooms for ex-cons (and one for a staff member on night duty) and shared living space for both men and women transitioning from prison.

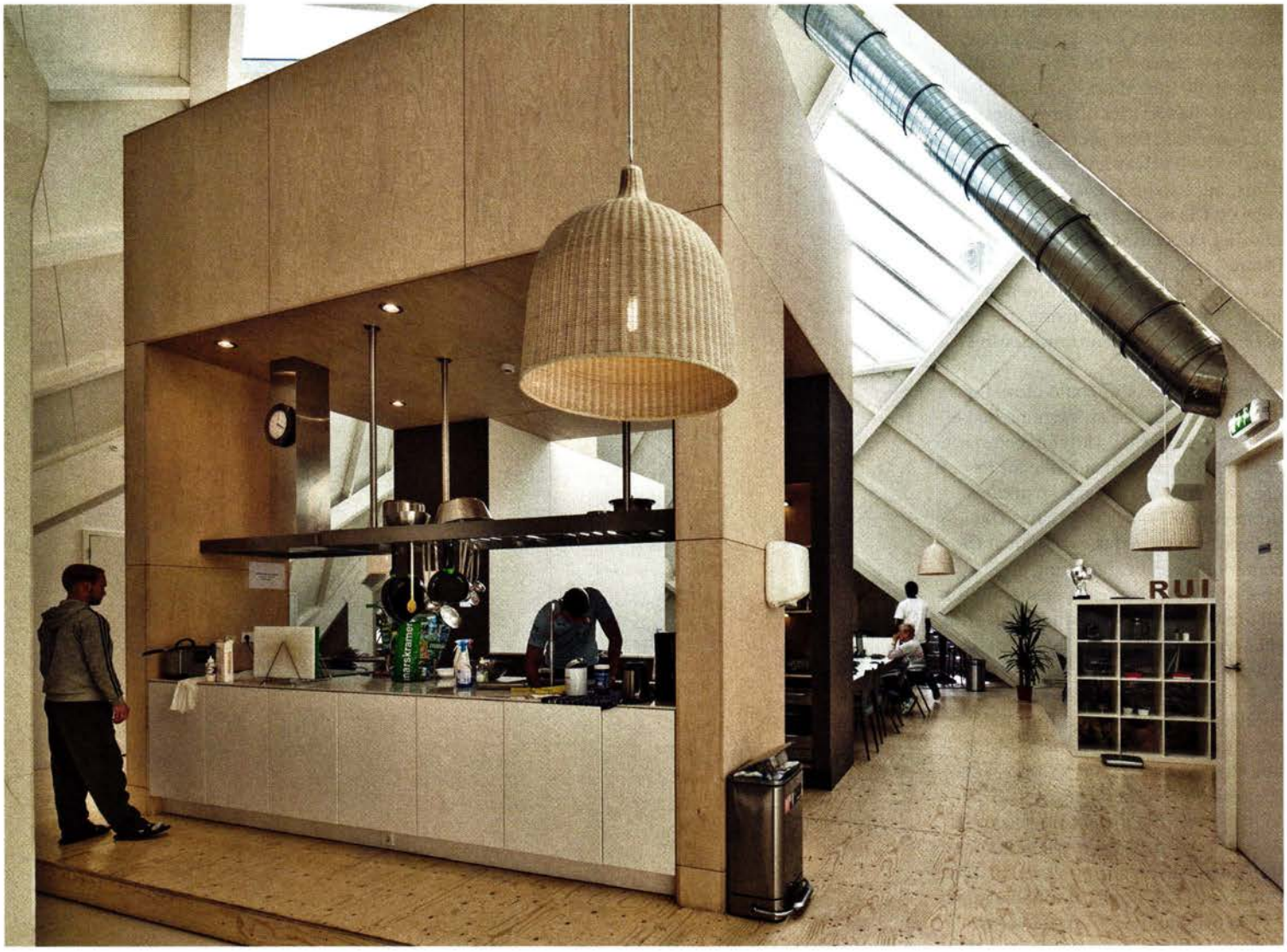
But before Exodus could move in, the supercube required an extreme makeover. "To make this oddly shaped space of 13,000 square feet suitable for its new use, we had to do a major structural intervention," says van Schaik. The architects removed the column at the center of the cube, replacing it with an open shaft that serves as an atrium for all four floors. That meant transferring the weight of the upper floors to steel portals at the four corners. Within the atrium, P-A added various functions connected by stairs: reception and pantry on the ground floor, washing and storage spaces on the floors with the residents' rooms, a kitchen on the fourth floor, and a lounge above that. Everything P-A added to the supercube is orthogonal, creating a visual distinction from Blom's overbearing diagonals.

The original stairs—located at two corners of the cube—now serve as emergency exits. On the new stairwell, nets cover openings as a safety measure. To improve acoustics, the architects added felt to the outside of the stairwell on the top and bottom floors, and these surfaces have turned out to be handy bulletin boards as well.

The central atrium is the heart of the renewed supercube, says van Schaik. "It creates not only a physical but also a visual connection between the floors, which is important for people who are learning to live with others again." Moreover, it brings daylight inside and pulls warm air up, solving two problems that had bedeviled the original building.



CORE STRATEGY The architect replaced a central column with a new atrium that is both a structural and programmatic element. On the ground floor (bottom) a pantry sits in it, while on upper floors it brings in daylight from above. Dwelling rooms wrap around the atrium on the second and third floors (top).



SOCIAL HUB By adding skylights and improving ventilation, P-A was able to turn the upper part of the cube into the main communal area, with a kitchen (above), consulting rooms (left), and places to work on computers (opposite, bottom). A small lounge overlooks it all (opposite, top).

Warm air is now collected and pumped to a heat-exchange installation. P-A also added new windows—three on the fourth floor to provide views outside and six at the tip for ventilation.

The architect designed the project to encourage interaction among the inhabitants, who spend anywhere between nine and 12 months at the facility. The communal kitchen and dining space on the fourth floor draw people upstairs and are complemented on the other side of the atrium by a living room where residents can relax or work on computers, a smoking area, and a glass-fronted consulting room for private conversations. A cozy lounge sits like a crow's nest above the common spaces, just below the tip of the cube. With a grass-green rug and a television for watching sporting events, it has earned the nickname De Kuip, after the local soccer stadium.

Restoring the residents' sense of individuality was an important goal of the architecture. Small elements—such as painted-wood doorposts, a light in front of each room, large

photographs of well-known spots in Rotterdam, and a private shower and toilet in each unit—provide dignity to the living experience. Beds and closets had to be custom-built to be durable and to fit in the unorthodox spaces. Some of the rooms reveal the exigencies of living in an upended cube: a bed in one room cantilevers out from the wall, and its occupant has cut out pieces of paper to cover windows that look directly into the neighboring cube.

Residents in the Exodus program can leave the building during the day but are not allowed to drink alcohol—even off-site—and must take a breath test when they return. The location in the city center helps reinsert them in society, while also providing a supportive retreat. For a facility serving former prisoners in a building with a checkered history, the place has a convivial atmosphere, especially on the communal fourth floor. And bedrooms, small though they are, feel like dwellings rather than cells. Exodus is a halfway house, with the emphasis on "house." One former convict living there recently even placed a mat in front of his door spelling out in florid letters: home. ■

Han-Sachs-Haus | Gelsenkirchen, Germany | von Gerkan, Marg and Partners

TURNING CORNERS The architect removed a 1950s extension, inserting a new glass-walled atrium. An old postcard (inset) shows the 1927 structure with the back wall filled in.

A HEART OF GLASS

A mixed-use civic center in Germany is brought back to life without forsaking its past.

BY HUGH PEARMAN

PHOTOGRAPHY BY HANS-GEORG ESCH

Gelsenkirchen is one of those German postindustrial cities that is just not on the tourist trail, unless you are a fan of its top-flight soccer club, Schalke. Set in the heart of the Ruhr megalopolis –the coal-mining and steelmaking area in the northwest of the country–the town was heavily bombed during World War II and rebuilt. But one notable prewar building survived and has now been restored, and transformed, at a cost of $97 million. This is Gelsenkirchen's city hall, known as Hans-Sachs-Haus.

Built in the mid 1920s, during the uneasy and turbulent period of the Weimar Republic, the structure is a fine example of "Brick Expressionism," a style that can be seen as continuing the Arts and Crafts tradition into the period of burgeoning modernism. Its architect, Alfred Fischer (1881–1950) was also the head of the nearby Essen Arts and Crafts school until his modestly progressive views fell afoul of the Nazi regime in 1933, after which he worked little. Concrete-framed, the predominantly six-story building was clad in impervious dark-banded brick and panels of equally somber geometrically patterned ceramics. A mix of strip and punched windows flowing around radiused corners define its aesthetic. With its large ground-level windows and canopies, you might mistake it for a department store put up between the wars.

The building–named after Hans Sachs, the 16th-century Meistersinger from Nuremberg immortalized in Wagner's opera but, oddly, lacking a local connection–was conceived as a palace for the people. Containing a concert hall, public library, restaurant, civic offices, and a hotel in a stubby 11-story tower to the rear, this design was ambitious at a time of economic crisis. Come World War II, a bomb reduced one corner to rubble and burned much of the interior; postwar, the exterior damage was carefully repaired, the interior redone in austere fashion, and an extension built at the rear in

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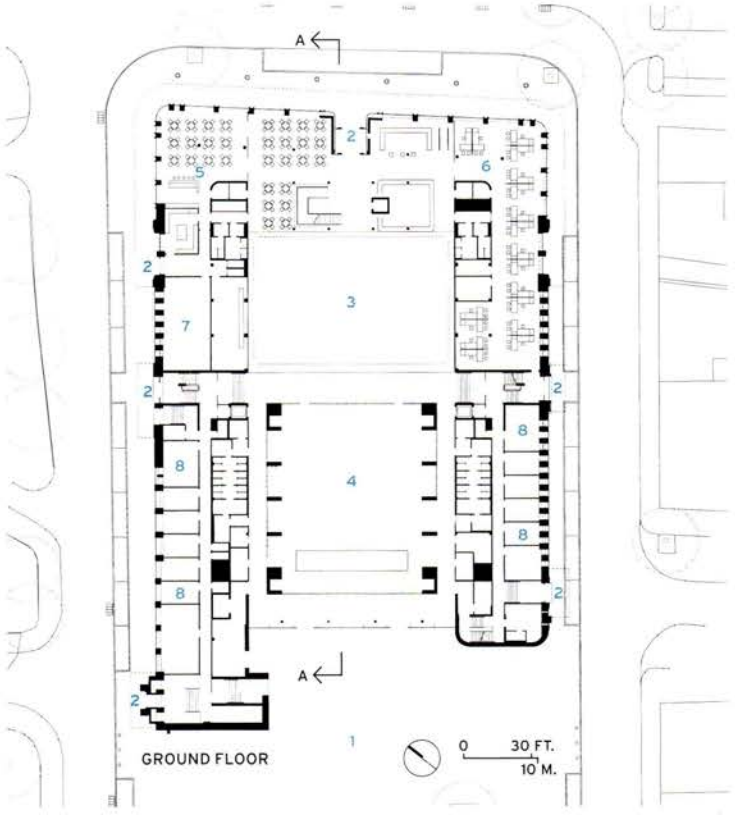
BRICK EXPRESSIONISM The original building by Alfred Fischer is noted for its textured masonry. In restoring the 1927 multiuse hall, the architect kept the original brick and added replacements for the protruding and recessed horizontal courses (above, left to right).



credits

ARCHITECT: von Gerkan, Marg and Partners – Volkwin Marg, Hubert Nienhoff, Rüdiger von Helmolt, Carsten Borucki, designers; Christian Hoffmann, associate partner; Jutta Hartmann-Pohl, project manager

CONSULTANTS: Rainer Schmidt Landscape Architects (landscape); Conceptlicht (lighting); Formkombinat (signage)

CLIENT: City of Gelsenkirchen

SIZE: 249,000 square feet

COST: $97 million

COMPLETION DATE: August 2013

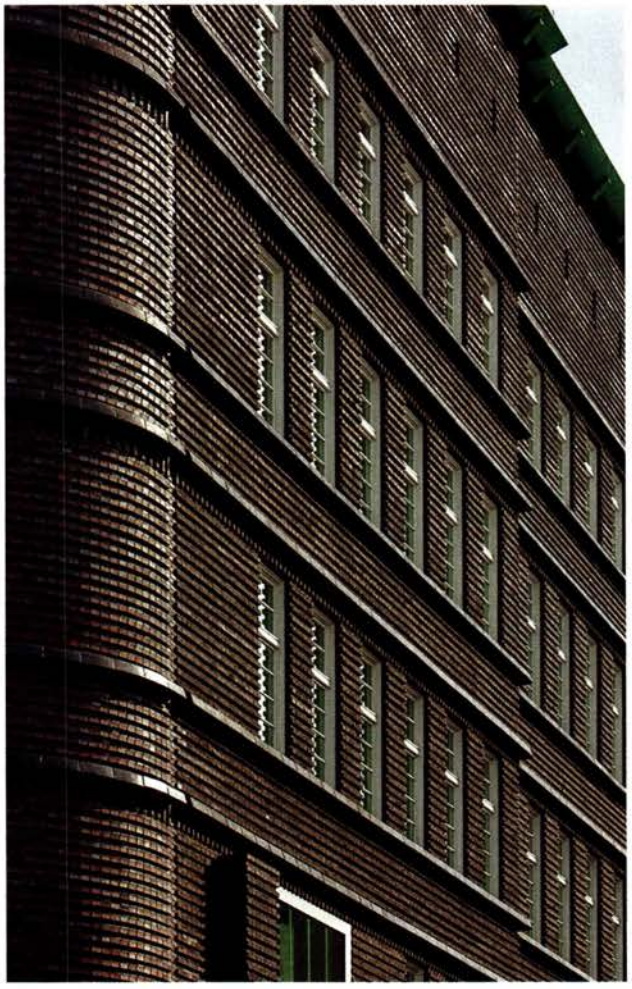
SOURCES

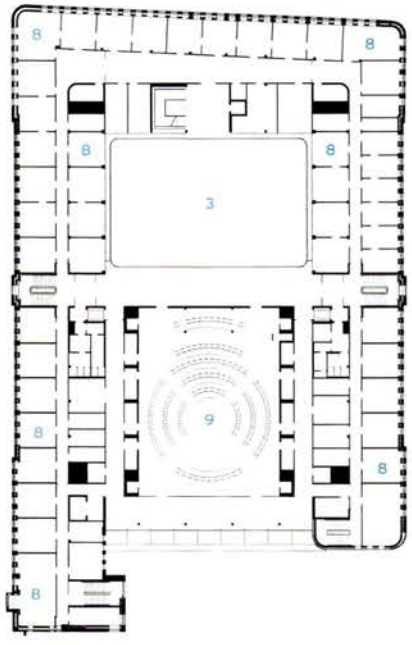
CURTAIN WALL: Raico, Schüco + Lacker

GLASS: Pilkington; Saint-Gobain

GLASS PARTITIONS: Strähle

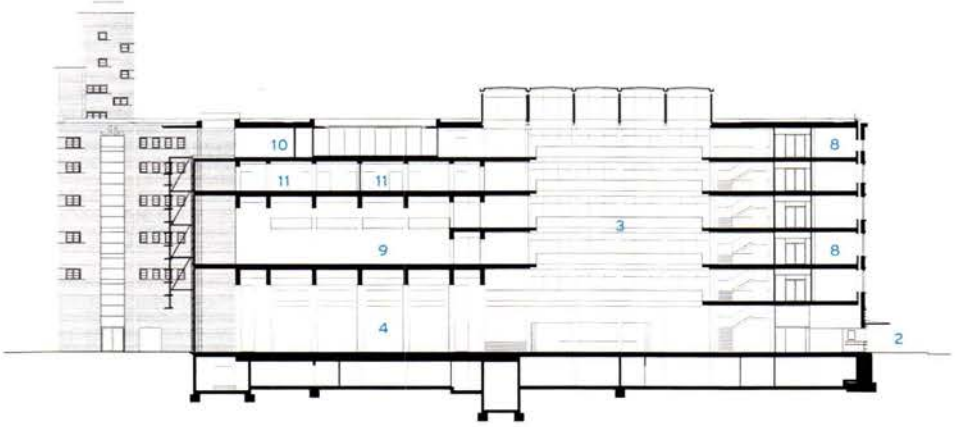
SLIDING DOORS: Dorma





SECOND FLOOR

1 ALFRED FISCHER PLAZA
2 ENTRANCE
3 ATRIUM
4 CITIZENS' FORUM
5 CAFÉ
6 CITIZENS' OFFICE
7 KITCHEN
8 OFFICE
9 COUNCIL CHAMBER
10 OFFICE OF LORD MAYOR
11 CONFERENCE ROOMS



SECTION A- A

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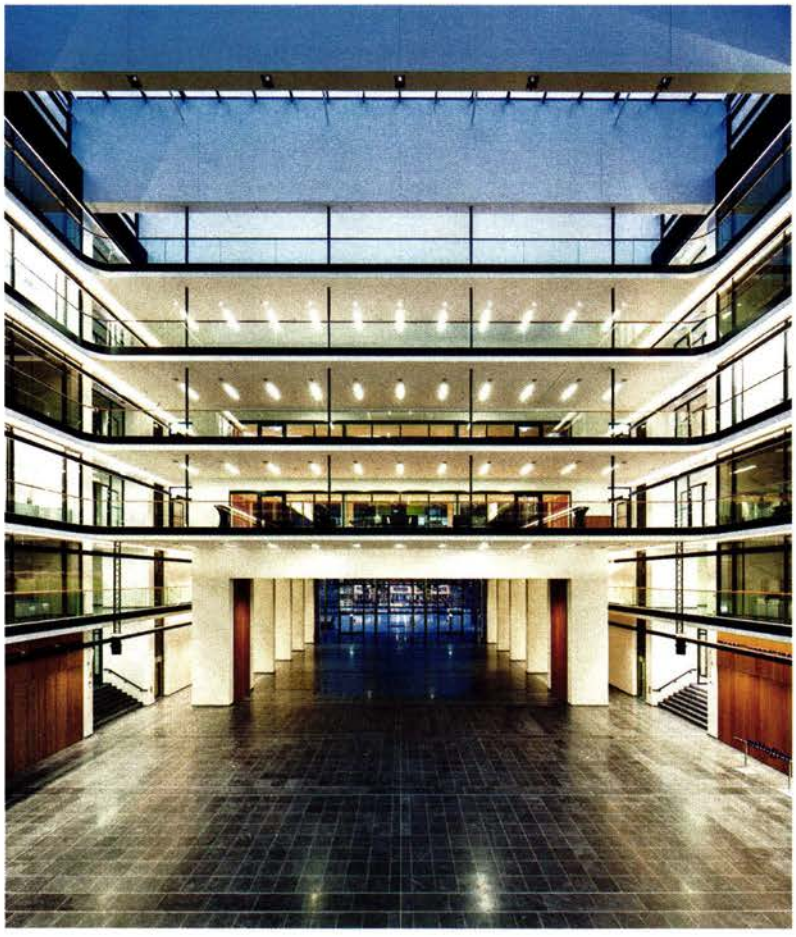
10 M.



CARVED SPACE
On the plaza side of the building is a "citizens forum" (above, left) under the council chamber (left). In creating the skylit atrium, von Gerkan, Marg and Partners gutted the center of the building and inserted a concrete frame. They sheathed the atrium in glass and opened the stair to augment light and visual access between the various spaces (above, right).

a 1950s-modern style. But over the following decades, neglect speeded the building's deterioration, and it was slated for demolition. Protests from conservationists eventually convinced the authorities to keep the facade of the building and to run an architectural competition for its reuse. Von Gerkan, Marg and Partners (GMP), one of Germany's highest-profile international architectural practices, won in 2008—nicely in time for the global recession and its delays.

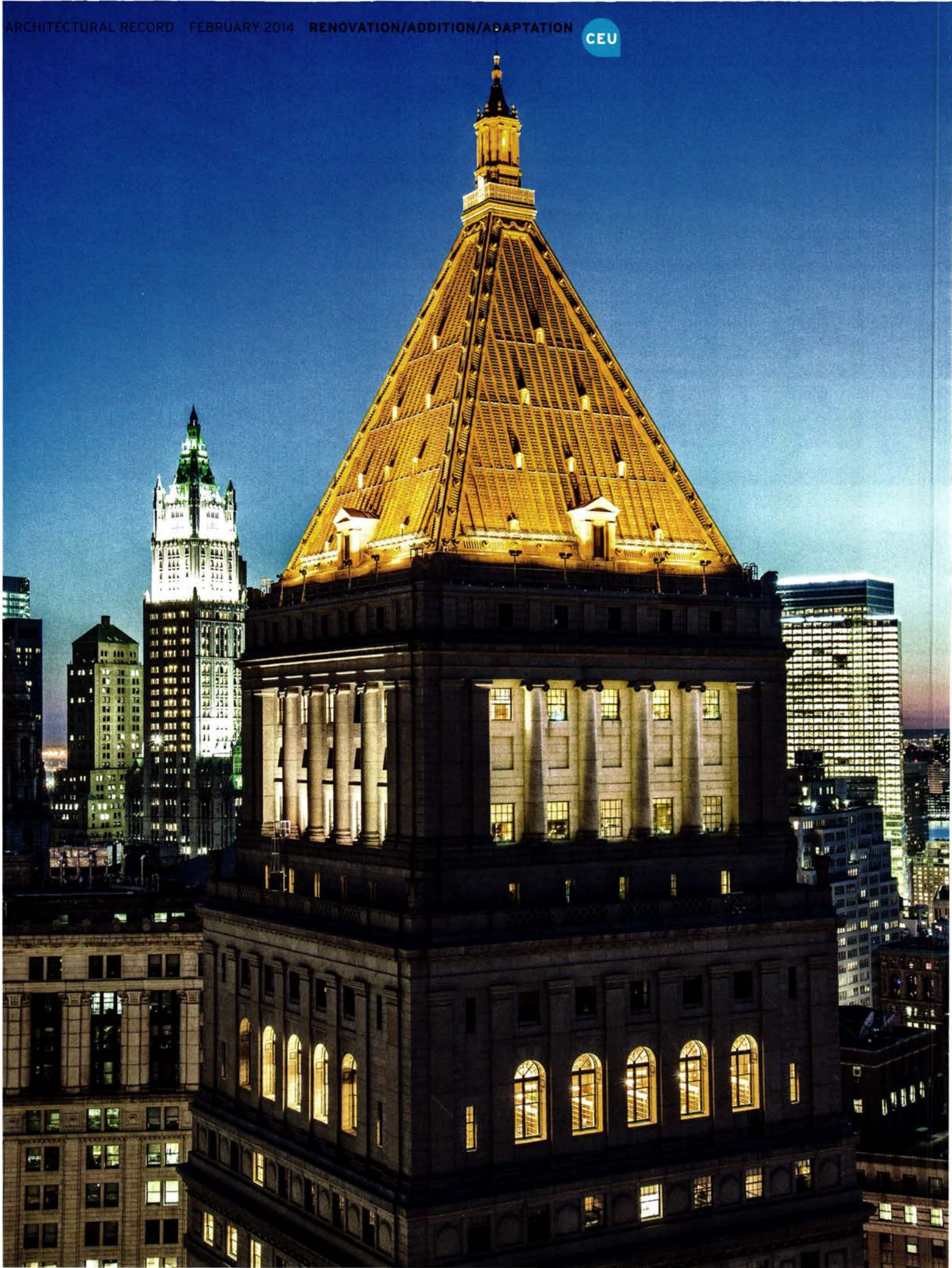
Now the renovation is complete. On a recent day, founding partner Volkwin Marg met me there for coffee with project architect Jutta Hartmann-Pohl: the restaurant is back. And although at first glance there is no concert hall, half of the large open floor at the rear of the ground level can be closed off by tall acoustically treated doors to make a 400-person multipurpose hall, expanding to 1,200 seats when opened to the skylit atrium at the center of the building. So music, then, is also back. The majority of the building is taken up with civic offices, including a two-story council chamber directly above the multipurpose hall and the office of the city mayor. A mini-museum, aimed at schoolchildren, wraps round the council chamber on two levels.

"Fischer's architecture here was a complete mixture–modern, traditional, and expressionist," says Marg. "The building reflected some of the confusion of the time." Essentially, GMP has dropped a wholly new concrete-frame donut-shaped atrium structure into the old shell, removing the postwar extension and creating a full-height glazed and solar-shaded facade at the rear, facing southwest. Here the original building, essentially U-shaped, had no presence. This facade–intended as a metaphor for the transparency of the political process within—is bookended by new brick corners that copy the existing facade, wrapping around to the back: the bricks are nearly identical to the originals, and you have to look very hard to distinguish new from old.

Inside, Marg and Hartmann-Pohl have paid homage to the lost original interiors, both in the pioneering Bauhaus-influenced color-coding of floors by designer Max Burchartz (1887–1961) and in two staircases, redone in a convincing 1920s manner. Remarkably, most of the original exterior timber window frames could be kept and fitted with new double-glazed units. The aesthetic is predominantly that of today, but with a nod to the past: the glass balustrades are as smoothly radiused around the new atrium corners as the brick is on the exterior, and the deep beams beneath the atrium roof recall those of the original concert hall. Their black cherry timber also harmonizes in tonality with the blue-gray Irish limestone floors in the public areas.

Last, there is the tower, rising five levels above the rest of the building. Its floor plates have been left in their raw state, with future uses to be determined. You can see up to the roof through Fischer's original concrete framing. The feel here is industrial, and that's appropriate: we are in the Ruhr. This building was always a symbol for the city, and on the wet Thursday I visited, the restaurant was packed: the people have returned to their Haus. Generally, I'm wary of "facadism"—the rebuilding of old buildings that are gutted, leaving only their facades—too often an excuse for poorly conceived architecture behind. Not here. GMP has entered into the spirit of the Weimar Republic, designing an architectural conversation across nearly a century. This is enlightened reuse. ■

Hugh Pearman is architecture critic for The Sunday Times *(London) and editor of the* Journal of the Royal Institute of British Architects.



Thurgood Marshall U.S. Courthouse | New York City | Beyer Blinder Belle Architects & Planners

ORDER IN THE COURT

A multidisciplinary design team applies a light and skillful touch to restore luster to a faded Lower Manhattan landmark while bringing it up to current standards.

