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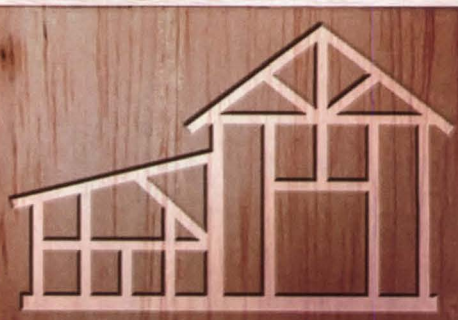

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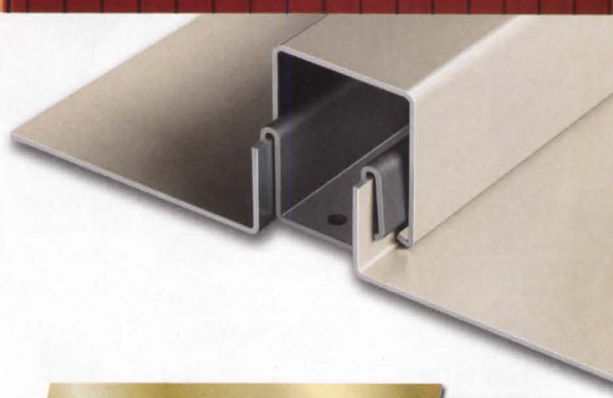

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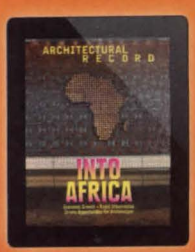

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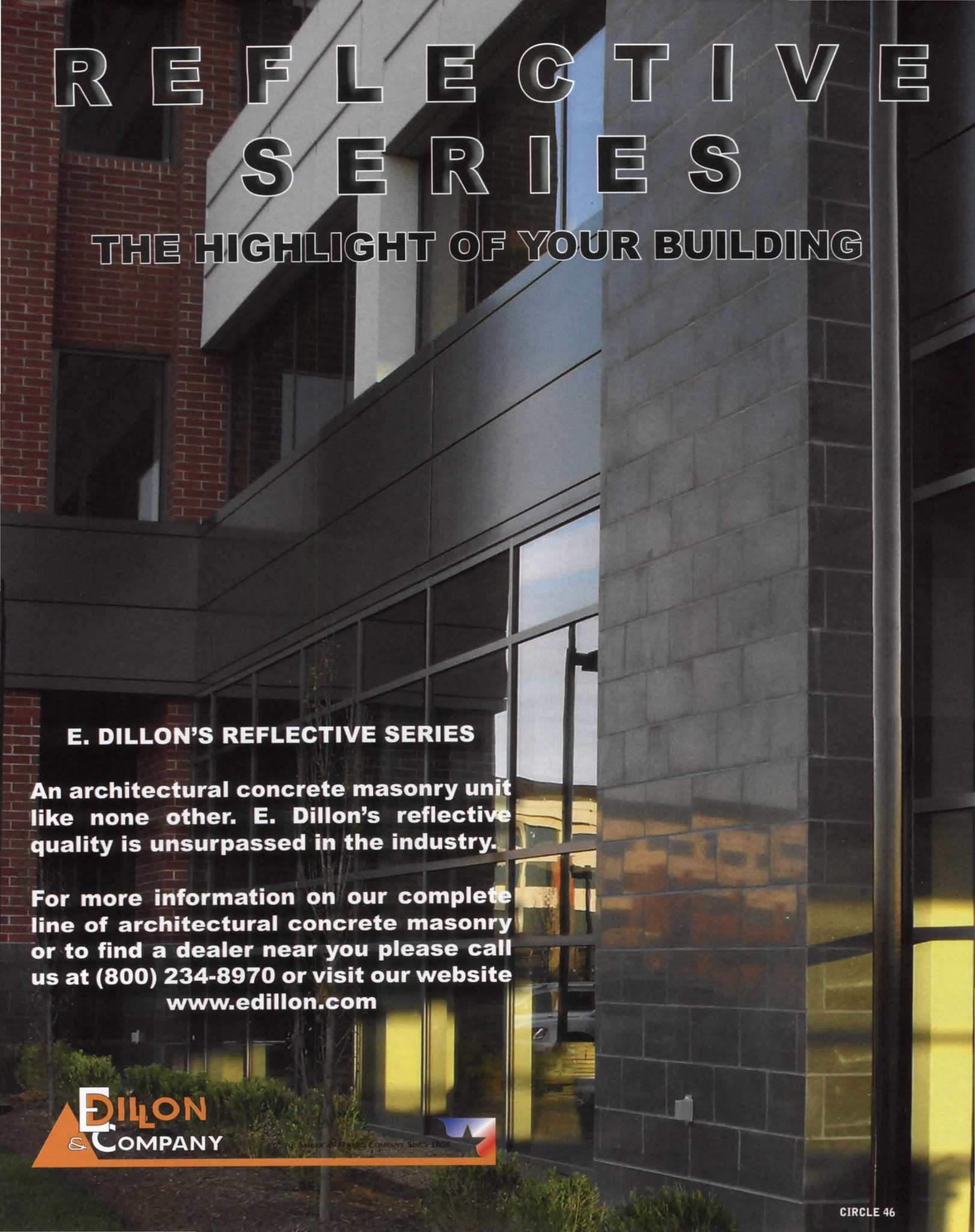
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CIRCLE 46

Inside Job

Designing great interiors calls on architecture's best.

ARCHITECTURAL RECORD'S annual Interiors issue is a favorite among readers both inside the profession and out. Who doesn't enjoy ogling photographs of a room's rich finishes and furnishings, such as those on display in the pages ahead? Yet frankly, even we acknowledge it's a little weird to consider interiors apart from "architecture." Clients often divide duties between architect and interior designer, but the essential values should be no different: the artful creation of space and deployment of light; the careful designation of materials and details. Eero Saarinen, who designed chairs, master plans, and buildings of every scale in between, said he learned this lesson from his father: "Eliel Saarinen saw architecture as everything from city planning to the ashtray on a living-room table." OK, no one designs ashtrays these days, but we still appreciate the point.

Architects who are invited to build within existing structures—who are handed raw space they did nothing to shape—face particular challenges. Vincent James, whose Minneapolis office, VJAA, was recently honored as the AIA's Firm of the Year, used an array of spatial moves to turn a vast 5,500-square-foot glass-enclosed penthouse into an art-filled home, employing wood in creative ways to instill a sense of warmth (page 100). On the street level of a new Tokyo tower, interior designer Masamichi Katayama of Wonderwall incorporated the window wall, as required by the developer, in creating a chocolate shop, but diverted attention upward with a deliciously witty ceiling, carved out of wood to look like a giant chocolate bar (page 64).

Historic buildings present their own obstacles to the interior architect, while often inspiring great ideas. When commissioned to design a culinary laboratory for the Copenhagen restaurant Noma—named best in the world by *Restaurant* magazine, it features a unique locavore cuisine that includes such ingredients as tree bark—the architects at GXN (the innovative division of 3XN) hit a wall. More accurately, they couldn't touch a wall, or the rustic wood columns holding up the protected 18th-century warehouse. So they designed an ingenious series of floating elements—shelves, tables—all made of locally sourced birch and spruce plywood, of course (page 90).

Similarly, BGP Arquitectura, creating a small library within the enormous 19th-century Ciudadela in the center of Mexico City, was not permitted to engage the old 3-foot-thick stone walls, but solved that problem with the elegant engineering of its light two-level intervention (page 96). And speaking of a light touch, New York–based SO-IL created offices in a landmarked cast-iron loft building in Manhattan's SoHo by shrouding the entire place—even the windows—in white scrim (page 70).

How best to honor a historic building's DNA? Lauren Rottet's interior for the Frankfurt branch of an American law firm offers one arresting model. Inside a handsome former U.S. Consulate, built by Gordon Bunshaft of Skidmore, Owings & Merrill in 1955, Rottet has created an exalted vision of a Mid-Century Modern interior—not slavishly reimagined, like a *Mad Men* set, but as a contemporary exemplar of lustrous minimalism.

You might argue that the São Paulo photography studio we feature (page 76) doesn't quite belong here because Studio MK27 designed the entire building. But in wrapping a stripped-down industrial shell around a stunning space—and allowing that interior to open to a private urban garden—the architects have created a magical place, one that is both backdrop for photo shoots and foreground for human activity. The inside itself is like a little city, with a pair of enclosed structures anchoring each end of a long room, joined by a slender concrete bridge.

Designing interiors isn't just about furniture and finishings or dead white space. Come on inside and see architectural ingenuity at its best. ■

Cathleen McGuigan

Cathleen McGuigan, Editor in Chief

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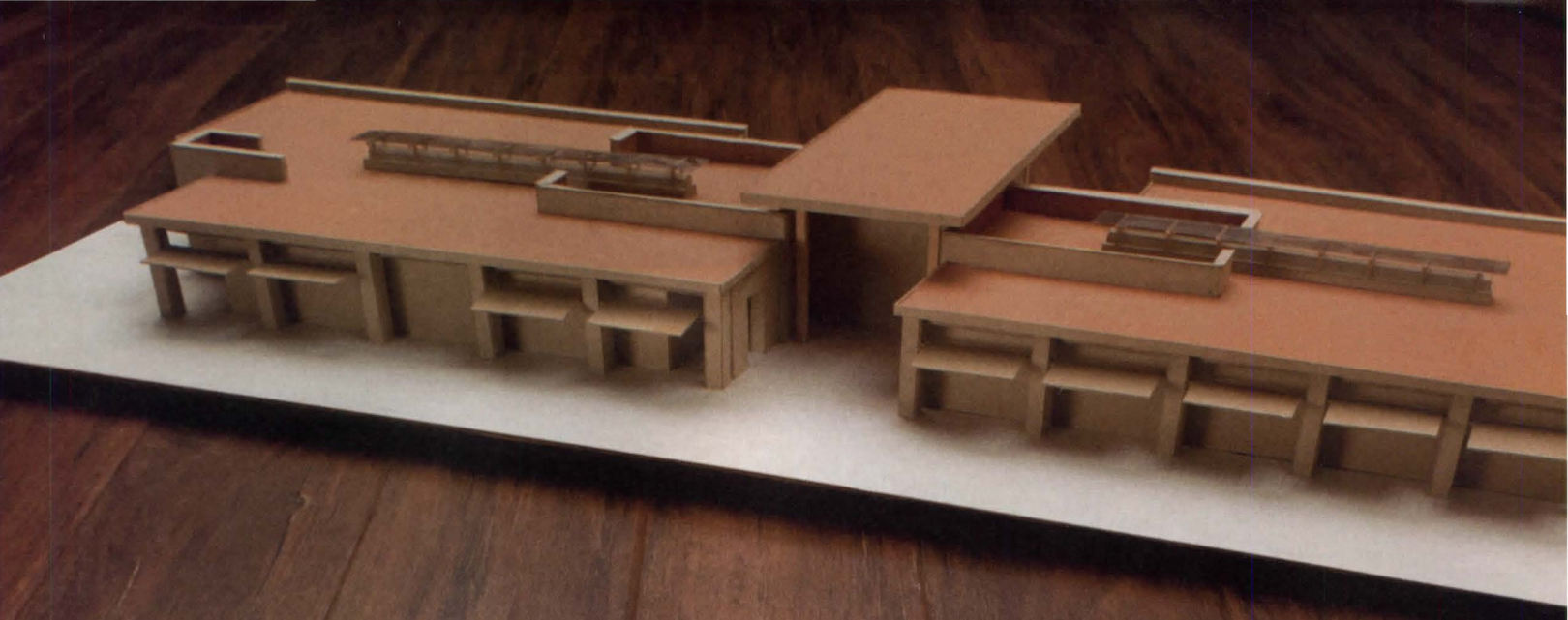

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"That's a term used for a lot of people. But since my name is Stern and 'Stern' means star, I think that's perfectly good. It's all the other people who are intruding." –*Robert A.M. Stern, to a* New York Times *reporter who said he has been called a "starchitect"*

Frank Gehry's scheme for the National Art Museum of China, one of the three final-cut entries for the commission.

Nouvel Said to Win Big Job in China

BY ARIC CHEN

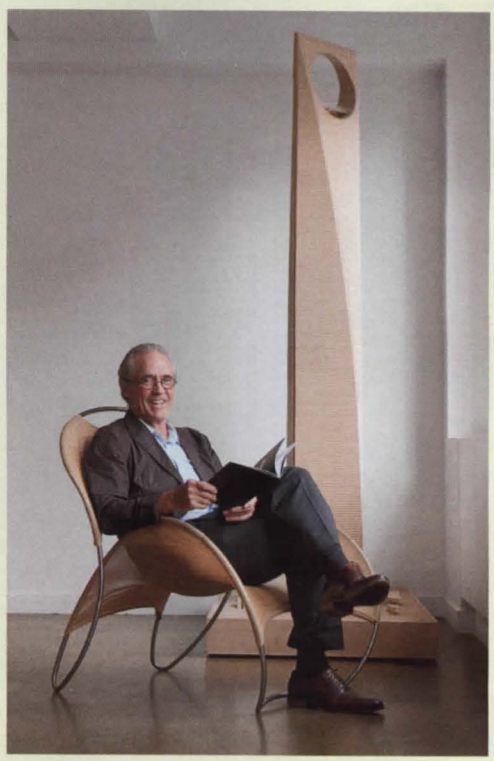
ACCORDING TO multiple sources, Jean Nouvel has been selected to design a mega-sized new building for the National Art Museum of China (NAMOC) in Beijing. If reports are true, the Pritzker Prize–winning French architect has beat out Frank Gehry and Zaha Hadid to snag the highly coveted commission. One well-placed source (who, like others, asked not to be identified because he was not authorized to speak on the record) says all three architects were informed of the decision on July 18.

The source added that an official announcement will not come until November, after the national government goes through its once-in-a-decade change in leadership. NAMOC and Gehry's office declined to comment, while a spokesperson for Nouvel did not respond to several requests for comment. At 1.3 million square feet, the new structure will be mammoth. It is the most prominent of a trio of buildings (the others are a museum devoted to arts and crafts and a Sinology center) being planned for a site next to the Herzog & de Meuron–designed National Stadium, known as the Bird's Nest. Part of a broader effort to draw more people to visit the area, post-Olympics, it is also probably the most symbolically important cultural building on the boards in China. "We were told to make a building so iconic that one day people will say that the Bird's Nest is next to *it*," said one early contender.

Nouvel's likely selection ends a process that, when it began in earnest in 2010, sent more than 150 architects from around the world scrambling to partner with Chinese artists, one of NAMOC's original recommendations. Twenty offices were then invited to submit designs, among them OMA, UNStudio, and the Chinese architects Yung Ho Chang, Zhu Pei, and Ma Yansong of MAD. From these, five finalists, including Herzog & de Meuron (who withdrew from consideration) and Moshe Safdie, were asked to make revisions. "It was intense," says Safdie. *(continued)*

10th Annual Innovation Conference to Be Held Oct. 4 in New York

ARCHITECTURAL RECORD'S 10th annual Innovation Conference will be held on October 4, 2012, at the McGraw-Hill Companies' headquarters in New York City. Titled "Design Leaders Envision the Next Decade," it will feature David Adjaye, Jeanne Gang, Gordon Gill, Francis Kéré, and Bill Pedersen (seated below in the new "loop de loop" chair he designed, next to a model of the original version of Kohn Pedersen Fox's Shanghai World Financial Center). This year's conference highlights groundbreaking achievements in supertall, superefficient, and supersmart buildings. Register at construction.com/events/2012/innovation/register.asp.

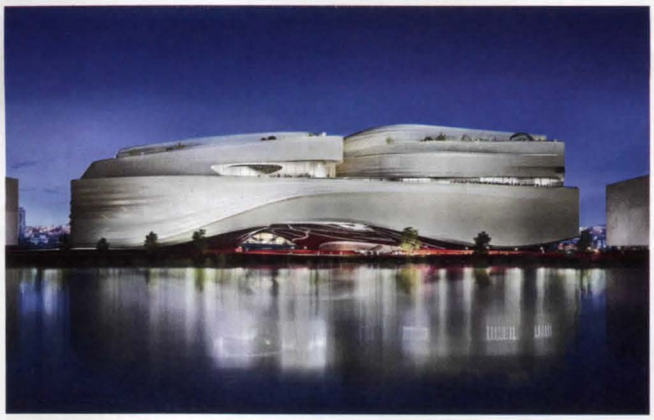


Bill Pedersen in a prototype of his "loop de loop" chair.

(Nouvel continued)

A recent sneak peek of the three final-cut entries by Nouvel, Gehry, and Hadid shows that all are similarly massed. With its "scrolling" forms, Hadid's glass- and glass-fiber-clad proposal looks not so much like some sleek spacecraft as the slow-moving mothership that might have launched it. "There were a lot of constraints and a lot to pack in, so you wound up with volumetrically very similar proposals," says Cristiano Ceccato, Hadid's associate in charge of the project. (Ceccato would neither confirm nor deny the results of the competition.) Meanwhile, topped by warped volumes, Gehry's otherwise boxy scheme features facades of scooped and scalloped metal behind "translucent stone" made of glass. By most accounts, the contest came down to a head-to-head between Gehry and Nouvel, the latter presumably winning with a somewhat softer-edged proposal offering a pastiche of envelope treatments: steel cut in decorative patterns, stenciled glass recalling Chinese ink brushstrokes, and a splash of parametricism, all explained via references to ancient Chinese poetry and philosophy.

The NAMOC commission is part of China's ambitious plans to develop its cultural infrastructure and "soft power." The museum's current Sino-Soviet-style building, which is not far from the Forbidden City and will remain an art museum, was one of the "10 Great Buildings" constructed under Mao Zedong in 1959. NAMOC is best known for its exhibitions of 20th-century and contemporary Chinese art. The proposed new edifice, meanwhile, offers a fresh reminder of how soft power nowadays works both ways. Rumors of political machinations at the highest levels surrounded the competition, with various nations supposedly jockeying to influence the selection process in favor of their own architects. Such speculations may have been unfounded, but they were not dampened when Gehry very visibly gave Xi Jinping, China's presumptive next president, a tour of his Walt Disney Concert Hall during Xi's high-profile visit to Los Angeles earlier this year.



Zaha Hadid, another NAMOC finalist, proposed an aerodynamic, scrolling form.

The new NAMOC is thought to be scheduled for completion in 2015. How the museum will manage to fill its square footage remains unclear. Adding further uncertainty is the widespread belief that NAMOC director Fan Dian, who enjoys a reputation as a progressive administrator, will soon be promoted to another job. What's for sure is that the process of choosing the building's design was both political and opaque. But there were positive aspects to the process, too. "Unlike other competitions, there was a lot of contact," says Safdie, recalling his numerous travels and visits with museum officials. (Nevertheless, he says he does not know who was on the jury that selected the final three in April.) "There was a lot of consultation and dialogue with the client," Ceccato concurs. ■

IMAGE: COURTESY ZAHA HADID ARCHITECTS

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Denise Scott Brown

BY SUZANNE STEPHENS

EVEN LOGICAL transitions often come as a surprise. The office of Venturi, Scott Brown and Associates has officially changed its name to VSBA to reflect the new ownership of the firm by longtime associate Daniel K. McCoubrey. Robert Venturi, 87, and Denise Scott Brown, 81, announced they are passing the baton to McCoubrey, president and principal of the new firm, and to Nancy Rogo Trainer, also a principal. RECORD asked Scott Brown to comment on the transition and the legacy of the firm, which started off as Venturi and Short in 1960, became Venturi and Rauch in 1964, then Venturi Rauch and Scott Brown in 1980, before adopting its most recent nomenclature in 1989.

The news about the succession seems surprising. When did you decide to do it?

It was a long while coming. I began talking with Dan [McCoubrey] in the early 1990s. One of the things I talked about was getting smaller as we got older. We needed to come down to a manageable size for a new group to take over. But we also wanted to see certain projects through completion and to meet our contractual commitments. The recession helped, but this is a new organization with new ownership and a new name. They are not us, and we are not them.

Robert Venturi and Denise Scott Brown, 2005

What do the new principals [McCoubrey and Trainer] offer prospective clients?

They worked with us for over 25 years, and they both bring with them great entrepreneurial and managerial leadership—as well as design ability.

Are you going to have any role in the new firm?

I recently hurt my back and had to stay at home—and found I loved it, since I'm still writing and lecturing. I have kept out of their hair, although I'll go once a week to the office. I just wrote an introduction to a book on the writings of Josef Frank, an early-20th-century Austrian architect and designer who was personally responsible for the invention of the Swedish Modern furniture style.

What about Venturi?

Bob is retired—he is not practicing and doesn't want to talk or write. He has a view of retirement that means going to the office in the morning and then coming back to the house. But he prefers a simple life, with no stress.

What do you consider your firm's legacy?

I would say communication as a function of architecture is a major one. We have also designed buildings to allow people to meet and interact easily in them. And we have used planning ideas from urban economics and transportation, particularly our understanding of the dynamic between streets and buildings—how streets generate urban settlement and activity patterns—as heuristics for the design of buildings. ■

For the complete interview, visit architecturalrecord.com/news.

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CIRCLE 35

OMA for Coach

BEFORE ITS Thanksgiving Day parade, Macy's will unveil another spectacle: a 2,000-square-foot Coach outlet designed by OMA, the firm founded by Rem Koolhaas in 1975. The outlet, on the ground floor of Macy's Herald Square flagship in New York City, is scheduled to open this month, and will be followed in 2013 by another in Tokyo's Omotesando district. Both are the work of OMA's New York office, headed by partner Shohei Shigematsu, who has been with the firm for 15 years. OMA has much experience in fashion retailing: In 2001 the firm unveiled a lavish Prada store on Broadway in Manhattan. And in 2004, Koolhaas spearheaded *The Harvard Design School Guide to Shopping*.

OMA's plan for a New York City Coach store.

Coach president Reed Krakoff has taken the company from a narrowly focused purveyor of leather goods to a luxury-products brand, vastly increasing its revenue but also "clouding the clarity of its store design," says Shigematsu. To recall the librarylike shelving of vintage Coach stores, OMA developed a display system of illuminated transparent blocks; some are glass, others are acrylic. Shigematsu worked on the design with Krakoff, Coach's in-house design team, and OMA project architect Rami Abou-Khalil. *Fred A. Bernstein*

New Trends in Museum Architecture

AN EXHIBITION at Pittsburgh's Carnegie Museum of Art highlights a new trend in museum design—away from Bilbao-esque icons and toward a more democratic model in which architects, often working together, create buildings and pavilions that defer to the landscape containing them, as well as to the visitors' journey. Raymund Ryan, the Carnegie's architecture curator, explores six projects in *White Cube, Green Maze: New Art Landscapes,* including Weiss/Manfredi's Olympic Sculpture Park in Seattle and Instituto Inhotim, a nature reserve with art galleries in Brazil. Iwan Baan documented each site. (September 22, 2012—January 13, 2013.) *Laura Raskin*

Raketenstation Hombroich, a museum on a former NATO rocket-launching base in North Rhine-Westphalia, Germany.

noted

Wiel Arets Named Dean at IIT, Takes the Helm This Fall

Dutch architect Wiel Arets will replace longtime dean Donna Robertson at the Illinois Institute of Technology College of Architecture this fall. The university has a lineage of modernist-minded leadership: Ludwig Mies van der Rohe ran the architecture program from 1938 to 1958.

WTC's Skinny Spire

New renderings for One World Trade Center show its 408-foot spire slimmed down to an exposed metal mast. The change could disqualify the spire from counting toward the SOM-designed building's official height, according to the Council on Tall Buildings and Urban Habitat, leaving it shorter than Chicago's Willis Tower and its goal of 1,776 feet tall.

Studios to Design Shanghai Dance Center Campus

Studios Architecture has won a competition to design the Shanghai International Dance Center, a new home for the Shanghai Ballet. Totaling 915,000 square feet, the project will include gently curving buildings with theaters, rehearsal halls, and space for 1,500 students.

NYC Releases First Report on Large-Building Energy Use

In August, New York City released the first benchmarking report analyzing a year of energy and water use for privately owned buildings over 50,000 square feet. The city is the first in the U.S. to enact a law requiring that such consumption be measured and now has energy-use data on over 15,000 buildings, the largest local database in the country.

ABI Up Slightly from June

The Architectural Billings Index rose to 48.7 in July (a number below 50 denotes a decrease in billings). The inquiries score was up nearly two points. As the overall economy shows modest improvement, "modest declines should shift over to modest growth in design activity over the coming months," says AIA chief economist Kermit Baker.

IMAGES: © OMA (TOP); IWAN BAAN, COMMISSIONED BY CARNEGIE MUSEUM OF ART

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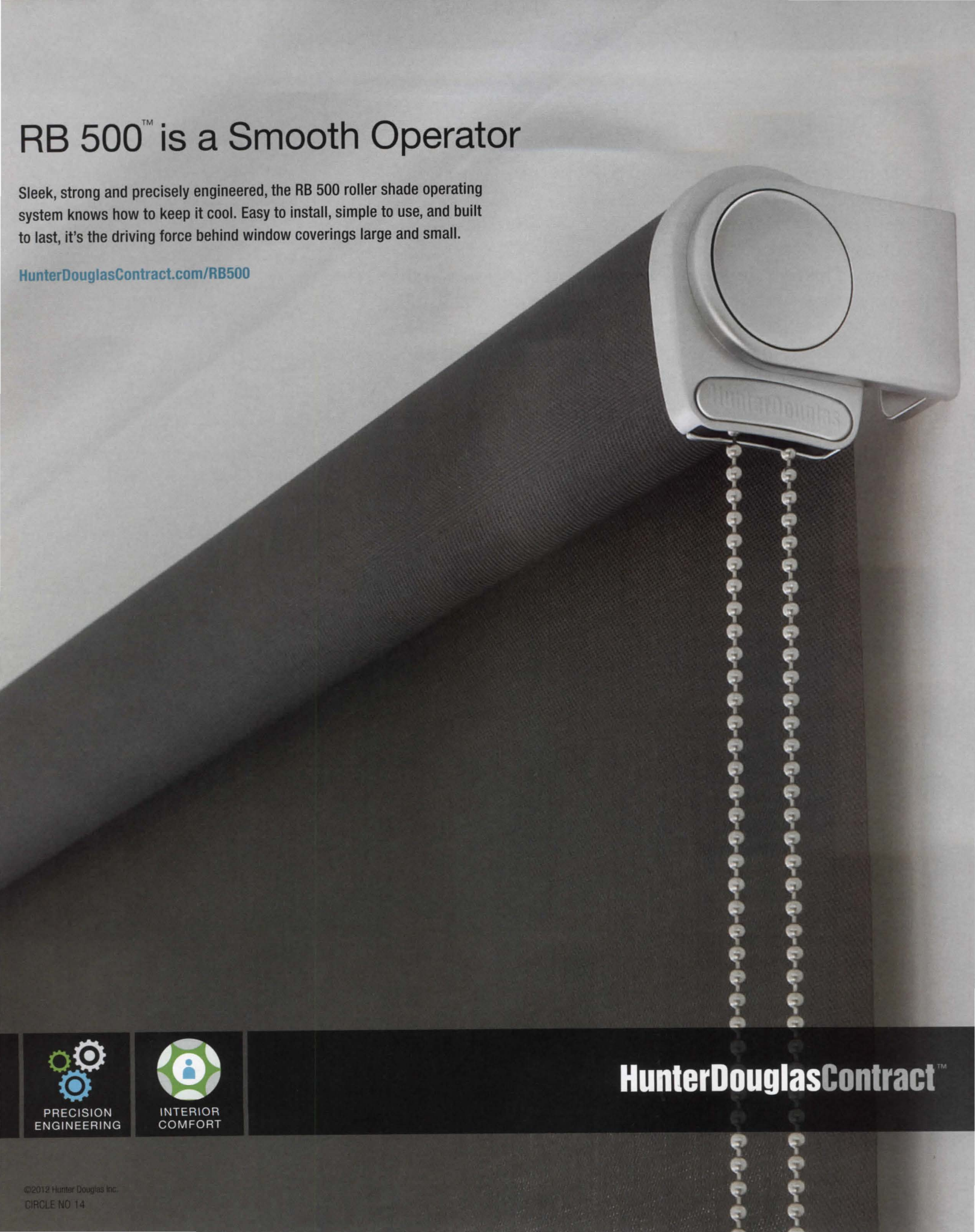

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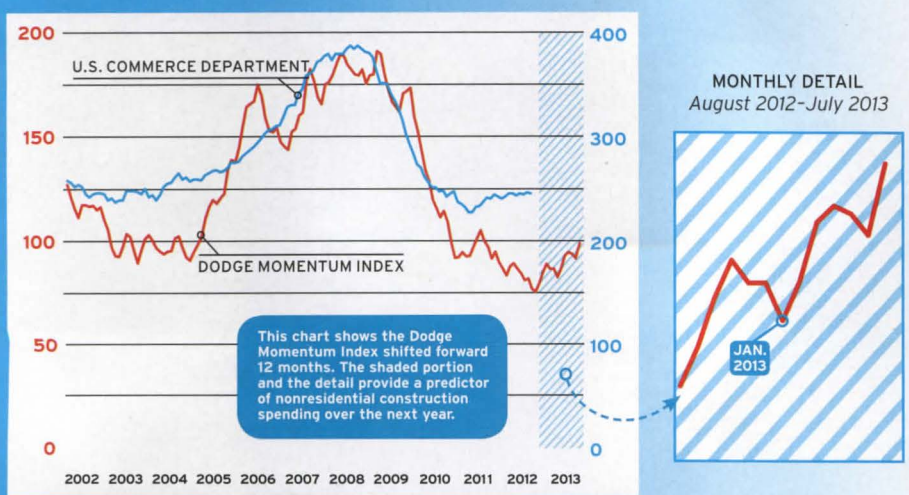
CIRCLE NO 14

Data from McGraw-Hill Dodge Analytics

DODGE MOMENTUM INDEX REBOUNDS

After retreating an adjusted 2.4% in June, the Dodge Momentum Index climbed 8.1% in July. This improved performance is in sync with Bureau of Labor Statistics data released in early August that showed a stronger-than-expected increase of 163,000 jobs for the previous month. Both the institutional and commercial components of the index rose in July, with the institutional segment advancing 9.0% and the commercial segment rising 7.3%.



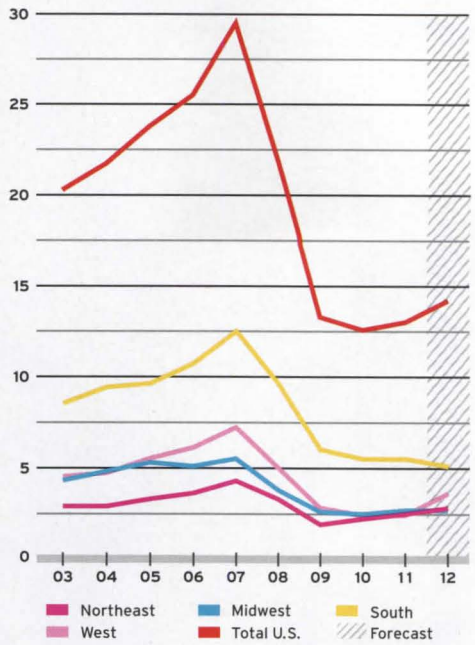
The Dodge Momentum Index is a 12-month leading indicator of construction spending. The information is derived from first-issued planning reports in the largest database of construction projects in the U.S., McGraw-Hill Construction's Dodge Reports. The data have been shown to lead the U.S. Commerce Department's nonresidential spending by a full year.

RETAIL CONSTRUCTION

After hitting a historic low in 2010, retail construction is beginning to show tempered improvement. This year, starts are expected to continue to rebound to $14.2 billion.

Retail Starts by Region

Including U.S. total and 2012 forecast figures, by billions of dollars



Top Metro-Area Markets

Total retail starts, 1/2011–6/2012

$ millions

1	New York City	1,771
2	Chicago	674
3	Dallas	627
4	Houston	528
5	Los Angeles	525

Top 2012 Retail Projects *Ranked by construction-starts value through June*

Values indicate the construction cost of the retail portion of mixed-use projects and exclude the costs associated with ancillary facilities.

$400M
PROJECT: *Macy's Herald Square Renovation*
ARCHITECTS: ***Studio V Architecture*** ***Highland Associates*** ***Charles Sparks + Company*** ***Kevin Kennon Architects***
LOCATION: *New York City*

$300M
PROJECT: *The Linq*
ARCHITECTS: ***David M. Schwarz Architects*** ***Klai Juba Architects***
LOCATION: *Las Vegas*

$250M
PROJECT: *World Financial Center Winter Garden Renovation*
ARCHITECTS: ***Spector Group*** ***Pelli Clarke Pelli Architects*** ***Omniplan*** ***Morrison Dilworth + Walls*** ***AvroKO*** ***BCV Architects***
LOCATION: *New York City*

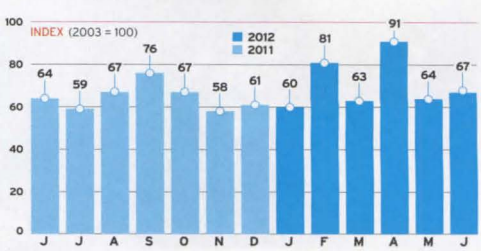
$60M
PROJECT: *Shops at Dakota Crossing*
ARCHITECTS: ***Bignell Watkins*** ***Hasser Architects***
LOCATION: *Washington, DC*

$55M
PROJECT: *North County Mall Renovation*
ARCHITECTS: ***Westfield Group*** ***Architects Orange***
LOCATION: *Escondido, CA*

THE DODGE INDEX FOR RETAIL CONSTRUCTION

6/2011–6/2012

This index is based on seasonally adjusted data for U.S. retail starts. The average dollar value of projects in 2003 serves as the index baseline.



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

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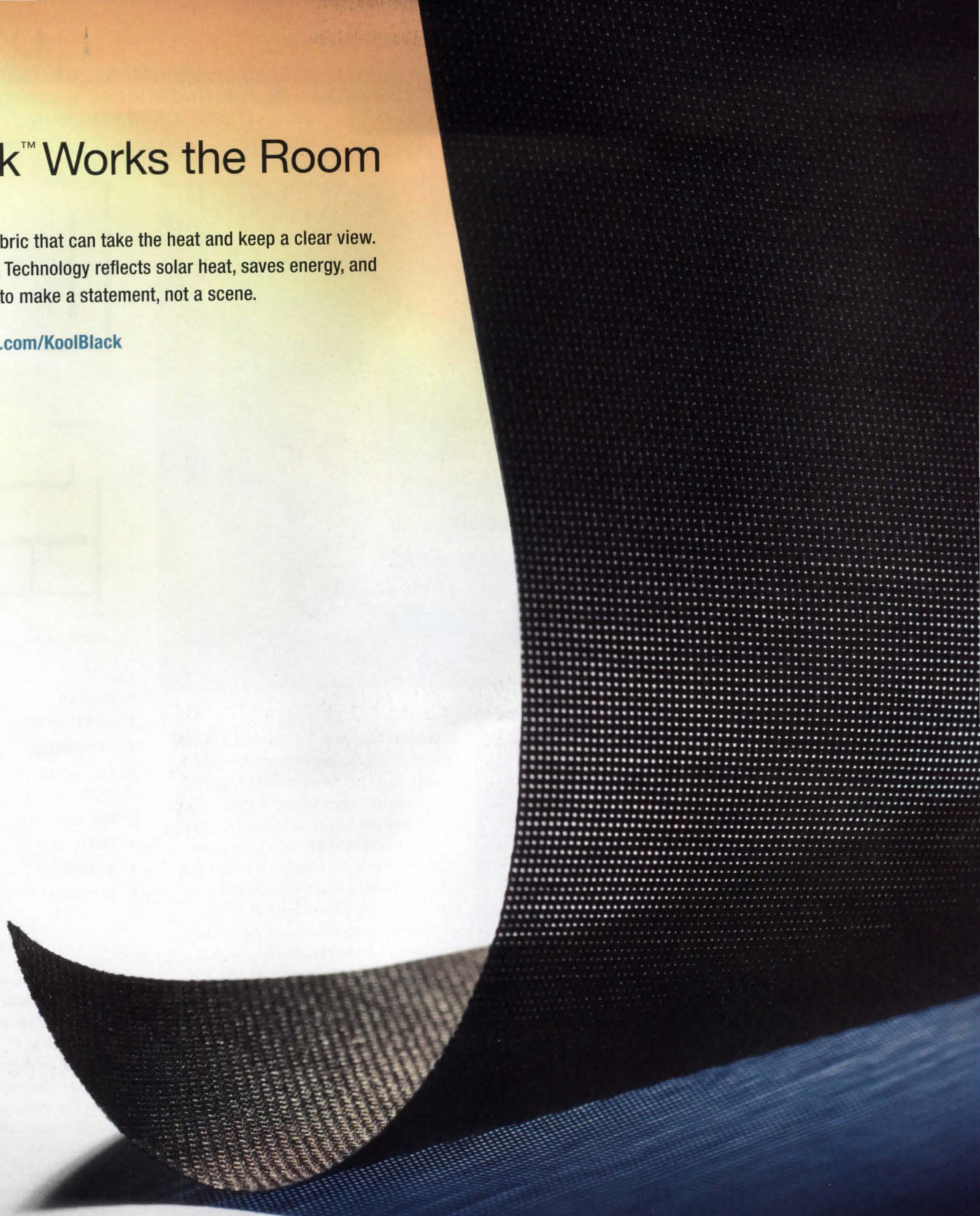

ENERGY SAVINGS

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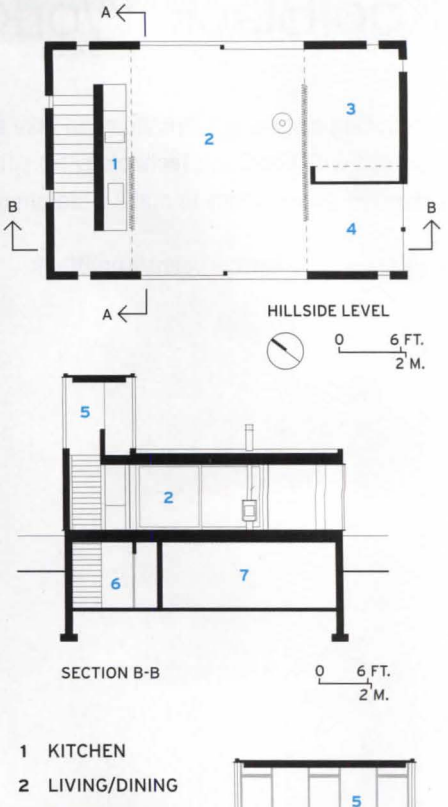
CIRCLE NO 22

perspective **house of the month**

JOHNSEN SCHMALING'S STACKED CABIN IN MUSCODA, WISCONSIN, ADHERES TO THE PROGRAM OF THE TRADITIONAL WOODED RETREAT, WITH AN EMPHASIS ON FLEXIBILITY. **BY LAURA RASKIN**



A YOUNG couple from Chicago wanted a weekend getaway in the Wisconsin woods, but their budget was "aggressively small," says Sebastian Schmaling, of Milwaukee-based Johnsen Schmaling Architects. A traditional cabin with inflexible private rooms surrounding large, common spaces was therefore not an option. The clients and the architects were also conscious of minimizing the footprint in the rural setting: a clearing that marks an old logging road in Muscoda, Wisconsin.

In order to consolidate the program, the architects stacked the functional spaces to create a house that looks like a three-dimensional L lying on its spine. By carving into the slope of a hill, they could place a garage and bathroom in a concrete base, where cedar, for entry and garage doors, adds warmth.

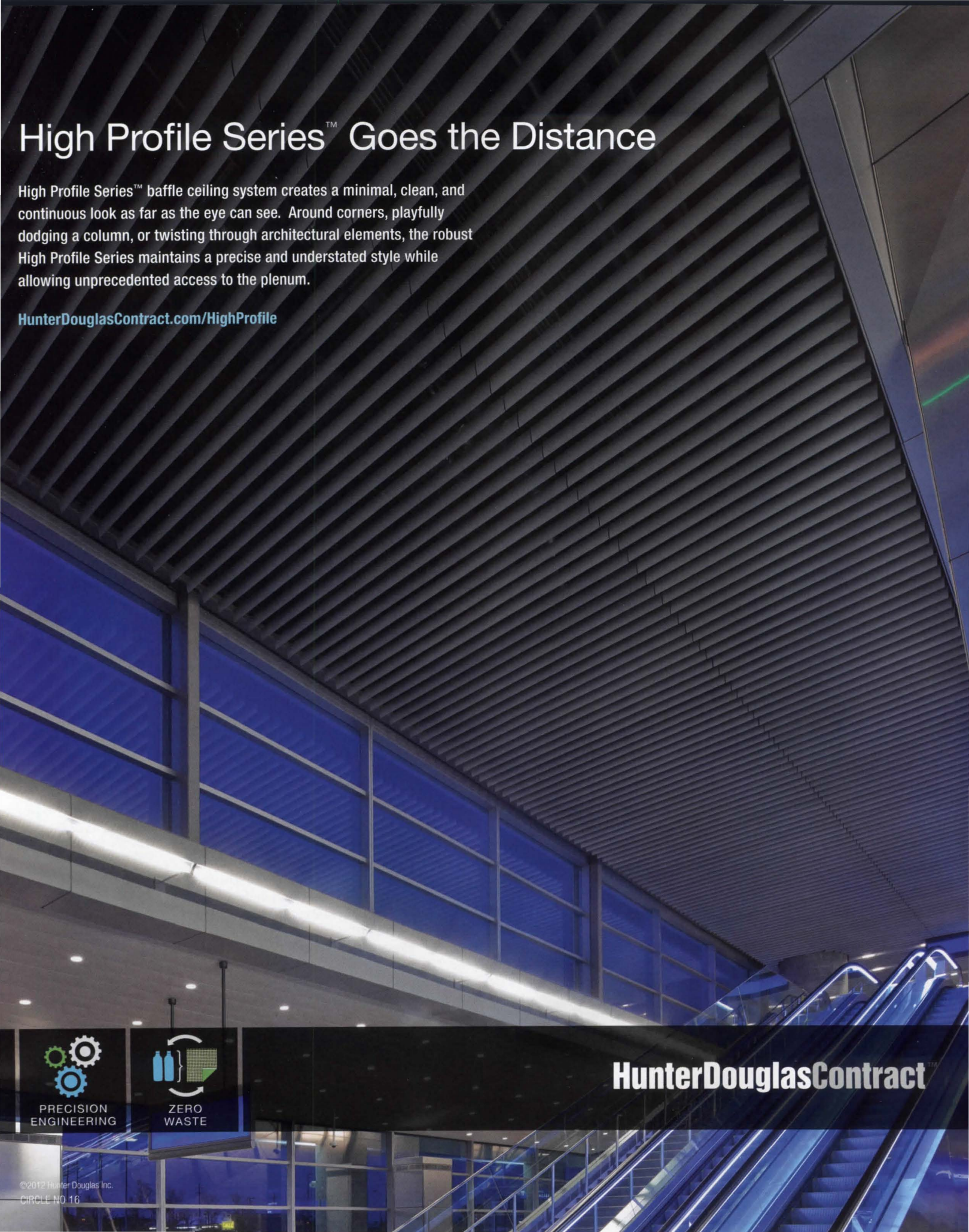
From this point at the foot of the slope, stairs lead to the main level, where floor-to-ceiling curtains partition two bedrooms from an open living and dining space. Two more curtains can be closed to conceal the galley kitchen. "On a cold winter night, you might want to sit around the fireplace and not do your dishes," explains Schmaling. Sliding glass doors open to the woods, creating a screened outdoor room in the summer. The top story, with only a third of the structure's floor plate, is an elevated observatory.

The two upper floors are clad in anodized metal panels. To avoid the rigidity of a grid, Schmaling staggered the vertical expansion joints in the concrete base so that they would not align with the joints of the metal panels and vertical windows.

This desire for a casual gesture fits well with the flexible spatial qualities of the house and the emphasis on its natural surroundings, making this a perfect place to leave it all behind. ■

FINAL CURTAIN The main living space sits at the top of a slope, affording views into the woods (top). Cedar slats protect the entry (center) from curious animal visitors. Gauzy curtains conceal the galley kitchen and bedrooms off the living space (left), eliminating the need for costly doors and hardware.

PHOTOGRAPHY: © JOHN J. MACAULAY

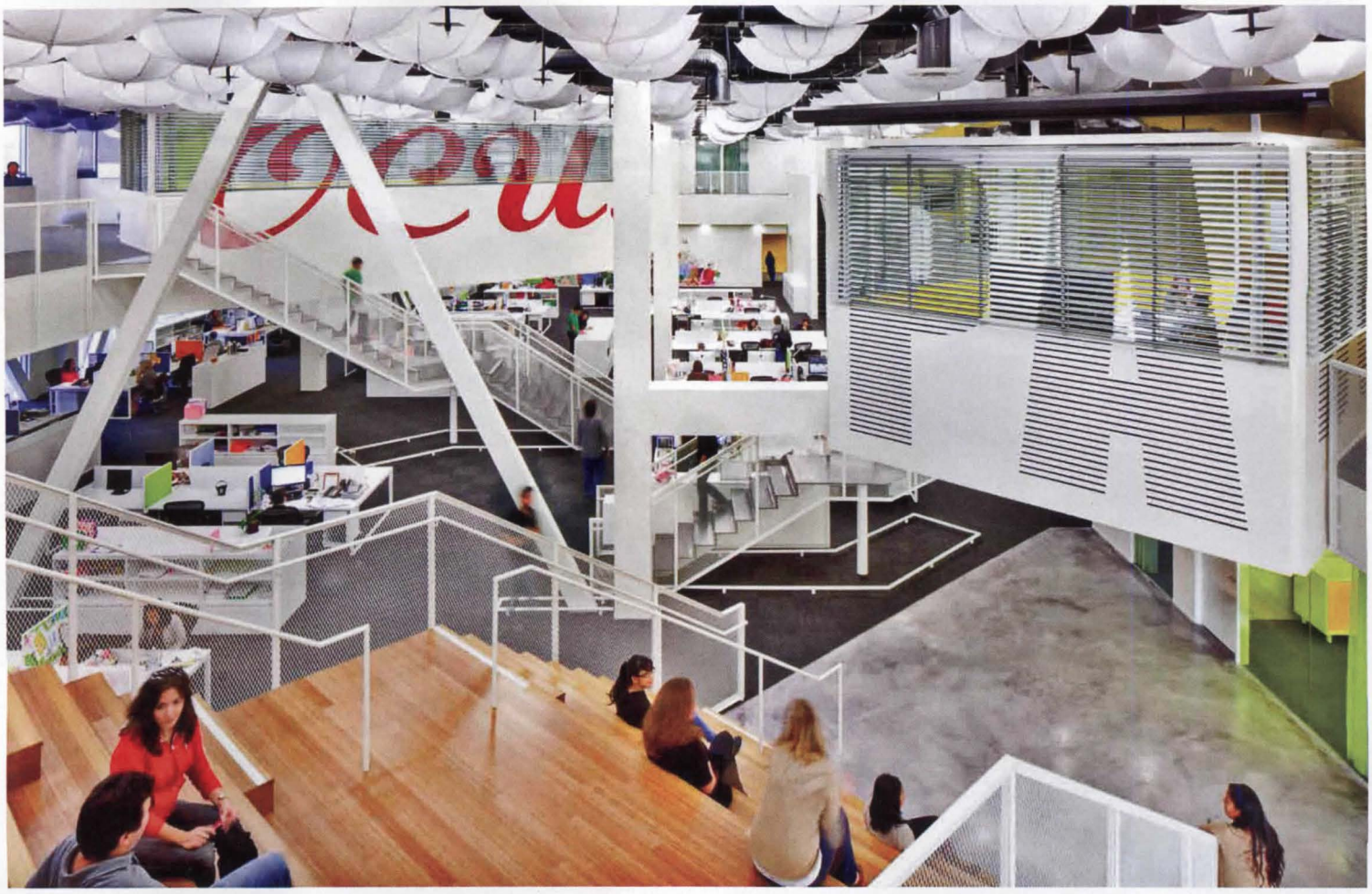


CIRCLE NO.16

Welcome to Corporate Kindergarten

Playful design is taking over the office, but are we really having that much fun?

BY WILLIAM HANLEY



IN AN EPISODE of the television show *Portlandia*, a sketch comedy that lovingly skewers the lifestyle quirks of the young and creative, a woman (played by indie rock star Carrie Brownstein) arrives on her first day at the Portland, Oregon, offices of advertising powerhouse Wieden+Kennedy. Her new boss (*Saturday Night Live* cast member Fred Armisen) calls to her from a balcony inside the former warehouse building renovated by Allied Works Architecture in 2000, asking her to join him in the "basket" for an important meeting. Struggling to follow him through a wood-and-concrete maze of stairs and catwalks leading up through the office's atrium, she stumbles through a birthday party and a basketball court, gets pelted with a Frisbee and several brightly colored exercise balls, and is besieged by colleagues urging her to engage in distractions from air guitar to "mood showering." When she finally arrives at the top floor—where she finds a meeting area set in a human-sized bird's nest—her boss asks if she was delayed because she was "having too much fun."

The sketch satirizes both the life of the creative worker, in which selling an affect requires tearing down boundaries between work and play, and its backdrop, an increasingly common design vocabulary that fosters that confusion. While contemporary workers may regularly watch *Mad Men* episodes, in which professionals of another era wear dresses and flannel suits to Miesian glass towers, they are likely to be viewing them while wearing hooded sweatshirts at offices that owe more to playgrounds and dorm rooms than boardrooms.

On the playground end of the spectrum, bright pop colors and twee graphics have brought a kindergarten feel to office interiors. They often come along with oversized furnishings, beanbag chairs, the aforementioned exercise balls, or the occasional slide—a standard in Google's offices. Rows of bleachers (Wieden+Kennedy was among the first to incorporate them) have replaced auditoriums, and they otherwise function, like the steps of a school building, as vertical circulation and places to socialize. On the dorm side, office spaces come with mismatched residential furniture, rec-room finishes, street art, bicycles, skateboards, and rooms

POP COLORS Lorcan O'Herlihy Architects transformed an existing Huntington Beach, California, movie theater into an office for advertising agency Grupo Gallegos. It is one of many recent office projects to deploy a retina-arresting palette in its interior finishes.

PHOTOGRAPHY: © LAWRENCE ANDERSON

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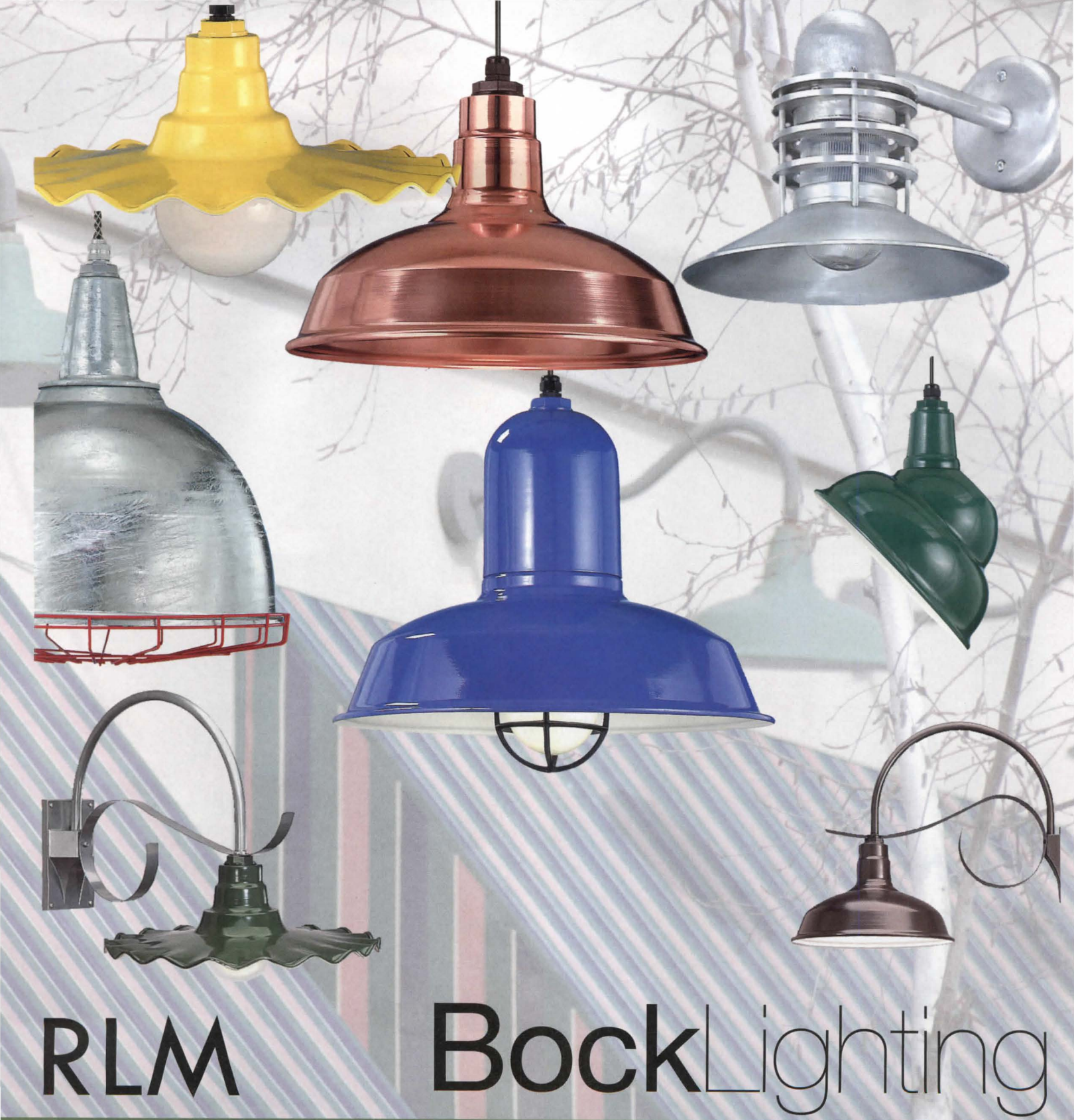

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CIRCLE 84

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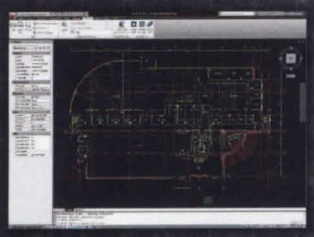

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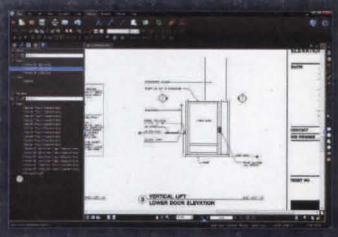

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CIRCLE 62

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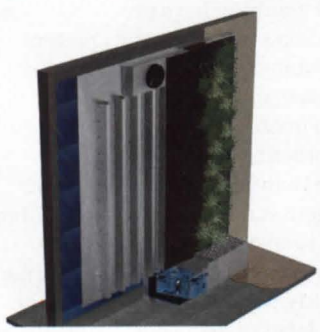

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CIRCLE 20

There Goes the Neighborhood

The Stedelijk's jarring addition strikes discord in Amsterdam's cultural enclave.

BY JUSTIN DAVIDSON

THE BATHTUB
The architect for the Stedelijk Museum extension, Mels Crouwel of Benthem Crouwel, has dubbed the wing, contoured in a white synthetic-fiber panel, the "bathtub." The controversial structure redirects the entrance of the 1895 neo-Renaissance museum designed by A.W. Weissman away from Van Baerlestraat (above) to the Museumplein (Museum Plaza).

FOR NINE years, the Stedelijk Museum has been Amsterdam's most forlorn and hopeful institution—shuttered, vacant, and in terrible need of an overhaul that was always just about to get started and would surely be finished sometime soon. Finally, all the delays have been overcome, overruns absorbed, and embarrassments set aside: The Netherlands' modern-art mecca can finally reopen. Its collection, which stretches from van Gogh to last week's wunderkind via Mondrian, Malevich, Picasso, de Kooning, and Warhol, is returning to public view. Unfortunately, the museum that contains such bounty has disappeared.

The flamboyant neo-Renaissance palazzo from 1895 hasn't vaporized, of course. Seen from the old front entrance—now the rear—its red-brick facade, striped with white stone bands and topped by fanciful Dutch gables and pyramidal turrets, looks cleaner and more exuberant than ever. But approach it from the bustling greensward of the Museumplein—or Museum Plaza—and the original building appears to be cowering behind a glossy white bathtub. This outsized plumbing fixture, clad in para-aramid, a synthetic-fiber panel, and finished with airplane paint to give it that enameled luxury look, is the long-awaited, crushingly disappointing extension designed by the Amsterdam-based firm Benthem Crouwel.

Something about this project brings out the worst in major talents. First Robert Venturi and then Álvaro Siza got the job, and both came up with unworkable designs. Now long deliberation and careful planning have produced a new wing that doubles the institution's bulk, blares its presence, and solves some internal problems while creating a whole passel of new ones for a troubled public space.

There's much to like on the inside. Visitors will have a more focused, better-lit, smoother, and more properly climate-controlled experience than they ever could before. The new Stedelijk can once again start borrowing works from other institutions, which had been loath to expose their fragile treasures to its damp and drafts. The addition touches the original building only gently, sealing the old rear facade inside the new glass entrance lobby. A double-height escalator threads through a bright yellow tube and down to a 10,000-square-foot, column-free underground gallery for really big art.

Lead architect Mels Crouwel has preserved the beloved white-brick interiors of the original, and at the same time ensured that old and new galleries flow together in a smoothly continuous sequence. The blind arcade and crown moldings remain in place at the top of the grand stair (now the school-group entrance); elsewhere, unadorned white walls float a few inches off the floor. Gone is the familiar herringbone parquet, replaced by pale wood flooring that would be the pride of a Swedish sauna.

View additional images at architecturalrecord.com.

There's a conceit at work here: The seamless integration of the old and new interiors correlates with the seamless sheen of the new building's envelope. In theory, the defiant juxtaposition in architectural styles highlights the continuity of the artistic experience. But this reasoning seems awfully gaseous when you're confronted with the way the building asserts itself on the city.

The museum borders the Museumplein, a vast open plaza where for more than a century Amsterdammers have gathered to ice-skate, listen to concerts, protest, or just loll in the sun. The square has had a tortuous evolution. At the end of the 19th century, as Amsterdam expanded, city fathers envisioned not just a national museum—the Rijksmuseum—but an entire cultural district, organized around an ample park. Vienna was opening its Ringstrasse, Paris its Haussmannian boulevards, and New York was erecting a massive Metropolitan Museum with an 800-acre backyard called Central Park. Amsterdam built three cultural châteaux: the Rijks- and Stedelijk museums and the Concertgebouw, home of the storied royal orchestra. The great green mall that stretched between these national homes of art and music had to negotiate a change in orientation, since the Concertgebouw turned its facade coquettishly aside to conform to a new street plan. Perhaps it's that slight kink that has allowed successive generations to nibble at the park's borders and muddy its symmetries.

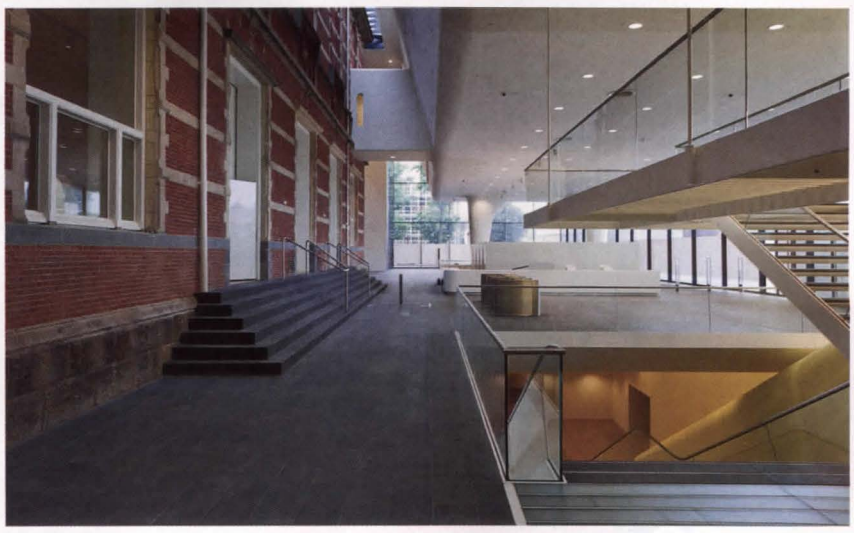
The Museumplein has been designed, destroyed, redesigned, and tinkered with, blurring the gracious original almost beyond recognition. Invading German armies filled it with bunkers. Postwar planners ran a multilane highway through it. In 1973 the Van Gogh Museum expanded into the park with Gerrit Rietveld's severe brick block, then did so again in 1999, with an appalling addition by Kisho Kurokawa. In the 1990s the landscape architect Sven-Ingvar Andersson had tried to clean up the mess. He replaced part of the roadway with a reflecting pool and greened over the rest—but he also sliced up the square with light paths that killed off symmetry once and for all. Andersson's boldest move was the *ezelsoor* (donkey's ear), created by peeling up one corner of the lawn above a buried supermarket. On one side is an attractive and popular grassy slope; on the other—the side facing the Stedelijk—is a grim, blank wall.

Andersson had handed Crouwel his greatest challenge. Instead of opening expansively onto the Museumplein, the new entrance would be staring into the wrong side of the donkey's ear. Worse, the people hanging out on the inclined green would have their backs to the museum. So instead of building out to the property line, Crouwel put half the new gallery space (plus an auditorium) on an upper floor and buried the other half, leaving the ground level for a plaza sheltered by an extravagantly cantilevered canopy. There is talk of keeping that outdoor area buzzing with activities. But left alone, the plaza, which is bounded by the glassed-in lobby and that unfortunate wall, seems likely to become an isolated and needless appendage to a grand civic square. Crouwel's design practically acknowledges as much: At one end of this potential dead zone, he has plunked a freestanding mechanical tower and loading dock that generally gets cropped out of photos but can't be edited out of existence.

The new Stedelijk's ungainliness is especially mystifying because few old cities have hitched their future to new architecture as decisively as Amsterdam. It's been expanding in every direction, most dramatically into the northern archipelago of artificial islands, where what were once green smudges on a gray horizon have sprouted crystalline structures. The Eye, a just-opened film museum by Delugan Meissl Associated Architects, swoops down to the water, and the future Palace of Justice by Claus en Kaan Architecten rears energetically above it. Old brick warehouses peek out from within new apartment complexes, idle piers sprout fresh neighborhoods, and 17th-century houses stand alongside modernist lofts. This is a city that takes its history and urbanism seriously.

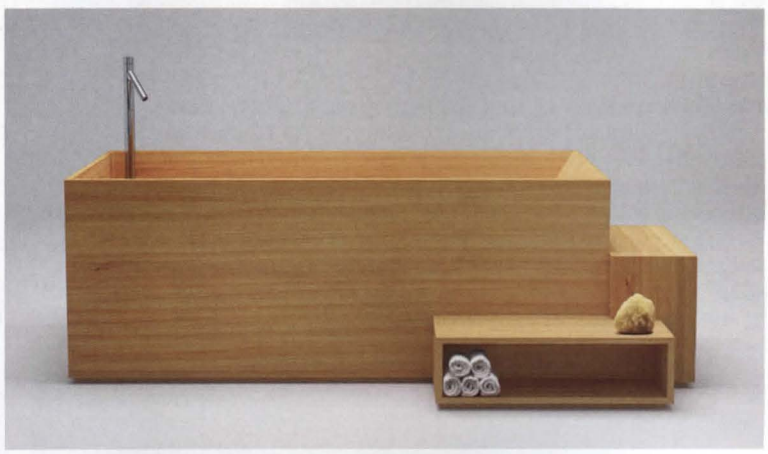
Crouwel has tried to honor that tradition by establishing a new equilibrium at the Stedelijk Museum, balancing fussy masonry with sleek industrial surfaces, ornamental curlicues with aerodynamic curves, and earthy color with white glare. If this were a movie about shackled strangers who discover how much they have in common, it would feel unbearably contrived. The new museum is an architectural odd couple, a pair of mismatched buildings trying to ignore the fact that they are joined at the hip. ■

Justin Davidson, a Pulitzer Prize–winning critic, writes on both architecture and music for New York *magazine.*



WHITE APPARITION The new entrance for the Stedelijk is now at the former rear of the old museum where the new wing extends out to the Museumplein (below). The light-filled lobby contains an escalator and stair that take visitors to a column-free lower-level gallery (bottom). There, much of the modern art will be on display in spaces that have no daylight.

partially cut away to echo the shape of water drops. Bisazza expects the collection to be available in the U.S. by the beginning of next year.
bisazzabagno.com CIRCLE 200



RINSE AND REPEAT Clockwise from top: A washbasin made of Cristalplant with a white varnished-brass tap sits in a steel structure covered with solid larch wood (mirror shown with a larch-wood frame); a

Axor Bouroullec

For their first Axor bathroom collection (right), Paris-based designers Ronan and Erwan Bouroullec have created an adaptable, modern line including faucets, washbasins, a bathtub, shower components, and accessories. The new designs permit interior designers and architects to create custom spaces with standard Axor products. For example, faucets can be freely arranged within the washing area—integrated into the shelves (where the water seems to flow from the ledge), in front of or next to the sink, or on the wall. An online design tool lets designers experiment with 40 interchangeable components to create spaces for individual needs. hansgrohe-usa.com CIRCLE 201

Kerdi-Line

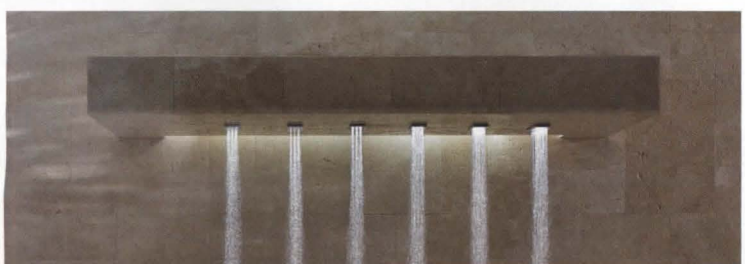
The Kerdi-Line drain (left) is a low-profile alternative to traditional shower drains. Kerdi-Line can be installed adjacent to walls or at intermediate locations in wheelchair-accessible showers, wet rooms, and other applications that require drainage. Since the floor can be sloped on a single plane to the drain, designers can more easily use larger-format tiles. The drain features an adjustable brushed stainless steel grate frame in a square trim design to accommodate a range of tile thicknesses. kerdi-line.com CIRCLE 202

ICU Sink

The ICU hand-washing sink and faucet system (above) from American Standard is designed to minimize splashing and create a more hygienic environment. The vitreous china bowl features a deep, sloping profile, while the hands-free gooseneck faucet spout directs the water flow to the sink's slanted back wall; a laminar-flow device in the spout prevents air being drawn into the water stream. The permanent EverClean surface inhibits the growth of stain- and odor-causing bacteria, mold, and mildew on the surface. americanstandard.com CIRCLE 203

Viking D3 Series

The Viking D3 line (left) features 24 color options, from basic stainless steel to bright green, and a patent-pending customization that allows customers to replace the standard polished chrome knob and handle inserts with wood or custom-painted clear acrylic inserts that can match any cabinetry or decor options. The standard inserts can be reinstalled at any time. The D3 line includes ranges, cooktops, built-in convection ovens, microwaves, warming drawers, ventilation, dishwashers, and a French-door fridge/freezer. vikingrange.com CIRCLE 204



Horizontal Shower

Wine Storage

Seattle-based Henrybuilt aims to fill the gap in the cabinetry market between modular European systems that appear too clinical and custom designs that look too homey. Henrybuilt has recently expanded its line to include wine storage (left) that can be configured to hold any number of bottles at a precise angle. Each system is built by hand to order within a 12-week lead time; the system can be used for either room-temperature storage or for longer-term storage in a conditioned environment. The back panels and support bars are available in American black walnut, rift-cut white oak, teak, wenge, Corian, or PaperStone. The rods come in brushed or anodized aluminum. Shown here is a back panel and storage unit in American black walnut and rods in brushed aluminum.
henrybuilt.com CIRCLE 206

CTline

The Milan-based Bulgarian architect Victor Vasilev was inspired by the profiles of buildings in big cities for his design of the CTline storage system (right) for Boffi. Featuring vertical units with shelves that work as "staggered floors" in different heights and depths, the design creates a composition with an irregular profile. Available in the U.S. through Boffi showrooms, the system is made of a matte white Betacryl solid-surfacing material and can be used anywhere that open storage is needed. With a mirror placed on the inclined front side (upon request, and not visible here), the storage can also function as a vanity.
boffi.com CIRCLE 207

Delos Bathroom Furniture

The Delos bathroom-furniture collection (above) is the latest design for Duravit by the Viennese design firm EOOS. The handle-free cabinets feature slightly overlapping doors; all the drawers offer push-open technology. The console's hidden support system makes it seem to float, and the mirror and console together form a flat surface crowned by a canopy of indirect, nonglare LED light. Delos is available in two wood finishes—dark walnut (shown) or light oak—as well as a high-gloss white lacquer. Delos coordinates with all of Duravit's ceramic ranges.
duravit.us CIRCLE 208

Numerouno

A homage to the retro/modern style of the mid-century kitchen, the Numerouno cabinet system (right) from the Italian manufacturer Doimo Cucine features curved corners and streamlined volumes that seem to float above the floor. Designed by Romano Giacomazzi, the system is available in a range of 32 colors in glossy or matte lacquer, with or without handles. The handle-free version comes with .8"-thick doors and faces in glossy glass or satin lacquer in seven color variations. The door with rounded corners, exclusively available in a 23.6"-wide option, is hinged on its curved side.
doimocucine.it CIRCLE 209

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CIRCLE 51

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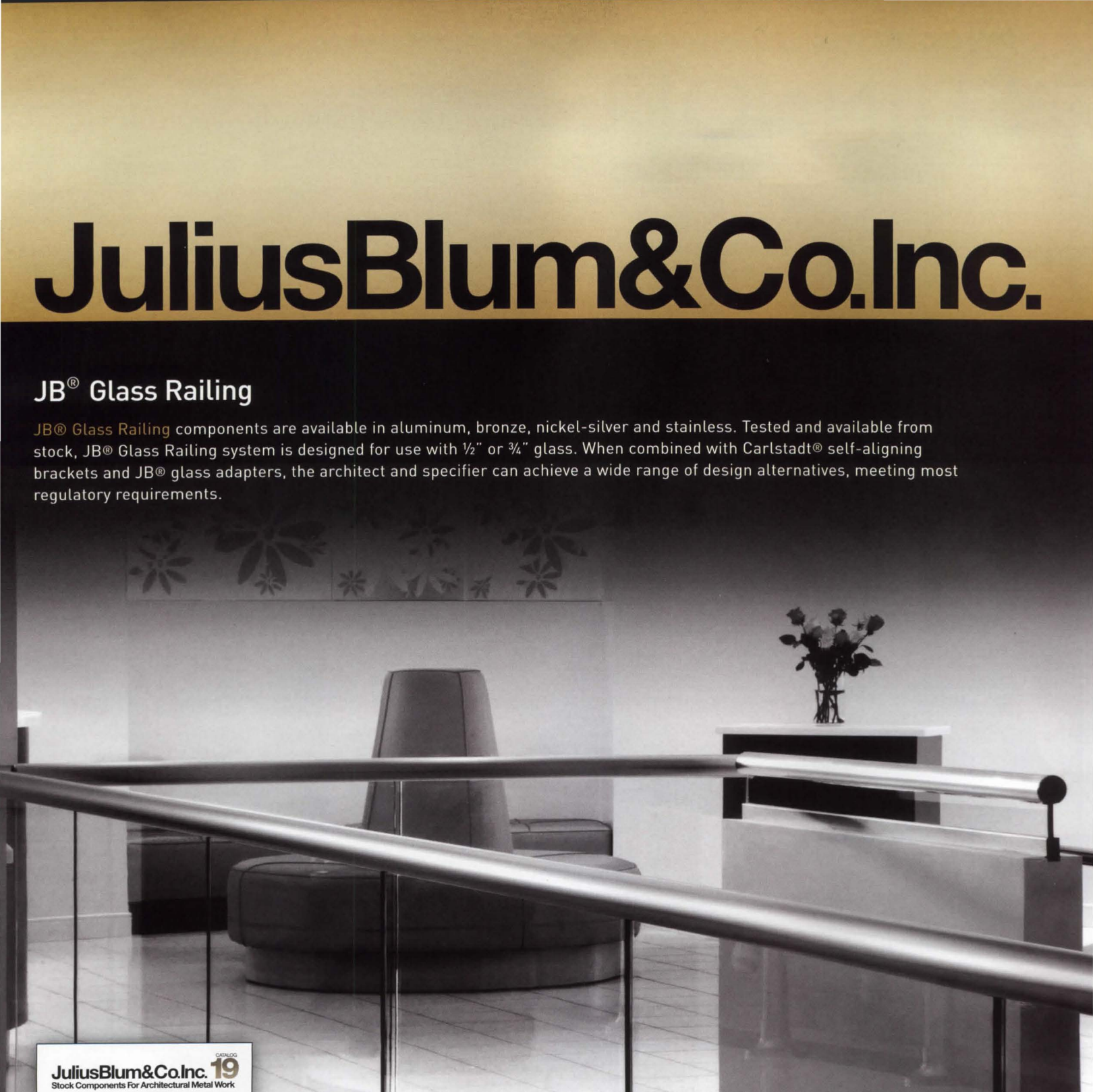

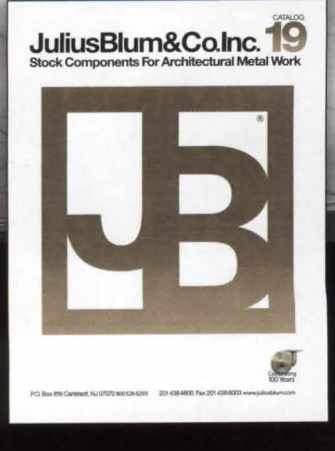

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CIRCLE 33

Record Interiors 2012

An antidote to the growing cacophony of visual noise surrounding us, this year's Record Interiors features seven projects that are refreshingly quiet, focused, and well crafted. Homing in on what's essential, the designers and architects are unapologetically minimalist in their strategies. Yet none resorts to cookie-cutter austerity. Each solution is uniquely tailored to its client, program, and context—19th- and 20th-century landmarks, a high-rise apartment, a new industrial-style structure, and a commercial space—fusing with the existing architecture but never overshadowing it. These contemporary living and work environments are standouts that we know will endure the test of time.
Linda C. Lentz

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LOGAN PRODUCTION STUDIO, NEW YORK CITY

100% Chocolate Café | Tokyo | Wonderwall

RAISING THE BAR

Blending subtle kitsch with an array of classic materials, a Tokyo firm spins its client's specialty with alluring results.

BY NAOMI R. POLLOCK, AIA

HIGH PROFILE Meiji's new café is front and center, with an entrance and clear views inside from the outdoor plaza of the Tokyo Skytree tower (this page), and a back door into the Tokyo Solamachi mall (opposite).

PHOTOGRAPHY: © NACASA & PARTNERS

Meiji is Japan's largest chocolate manufacturer, and its 100% Chocolate Café, designed by the Tokyo-based firm Wonderwall, is a cocoa connoisseur's dream come true. In addition to dominating the menu, Meiji's mainstay is the defining element of the café's architecture. A transparent refrigerator showcasing tubs of chocolate greets patrons upon entry; walls of wrapped chocolate squares tile the sales section; and an open kitchen, where chocolate concoctions are prepared before customers' eyes, presides over the seating area. Most delectable of all, a spectacular suspended ceiling that replicates Meiji's iconic *itachoco* bar in wood covers the room with chocolate.

Opened in May 2012, the café is Meiji's second foray into retail. The first came about in 2004 when the company rebuilt its headquarters in the heart of downtown Tokyo. Going head-to-head with the luxury chocolatiers launching boutiques citywide, Meiji hired Wonderwall to create a street-level shop in its new building. According to Hiroshi Harada, manager of Meiji's Business Development Team, the combined shop and café, based on the idea of a "chef's table in the kitchen," establishes direct contact between the mass-market manufacturer and its customers, minus the prices of the high-end brands.

The immediate success of the flagship inspired thoughts of a second outlet—but only if the company could find an appropriate venue. That opportunity arose with the construction of Tokyo Skytree, a 2,080-foot-high broadcast tower looming over a low-scale neighborhood east of the Sumida River. The building was poised to make its mark on the city's skyline and become a hot tourist spot. To lure visitors, the developers built Tokyo Solamachi, a 312-store mall, at the tower's base. When a 1,956-square-foot space with direct outdoor access became available, Meiji moved forward with its plan. "It is not just a shop inside a mall," explains Wonderwall founder Masamichi Katayama. With two exterior exposures, one directly opposite Skytree's elevator lobby, the café is practically an independent entity.