BY JOANN GONCHAR, AIA

PHOTOGRAPHY BY TIMOTHY SCHENCK

Fans of *Law and Order* will be familiar with the imposing entry of the Thurgood Marshall U.S. Courthouse. Along with the New York County Supreme Court and its other august neighbors on New York's Foley Square, the federal courthouse, with its massive granite steps and portico of 10 Corinthian columns, is a fitting backdrop for the pursuit of justice.

But the building, designed by Cass Gilbert and completed in 1936, is much more than an elaborate television or film set. Its monumental entrance is part of a 31-story 611,000-square-foot structure with a six-story base. This is organized around a set of three courtyards, but it otherwise completely fills its oddly shaped Lower Manhattan site. Set back from the facade, the campanile-like tower topped with a gilded terra-cotta roof, gives the building the distinction of being the first high-rise courthouse.

The structure, which was designated a national landmark in 1987, serves a critical role in the federal judicial system as the seat of both the U.S. Court of Appeals for the Second Circuit and the U.S. District Court for the Southern District of New York. Originally known as the Foley Square Courthouse, it was renamed by Congress in 2001 after U.S. Supreme Court Justice Marshall, who had worked in the building as a Second Circuit judge (he served on the higher court from 1967 to 1991). Despite its significance, the courthouse suffered from decades of inattention and insensitive modifications. But in early 2013, it emerged from a comprehensive five-year, $314 million renovation led by Beyer Blinder Belle Architects & Planners (BBB).

Before this project got under way, some of the pieces of granite covering the concrete-encased steel structure were cracked, here and there mortar joints had failed, and water penetration was pervasive. On the roof, a number of the terra-cotta roof tiles were loose or damaged. Inside, accumulated grime covered the walls from the days before cigarette smoking was banned from the city's workplaces and public buildings. In some locations, the sumptuous finishes, which include wood paneling, decorative plaster, and 22 types of marble, had been damaged or stripped during previous

CIVIC PRESENCE The Thurgood Marshall U.S. Courthouse (above, center) has just emerged from a $314 million renovation. The courthouse, built in 1936 and designed by Cass Gilbert, rises 31 stories above Lower Manhattan's Foley Square, where it is surrounded by other courthouses and public buildings. At night, the roof of the its campanile-like tower is illuminated in a way that accentuates the glow of the gilded terra-cotta tile roof (opposite).

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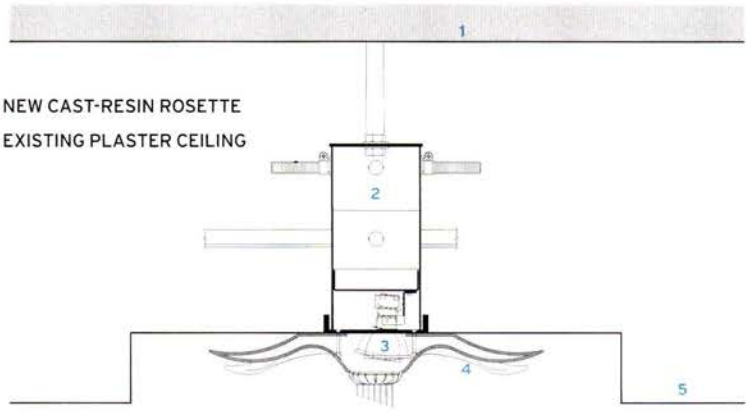
BRIGHT AND BEAUTIFUL Designers have deployed several strategies to enhance illumination levels: within the decorative plaster detail of the building's ceilings, they have inserted downlights; in the courtrooms (opposite) and other spaces, they have increased the number of pendant fixtures by replicating the historic originals; and in the lobby (left), they have hidden new uplights in the tops of the refurbished chandeliers.

1 EXISTING CONCRETE SLAB
2 NEW JUNCTION BOX/BALLAST HOUSING
3 CERAMIC METAL HALIDE MR16
4 NEW CAST-RESIN ROSETTE
5 EXISTING PLASTER CEILING



ROSETTE LIGHTING DETAIL

renovations. And offices had been shoehorned into formerly capacious corridors, robbing the hallways of the daylight that came in through courtyard-facing windows. Security concerns also took a toll, with screening equipment proliferating haphazardly in the stately entry lobby.

The renovation's primary objective was "clarification," says Lawrence Gutterman, project architect for BBB. He uses this term to mean the reversal of modifications made over time—due to changing function or evolving programmatic needs—that interfered with the building's original architectural configuration and expression.

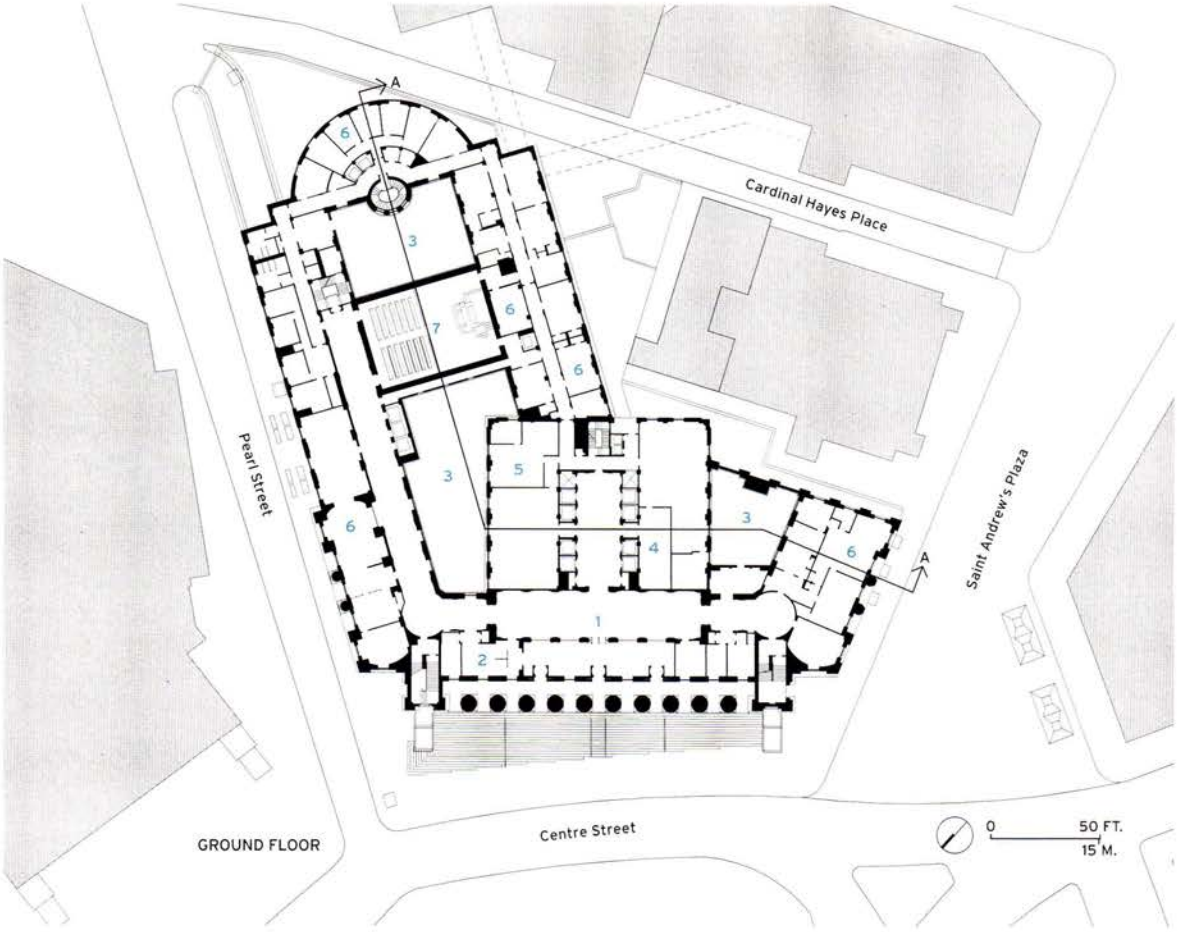
Toward that end, contractors cleaned and repointed the granite facade and replaced cracked panels. The campanile's terra-cotta roof was repaired, and the lantern at the very top was dismantled and then reassembled, so that its deteriorating steel structure could be repaired. Work inside the building included demolition of the offices that had cluttered the corridors, cleaning and restoring damaged finishes, and relocation of the security-screening process to a room just off the lobby. Designers also improved security by creating a proper service and loading area from the old sally port, or prisoners' entrance. (It had long ago been rendered obsolete by the construction of an upper-floor bridge that connected the courthouse with the nearby correctional center.)

In addition to the architectural problems, the project also addressed shortcomings in the building's systems for life safety and human comfort. These deficiencies included a lack of sprinklers in key spaces such as a 25th-floor library and the entry lobby; illumination levels that conformed to 1930s standards, resulting in gloomy interiors; and a cooling system for the tower offices and courtrooms that depended on window air-conditioning units. This climate-control method was not only inefficient but also produced a distracting noise when it rained. Reportedly, the loudness of raindrops pelting the air conditioners occasionally warranted the suspension of court proceedings.

The overhaul of this infrastructure had to be accomplished in a way that satisfied the requirements of the General Services Administration (GSA), the landlord for the U.S. courts and other federal agencies. These included a mandate for LEED certification that has been in place since 2003. Adding to the challenge: all of the project goals needed to be met without impinging on the structure's historic fabric.

In order to insert the new and more efficient infrastructure without detracting from the architecture, the design team reconfigured four of the tower's 11 elevators so that they made stops only below the 17th floor (the highest publicly accessible level). The upper portion of their shafts and the entire former service elevator were then converted into vertical distribution for the mechanical systems. The change was made on the basis of traffic studies and the building's programming, says Gutterman.

For the air-handling units and other equipment, contractors commandeered the tower's top floor, which has low



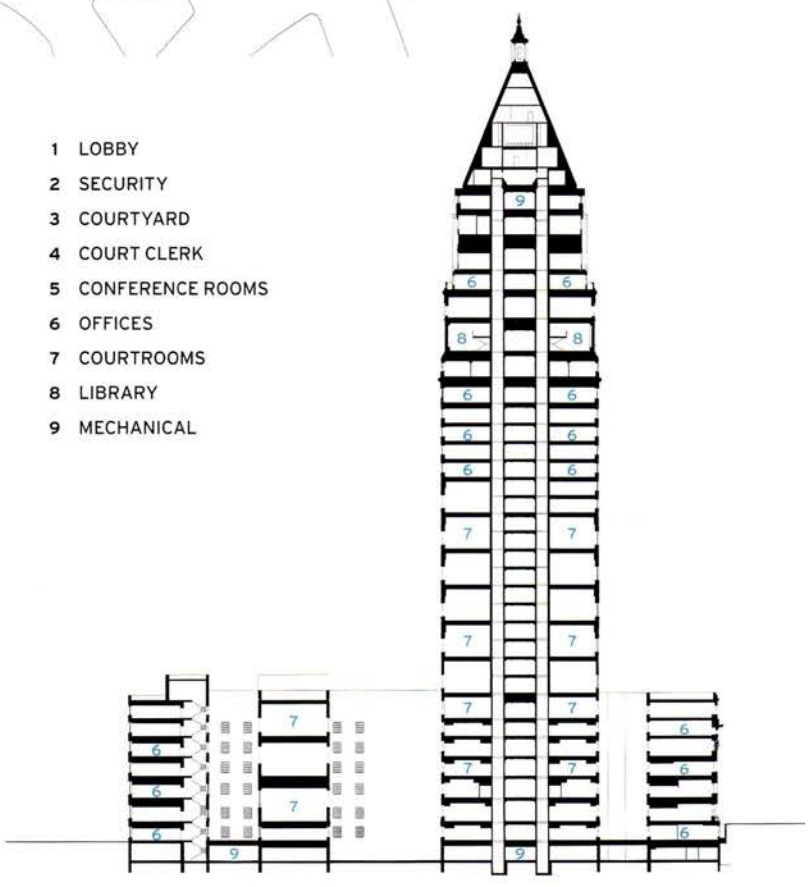
ceilings and small windows that make it undesirable as office space. And they concealed conduits, ducts, and piping above and behind historic finishes.

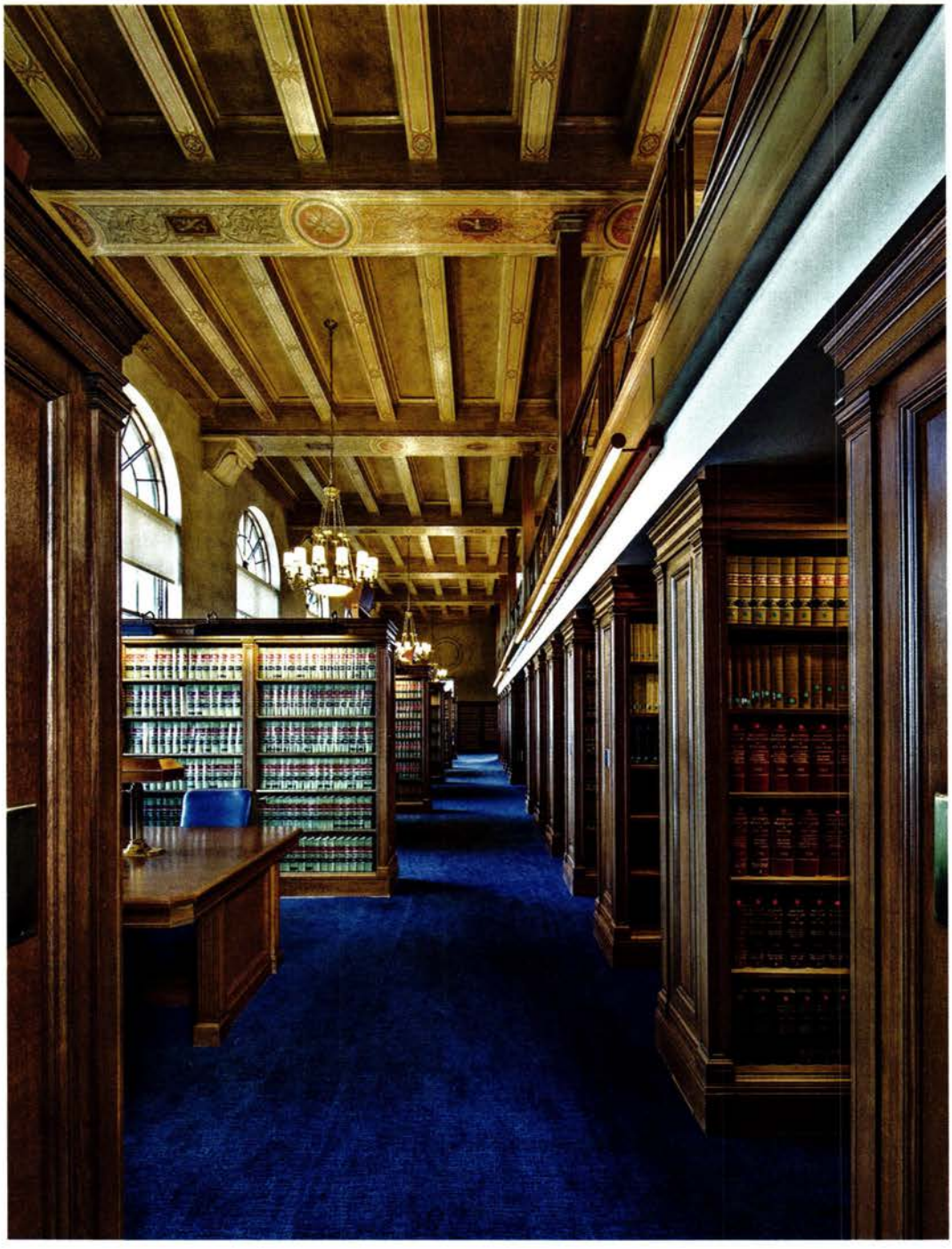
A few of the building's spaces required especially inventive solutions. The double-story library, for instance, had an original ceiling with plaster beams artfully painted to simulate wood. Diffusers and air return vents would have diminished this unique feature. So, instead, designers supplied conditioned air through the floor, from the level directly below. They also retained a mezzanine level added to a section of the library in the 1950s, in part because it provided a convenient place to inconspicuously insert sprinklers.

The new infrastructure has been so skillfully woven into the historic fabric that even the building's longtime occupants are likely to be unaware of the modifications. However, the effect of the changes to one system—the lighting—should immediately be apparent to people who were regular pre-renovation visitors. Before the recent revamp, lighting levels were low enough to cause discomfort, says Gutterman, who describes the interior's original illumination as "dismal." But now, the building's spaces are bright and welcoming, without being overly illuminated.

The renovation project's lighting designers, Domingo Gonzalez Associates (DGA), have achieved this effect by refurbishing and, in many cases, replicating the building's handsome glass and bronze historic pendants in order to increase the number of fixtures. A typical tower elevator

1 LOBBY
2 SECURITY
3 COURTYARD
4 COURT CLERK
5 CONFERENCE ROOMS
6 OFFICES
7 COURTROOMS
8 LIBRARY
9 MECHANICAL





CAREFULLY CONCEALED In order not to detract from the library's beamed ceiling painted to look like wood, the project team routed sprinklers through a mezzanine level added to the double-story room in the 1950s.

lobby, for example, now has six pendants instead of the original three. And in place of incandescent lamps, the historic fixtures and their replicas now house compact fluorescents behind their frosted glass shades. These were selected with special attention to their correlated color temperature (the measure of the whiteness of a light source) and their color rendering index (a measure of how well color can be perceived).

To further enhance the lighting, the design team has also created new downlights containing ceramic metal halide MR16s, seamlessly integrating them with the ceiling ornament. They have inserted these new fixtures within plaster rosettes, recreated in resin.

One of the few places where traditional incandescent lamps are found is in the main entry hall's chandeliers. But these are dimmed to low levels in order to extend their life. To illuminate the ceiling, the design team has concealed ceramic metal halide MR16 uplights in the upper part of the fixture. "We fooled the eye by sneaking in alternative sources," says Domingo Gonzalez, DGA president.

On the outside of the building, designers had initially planned to illuminate the tower's entire shaft. But they scaled their scheme back, opting instead to accentuate only the top. To emphasize the terra-cotta tiles' golden glow, they washed the crown in long-life high-pressure sodium floodlights—a source that is rich in reds and yellows. Just below the pyramidal roof, a section of the facade set back behind a colonnade is illuminated with metal halide lamps. These are whiter and more neutral, and therefore more naturally render the stone cladding, explains Gonzalez. At the building's base, the original pendant luminaires were refurbished and relamped.

If he had been designing the lighting today instead of between 2006 and 2008, Gonzalez says he would have specified LEDs for many of the applications. The technology, which has developed rapidly in the last few years, offers several advantages, including improved

credits

ARCHITECT: Beyer Blinder Belle Architects & Planners – John Belle, partner in charge; Frederick Bland, managing partner; Lawrence Gutterman, project architect; Stacey Moye, Charles Kramer, preservation architects; Tony Chavarria, Ivan Zurkiwskyj, Denis D'Ambreville, construction administration

ASSOCIATE ARCHITECT: Davis Brody Bond Architects and Planners

CONSULTANTS: WSP (m/e/p, fire protection, telecom/data); Robert Silman Associates (structural); Domingo Gonzalez Associates (lighting); Cerami Associates (acoustical and audio visual)

GENERAL CONTRACTOR: Cauldwell Wingate

CLIENT: U.S. General Services Administration

SIZE: 611,000 square feet

COST: $314 million

COMPLETION DATE: January 2013

SOURCES

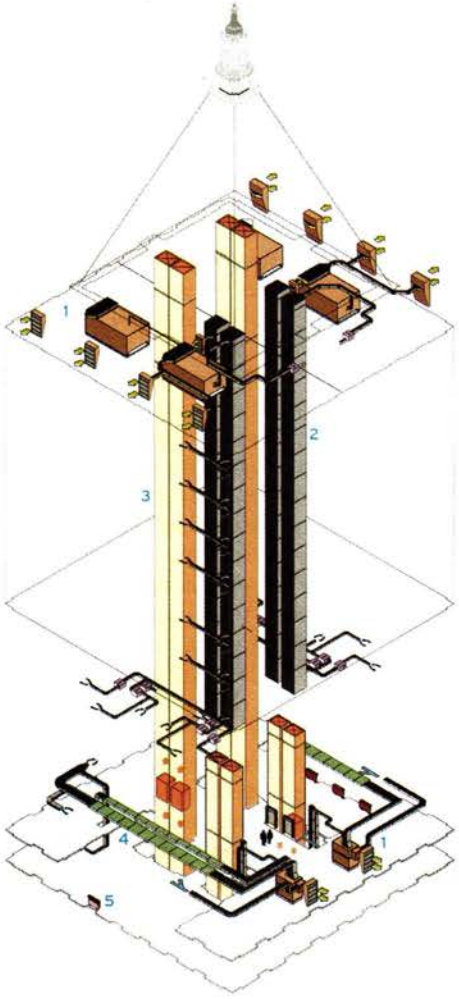
GRANITE: Cold Spring Granite

WINDOW RESTORATION: A-Val Architectural Metal, Signature

HISTORIC/ORNAMENTAL LIGHTING: St. Louis Antique Lighting, Crenshaw Lighting

CAMPANILE ROOF: Boston Valley Terra Cotta

DECORATIVE PAINTING: Evergreene Architectural Arts



INFRASTRUCTURE AXONOMETRIC DIAGRAM

efficacy (a measure of energy efficiency expressed in lumens per watt), optical precision, long lamp life, and almost full-range dimming. In addition, because LED lamps are "instant strike," meaning they turn on without a delay, they are relatively easy to coordinate with emergency systems.

Even without the most cutting-edge technology, the combined effect of the new lighting and other building-system upgrades is a projected energy savings of 15 percent when compared to standard new construction, estimates James Standish, a senior vice president of WSP, the renovation's mechanical engineer. The savings, which helped the project earn LEED Silver, were achieved without major modifications to the building envelope's thermal properties. Such changes were considered but rejected because they were inappropriate, too expensive, or both. For instance, the project team determined that adding insulation to the building's uninsulated granite-clad brick exterior walls could potentially cause damage. Under certain cold weather conditions, moisture could become trapped within the wall, then freeze, leading to deterioration.

The team also weighed options for the building's character-defining double-hung bronze windows, which were in relatively good condition. Replacing the original single-glazing with insulated glazing units or laminated glass would have required new window sashes, as well as new frames—a prohibitively expensive proposition, says Gutterman. Adding a secondary sash was also considered, but it would have interfered with another element in the building's historic fabric: the interior's bronze radiator covers. In the end, the team decided only to clean the windows, repair them when necessary, and add a film to improve blast resistance.

Naturally, there were other strategies, in addition to those relating to saving energy, that contributed to the project's LEED rating. Among the most notable are several features aimed at another critical resource: water. On top of its six-story base, the courthouse has a 21,000-square-foot green roof which retains stormwater, keeping it out of the city's over-taxed sewer system, in addition to helping to mitigate the heat island effect. The building also deploys several conservation approaches that are calculated to save about 25 percent of the potable water used by a conventional building. Not surprisingly, the courthouse now has low-flow plumbing fixtures, many of which are controlled by sensors. But it also has a more unusual feature for an urban high-rise: a 10,000-gallon rainwater-retention tank. The water collected there is used in the cooling tower to make up for water lost during its normal operation, from evaporation and other processes. According to Standish, in commercial and institutional buildings, which often have numerous server rooms requiring conditioning year round, the cooling tower consumes more water than any other use.

Most of the people who visit the building will be blissfully unaware that it is saving water or energy, since these systems are virtually invisible to occupants. But that is as it should be. Now attorneys, prosecutors, judges, jurors, and film crews—as well as other visitors to the courthouse—can focus on the cases being tried rather than be distracted by rain pelting air conditioners or lulled to sleep in courtrooms that are too dimly lit. And, of course, they can appreciate Gilbert's architecture, which has been so successfully revived for generations to come. ■

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CIRCLE 38

Office Retrofits Lit for the 21st Century

Working within the shells of century-old buildings, the design teams of the following office projects took full advantage of the latest lighting technologies. The result: lively, illuminating work environments that exceed the functional needs of the clients, as well as foster creativity and collaboration among employees—factors that breathe new life into the period structures.

THE NATURAL RESOURCES DEFENSE COUNCIL (NRDC), MIDWEST OFFICE IN CHICAGO BY STUDIO GANG ARCHITECTS

PHOTOGRAPHS © STEVE HALL/HEDRICH BLESSING

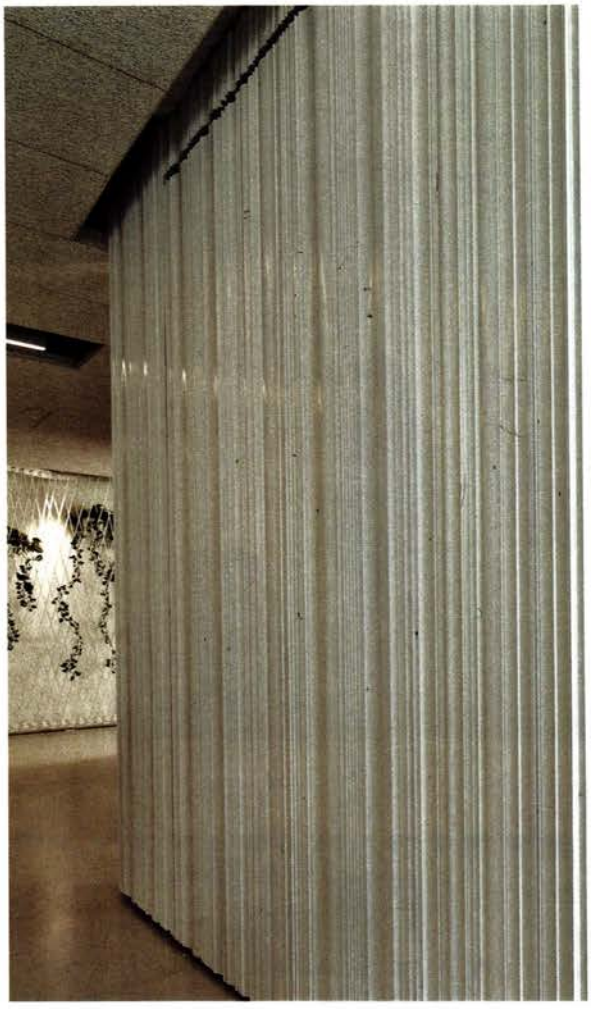
Natural Resources Defense Council, Midwest Office

Chicago

Studio Gang Architects

By Josephine Minutillo

SURFACE TREATMENT Cutouts in the acoustical ceiling feature staggered fluorescent tubes and reveal original ceiling heights (above). White-painted reclaimed-wood trim moldings create a striking fluted wall separating the reception area from an open kitchen with occupancy-controlled pendants and felt-wrapped ceilings (opposite).



PHOTOGRAPHY: © STEVE HALL/HEDRICH BLESSING

IF IT WERE only a case of "practice what you preach," the sustainably designed Midwest offices of the Natural Resources Defense Council (NRDC) would offer an impressive enough example, with a new space that exploits daylight and incorporates reclaimed materials. But this esteemed environmental-action group and its architect, Studio Gang, wanted to set a new standard. The project surpasses LEED Platinum to become the world's first tenant retrofit to achieve certification through the Living Building Challenge, the built environment's most rigorous performance standard. More than that, though, the office is a stunning workplace, with a carefully considered layout that caters to the unique needs of the Chicago branch of the organization's small but growing staff of lawyers, economists, engineers, communications specialists, and policy experts.

"When we asked ourselves, 'What kind of measure do we want to use?' " explains Studio Gang principal Jeanne Gang, "we realized that by taking on the Living Building Challenge, we essentially joined the movement to require transparency in the content of building materials. That has the potential to transform the industry faster."

The 7,800-square-foot office occupies the 16th floor of the entire northern wing of the 1929 Civic Opera House Building in The Loop. "We wanted to address the already-built environment and show that we could renovate an old structure to meet our own mission goals," says NRDC Midwest director Henry Henderson. "We also liked the space and its position on the river." Its deep footprint was a factor in the decision to forgo private offices for an open plan that would bring sunlight and ventilation to all workstations, strategically located along the perimeter. Daylight-responsive sensors control lighting within 15 feet of the perimeter glazing and over 50 percent of the total lighting load. LED task lamps supplement illumination at cubicles. Such measures contributed to the project's impressive Lighting Power Density calculation, which shows a 40.02% reduction compared to an ASHRAE 90.1-2007 baseline.

Dedicated areas for both collaborative and focused independent work surround the staircase and elevator core. An irregular configuration of glazed meeting rooms, kitchen, flex areas, and support spaces cheekily takes the shape of the state of Illinois in plan (oriented east–west). Large, more private conference rooms cap the eastern edge of the office. Occupancy sensors regulate the locally sourced pendant lights that serve as focal points in many of these areas.

To unify the open areas, the architect reprised and refined a rope structure it first experimented with for an exhibition of the firm's work at the Art Institute of Chicago last year. For this project, a more intricate version of the installation became the perfect framework on which easy-to-maintain

LIGHTENING THE LOAD Workstations along the perimeter of the 7,800-square-foot office benefit from daylighting and natural ventilation. Studio Gang designed latticework rope armatures for climbing plants that enliven the space and conceal structural columns.

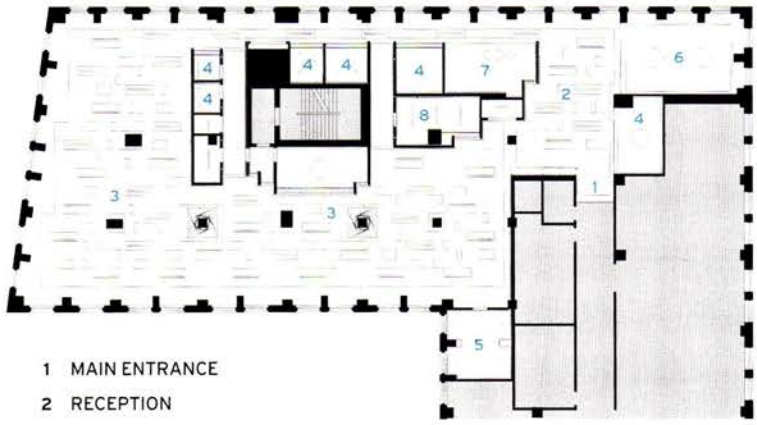
plants could flourish, aided by overhead grow lights.

With scant material, the rope latticework provides a striking three-dimensional surface that conceals structural columns among the shoulder-high workstations and graces a wall of the reception area. A second wall composed of reclaimed door moldings also greets visitors there.

The décor is playful and straightforward. Refurbished vintage mid-20th-century pieces comprise many of the furnishings in the space. Staggered two- and four-foot fluorescent tubes intermingle with cutouts in the acoustical ceiling to lessen the sense of directionality of the lighting—an arrangement that also offers flexibility for future ceiling modification. The finishes and all light fixtures were approved by the Living Building Institute.

Meeting the Living Building Challenge naturally lent itself to the "back to basics" design approach the architect took. Remarkably, it also satisfied the client's limited budget and constricted timeline for the project. According to Gang, "Truly engaging the users and setting goals at the beginning of a project are key parts to its ultimate success." ■

Trained as an architect, Josephine Minutillo is a New York–based writer for RECORD.



1 MAIN ENTRANCE
2 RECEPTION
3 OPEN WORKSTATIONS
4 FLEX SPACE
5 FLEX SPACE (QUIET)
6 CONFERENCE ROOM
7 KITCHEN
8 COPY ROOM

REFLECTED CEILING PLAN

credits

ARCHITECT: Studio Gang Architects – Jeanne Gang, design principal; Mark Schendel, managing principal; Margaret Cavenaugh, director of interiors; Angela Peckham, project manager

ENGINEER: WMA Consulting Engineers (m/e/p + LEED)

GENERAL CONTRACTOR: Norcon

CLIENT: Natural Resources Defense Council

SIZE: 7,800 square feet

COST: withheld

COMPLETION DATE: July 2013

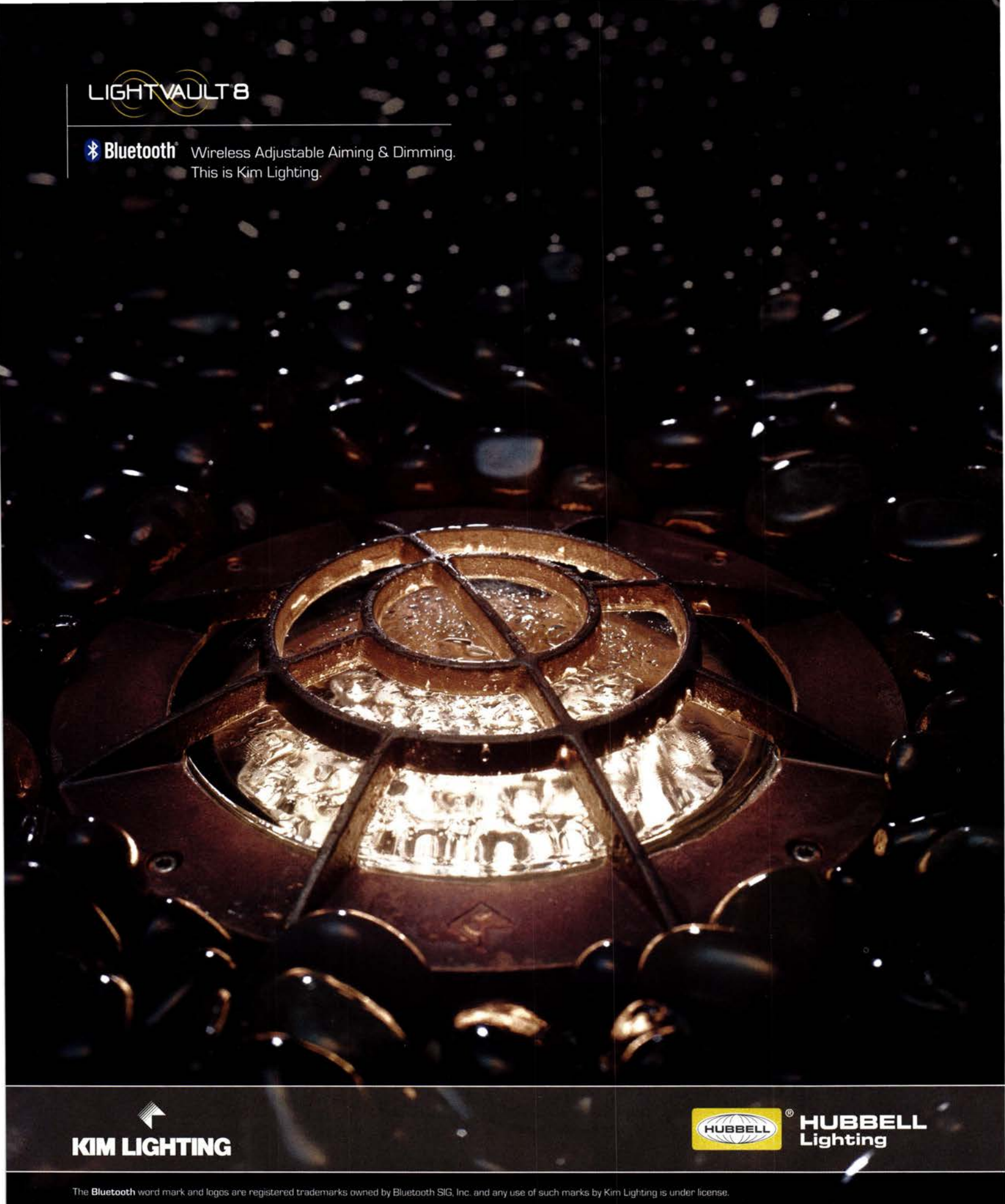
SOURCES

LIGHTING: 3G Lighting, Focal Point, XAL, Lithonia (ambient); Focal Point, Tech Lighting (downlights); Lighting Services, Optolum, Lightology (task); Lutron (controls, window shades)

ENERGY MANAGEMENT: Noveda

CEILING: Tectum; U.S. Gypsum

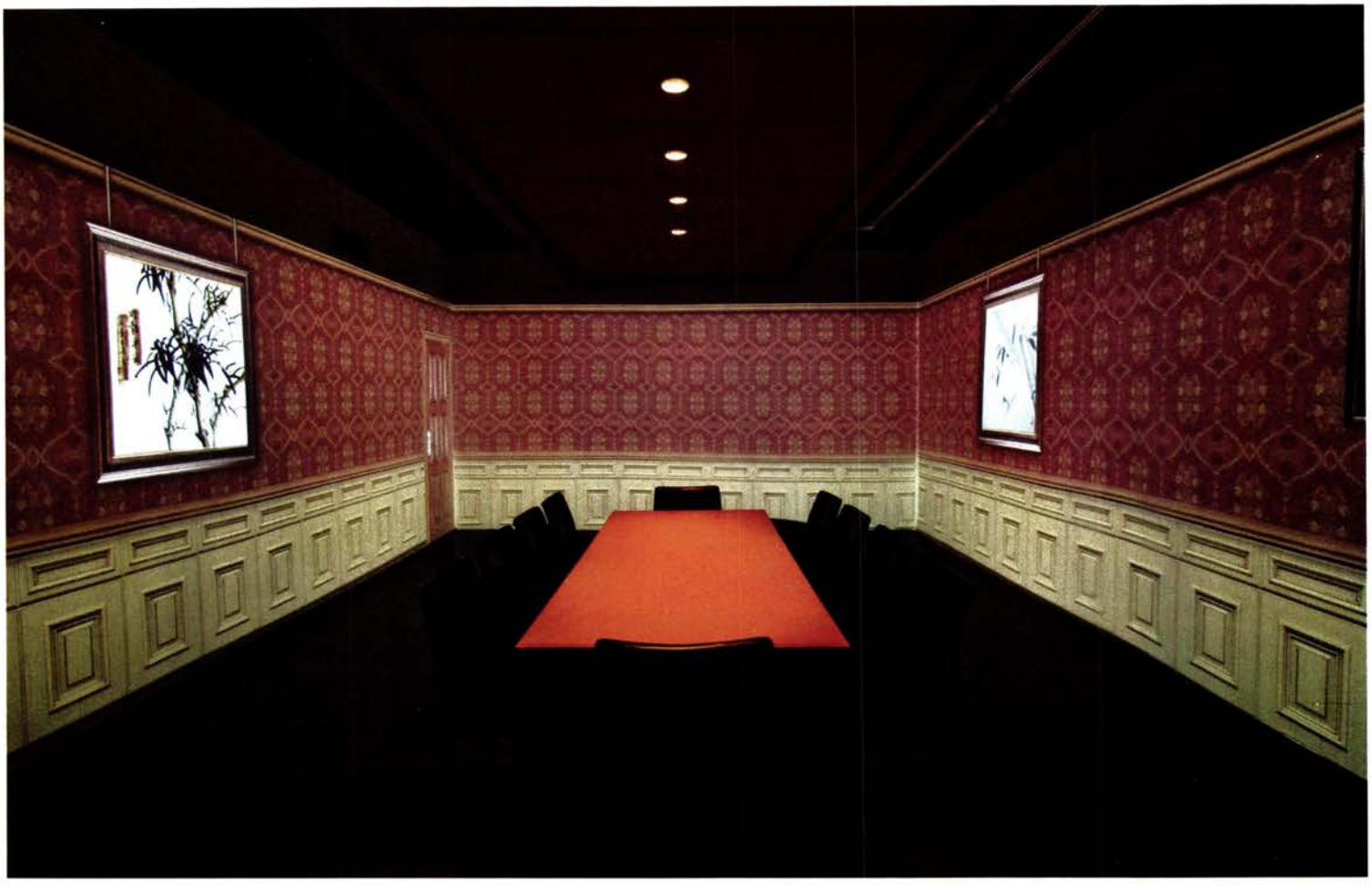
FURNITURE: Knoll, Huamscale, Coalesse, Moooi



Gallery 225

New York City
Paul Bennett Architect
Focus Lighting

By Linda C. Lentz



PHOTOGRAPHY: © RYAN FISCHER

WHEN FOCUS LIGHTING carved a new office out of a trio of two-story 1910 retail buildings on a busy street in Harlem five years ago, principal Paul Gregory wanted the facility to be more than a functional workspace for ongoing projects. He wanted it to communicate the illuminating potential of light to his clients and to the community around it.

The New York–based lighting-design firm has been collaborating with architects for more than 25 years to create transformative commercial, hospitality, and cultural environments. Gregory and his team are also known for flights of technical fancy in undertakings like the implementation of the 100th Anniversary Times Square Ball, and Reflect, an installation by artist Ivan Toth Depeña at the Stephen P. Clark Government Center in Miami (RECORD, May 2012, page 175). Working with Paul Bennett Architect, the firm gutted the three attached structures and devised a daylight-filled studio with open workstations, glazed conference rooms, and a double-height mock-up area to test systems and lamping for current schemes. This is where the day-to-day operations take place. In addition, Gregory had the architect design a flexible space on the ground floor of one of the buildings for independent research of a more artistic bent.

That space, in operation since early 2013, is called Gallery 225—named for its address on West 116th Street. Dedicated

SIDE EFFECTS
Color Kinetics LED Colorblasts allow for studies in color perception in the gallery's two rooms (top). Basic classroom projectors on the ceiling of the inner space envelop the walls in a traditional room setting (above).

to experimentation, it is an investment in the future, a playground for Gregory's creative staff to try out new ideas. Adjacent to Focus Lighting's main office, and accessed from a door in reception or from an existing storefront, the 1,400-square-foot gallery has three contiguous rooms designed for explorations in light and its psychological effects, and as a place the lighting designers can host clients and collaborators to demonstrate the results.

Visitors enter a street-side foyer where black surfaces and shaded windows prepare their eyes for the two "light laboratories" beyond, both surfaced with blank white walls and dark ceilings. The middle room features one contrasting brick wall, for texture, and a series of color-changing LED ceiling fixtures. From there one proceeds through a wide doorway into what looks like a typical conference room. But there is nothing conventional going on here. An acoustical ceiling, floating above the table, conceals housing for downlights, more color-changing LEDs, and six video projectors aimed and programmed to wash the walls with any number of milieus produced by digital photography or video.

With such an environment, says Gregory, "We can create any atmosphere without doing anything to the room itself." For instance, projected images controlled by a mobile app could surround diners in the private room of a restaurant with a serene landscape or period decor. Or, he muses, why not project the sky moving across the wall of a windowless conference room?—often the most boring space in an office.

"It's a great place to have a design meeting too," Gregory adds, noting that they could surround architects and developers with life-size renderings of a project for a realistic sense of a potential space. Think views from a condo in the soon-to-be developed Hudson Yards.

Even more significant for today's lighting scene is the ongoing study of the impact of colored light that uses color-changing LEDs—how we perceive various "white" color-temperatures, and the natural inclination of the eye to control its "white balance" in rooms saturated by colored light.

Plans for the future include an app to allow people in the neighborhood to experience luminous gallery installations from the street after hours. "It's a place where you want to be more creative," says Gregory. ■

credits

ARCHITECT: Paul Bennett Architect

lighting designer: Focus Lighting – Paul Gregory, principal; Daryl Wesoloski, Victoria McNulty, David Wilburn, design team

CLIENT: Focus Lighting

SIZE: 14,000 square feet

COST: withheld

COMPLETION DATE: January 2013

SOURCES

LIGHTING FIXTURES: Color Kinetics (color-changing LEDs); BenQ (video projectors); Times Square Lighting (downlights)

CONTROLS: Electrical Theater Control, Lutron

ROOM WITH A VIEW Images of the New York skyline can be configured to demonstrate potential views from a room in a proposed high-rise development or even enliven the walls of a conference room (above).

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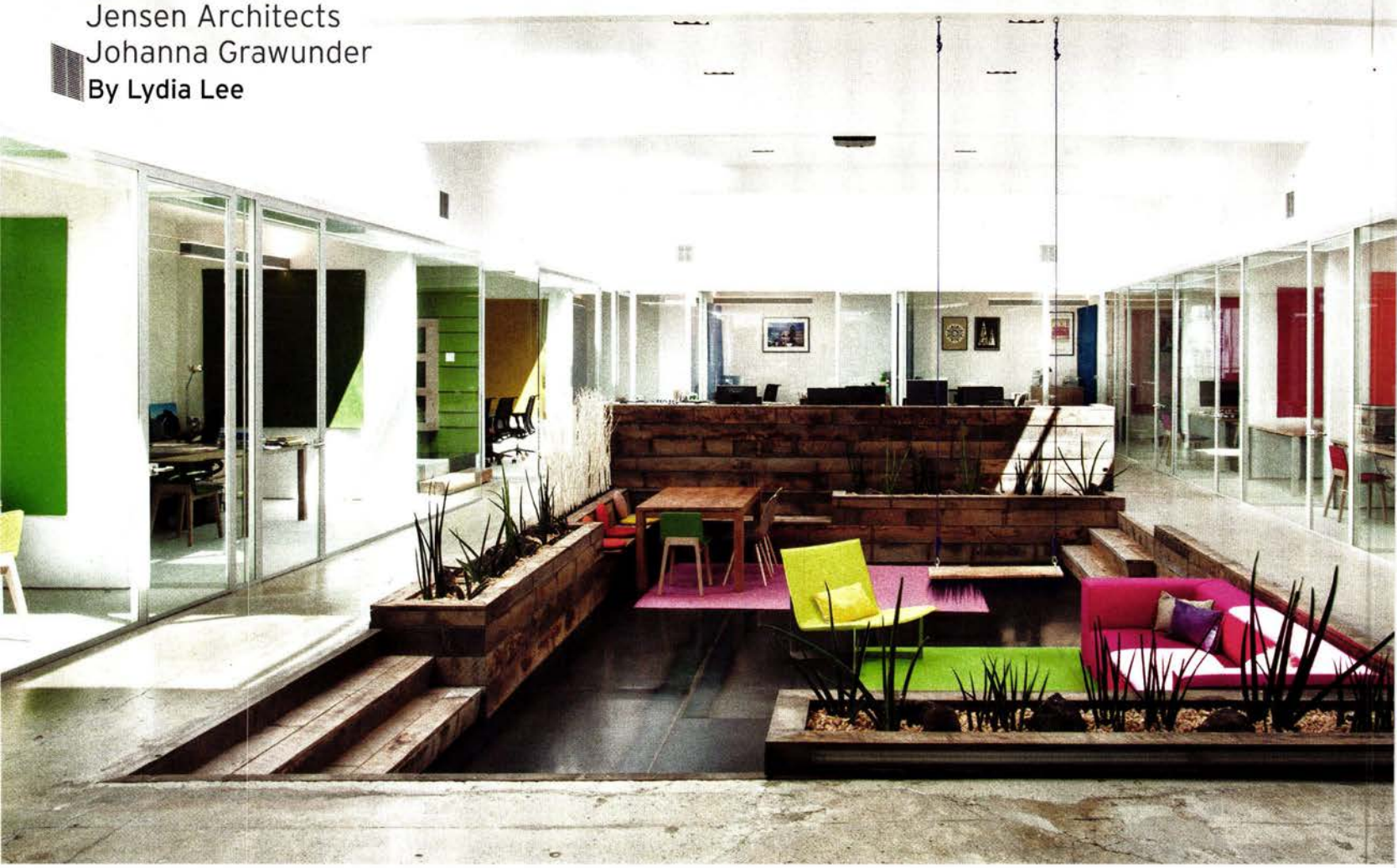
CIRCLE 54

Next World Capital

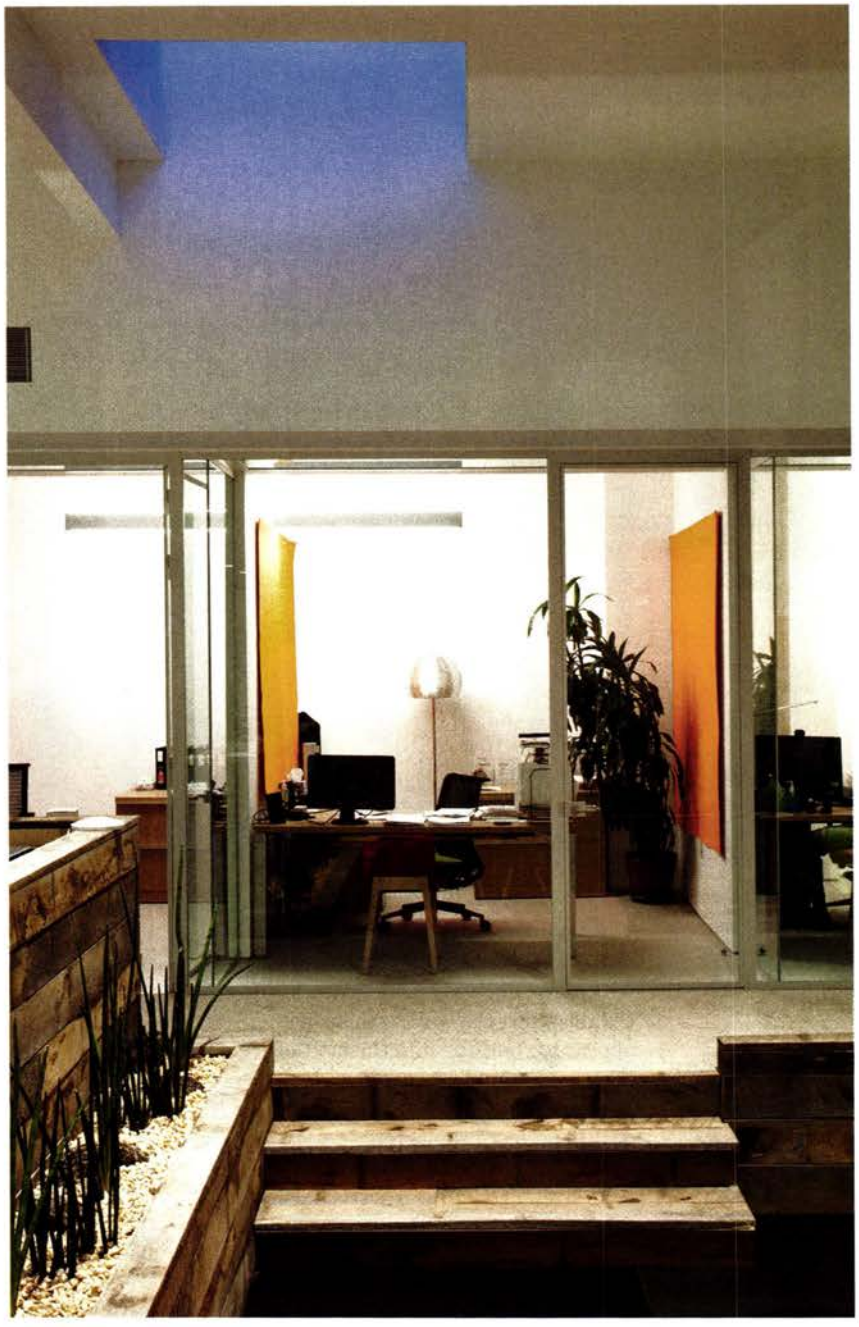
San Francisco
Jensen Architects
Johanna Grawunder
By Lydia Lee



SAN FRANCISCO'S multitudinous tech start-ups are not only making their mark in economic terms, they're redefining the workspace. To create alluring environments, youthful company owners overwhelmingly favor open floor plans, bright hues, fuzzy surfaces, and spacious lounges.

It was important for Next World Capital, a venture-capital firm that specializes in these businesses, to show that they were tapped into the zeitgeist. However, the 25-person firm was looking for a polished version of such an office for its space in the historic district of Jackson Square, and commissioned a local architect known for his restraint rather than than ebullience, Mark Jensen, shown in such projects as SFMOMA's rooftop sculpture garden and, more recently, in Shed, a foodie outpost in Healdsburg, California (RECORD, July 2013, page 96).

Due to the significance of the building's historic location, the design team had to proceed in a gingerly manner. They expanded the single-story former factory, which had six existing skylights, and opened it to more daylight by creating a double-height glass-roofed entry and luminous penthouse that now serves as the company's main conference room. However,



OPEN OFFICE
Jensen Architects took advantage of existing skylights to create the feeling of a courtyard, designing a conversation pit with industrial overtones such as a cold-rolled steel floor (opposite, top), and also reclaimed barn-wood paneling. The team neutralized the Italianate pastiche on the exterior with a coat of gray paint. (opposite, bottom). Inside, they hung colorful panels of acoustic felt in the private offices (right).