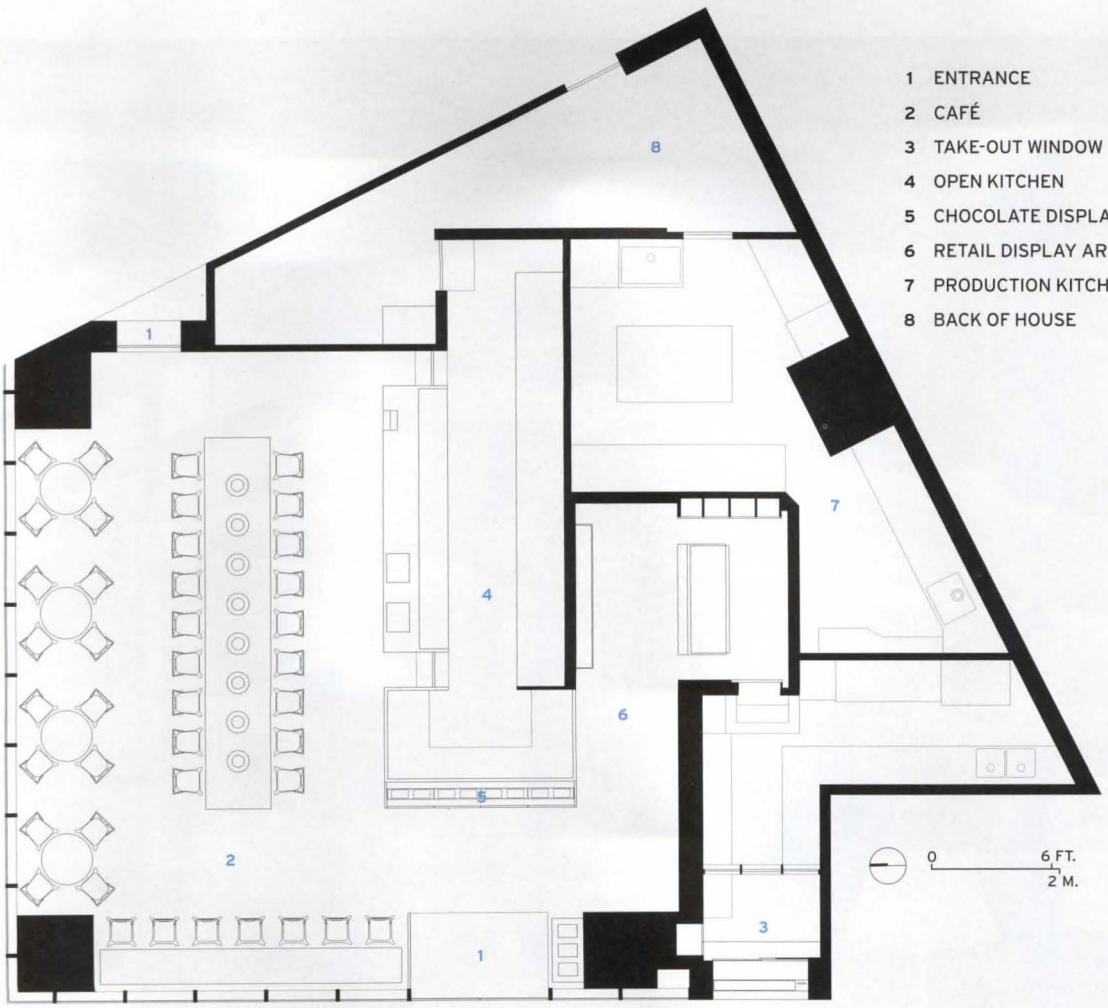
Incorporating the building's window walls as mandated by the developer, Katayama put a take-out counter and the shop's main entrance on Skytree's front, pedestrian plaza. (A secondary door at the back of the store connects to the mall interior.) He organized the café itself into three different seating areas with a central, open kitchen that separates it from a retail section behind. Then he installed another, concealed kitchen, connected to the first by a pass-through, where ingredients are prepared from scratch daily. This area mediates the café's rectilinear layout and the irregular geometry of the raw space.

Though the base building's 16-foot-high gross ceiling height offered plenty of design opportunities, the four reinforced-concrete columns at the perimeter could not be budged. To diminish their presence, the designer covered both the 33-inch-square columns and the adjacent walls with white, 4-inch-square glazed tiles normally used in home kitchens. Wood floors, stainless steel counters and cabinets, and the "skeleton refrigerator" underscore Katayama's "open kitchen" concept.

One of the project's signature elements, the full-height glass case chills 56 individual bins of chocolate, each a different flavor developed by the client. Parlaying an architectural detail into a successful marketing tool, the vats, which are identified by name and number, correspond to the chocolates for sale. Their bright, candy-colored wrappers, along with the café's logo, are the products of the graphic-design studio Groovisions.

While the retail side caters to Japan's voracious appetite for souvenir shopping, the seating area, with its chocolate-brown Tolix chairs, accommodates groups of various sizes. In addition to the seven-person stainless steel bar at the window facing Skytree, 32-inch-round white marble tables fit groups of four, and a 19-foot-long communal gray-veined slab, running parallel to the kitchen, seats up to 20. Invisible

SWEET SURROUNDINGS
A wooden replica of the company's *itachoco* bar, the well-crafted dropped ceiling neatly conceals the room's mechanical and electrical systems from the patrons seated at the marble tables below.



FLOOR PLAN

CLEAR DIVISIONS The refrigerated display case backs onto the open kitchen and separates the casual dining area of the café from its colorful retail section. Containing 56 bins of chocolate—each with a different flavor—the full-height glass unit provides a deliciously transparent foil for the rich walnut ceiling above.

credits

INTERIOR DESIGNER: Wonderwall – Masamichi Katayama, principal in charge

CONSULTANTS: Plus Y – Yasuhara Masaki (lighting design); Groovisions (graphic design)

OWNER: Meiji

GENERAL CONTRACTOR: D. Brain

SIZE: 1,956 square feet

COST: withheld

COMPLETION DATE: May 2012

SOURCES

LIGHTING: Flos (table lamps); Maxray (halogen downlights); DN (fluorescent); Luci (LED); Complex Universal Furniture Supply (cast-aluminum pendants)

CHAIRS: *Tolix*

wood underpinnings support the heavy top from below and secure a row of glass-shaded lamps affixed to the tabletop that softly illuminate and separate strangers sitting opposite each other.

Elsewhere, rows of decorative pendants—simple globes above the counter seating and vintage-inspired fixtures above the kitchen—contribute to the cheery atmosphere. Thanks to the glass facade, the room is filled with daylight, augmented by halogen downlights mounted in the ceiling—the only surface where Katayama could really go to town.

A thick slab of mouth-watering walnut wood articulated with a chunky, chocolate-bar-like grid, the nearly foot-deep dropped ceiling unifies the café. It also conceals the mechanical and electrical equipment, such as fire-protection, lighting, and air-conditioning systems (the on-site chocolate preparation prohibits room temperatures above 75 degrees Fahrenheit); and, although the indirect fluorescent lighting around the ceiling structure makes the suspended plane appear to be floating, it requires a steel-box frame to hold its heavy construction in place.

"The ceiling is a little 'pop,'" concedes Katayama with a grin. One would not expect anything less from Wonderwall, but this isn't Hello Kitty kitsch. The 100% Chocolate Café at Skytree tastefully creates a new consumer outlet without challenging the image of the established chocolate manufacturer. ■

Naomi R. Pollock is a Tokyo-based architect and special international correspondent for RECORD.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Logan | New York City | SO-IL

SHEER WALL

The New York office for a production company exploits the architectonic potential of scrim.

BY SUZANNE STEPHENS

VIRTUAL SPACE Thick but diaphanous "walls" of white nylon divide office spaces, allowing daylight to permeate the interior (this photo). The two layers of scrim, attached to steel portals, enshroud rows of white cast-iron columns. A single layer of the scrim along one outside wall cuts glare.

PHOTOGRAPHY: © IWAN BAAN

CONTINUOUS PLANE Two white tables topped with a seamless solid surface extend 65 feet down the length of both workspaces. At the end of one table in the inner workspace (right), two layers of glass divide offices for acoustical privacy. The pattern of reflected windows in the exterior walls adds visual ambiguity to glazed partitions.

How do you design a workspace that expresses the digital world of flux and virtual reality? Think diaphanously. Or that is how the Brooklyn-based architectural firm Solid Objectives—Idenburg Liu (SO-IL) approached the configuration of new offices in New York City for Logan, a production company involved in commercials, video games, and feature films. "The way we work is very fluid," says Alexei Tylevich, owner and managing director of Logan. "It's important to have a place that reflects that."

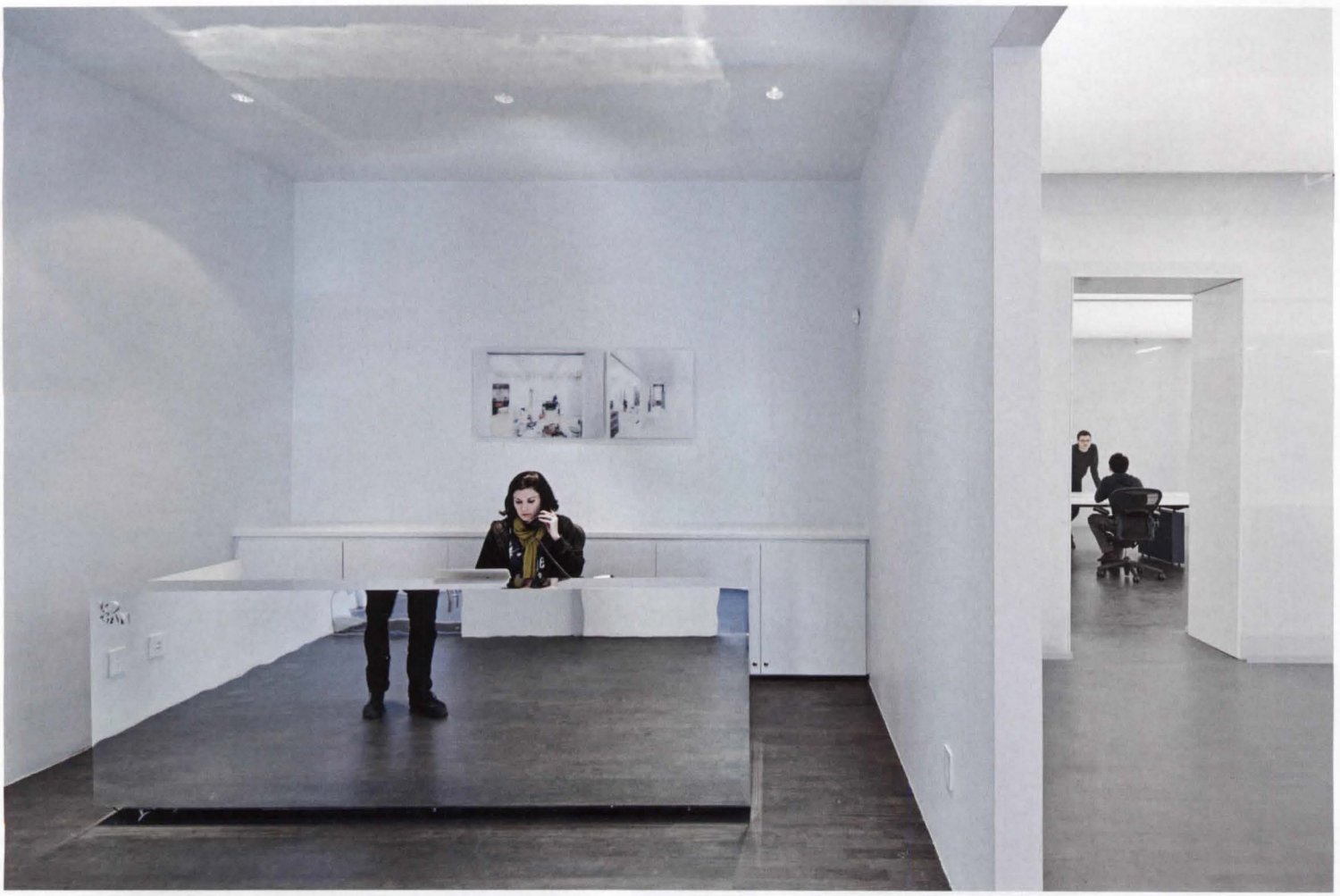
SO-IL—founded in 2008 by Dutch-trained architect Florian Idenburg and Chinese-born, U.S.-trained architectural partner and wife Jing Liu—responded with a scheme in which nylon scrim plays a dominant role in defining the interior. Idenburg and Liu, who met when they were working at the architecture firm SANAA, have shown a distinct predilection for ethereal, free-form structures. In recent months their K3 for Kukje Gallery in Seoul gained attention with a gray chain-mail carapace enveloping a concrete structure (RECORD, July 2012, page 68). In May their snakelike temporary white vinyl tent for the Frieze Art Fair in New York garnered more notice. Not surprisingly, when photographer Iwan Baan introduced Idenburg to Tylevich, the two found a commonality of vision: abstract, surreal—and blurry.

To accommodate Logan's team of producers, filmmakers, designers, artists, and animators, the architects took translucency as the starting point for the bicoastal company's SoHo office. "We wanted to deviate from the standard dark-hole video workspace," says Ilias Papageorgiou, SO-IL's associate principal in charge of the project.

Working with 6,500 square feet in a landmarked cast-iron loft building dating from 1867 at the corner of Greene and Grand streets, SO-IL created two long, rectilinear work areas separated by a dividing wall of double layers of white nylon scrim. Affixed to steel portals that give access from one space to the other, the layers enshroud a long row of cast-iron columns, painted white. (This same type of thick but lightweight "wall" separates the innermost workspace from a corridor connecting service functions along the eastern perimeter of the office.) "The fabric walls not only diffuse the light but, like a projection screen, change colors as natural light changes throughout the day," notes Papageorgiou. The client remarks that the fabric also gives its occupants easy visual access to other areas. "The space is translucent and mysterious," Tylevich says. "You feel both exposed and hidden at the same time."

In addition, the seamless nylon fabric, 14 feet high, stretches the length of the peripheral brick wall punctured by large windows along Greene Street. It not only mitigates the sun's glare, but recasts the interior architectural elements of the original structure as haunting apparitions of its 19th-century past, replete with shadowy traces of heating pipes and window mullions.

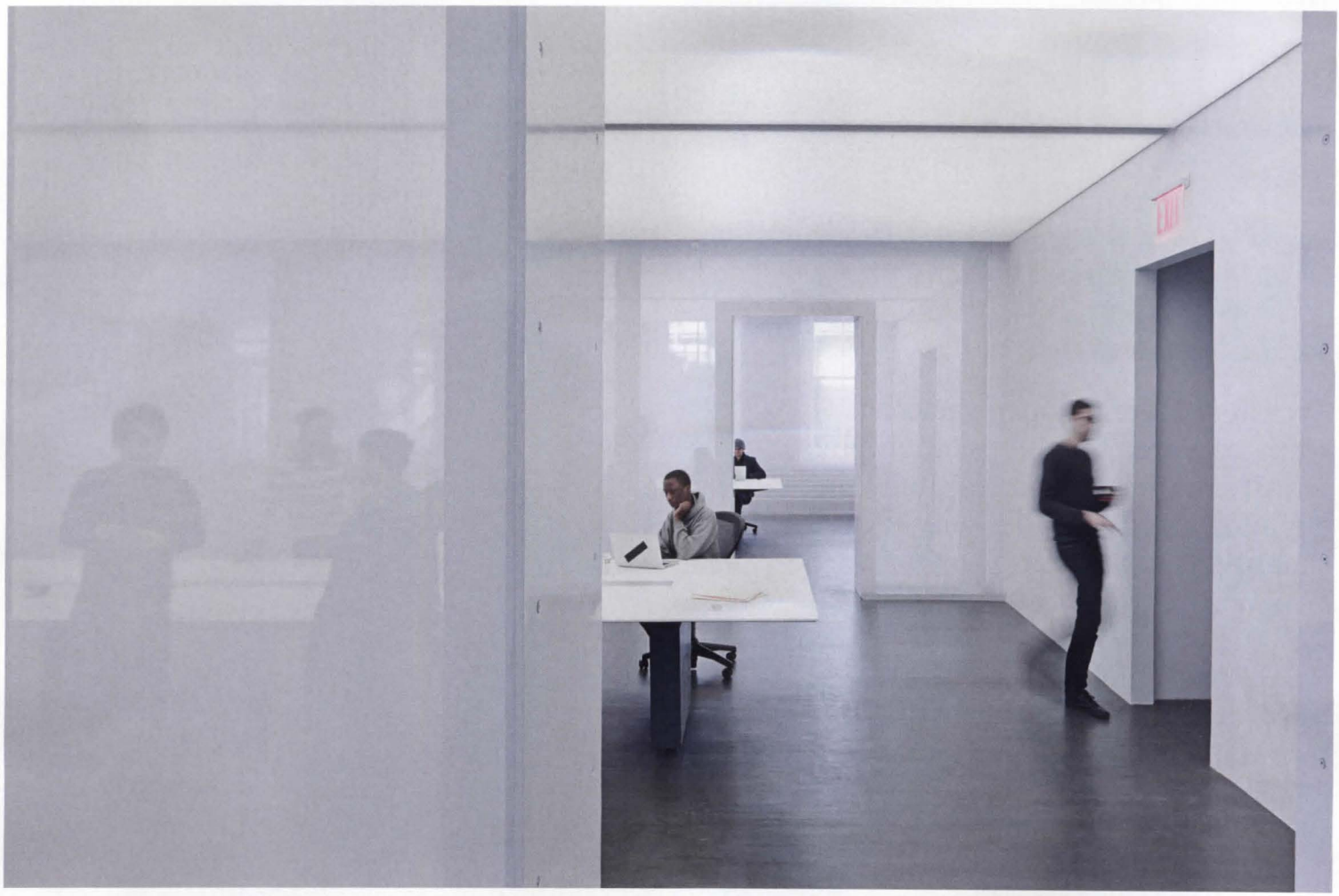
Down the middle of each of the two rectilinear workrooms run 65-foot-long, 5-foot-wide, solid-surface worktables on custom-designed metal bases. They can permit up to 55 nomadic designers to sit communally at the computer stations; many of them, assigned on a project-by-project basis, linger only a few days. The superlong refectory-like tables, the owner notes, encourage the exchange of ideas and information among the itinerant designers.



FLOOR PLAN

1 ENTRY
2 RECEPTION
3 WORKSTATIONS
4 CONFERENCE ROOM
5 OFFICE
6 EDITING BAY
7 RECORDING ROOM
8 SERVER ROOM
9 KITCHEN

LUMINOUS
Daylight, admitted from the south and west walls in the corner office space, permeates the interior (opposite) through an ethereal haze of scrim. "We wanted to avoid glare on the computer screens," says SO-IL's Ilias Papageorgiou. The reception desk at the entrance (above) is clad in aluminum to bounce indirect light, while the existing wood floor is painted gray with an ebony finish to ground the white interior with a smoky, planar surface.



To provide two acoustically private offices plus a conference room, SO-IL installed single-pane, low-E glass partitions at the south end of the two workrooms overlooking Grand Street. The long white tables, for which Brooklyn-based Situ Studio joined 10-foot lengths of the solid-surface tops with glue to make them appear seamless, virtually shoot through the glass partitions in a continuous path that perceptually extends the workspace. "Connection to the outside and natural light were really important for us," says Papageorgiou.

Along with the scrim, the design team heightened the ghostly ambience by stretching backlit white polyvinyl chloride (PVC) ceiling panels onto frames suspended above the tables. "The subtle interplay of light changes throughout the day and feels gentle," Tylevich comments. "Then the backlit ceiling becomes the dominant source of illumination at night—like a futuristic film set." In addition, Studio Hoon Kim gave the solid wall surface along the north edge of the workspace a sheen from bounced light by treating it with a venetian plaster before coating it with silver wax.

SO-IL did include a few (literally) dark notes: The existing wood floor was painted gray with an ebony stain to create a funereal, smoky plane. The firm swathed walls in the editing suites in thick gray felt to provide total sound isolation.

Logan's interiors offer flexibility and serenity to its itinerant workers and permanent staff in a minimal, uncluttered, evanescent space. It does so happily without resorting to the faddish playpen/dorm-room design of so many high-tech offices today (see "Welcome to Corporate Kindergarten," page 36). This crisply low-key but memorable workplace demonstrates that it's not necessary to indulge in infantilization to be perceived as youthful. SO-IL and Logan both dare to pose an alternative to the corporate-office look without, as Tylevich notes, "being loud or vulgar." ■

credits

ARCHITECTURAL DESIGNER: Solid Objectives-Idenburg Liu (SO-IL) – Florian Idenburg, Jing Liu, partners; Ilias Papageorgiou, associate principal in charge; Danny Duong, Nicole Passarella, Takuya Iwamura, design team

ARCHITECT OF RECORD: Formactiv

GENERAL CONTRACTOR: Katsura Construction

CONSULTANTS: Situ Studio (work-surface fabrication); Studio Hoon Kim (plaster walls); Lighting Workshop (lighting)

SIZE: 6,500 square feet

COST: withheld

COMPLETION DATE: January 2012

SOURCES

NYLON FABRIC: Gerriets (Trevira)

SOLID SURFACING: LG Hausys

STRETCHED-PVC CEILING: Newmat

FELT WALLS FOR EDITING SUITES: Felt Studio

Studio SC | São Paulo | Studio MK27

GARDEN OF HIDDEN DELIGHTS

Architect Marcio Kogan tucks a studio devoted to food photography within an industrial-style shell and expands its possibilities with a wall that opens to a secret courtyard.

BY HATTIE HARTMAN

Located in São Paulo's Vila Olimpia neighborhood, Studio SC is a temple to food, or, more precisely, to food photography. It is also the ultimate expression of Brazil's current economic prosperity, and epitomizes a city where eating well is a serious business. Though it is primarily a working photo studio, the facility is also used for staging receptions and food demonstrations by and for the Paulista glitterati—including celebrity chef Alex Atala of the city's top-rated restaurant D.O.M.—in a luxurious setting where garden, interior, and roof terrace converge seamlessly.

The studio, designed by São Paulo–based architect Marcio Kogan and his firm, Studio MK27, is housed within a white metal shell inspired by the neighborhood's industrial past. The building's minimalist street facade provides a surprising counterpoint to the exquisitely detailed materials within. When visitors arrive, they are typically directed to a discreet double security door by a voice from an intercom—a reminder that São Paulo is a city where much takes place behind secure walls. They enter into a beautiful and boldly landscaped courtyard that runs the full length of the 143-foot-long site. Realizing that photography studios do not need windows, the architects cleverly opted for a narrow, 41-foot-wide single-aspect building that opens along its entire north side to embrace the 25-foot-deep garden, which is more an outdoor room than an ancillary space. A large gate in the *street wall swings* in to welcome guests (and deliveries) directly into the garden for gala events.

Sliding doors, just short of 10 feet high, separate the outdoors from the studio's main interior area, a spacious open gallery for photo shoots, flanked by a pair of double-height,

OUTDOOR ROOM The windowless building actually houses a structure within a structure that opens along one side to embrace a charming garden, providing ancillary space for photo shoots and events.

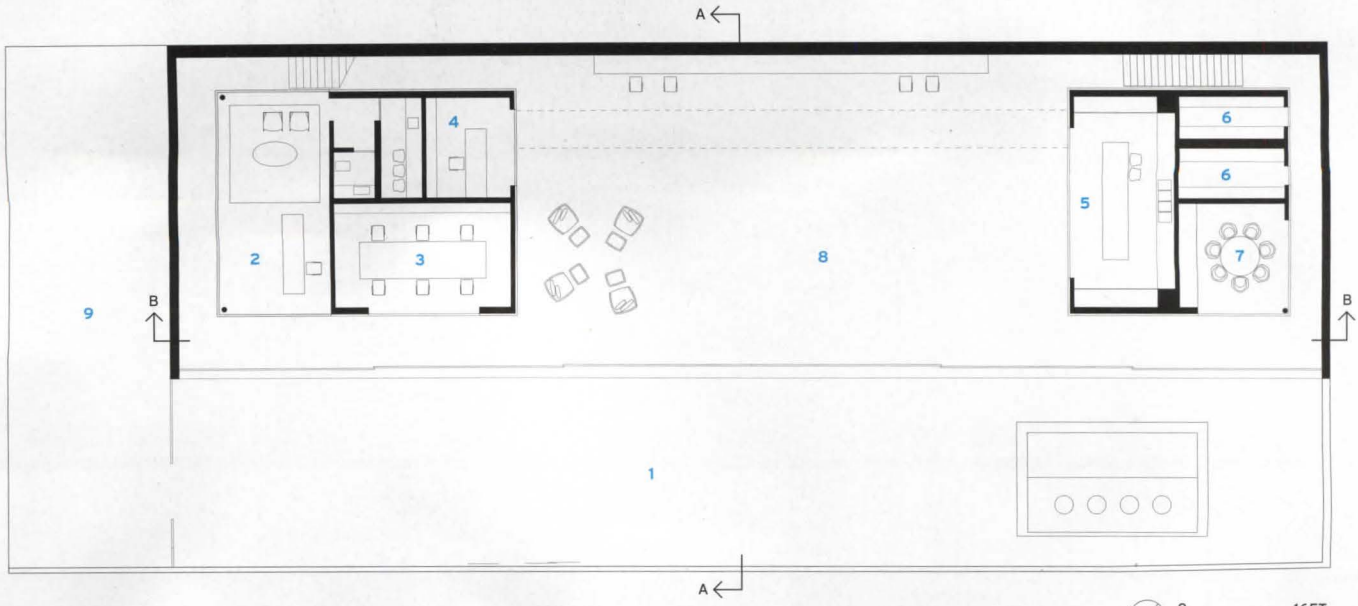
PHOTOGRAPHY: © NELSON KON

boxlike structures that are simultaneously linked and punctuated by a slender concrete bridge. Made of custom panels and bifold doors of freijo, a Brazilian hardwood that contrasts with the building's gray terrazzolike concrete floors and limestone threshold, the two side volumes contain private office and conference areas on the upper floors and production spaces on each side of the ground level.

The building's parti reveals itself to visitors on the upper floor, where they can see it is all a pretext to cross from one side of the studio to the other via the bridge, which overlooks the main space with its workstations lining the long back wall. (Woe to any employee with a messy desk!) Influenced by the spatial organization of such notable Brazilian modernists as João Batista Vilanova Artigas, Kogan's design enables the studio to work simultaneously as a flexible area for photo shoots and as a place for social gatherings, which can spill out into the garden. The fabrication and configuration of all the materials reinforce the extreme linearity of the space, from the horizontal imprint of the narrow timber formwork on the concrete bridge to the verticality of the wood on the folding doors, which enclose an image-processing lab at one end and a kitchen across the way. The 1-by-4-foot dimensions of the custom concrete floor tiles reinforce the elongated effect.

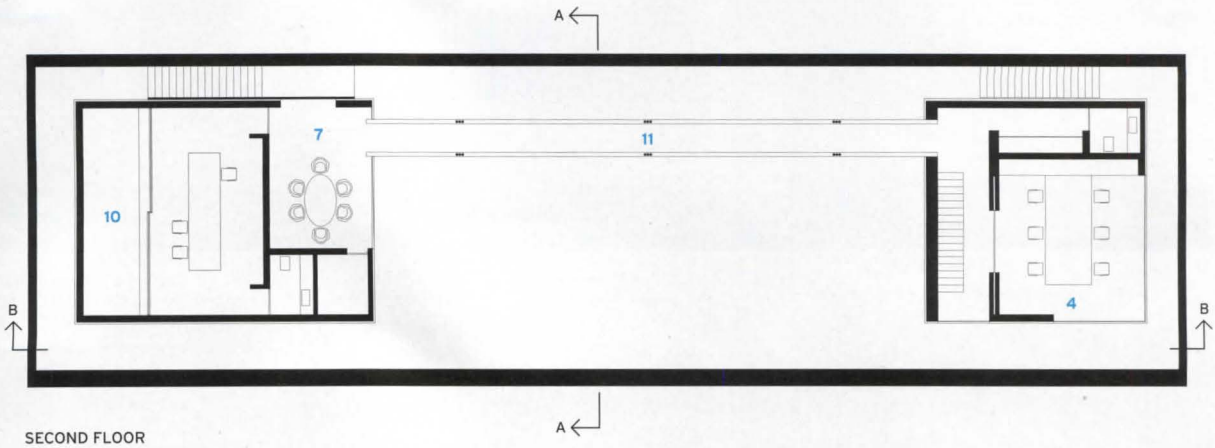
"We are compulsive about all of the detailing, obsessively so," explains project architect Suzana Glogowski. This is

HIGH WAY A slender timber-formed concrete bridge stretches between the double-height studio's two volumes, overlooking an elongated workstation, as well as adding a convenient place for editors and producers to get an unobstructed view of the activity during a photo shoot.

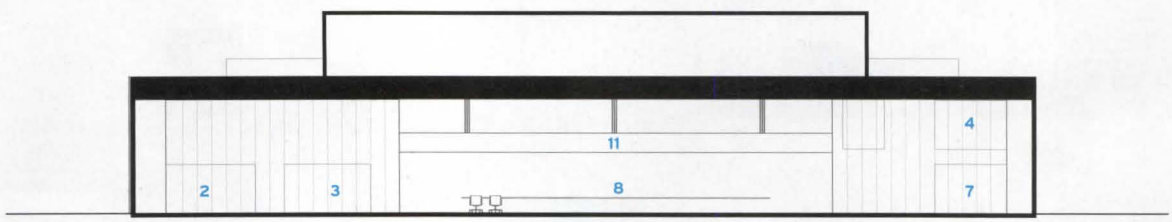


GROUND FLOOR

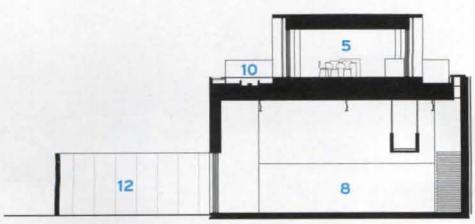
1 GARDEN
2 RECEPTION
3 IMAGE PROCESSING
4 OFFICE
5 KITCHEN
6 STORAGE
7 CONFERENCE ROOM
8 STUDIO
9 PARKING
10 PATIO
11 BRIDGE
12 GARDEN WALL



SECOND FLOOR



SECTION B-B



SECTION A-A

credits

ARCHITECT: Studio MK27 – Marcio Kogan, design architect; Suzana Glogowski, co-architect; Diana Radomysler, interior designer; Beatriz Meyer, furniture designer

ENGINEERS: Leão e Associados (structural)

CONSULTANT: Isabel Duprat (landscape)

GENERAL CONTRACTOR: Lock Engenharia

OWNER: Studio SC

SIZE: 12,500 square feet

COST: $5.8 million

COMPLETION DATE: March 2011

SOURCES

FLOORING: Concresteel

LIGHTING: Tom Dixon, Foscarini (floor lamps)

FURNITURE: Moroso

BOXED UP Designer furnishings, such as Tom Dixon's Cone Lights on a tripod, decorate the main studio (above). This spacious gallery is flanked by two double-height volumes (one shown above) that house offices and conference rooms on the upper levels, image processing and kitchen spaces on each side of the ground floor, and a light-filtered reception area (left) that opens to the garden, near the entrance gate.

SNAP SHOTS Trios of 1½-inch-round steel bars connect the 72-foot-long concrete bridge to the ceiling, where discreet lighting provides general illumination (right).

The top floor houses an event space with a surrounding rooftop deck, and a large demonstration kitchen where chefs can prepare complete meals and serve them on the 33-foot-long wood counter (opposite, top).

The prep kitchen for photo shoots looks out into the studio and offers food stylists views of the garden when the metal sliding doors are opened (below).

In addition to extending the interior space by 25 feet, the garden serves as a natural, 3-D "wallpaper" for the enclosed workplace (opposite, bottom).

apparent in subtle aspects of the construction, such as the seemingly delicate trios of circular steel bars—only 1½ inches in diameter—that carry the 72-foot-long bridge across the room and a subtle 1-inch shadow gap between the bridge and the wood boxes on either side of it.

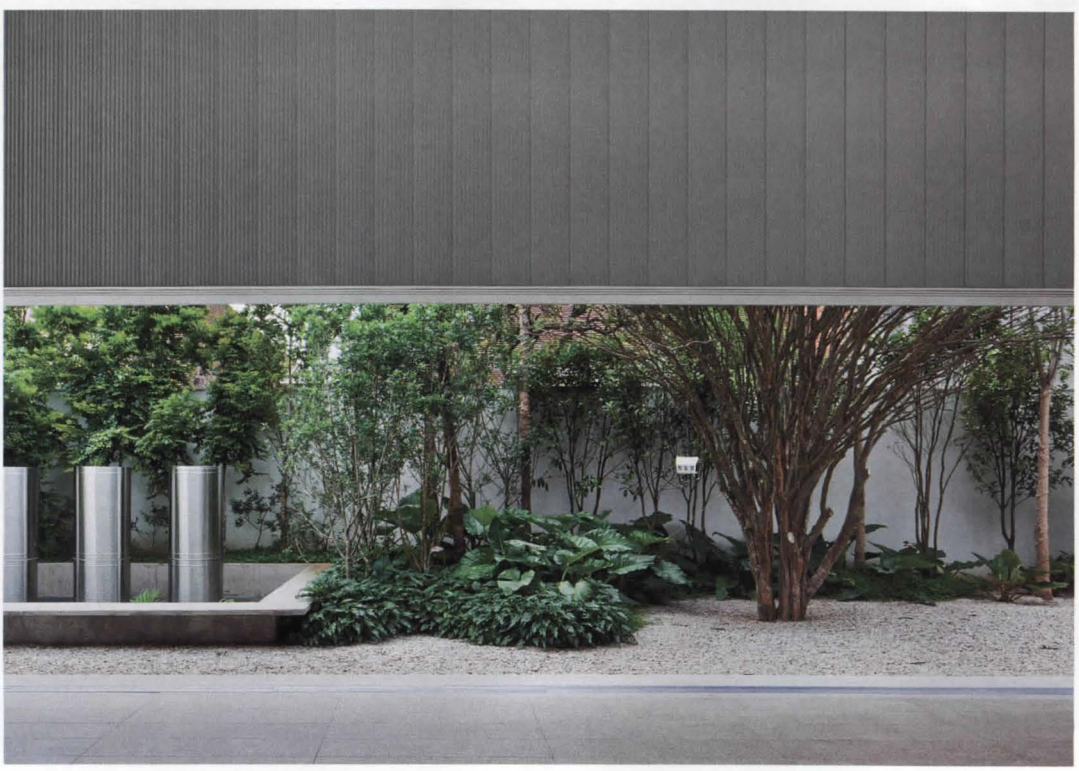
A third floor, surrounded on all four sides by a roof deck, houses an events space equipped with a gourmet demonstration kitchen. A 33-foot-long wood counter here accommodates up to 16 guests in the gracious space where three layers of sliding perforated-metal screens modulate daylight with a shimmering moiré effect. Incorporating his aesthetic vision into every aspect of the project, Kogan tucked tall appliances, storage units, and an audio/video system along an adjacent stainless steel wall, and even added sleek tubular-steel sprinkler heads in the ceiling. Glogowski explains that extensive discussions with a team of seven Japanese engineers responsible for the mechanical services resulted in the flush detailing of the supersized ventilation system installed above the island cooktop.

On a more decorative note, Studio MK27's interior designer, Diana Radomysler, arranged brightly colored cushioned chairs around the dining counter—a whimsical touch that adds a festive note to the room. Eschewing the traditional Brazilian proclivity for marble, Radomysler used a pristine, stonelike quartz composite to give a contemporary feel to kitchens and bathrooms, and selected Cone Lights on tripod stands by British designer Tom Dixon for their nod to the utilitarian lighting equipment typically used by photographers.

Completed in March 2011, Studio SC is doing so well that it has already outgrown the existing premises. The architects recently added a second kitchen on the roof near the stair, inserting it like a plug. The owners have also purchased the adjacent property, where an extension is already under construction for back-of-house support functions for the gourmet kitchen.

With the success of Studio SC, Kogan's roughly 20-person practice has reached a new threshold. After years of designing primarily one-off houses, such as the Bahia House in Salvador, Brazil (RECORD, April 2011, page 68), and finally earning international acclaim, the firm is now doing larger projects abroad, including a 26-unit housing complex in Madrid and a bungalow hotel in Alentejo, Portugal. With this increase in both scale and geographic spread, Kogan's challenge will be to maintain the level of detail that renders Studio SC such a visual feast. ■

Hattie Hartman is an editor at London's The Architects' Journal. *She previously lived and worked in Brazil.*

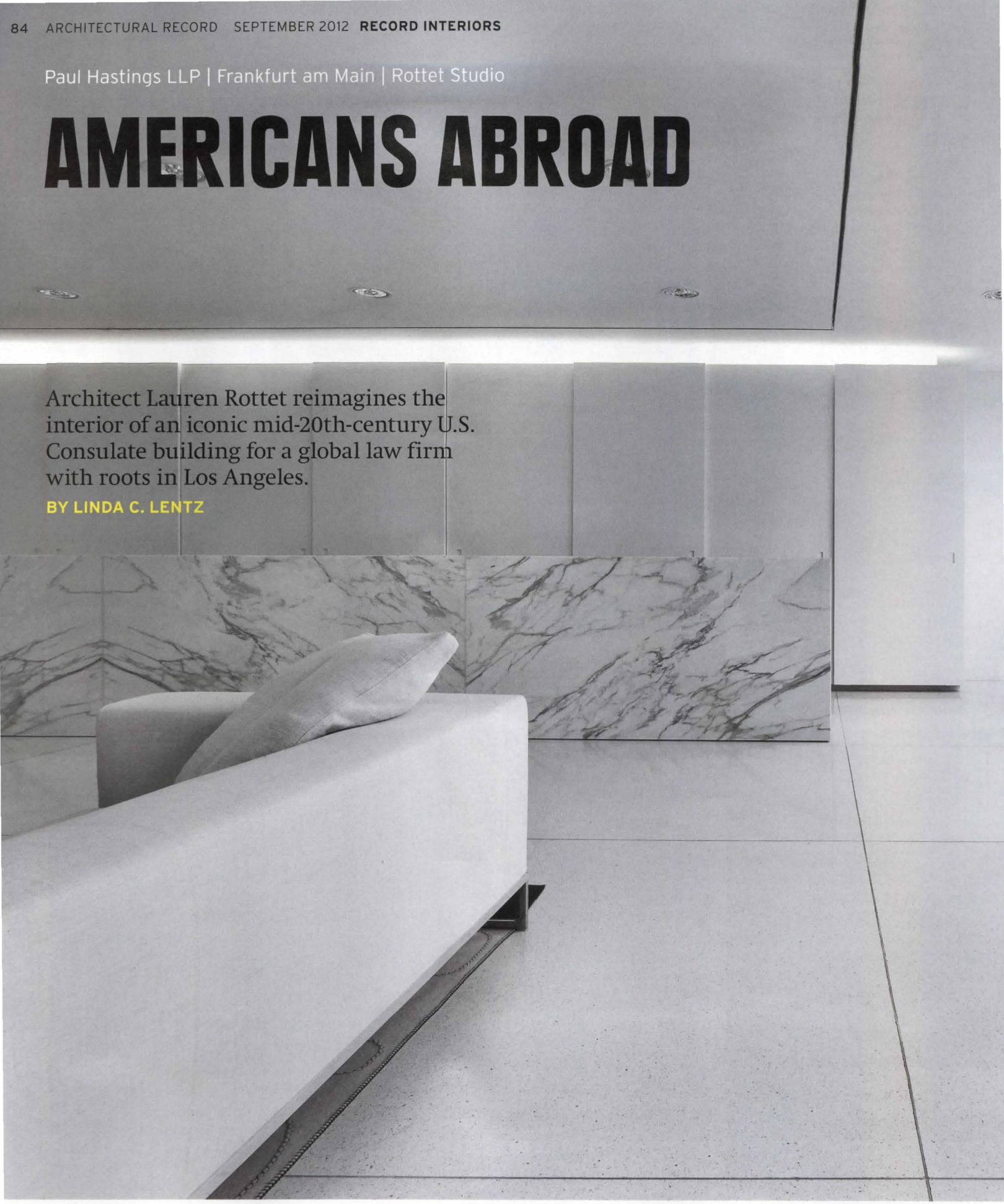


Paul Hastings LLP | Frankfurt am Main | Rottet Studio

AMERICANS ABROAD

Architect Lauren Rottet reimagines the interior of an iconic mid-20th-century U.S. Consulate building for a global law firm with roots in Los Angeles.