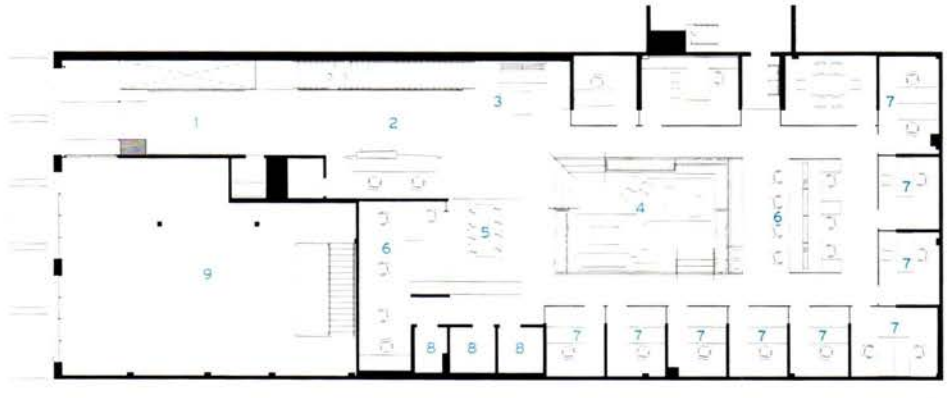
PHOTOGRAPHY: © MANIKO REED

the additional level could not be visible from the street, so the architects set it back 10 feet from the facade. Then they demolished the walls that divided the 5,000-square-foot ground floor into a warren of rooms. Jensen's team also unearthed a sunken seating area—the circa-1920s concrete building had once been a cabaret—and expanded it into a large conversation pit.

To enhance the ambiance, Jensen brought in lighting designer and architect Johanna Grawunder, who created a layered electric lighting system to augment the daylight provided by the skylights. Her scheme includes a series of ambient recessed-LED fixtures and a strip of warm, 3,000-Kelvin (K) LEDs for uplighting, concealed in the soffit around the central space. She also ringed each skylight with color-changing LEDs that provide lighting at night and help set the mood for company parties in the central lounge.

Next World Capital was intent on having some private offices to help productivity and concentration. Jensen wrapped the central area with glassed-in offices, offering acoustic privacy while maintaining the expansiveness the client desired. The architect pushed each office out with a 3-foot-deep "sunroom" to mimic the welcoming feeling of a row of storefronts around the communal area, blurring the edge between public and private space, and hung acoustic-felt panels, in a rainbow of colors, on the white walls inside.

"We wanted the space to be clean, almost gallery-like," explains Jensen. "By introducing moments of color and heavy materiality in an otherwise neutral setting, the panels have the effect of paintings."



GROUND FLOOR

1 ENTRANCE
2 RECEPTION
3 SITTING/WAITING AREA
4 CONVERSATION PIT
5 KITCHENETTE/BREAK AREA
6 OPEN OFFICE
7 PRIVATE OFFICE
8 RESTROOM
9 FRONT TENANT

BRIGHT AERIE
The new boardroom has windows on three sides and a large skylight–shaded for sun–with views of the Transamerica tower's top (left). Transparent glass boxes, dubbed "sunrooms," extend from each office, visually connecting the private spaces with each other and with the circulation corridor (below).

Grawunder positioned glare-free, linear LED pendants over each desk within the enclosed work areas, butting them against the wall so that they appear to continue into the next office. "These are simple things that don't cost any more money, but you get a dashing effect," she says.

To further reduce noise, the architects stretched white acoustic fabric across the ceiling of the main central space and conference room. More of this sound-absorbing textile covers LED tape above the reception area to create a glowing yet visually clean ceiling.

The brightest space is the upstairs conference room, where a selection of Eames molded-plastic chairs in jelly-bean hues surrounds a conference table made of salvaged California bay laurel. Here clients are encouraged to sit in a seat with an illuminating view: the iconic Transamerica tower, perfectly framed through a new skylight, shedding light on the potential of venture capital. ■

Lydia Lee is a San Francisco–based writer and editor with a focus on architecture, design, technology, and sustainability.

credits

ARCHITECT: Jensen Architects – Mark Jensen, principal; Frank Merritt, Nick Sowers, lead architects; Paul Jones, Ryan Golenberg, Kim Cinco, Kyle Belcher, Erin Osberg, project team

LIGHTING DESIGNER: Johanna Grawunder

ENGINEERS: Fulcrum Structrual Engineering; Sandis (civil); Glumac (mechanical); Geotecnia (geotechnical)

GENERAL CONTRACTOR: Johnstone McAuliffe Construction

CONSULTANTS: Growsgreen (landscape design); Christopher VerPlanck (historical)

CLIENT: Next World Capital

SIZE: 9,750 square feet

COST: withheld

COMPLETION DATE: May 2013

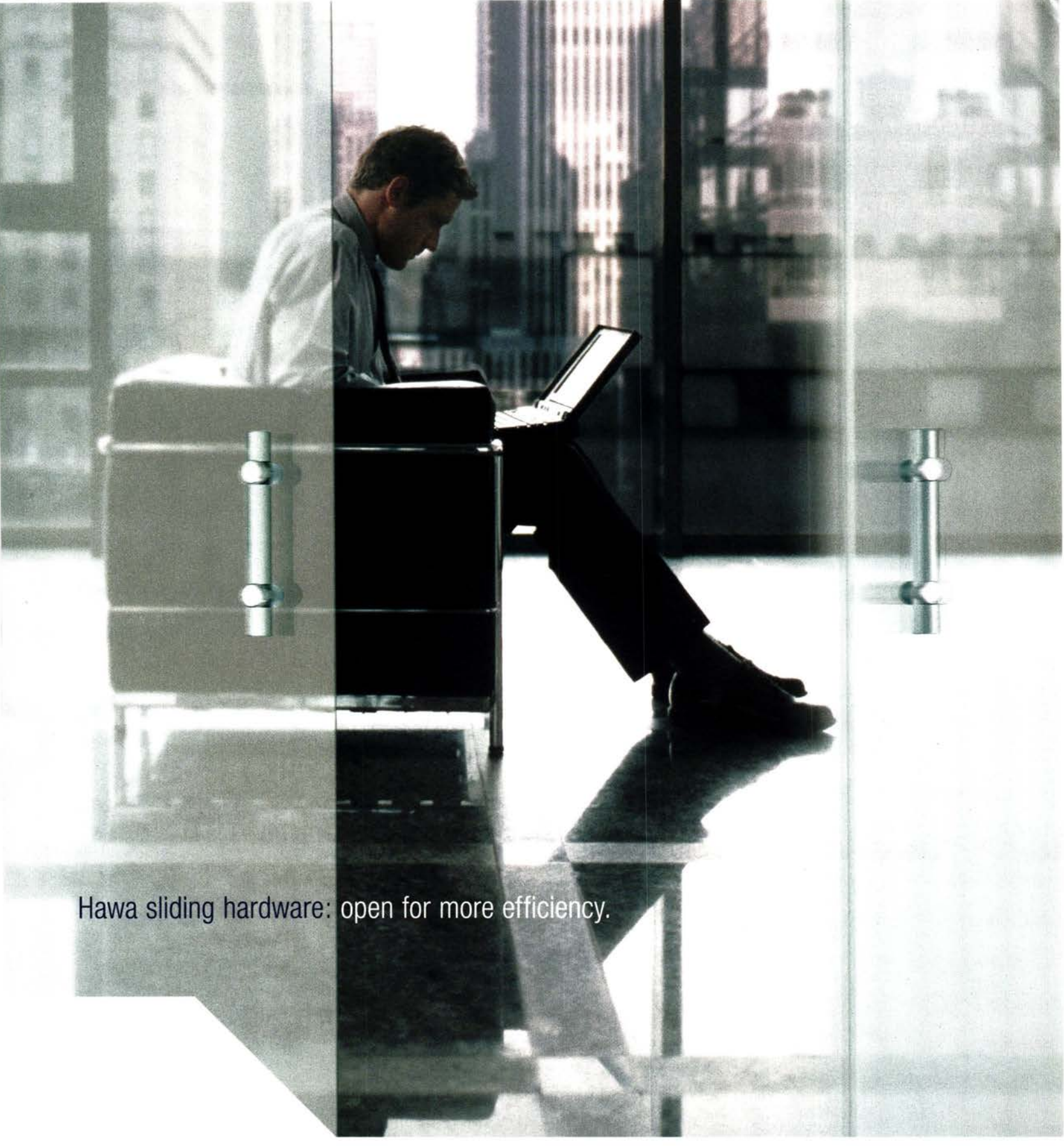
SOURCES

LIGHTING: Aion (interior ambient/skylights); Flos, Finelite, Iris (downlights); Litelab (recessed track)

WINDOW SHADES: Burris

ACOUSTICAL CEILING: Clipso

GLASS OFFICE PARTITIONS: Modernus



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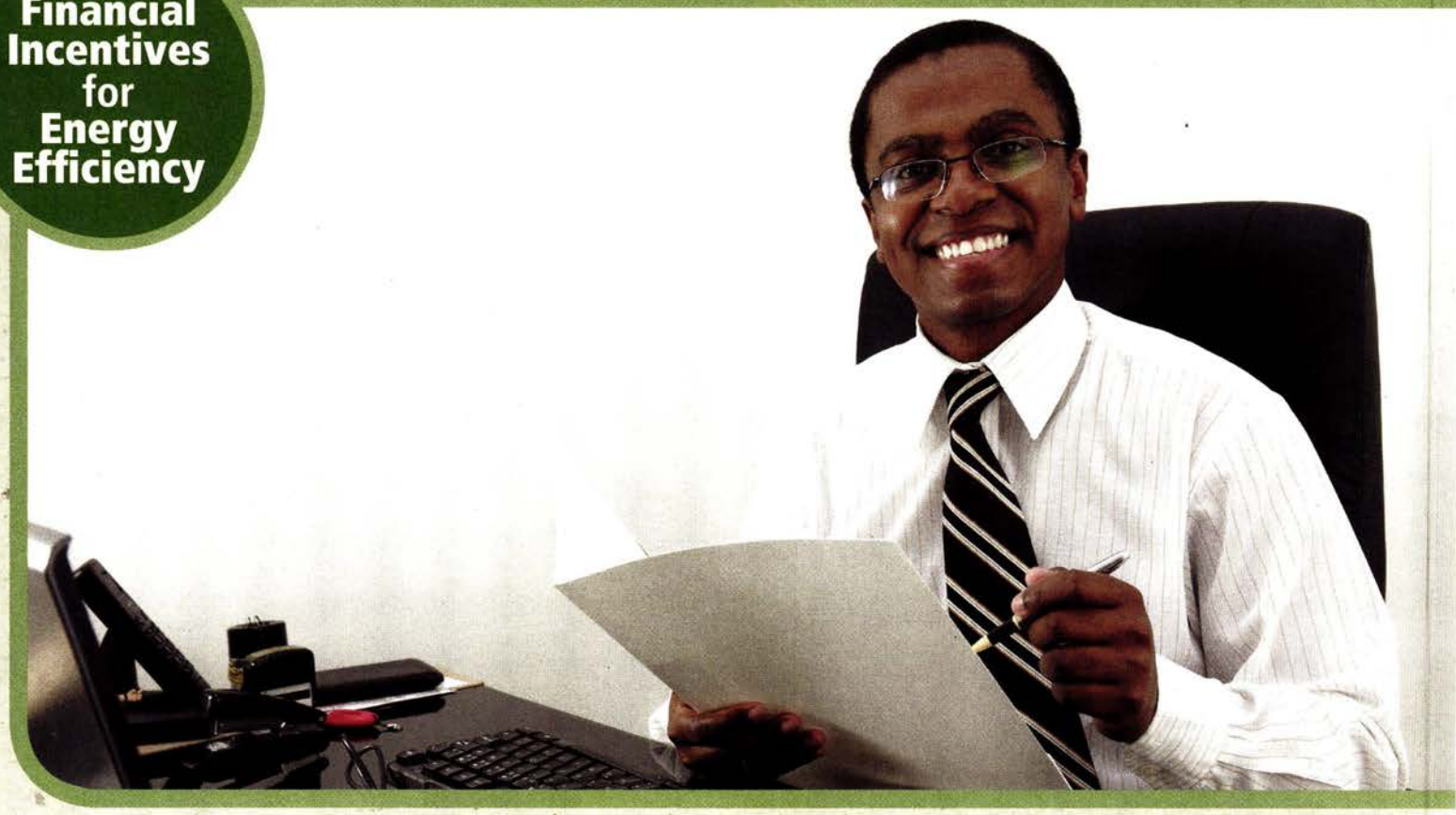
CIRCLE 51

Financial Incentives for Energy Efficiency



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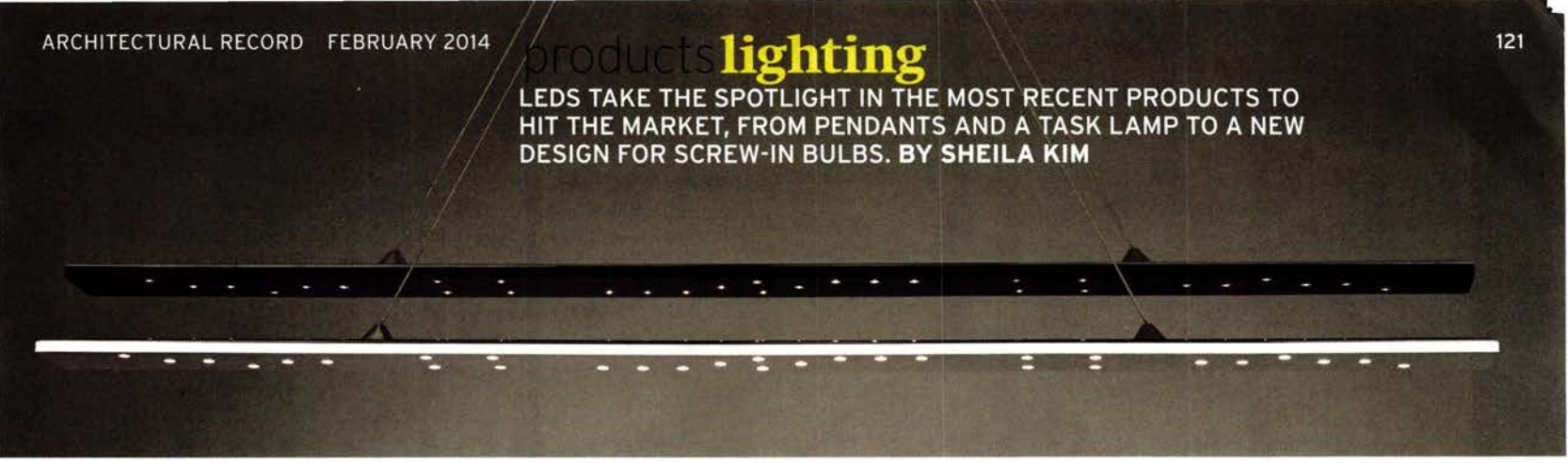
LEDS TAKE THE SPOTLIGHT IN THE MOST RECENT PRODUCTS TO HIT THE MARKET, FROM PENDANTS AND A TASK LAMP TO A NEW DESIGN FOR SCREW-IN BULBS. **BY SHEILA KIM**



Parallax

While visible LED light points aren't desirable in some fixtures, they serve an aesthetic purpose in the Parallax suspension lamp from Tech Lighting. The slim, monolithic piece, measuring 54" long x 3⅞" wide, features on its face an asymmetrical arrangement of 30 LEDs that evoke patterns found on a circuit board. Available in a black or white finish, the fixture is constructed of aluminum and acrylic. techlighting.com **CIRCLE 200**

Big Bang

Italian lighting company Foscarini has updated one of its past crowd-pleasers with an LED retrofit. Big Bang (left), originally designed by Enrico Franzolini and Vicente García Jiménez in 2008, evokes an explosion with a seemingly haphazard arrangement of cardlike pieces that interlock and fan out. Constructed from methacrylate, the diffuser comes in white or red. foscarini.com **CIRCLE 201**

SlimStyle LED Bulb

Manufacturers have been looking for ways to design the 60W-equivalent screw-in LED bulb with a reduced heat-sink area for true omni-directional illumination. Philips has recently launched its solution, SlimStyle, which lights up in the perimeter of the lamp and conducts heat toward the flat surface at its center. The result is improved light distribution and a lighter weight, thanks to the elimination of the typical aluminum heat sink. The dimmable bulb delivers 800 lumens and comes in a 2700K color temperature.
philips.com **CIRCLE 203**

Fairy

Bulbous tips of faceted glass with chromed-aluminum stems form the drop-shaped diffusers of the Fairy collection, designed by Manuel Vivian for Axo Light. The whimsical fixture uses LED lamping and comes in a range of formats, including circular or linear suspension with multiple varied-height drops; single-drop pendant; ceiling lamp; or sconce. Each glass diffuser measures 3½" in diameter and is available in transparent, amber, or smoke-gray finish.
axolight.it **CIRCLE 202**

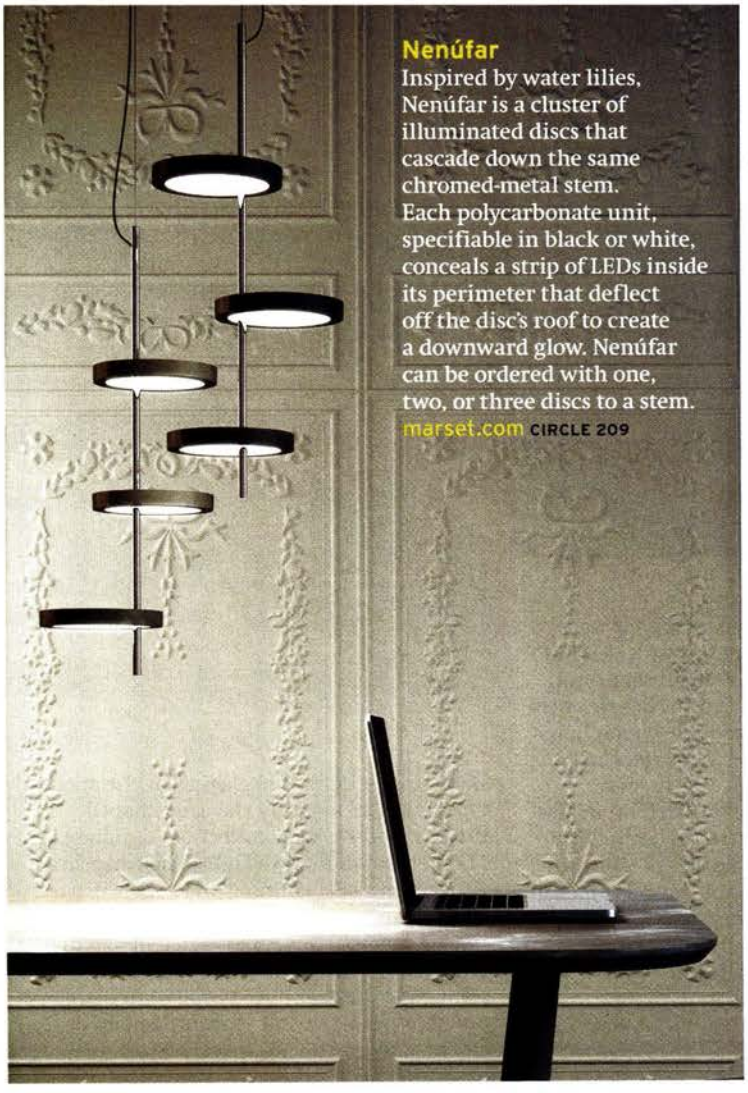
Fletcha

Jorge Pensi's architectural training is evident in his structured, angular lighting series Fletcha. Designed for Leucos, the line consists of a task lamp (right) with an integrated USB outlet for charging gadgets, an upright wall sconce, and a diamond-shaped suspension light. Made of polyurethane resin and finished in glossy white, the fixtures house 8W LEDs.
leucos.com **CIRCLE 204**

For more information, circle item numbers on Reader Service Card or go to architecturalrecord.com/products.

Tysen
A speckled pattern adds flair to the hand-blown-glass dome shade of the Tysen pendant from Nora Lighting. Measuring 5½" in diameter x 4⅞" high, the shade is offered in white, amber, red, or taupe. Lamping options include LED, Bi-Pin, and line voltage with a G9 base or E12 candelabra base, while mounting options range from track to monopoint canopy. noralighting.com CIRCLE 205

Bruno LED
Available in a suspension or wall-mount version, Bruno LED is a minimalist luminaire from Peerless that helps reduce energy consumption not only through its lamping but also its optional sensor controls for daylight and occupancy detection. In the suspended model (below), the sensor is discreetly built into the fixture, which can be customized to deliver 1800 to 4800 lumens in three color temperatures. Available in aluminum, white, or custom finishes. peerlesslighting.com CIRCLE 206



Nenúfar
Inspired by water lilies, Nenúfar is a cluster of illuminated discs that cascade down the same chromed-metal stem. Each polycarbonate unit, specifiable in black or white, conceals a strip of LEDs inside its perimeter that deflect off the disc's roof to create a downward glow. Nenúfar can be ordered with one, two, or three discs to a stem. marset.com CIRCLE 209

Urban LED Wall Sconce
Simple and subtle in appearance, the Urban Wall Sconce from Modern Forms directly illuminates interior and exterior steps and pathways using two integrated downlights. The LED fixture is available in three heights—10", 16", and 22"—and is constructed of aluminum finished in black, bronze, graphite, or white. modernforms.com CIRCLE 207

Finiré LED Recessed Lighting
The latest addition to Lutron's fixture brand Ivalo Lighting, Finiré LED Recessed Lighting combines the company's Hi-Lume A-Series dimming driver with the efficiency and color consistency of Xicato's LED modules. The fixture is available in round or square format, while the beam spread can change from 20° to 50° to meet needs ranging from spot to flood lighting. lutron.com CIRCLE 208

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CIRCLE 23

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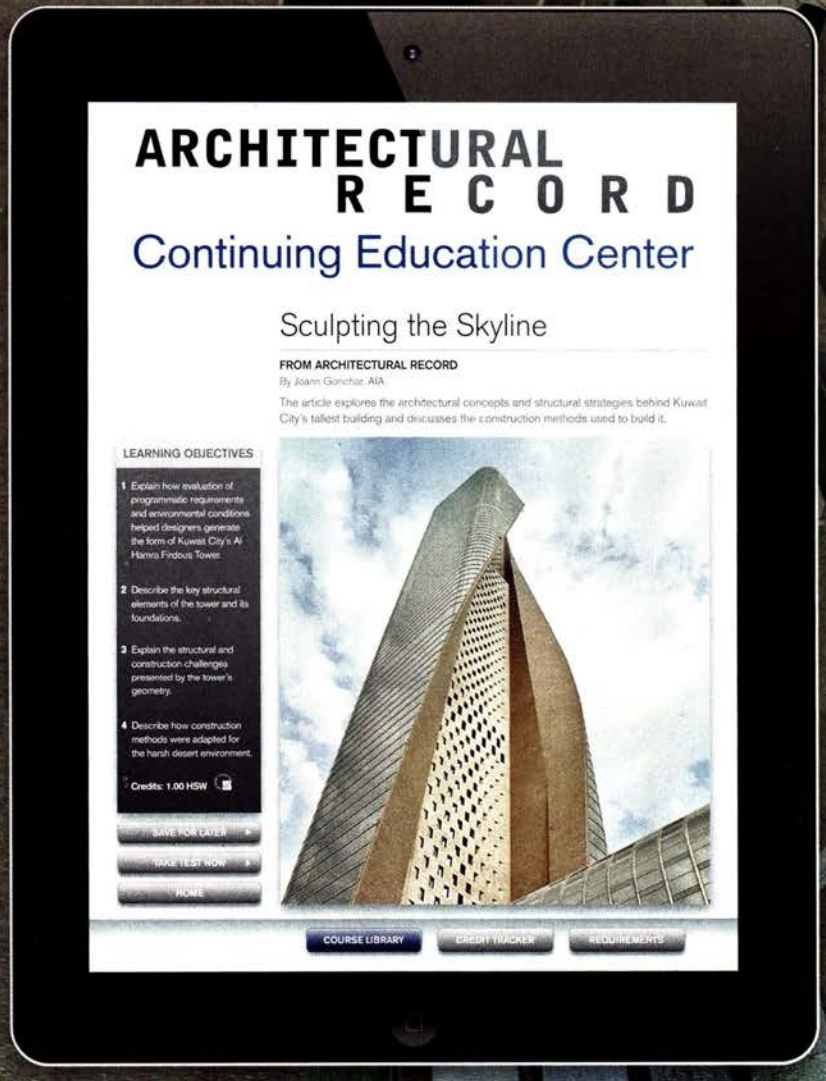

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P126

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Appliance Performance Beyond ENERGY STAR®

Emerging standards focus on performance over prescriptive requirements

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

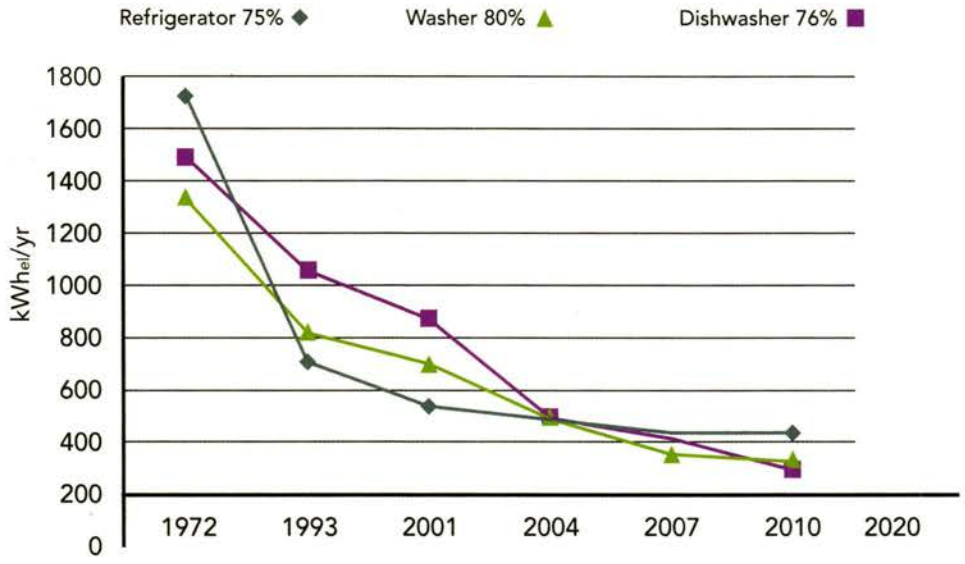
Residential construction and renovation has increasingly focused on energy efficiency as a part of good design. Typically, we focus on energy used for heating, cooling, water heating, and lighting, which is appropriate since in a typical house, those systems can account for over 70 percent of the energy consumed. But the other 30 percent of residential energy consumption merits attention as well. According to the U.S. Environmental Protection Agency (EPA), 13 percent of the energy used in a typical home can be attributed to just four common appliances—the refrigerator, dishwasher, clothes washer, and clothes dryer. Furthermore, another 11 percent is consumed by other miscellaneous appliances and equipment in a home such as cooking appliances like ranges, microwaves, etc. The energy efficiency of residential appliances is constantly being improved. Emerging efficiency standards and technology advancements mean that manufacturers are offering products which are more resource efficient and cost effective than ever before.

APPLIANCE HISTORY AND OVERVIEW

The time period following World War II produced significant growth and prosperity in the U.S. and elsewhere. The mantra of modern living included chore-saving home appliances, and they became increasingly standard in new and remodeled homes everywhere. Energy was abundant and inexpensive, so energy efficiency wasn't a dominant concern, rather convenience, performance, and style were the focus. When the energy crisis of the 1970s struck, things changed.

In 1975, the U.S. Congress passed the Energy Policy and Conservation Act with far-reaching standards and requirements for the production and conservation of energy in the United States. Part B of Title III of this act included minimum energy conservation standards for appliances and equipment which were mandatory for all appliance manufacturers in order to sell their products in the U.S. This Act of Congress was subsequently amended and updated during the 1980s by the National Energy Conservation Policy Act and the National Appliance Energy Conservation Act (amended further in 1988). The impact of these laws was dramatic. Appliance manufacturers began paying close attention to the energy efficiency of their products and the average amount of energy utilized by residential appliances dropped by 30 to 60 percent depending on the specific appliance between 1975 and 1993. This was only the beginning. Continual efficiency improvements became commonplace and developed momentum as manufacturers recognized energy efficiency as a desirable and marketable feature of their products.

Renewed interest in energy conservation and CO_2 air pollution led to additional Energy Policy Acts (EPACT) being passed by Congress and signed by the President in 1992 and again in 2005. The comprehensive Energy Independence and Security Act of 2007 (EISA) built on the prior two decades of legislated energy advancement with a continued appropriate emphasis on energy efficiency and conservation. (These laws are codified in the United States Code, Title 42, Chapter 77, Subchapter III, Part



Since the 1970s the amount of electricity needed to run common household appliances has decreased dramatically.

A—Energy Conservation Program for Consumer Products Other Than Automobiles.) In all, the products regulated by this legislation represent about 90 percent of home energy use. Standards developed in response to this legislation have reportedly saved American consumers $40 billion on their utility bills in 2010, and the annual carbon dioxide reduction will reach 250 million tons by the year 2020. Legislation and the continued efforts of household appliance manufacturers have resulted in further energy efficiency gains through 2010 compared to 1975 levels with a 75 percent average energy use reduction for refrigerators, 80 percent for clothes washers, and 76 percent for dishwashers. These are dramatic improvements, making energy-efficient appliances the norm, not the exception.

It is worth noting that concurrent with the interest in conserving energy, interest in reducing the use of potable water was also a growing concern during this time period. There are two reasons for this. First, most potable water requires a significant amount of energy to pump, move, treat, process, and deliver to consumers. Only a small fraction of this water is actually consumed by people through drinking or cooking. Most residential water is used for washing, showering, and flushing, which all typically require energy for moving, processing, and treating before returning the water back to the environment. Hence, reducing the amount of water required by a household directly reduces the amount of energy used to deliver and recover that water. Second, as populations have increased in certain areas of the U.S., the demand for water has increased to the point where supply is becoming scarce. In some cases, supply is already being disputed for territorial control. The combination of increasing water scarcity and the energy requirements of processing water in aging infrastructure systems has driven the logical inclusion of water conservation in energy legislation.

STANDARDS AND PROGRAMS FOR APPLIANCE PERFORMANCE

Federal legislation was an appropriate first step to spark change in appliance energy use. However, practical execution of the federal legislation comes about through performance standards and programs that can test and certify those appliances as compliant. Federal standards for appliances were developed to ensure compliance with the legislative mandate. Furthermore, two additional voluntary standards have emerged which offer manufacturers a method to communicate the resource efficiency of their appliances to customers.

Federal Standards

With legislation in place, a federal mechanism is obviously needed to determine if the law is being followed. In this case, the U.S. Department of Energy (DOE) and specifically the Buildings Technologies Office is charged with setting minimum energy efficiency standards for approximately 50 categories of appliances and equipment used in homes, businesses, and other applications. The appliances and equipment covered include, among other things, refrigeration, cooking, dishwashing, clothes washing and drying. In addition, the DOE implements the laws designed to limit the water consumption of several plumbing products. For most of these products and appliances, the laws passed by Congress established time schedules for the DOE to create, review, and update standards and test procedures. All manufacturers and importers of covered products must use the DOE test procedures to demonstrate compliance with the standards, unless granted explicit waivers. This means that any appliance which does not meet the standards cannot legally be sold in the United States. Hence, it is fair to assume that any commercially available appliance that is specified, purchased, or installed has met these federal standards or they wouldn't be on the market.

The DOE regulations or standards governing covered appliances and equipment are established through a rulemaking process that provides opportunities for public review and comment. Manufacturers, product importers and distributors, energy suppliers, efficiency and environmental advocates, and other members of the public are encouraged by the DOE to participate in the rulemaking. The DOE maintains a rulemaking schedule and provides progress reports to Congress every six months.

There are two notable updates underway that apply to certain appliances. In 2014, new federal standards related to refrigerators will take effect requiring roughly 20 to 30 percent more energy use reductions compared to the standard in effect in 2013. Similarly, clothes washers are targeted

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Learning Objectives

After reading this article, you should be able to:

1. Recognize advances made in the appliance industry since the 1970s due to mandatory and voluntary energy-efficiency standards.
2. Distinguish between different national programs and standards related to the energy performance of residential appliances.
3. Explore current and emerging technologies that are used in the five most common kitchen and laundry appliances that meet or exceed new standards.
4. Demonstrate the ways that energy-efficient appliances can contribute to certification under some national green building certification programs.

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for updated federal standards in 2015 which will reduce the allowable amount of water and energy used in these appliances.

ENERGY STAR® for Appliances

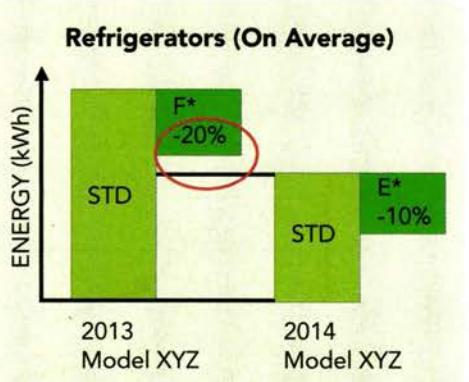
ENERGY STAR® is a well-known federal program initiated in 1992 by the U.S. Environmental Protection Agency (EPA) in the interest of reducing air pollution by reducing the need for fossil fuel produced electrical energy. The EPA joined with the U.S. DOE to develop this program as a way to encourage and recognize products of many types that excel in their ability to go beyond simply meeting the minimum federal standards for energy efficiency described earlier. The familiar blue and white ENERGY STAR® label has therefore become a recognized symbol for energy efficiency that is earned by demonstrating performance through verifiable testing. It is intended to help consumers save money and protect the environment through the proliferation of energy-efficient buildings, products, and practices over less efficient alternatives. The program is completely voluntary but has been embraced by many companies as a means to distinguish their products and demonstrate their commitment to energy efficiency, which has become a requirement of many consumers.

Appliances are a significant category of products within the overall ENERGY STAR® program. To qualify, appliances must use 10 to 50 percent less energy and water (actual percentage depends on the appliance type) than standard models that simply meet the federal standards. This is often accomplished through the incorporation of advanced technology in the products which still allows the appliance to perform its basic or core function but uses less energy in doing so. Just as modern LED light bulbs use less energy to provide just as much or more light than traditional incandescent bulbs, modern ENERGY STAR labeled appliances still provide their full core functional requirements but with demonstrated energy use reductions. In order to qualify to earn and display the ENERGY STAR label, those appliances must be tested at qualified independent labs which report the results back to the manufacturer to submit to the EPA. Once reviewed and accepted, that test data is available to be accessed through the ENERGY STAR® web site.

Like the federal standards, ENERGY STAR® testing and requirements are updated periodically in response to trends and improvements in technology. Since this program is based on exceeding the federal minimum standards, it becomes more stringent when the federal standards are made more stringent. Hence the new 2014 federal requirements for refrigerators discussed previously means that a 2014 standard refrigerator could now be more energy efficient than a comparable 2013 ENERGY STAR® model.

This is because a 2013 ENERGY STAR® refrigerator needed to be 20 percent more efficient than the federal standard in effect in 2013 to qualify. The new 2014 federal standard meets or exceeds the prior (2013) ENERGY STAR® threshold at 20 to 30 percent more efficient than the previous 2013 federal standard. While this sounds like large gains, the absolute energy use (measured in terms of kilowatt hours) has been reduced dramatically since the 1970s. The 2014 ENERGY STAR® update could amount to a calculated average of only $6 per year difference in energy use between a 2014 ENERGY STAR® refrigerator and a comparable 2014 federal standard refrigerator. Recognizing this diminishing absolute amount of energy available to be saved, the 2014 ENERGY STAR® label (Version 5.0 for Residential Refrigerators and Freezers) can now be earned for a refrigerator that uses only 10 percent less energy than the 2014 federal standard.

In addition to product category updates in the ENERGY STAR® program, new product categories have also been added over time while some products still remain outside the purview of the program. For example, refrigerators, clothes washers, and dishwashers are some of the appliance categories that have been eligible to apply for an ENERGY STAR® label, but cooking appliances and clothes dryers are not currently covered under the program. A clothes dryer standard is under development and may be available in 2015.

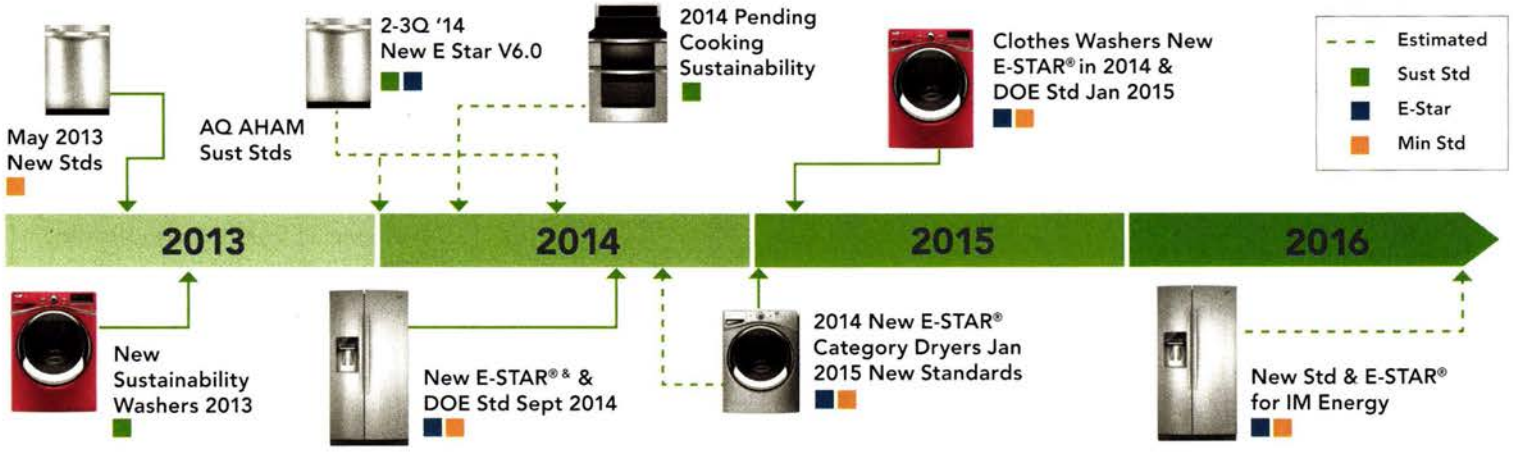


Updates to federal standards for refrigerators mean that in 2014 appliance manufacturers must effectively improve their models 20 to 30 percent over 2013 standards which are equal to or more efficient than 2013 ENERGY STAR® levels. To qualify for a 2014 ENERGY STAR® label, refrigerators will need to be 10 percent more efficient than the 2014 standards or 40 to 45 percent more than the 2013 federal standards.

AHAM Sustainability Standards

The Association of Home Appliance Manufacturers (AHAM) is an appliance industry trade association representing manufacturers of major, portable and floor care home appliances, and suppliers to the industry throughout the U.S. and Canada. Altogether, AHAM boasts a membership of over 150 companies located throughout the world. In addition, AHAM is also a standards development organization, accredited by the American National Standards Institute (ANSI). In that role, it has authored numerous appliance performance testing standards used by manufacturers, consumer organizations, and governmental bodies to rate and compare appliances.

In recent years, AHAM has embarked on a broad Product Sustainability Initiative with the overall goal to provide meaningful product sustainability information to consumers, their



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member companies, and other stakeholders. Their stated intention for this initiative is to drive innovation and continual improvement in the sustainability performance of home appliances by empowering consumers with information and knowledge. To date, they have produced first editions of two completely voluntary, consensus-based Sustainability Standards—one for refrigerators and one for clothes washers with others planned or in the works.

Refrigerators. The Sustainability Standard for Household Refrigeration Appliances was first published in June of 2012 and was produced as a joint effort between AHAM, Canadian Standards Association (operating as CSA Group), and Underwriters Laboratories (UL). Because of this tri-party development and publication, the standard is cited as AHAM 7001-2012/ CSA SPE-7001.12/ UL 7001. It recognizes that the environmental performance of refrigeration home appliances has commonly been evaluated on the single environmental attribute of electricity consumption during use. This standard was intentionally developed using life-cycle thinking with a broader, multi-attribute, and more holistic approach to assess the environmental impacts of refrigeration home appliances using life-cycle assessment (LCA) data along with other key factors. Eligible refrigeration products can be evaluated for their sustainability under this standard based on six attributes, each of which provides points that can be awarded through a combination of prerequisite and optional point items as follows (note that the first five attributes are required; item F, innovation, is a bonus attribute, and is therefore not required):

Technological advances in the design and manufacture of appliances have created a new generation of very energy- and water-efficient products.

A. Materials	25 points
B. Energy consumption during use	45 points
C. Manufacturing and operations	15 points
D. Product performance	5 points
E. End of life	10 points
F. Innovation (bonus attribute)	10 points
TOTAL points available	110 points

For refrigeration appliances to be considered as having some level of recognized environmental performance under this standard, such appliances shall:

A. Receive a minimum total of 60 points.

B. Meet ENERGY STAR® performance criteria within the attribute of "energy consumption during use."

C. Meet the requirements of the product performance attribute.

D. Show a balanced manner of reaching the 60-point level such that some points are attained in each of the five required attributes (i.e. items A through E above).

Full details of all aspects of the definitions, prerequisites, requirements, and testing of household refrigeration appliances are included in the full publication of the standard.

Clothes washers. The Sustainability Standard for Household Clothes Washing Appliances was developed in a manner similar to the refrigeration standard development. It was also a joint effort of AHAM, CSA, and UL and is referred to as AHAM-7003-2013/ CSA SPE-7003/ UL 7003. First published in May of 2013, it also recognizes that there is more to a sustainable clothes washing appliance than just water use and energy consumption. Eligible products can be evaluated for their sustainability under this standard based on six attributes, each of which provides points that can be awarded through a combination of prerequisite and optional point items as follows (note that the first five attributes are required; item F, innovation, is a bonus attribute, and is therefore not required):

A. Materials	20 points
B. Energy and water consumption during use	45 points
C. Manufacturing and operations	20 points
D. Consumables	5 points
E. End of life	10 points
F. Innovation (bonus attribute)	10 points
TOTAL points available	110 points

For clothes washing appliances to be considered as having some level of recognized environmental performance under this standard, such appliances shall:

A. Receive a minimum total of 60 points.

B. Meet ENERGY STAR® performance criteria within the attribute of "energy and water consumption during use."

C. Meet the requirements of the product performance prerequisite.

D. Show a balanced manner of reaching the 60-point level such that some points are attained in each of the five required attributes (i.e. items A through E above).

E. Under the Materials attribute, meet the prerequisite and receive at least 1 point in certain evaluation subsections.

F. Under the Manufacturing and operations attribute, meet the prerequisite and receive at least 1 point in certain evaluation subsections.

G. Under the End of life attribute, meet the prerequisite and receive at least 1 point in certain evaluation subsections.

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LED panel lighting takes advantage of the latest energy-efficient technology while producing very high-quality light for commercial spaces.

LED Lighting for Commercial Ceilings

New panel products and technology provide high-quality, efficient light

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

Providing commercial buildings with good-quality interior lighting has become as much a science as an art. The need for greater energy efficiency mandated by codes, standards, and professional best practices has spurred improvements to existing lighting technologies and given rise to entirely new ones. Fluorescent light fixtures, for example, have been a long-standing staple for commercial lighting and have undergone many improvements in their lamps, ballasts, and fixture design, resulting in more light output from less energy. Meanwhile, new technologies using electronic light-emitting diodes (LEDs) have emerged, been developed, and brought to market in a variety of ways. Among the newest available technologies are luminous LED panels that provide even greater efficiency along with other attributes that make them worthy for consideration in all commercial building designs. These LED panel fixtures can meet and/or exceed energy conservation requirements while also addressing the quality of the luminous environment appropriate to the design intent of the building.

LIGHTING PERFORMANCE OVERVIEW

In order to put the energy and light-emitting performance of these different lighting technologies into perspective, let's start with a review of some fundamental lighting principles. Since we are talking about electrical energy that powers all of these lights, the energy that is consumed is measured in watts, or more commonly kilowatts (1,000 watts). The electrical utility company charges not just for the wattage but also for the time that energy is being consumed and hence the common billing unit of kilowatt-hours (kWh). Based on this, it should be clear that electrical energy consumed for lighting is a function of both the amount of watts that each light fixture requires to operate and the time that the lights are on. In other words, the total kWh needed for lighting a commercial building on any given day is equal to the electrical power (kilowatts) consumed by the light fixtures multiplied by the time (hours) those fixtures are turned on.

The time portion of this equation is obviously governed by a whole series of variables. The building location, usage, daylighting options, management policies, and most notably, human input all can work to positively optimize or negatively maximize the amount of time that the lights are on. Energy codes address this variable by calling for automatic means to turn off lights when spaces are not occupied or when the building is closed, with security and safety lighting given due consideration. The ability to turn off or

Electricity use for lighting is a function of both power consumed (kilowatts) and time (hours) that the lights are on.

dim down electrical lighting systems when not needed is recognized as a key contributor to minimizing environmental impact. While lighting controls are an important topic due to the impact they can have on overall energy use, we will focus here primarily on the energy needed (watts) for commercial lighting and leave controls for another article.

Most commercial lighting fixtures have several parts, all of which contribute to the ultimate total energy consumption discussed as follows:

Lamp or Light Source

The primary power consumption in commercial light fixtures is the light source commonly referred to as a bulb or lamp. There are four common types of lamps used in commercial buildings, namely incandescent/halogen lamps, fluorescent lamps, HID lamps, and LED lamps.

- Incandescent and halogen lamps: Dating back to the early 1900s, these lamps employ the oldest basic technology in use today for lighting. These lamps are sometimes used for highlighting or spot-lighting particular areas in commercial areas. Pressed glass aluminized reflector (PAR) lamps are an example of this type that can use either a tungsten incandescent filament or a tungsten halogen combination that creates a longer-lasting, brighter light. Hence, their respective abbreviated common names of incandescent or halogen lamp.
- Fluorescent lamps: Fluorescent lamps were first introduced in 1939 and have gained great popularity in commercial buildings ever since. They create light when an electric arc passes through inert gas and mercury contained in a glass tube that is coated with phosphor on the inside. The tubes are available in a variety of shapes and sizes, including the common 4-foot and 8-foot linear lamps, U-shaped, and round. In contrast to these fluorescent lamps, compact fluorescent lamps (CFL) were introduced in the 1980s in a form that offered a new range of compact shapes with dictated socketing or screws—in bases like a traditional incandescent bulb.
- High-intensity discharge (HID) lamps: Originally referred to as mercury lamps in the 1930s, they were trumped in the 1960s by metal halide and high-pressure sodium (HPS) technology. In each case, the glass enclosure is under pressure with an electric arc used to create a very bright point source of light that can, with the help of a reflector, project a far distance, making them well suited for high ceilings. This process of producing light requires some time to both start up and cool down, however.
- Light-emitting diodes (LEDs): Unlike all of the other lamps described, an LED uses a solid-state semiconductor to convert electrons (electrical energy) directly into photons (light). This means that an LED uses no heavy metals like mercury or lead, uses no gas, and needs no filament to operate. Because of its electronic nature, there are no moving parts that can fail and it does not require a fragile glass bulb. Colored LEDs became common in the 1960s and '70s and were used in electronic devices such as watches and calculators. By the 1990s they were being used in exit signs and traffic lights as clear LEDs became available and their brightness increased. Currently LEDs are available in a full range of colors and can be clustered together in bulbs or fixtures to create a complete light source.

In addition to the differences in the development and physical characteristics of each of these lamps, there is also a notable difference in the amount of energy that each one requires to produce equivalent amounts of light. The unit of measurement that describes the quantity of light emitted from a source of light is called a lumen. Different lamps are usually compared based on the amount of lumens of light that they produce for each watt of electricity they consume. This measure of lumens per watt (lm/W) is the lamp's "efficacy" (sometimes incorrectly called efficiency) and is similar to a "miles per gallon" rating for cars. The higher the rating, the more output that is achieved (e.g. light or miles) compared to the energy put in (e.g. electricity or gasoline). It should be noted that just as an older car may get worse gas mileage, the lumen output of most lamps drops off over time by as much as 20 to 30 percent for incandescent and fluorescent lamps.

Looking at the four categories of lamps, incandescent and halogen receive the lowest efficacy, meaning they need a lot of energy to produce their light output. This is in part due to the fact that up to 90 percent of the electricity gets turned into heat rather than light. Fluorescent lamps are notably cooler and perform much better, particularly with advances made in the past decade such that a common 40-watt linear tube now usually only requires 28 or 32 lamp watts to produce the same lumen output. HID lamps typically produce a great deal of light, so their lm/W rating is usually favorable, but they aren't always appropriate choices in many locations due to poor color rendering and lack of beam control without a reflector. LED lamps are known for their low energy needs, good color rendering, precise beam control, being cool to the touch, and most importantly, their efficacy is commonly superior to the other lamp types.

One other characteristic of different lamp types is their average rated life. Manufacturers will test representative lamps and determine how many hours they will continue to work until they "burn out" or no longer provide light. The average is computed based on this testing and the manufacturers can indicate a rating of their average life expectancy. Incandescent and halogen lamps are often rated for approximately 1,000 to 2,500 hours. Fluorescent and HID lamps are rated from 6,000 to 24,000 hours, meaning in an average commercial facility with the lights on 10 hours a day, they could last anywhere from 2 to 6 years before needing to be replaced, assuming that their light quality and efficacy remain high. However, modern fluorescent lamps, such as T5, T8, and T12 versions, all have significant lumen depreciation over time.

LEDs clearly lead the way in terms of average rated life. They are rated between 50,000 and 100,000 hours, meaning that they could easily operate effectively between 12 to 27 years.

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Learning Objectives

After reading this article, you should be able to:

1. Identify and recognize the characteristics associated with high-performance lighting particularly LED lighting fixtures for commercial spaces.
2. Investigate the conditions that contribute or detract from lighting quality.
3. Assess the functional attributes of LED lighting fixtures and their suitability for use in commercial applications.
4. Specify LED light fixtures that are energy efficient and provide the quality of light required for particular design intents.

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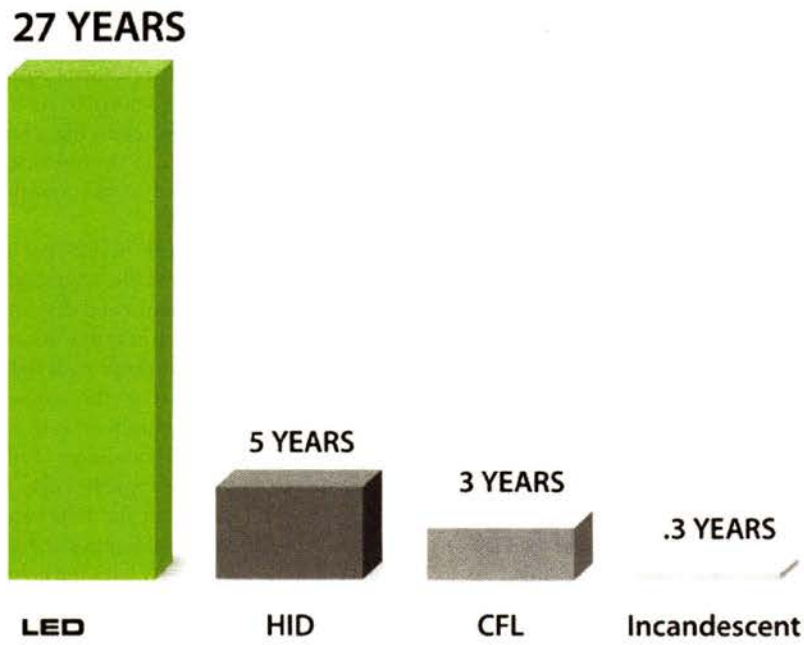

A comparison of the rated lifespan of different lamp types based on 10-hour-per-day operation.

This rating is based not on the LED lamps "burning out" but rather losing light output to the point that it is perceptible to people. L70 is an industry standard to express the useful lifespan of an LED. It indicates the number of hours before light output drops to 70 percent of initial output. Hence their long average rated life is based on the average number of hours (years) that it will take to reach this 70 percent light reduction. With that type of longevity and lumen maintenance, there is no need to store spare lamps or to replace them, thus freeing up maintenance budgets and storage costs.