BY LINDA C. LENTZ



WHITE ON WHITE
Timeless materials and furnishings, including white solid-surface door panels, a Calcutta marble counter, and terrazzo flooring, ease into the 1950s Modernist architecture so well that the new interior almost seems original.

PHOTOGRAPHY: © ERIC LAIGNEL, EXCEPT AS NOTED

Ranked second on the 2012 A-List of the *American Lawyer*, the Los Angeles–based Paul Hastings LLP is a 61-year-old firm with a progressive global vision—one that incorporates good design into a business strategy that aims to attract prime talent and clients with leading-edge facilities. So when the managing partners decided to open a Frankfurt office after a 2008 merger with the German firm Smeets Haas Wolff, they tapped architect Lauren Rottet to regenerate a high-profile 1950s location to reflect the open work style they embrace. Their new address is not only on a leafy residential street in Frankfurt's affluent Westend neighborhood next to the city's gorgeous Palmengarten and Botanical Gardens, it also has an intriguing architectural pedigree.

Siesmayerstrasse 21 is a 1955 building by Gordon Bunshaft of Skidmore, Owings & Merrill that echoes his 23-story Lever House in New York City (1952), both in plan and by virtue of its distinctive facade made of contrasting rows of clear and tinted glass framed by a metal grid. Part of a diplomatic initiative as complex as a James Bond plot, the five-story structure is one of five similar U.S. Consulate buildings in West Germany designed by Bunshaft in collaboration with German architect Otto Apel, an assistant to Albert Speer from 1933 to 1943. The post–World War II era was fraught with Cold War politics, and the State Department commissioned America's top Modernist architects—including Harrison & Abramovitz, Ralph Rapson, and Edward Durell Stone—to design facilities around the world as symbols of democracy, culture, and power. "Architectural modernism became linked with the idea of freedom after the war," writes Jane C. Loeffler in her fascinating *Architecture of Diplomacy* (Princeton Architectural Press, 1998). Bunshaft's style, she says, was considered one of the most "American," and Lever House had the look and quality U.S. officials wanted to export.

Rottet, who has created more than a dozen interiors for Paul Hastings over the past 10 years, says, "The building is a Modern gem, and I recommended that they lease it as soon as they showed it to me." It fits with the firm's program. Unlike traditional law offices, she explains, Paul Hastings wants to be seen from the street. The building's footprint and glazing allow for that visibility, with a single-story base shaped like a square doughnut, topped by a shallow, recessed mezzanine and three-story office block across its north side.

Prior to the firm's lease, the building changed hands from the State Department to the German developer Gross & Partner, and underwent a structural overhaul led by the Frankfurt-based architects Schneider+Schumacher in 2007. Repaired and reglazed, with a new underground parking garage and freshly landscaped grounds, the 57-year-old landmarked building appears unscathed by the rigors of time and bureaucratic management. Its scale, massing, and reflective qualities provide an elegantly contemporary counterpoint to the surrounding streetscape dotted with turn-of-the-20th-century Wilhelminian-style buildings.

"We definitely wanted to work with the architecture to create an interior that looks like it could have been there forever," explains Rottet. Ironically, budget constraints curbed Bunshaft's original vision for the interior, and records indicate that designer appointments, such as Knoll furniture, were the exception, not the rule. Free of rigid

GROUND FLOOR

0 20 FT. 6 M.

SECOND FLOOR

1 ENTRANCE
2 RECEPTION
3 LOUNGE
4 WARDROBE
5 COURTYARD
6 ENTERTAINING AREA
7 KITCHEN
8 RESTROOMS
9 CONFERENCE ROOM
10 CLIENT LOUNGE/ CONFERENCE ROOM
11 LIBRARY
12 PRIVATE OFFICE
13 OPEN WORKSPACE

MODERN GEM
Rottet Studio developed a strategy based on Gordon Bunshaft's recently restored building, maintaining its openness with unobstructed views from the street clear through the interior—never compromising the distinctive facade.

credits

ARCHITECT: Rottet Studio – Lauren Rottet, principal; Kelie Mayfield, Alice Hricak, Ben Koush, Laine Gregory, Simona Furini, *design team*

ARCHITECT OF RECORD: Scharnberger Architekten

ASSOCIATE ARCHITECT: Mudrony Architekt

ENGINEERS: Ingenieurbüro Klöffel (electrical/mechanical)

CLIENT: Paul Hastings LLP

GENERAL CONTRACTOR: Gross & Partner

SIZE: 20,864 square feet

COST: withheld

SOURCES

SOLID SURFACE: Corian

FURNITURE: B&B Italia; Bene; Brunner Group; Established & Sons; Interstuhl; Minotti; Vitra; Walter Knoll; Renz; Wilkhahn Modus; USM Haller

PLASTIC LAMINATE: Pionite (gloss); FunderMax

LIGHTING: Selux; Alkco; Hatec Lichttechnik; Megaman; Focal Point

GLASS: Mäder Office (office fronts)

PHOTOGRAPHY: © JOERG HEMPEL

historical criteria, she devised a timeless modern scheme.

In keeping with the building's International Style, Rottet opted for a minimalist palette of materials and furnishings. Because the structure was gutted during the restoration, the architect and her team at the Houston- and Los Angeles–based Rottet Studio were able to retain the openness of the architecture without major demolition. First the HVAC was upgraded with sleek, low-profile radiators beneath the windows and an energy-efficient radiant-cooling system in the ceiling. (Forced air conditioning is used sparingly and vented through subtle ceiling slots in conference rooms and event spaces.) Then they installed terrazzo flooring, noise-resistant transparent or white walls, and fluorescent lighting recessed into perimeter ceiling and wall coves or downlight fixtures, carefully maintaining unobstructed views throughout.

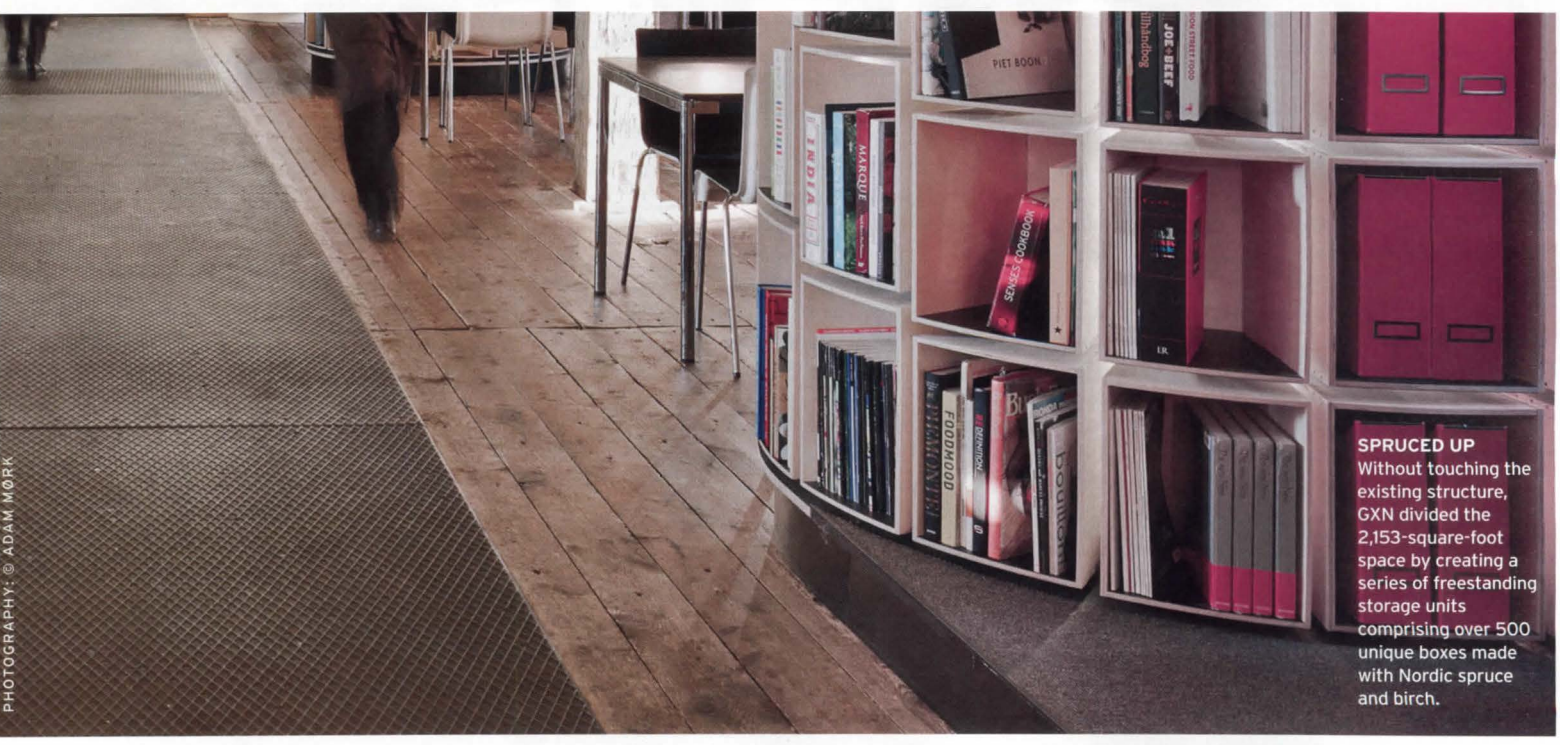
Paul Hastings is the building's anchor tenant, occupying the first three floors and lobby. To remain prominent, the firm's receptionist doubles as host for the businesses on the upper floors as well. For privacy, Rottet tucked a cherry-wood reception desk to the left of the entrance and installed a wall of lacquered panels behind it that slide out on either end to close off the firm's inner space when necessary. Likewise, she concealed an adjacent conference room with glossy, opaque tempered glass. A composed seating area in soft neutrals serves as a tranquil lobby lounge.

The client originally wanted to put offices in the lobby, says Rottet. But it didn't really need the space, and the architect "felt it was important to emphasize the building's transparency." She convinced the firm that this area would be an ideal focal point to establish the company's presence and for entertaining. Then she organized day-lit banks of glass-enclosed offices, open support stations, a library, and pantries along the north, west, and south halls of the ground floor and on the two upper levels overlooking the courtyard.

Rottet's most surprising and gracious move lies behind the wall backing the reception area, where she created a hybrid entertainment/work lounge dominated by a striking marble bar and generous seating arrangement. It is very discreet: She covered a kitchen and restrooms with low-luster, solid-surface doors and tucked a closet behind pristine, back-painted glass. This luxurious touch of Bond happens to be extremely functional, says the local director of office administration, Elena Ernst. "Clients come here between meetings to make phone calls," she says. It's a place where they can sit and relax. It is also where the firm hosts parties.

It's hard to believe that this urbane setting was once a haunt for travelers and expats, hidden behind venetian blinds and filled with standard-issue government furniture. Rottet's refined transformation enables this mid-20th-century classic to take on the 21st—identity intact. ■

DIPLOMATIC MOVES While Paul Hastings is the building's anchor tenant, leasing the first three of its five floors, the firm shares the lobby (and its own receptionist) with the businesses on the top two floors. Rottet created a Zenlike seating area at the far side of the main corridor to serve as a lobby lounge (above, left and right). She tucked the cherry-wood reception desk (opposite, left) to the side of the entrance and installed a wall of lacquered panels behind it that slide out on either end to close off the firm's space when necessary. Then she concealed a conference room with glossy, painted-glass walls and doors (opposite, right).



SPRUCED UP
Without touching the existing structure, GXN divided the 2,153-square-foot space by creating a series of freestanding storage units comprising over 500 unique boxes made with Nordic spruce and birch.

PHOTOGRAPHY: © ADAM MØRK

Noma FoodLab | Copenhagen | GXN

RECIPE FOR SUCCESS

The innovation unit of 3XN Architects rises to the challenge of turning a historic warehouse into a state-of-the-art test kitchen for a culinary superstar. BY CHRIS FOGES

TEAMWORK
The architects inserted a modern kitchen into the historic structure with high-tech German appliances, ample lava-stone counters, and plenty of storage.

Using only ingredients sourced from the forests, fields, and waters of the Nordic countries, René Redzepi invented a regional cuisine whose celebration of the local has found a global audience. This year *Time* magazine named the 34-year-old chef as one of its 100 most influential people, and his Copenhagen restaurant, Noma, was voted *Restaurant* magazine's best in the world for the third time.

Noma's food is equally strange and sophisticated, earthy and precise—qualities echoed in the design of its new culinary laboratory, the FoodLab. The test kitchen, once in a nearby houseboat, has been relocated to the space above the wharfside restaurant to act as an engine of inspiration. For the interior, Redzepi turned to the architecture firm 3XN, whose office faces Noma across a small harbor. The connection between the two goes beyond mere proximity, however. Kasper Guldager Jørgensen leads 3XN's in-house research-and-development unit, GXN, and made contact with Redzepi after seeing him on TV. The architect was struck by the similarity of their positions: Both lead young, international teams focused on aesthetic and technical innovation. While Noma's chefs draw flavor from bitter roots and unripe fruit, GXN's architects and engineers develop biocomposite cladding and microperforated sunscreens.

For Jørgensen, Noma's "experimentarium" is itself an experimental project that can be applied to 3XN's larger buildings. Though small, it is dense in both ideas and program. In addition to the test kitchen, the 2,153-square-foot FoodLab provides lockers, linen storage, a library, an office, and a staff canteen. To complicate matters, the 18th-century warehouse containing the restaurant and lab is a protected historic structure, so nothing can be fixed to the walls or the eight gnarled pine columns that march in pairs through the center of the space.

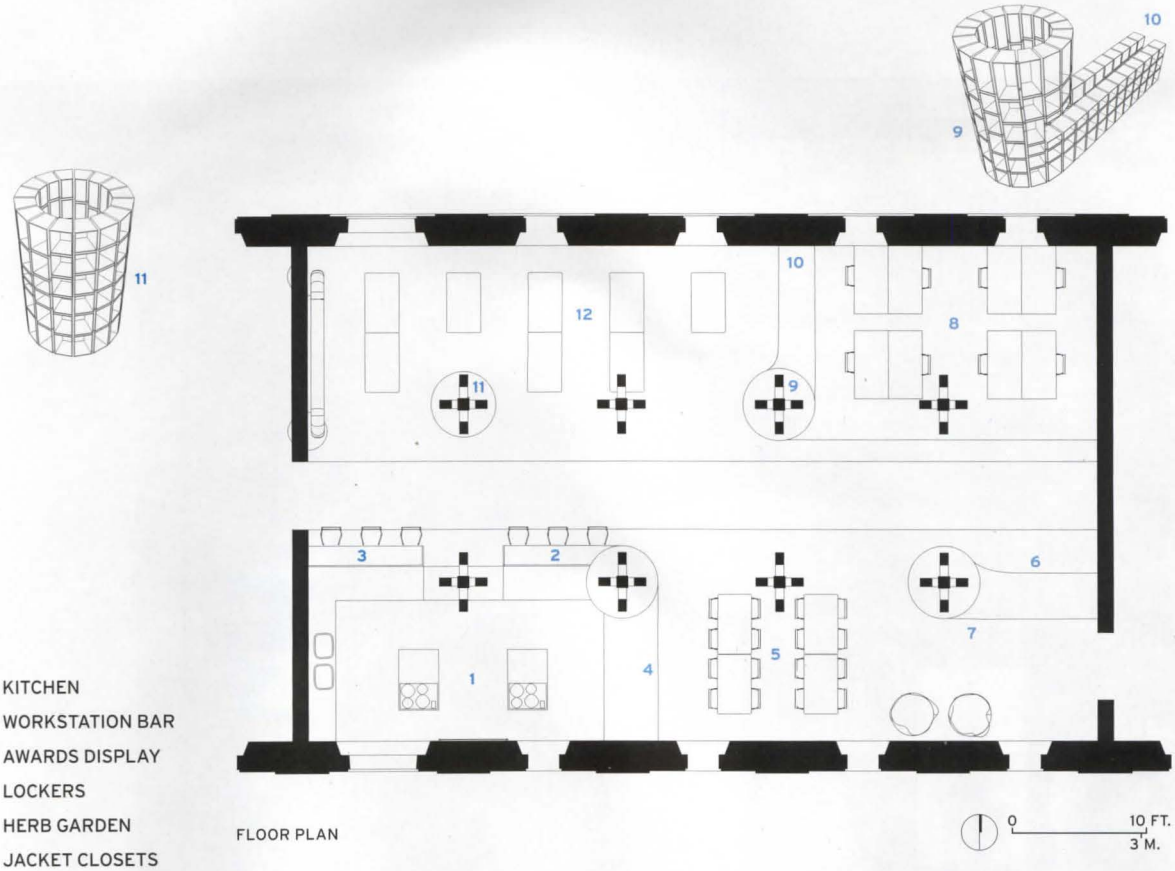
GXN's response: to make a series of freestanding installations, at a scale between building and furniture, that serve as both room dividers and shelving. Four cylindrical displays wrap alternate columns. From three, long tails of double-sided storage units extend to the walls, splitting the room roughly into quarters—dining, kitchen, office, and linen storage—that are discrete but not separate.

The architects designed the furniture using parametric-modeling software that allowed for continuous revisions throughout the process and optimized material use. They had all 5,283 components cut from 249 standard 8-by-4-foot sheets of Nordic birch and spruce plywood at a local shop with a CNC milling machine. Then they assembled the pieces themselves on site, in three weeks.

The use of locally produced plywood echoes Redzepi's attitude toward ingredients. The ordinariness of the material is not disguised, but made special by the evident care and intelligence in the design and fabrication process. The shelving is made up of more than 500 open-front boxes, which appear to float independently. Concealed plywood frames allow soft light from integral fixtures to filter through the gaps between boxes, giving the blond wood a warm glow.

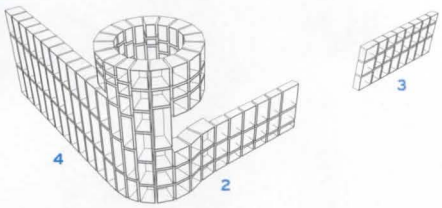
The boxes, in various sizes, are arranged in a staggered pattern reminiscent of brickwork, their dimensions derived from the humble plastic containers Noma uses for its spice library. Bearing the names of the exotic produce within them—Icelandic moss, samphire salt, onion ash—these are on display next to decorative artifacts referencing the wild ingredients the chefs forage: blue speckled birds' eggs, razor clams, scallop shells. Elsewhere in the room, nature appears as pixelated birch-tree reliefs carved with a router into the face of the locker doors, and an herb garden in plywood carts, bathed from above in ultraviolet light.

The GXN plan places working areas next to windows, which look out over the harbor, and keeps the wide central aisle free for those passing between areas, or through the lab to one of the restaurant's three service kitchens, where 50 cooks

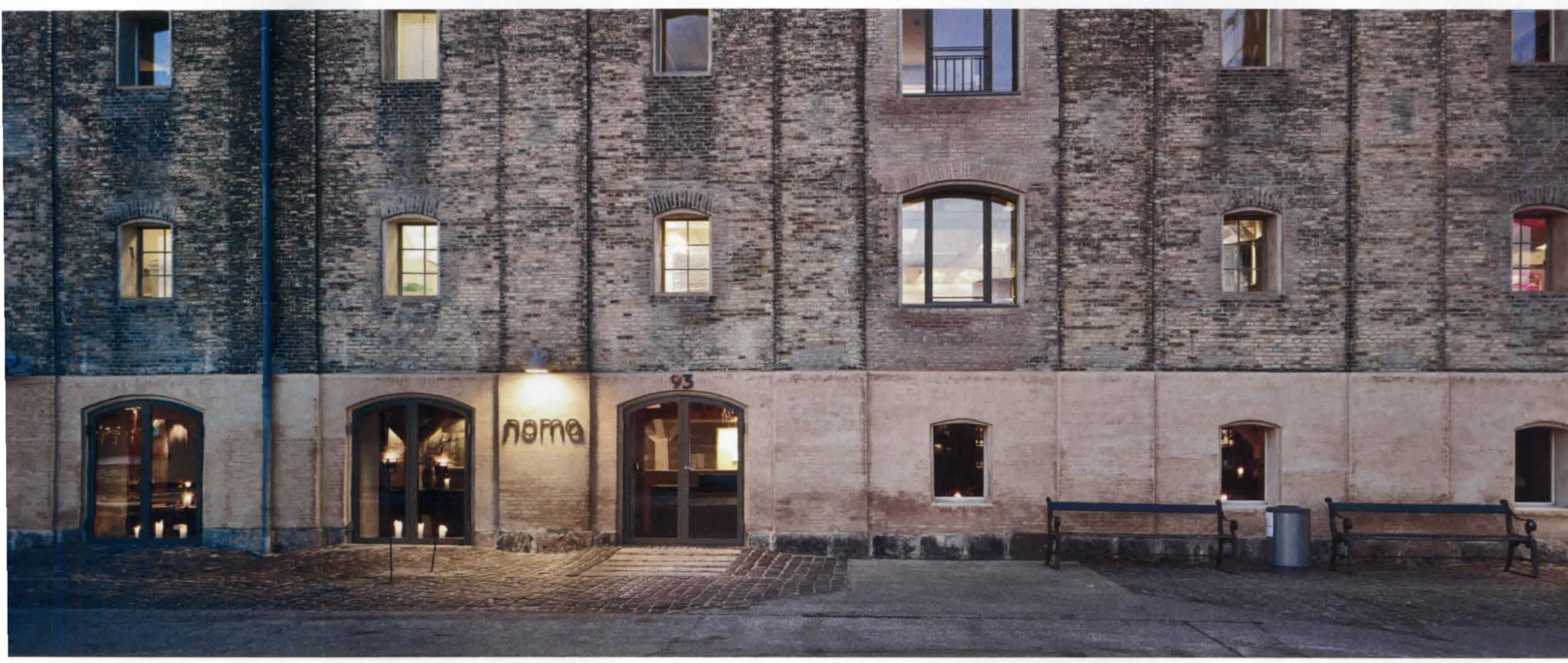


1 KITCHEN
2 WORKSTATION BAR
3 AWARDS DISPLAY
4 LOCKERS
5 HERB GARDEN
6 JACKET CLOSETS
7 LINEN SHELVES
8 OFFICE
9 STORAGE
10 WORK SURFACE
11 LIBRARY
12 CANTEEN

FLOOR PLAN



HISTORIC PAIRINGS The Noma FoodLab is located one floor above the restaurant it serves, in a former warehouse listed on Denmark's national registry of protected buildings (below). GXN's ingenious shelving units were sized to accommodate the plastic storage bins that Noma's chefs use to hold the components of their spice library (opposite).



supply just 12 tables. It encourages chance encounters among waiters between shifts, office staff at their desks, and chefs on break, reflecting Redzepi's belief that you get the best results from happy people.

The Danish word *hygge,* roughly translated as "coziness," describes a condition whose cultivation is said to be a national obsession. It has both social and material connotations, linking the companionship of family and friends, especially over food, and a physical well-being that comes not from luxury but from low, candle-like light and modest comfort. At the FoodLab, clear plastic "Star" fixtures, designed by the architects, twinkle above the 50-seat canteen. As with the furniture, these were created to embody what Jørgensen calls "Nordic cool" geometry, in which an inner complexity of design and construction is evident in simple forms. A delicate tension also exists between the cool look of the pale, engineered plywood and the warmth of materials like the black lava stone used for the kitchen counters. Chairs, upholstered in a soft, feltlike fabric, help to create an intimate acoustic.

In the dining room downstairs, Redzepi rejected the starched linen tablecloths and cut crystal of Copenhagen's traditional upmarket restaurants in favor of bare, age-scarred walls and understated Danish Modern furniture. It is a carefully contrived design, but one that underscores the food. In the FoodLab, GXN has achieved something similar. The architects have made the plate, not the meal. ■

Chris Foges is the editor of the London-based design journal Architecture Today.

credits

ARCHITECT: GXN (innovation unit of 3XN Architects) – Kasper Guldager Jørgensen, project director; Kim Herforth Nielsen, André van Leth, Lila Held, Morten Norman Lund, Lars-Erik Eriksson, Pedram Seddighzadeh, Matthew Scarlett, Bjørk Christensen, Kyle Baumgardner, Elliot Mistur, Tore Banke, Simon McKenzie, Jacob Hilmer, project team

CONSULTANTS: Normann Copenhagen (lighting); 1:1 Production (production)

OWNER: Noma

SIZE: 2,153 square feet

COST: withheld

COMPLETION DATE: January 2012

SOURCES

KITCHEN: CPH Square

APPLIANCES: Gaggenau

FURNITURE: Gubi

Antonio Castro Leal Library | Mexico City | BGP Arquitectura

BASTION OF KNOWLEDGE

A small library is one of the first finished pieces of a larger project to transform a historic building into a center for culture and education.

BY BETH BROOME

Amid the traffic and bustle of central Mexico City, the fortresslike Ciudadela building sprawls territorially across its 7-acre parcel of land, bordered by the busy Balderas Avenue and bright yellow vendor carts to the east, a smaller street to the west, and public plazas to the north and south. Tucked within its stone confines, along the building's northwest perimeter and facing an interior courtyard, is the diminutive Antonio Castro Leal library, a newly renovated space designed by Mexico City–based BGP Arquitectura to house the private collection of the Mexican intellectual, diplomat, and National University president who died in 1981.

A single-story structure built on a square plan, La Ciudadela has a history that is as rich as its walls are thick. Commissioned by the Spanish crown at the end of the 18th century, the building, which rests on a robust vaulted foundation over swampland, started its life as a tobacco-processing facility—the four large courtyards at its center were used for drying leaves. Through the 19th century the building served as a military post, an arsenal, and a hospice for the poor. It earned its name La Ciudadela (The Citadel) in 1885, when it became the northern barracks of the city garrison. Later it was used for weapons manufacturing, and then, in the 1940s, part of the building was turned over to the nation's general archive and another part to the National Library. In the 1960s other cultural and educational institutions moved in to share the space. More recently, in 1987, Mexican architect Abraham Zabludovsky enclosed the main courtyards with

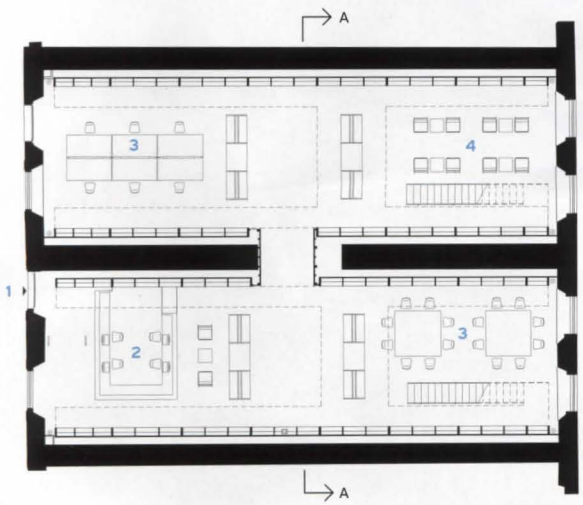
GRAND ENTRANCE
A passage on the southwest corner of the Ciudadela (above) leads into one of many interior courtyards. The stone and stucco building, dating to 1805, has served many functions over its history and is now held by Mexico's National Library.

The stainless steel–lined connection between the library's two bays (right) reveals the thickness of the original stone walls.

View additional images at architecturalrecord.com.

PHOTOGRAPHY © JAIME NAVARRO EXCEPT AS NOTED.
BETH BROOME/ARCHITECTURAL RECORD (LEFT)

1 ENTRANCE
2 RECEPTION
3 STUDY
4 *READING*
5 PERIMETER BALCONY
6 LIGHT MONITOR



GROUND FLOOR

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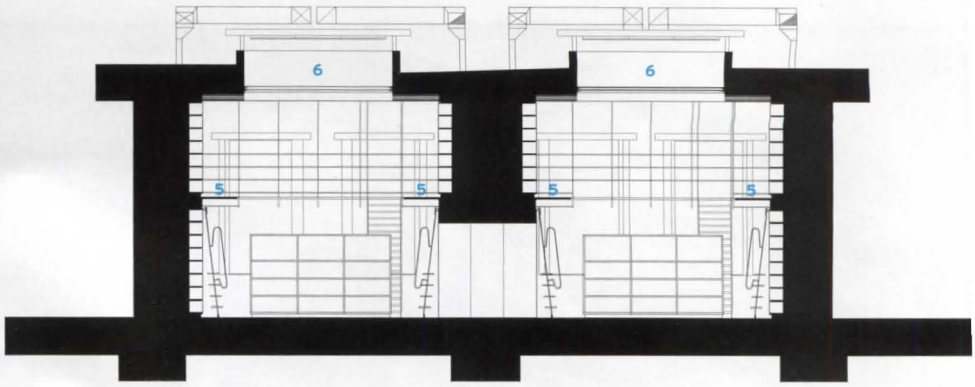
3 M.



SECTION A-A

0 10 FT.
3 M.

credits

ARCHITECT: BGP Arquitectura – Bernardo Gómez-Pimienta, Luis Enrique Mendoza, partners in charge; José Barreto, Christian Santillano, Ivan Rey Martínez, Alejandra Aguirre, Edgar González, Mariana Ruíz, Homero González, Raymundo Alonso, Karla Garza, Ramón Alvarez, project team

ENGINEERS: Diseños Integrales de Ingeniería (m/e/p); Izquierdo Ingenieros y Asociados (structural)

CONSULTANTS: Luz en Arquitectura (lighting)

CLIENT: Libraries General Management of Conaculta

SIZE: 5,685 square feet

COST: $1.4 million

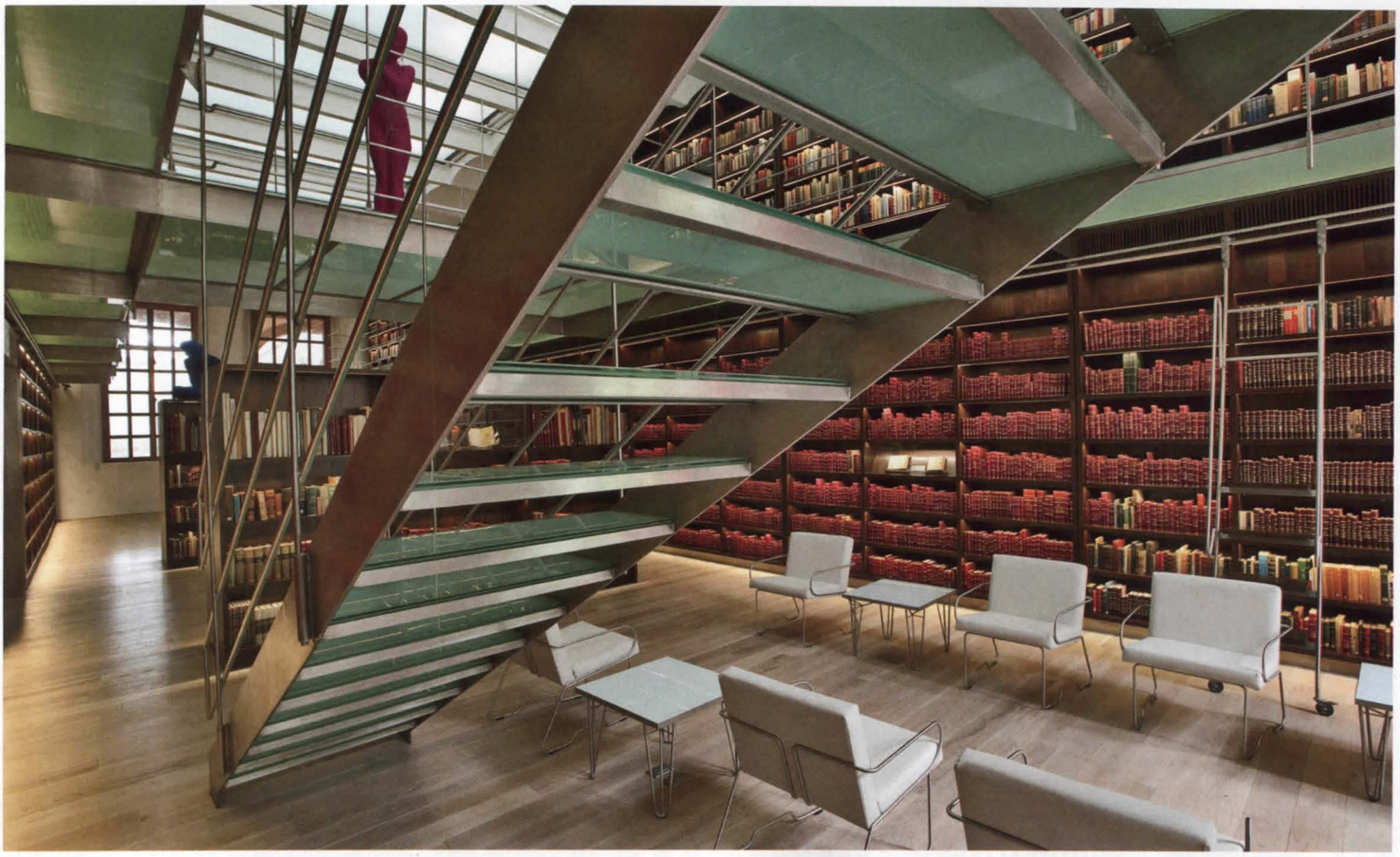
COMPLETION DATE: December 2011

SOURCES

DETECTION SYSTEM: 3M

FURNITURE: BGP Arquitectura; Vitra

LIGHTING: Artemide



SILENT TYPE
The client paired each architect working in the Ciudadela with an artist. Alejandra Zermeño's brightly colored human forms (left and above) lurk eerily about the space, which is divided into areas for reception, independent research, teamwork, and reading. BGP designed chairs and tables with stainless steel components that complement the railings (above).

enormous steel canopies to create reading rooms and file storage.

In 2010, with the building having fallen into disrepair, and with the end of President Felipe Calderón's term drawing nearer, Consuelo Sáizar, director of the National Council for Culture and Arts, called in architects Bernardo Gómez-Pimienta of BGP and Alejandro Sánchez to create a master plan for adapting and restoring the 325,000-square-foot Ciudadela as a center of culture and study for the National Library. Accordingly, the two recommended a number of Mexican architects (including Tatiana Bilbao and Mauricio Rocha) to design various spaces within it—libraries, offices, galleries—while overseeing some of the interiors themselves. The Castro Leal library is one of the first finished pieces of the larger undertaking, which today is deep in the throes of renovation, racing toward a November completion date, when the president will inaugurate the building.

Gómez-Pimienta took on the conversion of two 72-by-23-foot perimeter bays to house the 50,000 titles that make up Castro Leal's personal library. The eclectic collection, organized by country as its late owner intended, is one of five holdings of people in culture that the National Library has recently purchased. The challenge was to leave the original walls of the 5,685-square-foot space untouched, as mandated by the historical and landmark-preservation agencies. So Gómez-Pimienta anchored I-beams vertically at 10-foot intervals in the floor and ceiling, separating them from the 3-foot-thick stone walls with a 4-inch gap. The structure supports the shelves, made of walnut to honor the dark wood shelving in Castro Leal's house in the borough of Coyoacán. Perimeter balconies and stairs composed of three layers of tempered, sandblasted glass also hang from the I-beams, as well as from the ceiling, and provide a visual break from the relentless rows of books lining the walls from floor to ceiling, as they did in Castro Leal's home. Local code allowed for railings just ¾-inch thick with horizontal bars spaced only every foot, enabling the walkways to float gracefully. "I used the slimmest elements possible," says the architect, "so you can get this sense of lightness."

To underscore the contrast between the staunch old structure and the new light architecture of glass and steel, Gómez-Pimienta used white-stained oak on the floors and made the furniture (much of which he designed) white. "I wanted to be very neutral," he says. "The important part is the books, so I worked with a reduced palette of materials." Light monitors set into the vaulted ceiling illuminate the two rooms during the day. And LEDs installed in coves within the stacks bring the patchwork of colors and textures of the book spines to the fore.

Gómez-Pimienta's instinct to use a light hand in this delicate intervention and let the books take center stage has resulted in an elegant space that is apt for the elevated pursuit of scholarship. These choices also portend well for the larger project that is unfolding as the next chapter for Mexico City's venerable Ciudadela. ■

PHOTOGRAPHY: © P

a collection of contemporary Asian art. Perforated metal screens help divide spaces while letting daylight flow throughout the apartment.

and allude to shoji and other [illegible]
of the holes in the anodized-aluminum partitions varies, creating a subtle ripple pattern that adds a touch of movement to the design. James also applied the traditional Asian concept of a courtyard house to the floor plan, organizing

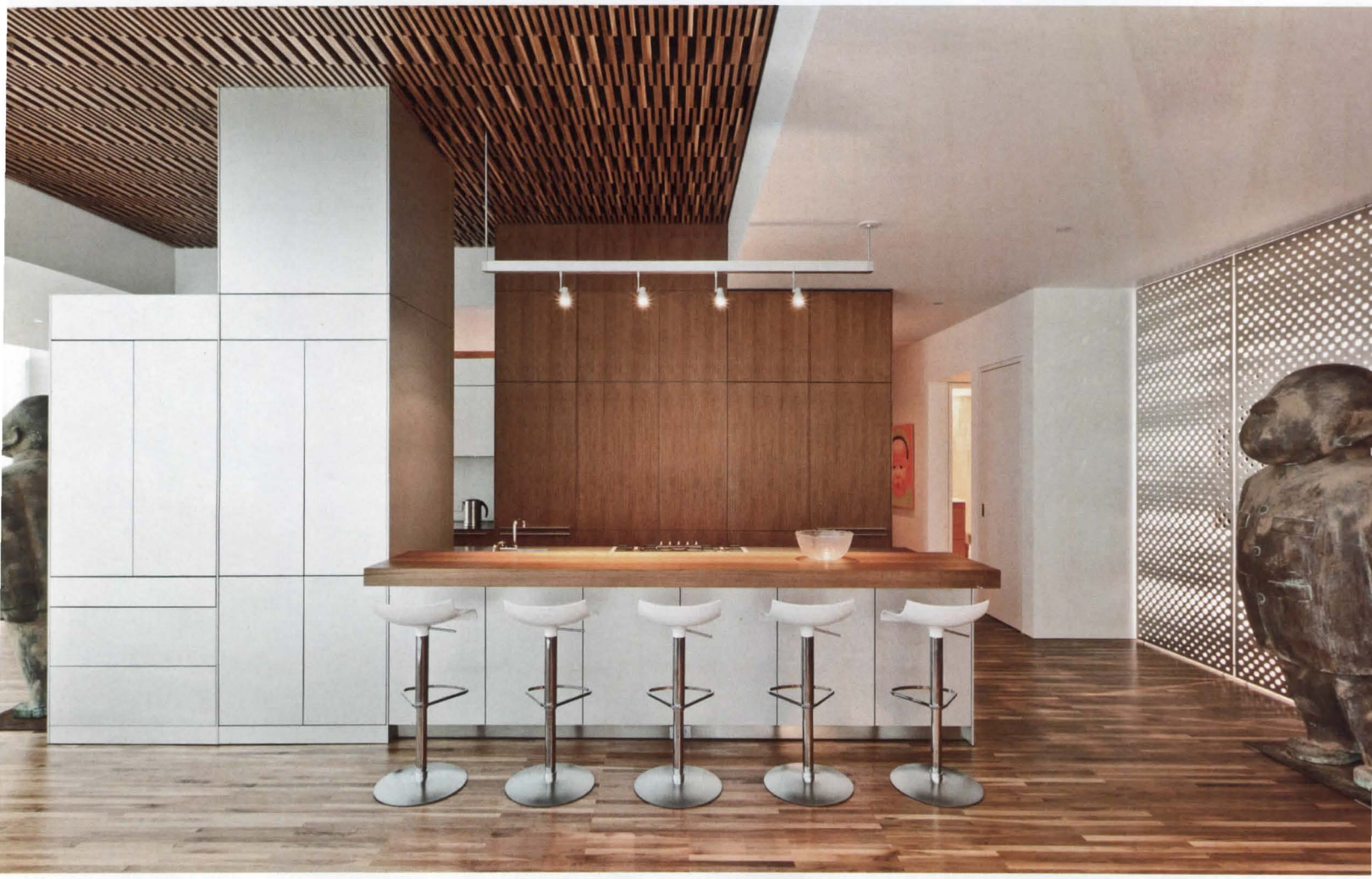
FLOOR PLAN

1 ENTRY
2 DINING
3 LIVING
4 OFFICE
5 KITCHEN
6 ENTERTAINMENT
7 BEDROOM
8 MASTER SUITE

rooms around a central "open" space where people enter from the elevator lobby. Such an approach raises intriguing questions of place and cultural connection.

To add warmth to the large apartment, the architect used narrow strips of walnut for flooring in all the public spaces and on ceilings in a few places such as the living room, dining room, and kitchen. When used on the ceiling, the wood forms latticelike screens that hide acoustical material, lights, and sprinklers. The wood ceilings, which are raised more than 2 feet above the others, also help define the areas they cover by creating visual contrasts to the neutral palette of colors in the rest of the project. White and off-white paint, along with reflective surfaces on kitchen cabinets and other elements, keep the apartment bright and provide a calm, modern backdrop for the art.

Although James did not know exactly which pieces from the clients' art collection would end up in the apartment, he understood the nature of the work and created an environment that would complement it. That meant establishing a dialogue between architecture and art in which scale, procession, and views from one space to another serve as key topics. Working with the clients after construction was done, James mounted paintings and placed sculptures to pull people through and around the public spaces, using the profile of a burly man sculpted by Zhu Wei, for instance, to grab your eye and entice you to keep exploring. And a set of vertical paintings in the dining room makes that space feel lively even when no one is there. Works that are sensitive to daylight are hung on walls set back from the glazed



HIDE AND SEEK
The architects hid a structural column in the kitchen by wrapping it with cabinets (above) and opened views from the counter to the lake (opposite). They also tucked mechanical systems above ceilings and removed radiators after installing radiant heating below the walnut floors. Art, such as a sculpture by Zhu Wei, helps draw people from one room to another (above).

perimeter on the south and east.

The clients said they wanted a home that had a sense of repose. In Kyoto they had visited the Katsura Imperial Villa and loved the way it unfolds as a sequence of layered spaces and uses repetition and asymmetry as essential elements. Although surrounded by sky, rather than 17th-century gardens, their urban penthouse borrows some of the Japanese palace's design strategies and its quest to remove its privileged denizens from the messiness beyond its walls. Its porous spaces flowing into one another and its simple detailing instill a sense of gracefulness but also one of separation.

Set on the top floor of a tower, the apartment resides in a safe and abstract realm with little connection to the particular city hundreds of feet below. While this frees the architecture from the constraints of an urban context and allows it to reference Asian design without seeming clichéd, it also strips away the idiosyncrasies of place—those odd or unique characteristics that help us identify with a town and call it ours. This apartment could be anywhere, or at least in any big city with tall buildings and a large body of water. As lovely and elegant as it is, and as rich as it may be in artworks, there seems to be something missing here. Floating above it all, it has everything except roots to a larger place that one might call home. ■

credits

ARCHITECT: VJAA – Vincent James, Nathan Knutson, Jennifer Yoos, principals; Karen Lu, project manager/architect

ENGINEERS: Van Sickle, Allen & Associates (structural); WMA Consulting Engineers (mechanical/electrical)

LIGHTING DESIGNER: Office for Visual Interaction

GENERAL CONTRACTOR: Bovis Lend Lease

SIZE: 5,500 square feet

COST: withheld

SOURCES

KITCHEN: Bulthaup

MILLWORK: Bernhard Woodwork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Baird Sampson Neuert Architects / Photo © Tim Arban

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Revival of an Icon

The United Nations renovation team brings back the long-faded luster of the Secretariat while satisfying ambitious performance goals.

By Joann Gonchar, AIA

CENTERPIECE The strikingly thin, 39-story Secretariat was the most prominent piece of the United Nations compound in the early 1950s (above), as it is today.

PHOTOGRAPHY: EZRA STOLLER © ESTO

EARLY IN JULY, the first of more than 3,000 United Nations officials began to move back into the newly renovated Secretariat, the 39-story office tower that is the most visible element of the organization's 17-acre campus on the eastern edge of Midtown Manhattan. The high-rise is the first piece of a multiphase capital plan for the revamping of the U.N. slated for completion in 2014 and now projected to cost about $2.3 billion, according to the U.S. Government Accountability Office.

The rational and prismatic Secretariat, with its billboard-thin profile and once-again-glittering skin, is the embodiment of post–World War II optimism. It represents the ideals of the age more succinctly than the sculptural General Assembly or the low, rectangular conference building—the other components in the early-1950s trio of U.N. buildings designed by an international team that included Le Corbusier, Oscar Niemeyer, and Wallace Harrison.

In recent decades the Secretariat, along with the rest of the now six-building, 2.6 million-square-foot complex, had lost much of its luster and become increasingly outmoded: It was riddled with asbestos, had mechanical systems that were outdated and grossly inefficient, and lacked many of the most basic life-safety features, including sprinklers. Over the years, fixes intended to address numerous facade problems radically altered the appearance of the U.N. structures,

especially the Secretariat. John Gering, managing partner at HLW, design architect for many aspects of the renovation project, likes to compare the gradual deterioration and recent transformation of the U.N. centerpiece to a Grimm's fairy tale. "The building was a prince that turned into a frog," he says. "Our goal was to turn it back into a prince."

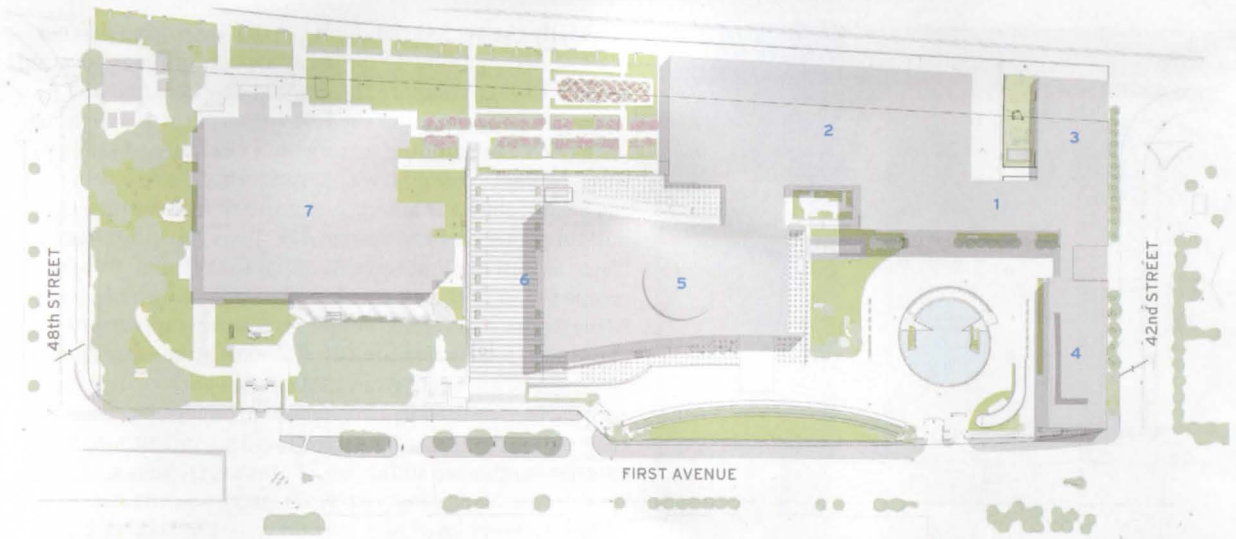
The Secretariat is among a handful of mid-century U.S. buildings that realized the ideal of the crystalline tower. Pietro Belluschi's Equitable Building in Portland, Oregon, completed in 1947, was the first glass-and-aluminum-clad high-rise. Its concrete structure is closely wrapped with aluminum panels that are filled in with aluminum-framed glazing. The envelope strategy contrasts with that of the Secretariat, finished in 1950, whose primary elevations are enclosed by free-hanging glazed facades. And although another Manhattan building—Skidmore, Owings & Merrill's Lever House, completed two years later—was the first tower to be *entirely* enclosed by a curtain wall, the Secretariat holds the distinction of being the first tall building to employ such a suspended system, explains Robert Heintges. His eponymous firm is the architect of record for the envelopes of all the buildings included in the U.N.'s renovation plan.

Judging from early-1950s photos, the glass walls on the east and west elevations of the newly completed Secretariat were sleek and taut, even though they were made up of many small components, including operable double-hung aluminum windows and glazed spandrel panels nested between aluminum-clad steel mullions. The resulting grid, which concealed rather than expressed the building's steel moment frame, ran vertically between louvered mechanical levels occurring roughly every 10 floors and stretched horizontally between Vermont-marble-clad walls on the north and south. The stone bookends emphasized the building's almost improbable thinness (its floor plate is 287 feet long but less than 74 feet wide) and provided a contrast to the two transparent facades.

But soon after occupancy, performance problems surfaced, especially due to heat gain and glare through the east- and west-facing facades and their blue-green-tinted,

FIRST BUT FLAWED The Secretariat is the first skyscraper with a curtain-wall skin. However, the transparency of its original glazing (far left) was compromised by the installation of reflective film on both the east and west (near left) facades. The new curtain wall (above) re-creates the appearance of the building during the years just after completion, but with a state-of-the-art pressure-equalized system.

PHOTOGRAPHY: TELEGRAM/GETTY IMAGES; ©UNITED NATIONS MULTIMEDIA/JOHN MOSBRUCH AND PETER BROWN; HEINTGES AND ASSOCIATES; EZRA STOLLER © ESTO



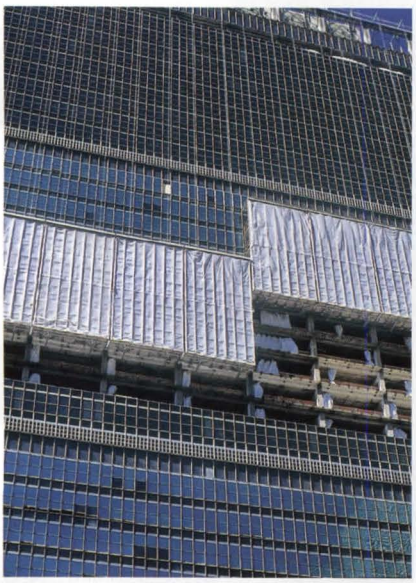
1 SECRETARIAT
2 CONFERENCE BUILDING
3 SOUTH ANNEX
4 LIBRARY
5 GENERAL ASSEMBLY
6 NORTH PODIUM
7 TEMPORARY NORTH LAWN BUILDING

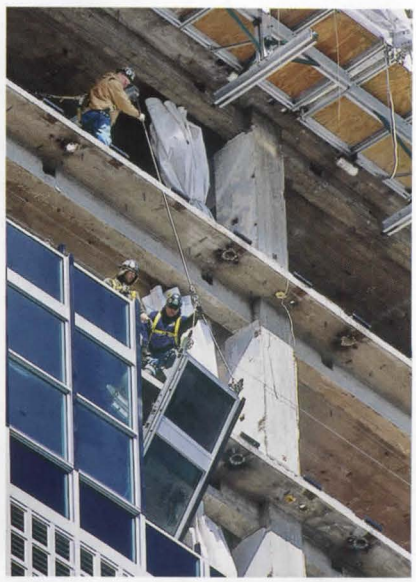
SITE PLAN

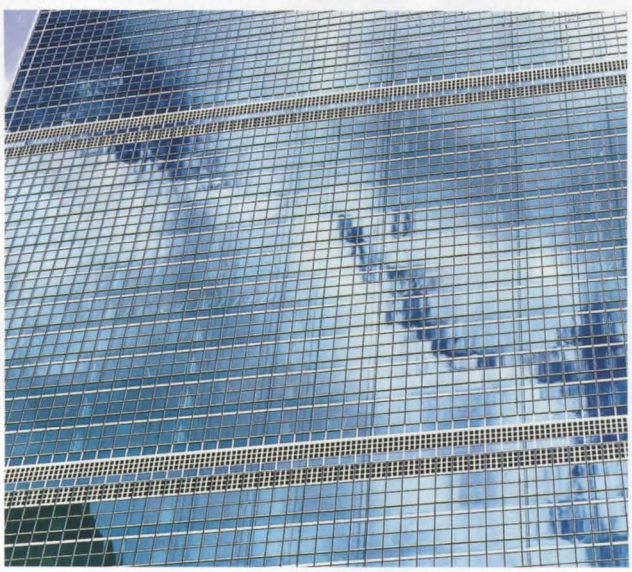
single-pane vision glass. The complex's architects oriented the Secretariat parallel to Manhattan's street grid (29 degrees east of north) to take advantage of views of the skyline and the East River, rather than with an eye toward reducing solar loads, explains Michael Adlerstein, an architect and the U.N. assistant secretary-general in charge of the renovation.

The original design-team members were not oblivious to the problems associated with their orientation choice, however. Le Corbusier argued for an envelope solution that included external shading devices, such as the brise-soleil that had been installed on his 1933 Salvation Army project in Paris several years after its completion. Harrison, meanwhile, advocated the use of insulated glazing, a new technology consisting of two layers of glass with a sealed air space in between. The U.N. originally chose insulated glazing based on a cost study by the mechanical-engineering firm Syska Hennessy (which, coincidentally, is also the mechanical engineer for the U.N. renovation). The study showed that the new glazing technology would be less expensive and easier to maintain than the combination of conventional glazing and an external shading system. However, the insulated glass was also eventually eliminated from the specifications, not only due to its cost premium over single glazing but also because the layered glass was too heavy for the double-hung sashes. Its international design team notwithstanding, the Secretariat "fell victim to that uniquely American practice affectionately known as 'value engineering,'" says Heintges.

The glare and heat-gain problems were most acute on the building's east side, which faces the East River. Here, almost immediately after the building's opening, the U.N. installed a reflective film to the inside of the vision glass. (A different type of adhesive film was applied to the Secretariat's west facade—which is partially shaded by Midtown Manhattan's mass of buildings—but not until after the 9/11 attacks in response to heightened security concerns.) The east facade's reflective film helped reduce the solar load, but it also radically altered the Secretariat's appearance, eventually bubbling, wrinkling, and peeling. And because the glazing was simply annealed (meaning it had not been heat-treated), the film also induced thermal stresses, causing the glass to

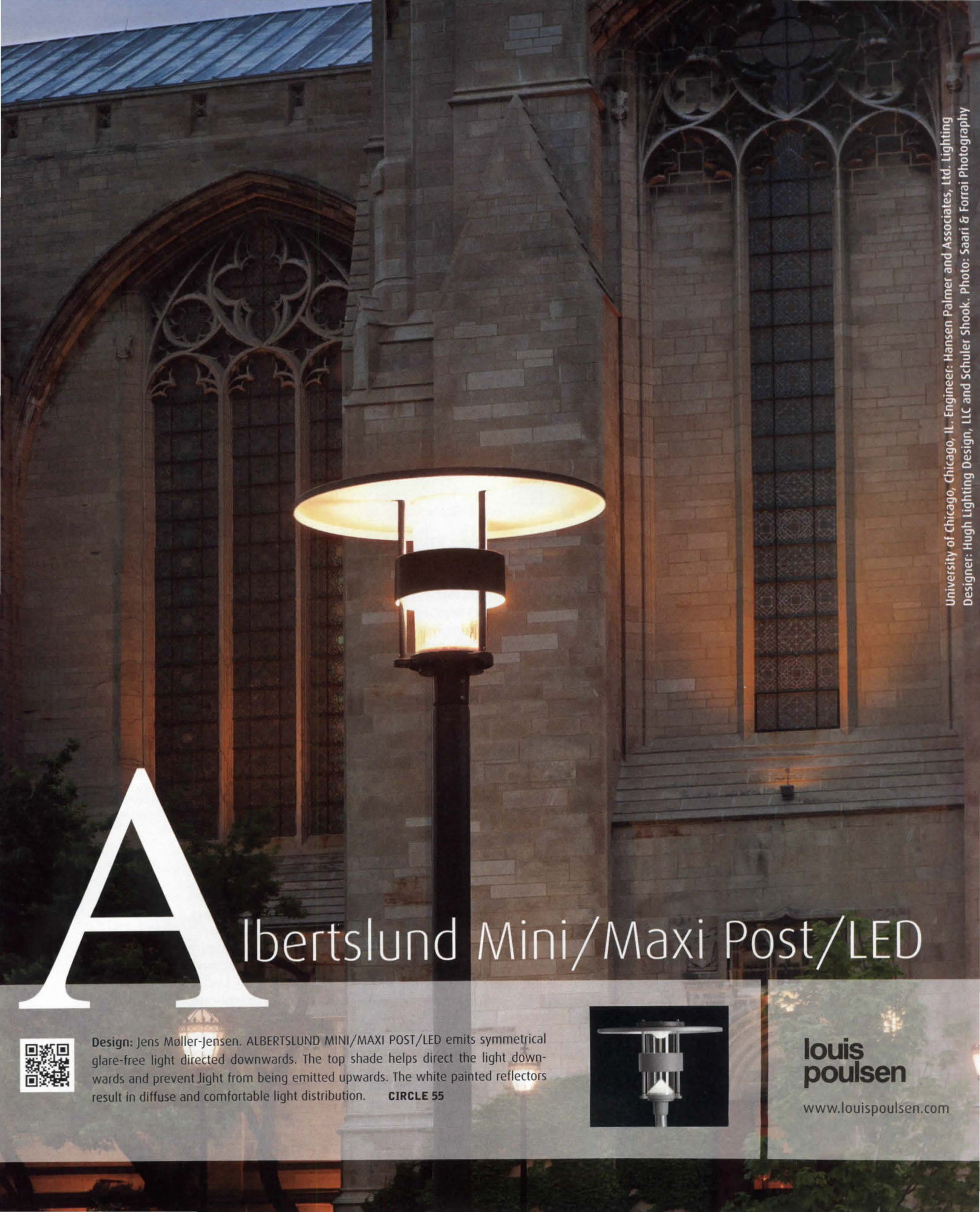






SEQUENCE
Demolition of the original curtain wall (above left) and installation of the new one (above right) proceeded from bottom to top in each of the roughly 10-story zones defined by the tower's louvered mechanical levels. The new cladding (left) incorporates numerous performance enhancements, including a low-E coating and blast resistance.

PHOTOGRAPHY: © WILLIAM RAVELLI



University of Chicago, Chicago, IL. Engineer: Hansen Palmer and Associates, Ltd. Lighting Designer: Hugh Lighting Design, LLC and Schuler Shook. Photo: Saari & Forrai Photography

Albertslund Mini/Maxi Post/LED

Design: Jens Møller-Jensen. ALBERTSLUND MINI/MAXI POST/LED emits symmetrical glare-free light directed downwards. The top shade helps direct the light downwards and prevent light from being emitted upwards. The white painted reflectors result in diffuse and comfortable light distribution. **CIRCLE 55**

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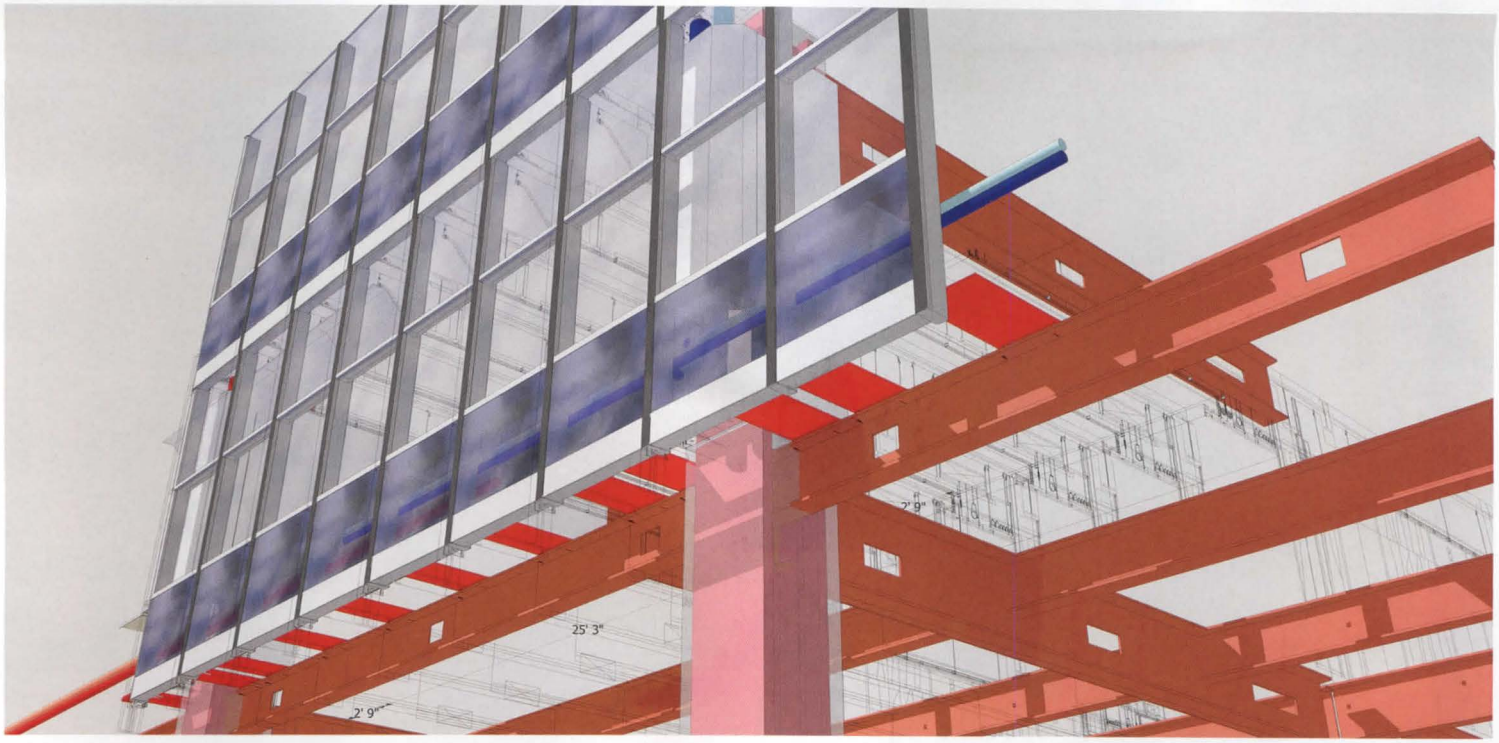

break. As the panels cracked, they were replaced with glazing of various types, creating a jumble of different hues and degrees of transparency.

The spandrel panels also suffered from occasional breakage. And although the originals were made of tinted wire glass, they were replaced in some places with clear glass and in others places with nonwire, laminated glass containing a blue-green PVB (polyvinyl butyral) interlayer intended to approximate the original tint. Behind the spandrels, paint began peeling from the concrete-block knee walls, revealing the masonry joints through the glass.

The glazed portions of the curtain wall were not the only sources of problems. The system as a whole suffered from air and water infiltration and condensation, resulting in energy loss and occupant discomfort, and creating ideal conditions for deterioration of the facade's structural components. And there were visible signs of such damage, like bulging mullion covers—an indication that the steel behind the aluminum was rusting. So in 2002, the U.N. authorized an inspection program that included borescopic investigation of the mullions performed from the building's interior and more extensive probes of the exterior conducted from a swing stage. The latter focused on areas deemed representative of the whole enclosure system and entailed the selective removal of spandrel panels, extrusions, and flashing. About 97 percent of the anchors inspected exhibited some form of corrosion, and 54 percent had significant corrosion.

The U.N. and its consultant team considered repairing the Secretariat curtain wall, restoring it to its original condition, and a strategy that Heintges calls "faithful reconstruction." The last option, which is the one they ultimately chose, involved complete replacement of the curtain wall with a state-of-the-art system that would closely match the look of the 1950s materials, replicate their profiles, and realize the original design intent. Replacement, they concluded, would be the only way to meet heightened security standards, maintain comfortable interior environmental conditions, and conform to energy codes—codes the U.N. says it is voluntarily complying with, and in many cases exceeding, even though it is not bound by local zoning or building regulations. "We want to be good citizens and responsible owners, even though we are on sovereign territory," says Adlerstein. The U.N. predicts that the facade, along with features such as daylight dimming, demand-control ventilation, and a sophisticated building-management system, combined with campus-wide improvements like the revamp of the central plant, will cut the compound's energy use by 50 percent.

Due to security concerns, the U.N.'s consultants won't reveal all the details of the new curtain wall. However, they describe it as unitized, pressure-equalized, and thermally broken. Although the original had been anchored to the floor slabs, outrigger plates now tie the assembly to the building's frame, which has also been made more robust.

The profiles of the curtain wall's aluminum extrusions closely follow those of the original components, but project a few inches farther into the building's interior in order to accommodate the performance enhancements. Although all of the glazing is fixed, some extrusions are offset to mimic the appearance of the original double-hung windows. Designers decided against similarly offsetting the glazing to replicate upper and lower sashes because computer simulation showed that doing so would produce an almost imperceptible effect.

Simulation was also an important part of the glass specification process. Design-team members virtually re-created the early-1950s appearance of the building by measuring the spectral characteristics of an original glass sample. They then used the model as a benchmark for the new glazing. They combined this digital process with on-site testing of

NEW AND IMPROVED Although the Secretariat's original curtain wall was anchored to the concrete floor slabs, the new curtain wall (above) is tied to the building's moment-frame structure with outrigger plates. As part of the curtain-wall replacement, the masonry knee walls at the spandrels, mandated by now-outmoded fire codes, have been eliminated.

RENDERING: COURTESY HLW

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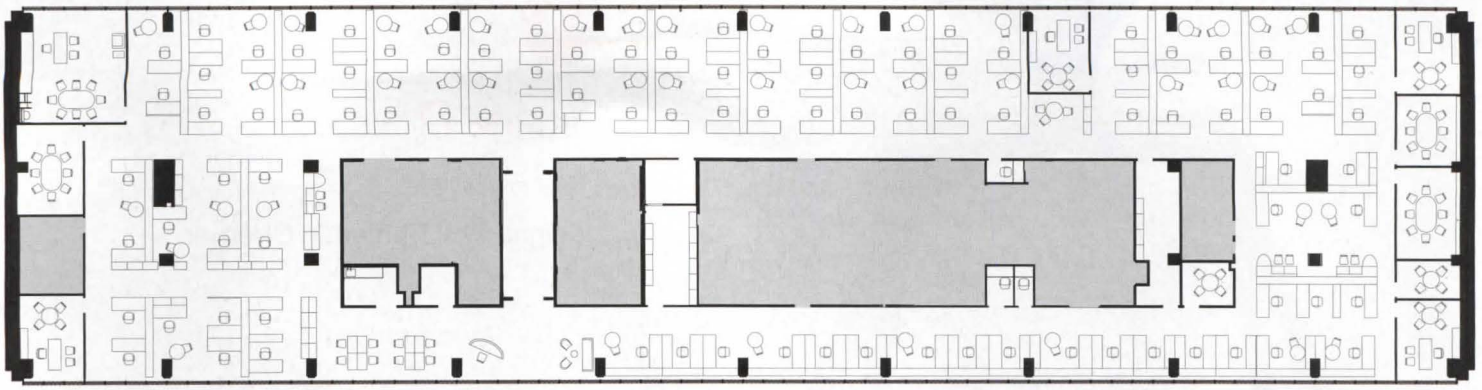


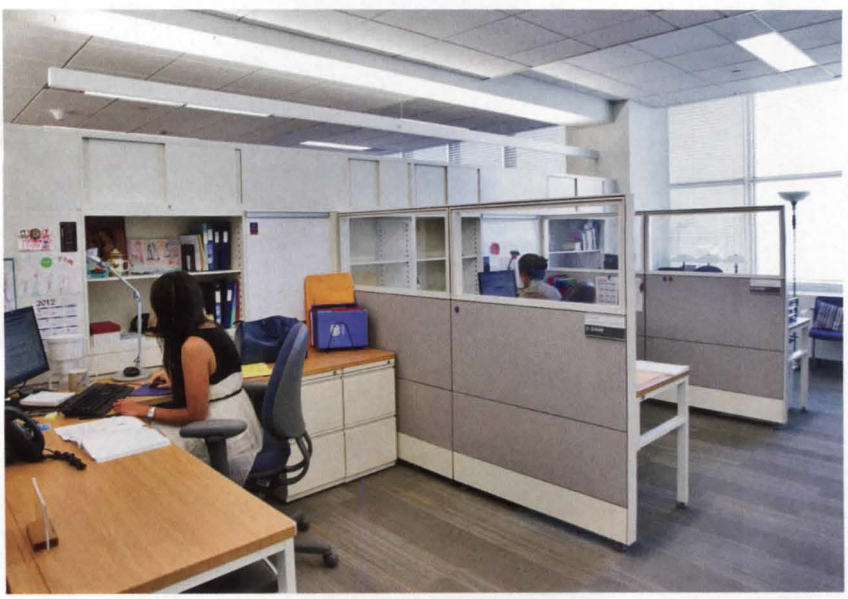
TYPICAL FLOOR PLAN

glass samples, under various atmospheric conditions and at different times of day, in order to select glazing without polarizing effects or undesirable color shifts. After narrowing the glazing options, contractors built a one-story-tall, four-unit-wide mock-up on the Secretariat's lawn. Ultimately, the team chose high-performance insulated vision panels of laminated glass that include a low-E coating and a blue-green-tinted substrate on the outer lite. The spandrels, which are also insulated, have painted aluminum back-pans to replicate the effect of the now-removed masonry knee walls.

Many more U.N. employees should be able to enjoy the daylight and views afforded by the new curtain wall, since the interior has been transformed from a warren of mostly private offices to floors devoted almost entirely to open and reconfigurable workspaces. These spaces are organized by 78-inch-tall modular "work walls" that extend from the perimeter columns and contain shelving, power, and data. The new Secretariat office floor layout also has a clearly defined circulation path around the perimeter of the core—a feature that was inexplicably lacking in the original building. "Way-finding was a nightmare," according to HLW's Gering. The ceiling in this new zone is 8 feet tall, gradually stepping up to 9 feet 6 inches at the windows, creating a configuration that reinforces the circulation path and aids in the distribution of mechanical services.

Each employee will have an average of 170 square feet of workspace, a number that is down from a pre-renovation average of 193 square feet. The figure includes new shared amenities such as "focus rooms" for sensitive phone calls or tasks requiring intense concentration; pantries; and spaces for small and impromptu meetings, distributed throughout the floor. More formal conference facilities, which are greatly expanded in the renovated Secretariat, and whose area is not part of the individual workspace totals, have been moved to dedicated floors below each mechanical level.

Adlerstein lobbied hard for the move to a largely open-office scheme. He, along with the rest of the renovation project team, won't know how well U.N. employees adapt to this "cultural change" until well after the last of them return from swing space in Midtown and Queens and quarters in a temporary building erected on the compound's north lawn—a process scheduled to be complete late this year. He compares the project's logistical challenges to those involved with moving an army. Now he just has to finish bringing the troops home. ■



MODULAR AND FLEXIBLE To facilitate future changes to office floor layouts, the Secretariat renovation team has created an open-plan system organized around 78-inch-tall furniture-like "work walls" that extend from each perimeter column and contain power, data, and storage.

PHOTOGRAPHY: © U.N. PHOTO/JOHN MCILWAINE

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Learning Objectives

1 Outline the early history of curtain-wall cladding on tall buildings and explain the technological and historical significance of the Secretariat's curtain wall.

2 Describe the performance problems of the Secretariat's curtain wall and explain the causes of those problems.

3 Explain the renovation team's strategy for addressing those problems.

4 Explain the renovation team's strategy for complying with new codes and satisfying goals for energy conservation, security, and occupant comfort.

AIA/CES Course #K1209A

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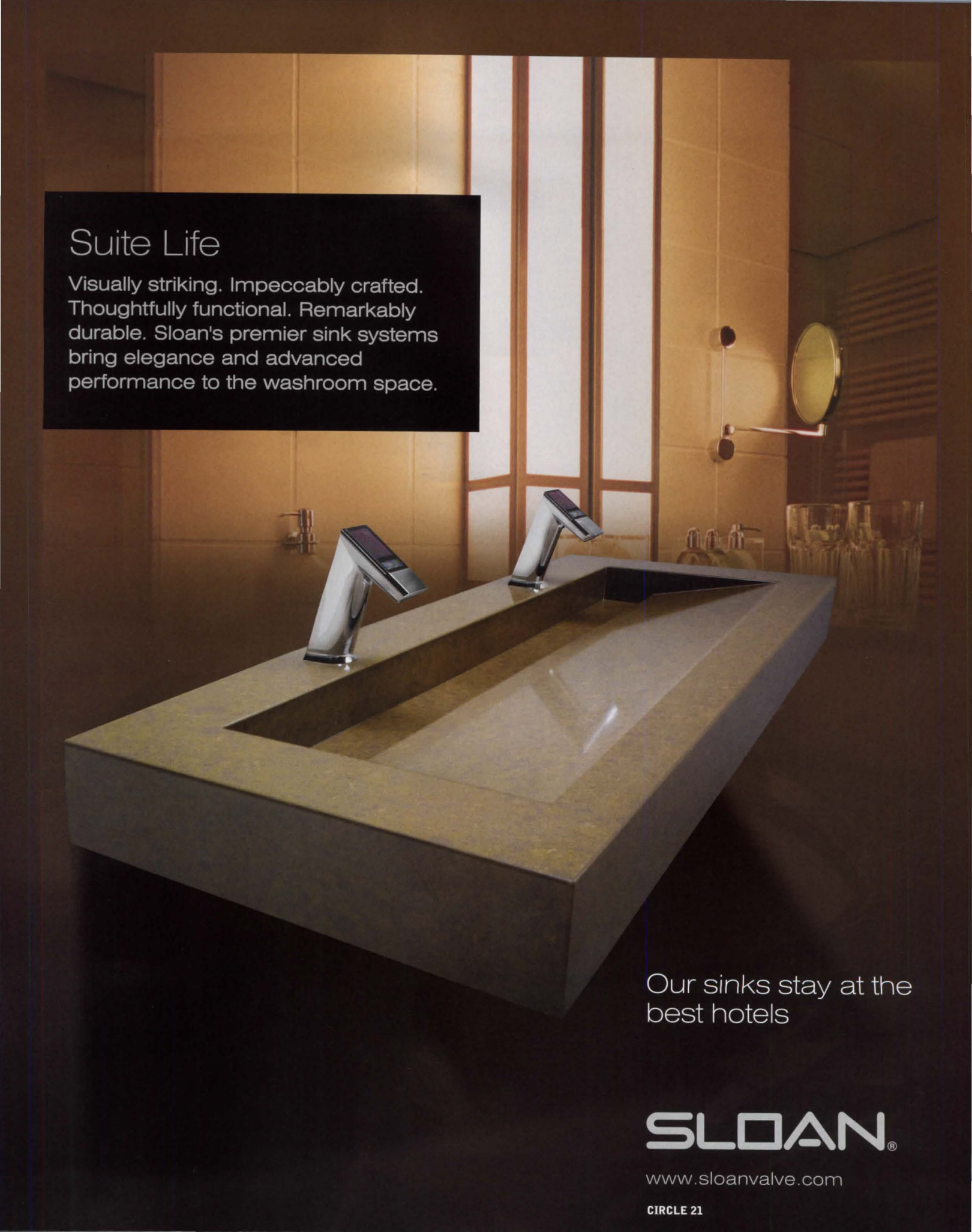
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RECORD KITCHEN & BATH

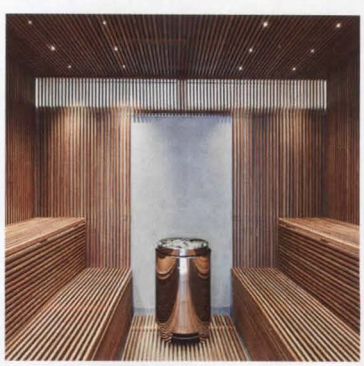
From a studio on a remote island off the coast of Sweden to a loft in the center of Manhattan, these residential and commercial kitchens and baths creatively use materials, scale, and a subtle balance of openness and privacy.

Studio Furillen Sweden
Architect **Andreas Forsberg**

THE REMOTE northeastern peninsula of Furillen, on the island of Gotland, is about as far as one can go in Sweden before the Baltic gives way to Eastern Europe. Once the site of military radar stations and active limestone quarries, Furillen's rugged landscape now attracts artists and vacationers.

One of the peninsula's newest converts, Mikael Blomqvist, wanted to build an inspiring retreat here for artists, architects, and others to borrow or rent. The entrepreneur and art collector enlisted Andreas Forsberg, of the Swedish architecture firm AQ Arkitekter, to design a 65-foot cube sheathed in glass and Cor-Ten steel hydraulic panels that can close up around the house to form a bunker or be lowered to create terraces. The two-story house—bedrooms and a wine cellar are in the basement level—includes a library and spaces for meetings.

Forsberg continued the theme of "opening and closing" in the kitchen by installing German manufacturer Bulthaup's flexible B2 kitchen workshop. It includes three distinct elements: a stainless steel countertop with a stove and sink and two walnut "tool cabinets" with doors and shelves that fold out for easy access to appliances, dishes, and pantry items. "It's more like furniture rather than fixed interior design," says Forsberg, who likes the idea of kitchens becoming smaller instead of more monstrous. "I think Bulthaup is figuring something out about modern living."