Lamp Ballasts and Drivers

Since fluorescent and HID lamps require a controlled arc of electricity to create light, a ballast is used to control and limit the flow of electricity during start up and operation. Without them, large amounts of electricity would flow in to create the arc in an unrestricted way.

There are two types of ballasts that are commonly used. Electromagnetic ballasts were the original type used when fluorescent lights were first made available. These ballasts are essentially an electrical transformer with a steel core that is wrapped with wire and placed in a metal housing. These components work together to choke or limit the amount of current that goes into the lamp. In the process, they also produce unwanted heat and noise so they are commonly wrapped in asphalt to conduct the heat away, reduce noise, and help improve longevity.

The second and more common type used today is an electronic ballast. In this case, solid-state circuitry is relied upon to dampen and control the flow of electricity to the lamp. Electronic ballasts allow the electrical current to flow at a much higher frequency (20,000 Hz for electronic vs. 120 Hz for magnetic ballasts), reducing any audible noise while also operating at cooler temperatures. Although they are commonly more expensive than electromagnetic ballasts, they are more efficient and more flexible such that the overall benefits are worth the small additional cost. In fact, it is safe to say that almost all new light fixtures are produced with electronic ballasts except for some that need a heavy-duty or temperature-tolerant ballast based on their location.

Ballasts can allow fluorescent lights to be dimmed, although the percent of dimming will depend on the type of ballast. Electronic ballasts can readily dim lamps down to 10 percent, 5 percent, and even 1 percent of full light output while electromagnetic ballasts generally are limited to 50 percent dimming. As the fluorescent lamps are dimmed down, they use less energy, making them particularly useful in situations where daylighting is designed into a space and photo-sensors trigger the dimming process.

From an energy standpoint, not all ballasts are created equal. Since they are located in the flow of electricity, they use and consume some energy in the process of conditioning it. Electronic ballasts are more efficient and consume less energy than the electromagnetic type, causing energy codes to favor them as a result. Recognizing this consumption, ballasts are tested and rated to determine the ballast factor (BF), which is simply the percentage of a lamp's rated lumen output that can be expected when it is operated on a specific ballast. So, for example, a ballast with a BF rating of 0.90 results in the lamp emitting 90 percent of its rated lumen output. Since the ballast is part of the overall lighting system with component parts that work together, this light reduction obviously plays into the overall lighting of the room or space in the building.

LED lighting does not require ballasts—relying instead on an electronic driver to condition and control the electricity. The driver uses a negligible amount of electricity to operate, making it much more efficient than ballasts. Drivers are rated for overall power factor similar to rating ballasts; however since drivers use so little energy, their power factors are commonly over 99 percent. LED lights are also dimmable, using dimmable drivers which allow the amount of light and energy to be reduced electronically.

Luminaires

A completely packaged light fixture including lamps, holders, internal controls, reflectors, housings, ballasts and/or drivers is referred to as a luminaire. In essence, it is a manufactured electrical device to produce, control, and distribute light. The design and physical attributes of the luminaire are the final influencing factor on the total light that is emitted. The efficacy of light sources, the ballast factor, and the efficiency of the luminaire design all combine to determine the luminaire efficacy rating (LER) for fluorescent fixtures or the ultimate lm/W (lumens per watt) for LED lighting fixtures. LER is different from, and advantageous to, traditional lamp efficacy measurements because it takes into account all components of the luminaire system: luminaire efficiency, ballast factor, and input wattage.

The National Electrical Manufacturers Association (NEMA) has taken on the task of defining the tests and standards for determining the LER for fluorescent lighting fixtures in *NEMA Standards Publication LE5-2001: Procedure for Determining Luminaire Efficacy Ratings for Fluorescent Luminaires.* In this publication, they identify categories of lamps, ballasts, and fixtures that can be combined to create different luminaires. The procedures for testing and reporting are detailed so that equal comparisons can be made between different luminaires. They point out that LER values are published based on manufacturers' literature and are based on a specific lamp used in conjunction with a specific ballast in a particular luminaire. Since there are many variables between ballast and lamp performance, use of the LER data to compare different luminaire products requires attention to any differences in ballasts and lamps used in the tests. In this way, the focus of the comparison can be on the differences

in fixture design and the optical properties that enhance or restrict light from leaving the fixture. The goal is obviously to get the most light out of the fixture for the least amount of watts. Hence a higher rather than a lower LER value is desired for fluorescent luminaires since it reflects the total lumens output compared to the watts input.

LED luminaires for commercial space applications are currently available that compare very favorably to fluorescent luminaires since they can provide equivalent light output using about half of the energy. The U.S. Department of Energy's Solid State 2011 index lists LED luminaires performing in the impressive range of 40-50 lm/W. The tests for this determination are more straightforward since there are fewer components to address. Hence, it is based on a straight lumens output compared to the total watts input for the lamps and driver.

Lighting Power Density

Energy codes, standards, and green building rating systems have taken all of this lighting efficiency information and applied it to buildings on a square footage basis. The common term of lighting power density (LPD) is a measure of the number of watts required per square foot of lighted area. Depending on the type of use in a building, the codes set a maximum number of watts that are allowed per square foot to be compliant. So, for example, low light areas such as parking garages and warehouses are allowed 0.3 and 0.8 watts per square foot respectively. Spaces that need higher light levels such as theaters and libraries can go to 1.6 and 1.3 watts per square foot respectively. In between is where many other commercial spaces fall such as offices, exercise centers, hotels, etc. which are allowed 1.0 watts per square foot. So for a typical office building, a 1,000-square-foot office area is allowed to consume 1,000 total watts for lighting.

Showing compliance with the LPD includes accounting for the energy used in the entire luminaire. Hence the LER or lm/W need to be shown based on published data for the lighting fixtures being used or specified. That means the ballast factor and luminaire design is accounted for in the LPD. So a 2 x 4 lay-in fluorescent luminaire with two lamps and a ballast may require 72 watts to power two 34-watt lamps and an electronic ballast. That will limit the total number of fixtures in a 1,000-square-foot office area to about 13 luminaires. Since LED lighting fixtures have inherently lower energy consumption as compared to an installed fluorescent lighting fixture, a comparable 2 x 4 lay-in LED luminaire could require as little as 44 watts to operate in total. That means as many as 22 LED luminaires are allowable in the same 1,000-square-foot office area. If that many aren't required, then the energy reduction increases by using fewer fixtures, reducing the actual LPD and saving the owner money on electrical lighting costs.

Color rendering index (CRI): The CRI is a number between 1 and 100 used to describe the ability of a lamp to accurately render within the lighted space all the colors in the visible spectrum. For example, a CRI of 80 or above normally indicates that the lamp or luminaire has good color properties such that it would not significantly distort or diminish the true color of an object being illuminated. A low CRI rating would tend to distort the color of illuminated objects, making them appear too yellow or blue for example.

Light color can be a rather subjective thing to discern between different people, but standardized measurements and tests help determine generally accepted light quality characteristics.

Color temperature: The color temperature of a light source is a determination of its color appearance. Color temperature is used to describe the overall color tone of a white light source such as warm in appearance or cool in appearance.

Correlated color temperature (CCT): The CCT numerically describes the overall color appearance of a lamp measured in degrees K or Kelvins. Common warmer light sources, similar to incandescent color, have a Kelvin temperature in the range of 2,700K to 3,000K. Somewhat cooler or neutral light sources commonly used in offices can range between 3,500K and 4,100K. Very cool color temperatures, often used to match daylight, are between 5,000K and 6,500K.

LIGHT QUALITY CONSIDERATIONS

Energy savings are great particularly when determining the quantity of light needed, but what about the quality of the light desired for a building? Good lighting design begins with the development of a thoughtful statement of design intent for the various spaces within a commercial building project. This design intent obviously needs to be coordinated with everyone on the project team such as architects, interior designers, lighting designers, engineers, etc.

Establishing light levels and lighting quality to match the design intent should be based on professional consensus standards such as ANSI standards and recommendations published by the Illuminating Engineering Society of North America (IES). Most of these standards have been developed in the context of meeting or exceeding current energy code requirements such as the International Energy Conservation Code (IECC) or ASHRAE/IES 90.1. These standards are based on the premise that more light is not necessarily better light; rather it is all about the characteristics of that light. Is the light focused or dispersed? Is it used to create contrasts or uniformity? Are there a mix of lighting needs within a space such as ambient lighting and task lighting that need to be addressed? What effects related to the color of the light are desired?

Color in particular is an important and controllable aspect of electrical lighting. Although perceptions of color can vary between different people, the IES describes several key metrics that are used to define color traits when applied to lighting. These include a color rendering index (CRI), color temperature, and the correlated color temperature.

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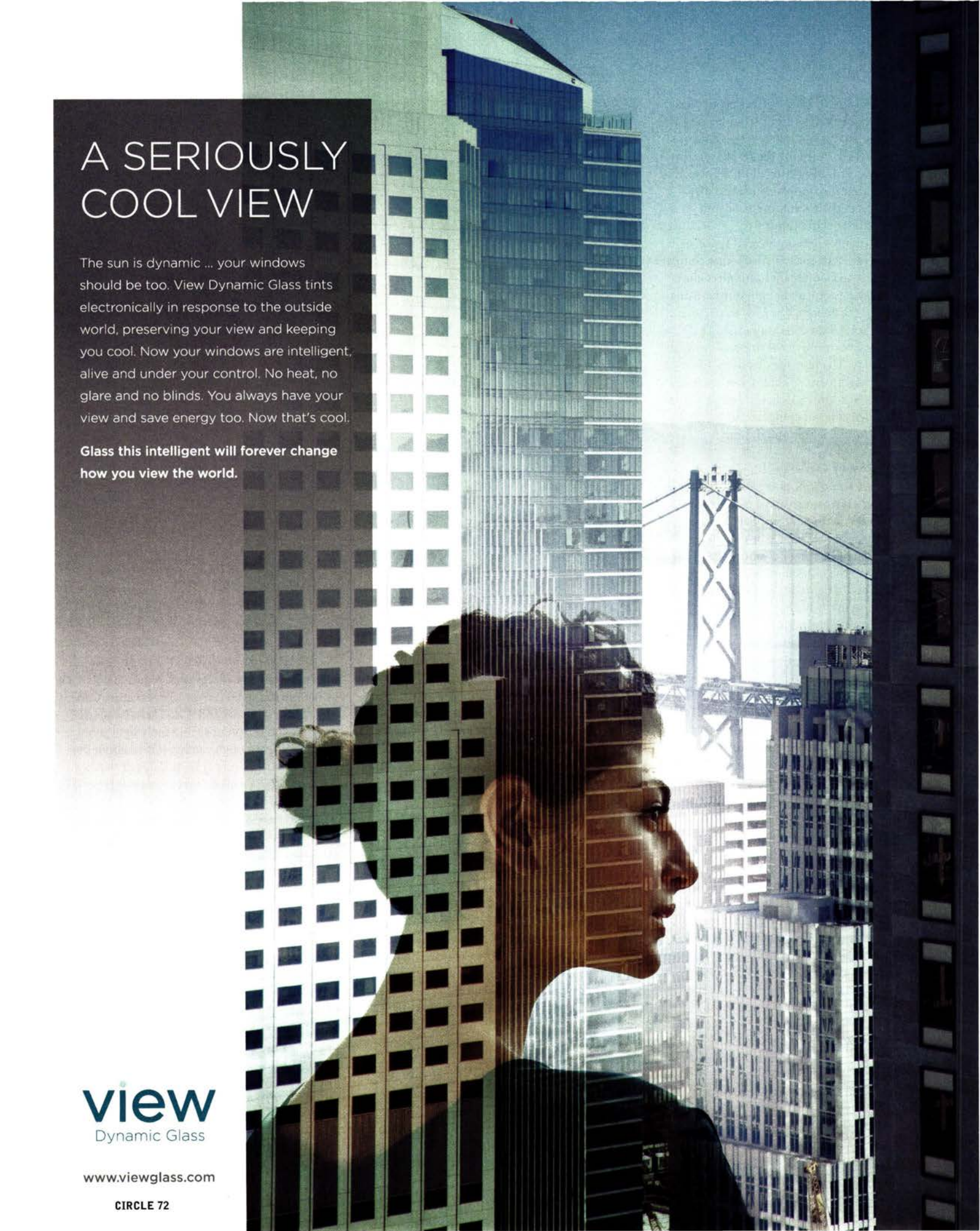

A SERIOUSLY COOL VIEW

The sun is dynamic ... your windows should be too. View Dynamic Glass tints electronically in response to the outside world, preserving your view and keeping you cool. Now your windows are intelligent, alive and under your control. No heat, no glare and no blinds. You always have your view and save energy too. Now that's cool.

Glass this intelligent will forever change how you view the world.

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CIRCLE 72

Photo courtesy of View Inc.

Dynamic glass switches between clear and tinted states on demand, providing glare and heat control while offering unobstructed views.

The Move to Dynamic Glass

Architects, building owners, and occupants are embracing next-generation windows for improved sustainability

Sponsored by View Inc.

It's no secret that architects love glass. The material is dramatic, sustainable, and bridges the interior of a building to its environment. Dynamic glass, which tints electronically in response to outside conditions, is proving itself superior to static glass. With the intelligence to provide optimum natural light and comfort regardless of exterior conditions or time of year, dynamic glass has far-reaching implications for building design, ongoing building performance, and occupant experience.

This is an important consideration in light of the fact that windows are commonly regarded as one of the least energy-efficient building components, responsible for up to 40 percent of the total heating, cooling, and lighting consumption. By making fenestration a responsive façade solution for solar control, dynamic glass has become a key component of high-performing buildings. This article will describe how dynamic glass behaves, its benefits for architects, building managers and users, and present studies and real-world examples of its use. Also covered will be how the technology is being increasingly referenced in energy codes and sustainability rating systems such as the U.S. Green Building Council's Leadership in Environmental and Energy Design (LEED) Version 4.

DYNAMIC GLASS—WHAT IS IT?

Dynamic glass switches between clear and tinted states on demand, providing glare and heat control while offering continuously unobstructed views. The system can function autonomously or be controlled on demand, enabling a user to tint or clear the glass according to preference. In automated mode, the system will automatically tint or clear the glass, adapting to environmental conditions.

Advanced dynamic glass can deliver separate tint levels, corresponding to less than 4, 20, and more than 60 percent visible light transmittance (Tvis) with other tint levels available as required. In its fully tinted state, building occupants can block out heat and manage glare while still seeing through the glass for an unobstructed view of the outside world.

The technology allows for control of individual windows or coordinated groups of

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Learning Objectives

After reading this article, you should be able to:

1. Discuss the benefits of dynamic glass as they relate to occupant performance and sustainability.
2. Explain the salutary effect of views and daylighting on building occupants.
3. Discuss peak cooling load reduction and annual energy savings as they relate to dynamic glass.
4. Describe the stance of prevailing energy codes and LEED Version 4 towards dynamic glass.

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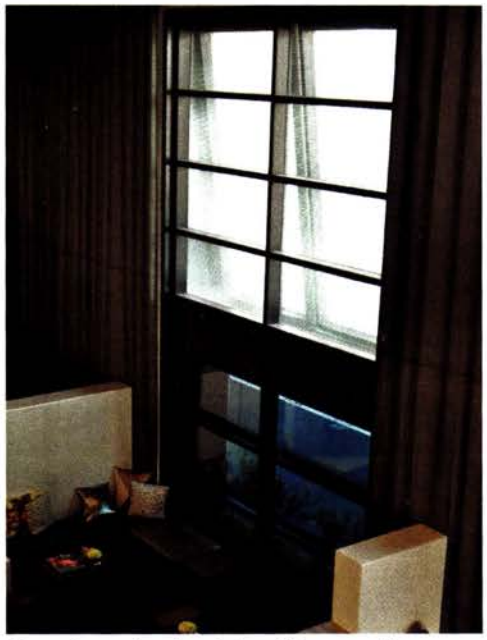
windows. With a grouping capability, zones can be created to tailor the behavior of the glass for spaces with different uses or even within a single façade for optimal daylighting. For example, in a curtain wall design, the top course of vision glass could be set to 20 percent Tvis, admitting light for daylighting purposes, while the remaining eye-level glass can be set for a darker tint to decrease glare.

With this zoning capability, dynamic glass control can be integrated into building management systems, or be controlled from a tablet or smart phone.

Technologies

Not all dynamic glass functions the same way. Examples of technologies that enable smart windows include electrochromic (EC), thermochromic, photochromic, liquid crystal (LC) and suspended particle devices (SPD). Thermochromic and photochromic technologies change their properties based on ambient temperature and ambient light levels respectively. They are commonly termed "passive" dynamic technologies. EC, LC and SPD technologies have the advantage of active electronic control of glass performance, enabling truly intelligent controls that can be integrated with occupant schedules, lighting levels, or algorithms to increase building energy efficiency. Both LC and SPD require continuous high-voltage AC power to operate, and their failure mode is to a dark state. EC technology has the advantage of using low voltage, has very low energy consumption, and has a power off mode that is neutral or clear.



Since dynamic glass is intelligent and can change, it can adjust to the outside world, to provide optimum natural light and comfort, no matter what the conditions or time of year.

Photos courtesy of View Inc.

For EC glass, multiple thin layers of metal oxide form the electrochromic component on the inside of the glass. In the absence of a voltage, the metal oxide film is completely transparent. With the application of a 5-volt electrical charge, the ions in EC glass move between layers, changing its properties and tinting the glass. The darker the tint, the more solar radiation and glare are rejected, resulting in temperature and energy control. The coating itself has the low emissivity benefits similar to traditional low-e glass, enhancing the thermal performance when combined into a dual pane insulting glass unit. The application of EC technology to windows can substantially reduce the energy consumption of buildings by reducing cooling and heating loads as well as the demand for electric lighting. Among the aforementioned smart window technologies, EC is the only one to have passed the ASTM standard for accelerated environmental durability, which designates a 50-year service life.

Intelligence

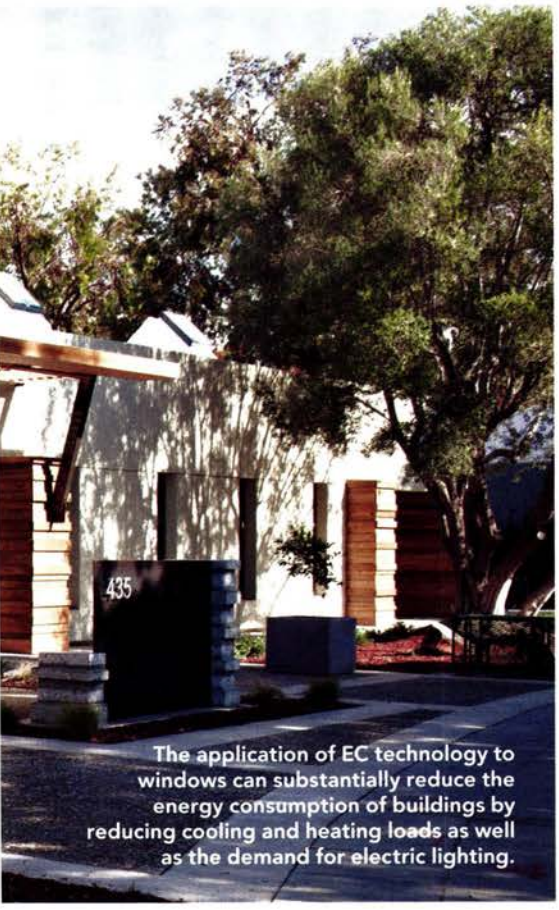
While the glass provides the tint, the system makes it intelligent. Predictive intelligence foresees the sun's movement and automatically adjusts each window's tint to anticipate the sun's solar load. The same intelligence then adjusts the tint level according to location, space type, weather, and user preference. Each window has local intelligence and knows its unique position, orientation, and condition. As a result, the intelligence function seamlessly manages direct glare on occupants while maintaining the architect's intended views. As inputs to the intelligence function, several project parameters are required, including the following:

- Building location and orientation sunpath
- Exterior building characteristics
- Interior space design
- Maximum heat load allowed
- Sensors

In practical terms, the dynamic glass manufacturer collects the required project parameters from blueprints and site visits, building up a database for each project. A building's longitude and latitude will be noted as will sun location coordinates and sun radiation year-round. Zoning will be taken into account as well as window measurements, interior measurements, and the building's maximum heat loads and sensor inputs.

Intelligence computes in the following three ways:

Glare control. Intelligence calculates the angle of the sun and determines if there is glare on occupants, and tints the window down if necessary.



The application of EC technology to windows can substantially reduce the energy consumption of buildings by reducing cooling and heating loads as well as the demand for electric lighting.

Architects can specify large glass units active edge-to-edge without internal conductors that interrupt the view.

Heat load control. The heat load of the space is managed to be lower than peak solar heat gain design load and associated HVAC design, and daylight is maximized. Based on maximum radiation for a particular façade for a specific time and day, intelligence will determine the necessary tint state to keep heat gain below peak/maximum. As shown in the accompanying figure (see the online version of this course), Max Inside Radiation = Max sun radiation * SHGC of glass. Intelligence tints glass down as needed to keep heat generated by the sun in the room below the design maximum. With this control, the building's peak load will be reduced compared to a baseline design using static glass. The dynamic glass design therefore requires a smaller building HVAC system.

Daylight control. Based on actual environmental conditions, the intelligence function adjusts the tint level to achieve maximum amount of daylight. The inside radiation equals the outside radiation * SHGC of glass. Based on actual environmental conditions, the tint level will be adjusted to achieve the maximum amount of daylight.

System Architecture

A focus on simplification and performance has driven a major rethinking of the dynamic glass electronic system architecture. In many cases, traditional complex wiring approaches have been replaced by a single line or cable, similar to a LAN network, to facilitate routing and reduce install complexity. Factory pre-terminated wiring with threaded connectors cuts labor time and adds to long-term reliability. Window control has been moved to intelligent nodes close to the window to optimize tint uniformity and allow maximum zone control flexibility, user control, and ease of future reconfiguration. Intelligence at each point, from the insulated glass unit (IGU) back to the user interface, facilitates maximum user flexibility and central or individual control.

Energy Benefits

Dynamic glass contributes to thermal management of a building in two major ways:

Peak cooling load reduction. Dynamic glass can tint during peak cooling demand periods, thereby blocking more than 90 percent of solar radiation and resulting in a reduction of peak cooling required. This results in reduced HVAC equipment sizing as well as system simplicity when compared to traditional glazing solutions.

Annual energy savings. Due to its interactive nature, dynamic glass reduces overall HVAC energy consumption and costs by limiting unwanted heat gain in summer but allowing beneficial passive heat gain in winter. Intermediate states convey additional benefits by saving lighting energy, thus allowing for optimal daylighting.

These statements are based on whole-building energy simulations developed to compare the energy use of current low-E glazing and high-performance dynamic glass. A typical 20-story high-rise office building with high performance low-E glass was modeled against a building with dynamic glass. The analysis was conducted across five U.S. cities in different ASHRAE climate zones. The window-to-wall ratio modeled was 50 percent, which is typical for high-rise buildings. With all other aspects held constant, the difference in energy performance was a direct result of the performance of the glass. Averaged across these typical climates, use of dynamic glass reduces lighting and HVAC electricity (space cooling, ventilation fans, pumps) consumption by 20 percent. The savings in lighting energy is attributed to the intermediate state features of dynamic glass and dimmable lighting.

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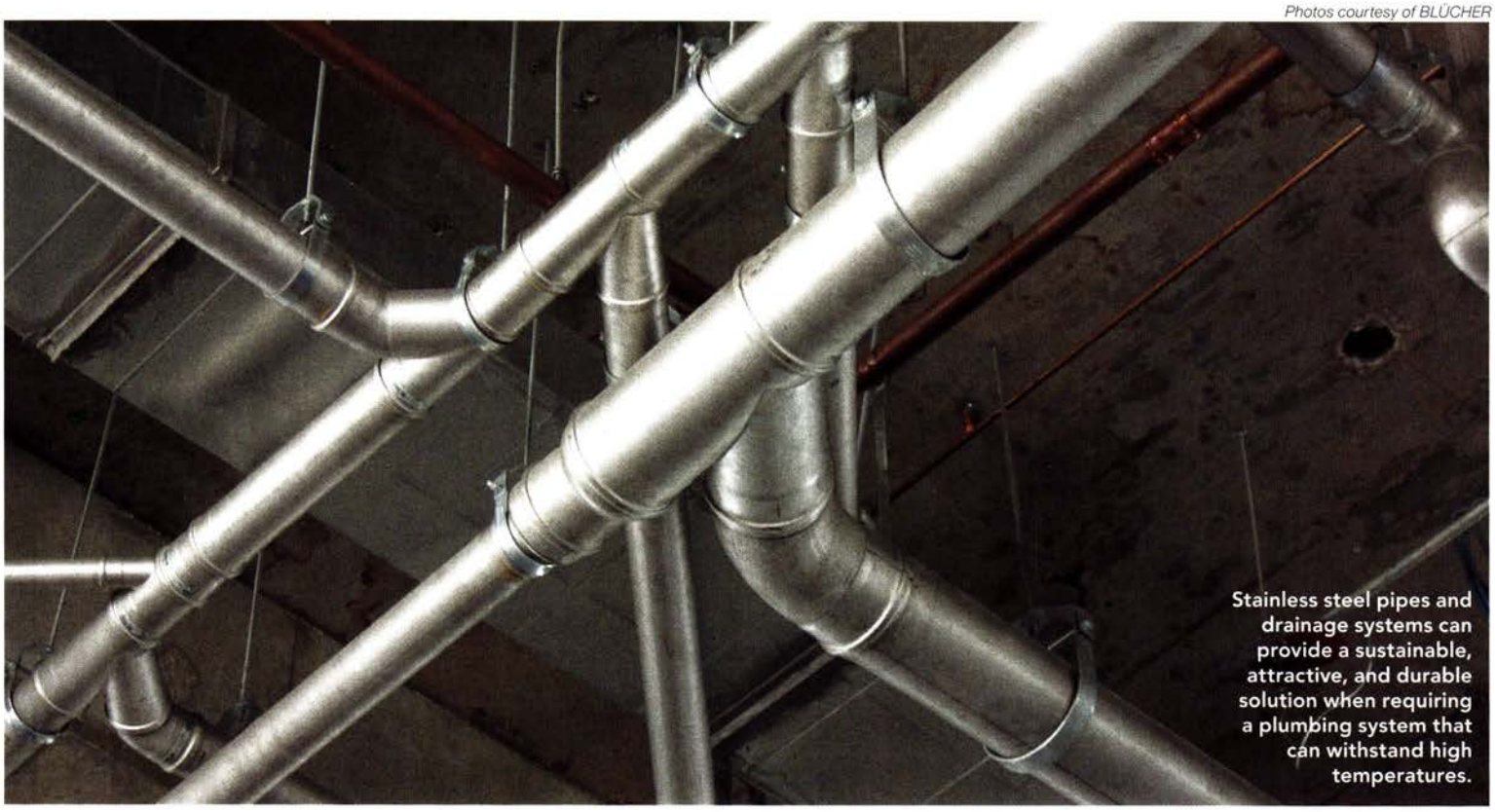
Photos courtesy of BLÜCHER



Stainless steel pipes and drainage systems can provide a sustainable, attractive, and durable solution when requiring a plumbing system that can withstand high temperatures.