Two freestanding, identical side-by-side bathtubs, on the ground floor, have views out to the surrounding forest through the house's ceiling-height glazed doors. The bathtubs sit outside a sauna made of teak louvers. "If you have several people, it could be quite practical," says Blomqvist of the bathtubs. *Laura Raskin*

TIDY UP The Bulthaup B2 kitchen (above) includes three streamlined pieces of furniture. Architect Andreas Forsberg points out that, unlike their neighbors in Finland, most Swedish people do not have saunas in their homes; at Studio Furillen, the teak room is an additional luxury (left).

credits

ARCHITECT: Andreas Forsberg, AQ Arkitekter
ENGINEER: Projektbyggaren

SOURCES

KITCHEN: Bulthaup
CONCRETE FLOORS: Maxit Floor
TOILETS AND BATHTUBS: Duravit
FAUCETS: Vola
SAUNA: Tylö
INTERIOR LIGHTING: Erco, Delta Light
PULLS: Frost

View additional images at architecturalrecord.com.

Blantyre House Toronto
Architect **Williamson Chong Architects**

ACCORDING TO architect Donald Chong, when his clients wanted to build a house in The Beaches, a popular Toronto neighborhood, "they were committed to the idea that they could live well in a compact square footage."

This was to their advantage, says Chong, a founding partner of Toronto's Williamson Chong Architects. Narrow infill projects can scare off buyers. The couple found a 19-foot-wide lot with one catch: a 100-year-old Norway spruce in the backyard. Saving the tree and compressing the footprint for the three-story, 2,300-square-foot house "was our first big chess move," says Chong. He bumped the living room up to the second floor with the children's bedrooms and created a "kitchen studio" on the first. It spans the length of the house, with window walls at each end.

Rift-cut white-oak-veneer plywood panels line one wall, hiding mechanicals and cabinetry. Nary an appliance is to be seen: The seamless plane of the cabinets, interrupted only by an angled cutout for counter space, was driven by the clients' anti-clutter aesthetic. A monolithic quartz countertop with an attached oak table anchors what clients Ken Leung and Bonnie Lam call the heart of the home. "When we have friends over, we never end up leaving," says Leung.

The master bath on the third floor has a view of Lake Ontario. A freestanding glass wall separates a bathtub from a depressed-floor shower. Limestone tiles ease the transition from the bedroom's warm wood palette. The effect is spa-like, but Leung and Lam, with a young child and another on the way, had a special request: three-sided access to the tub and room to step over toys. *Laura Raskin*

CLEAN LIVING Floor-to-ceiling glazing at the east and west ends of the kitchen (left) allows daylight to penetrate the entire first floor. An oak and quartz island and attached dining table are a single fixed unit. The master bathroom on the third floor (above) is spacious enough to accommodate the clients' growing family.

credits

ARCHITECT: Williamson Chong Architects – Donald Chong, partner in charge

GENERAL CONTRACTOR: Derek Nicholson Incorporated

SOURCES

KITCHEN FLOOR: The Sullivan Source

COUNTERTOP: Caesarstone

VENT HOOD: Faber

COOKTOP: AEG

MILLWORK: Khang Le

BATHROOM FLOOR TILE: Stone Tile

TOILETS: Duravit

BATHTUB: Cosmic

PHOTOGRAPHY: © BOB GUNDU

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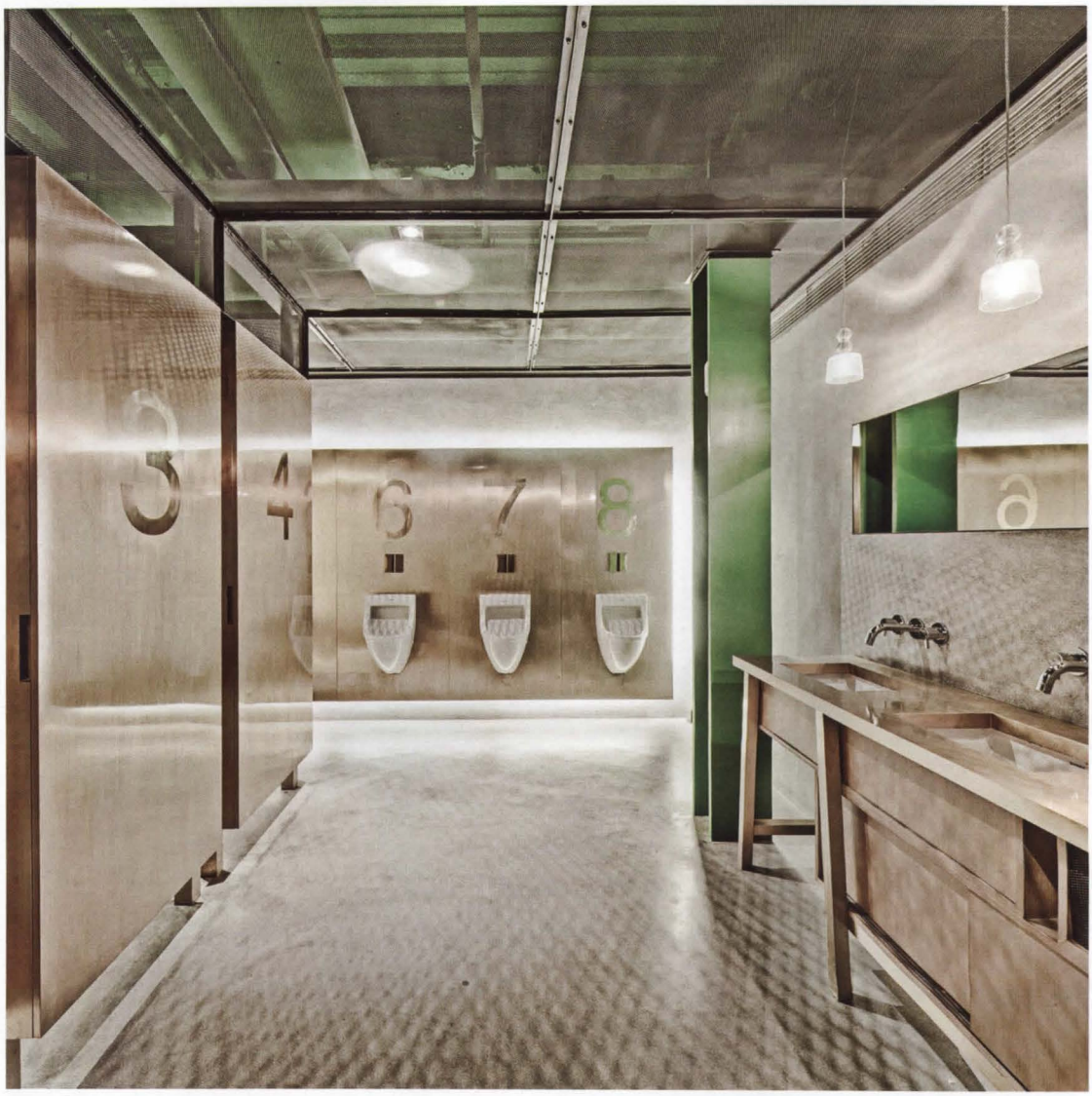
New Heights Restaurant Bathrooms Shanghai
Architect **Neri & Hu Design and Research Office**



WHILE IT IS the view that draws most visitors to the New Heights Restaurant, located on the top floor of the Renaissance-style Three on the Bund building in Shanghai, there is now one more reason to make a stop—a striking new bathroom design by Shanghai-based Neri & Hu Design and Research Office (NHDRO).

NHDRO founding partner Lyndon Neri knows the historic 1916 building well; while he was director in charge for Asia projects for Michael Graves & Associates, he designed many of the building's interior spaces during a renovation completed in 2004. In 2009, Neri returned with his own firm to design the New Heights restaurant, and earlier this year they completed a multipurpose dining room and redid the bathrooms in the space.

Off the new dining room—a steel-framed, frosted-glass insertion—is an oak-lined corridor leading to the renovated restrooms, where bronze signage on the terrazzo back wall directs visitors to the ladies' or men's side. A variety of materials and textures makes up the space, including wood countertops, porcelain sinks, and a metal-mesh ceiling that allows a view of the ductwork and pipes in the plenum. Lighting above the ceiling shines down to "create a series of beams to break up the scale," says Neri; it casts patterns in the space that add another layer of texture.

While one of the team's challenges, and successes, was to make the cubicle partitions "read as floating," Neri doesn't feel the space is futuristic. Instead, he says, the team merely played with neutral-colored, natural materials, such as terrazzo, wood, and bronze, in unusual ways. As a "strategy to give character" to each private space in the bathrooms, the team had large numbers etched into the custom bronze panels behind the men's-room urinals and into the bronze stall doors—a playful touch that makes the space more memorable than a typical restaurant restroom. *Rita Catinella Orrell*

TO THE LOO The corridor leading to the restrooms is lined with oak and features bronze signage (above left). In the men's room (above right), etched bronze doors and panels bring a luxe touch to the stalls and urinals. Lighting diffused by the metal-screen ceiling casts a pattern on the walls and floor.

credits

ARCHITECT: Neri & Hu Design and Research Office – Lyndon Neri, Rosanna Hu, principals in charge

GENERAL CONTRACTOR: Shanghai Haiyi Construction Group Company

SOURCES

HARDWARE: Häfele, Dorma

INTERIOR AMBIENT LIGHTING: Produzione Privata

TOILET, SINKS, URINALS: Duravit

FAUCETS: Goldiden

LIGHTING CONTROLS: Clipsal by Schneider Electric

DOORS, SIGNAGE, METAL CEILING: Locally sourced

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Arabella Residence New Orleans
Architect **Eskew+Dumez+Ripple**

CRAFTING A functional, attractive home for a family is a tall order for any architect. And when that family is your own—including your wife and two children (ages nine and six)—the challenge only grows. That's what New Orleans–based architect Steve Dumez, a founding partner of design studio Eskew+Dumez+ Ripple, learned when he embarked on a nine-month renovation of the family's 3,800-square-foot, two-story home in the Big Easy. "We knew we wanted to modify the way the spaces related to one another and open things up more," says Dumez of the house, built circa 1920 in the Uptown neighborhood. The family had fallen in love with the seamless living afforded them by their old home, a loft apartment with an open floor plan. "The loft had a casual feel that we wanted to replicate in the house," he says.

To begin, Dumez removed several of the house's interior walls to create a series of contiguous living spaces on the ground floor. A sitting nook opposite the kitchen island, carved from a space beneath the stair, allows for the occasional spectator. "And by pushing that wall under the stair, you capture space for the master closet," says Dumez. The newly open kitchen is organized around that central island of white statuary marble. Stainless steel appliances and other kitchen accouterments sit in a niche carved into the opposite wall, to maximize floor space and let the kids move freely through the area.

The expanded master bathroom, too, is streamlined: His-and-hers sinks sit atop a cantilevered counter of sapele wood, while a single pane of glass and ⅜-inch drainage gap separates the "dry" areas of the room from the shower and sunken tub. And for those who are curious, yes, you *can* slip between the bathtub and into the pool beyond, by way of a custom-milled-shiplap sliding door between the two. As the family often enters and exits the pool this way, "our children like to call the bathtub the 'hot tub,'" says Dumez with a laugh.

The process had its frustrations, "like learning to live with the client's budgetary restraints," Dumez jokes. "But at the end of it all, you feel like you've been able to change the way you live in a really positive way, through design." *Asad Syrkett*

OPEN HOUSE The Dumez family went with a loftlike open floor plan in their new home to encourage family members to commune in the kitchen (top) and other common spaces. A custom-milled-shiplap door (above) separates the master bath and family pool, opening to provide backyard views through the master bath (left).

credits

ARCHITECT: Eskew+Dumez+Ripple – Steve Dumez, principal; Michael Keller, intern architect

GENERAL CONTRACTOR: C. Anderson Construction

SOURCES

WINDOWS: Pella (operable awning)

GLAZING: Velux (skylights)

HARDWARE: Blum (closers)

PAINTS: Benjamin Moore

FURNISHINGS: Knoll (barstools)

LIGHTING: Lightolier (downlights)

PLUMBING: Duravit (sinks); Vola

APPLIANCES: Miele (fridge, dishwasher); Gaggenau (stovetop)

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Union Square Loft New York City
Designer Studiodb

FOR THE RENOVATION of a loft in a landmarked building in the Union Square neighborhood of Manhattan, the New York City design/build firm Studiodb devised a series of bookshelves and sliding doors that allowed for an expansive layout, with the flexibility to create private spaces when needed. The owner, a native New Yorker, bought the apartment as a primary residence but divides his time between his hometown and Washington, D.C.

The client wanted the kitchen to be open to the living space, with a larger than usual island where visitors could gather while he is entertaining. At his request, the designers inserted a large pantry and prep area next to the kitchen, which allows it to remain clean and uncluttered. A custom blackened-steel sliding door with a perforated mesh screen closes off the ancillary area from the main space. When open, the pantry is "almost like a grand piece of furniture," says Studiodb partner Damian Zunino.

The kitchen cabinets, made with reclaimed teak, echo the warmth of the loft's existing wood columns and central beam. The designers played with various materials: The countertops are cast-in-place concrete with blackened-steel side panels and surrounds, and the backsplash is made from vintage slate chalkboards. The unusual kitchen exhaust hood is a repurposed industrial dust collector. "Although it is large and seems like it might be noisy, it is really quiet," says the client.

A relatively tight budget led to creative solutions, such as buying a Viking oven from Green Demolitions, a not-for-profit organization that sells overstocked or landfill-bound luxury items. According to Studiodb partner Britt Zunino, "If you are flexible, you can get a great product at a great price." *Rita Catinella Orrell*

SUPER VENT An industrial dust collector sits over a large island in the center of the loft's open kitchen space (above). Reclaimed materials include the teak for the cabinets and a blackboard backsplash. A sliding steel-and-mesh door (below) keeps the pantry hidden from view when needed.

credits

DESIGNER: Studiodb – Britt Zunino, Damian Zunino, principals

ARCHITECT OF RECORD: Kevin Byrne Architects

GENERAL CONTRACTOR: Faro Building Corporation

SOURCES

PANTRY DOOR/TRACK: Argosy Designs

PANTRY MESH SCREEN: McNichols

CABINETRY: Big Time Dynamo

COUNTERTOPS: Get Real Surfaces, PaperStone

EXHAUST HOOD: Avani Environmental

OVEN: Viking

PAINT: Benjamin Moore

FAUCET: Gessi

LIGHTING CONTROLS: Lutron

View additional images at architecturalrecord.com.

73rd Street Penthouse New York City
Architect Turett Collaborative Architects

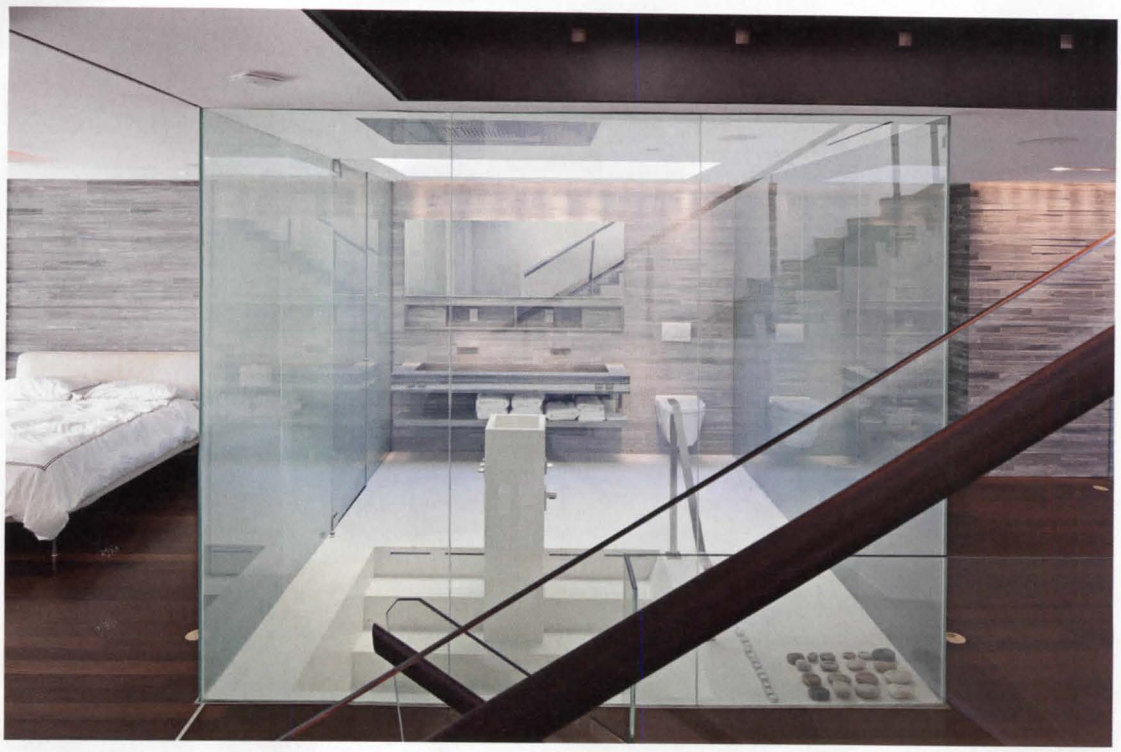
A 2,400-SQUARE-FOOT triplex penthouse residence is a world apart from New York's notoriously cramped housing stock. But even rarefied living quarters have to contend with the city's tight lots and dense urban fabric, which often eat up light and air. Just ask New York's Turett Collaborative Architects (TCA), which worked with its client, a Manhattan-based businessman, to craft an inviting two-bedroom, three-bathroom apartment that maximized daylight from its northern and southern exposures, despite being closed in by an adjacent school and apartment tower.

A conventional master bath, isolated from the main living spaces, would obstruct natural light and decrease square footage, explains project manager James Saisakorn. Instead, TCA designed a vitrine-like 122-square-foot washroom, glassed in on three sides and cantilevered over the kitchen below. While TCA aimed to preserve daylight in the space, it needed an elegant solution for a potential privacy problem. With the flip of a switch, users can toggle the bathroom's glass walls between opaque and transparent by activating a low-level electric current that runs between the panes. "It was an opportunity for us to create this dichotomy between public and private," says Saisakorn.

The design team went with a depressed-tub scheme because that was the best way to preserve sightlines through the apartment. But finding a way to support the sunken tub—which is made up of two pieces of white synthetic surfacing and weighs in at 1 ton—was a particular challenge, says TCA founder and principal architect Wayne Turett. As a solution, TCA engineered a heavy-steel crossbeam system to brace the floor of the tub. "Luckily, we were working with an adventurous, design-minded client," says Turett.

That spirit of adventure (and an undisclosed budget) led the design team and their client to Vals, Switzerland, where they visited thermal baths designed by the Pritzker Prize–winning Swiss architect Peter Zumthor and sourced quartzite for the apartment's walls. Back in New York, contractors laid the quartzite according to an algorithm that accounted for the width and height of each slab. Larger blocks of quartzite were cantilevered from the wall to form a sink and a shelf. Above the basin, a long rectangular alcove in the wall provides space to store brushes, soaps, and other toiletries. "This was really an opportunity for us to work on design on the micro and macro levels," says Saisakorn. "And I think this is a great example of how beautiful the meeting of materials can be."

Asad Syrkett



VANISHING ACT With the touch of a button, a low-level electric current runs between the panes of glass in the master bathroom to transform the *walls from* transparent (above) to opaque (right), allowing light in while retaining privacy.

credits

ARCHITECT: Turett Collaborative Architects (TCA) – Wayne Turett, principal; James Saisakorn, project manager; Christian Nicholas, designer; Sam Verrill, junior designer

GENERAL CONTRACTOR: Alcon Builders Group

SOURCES

DOORS: SPD Systems (privacy glass)

HARDWARE: Dorma (locksets, closers); Vola (pulls)

FINISHES: Benjamin Moore (paints and stains); DuPont Corian (special surfacing); Quarra Stone (quartzite)

LIGHTING AND LIGHTING CONTROLS: Lutron; Starfire Lighting; Hevi Lite

PLUMBING: Duravit (toilet); Quarra Stone (sink); Dornbracht (faucets, shower)

TUB: DuPont Corian

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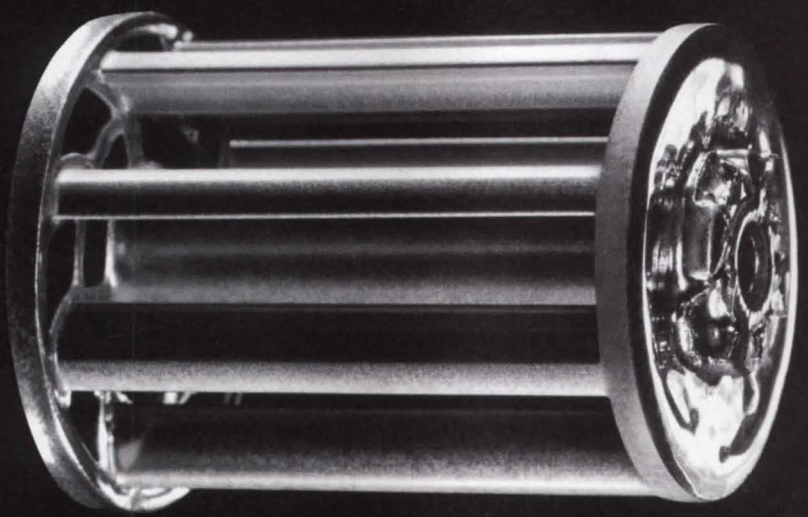

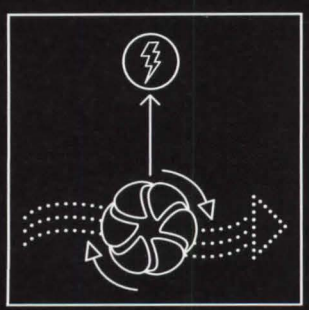

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Cultural Centre Amenities Perth, Australia
Architect **Coniglio Ainsworth Architects**

SINCE 2008, Australia has been a cautious bystander to the worldwide recession, and the city of Perth in Western Australia has pressed ahead with several major building projects, including a new 45-story office tower and plans for a six-star, 500-room luxury hotel in the city's outskirts. Construction has continued in the public sector as well, with projects including a $600,000 face-lift on a nearly 700-square-foot public restroom alongside an art gallery and library. The new restroom, which opened in October 2011 and was dubbed the "Loouvre," was designed by Perth-based Coniglio Ainsworth Architects as part of a city-sponsored program to renew public spaces in the aging Perth Cultural Centre precinct.

The city's initial proposal called for simply refurbishing the rundown and often-vandalized public toilets, which are located in a building that houses stairs and elevators for an underground parking garage. But the architects saw an opportunity to rethink the restrooms and to connect with the cultural precinct and art gallery nearby. "Although it is just a toilet project, its setting deserved a better and more rigorous design response," says Andrew Ainsworth, the project's director.

To integrate the space with its surroundings, the architects installed windows and skylights—an unorthodox design strategy for a public restroom. City officials were skeptical about the windows at first, but the architects addressed that by orienting them so passersby could not look in. Three windows, two in the women's restroom and one in the men's, were carefully positioned to take advantage of views of the library and a public garden. The architects also embedded custom LED uplighting in the skylights to play off the Corian-clad walls and ceiling. Except for the windows, the exterior of the building was unchanged. "The existing geometry was a big driver for us," says Ainsworth.

The architects also convinced the city to include artwork in the project. The neighboring gallery and the city donated a total of nine works that were photographed and digitally printed on Laminex Customart panels. Since the restroom opened, vandalism has decreased dramatically. "Hopefully, that is the architecture doing its job," says Ainsworth. *Laura Mirviss*

NEW ANGLE Walls inspired by the existing structure have a matte satin finish (top). Stall art was donated by the Art Gallery of Western Australia and the City of Perth Art Collection (bottom left). Laminated safety-glass windows are covered with an anti-graffiti film (bottom right).

PHOTOGRAPHICS (BOTTOM RIGHT)

credits

ARCHITECT: Coniglio Ainsworth Architects – Andrew Ainsworth, project director; Matthew Coniglio, Jonathan Scull, Blair Ginbey, Mark McKenna, project team

SOURCES

TOILETS: Caroma

SINKS: Australian Counter Top, Caroma

SOLID SURFACING: DuPont Corian

HAND DRYERS: Britex

SKYLIGHTS: Ampelite

FLOOR TILING: Original Ceramics

INTERIOR LIGHTING: Halo Lighting

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Left Picture: Sponsor Award Winner, EMPAC / Grimshaw Architects
Right Picture: Citation Award Winner, Hudson-Panos House / Swatt Architects

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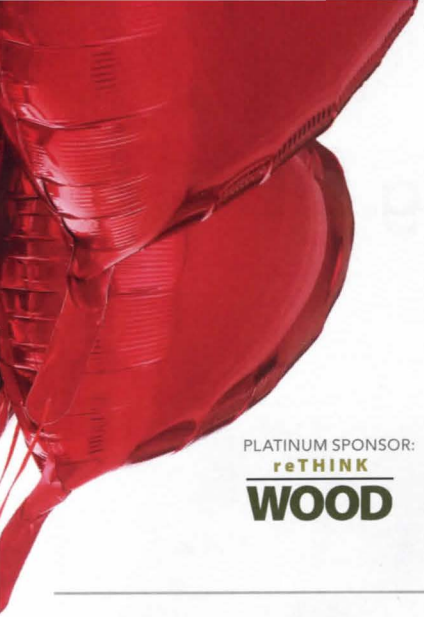

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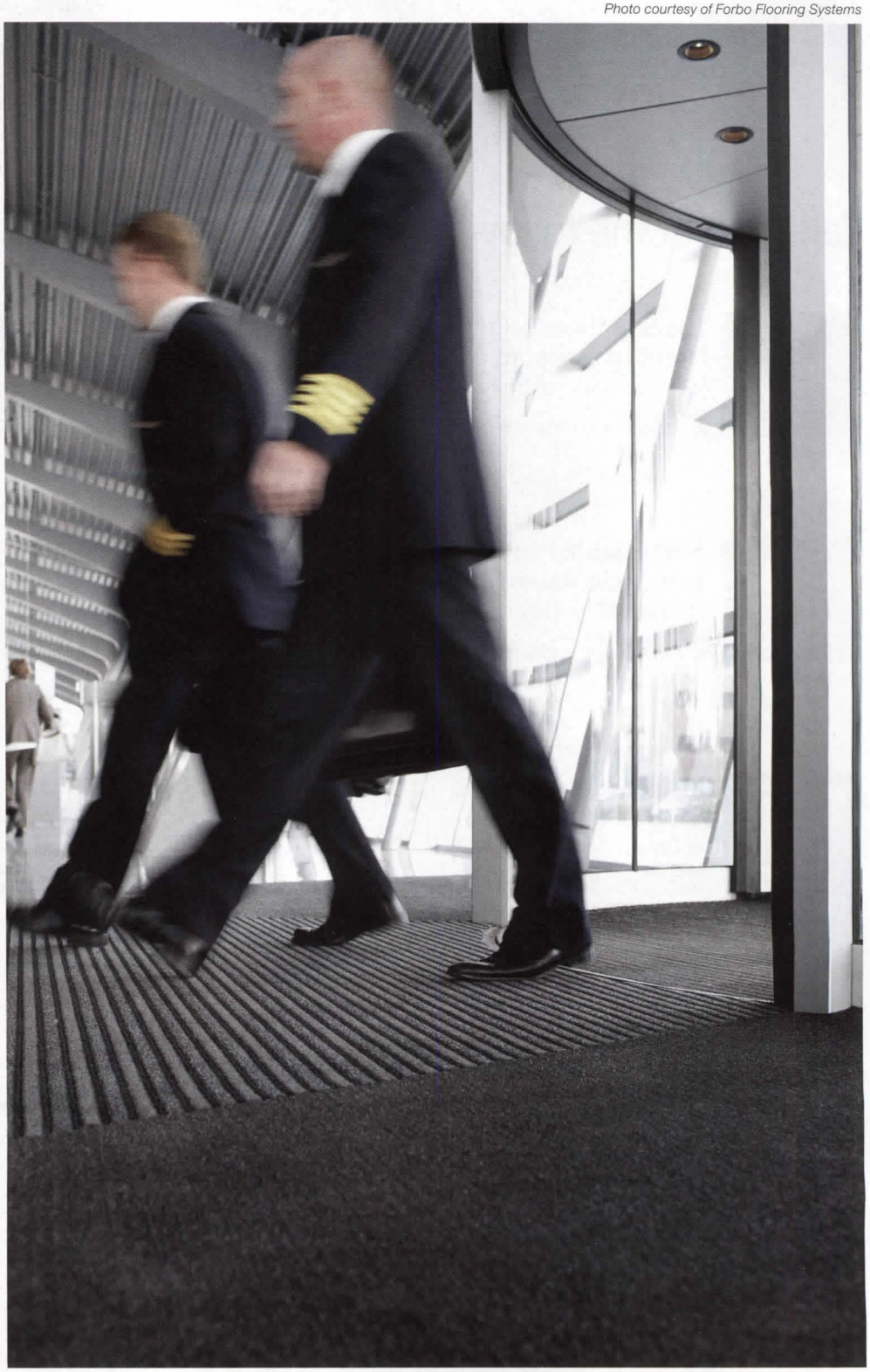


Buildings with pedestrian foot traffic that is concentrated at specific entrances are prone to have those pedestrians carry a lot of dirt on their shoes and rain water on their bodies as they enter those buildings. The dirt may either build up near the entrance or more likely get carried throughout the building as those people walk to their specific destinations. The water may tend to be deposited near the entrance but that means a potential slipping hazard is created. If it mixes with the dirt, then it is more likely to be carried to other parts of the building and create real cleaning challenges throughout. Entrance flooring systems have been recognized as an effective solution to these problems. Designed and installed properly, they help assure clean interior environments, reduce slip hazards, and reduce the need for flooring maintenance overall.

DESIGN PRINCIPLES FOR ENTRANCE FLOORING

Many building owners who are involved in maintaining them are often the drivers behind the decision to include entrance flooring systems. If they have any experience in keeping floors throughout a building clean at all, they know that flooring maintenance alone can account for up to 60 percent of total building maintenance costs. Sweeping, vacuuming, mopping, waxing and repairing are some of the activities that maintenance staff must conduct on a daily basis just to keep the floors reasonably clean and safe. In fact it is estimated that over a 10-year span, building owners will spend more than eight times the original flooring purchase price on maintaining those floors. Entrance flooring systems can help dramatically reduce some of this activity, thus reducing the associated maintenance costs over time. The reasoning is simple—stop the dirt at the entrance and it doesn't get carried to other areas, thus keeping other floors cleaner and easier to maintain. The old adage applies succinctly here—an ounce of prevention is worth a pound of cure. The relatively small entrance area prevents a lot of the dirt from being carried to the rest of the building, thus saving the heavy work of having to clean it throughout the building.

Risk management and liability are also strong drivers for using entrance flooring systems. Building entrances are common sites

of slip and fall accidents either because of wet or poorly maintained floors. People who slip on these floors and are hurt often bring lawsuits against the building owner and their insurance companies. It is not uncommon for them to claim large amounts of money as just compensation for injuries, loss of income, pain and suffering among other things. Entrance flooring systems can reduce the likelihood of such accidents by helping to control the build-up of water and keep the entrance floor surface more slip resistant.

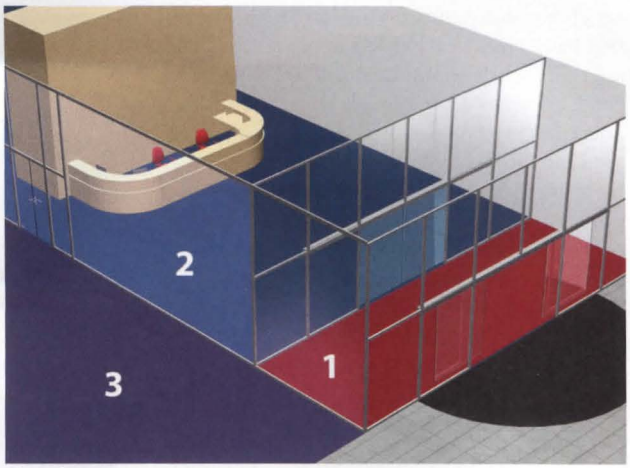
Whatever the final reasons are to include an entrance flooring system in a building, properly designing a successful one starts with understanding how it works. From a purely functional stand point, entrance flooring systems need to accomplish four things. These are referred to as the four "R's" of an entrance flooring system. First it must ***remove*** dirt, soil and debris from shoes or boots as people enter a building. It does this typically through intentionally irregular shapes in the surface of the flooring to help create friction and clean against the footwear. Second, it must collect and ***retain*** the dirt and debris in the flooring to prevent other people from tracking it into the building. Then when the flooring is cleaned or vacuumed, it must readily ***release*** the collected and retained dirt and debris to prevent it from being saturated and unable to function as intended. Finally, the entrance flooring must be able to ***recover*** as a product so that it continually looks good and functions properly. When evaluating entrance flooring products from different manufacturers, then, it will be important to question how well they each accomplish all four of these functions. If a product doesn't have a successful track record for doing all four of these R's then it will not be effective at achieving the intended maintenance and risk management goals.

Determining where to locate entrance flooring systems in a building is more than just deciding to put it inside the entry door. Instead a comprehensive design is based on identifying and addressing the typical entrance zones of a building. There are commonly three such entrance zones as follows:

Zone 1: This is the very first area of defense against foot-borne soil and water being carried into the building. It is ideally located right outside the building to prevent soil from ever entering the building at all. Where that is not practical, it can also be located immediately inside the doorway. Either way, this is the location to choose the most effective entrance flooring system relative to the degree of foot traffic encountered.

Zone 2: This may be a vestibule or other extended entry area that is immediately beyond the zone 1 entrance area. A secondary entrance flooring system or a continuation of the primary one may be installed here to address soil and water not picked up in zone 1.

Image courtesy of Forbo Flooring Systems



The three common entrance zones of a building.

Zone 3: As people move out of the defined entrance area, they are typically directed into a lobby or other common area. To be sure that the maximum possible soil and water is removed it may be desirable to extend a form of entrance flooring system in this zone. In certain parts of the country, building owners who have not done this find they resort to using separate entry rugs or mats placed on top of the floor and have them cleaned regularly. These removable mats are not always attractive or consistent with the design intent of the building, nor are they always functional if they become saturated due to high use or bad weather. Selecting and designing a permanent product in this area will help avoid those limitations and improve the appearance overall.

The rest of the building: While not an entrance zone, the area throughout the rest of the building can be covered with any of the hundreds of flooring products available. It won't receive entrance flooring but will benefit from being cleaner, safer and better looking than it might have been otherwise without the entrance flooring system in place.

Each of these zones should be looked at during the design phase to determine where each of the boundaries could be located to be the most effective for a particular project or building. It is important to note that different buildings will of course have different needs in terms of usage and zones. An elementary school for example will have different specific entrance flooring needs than an office building will while both of them will have different specific needs from an industrial facility. Nonetheless, all applications can benefit from this simple quick analysis of the entrance zones to determine the best type and style of entrance flooring to design with and specify.

Within the flooring industry, there are two common types of entrance flooring systems available from manufacturers. A rigid grid mat system usually made of aluminum with walking surface material incorporated is what most people think of when talking about entrance flooring systems. These are available in a variety of configurations and usage ratings and may be most appropriate for zone 1 and 2 applications. However, there are also systems

Entrance flooring systems need to accomplish four things:
Remove dirt, soil and debris from shoes or boots as people enter a building
Retain the dirt and debris in the flooring to prevent other people from tracking it into the building
Release the collected and retained dirt and debris
Recover as a product so that it continually looks good and functions properly

CONTINUING EDUCATION

EARN ONE AIA/CES HSW CONTINUING EDUCATION HOUR (CEH)

Learning Objectives

After reading this article, you should be able to:

1. Differentiate and distinguish between the types of entrance flooring systems that are commercially available for buildings.
2. Identify the needs of different building types and user groups when designing and specifying entrance flooring systems.
3. Investigate and compare proper installation strategies on different types of new and existing building construction.
4. Explore successful cleaning and maintenance methods required for ongoing safe and slip-resistant entrance flooring systems.

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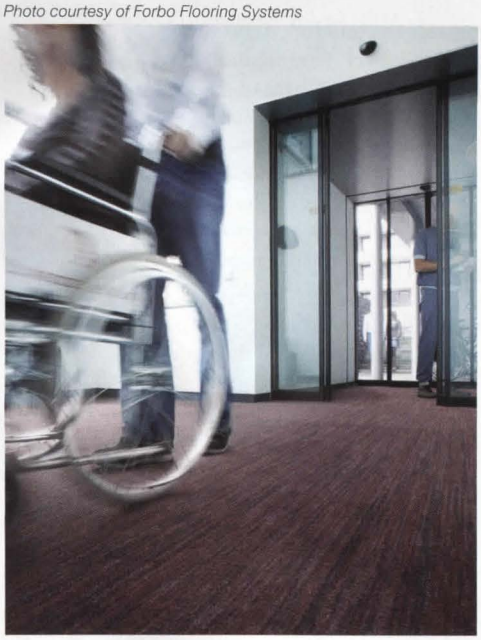
which are heavy-duty textile-based mat systems that have a more carpet-like appearance. These are particularly well suited to zone 2 and 3 applications and can provide attractive and effective performance in an extended entrance area of a building. Within each of these types there are options, variations and customization opportunities, but all must first be rated to comply with prevailing codes and standards for entrance, egress and handicapped accessibility.

APPLICABLE CODES AND STANDARDS

The collection of codes published by the International Code Council (ICC) includes the Building Code and Fire Code which address in detail the requirements for safety and slip resistance in means of egress which often may include a building entrance as well. This is also often true for jurisdictions that have adopted their own localized or state codes. Essentially, any area that is part of an exit that does not have slip resistance accounted for in the floor is not only out of compliance with the codes, it can be dangerous or fatal in emergency situations. The entrance flooring system can clearly contribute to helping achieve a code-compliant and safe condition then. While this is the appropriate starting point, there are also a number of other applicable standards that come into play and need to be addressed whenever specifying and designing entrance flooring systems:

Photo courtesy of Forbo Flooring Systems



Entrance flooring systems can be specified to meet handicapped accessibility requirements.

Handicapped Accessibility

The Americans with Disabilities Act (ADA) sets out specific requirements for barrier-free environments including unobstructed paths of travel. Much of this has been codified in American National Standard ICC A117.1 (the Standard) which is appended to most building codes as the prescriptive requirements to achieve such barrier-free environments. Chapter 3 of this standard specifically addresses floor surfaces which includes entrance flooring systems. Section 302 indicates that flooring must first be stable, firm and slip resistant. For carpeted systems, it requires that edges are secured, that the height is limited and addresses the texture, all of which are achievable in entrance flooring systems. In cases where there are openings, such as in rigid grid mat systems, openings in the surface must not allow passage of a 1/2-inch diameter sphere. Where these openings are elongated as is typical in entrance flooring mats then they must be perpendicular to the direction of travel which is the common and recommended manner of installing them.

Changes in level are addressed in Section 303 of the Standard. This would apply to the edges of entrance flooring systems over which people are walking or riding a wheelchair. The maximum allowed vertical rise is 1/4 inch which can be increased to 1/2 inch if the edges are beveled with a slope of no more than 1:2 on the bevel. Most entrance flooring systems can readily accommodate these requirements, although some do require a recessed floor slab in order to remain level and flush with the surrounding path of travel or within the 1/4-inch to 1/2-inch limitations.

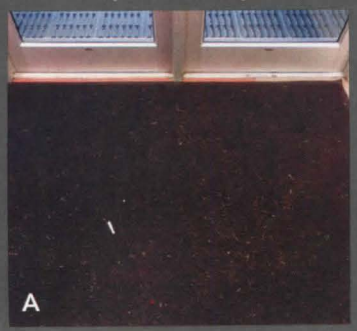
TEXTILE-BASED MATS AT PRINCETON UNIVERSITY STORE, PRINCETON, NEW JERSEY

The Princeton University Store in Princeton, New Jersey, is exposed to high volumes of student and visitor foot traffic on a daily basis. John Augustine, the University Store manager, needed a solution to stop large amounts of dirt and moisture from being walked into the store each day. A textile-based entry flooring mat system was selected as a solution.

Six months after installation, the manufacturer sent a representative to visit the University Store to inspect the flooring, which was now dirty from heavy use. A quick cleaning with a residential-grade vacuum cleaner revealed the impact of using this textile-based system at the store entrance—literally piles of dirt and debris were removed. The textile entrance flooring not only prevented the dirt from being walked into the store, it also reduced the facility's cleaning and maintenance costs directly. Further, they have lowered the risk of slip and fall incidents.

After six months of heavy daily use, the textile flooring performed extremely well on all four R's. The condition of the mat before cleaning (see photo A) showed that it effectively removed dirt from shoes and retained it in the mat. The use of a common vacuum cleaner (see photo B) and the resulting piles of dirt that were collected (see photo C) attested to the ability of the flooring to first retain a considerable quantity of dirt and then release it when cleaned. When complete, the cleaned textile-based mat was able to recover quite well, was ready for continued use and still looked great (see photo D). Altogether, the University Store and the manufacturer were very pleased with the performance and the results of this installation.

Photos courtesy of Forbo Flooring Systems



There are of course other accessibility requirements for paths of travel including doorways, obstructions, etc. and those will need to be coordinated in the overall design. There is nothing about the entrance flooring system, however, that should impair or impede that coordinated design effort.

Occupational Safety and Health Administration (OSHA)

Consistent with this federal agency's mission of protecting workers, they have identified requirements for walking surfaces and means of egress. Entrance systems that fall within these areas can be shown to be compliant with OSHA regulations as long as they are properly installed and maintained.

ASTM F1637 Standard Practice for Safe Walking Surfaces

The American Society of Testing Materials produces many standard specifications for numerous things related to design and construction. In the case of walking surfaces, ASTM F1637 is the published standard available. It addresses indoor and outdoor walking surfaces indicating that walkway surfaces shall be stable, planar, flush and even to the extent possible. It goes on to say that walking surfaces shall be slip resistant under expected environmental conditions and use. It also states that when wet conditions are reasonably foreseeable, then an abrasive additive, grooving, texturing or other appropriate means shall be incorporated to render the surface slip resistant. This is where entrance flooring systems can readily address these concerns and allow for the removal and retention of water that is removed when the system is cleaned. Similar to the handicapped accessibility standards, this ASTM standard calls for changes in level along the edges that are either 1/4-inch maximum when vertical or 1/2-inch maximum where they are beveled at a slope not to exceed 1:2.

Carpet systems are addressed in this standard as well with predictable requirements for it to be firmly secured and seams maintained all in the interest of avoiding pedestrian hazards. More significantly, this standard states: "Building entrances shall be provided with mats or runners, or other means to help remove foreign particles and other contaminants from the bottom of pedestrian footwear. Mats should be provided to minimize foreign particles that may become dangerous to pedestrians particularly on hard smooth floors, from being tracked on floors." This language is exactly consistent with the design intent and purpose of entrance flooring systems. It goes on to address water by saying "Mats at building entrances also may be used to control the spread of precipitation onto floor surfaces, reducing the likelihood of the floors becoming slippery." There is clearly recognition that the use of entrance flooring system mats will contribute to a safer walking condition when the surface becomes wet. Finally, this standard indicates the importance of good design principles. "Mats shall be of sufficient design, area and placement to control tracking of contaminants into buildings. Safe practice requires that mats be installed and maintained to avoid tracking water off the last mat onto floor surfaces. Mats, runners and area rugs shall be provided with safe transition from adjacent surfaces and shall be fixed in place or provided with slip-resistant backing." The ability for entrance flooring systems to be secured in place during construction makes them a superior choice over removable entrance mats or runners.

Clearly, then, there are numerous sources of requirements and safety standards that can be consulted on for entrance flooring systems. It is important that the architect as designer and specifier understands and addresses these standards as part of the entrance design. However it is common for manufacturers of entrance flooring systems to be keenly familiar with all of them and design their products accordingly.

LEED® Standards for Green Buildings

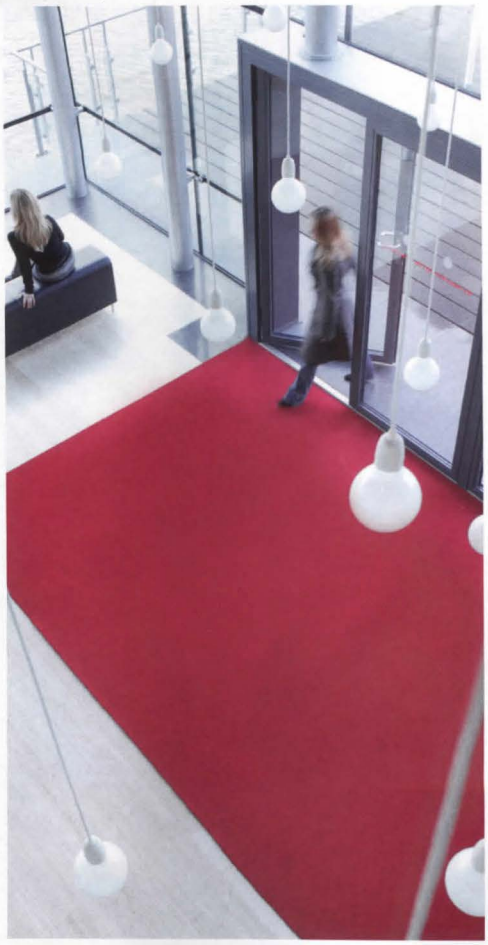
The green building movement in this country has given rise to quantifiable rating systems that seek to establish specific levels of achievement in the creation and performance of green buildings. The best known of these green building rating systems has been developed by the U.S. Green Building Council (USGBC) and is known as the LEED rating system. This is actually a family of ratings that apply to different building situations (e.g. new or existing buildings, core and shell, interiors) and in some cases building types (schools, health care, retail, homes, etc.). All of the LEED rating systems have been subject to ongoing changes and updates since their inception, but the basic categories of defining green buildings have remained the same across the different versions over time.

One of the key areas of the LEED rating systems is Indoor Environmental Quality. Within that portion, consideration for credit is specifically given to buildings that include "walk-off" flooring systems that remove dirt and other contaminants as a way to control indoor pollutant sources. Metal grid mat systems have consistently been recognized for their ability to meet this requirement and obtain LEED credit. However, there is currently some debate about accepting textile-based systems, so that should be verified through a credit interpretation request (CIR) to the Green Building Certification Institute (GBCI) an independent administrator of the LEED program for the USGBC.

Beyond the indoor pollutant control credit, it is possible that entrance flooring systems may contribute to other LEED credits such as recycled content and regional materials. Those will need to be evaluated on a case-by-case basis.

Continues at ce.architecturalrecord.com

Photo courtesy of Forbo Flooring Systems



Textile entrance mats can be custom designed with colors, and even logos and patterns.

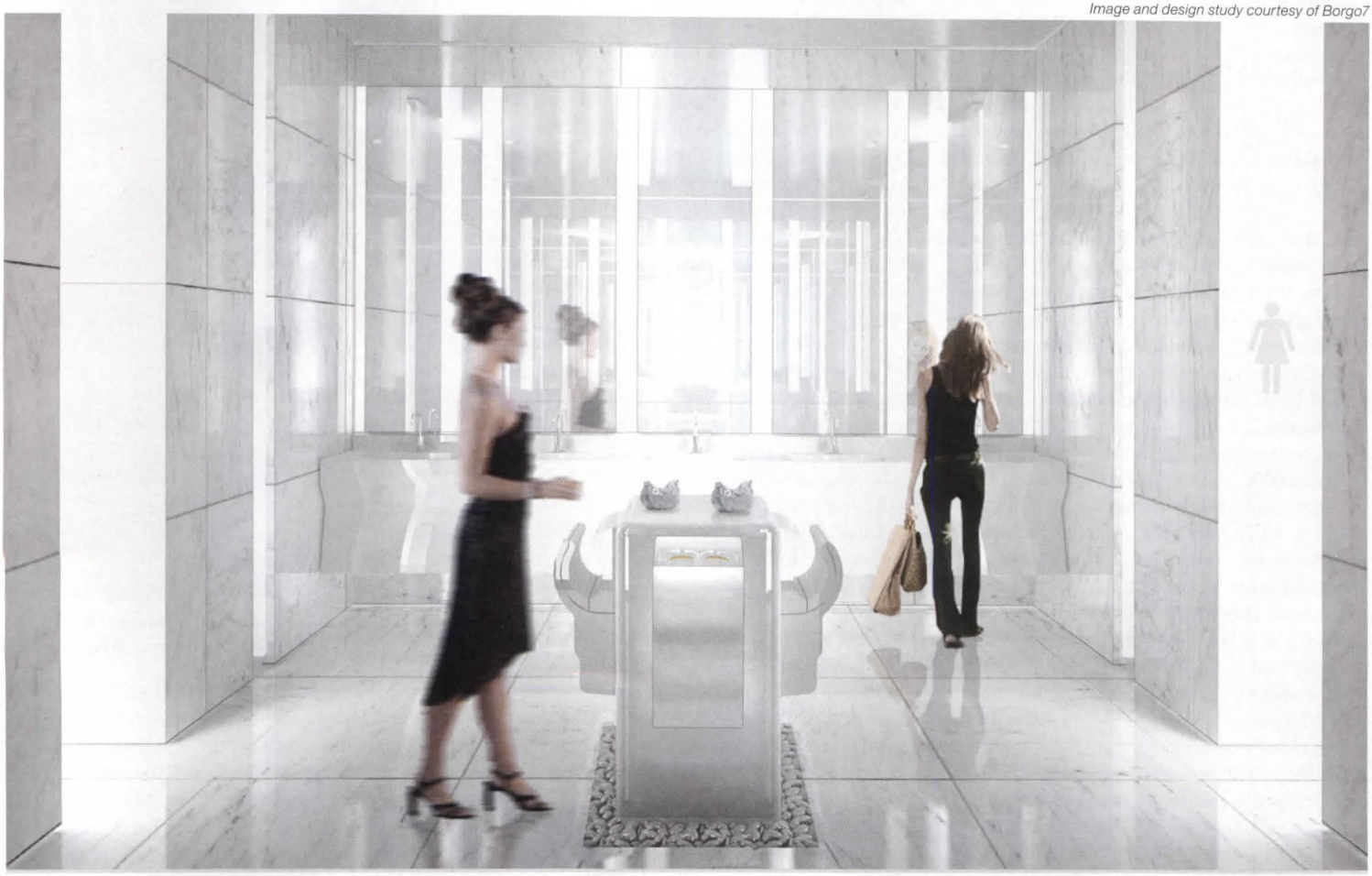
Peter J. Arsenault, FAIA, NCARB, LEED AP, *practices, consults and writes about sustainable design and practice solutions nationwide. www.linkedin.com/in/pjaarch*

Sustainable Hand Drying and Life-Cycle Assessment

Innovative product designs boost building life cycle

Sponsored by Dyson Inc.

Image and design study courtesy of Borgo7



High-speed, hands-in dryers are an alternative to hands-under type dryers and paper or cotton towels. Life-cycle assessment (LCA) studies have been used to compare their relative performance for a variety of environmental benefits.

Unitary systems and equipment tend to be relegated to the last-minute spec or punch list. In some cases, they are considered items left beholden to the operational preferences—or standards—of the owner or tenant. This has long been the case, but the trend is changing quickly. Behind the move toward greater architect control and influence over appliance choices is the adoption of life-cycle analysis or assessment (LCA) into sustainable building standards, and the benefits of return-on-investment (ROI) analysis for both building occupants and owners.

Of course, some equipment has a greater impact than others in the ROI and life cycle of a building. Packaged terminal air conditioners, often found in hotel or motel rooms, offer a typical example; these products may be used for years, and their energy-efficiency ratings indicate a real effect on operational costs.

Yet another type of equipment that deserves renewed scrutiny today is an option in restroom equipment: the category of hand dryers. In some buildings, the hand dryer is left out and towel dispensers are selected, leaving the client a legacy (and open-ended tab) for bulk quantities of roll or folded paper.

In more buildings, however—from the London Eye and Los Angeles International Airport to the Time Warner Center in New York and in Costco stores around the United States—electric dryers are chosen. This choice is an important one because relying on consumables has a significant impact on sustainability and occupant health, says James Dyson, an inventor and entrepreneur known for his designs of vacuum cleaners, fans and hand dryers. "Paper towels—like vacuum bags—are from a bygone era. Technology has moved on," he explains. "People want to dry their hands quickly, completely and without damaging the environment."

This learning unit reviews the environmental and societal value of reviewing the restroom specification more carefully. It will show that the choice of hand-drying method can have a sizable impact on green building design and energy-efficient operations, as well as side benefits to public health, occupant comfort

and efficient operations. Comparisons are also made between warm-air and high-speed hand dryers —including hands-under and hands-in designs —as well as between electric dryers and paper methods.

Increasingly, architects are making strong recommendations for clients on the choice of hand-drying equipment, says Marlyn Zucosky, IIDA, director of interior design for Princeton, N.J.-based architecture firm JZA+D. "For office buildings, we tend to recommend touchless, high-speed hand dryers, which are seen as convenient for users and also easy to maintain for the property manager," says Zucosky, whose practice is heavy on tenant installations and workplace design. "They can also contribute to greener, cleaner building practices."

On a global level, the impact of hand-drying selection could have a significant environmental impact in aggregate. According to estimates cited in *Crain's*,[1] hand dryers are in place in about 10 percent of nonresidential restroom locations in the United States. Given that there are millions of commercial and institutional buildings, one can infer that millions of locations today are buying and disposing of bulk paper for restroom operations. "This is very different from Europe, where warm-air hand dryers are far more prevalent," says Todd Clarke, director of specifications, Dyson Inc. "For U.S. buildings, a hand dryer may be a small part of a facility's footprint, but across the whole market it can have a very big impact."

INDUSTRY STANDARDS

Even in one building, the numbers are surprising. As an example, says Clarke, at a college if each student washes his or her hands once per day using two paper towels, over a 200-day school year the consumption of paper towels easily reaches into the millions. (If the student body is 4,000 undergraduates, the total use would be 4,000 x 2 towels x 200 days, or 1.6 million towels.)

For reasons of client preference and environmental prerogatives, architects are lending more attention today to hand-drying methods and product review.

The potential change in choice of restroom equipment must be reviewed against a backdrop of codes, standards and regulatory jurisdiction. Overall there is little focus by standard-setting groups on hand dryers. For example, a new or renovated building may achieve the U.S. Green Building Council's LEED® Platinum certification regardless of the choice of hand-drying method. In addition, there is no established benchmark for certification under LEED for New Construction (LEED-NC); for that reason, a reduction in waste may be good for sustainability but it will not necessarily be awarded points toward any certification level.

On the other hand, the choice of hand-drying method can have a valuable contribution to LEED's Energy & Atmosphere (EA) credits, including Prerequisite 2 – Minimum Energy Performance, as well as EA Credit 1 – Optimize Energy Performance, which is required for all buildings that are LEED certified. In addition, the choice of hand-drying solution can impact the LEED category of Materials & Resources (MR), including the MR Prerequisite 1 & 2, the credit for Sustainable Purchasing: Ongoing Consumables (MR Credits 1.1 - 1.3), and Solid Waste Management: Ongoing Consumables (MR Credits 7.1 – 7.2).

Last, there is a new credit category in upcoming versions of LEED for using products that have undergone a published LCA.

What's left out? Related benefits of waste reduction and disposal energy, including those for paper trash from restrooms. The LCA impacts of installed equipment and bulk consumables like paper and soap are omitted, too. Social sustainability measures, such as universal design, in the drying method selected. User comfort and acoustical issues, such as the noise of electrical equipment operations. Plus energy impacts, such as the comparative operations energy use by warm-air vs high-speed dryers. And much more.

In the public sector, there are few guidelines to help specifiers. Equipment in many buildings can have U.S. EPA Energy Star ratings, but not hand dryers. In 2010, the short-term project funding through the American Recovery and Reinvestment Act (ARRA) stated an official federal preference for procuring products verified to be at least 25 percent more energy efficient than typical or alternative specifications.

In addition, the health impacts of various hand-drying methods are poorly understood and often left to an architect's personal preferences—a weak way to extrapolate against the diverse user bases in university buildings, hospitals or a baseball stadium. One challenge is that Ann Arbor, Michigan-based standards organization NSF International, The Public Health and Safety Company (formerly known as the National Sanitation Foundation), provides only limited standards guidance for hand dryers. One valuable but narrow standard is the protocol *NSF P335 – Hygienic Commercial Hand Dryers*. (See "A Key Dryer Standard."[2])

Still, linking hand dryer performance to user effectiveness, energy efficiency, acoustical comfort, and even public health is left largely to the architect to determine.

For example, the amount of time it takes for the appliance to dry the user's hands has a useful NSF benchmark: If it takes less than 15 seconds using air filtered by high-efficiency particle arrestor (HEPA) media, the product may qualify to bear the NSF seal. Yet the definition of what "dry" means is inconveniently left open. So while some manufacturers agree that "dry"

Images and design study courtesy of Dyson Inc.

The choice of hand-drying method can impact building waste reduction and disposal energy, including that for paper trash from restrooms. The LCA impacts of installed equipment and bulk consumables like paper and soap must also be considered.

CONTINUING EDUCATION

EARN ONE AIA/CES HSW/SD CONTINUING EDUCATION HOUR (CEH)

Learning Objectives

After reading this article, you should be able to:

1. Discuss the use of LCA for product comparison and selection, including restroom products.
2. Explain how restroom hand-drying choices can have a significant environmental impact.
3. Discuss trends in sustainability and energy efficiency and how they impact the environment, with attention to life-cycle impacts or ROI (or both).
4. List related trends in sustainable building or occupant health that could influence the choice of hand-drying products.

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Photo © Bruce Damonte

Ergonomics and user-friendliness are important considerations in restroom design, as is the usability of the hand-drying method by people in wheelchairs.

means a measure of 0.1 grams of water total remaining on the user's hands, which is used for the P335 Protocol, this is by no means a universal assumption—which can make some LCA studies hard to compare. (See sidebar on the next page.)

Another challenge is that ergonomics and user-friendliness are not fully assessed by the protocol. In addition to speed of drying, the standard P335 considers the cleanability of the appliance, noise levels while operating, resistance to causing user burns, water disinfection capability, and whether or not the product allows for hands-free operation.

It's a good checklist, but it leaves out usability by people in wheelchairs, for example, or the discomfort associated with product use by seniors. With about 35 million U.S. citizens over aged 65 or over and with 54.5 million that have some disability, according to Boston's Institute for Human Centered Design (IHCD)—and with future LEED versions to include universal design such as the recent *Pilot Credit 34, Design for Adaptability*—the notion of user-friendliness has become central to green design as well as public Health, Safety and Welfare (HSW).

Most important, the protocol is all about hygiene. NSF P335 is not designed to present comparative data on using hand dryers—hygienic or not—over paper towels. Put simply, the protocol won't give a life-cycle argument for the environmental benefits of the selection.

LCA Studies for Hand Drying

"In the absence of comparable, full data informing our selection of a building material or appliance, we like to see thorough life-cycle assessments that help us and our clients understand any long-term environmental gains possible through our design choices," says Jay Brotman, AIA, LEED AP, a partner with New Haven, Conn.-based architecture and art firm, Svigals + Partners. Fortunately, LCA studies have been undertaken for this product category—in the MasterFormat division 10 2000, *Interior Specialties*, under 10 28 40 for hand dryers as well as for alternatives including paper towel and cotton roll towels. However, the assessments start with different assumptions so architects can't easily compare the results apples-to-apples. Some LCA results only compare standard warm-air dryers to paper towels or one electric dryer type against another, while other studies only assessed cotton roll towels vs paper towels.

A number of the studies comply with an accepted standard for life-cycle assessments, such as the International Organization for Standardization's ISO 14040 and 14044 LCA standards, but most do not. Examples of those adhering to the ISO standards include an analysis of cloth and paper towels by a European textile trade group, a study of various folded and roll towel products for the paper producer Kimberly-Clark, and LCAs of multiple or single electric dryers by their respective manufacturers.

With all these life-cycle studies on the market, how can architects glean useful, equivalent data for making a good choice and specification?

One recent meta-study by a Boston-area research university has put all these LCA studies side by side, using ISO-based LCA methods to ensure a consistent basis of comparison. According to the authors of the mid-2011 analysis, titled *Life-Cycle Assessment of Hand-Drying Systems*,[3] four steps were needed to compile and evaluate all of the industry data:

1. Establish the "*functional unit* under consideration, and regional and temporal boundaries of the assessment." In this case, the functional unit is a single pair of dry hands.

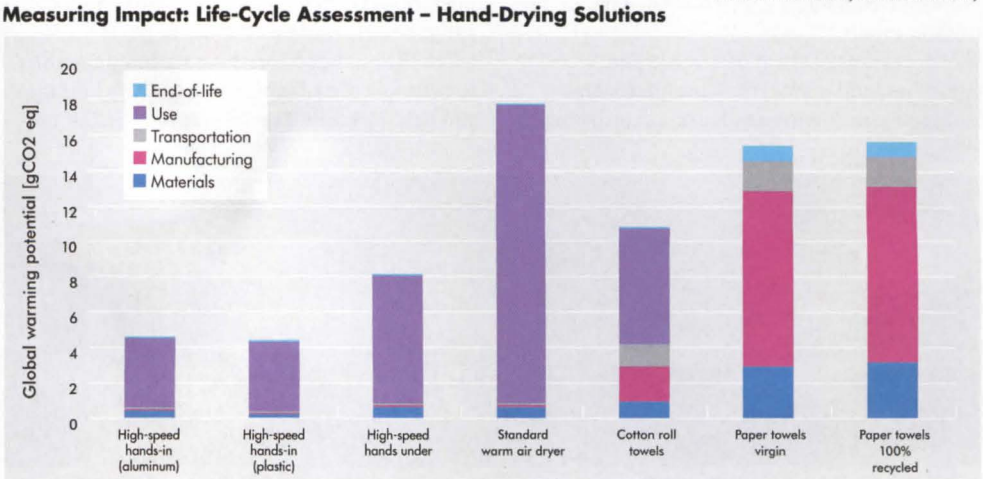
2. Undertake an *inventory analysis*, which "entails the quantification of energy, water, and material resource requirements, and emissions to air, land, and water for all unit processes within the life cycle."

3. Assess *impacts* to understand "the human and ecological effects of the resource consumption and emissions to the environment associated with the life cycle."

4. Interpret the results "within the context of the limitations, uncertainty, and assumptions in the *inventory data* and scope."

Source: Materials Systems Laboratory

Measuring Impact: Life-Cycle Assessment – Hand-Drying Solutions



Cambridge, Mass.-based Materials Systems Laboratory has compared data for seven hand-drying systems. One of the comparisons is based on GWP, or global warming potential, based on CO_2 equivalents required for each option.

USING LCA FOR PRODUCT ANALYSIS

Life-cycle assessment (LCA) is a scientific means for analyzing the environmental impact of a single building product or a group of functionally comparable alternatives. Various technologies with the same purpose can be directly compared, such as two complete cladding systems.

The main benefit of LCA is that it considers whole product systems for a detailed and balanced comparison of their total environmental footprint. This means they must cover: constituent materials; manufacture and production methods; base material and product transport; use-phase properties; and disposal and reuse options.

Assumptions in LCAs are made for particular situations and justified through clearly stated variables. These may include manufacturing location, product usage scenarios as well as recyclability of constituent materials or product components.

Most important, an LCA must consider the environmental impact in a holistic way, reviewing everything from resource use and ecosystem quality to global warming potential (GWP) and potential human health impacts.

GWP, expressed as CO_2 equivalents, is a well-accepted metric that uses measured carbon dioxide equivalent totals to compare the environmental impacts of like products or materials.

International standards are employed to help ensure that the LCAs are rigorous and comparable to others. Two of those, ISO 14040 and ISO 14044, have been created to standardize the functional units compared and the system boundaries for the product under consideration. To make direct comparisons between two dissimilar LCA studies, the architect or green building consultant must ensure that the justified functional unit and set of system boundaries are consistent among the LCAs across all potential scenarios.

The LCAs should also provide for how changes to important variables might affect the overall outcome.

The research team at the Cambridge, Mass.-based Materials Systems Laboratory (MSL) recorded, interpreted and compared data for seven hand-drying systems: cotton roll towels; virgin content paper towels; 100 percent recycled paper towels; a typical warm-air, hands-under electric dryer; a high-speed, hands-under dryer; and two high-speed, hands-in dryers, one in a plastic finish and the other in an aluminum housing.

COMPARABLE LCA DATA FOR HAND-DRYING SYSTEMS

The results of the analysis have been the subject of some debate in an industry known for highly competitive and provocative claims. Yet most observers note that the study broke new ground, because the various LCA studies have never been compared against each other using rigorous statistical formulas.

In terms of green building design, the LCA analysis offers a cradle-to-grave analysis with all use-phase effects to understand the full, relative impacts of cloth, paper and electrical means. It includes all implied operational needs, including the dryer machine, towel dispensers, waste bins and bin liners, as well as packaging typically used. The impacts are allocated by assuming a five-year life span—mainly because electric dryers are typically warranted for five years—and a total life usage of 350,000 pairs of hands, or about 1,350 per week. In this way, the functional unit is defined as: 1/350,000, or 2.86×10^{-6} of the chosen drying method's total life-cycle impact.[4]

More assumptions need to be made to compare the drying methods. For example, trash or laundry bin liners—typically bags made of polyethylene or a biodegradable alternative material—can serve hundreds of pairs of hands but not all 350,000 uses. Bin liners for cotton rolls were set at 270 uses each, with 1/270 of a liner for each dry pair of hands; more are required for paper towels. On the other hand, cotton towels must be laundered, while paper towels do not have a washing impact.

In terms of transportation impact, the study assumes that all the drying systems are made in China and used in the United States, except for paper towels, which are primarily of domestic origin.

Upstream processes are also included in the analysis, say the authors. This is important, because the production of most dispensers and paper products is energy intensive. In one industry study,[5] 100 percent recycled paper towels are assumed to require about 40 percent of the embodied energy of virgin-source paper towels, estimated at 3.884 watts per paper towel. If two towels are used, the functional unit cost is 7.768 watts. Hand dryers, by comparison, may need only 2.9 watts total to produce a pair of dry hands—an energy savings of 63 percent over the five-year life of the systems.[6] The use-phase assumption of two towels per dry—similar to the dry times for various electric dryers according to the NSF protocol P335—are important to an accurate estimate of the system LCA.

Impacts for the production phases, such as raw materials and manufacturing, seem to pale in comparison to the use-phase numbers over the five-year system lifetimes. In addition, the end-of-life scenarios are important but relatively minor. One key fact from an environmental standpoint is that recycling is uncommon for products used in America's 20 million away-from-home restrooms. "Since paper towels can use recycled content but are rarely recycled themselves," write the MSL authors of *Life-Cycle Assessment of Hand-Drying Systems*, "they represent the final product of an open-loop recycling system."

> The choice of hand-drying method can have a sizable impact on green building design and energy-efficient operations, as well as side benefits to public health, occupant comfort and efficient operations.

See endnotes in the online version of this article.

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Insulated Composite Backup Panels

Emerging, simplified wall construction system outperforms conventional systems

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

Exterior walls have always been a key element of the overall building envelope to define the separation between indoor and outdoor space. In its earliest forms, solid masonry and stone provided this function but as lighter-weight materials such as steel emerged, new exterior wall systems made of multiple components became commonplace. In recent years, the importance of energy conservation and green building design has focused increased attention on the details of how these exterior walls are designed, assembled and actually perform in numerous ways. This attention has created new options for how walls are constructed using improved products that address all of the performance issues of exterior walls. One of the most versatile and promising products now available in support of this focus are insulated composite backup panels (ICBPs).

CONVENTIONAL WALL SYSTEMS

All exterior wall systems need to address some fundamental design and performance issues. Obviously, they need to provide structural support either for the building or simply for the wall itself if attached to a separate structural system. As the dividing line between inside and outside, exterior walls need to act as the barrier to weather, wind and rain, and still offer a suitable finished appearance. Since the air pressure between inside and outside is typically different, and since air will naturally flow from high pressure to low pressure, the wall needs to address and control this air flow. That air will commonly carry vapor with it, which, if not controlled, is prone to be captured in the wall, condense and cause damage over time. Similarly, heat will flow from warm areas to cold areas and exterior wall designs have increasingly paid attention to effective insulation techniques to address that heat flow thus improving comfort while reducing the amount of energy used in buildings to maintain that comfort. Hence, the performance of any exterior wall system can be evaluated on the basis of how well and how completely it addresses all of these fundamental issues and needs. This is particularly true for the following conventional wall types.

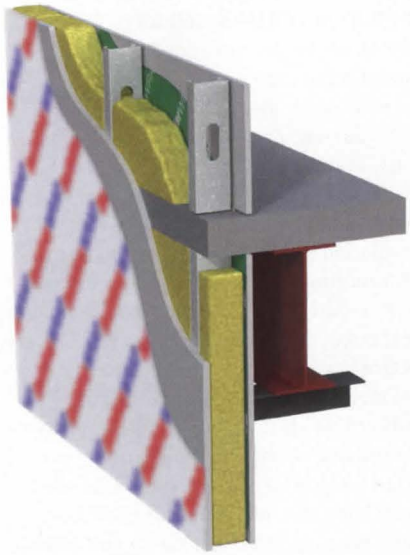
Solid Masonry Walls

Solid multi-wythe brick walls were the norm for centuries for exterior wall construction. This was followed by a variation of brick applied directly over poured concrete or concrete masonry. As solid construction, these walls were durable and long lasting from a structural standpoint but offered little if any thermal resistance to heat flow. Their shear mass made them an effective air barrier, but they were often porous and prone to wicking water and moisture into parts of the walls. Hence they were not always an effective barrier for water and vapor, particularly if maintenance was lacking.

Masonry Cavity Walls

Masonry walls that separated the inner and outer wythes by an air cavity have become commonplace as a means to improve performance compared to solid walls. In this approach, a layer of finished brick or other masonry is located on the outermost side providing the aesthetic appearance and acting as the weathering surface or "rainscreen." The intentional air cavity behind this outer

Image courtesy of CENTRIA



Conventional metal framed composite walls are assembled from many separate components.

masonry separates it from an inner or back-up layer of masonry or concrete, which is often the primary structural component as well. The cavity exists to allow moisture that may enter and get trapped in the assembly to collect and drain out through weep holes at the bottom. This drainage usually occurs on the outer face of the inner masonry wall, thus creating a drainage plane there. That inner masonry wall then becomes the basis for the barrier for air and vapor penetration between inside and outside. Thermal insulation is commonly added within the cavity, thus improving the thermal performance of the assembly, although metal brick ties often interrupt or interfere with the effectiveness of that insulation.

Steel Framed Walls

With the advent of steel framed buildings in the late 1800s, new wall assembly options were possible for commercial, industrial and institutional buildings. Buildings became lighter in weight compared to masonry buildings and could be assembled with multiple manufactured components. This included the eventual use of steel studs for infill between structural steel members or as the structure itself for a low-rise building. This system provided great flexibility in design, less dependence on weather or season for installation, and a predictable quality from the manufactured steel products. The steel framing of course then needed to be covered or filled in to address air, water, vapor and thermal issues. That means that multiple products are added by various labor trades to include interior drywall, vapor barriers, insulation, exterior sheathing, building wrap/ air barriers, and exterior finish. The hoped for result is that the outer side of the steel framed wall is water and air tight, while the climate appropriate side is also vapor tight. In addition the thermal insulation needs to be consistently and uniformly installed and functional to achieve its full thermal resistance capability. Since all of this is done in the field under varying conditions and with varying degrees of installer capabilities, it is understandably very difficult to achieve consistent construction of a wall that will perform optimally.

ADDRESSING CONVENTIONAL WALL SYSTEM DESIGN ISSUES

Designing with conventional wall systems with the intention of achieving high performance in all areas, means that the weaknesses of common multi-component wall assemblies must be overcome.

Multiple Penetrations

One of the most obvious problems is the presence of multiple penetrations from hardware and fasteners through any of the air or vapor barriers. Hundreds if not thousands of such fasteners are used to hold interior drywall and exterior sheathing in place and in the process typically puncture the barrier membranes that are otherwise so painstakingly installed. Further, masonry ties or metal panel clips are connected through the exterior sheathing and air barrier into studs to secure the finished facing or rainscreen material in place. Unless each of these penetrations are sealed, they are potential spots of failure that allow water, vapor or air to pass through, thus reducing the performance and efficiency of the wall or worse, causing damage to occur in the wall. This damage could include such things as direct water penetration that compromises materials like gypsum board or insulation or could lead to longer-term problems such as rusting of steel members, mold growth or loss of thermal performance from wet insulation. None of these are desired outcomes of course, but correcting them often becomes a confusing matter of blame between contractors and different subcontractors over the flaw that caused the problem, and likely citing the design as a potential source of failure as well.

Sealing Points of Weakness

Other sources of performance loss in a conventional stud frame wall include mechanical and electrical boxes that are run in the wall, thus causing a breach in the inner seals and reducing the available insulation between the studs. The actual wall framing is also interrupted by floor and roof slabs or decks similarly causing an interruption in the air, water and vapor barriers. In all of these locations, the barriers must be designed and installed to be continuous around these potential points of performance weakness. This attention to sealing is important not just for the integrity of each of these barriers, but also to reduce heat loss or gain from excessive air infiltration. The latest versions of energy codes and the recently released International Green Construction Code (IgCC) in particular, all recognize the importance of such barriers and have them mandated for inclusion in wall assemblies. They also require that they are appropriately sealed at all junctions and penetrations as described.

Codes and Standards

Energy codes and green building standards have also recently recognized that insulation installed between studs, particularly steel studs, has real limitations. The thermal resistance value of insulation shown by its manufacturer is likely reliable for the insulation itself. However, the actual value for the composite assembly will be less, often a lot less. This is due to the significant thermal bridging or short circuiting of heat flow through the steel studs. ASHRAE Standard 90.1 which is appended to many energy codes and other standards include some very clear correction factors for this phenomenon. For example, a metal stud wall using 6-inch nominal studs at 16-inch o.c. may include batt insulation that carries a

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Learning Objectives

After reading this article, you should be able to:

1. Identify key energy flow performance issues in conventional exterior wall assemblies related to insulation, thermal bridging, air barriers and water barriers.
2. Comprehend the nature of exterior wall material problems caused by failures or compromises in components of conventional wall assemblies.
3. Investigate strategies for creating innovative, sustainable wall assemblies when insulated composite backup panels (ICBPs) are used over steel framing.
4. Recognize the green building benefits of ICBP wall system technology and how it can be superior to multi-component assemblies.

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

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Photo courtesy of CENTRIA

ICBPs are based on metal exterior panel and rainscreen design principles.

manufacturer's rating of R-21. However, the frequency of the metal studs including the head and track pieces compromises that R-value by as much as 65 percent. Therefore AHSRAE 90.1 assigns a working value for the assembly of only R-7.4 (U-value of 0.135) which is little more than a third of the intended R-value. At this level it does not meet the minimum energy performance levels required to be code compliant in most of the U.S.

Recognizing the limitations of cavity insulation between steel studs, an alternative has been incorporated into most energy codes and standards based on an application of insulation that is continuous on the outside of the studs. This continuous insulation is commonly a rigid foam plastic product of one type or another which may also serve as a water barrier and drainage plane if designed to do so. In some cases, it may act as an air and vapor barrier as well. To use the insulation in any of these ways will require proper attention to junctions and joints to be sure they do not allow water or air to penetrate. Even if that is accomplished, achieving truly continuous insulation is difficult in that it requires near perfect installation and even then is compromised by penetrations from supports and fasteners. Those fasteners, which may be "Z"-shaped channels to hold the insulation in place, also compromise thermal performance by creating a thermal bridge at each of those junctions. Separate fasteners that support the exterior rainscreen or masonry veneer will commonly need to penetrate the insulation and compromise its integrity and performance even more.

A further criterion of any wall assembly that uses foam plastic insulation is fire protection since these products can not only be highly flammable, they can give off toxic smoke. The International Building Code (IBC) requires that wall assemblies be tested for temperature and flame propagation. If a continuous insulation assembly is specified or designed, it must demonstrate that it complies with the IBC and passes testing of the National Fire Protection Association (NFPA) based on NFPA 285.

Clearly, there has been great attention paid to improving performance in the evolution of opaque wall assemblies. All of this has set the stage for other innovative alternatives to be researched and implemented that can provide the desired performance and overcome the weaknesses described here of multi-component conventional assemblies.

Image courtesy of CENTRIA

A steel stud wall assembly with insulation installed between the stud framing.

THE EMERGENCE OF INSULATED COMPOSITE BACKUP PANELS (ICBPs)

Based on all of the previous work and understanding of exterior opaque wall systems, an ideal view of a high-performing wall that meets current needs can be envisioned. Inherently, it must provide a continuous, unbreached, air, water and vapor barrier. Thermally, it should provide a full covering of rigid insulation outboard of wall studs to avoid thermal bridging and free up the stud cavities for other needed things like mechanical and electrical boxes. From an energy performance perspective, it would provide superior thermal performance reliably in all climates. The materials of this ideal wall would be waterproof but non-organic so that no mold would be allowed to grow. And of course it would need to comply with all relevant building and fire codes and the associated testing for compliance. From a design standpoint, it would offer exterior finish options, be durable but lightweight to minimize structural requirements, and maximize the potential for meeting green building design criteria. From a construction perspective, this ideal wall assembly would limit the potential for installation errors through simplified design and install quickly by minimizing the number of trades involved, thus clearly identifying lines of responsibility for performance. Building owners of course would want to know that they were receiving an excellent value for the installed cost of such a system and its life-cycle costs were attractive.

Insulated composite backup panels (ICBPs) represent a significant contribution to exterior wall design, providing advanced thermal performance and moisture control.

Although no system is perfect, a wall assembly that uses ICBPs along with metal studs on the interior and a separate rainscreen on the exterior comes very close to achieving this idealized vision of a wall assembly. As a recent addition to the choices available they are already proving to be superior in providing advanced thermal performance and moisture control compared to conventional wall systems.