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EARN ONE GBCI CE HOUR FOR LEED CREDENTIAL MAINTENANCE

Learning Objectives

After reading this article, you should be able to:

1. Compare the life-cycle benefits of stainless steel drains, channels, and piping with other types of materials as a durable solution for areas with caustic wastewater.
2. Evaluate transportation cost reductions by choosing sustainable stainless steel drainage systems that weigh only one-third the weight of alternative cast-iron systems.
3. Identify a variety of wastewater applications and the grades of steel that can be selected to improve longevity in high temperature drainage systems.
4. List the unique properties, including high-recycled content and recyclability, and simplified labor costs, of stainless steel for use in drainage systems to help meet green building ratings criteria.

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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Choosing Stainless Steel Drains for Caustic Environments

Stainless steel drainage systems provide greater longevity for sustainable wastewater solutions.

Sponsored by BLÜCHER | *By Celeste Allen Novak, AIA, LEED AP*

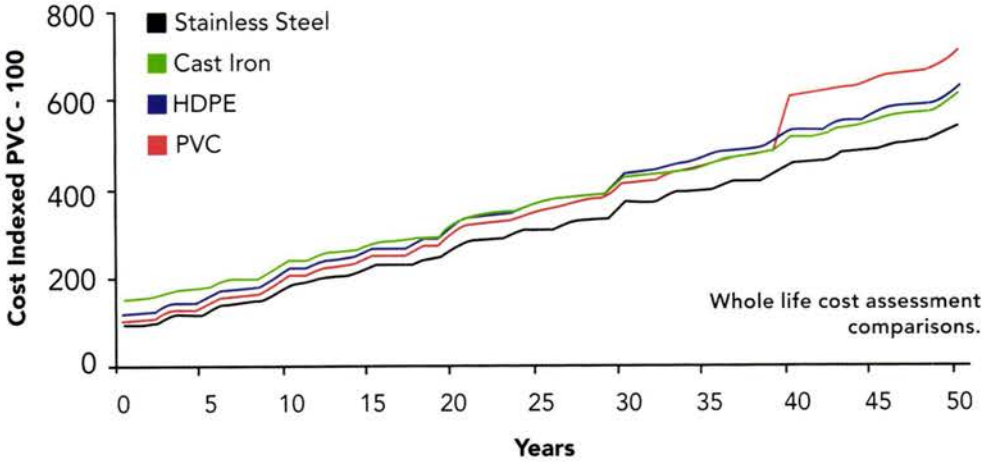
Sludge, grease, acids, high temperatures—a caustic waste stream is a challenging problem for any drainage system. The control of wastewater in buildings from airports to hospitals and commercial kitchens can lead to costly retrofits. Handling the harsh environment in drainage systems may be one of the last items on the specification list, but critical to the success of many projects.

Commercial codes for wastewater drainage require that these systems meet standards for both black and grey water. Industry standards for highly corrosive environments require the control of effluents that can be very hot and/or acidic. Higher concentrations of cleaning fluids, higher temperatures for manufacturing and cleaning are making the task of removing and treating waste a difficult proposition. In the past, engineers have chosen cast iron as the only solution to wastewater problems. Today, some engineers are choosing stainless steel drainage systems, instead of cast iron, because stainless provides higher performance values for meeting the requirements of caustic waste and it provides much greater longevity over the lifetime of a facility.

In addition, the advantage of stainless steel is that it is aesthetically pleasing. As more designers are opening up areas to view by the public in restaurants, hospital kitchens, and even manufacturing plants, drainage is becoming a design element. Sleek, stainless steel, ADA-compliant drains, fittings, and fixtures are also evident in multifamily housing, where the rate of investment requires durability.

To meet green building targets, engineers are selecting materials that have green properties. Stainless steel is one of these choices as most stainless steel contains approximately 60 percent recycled content. Because it is lightweight in comparison to cast iron, the selection of stainless steel reduces transportation costs and therefore carbon emissions.

Source: BLÜCHER



With all of these considerations, the advantages of stainless steel drainage systems make them the best choice for aesthetics, durability, and sustainability for any project. These systems outperform cast iron or other alternatives in almost every category. The choice of drainage system is often based first on the direct costs of the system. However, calculations show that when you include costs of installation, labor, and product-life expectancy, a stainless steel drainage system is more cost-effective in the end.

BENEFITS OF STAINLESS STEEL DRAINAGE SYSTEMS

Stainless steel drainage systems have functional and aesthetic benefits as well as provide superior safety and durability. Stainless steel drainage systems meet or exceed all of the required codes for effluent transport. Stainless steel is a 100 percent recyclable and non-toxic material and provides an impressively long product life, making it an environmentally friendly and maintenance friendly choice.

Functionally, stainless steel systems provide good flow characteristics which is important when considering a material that needs to transport fats and greases. Stainless steel has a unique smooth surface that guarantees excellent flow capacity. Stainless steel has a greater tolerance for the transportation of fat, which can quickly congeal and clog plumbing lines. The addition of an electric heat element to pipes allows for an even easier transport of grease through the pipelines. Due to smooth, hard, nonporous surfaces, bacterial growth is greatly reduced in stainless steel drainage systems. Using this material to transport kitchen wastes provides optimal performance for difficult projects.

Stainless steel channel drains are both an attractive and hygienic solution for hospital and hotel settings.

Stainless steel drainage systems are easy to install and require minimal maintenance. The low weight of the smaller steel products means that the weight of a drainage system can be reduced by more than 20 percent compared to cast iron. Push fit connections are also lighter in weight, reducing labor and installation expenses.

Stainless steel is resistant to corrosion, fire, chemical abrasions, deformation, and thermal stress. Stainless steel can withstand a high degree of vibration, and it functions within a wide scale of temperatures. Stainless steel is classified as a fire-resistant material and some alloys with chromium content of at least 18 percent can withstand temperatures over 800°C. The high temperature strength of stainless steel is referred to as "creep strength" or the ability to resist distortion or flaking over time.[1] This means that stainless steel provides greater assurance than cast iron piping, which collects rust flakes that can constrict flow over time.

Stainless steel has a greater life expectancy than cast iron in commercial and industrial settings. In comparison to cast iron, a typical stainless steel drainage system will not corrode when used with highly acidic environments. Stainless steel can meet the requirements of high temperatures whether from boilers, grease, or chemical waste.

Stainless steel is strong. Stainless steel offers a combination of low weight and high strength. The advantages of this property means that drainage lines can be hung from ceilings of commercial buildings with longer runs using fewer connections. Stainless steel alloys used in plumbing have ratings from 73,000 pounds per square inch tensile strength to 90,000 pounds per square inch tensile strength. Because this material is strong, it can be placed above or below ground. Even during installation, the advantage of using strong stainless steel drains and drain components is that they can be subjected to heavy construction equipment and vibrations. Stainless steel grates can be specified to provide strong surfaces during and after construction to support heavy equipment.

Easy to clean and constructed of non-toxic materials, stainless steel meets the strict hygiene and cleaning requirements for many settings, from restaurants to hospitals. Stainless steel drainage systems are the choice for buildings that are designed to last and for facilities that cannot be easily closed for the replacement and/or maintenance of a clogged cast iron drainpipe.

Besides prisons, other applications for stainless steel drainage systems include some of the most caustic drainage environments as well as the most visible. Obviously durable drains are required in industrial areas; however, equally difficult applications include commercial kitchens.

See endnote in the online version of this article.

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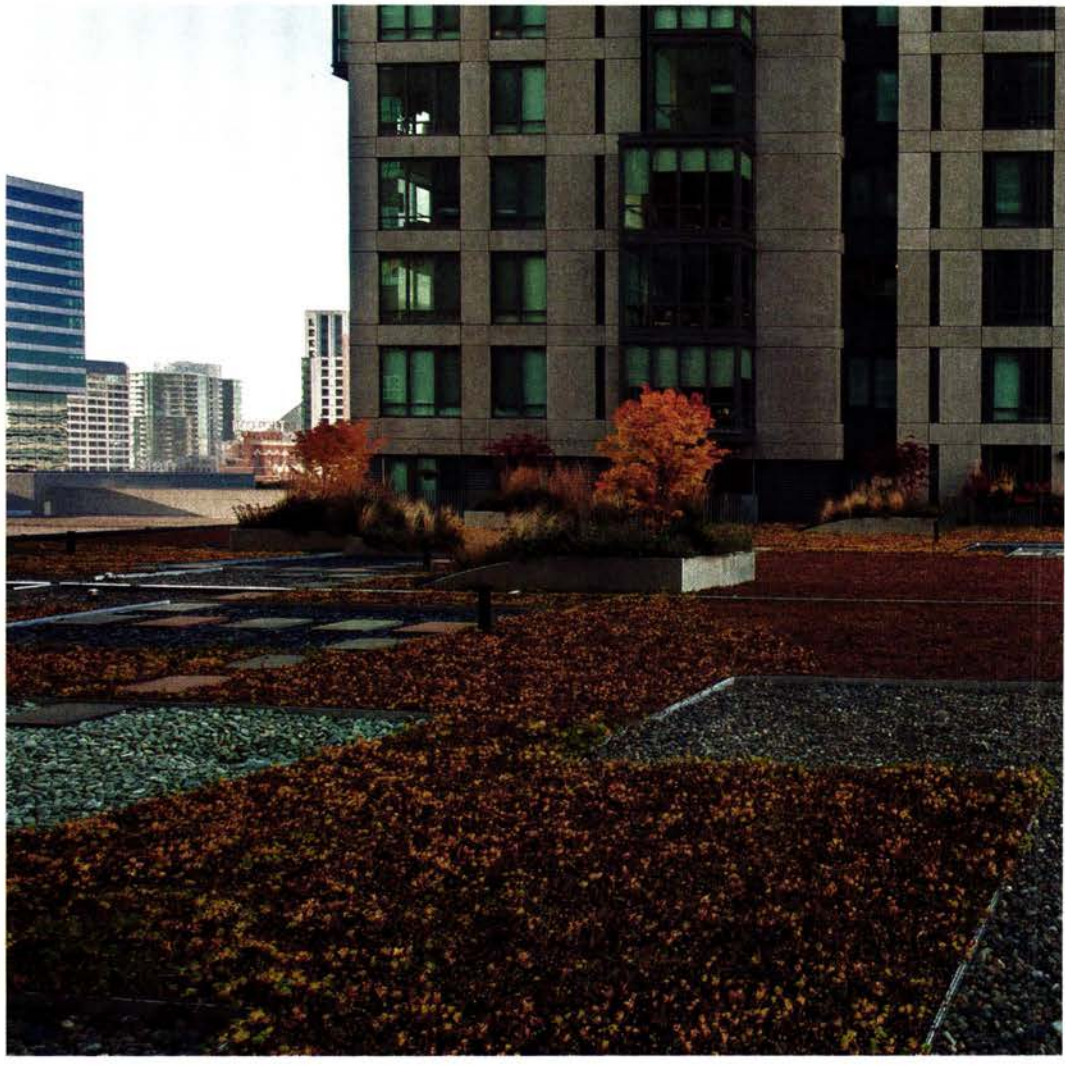
Architect Celeste Allen Novak, AIA, LEED AP, *is the author of "Designing Rainwater Harvesting Systems: Integrating Rainwater Into Building Systems" to be published by Wiley in April 2014.*

Building Green

Enhancing healthy living and green building construction through sustainable and renewable materials

Sponsored by Cavawood Architectural Products, Columbia Green Technologies, Eldorado Stone, and Tournesol Siteworks

By Elena M. Pascarella, PLA, ASLA



Green buildings are sustainable through a multifaceted approach that reduces environmental impacts and enhances healthy living. Green buildings use materials and components that are readily available, environmentally friendly, and that do not burden the environment by draining natural resources. Green buildings are energy efficient and minimize their carbon footprint by using locally available materials as much as possible.

Historically, buildings were constructed from locally and readily available materials. In the Southwest, the Anasazi sited their villages and built their homes into the local rock cliffs and oriented villages so that all of the dwellings received the benefit of naturally available solar heat. Early New England settlers used locally available stone and wood to construct dwellings and barns, and the local stone was used in the construction of the many stone walls that penned farm animals—walls that still crisscross the New England countryside.

The 20th century's green building movement arose out of the need for more energy-efficient buildings and a desire for more environmentally focused construction practices. Oil price increases in the 1970s spurred improvements in energy-efficient design and construction and the use of renewable material resources as well as renewable energy resources.

Green buildings use a number of approaches towards achieving sustainability including:

- Using sustainable and renewable resources and materials in their construction
- Using landscaping to reduce energy consumption and manage stormwater effectively
- Creating healthy living environments by minimizing the use of toxic materials and chemicals

The incorporation of sustainable materials into project construction requires knowledge of the product's building life-cycle impact (LEED MRc1), environmental impacts (LEED MRc2), raw material sources (LEED MRc3), material ingredients (LEED MRc4), and the manufacturing, fabrication, and shipping processes required to get that material to market. In addition, LEED v4 has changed the evaluation process for Materials and Resources criteria, requiring more rigorous technical standards for qualifying sustainable materials and resources by including:

- The entire life-cycle assessment of the material/resource
- A comprehensive Environmental Products Declaration (EPD) through full disclosure of impacts and ingredients for the material/resource
- Adherence to higher standards such as GreenScreen™, the European REACH (Registration, Evaluation, Authorization, and restriction of Chemicals) program, and others

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Learning Objectives

After reading this article, you should be able to:

1. Describe the benefits that may be obtained through the use of materials derived from renewable resources.
2. Identify renewable woods that can be used as alternatives to non-renewable South American Hardwoods, which are harvested from rainforests.
3. Discuss the benefits of green roof systems.
4. Identify the sustainable aspects of using manufactured stone veneers.

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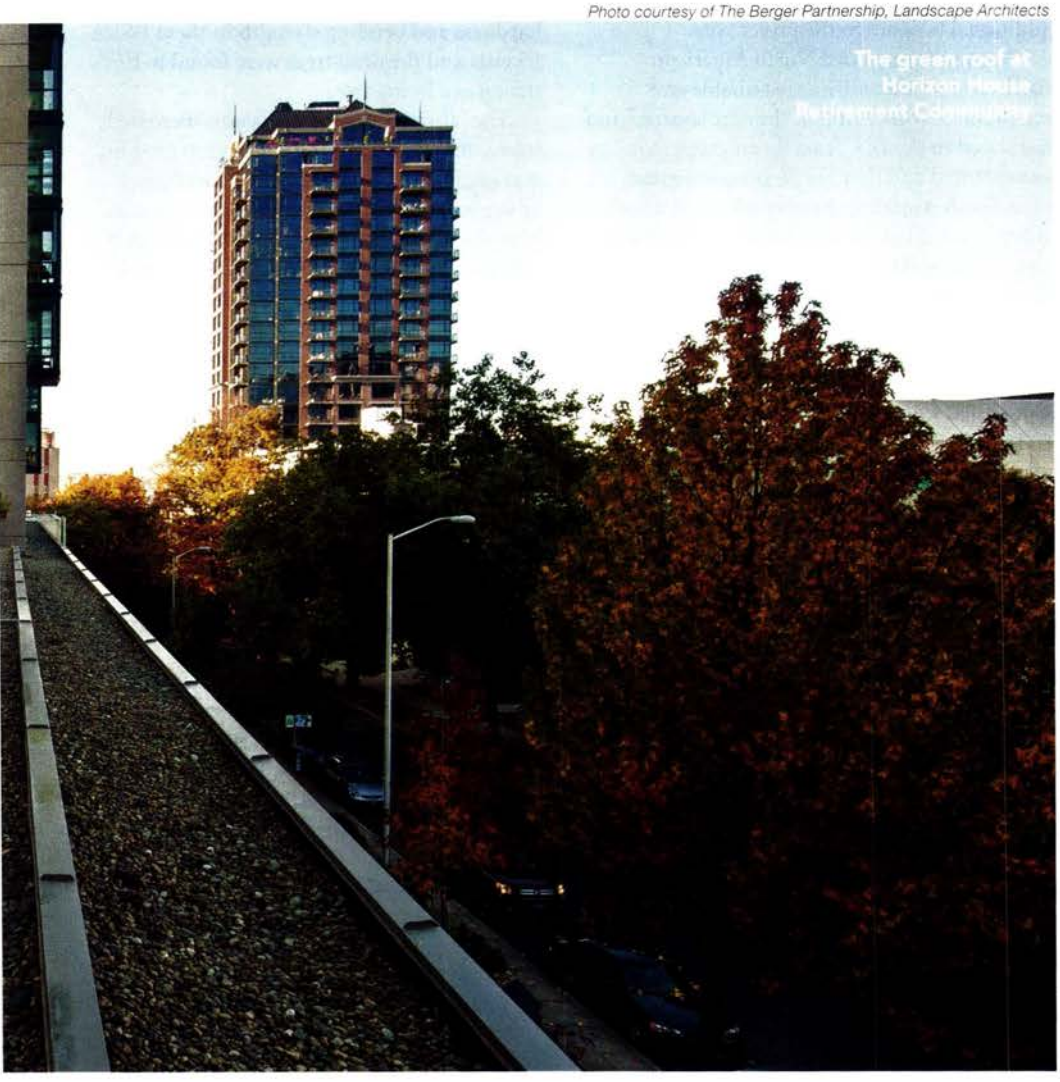
Photo courtesy of The Berger Partnership, Landscape Architects



The green roof at Horizon House Retirement Community

Thermally modified wood tiles, built onto adjustable paver pedestals

Photo courtesy of Tournesol Siteworks

SUSTAINABLE AND RENEWABLE RESOURCES AND MATERIALS

This article will provide examples of products that qualify as renewable materials/resources by green building and sustainable design criteria. Some of these products are obtained directly from renewable resources (forest products) while others are produced by processes that mimic non-renewable natural resources rather than deplete their supply. One product utilizes living renewable plant resources as part of its function to manage stormwater and provide energy-efficient roofing for buildings. Using any of these products on a project can assist in enhancing the healthy living environment and sustainability of the project.

Renewable Wood

Wood has been used for centuries as a construction material. It is considered a sustainable building material as it is harvested from a renewable source (forest land) and has a "low embodied energy"[1] due to the following factors:

- There is minimal non-renewable energy used in the harvesting and production of timber and in its construction use.
- Due to its natural thermal properties, structures built of wood rely less on carbon-emitting appliances for heating and cooling.
- Many wood products (especially hardwoods) have a service life of 50 or more years and require minimal maintenance.
- Wood can be readily recycled, thus providing a low carbon footprint.

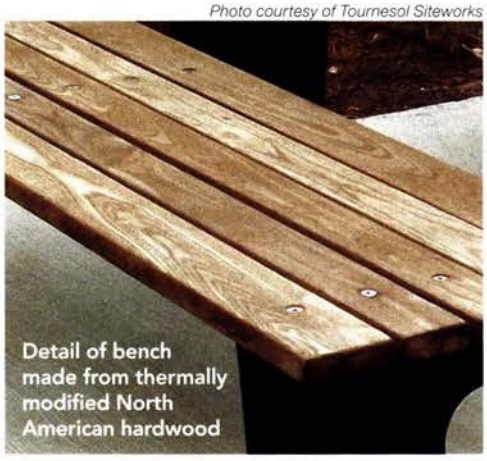
Forests play a key role in natural water-carbon-nitrogen cycles. For years, many wood products were treated with chemical preservatives to increase their durability and provide added protection from rot and insects. Most of these chemical preservatives later proved to be toxic to both human health and the environment and their use was discontinued. In an effort to provide wood products with increased durability and longevity, timber companies began to harvest South American and Latin American hardwoods such as Ipe, Cocobolo, Bocote, and Parota. The harvesting of these woods has begun to deplete stands of tropical rainforests. Although many of the South American woods are certified through the Forest Stewardship Council (FSC) and are thus considered responsibly harvested, other woods are harvested illegally or do not meet FSC criteria and certification.

Thermally Modified Hardwoods

Thermally modified North American hardwoods are used as exterior tiles for roof decking, ground-level decking, and as wood components for landscape site furniture such as benches, chairs, and tables. These wood products do not require chemicals to enhance their durability or resistance to decay as the thermal heat process provides this durability. Thus, the product is ecologically and environmentally safe.

These thermally modified North American hardwoods are domestically sourced from red oak and ash trees that are currently harvested in Wisconsin. Red oak and ash are the preferred species because of their consistency in durability and color. The natural durability of the red oak and ash is enhanced through the thermal heating process, creating a product that is a

Photo courtesy of Tournesol Siteworks



Detail of bench made from thermally modified North American hardwood

Grade-A wood with a 25-year Class 1 durability level and a resistance to decay that is comparable to South American hardwoods.

The thermal wood process was originally developed in Finland and the U.S. company that provides the thermally modified wood product utilizes special kilns fabricated in Finland. These kilns provide high temperature heat with steam, and the process changes the chemical composition of the wood, making it highly resistant to rot, decay (EN-350-2 Standard), and pests as the resin and sap content are essentially cooked out of the wood. The thermal process also creates a very aesthetically pleasing dark-colored wood product.

The thermally modified hardwood is FSC certified, harvested, processed, and finished. The wood decking products have a Class B fire rating based on ASTM E-84-10 standard test method for surface burning. (Note: the wood decking products must be treated with fire retardant to achieve a Class A fire rating).

Thermally modified North American hardwood products are lighter in weight and easier to cut and work with than many of the South American hardwoods such as Ipe. Red oak and ash are easy to cut and easy to use in construction. In addition, the cell structure of the red oak and ash changes during the thermal modification process, making the wood resistant to warping, twisting, and other moisture-related movements and thus providing long-term dimensional stability.

Thermally modified North American hardwood products have been used for both decking and benches at the Patagonia Clothing Company headquarters in Ventura, California. The company embraced the use of the reclaimed wood as it closely reflects their own corporate ethos. The project designer suggested this product specifically because of the qualities of thermally modified North American hardwood. The Patagonia Clothing Company is pleased with the overall performance of the wood over the first year (the benches were installed winter 2013), and the company is planning to add additional benches to the project site.

Thermally modified North American hardwood products are a sustainable and renewable resource in that they are sourced and harvested in the U.S. from forest crops that can be replanted and they are 50 percent lighter than South American hardwoods so there is less energy (as well as less cost) used in processing and shipping. They also meet LEED MR Criteria through FSC certification and lack of toxic chemical content.

Laminated Wood Poles

Laminated wood poles are a product that can add aesthetic value as well as sustainability to a project. Laminated wood poles utilize the renewable resource of wood in their composition and hence meet a number of LEED MR criteria both by using a renewable resource and by using less energy than metal or synthetic composites in their manufacture.

Dead Alaskan Yellow Cedar trees or "snags" are used in the fabrication of laminated wood poles. The Alaskan Yellow Cedar tree is a slow growing species that produces a dense growth ring structure, resulting in natural decay resistance to disease and insects, thus requiring no chemical preservatives or treatments. Testing completed by the USDA Forest Service (USDA-FS) in the 1990s on dead "snags" showed that "all wood tested from the dead yellow-cedar trees, regardless of the number of years the trees had been dead, appeared to maintain strength with time. Not one of the snags, in any class, had lost enough strength to prevent it from potentially being used."[2] Many of the harvested Alaskan Yellow Cedar trees have been dead for up to 80 years. The trees were tested for both hardness and bending strength in these USDA-FS tests and the dead trees were found to be as strong as a living tree.

The laminated wood also gains increased strength as a result of the lamination process, making it as durable in exterior conditions as steel or aluminum. Product testing results have shown these laminated wood poles to be stronger than fiberglass and aluminum poles.

The shafts of the laminated wood poles are made of laminated beams that are fabricated from locally sourced materials and components. The tapered shaft comes in lengths up to 25 feet and has an internal wire way. On-site installation is facilitated through a gasketed internal wiring compartment inside a cast aluminum base. The poles can accept any style lighting luminaire fixture or arm via an aluminum tenon assembly bonded at the top of the pole shaft.

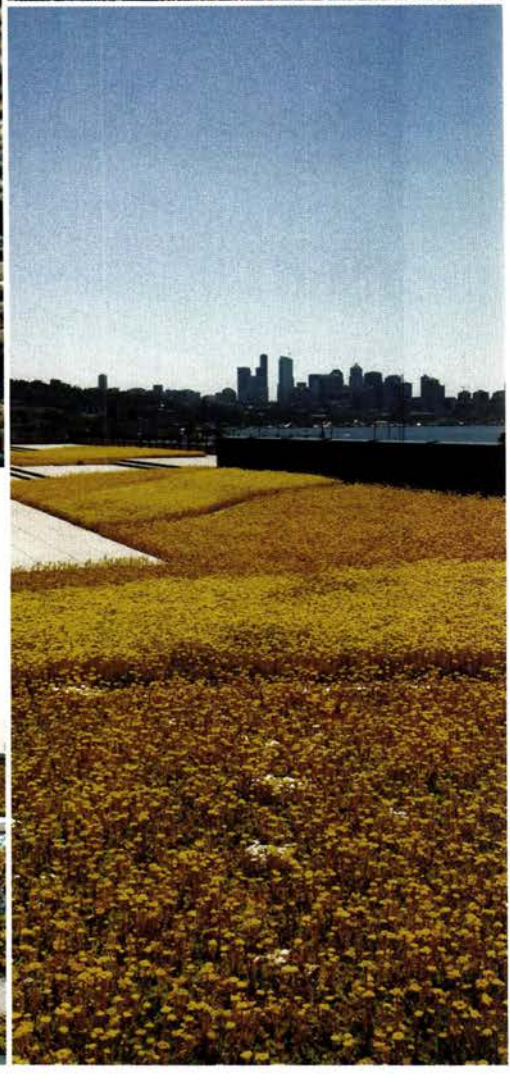
In using dead trees from a forest resource, laminated wood poles meet criteria for both a renewable resource and a recycled resource (dead trees); additionally, wood is a carbon absorber rather than a carbon producer. The fabrication process for these laminated wood poles uses less energy than that required for steel, fiberglass, or other metal poles. The laminated wood poles are manufactured in the U.S. of locally sourced materials as all components, except for the trees, are produced within 50 miles of the production facility to minimize the energy consumed during the manufacturing cycle.

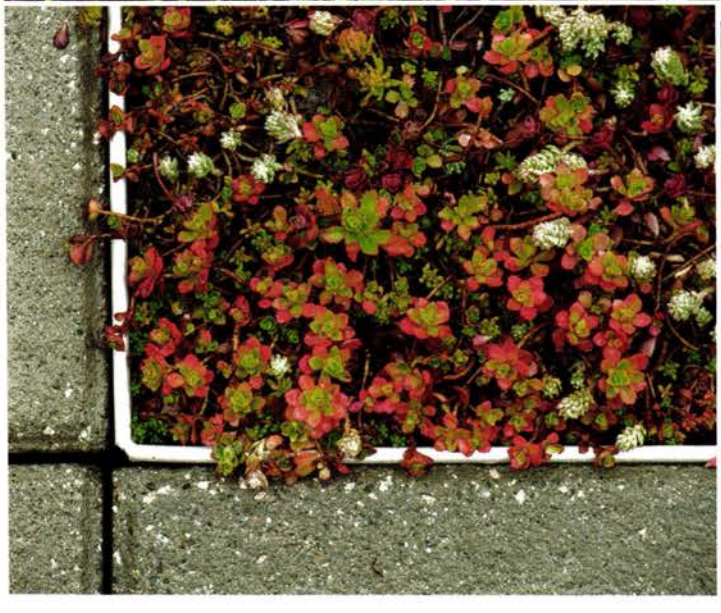
Laminated wood poles are typically used where site lighting is an integral part of the landscape design for a project and complementary to the building exterior.

Environmentally responsible alternatives to South American woods include two new products. Both thermally modified North American hardwoods and laminated wood poles fabricated from responsibly harvested Alaskan Yellow Cedar trees meet the criteria for renewable resources and responsible forestry. In addition, thermally modified North American hardwoods are FSC certified.

Laminated wood poles were used at a school facility (left) and at a streetscape project (right) to meet renewable resource criteria and provide a natural aesthetic.

Photos courtesy of Cavawood





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Images, listed clockwise: 1) Boulevard structural wood tiles; 2) Adjustable pedestal supports; 3) Patagonia, Ventura, CA; 4) 5) Northlakes Collection Bench with Boulevard wood.

Photo courtesy of Braun & Steidl Architects

The green roof at Taylor Hall, Kent State University

The benefits of green roof technology are wide ranging. They include management of stormwater, reduction of heat island effects, restoration of habitat, biodiversity of plant and wildlife, water efficiency, energy optimization through both cooling and heating, reuse of building materials, recycled-content materials, increased roof durability and longevity, and creation of rooftop amenity spaces.

While standard metal poles may be used in a parking lot, wood poles are typically used for pedestrian scale lighting, particularly as you approach the entrances and pathways to a building. Laminated wood poles have been used in downtown renewal projects, streetscapes, schools, and retail locations.

Laminated wood poles were an integral component in a concept design for a connector between the Delaware River and Penn Treaty Park in Philadelphia, Pennsylvania. Penn Treaty Park is the site where William Penn signed a treaty with the Lenape tribe. This project is part of a Penn DOT improvement that involves better lighting, access, and streetscaping, as well as the construction of another smaller park. Artist Donald Lipski's design used laminated wood light poles to guide a pedestrian walk to the river. Two light poles will flank the entranceway to the underpass—one with a fiberglass wolf sculpture on top and another with a fiberglass turkey on top. At the other end of the underpass, a series of light poles will lead into the park; in this case each one will stand on the back of a cast bronze turtle. The Lenape origin myths include animals that are associated with its three clans: wolf, turkey, and turtle.

Green Roof Technology

The modern green roof movement began in Germany in the 1980s. These first green roofs used materials that were repurposed from other applications. For example, air barriers or felt from the building envelope were repurposed as water retention layers, and landscape nursery trays were repurposed as green roof plant trays. The use of repurposed materials presented problems, fostering further research to develop technology solely for green roofs.

These new products and systems focus on green roof technologies for stormwater management and fall into two categories of green roof assemblies, manufactured and installed in conjunction with roofing membrane partners. In some cases, a major advantage lies in having a single-source warranty for all components of the green roof.

The two major categories of green roof assemblies are 1) multi-layer or built up and 2) tray-based. The multi-layer green roof assembly is the most flexible in depth and layout. This assembly presents the opportunity for construction of an intensive roof garden due to the potential for greater depth of planting and the ability to easily accommodate organic shapes. Multilayer assemblies can also accommodate the very shallow growing media sometimes used in retrofit applications.

The tray-based green roof assemblies have a more restricted range of planting depths but they are the easiest to install and provide easy access to maintain the roof membrane underneath. The trays are, however, interlocking and once all of the trays are locked together, the medium can be surcharged and the depth can be increased by adding 3 to 4 inches of soil on top of the trays. The most common plants used in extensive green roofs are sedums, which are extremely hardy and come in a wide variety of different mixtures for specific regions and aesthetic goals. The tray systems are designed for the best stormwater management properties. They meet multiple LEED MR criteria as they have components that are manufactured from 88 percent recycled content. The tray assemblies also have internal drip irrigation built into the trays.

The structural requirement for green roofs is dependent on the size of the roof, the size and depth of the soil, and the growing medium. The design of larger roof gardens for the assembly can be very involved, especially when stormwater management calculations are required, but the green roof technology team will provide an accurate weight calculation based on the green roof's required size, depth, and water retention.

Green roof technologies must meet FLL guidelines, which are standards that were developed in Germany for growing media and which have been accepted in the U.S. These standards govern the growing medium and evaluate its air porosity and maximum saturated weight. Other standards which must be met are Factory Mutual Assurance (FM) certifications.[3] In addition, green roof technologies for stormwater management must meet the latest LEED v4 Materials and Resources criteria for Environmental Product Declarations by providing a listing of all ingredients used in the assemblies and membrane for the system. The

The organization Green Roofs for Healthy Cities (www.greenroofs.org) cites a number of public, private, and design-based benefits from green roofs including:

Public Benefits

- ▶ Aesthetic improvements
- ▶ Stormwater management
- ▶ Moderation of urban heat island
- ▶ Improved air quality
- ▶ New amenity spaces
- ▶ Local job creation

Private Benefits

- ▶ Energy efficiency
- ▶ Increased roof membrane durability
- ▶ Fire retardation
- ▶ Noise reduction
- ▶ Reduced electromagnetic radiation
- ▶ Enhanced building marketability

Design-Based Benefits

- ▶ Increased biodiversity
- ▶ Improved health and well-being
- ▶ Enhanced urban agriculture
- ▶ Enhanced educational opportunities

Manufactured stone veneers are fabricated in large multi-panel systems, which facilitate installations covering extremely large areas and allow a much larger surface area to be covered in less time than in a natural stone application. The variation of natural stone is achieved by replicating limited areas of natural stone mold per profile so that there is less chance of repetition.

Photos courtesy of Eldorado Stone

Manufactured stone veneer was used at a northwestern Wisconsin house (left) and throughout the Parkland Golf and Country Club (right).

Declare label ensures that all components are "red list free" meaning that it is free of toxins and it meets the standards for certification through the Living Building Challenge.[4]

With respect to specifying this product for a project, it is recommended that Master Format Section 07 55 63 Vegetated Protected Membrane Roofing of the Construction Specifications Institute (CSI) be used to provide better coordination between the architect and the landscape architect on the project.

Green roof technologies for stormwater management have been implemented at a number of locations throughout the U.S. and Canada including Kent State University's Taylor Hall in Kent State, Ohio, and Horizon House Retirement Community in Seattle, Washington.

Beth Ruffing, assistant director in the Office of the University Architect and project manager for the roof garden on Kent State University's Taylor Hall, says, "green roofs can have many environmental benefits; they reduce cooling costs for buildings and they slow the speed of stormwater to release stress on drainage systems. In addition, they're visually appealing and provide an opportunity for our students to learn about sustainability." She continues, "this green roof will require very little maintenance. The sedum plants are watered by an integrated irrigation system and do not require mowing or chemical weed control."

Meanwhile, at the Horizon House, "a dynamic retirement community dedicated to dignified aging," the green roof is "an integral part of providing a healthy, green, and sustainable residential environment," says Brad D'Emidio, director of Building Services and the Horizon House Retirement Community.

Green roof technologies for stormwater management reflect an upward trend in green roof technology that meets all of the private, public, and design-based benefits and also addresses tax-credit incentives that are now being introduced in various communities such as in Washington, D.C., where planning policy provides credits for plans that utilize green roofs to help to manage stormwater.

The city of Seattle, Washington has an innovative development standard called the Seattle Green Factor (SGF), which is a scoring system designed to promote ecologically functional as well as attractive urban landscaping and which provides incentives for the use of green roofs as well as other green building technologies.[5]

Using Manufactured Stone Veneers to Mitigate Environmental Impacts

Natural stone is a durable, attractive product that must be quarried and processed to make it usable as a veneer or architectural siding. Manufactured architectural stone veneers are also durable, attractive, and manufactured for use as both interior and exterior veneers and siding. They are one-third the weight and one-half the installation cost of natural stone. They are also sustainable and place minimal impact on the natural environment because they are not quarried but are cast from molds.

The manufacturing process involves having the fabricators visit quarries to select pieces of natural stone that have already been quarried. Molds are then cast from these natural stone pieces. The molds are filled with Portland cement, lightweight aggregate, and iron oxide dyes so that the veneer pieces are fabricated in the appropriate size and color. The natural stone textures are achieved because the molds are created from natural quarried stone pieces. Some manufactured stone veneer products come with an extended warranty. Manufactured stone veneers are easily maintained and damaged pieces can be replaced by re-casting the molds.

As manufactured stone veneers are not quarried, there is only a 2 percent waste in their fabrication versus a 10 percent waste with natural stone. The lighter weight of the veneer reduces both the energy use and cost involved with shipping and all of the manufactured stone veneers can be recycled and reused. Additionally, their light weight eliminates the need for wall ties, and thus they are designed to adhere easily to a variety of structurally sound surfaces, and are capable of being used in installations that would normally be very difficult and costly to achieve with natural stone.

Manufactured stone veneers are tested for freeze/thaw durability. As with any installation, installers should incorporate good building practices which include proper flashing and water diversion techniques to help ensure a successful installation. The base color in manufactured stone veneers is blended throughout and permanent mineral oxide pigments are applied and absorbed when the veneer is cast. The color is an integral part of the veneer and there are minimal noticeable color changes after years of weathering.

See endnotes in the online version of this article.

Continues at ce.architecturalrecord.com

Elena M. Pascarella, PLA, ASLA, *is the principal and landscape architect at Landscape Elements LLC.*

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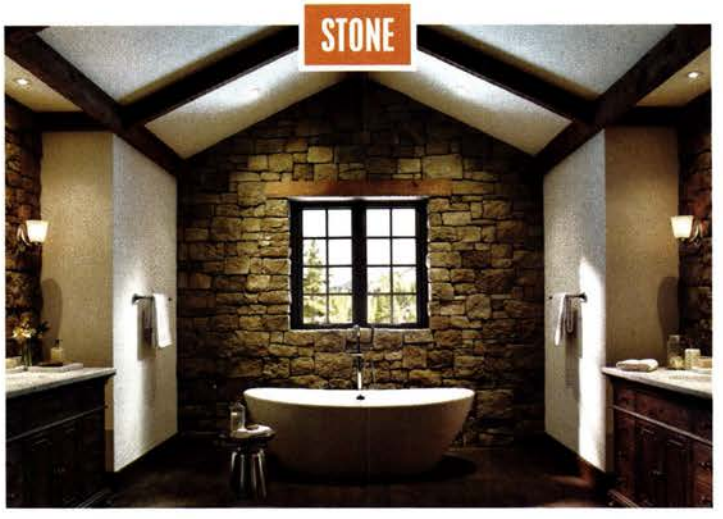

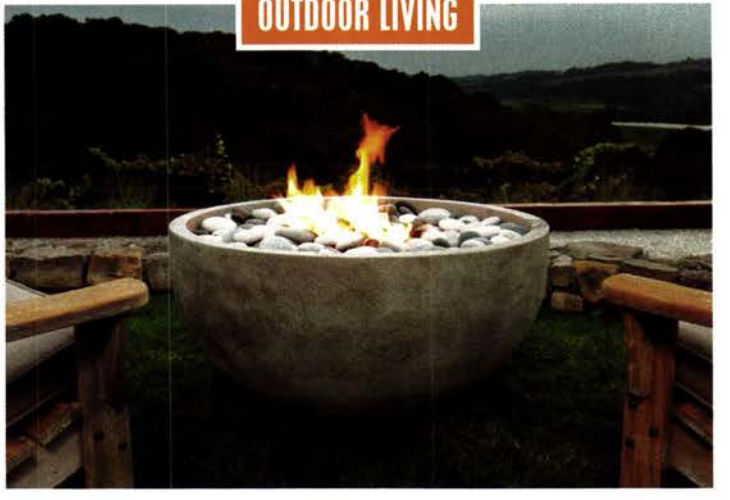

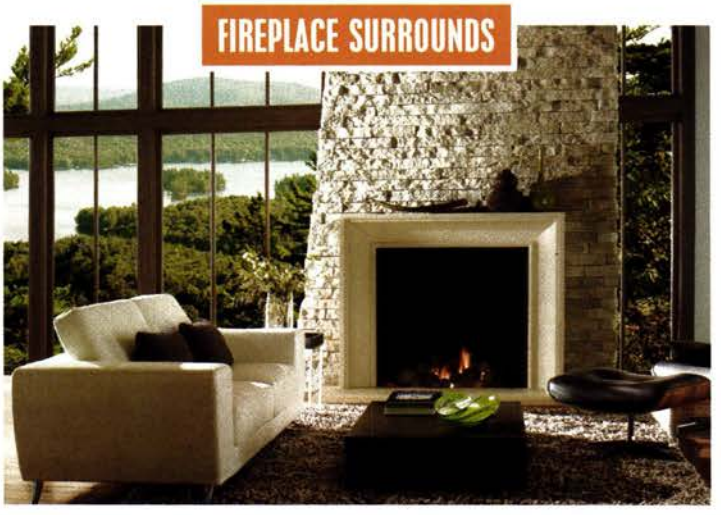

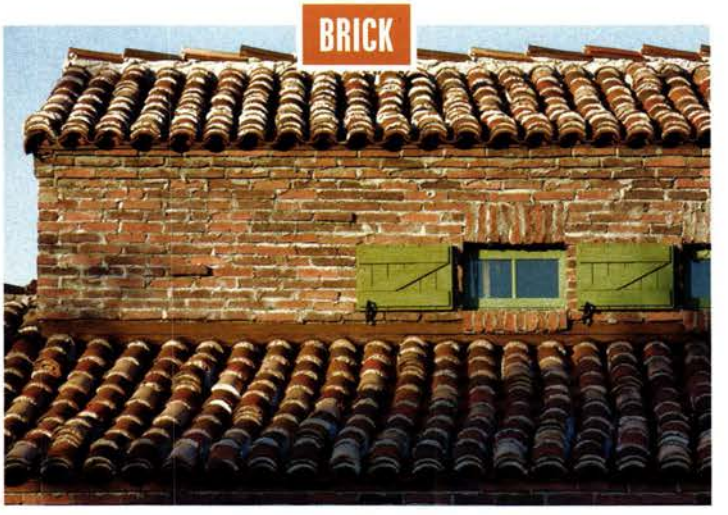

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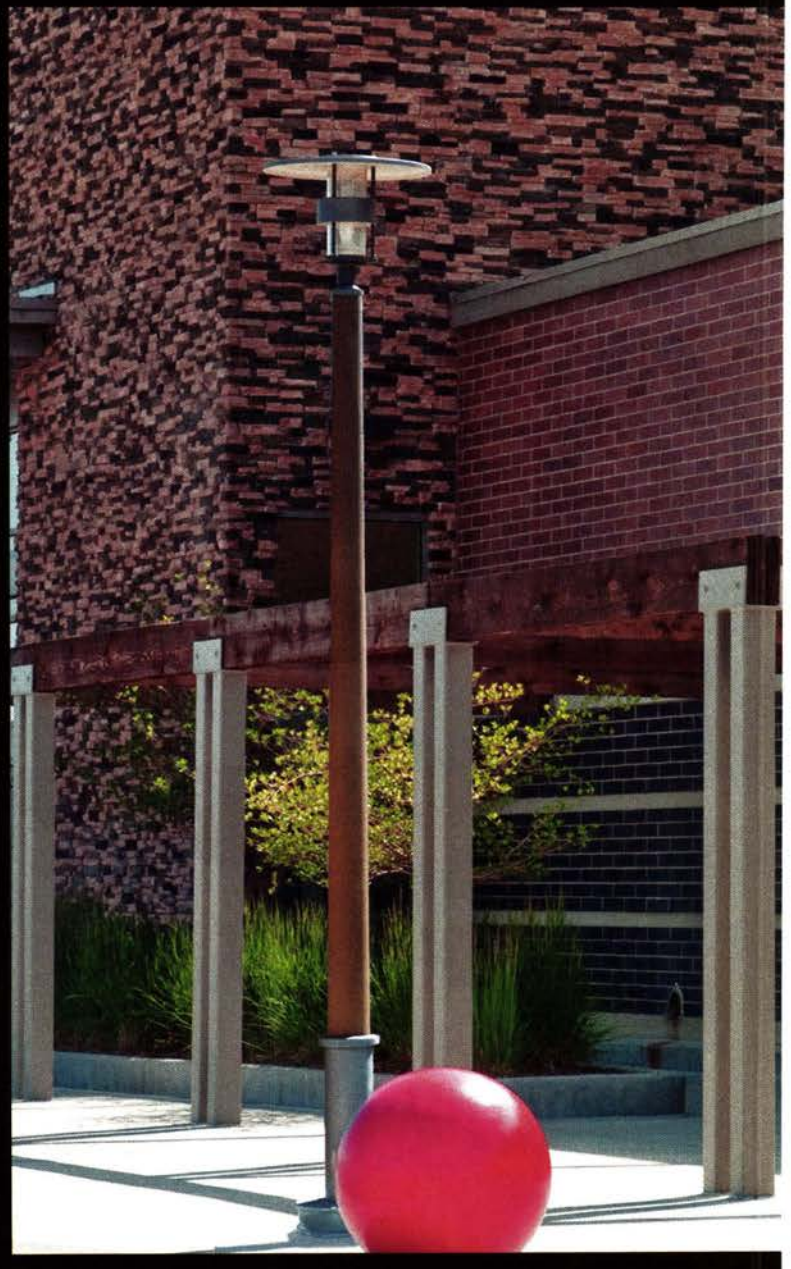

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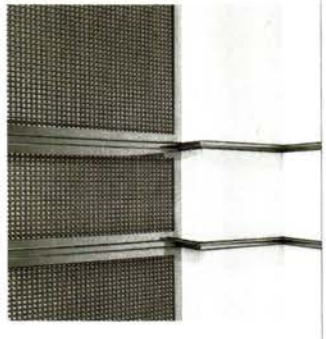

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Exhibitions

Site & Senses: The Architecture of Aidlin Darling Design
Sonoma Valley, California
Through March 2, 2014
The Sonoma Valley Museum of Art has dedicated its entire 5,000-square-foot exhibition space to the sensory explorations that guide the design process at the multidisciplinary firm Aidlin Darling Design. The solo show, the firm's first, features material palettes, models, sketches, renderings, full-scale mockups, photographs, and videos. The exhibition's focal point is *C-Chassis*, a site-specific, 55-foot-long installation piece. For more information, visit aidlindarlingdesign.com.

In Focus: Architecture
Los Angeles
Through March 2, 2014
The long, interdependent relationship between photography and architecture is the subject of this survey drawn from the Getty Museum's collection. Spanning the history of the medium, the exhibition features 24 works by such diverse practitioners as William Henry Fox Talbot, Eugène Atget, Walker Evans, Bernd and Hilla Becher, and Ryuji Miyamoto. Seen together, the varied photographic representations of secular and sacred structures on display reveal how the medium has impacted our understanding and perception of architecture. For more information, visit getty.edu/museum.

Overdrive: L.A. Constructs the Future, 1940–1990
Washington, D.C.
Through March 10, 2014
The first comprehensive survey of the architecture of mid- to late-20th-century Los Angeles, *Overdrive*, at the National Building Museum, sheds new light on well-known landmarks, uncovers hidden jewels, and explores the architectural soul of one of America's most complex cities. Visitors can get an in-depth view of the free-spirited, often experimental architecture of post–World War II Los Angeles, from its ambitious freeway network, sleek corporate towers, and whimsical coffee shops to popular shopping malls, refined steel-and-glass residences, and eclectic cultural institutions. For more information, visit nbm.org.

Frank Lloyd Wright and the City: Density vs. Dispersal
New York City
Through June 1, 2014
This exhibition at the Museum of Modern Art celebrates the recent joint acquisition of Frank Lloyd Wright's extensive archive by MoMA and Columbia University's Avery Architectural and Fine Arts Library. Through an initial selection of drawings, films, and large-scale architectural models, the exhibition examines the tension in Wright's thinking about the growing American city in the 1920s and 1930s, when he worked simultaneously on radical new forms for the skyscraper and on a comprehensive plan for the urbanization of the American landscape titled Broadacre City. For more information, visit moma.org.

Lectures, Conferences, and Symposia

Shenzhen & Hong Kong Bi-City Biennale of Urbanism/Architecture
Shenzhen, China, and Hong Kong
Through February 28, 2014
The only biennale hosted by two cities, this program of exhibitions, lectures, and events stretches from the boomtown of Shenzhen to the former British colony of Hong Kong. In Shenzhen, two different teams of curators have assembled shows exploring the boundaries of the contemporary city from a historical perspective. Ole Bouman presents *Biennale at Risk*, reimagining China's industrial heritage at an abandoned glass factory, while, at a warehouse near the Shekou Ferry Terminal, Jeffrey Johnson and Li Xiangning examine urban borders. The Hong Kong portion is curated by Colin Fournier and addresses the theme "beyond the urban edge." For more information, visit szhkbiennale.org.

Architectural Ceramics in the 21st Century: Design and Preservation of Contemporary & Historic Architecture
Cambridge, Massachusetts
March 22–23, 2014
Held on the MIT campus, this symposium features more than 35 noted architects, engineers, and researchers who will give presentations on topics including the basic characteristics of terra-cotta, clay, and porcelain tiles. *Architectural Ceramics in the 21st Century* will address the effect of materials on performance and durability, advances in ceramic materials, installation techniques for both new and preservation projects, and evaluation methods for the condition of architectural ceramics. For more information, visit architects.org.

Competitions

2014 Architectural League Prize: Overlay
Submission deadline: February 10, 2014

dates&events

Young architects and designers are invited to submit work to the annual Architectural League Prize Competition. All projects, either theoretical or real, executed in any medium, are welcome. The jury will select work for presentation in lectures, digital media, and an exhibition opening in June 2014. Winners will be featured in a catalogue and receive a cash prize of $1,000. For more information, visit archleague.org.

perFORM 2014
Submission deadline: March 24, 2014
Home-building company Hammer and Hand is sponsoring perFORM 2014, a competition that asks emerging architectural professionals (students and interns) to design a single-family house to be based in the Pacific Northwest. The house must showcase how high energy performance can complement high design. A panel of leading Pacific Northwest architects, educators, and builders will judge entries based on resourcefulness, applicability, and beauty. Registration is free, and first- and second-place winners will receive cash prizes. For more information, visit hammerandhand.com.

4th International Holcim Awards
Submission deadline: March 24, 2014
Since 2003, the Holcim Foundation for Sustainable Construction has recognized innovative projects and future-oriented concepts from architects and designers worldwide. The Holcim Awards is currently accepting submissions that envision a more sustainable and equitable built environment. Including students and young professionals as well as established firms like Skidmore, Owings & Merrill, the Holcim Awards attracts submissions from visionary practitioners and leaders around the world. For more information, visit holcimfoundation.org/awards.

Competition Innatur 3
Registration deadline: April 29, 2014
For the third staging of this international competition, Spanish organization Opengap seeks cutting-edge proposals for a nature-interpretation center committed to implementing architecture in a natural environment. Projects must promote that objective, and each participant can propose the location of his or her project. The first-place winner will receive a €2,000 prize, and the proposal will be published on Opengap's website. For more information, visit opengap.net.

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PROJECT ENERGY BUNKER
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IN HAMBURG, a former Nazi bunker has reopened with an unlikely new program as a sustainable-energy facility. Built in 1943 as a combined air raid shelter and anti-aircraft artillery tower, the 90,570-square-foot concrete-and-steel structure is fortified with 6-foot-thick walls and a 12-foot-thick roof. In 1947, the British attempted to raze it during postwar disarmament, demolishing six of the eight floors inside before abandoning the project. The building sat vacant for more than 60 years. In 2008, fearing the bunker was at the brink of collapse, the city turned to Kassel, Germany–based Hegger Hegger Schleiff Architekten to convert it into a renewable-energy plant. Following a two-year, $37 million renovation, the resulting power plant-cum-exhibition hall-cum café serves thousands of local residents through a massive heat-storage unit fed by solar thermal panels, waste heat from an industrial plant, wood combustion, and biomethane gas. The architects restored the facade to its original state, with a couple of notable additions: solar panels along the roof and south face, and a large window, which the team glazed after using the opening to remove 25,000 tons of concrete rubble. Though the architects gutted most of the interior, they left the concrete walls intact—including graffiti and drawings left by civilians during wartime—as an acknowledgement of the building's complicated past. *Laura Mirviss*

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