ICBPs were spawned by product manufacturers who were in the business of making primary exterior metal panels with an insulating foam plastic core. Sometimes referred to as "sandwich panels," they have been used around the world as an exterior finish system attached to the building structure. This technology has been proven and in use for over 50 years so the techniques of using

Photo courtesy of CENTRIA

A completed exterior wall system using ICBPs can provide significant contributions to green building design and performance.

insulated metal panels are quite well refined at this point. By using this same basic panel technology combined with the latest needs and research for exterior walls, ICBPs were born. Similar to architectural metal wall panels, ICBPs use steel skins sandwiched over rigid insulation. However, as backup or secondary panels that are not directly exposed to sun or weather, they are engineered with lighter-gauge steel, and a more economical coating system. The insulation is selected for greater thermal performance rather than structural performance, meaning that it is less dense. The front and back metal faces of the ICBPs are thermally broken from each other along the top and bottom by the insulation, meaning that thermal bridging is eliminated. The ICBPs are also commonly manufactured in standard sizes with an interlocking, offset lapping configuration for easy installation and sealing.

As part of an overall wall system, ICBPs are a single component panel that combines four functions within itself: an air barrier, water/vapor barrier, an exterior drainage plane and building insulation. They are intended to be located over the exterior side of metal studs, meaning that typical structural systems and infill framing can be used. Their location and combined functions mean that the wall assembly is no longer dependent on the interior surfaces for air and vapor barrier protection. Hence, the inside face of the studs can be finished with gypsum board or any other interior finish product as desired—penetrations in the interior finished surface will no longer impact performance. It also means that the stud cavities are not required for insulation so any mechanical or electrical runs can be made in that space without impacting the thermal or other performance characteristics of the wall. As such, standard-size smaller studs (e.g. 3-5/8 inches) may be all that is needed instead of deeper studs (e.g. 6-inch nominal) since the insulation is no longer dependent on stud depth.

Factory fabrication of ICBPs means that their quality is more consistent and more readily controlled. On-site installation is commonly done with a simple clip attachment system that holds the panels onto the studs with a minimum of penetrations. In fact, some manufacturers have refined that attachment system to the point that the clips are multi-functional in design—they hold the panel to the studs and extend outward to provide a connection point for masonry ties or other rainscreen materials.

Further, since they can be installed on the outside of at least part of the insulation, they avoid creating a thermal bridge. When installed in this manner, the panel penetration occurs within pressure-equalized joints so that air and water penetration is avoided. The panels themselves typically contain a factory-applied sealant which is "married" to or connects with a continuous bead of *field applied* non-skinning butyl sealant at the vertical panel joints. Hence, the entire perimeter of the ICBPs is provided with a continuous air and water barrier seal in addition to the non-permeable properties of the panels themselves. If installed in this manner, the panels can actually be field tested with an exterior water spray test. When subjected to 30 to 35 psi of water spray over at least 5 feet of joinery for at least 5 minutes, no visible leakage should occur through the panels. Once that test is completed, then the rainscreen is ready to install.

Rainscreens are meant to be just that–a screen that keeps the initial forces of nature (rain, sun, wind, etc.) off the building. Rainscreens are not meant to be water tight, the back-up system is—in this case, the ICBPs. That means that any rainscreen of choice can be designed or specified for any given installation such as masonry, metal, terra cotta or other available products. Installation is made with connectors such as masonry ties or panel connectors that tie back in to the extended portion of the clip connectors of the ICBPs. Any water that penetrates the rainscreen simply runs down the face of the ICBP which is now the continuous drainage plane for that purpose.

As a manufactured product designed to be installed in a consistent and predictable manner, ICBPs have been tested for compliance with building and fire codes for rigid plastic insulation. In order to be commercially available, manufacturers will readily provide written evidence of passing that testing. Hence, it is entirely appropriate to specify submission of test results as part of the submittal process for any project where these panels are used.

The ultimate result of working with ICBPs is that the design and construction of a simplified wall system is achieved that provides excellent thermal efficiency, advanced moisture protection and vastly reduced potential for failure. They also use fewer components and less labor to install, thus increasing construction efficiency and making them cost effective.

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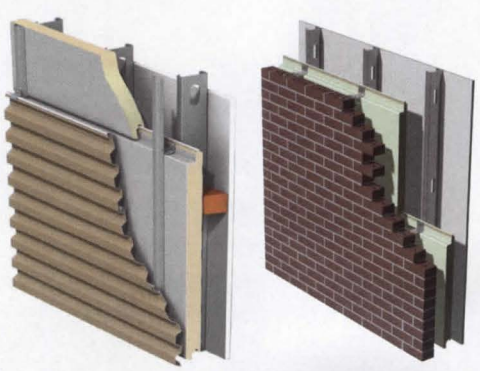
Images courtesy of CENTRIA



Many different rainscreen options can be installed over ICBPs including metal finish panels (left) and brick masonry (right).

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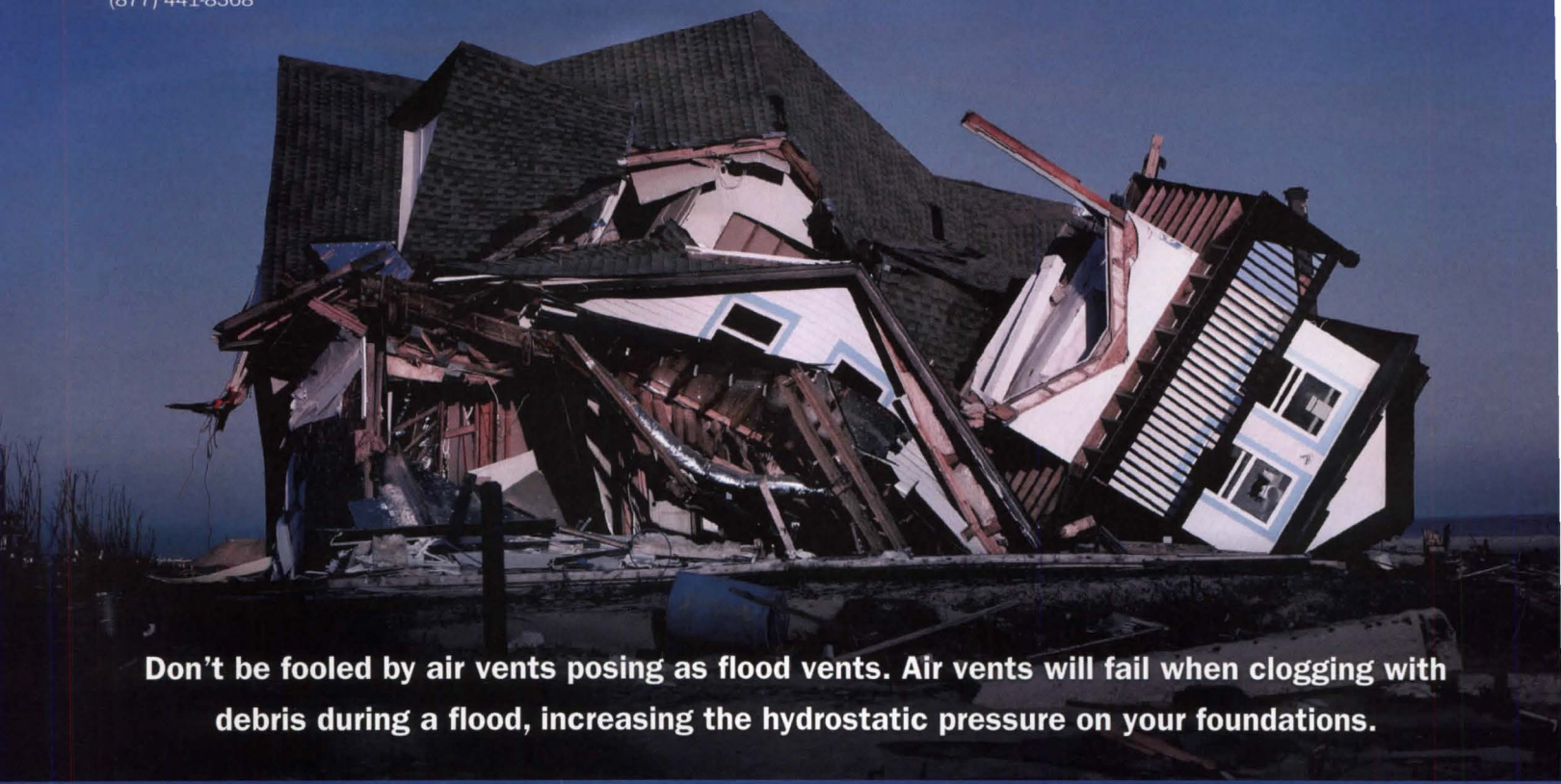
Designing in a Flood Zone?



Don't be fooled by air vents posing as flood vents. Air vents will fail when clogging with debris during a flood, increasing the hydrostatic pressure on your foundations.

The Smart Solution For Flooding

Model 1540-510

DUAL FUNCTION model provides flood protection along with natural air ventilation. Louvers inside the vent door pivot open and closed with temperature.

Model 1540-520

INSULATED model seals out cool or warm air with a solid door and weather stripping. The 2-in. styrofoam core inside the vent door has an 8.34 R-value.

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PIP VINYL BUCKS are made from high strength PVC. Each wall buck comes fully assembled, ready to install. Available for all models and wall thicknesses.

Each 16-in. x 8-in. model is ICC-ES Certified for 200 sq. ft. of flood protection. Additional models and color options are available for every type of application, residential or non-residential.

ICC ES ESR-2074
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316 Marine Grade Stainless Steel

CIRCLE 85

Floodproofing Non-Residential Buildings

Safety, cost and liability in flood hazard areas

Sponsored by Smart Vent Products, Inc. | *By Layne Evans*

Photo by Anton Grassl/Esto

At the new James E. Clyburn Research Center, Charleston, South Carolina, foundation flood vents meet functional as well as aesthetic requirements.

Almost everyone lives in a potential flood zone. In addition to the hurricanes and catastrophic floods that make national headlines, a damaging flood is happening somewhere in the U.S. every day, even in desert regions, caused by local heavy rainfall, dam failures, land development runoff, drainage problems, inland remnants of tropical storms and many other conditions. Nationwide, flooding is the leading cause of deaths related to severe weather, and it wipes out businesses, too. According to the National Flood Insurance Program (NFIP), almost 40 percent of small businesses never reopen their doors after a flood disaster, because just a few inches of water can cause tens of thousands of dollars in damage.

In an increasing number of areas around the country, the risk of flood is even more acute. Over 178 million acres have been designated as floodplains by FEMA. These areas are growing steadily, and more people are finding themselves within a floodplain as flood maps are redrawn. The new maps reflect changes in conditions and new development, and also improvements in scanning technology, additional years of climate, flood and topographic data, and more advanced prediction models.

Building in floodplains, or Special Flood Hazard Areas (SFHA) designated by FEMA, is strictly regulated by the NFIP, the International Building Code, ASCE national reference standards, and by local community codes, all of which are discussed in this course. Deciding on a non-residential building's floodproofing strategy will have a direct connection to the project's cost, to the safety of the building's occupants and the survivability of the building itself, and to the risk of liability for the designer and builder in case of flood damage.

NATIONAL FLOOD INSURANCE PROGRAM

Standard insurance policies do not cover floods. The NFIP was created to provide flood insurance, but also to prevent flood damage in the first place by encouraging effective management and use of floodplains. Community participation in NFIP is voluntary, but flood insurance and many types of disaster assistance are only available in communities that participate by adopting and enforcing floodplain management and construction ordinances that meet or exceed NFIP guidelines. Over 20,000 communities participate in the NFIP, in an effort to avoid the skyrocketing costs of disaster assistance, repair and rebuilding.

CONTINUING EDUCATION

EARN ONE AIA/CES HSW/SD CONTINUING EDUCATION HOUR (CEH)

Learning Objectives

After reading this article, you should be able to:

1. Identify FEMA regulations, National Flood Insurance Program requirements and ICC building codes as they relate to sustaining non-residential foundations in flood hazard areas.
2. Describe the effects of hydrostatic pressure on building sustainability.
3. Analyze the differences between active and passive floodproofing measures in non-residential buildings and their impact on optimizing health, durability and maintenance.
4. Explain the features and benefits of ICC-ES certified engineered automatic flood vents in terms of cost, code requirements, performance in floods, and reduced liability for design professionals.

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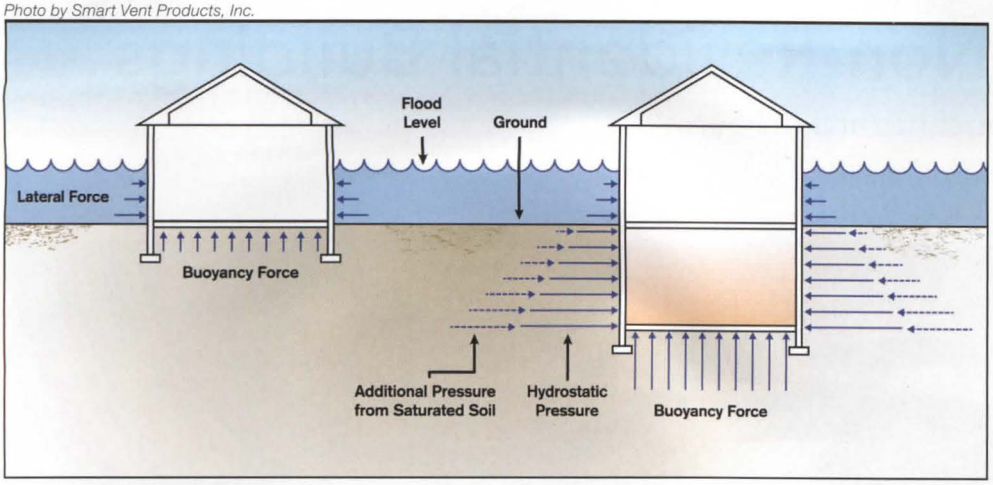


Unless hydrostatic pressure acting on structures during floods is equalized or relieved, walls can be damaged or even fail.

NFIP insurance is available to anyone within the participating community, and FEMA encourages homeowners, business owners and renters even in low-risk areas to purchase flood insurance, since at least 25 percent of flood insurance claims every year come from low- and moderate-risk flood areas. In designated Special Flood Hazard Areas, however, flood insurance is mandatory. Premiums are based on the specific measures taken in the building, and can vary widely depending on what floodproofing options are used.

With luck, most of the buildings built to NFIP standards will never face a catastrophic flood, but effective floodproofing measures also result in more durable structures that require less maintenance and suffer an estimated 80 percent less damage every year. If the worst case does occur, the right floodproofing option will increase a building's "sustainability" in a fundamental way, often determining whether or not the building will survive at all.

SPECIAL FLOOD HAZARD AREAS

Special Flood Hazard Areas are designated on Flood Insurance Rate Maps prepared by the NFIP. These are areas subject to flooding during what is called the *base flood*: a flood that has a 1-percent chance or greater of being equaled or exceeded in any given year.

The base flood is also commonly referred to as a "100-year" flood, but it's important to note that this is not a flood event that is expected to happen only once every 100 years. The base flood has a 1-percent chance of happening every year. This translates to a 26-percent chance of happening once over a 30-year mortgage. In fact, in some areas 100-year floods have happened in consecutive years.

The Special Flood Hazard Areas are divided into zones beginning with the letter A or the letter V. There are also numerous subdivisions, such as AO, AE, VE, etc., based on varying types of risk for the exact topography and other characteristics of the area. "V" zones are in coastal floodplains where high velocity wave action could occur during the base flood, so building designs have to take hydrodynamic forces into account. "A" zones can be on coastal floodplains, but they can also be in inland areas. High-velocity waves are not expected in "A" zones, so most damage results from hydrostatic forces, as will be discussed in more detail below.

Codes and regulations specify floodproofing measures in relation to the "base flood elevation" (BFE), the water surface elevation associated with the 100-year flood. The BFE is the basic standard for floodplain development, used to determine the required elevation of the lowest floor of any new or substantially improved structure.

In "A" zones, a non-residential structure is allowed to have an enclosed space below the BFE provided that the building has been designed, constructed and certified to be floodproofed and to meet established criteria, as explained in this course. In "V" zones, construction or substantial improvement of buildings with lowest floor elevations below the BFE is not allowed, regardless of floodproofing techniques.

Purchase of flood insurance is mandatory in both "A" and "V" areas.

FLOODPROOFING BASICS

As mentioned above, local communities adopt and enforce their own ordinances, and many exceed the minimum standards discussed here, as the NFIP encourages them to do. But a number of basic concepts apply to all floodplain building ordinances, and they are important to understand when planning a new non-residential building in a Special Flood Hazard Area.

Wet vs Dry Floodproofing

NFIP regulations require flood openings in all enclosures below the BFE of buildings in flood hazard zones. This is referred to as "wet floodproofing," where water is expected to move in and out of the lower, uninhabited portions of the building. It is required in all residential buildings, but in non-residential buildings an exception is allowed for what is referred to as "dry" floodproofing, essentially attempting to make the building watertight. This course will analyze the costs and benefits of each approach.

Elevation Certificate

The FEMA Elevation Certificate (EC) or FEMA Form 81-31 is the official form the community uses to document compliance with the community's floodplain management ordinance. (www.fema.gov/library/viewRecord.do?id=1383)

Insurance agents also typically use the information from the EC to determine flood insurance eligibility and rates. The current EC form includes a check-box if the project is using pre-certified engineered flood vents. With certain types of other measures, additional documentation will be required. For instance, if using dry floodproofing methods, the design professional on the project is required to certify that the structure is floodproofed to a certain elevation (the BFE plus 1 foot, and higher in many communities). Certification methods are described in detail in the online version of this article.

Enclosure Types

Some of the types of enclosed areas under elevated buildings that will require flood openings or other floodproofing measures include:

- Parking areas or attached garages
- Building access areas such as stairwells, foyers, elevators
- Storage (for low-value items)
- Under-floor spaces like crawlspaces providing access to utilities

Photo by Smart Vent Products, Inc.

Flood vents provide wet floodproofing, automatically equalizing the hydrostatic pressure acting upon the structure.

Freeboard

The term for extended floodproofed space above the BFE, added for additional safety, functional reasons and often to decrease insurance premiums. (See sidebar "Design Solution: Add Freeboard" on the next page.)

Active vs Passive Floodproofing

"Active" floodproofing measures require human intervention, such as opening and closing flood gates, etc. "Passive" floodproofing measures are built into the building and operate automatically without any human activity necessary. In residential buildings, wet floodproofing *must* operate automatically, without any human intervention. However, in non-residential buildings, many dry floodproofing systems require human intervention in order to function effectively. Again, these are subject to strict rules and must be individually certified by the design professional in charge of the project.

Photo by Smart Vent Products, Inc.

Hydrostatic pressures are extremely strong under flood conditions, and can shift, separate and even destroy foundations if not properly floodproofed.

"DRY" FLOODPROOFING

The only exception to the requirement for flood openings is for non-residential buildings that are designed and engineered to be floodproofed by meeting stringent requirements to be watertight.

Using dry floodproofing essentially means making the building, and all its utility systems, completely watertight and impermeable to the passage of water below the BFE. (Dry floodproofing is not permitted in V zones, where breakaway walls are required below the BFE.)

Dry floodproofing can include passive measures such as waterproof sealants and coatings on walls and floors, water barriers, and automatic backflow prevention valves and sump pumps. But it also may include active measures, for instance, flood gates, shields or doors, which must be manually activated when high water is expected. The design has to take into account important planning considerations such as how much warning time is likely to be available, how people will enter and exit the building, what the flood frequency in the area is, and what floodwater velocities, flood depths and debris impact can be expected.

Examples of features of dry floodproofing systems include the following (and additional examples of system design are given in the Cost Analysis PDF in the online version of this course):

- Sealants, coatings and membranes to reduce seepage of floodwater through walls and wall penetrations
- Installation of watertight closures for doors and windows
- Reinforcement of walls to withstand floodwater and floating debris
- Anchoring of the building to resist flotation, collapse and lateral movement
- Installation of pumps to control interior water levels
- Installation of check valves to prevent the entrance of floodwater or sewage flows through utilities
- Location of electrical, mechanical, utility and other valuable damageable equipment and contents above the expected flood level

The choice to use dry floodproofing triggers a requirement for a floodproofing certification: Floodproofing Certificate for Non-Residential Structures (FEMA Form 81-65). Among other requirements, the certificate must state: 1) the elevation to which the building has been dry-floodproofed, 2) that the building, together with utilities and sanitary facilities, is watertight to the floodproofed elevation, with walls that are substantially impermeable to the passage of water, and 3) that the structure is capable of resisting hydrostatic, hydrodynamic and debris impact forces, including the effects of buoyancy.

Every building floodproofed in this way within the Special Flood Hazard Area must also be certified by a design professional, as stipulated in NFIP regulations: "Provide that where a non-residential structure is intended to be made watertight below the base flood level, a registered professional engineer or architect shall develop and/or review structural design, specifications, and plans for the construction, and shall certify that the design and methods of construction are in accordance with the accepted standards of practice for meeting the applicable provisions of … this section." Note: Detailed information on dry floodproofing is found in FEMA's Technical Bulletin 3, *Non-Residential Floodproofing – Requirements and Certification.*

"WET" FLOODPROOFING

As mentioned above, NFIP regulations require wet floodproofing in residential buildings, and it is also an option in non-residential buildings. Costs are lower (see the Cost Analysis PDF in the online portion of this course for more detailed cost and design discussion), and human activity is not needed, a definite plus under emergency conditions where warning is short and travel is difficult or impossible. In addition, in the case of engineered automatic flood vents which have been pre-certified under the International Code Council Evaluation Service (ICC-ES), the certification process is substantially streamlined, and liability for the performance of the product during a flood is the responsibility of the product manufacturer rather than the certifying design professional.

Wet floodproofing measures allow water to flow in and out of the lower, uninhabited portions of the building such as parking garages, building access areas and crawlspaces. Installation of flood openings—most commonly flood vents—in the walls allows for the automatic equalization of flood levels on both sides of the walls, preventing the catastrophic damage that can be caused by unbalanced hydrostatic forces created during floods.

When flood water rises against the building enclosure and is unable to flow into the space, or recedes much more quickly than it entered,

unequal pressure is created on opposite sides of the walls. The magnitude of hydrostatic pressure increases linearly with water depth. Unless the pressure is equalized or relieved, walls can be damaged or even fail (see figure at top of page 143). If they are load bearing walls the building will collapse. Lateral pressure pushes against exterior walls, while vertical force can shift and separate the foundation or walls, and even in some cases literally lift the structure. When significant floodwaters are present, forces of buoyancy can float the entire structure away.

Flood vents equalize the pressure of the forces acting upon the structure, by letting the water flow evenly in and out.

Photo by Smart Vent Products, Inc.

For commercial, industrial and other non-residential applications, pre-tested and certified engineered flood vents are available in large frame sizes and custom configurations.

CODE-COMPLIANT FLOOD VENTS

Requirements for flood opening sizes, location, number and other characteristics are primarily governed by NFIP regulations. The major requirements are outlined below, but the FEMA document that provides extensive details about meeting flood opening regulations is Technical Bulletin 1-2008, *Openings in Foundation Walls and Walls of Enclosures.* The American Society of Civil Engineers (ASCE) has developed the standard *Flood Resistant Design and Construction* (ASCE 24). This standard applies to buildings and site developments proposed in flood hazard areas. It is also referenced by the International Building Code. ASCE 24 Section 2.6.2.2 contains installation and design criteria for engineered openings. Local ordinances also refer to these three documents as a basis of their own floodproofing ordinances. The major requirements are as follows:

Openings must be in multiple walls. In order to allow water to flow freely in and out of the building, each enclosed area is required to have a minimum of two openings on exterior walls, located below the BFE. They should be installed on at least two sides of the enclosed area to allow for more even filling and draining of floodwater. If possible the openings should be reasonably distributed around the perimeter, unless there is a special justification for putting them on just two sides, e.g. in townhouses or buildings set into sloping sites.

The International Building Code (by reference to ASCE 24) requires a "minimum of two openings on different sides of each enclosed area."

Wall location. The NFIP's definition of an enclosure is any portion below an elevated building that is fully shut in by four rigid walls. Basements are not allowed in Special Flood Hazard Areas. To avoid having an enclosure classified as a basement, the entire length of one wall must have its inside grade higher than or equal to the outside grade for that wall. This would qualify the enclosure as a walkout basement.

Opening location. The bottom of the opening must be no more than one foot above the grade that is immediately under the opening, either the adjacent ground level, or the interior grade, whichever is higher. The lower wall will experience hydrostatic pressure first, so most of the openings should be there. This alleviates the initial force of the water and then provides quick drainage when water begins to recede.

In practice, most communities require additional height, or "freeboard," and insurance premiums will be substantially reduced by additional freeboard. (See sidebar.)

Continues at ce.architecturalrecord.com

DESIGN SOLUTION: ADD FREEBOARD

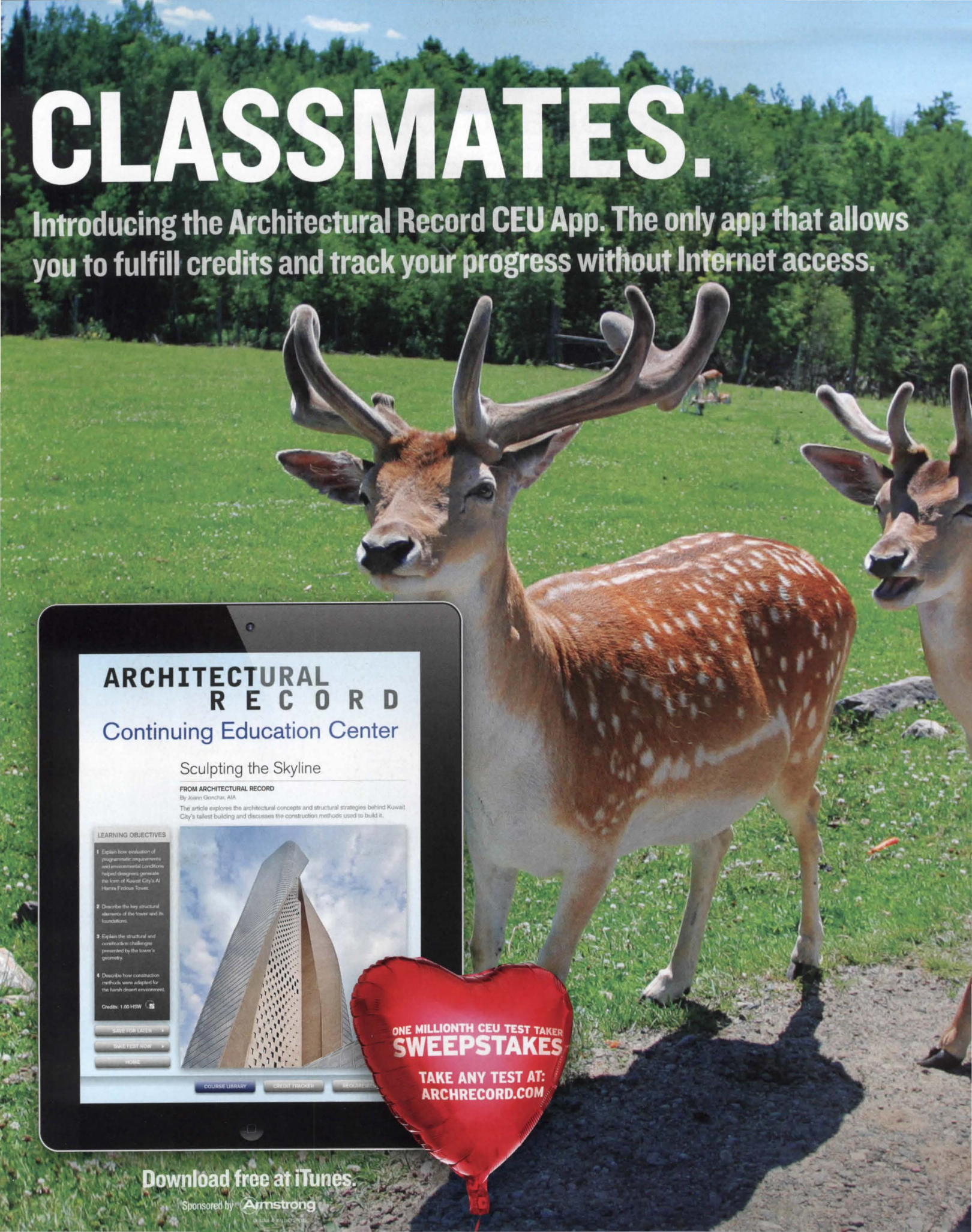
Adding an extra one or more feet above the BFE to a building space can significantly reduce insurance premiums in a flood hazard zone while providing additional space and functionality for the life of the building. For example, making a 4- or 5-foot-high crawlspace into a 10-foot enclosure might reduce insurance premiums by as much as 48 percent. Even adding one foot of freeboard might reduce premiums by over 35 percent. The additional space can add low-value storage areas, parking, better access or even just much improved headroom, and typically has a very quick payback of 2-3 years, since the cost in extra materials and labor is often minimal.

Elevating a building a few feet above legally mandated heights has very little effect on its overall look, but it has significant benefits, including:

Increased protection from floods and storms. Stormwaters can and do rise higher than shown on Flood Insurance Rate Maps (FIRMs). Freeboard helps protect buildings from storms larger than those that FIRMs are based on, and provides an added margin of safety to address the flood modeling and mapping uncertainties associated with FIRMs.

Better preparation for ongoing sea level rise. For example, Massachusetts has experienced a relative sea level rise of approximately 1 foot over the past 100 years. Since elevations on FIRMs do not include sea level rise, freeboard will help keep structures above floodwaters as storm surge elevations increase.

Greatly reduced flood insurance premiums. Recognizing that freeboard reduces flood risk, FEMA and NFIP provide substantial (sometimes more than 50 percent) reductions in flood insurance premiums for structures incorporating freeboard. These savings can rapidly accumulate, especially over the life of a normal mortgage.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Continuing Education Center
Sculpting the Skyline
FROM ARCHITECTURAL RECORD
By Joann Gonchar, AIA
The article explores the architectural concepts and structural strategies behind Kuwait City's tallest building and discusses the construction methods used to build it.
LEARNING OBJECTIVES
1 Explain how evaluation of programmatic requirements and environmental conditions helped designers generate the form of Kuwait City's Al Hamra Firdous Tower.
2 Describe the key structural elements of the tower and its foundations.
3 Explain the structural and construction challenges presented by the tower's geometry.
4 Describe how construction methods were adapted for the harsh desert environment.
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Functional Color and Design in Healthcare Environments

Color and nature provide healing benefits in hospital settings

Sponsored by Glidden Professional | *By Celeste Allen Novak, AIA, LEED AP and Barbara Richardson*

Photo by Scott McDonald

Color used in surgical areas at the Elmhurst Memorial Hospital, designed by Albert Kahn Associates, Inc., provides a calming and soothing atmosphere for patients as well as an inspirational and functional work atmosphere for staff.

Applied research and careful study conducted by professionals on the impact of color and design on healthcare settings have changed the design palette used in new healthcare settings. There is a wide consensus that there is no clear evidence suggesting that any one color is effective in achieving a particular healthcare outcome. In fact, the highly subjective nature of color, color combinations as well as cultural associations of color palettes make the selection of effective color for any environment difficult to predict. However, data does suggest that design professionals who understand the elements of color and the introduction of nature into healthcare environments can make an impact on healing. Architects who engage all five senses into the design process can enhance the healing process.

This article will explore some of the design research into the psychology of color and exposure to nature to enhance healing environments. As architect Anne Cox, AIA, LEED BD+C, EDAC, healthcare planner at Albert Kahn Associates, Inc. explains, "The latest and lasting trend in healthcare is to use informed research. In addition, one of the newest mandates for healthcare design is to become stewards of the environment—a reflection of the medical mandate 'to do no harm.' The case for green healthcare design is no longer just about energy savings. The rationale for building green today takes into account financial gains, improved patient outcomes, better staff health and reduced turnover, and community benefits through a reduced environmental impact."

HISTORY

A brief review of the history of medicine provides insight into the transformation of medicine from religion to science. Early humans living between 4,000 BC and 3,000 BC believed that illness was a punishment from the gods. In ancient Egypt, priests served as physicians as well as religious leaders. By the fourth century B.C., the Greek physician Hippocrates, considered the father of western medicine, was among the first to credit the environment as a cause for illness as well as a means of healing. The Greeks and Romans developed therapies

that included massage, art and herbs for healing. In China, acupuncture was developed as a means to treat numerous illnesses. Throughout the world, early humans' life expectancy increased from 20 to 30 years of age.

In Medieval times, the study of medicine was prohibited as religious leaders restricted the growth of science. Human life spans declined until advances in printing led to scientific collaboration and the Renaissance. The 16th and 17th centuries brought about the creation and development of the microscope, opening up new worlds of medical exploration and equipment including the first mercury thermometer. By the 18th century, the life span of the average person increased to 50 years of age as a variety of illnesses began to be diagnosed and treated with medicine, confinement and care.

Women became active healthcare participants in the 19th century. In Florence Nightingale's preface to her book on hospitals, she wrote, "It may seem a strange principle to enunciate as the very first requirement in a hospital that it should do the sick no harm."[1] She began the first nursing school in 1860 that led to the reform of hospital environments.

The 20th century brought organ transplants, healthcare plans and a life expectancy of 77 years. The 21st century has seen the first implantable artificial heart, stem cell research and an anticipated life span of 90 to 100 years of age. In this period there has been continued research and understanding of the impact of the environment on healing and healthcare outcomes.

GROWTH OF EVIDENCE-BASED DESIGN

In the last quarter of the 20th century, researchers began to explore design concepts that might improve healthcare facilities. In the 1990s, the Center for Health Design, a non-profit organization, was committed to advancing design in healthcare settings to improve patient outcomes. They launched the Pebble Project in 2000 to encourage the adoption of stricter research methodology, data collection and collaboration for healthcare designers. Evidence-based design (EBD) practitioners employ credible data and research to influence design decisions. The Pebble Project was created as a way to engage healthcare designers who were building or renovating environments to document their results and meet frequently with each other. The goal of the project was to create a cascade of insights on healthcare environments that would have a beneficial ripple effect throughout the industry. The research from the Pebble Project gained even more momentum as in tandem with its acceptance and growth, mind-body medical science was developing rapidly and confirming that patient stress and emotional states affect clinical outcomes. The Center for Health Design is the primary source for certification in evidence-based design and those professionals who have passed this exam list EDAC after their names as qualified providers of EBD design planning.

Photo by Scott McDonald

Designed by Albert Kahn Associates, Inc., this patient room in Elmhurst Memorial Hospital demonstrates how the use of natural colors and materials along with views to the outdoors can create an enhanced atmosphere for healing.

Hospitals built in the mid-20th century were functionally efficient yet blind to the emotional needs of the patient. One of the most cited and influential evidence-based healthcare design researchers in the world is Roger S. Ulrich, PhD, professor of architecture and landscape architecture and faculty fellow for the Center for Health Systems and Design, Colleges of Architecture and Medicine, Texas A and M University. His 1984 study, published by *Science* magazine titled "View Through A Window May Influence Recovery from Surgery"[2] discussed the emotional needs of patients and the influence of design on patient safety and health.

His studies are lauded for their scientific rigor, and his findings continue to be readily implemented by healthcare managers, clinicians, architects and policy makers throughout the world. His research has influenced the design of many billions of dollars of hospital construction and improved the safety and health outcomes of patients across the globe. Because of his work in this field, we are learning that designing within the basic principles of nature can lead to positive outcomes. It is becoming clear that evidence-based design is an approach to design that improve outcomes for the patient, family and staff within the healthcare facilities.

GOALS OF HEALING ENVIRONMENTS

There are three principal goals to every healing environment. Healthcare designers strive to heal the patient, support the staff and engage the family. The first goal is to heal the patient. A primary focus is to make sure that patients spend all of their energy fighting the disease—not the healthcare environment. Research reveals that individuals in healthcare settings nationwide agree that privacy, respect as an individual and their safety and security were the highest priorities for their care setting. Implementing EBD design theories that respond to these priorities has shown to improve patient satisfaction.

Additionally, patients need supportive staff. Healthcare organizations and institutions are

CONTINUING EDUCATION

EARN ONE AIA/CES HSW CONTINUING EDUCATION HOUR (CEH)

Learning Objectives

After reading this article, you should be able to:

1. Recognize the philosophy of evidence-based design for healthcare professionals.
2. Review psychological and physiological use of color and nature and the application of color theory to healing environments.
3. Define elements of color, hue, light reflectance and intensity, and optimize selections for visual clarity for major areas and departments within the hospital atmosphere.
4. Discover the positive impact on the hospital environment that is achievable when incorporating the influences of the five senses in the design process.

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Photo by Gregg Mastorakos: SmithGroupJJR

This colorful, daylit waiting area at Banner Health Clinic in Maricopa, Arizona, is designed by SmithGroupJJR using evidence-based design principles to help provide an atmosphere of comfort.

finding that they must differentiate themselves to recruit and maintain personnel. When featuring EBD to recruit and retain staff, they are finding that they are elevating themselves in competitive marketplaces.

Finally, family support is essential in therapy, caring and advocating for the patient. Families that are involved in the healing and therapy process respond to EBD environments and are engaged as good advocates for the patient. Healthcare settings that simulate a home environment and engage all of the five senses by design are shown to improve healthcare outcomes and family involvement in the patient care.

Design professionals using EBD have identified 12 aspects of a healing environment that have the ability to be a part of the healing process. These include:

1. Single patient rooms
2. Ergonomics
3. Furniture arrangement
4. Air quality
5. Windows
6. Wayfinding
7. Building layouts and zoning
8. Access to nature
9. Light – particularly natural daylight
10. Floor materials
11. Noise control
12. Positive distraction through the use of aesthetics

Photo by Gregg Mastorakos: SmithGroupJJR

This inpatient oncology room at Holy Cross Hospital in Silver Spring, Maryland, designed by SmithGroupJJR, simulates a home atmosphere.

Although there is no exact "design medicine," hospitals with designers who pay attention to these 12 areas achieve results for hospital caregivers. Healthcare design professionals should aim to provide patient's control over their environment and thoughtful accommodations for all caregivers including family members and friends. The cultural and geographic area of the world in which the hospital is located may guide the design direction and aesthetic choices. A hospital with the desert of Arizona in the background may have a very different design direction from one in Paris. Healthcare design that is inspired by the art, craft and culture of place will provide a setting that meets many sustainable design goals.

An example of this is the design of the Banner Maricopa Clinic in Arizona. According to Sonja Bochart, associate, IIDA, LEED AP at SmithGroupJJR, "The design of Banner's Maricopa Health Center was based on the Banner Health Center prototype, which defines and reinforces a strong and relevant brand image of quality, patient-centered care." The architect used a foundation color palette that represented the neutral, quiet background of the Center, combined with a stronger palette of accent colors. They used "the saturated greens of local flora, terracottas and plums that reflect the canyons and landforms of the Southwest, and smoky blues with hints of green to reflect the expansive desert sky—strategically aligned with specific areas of the Center. The overall effect is a timeless connection to nature and a sense of wellness."

In some communities, hospitals are becoming both places for healing the sick as well as places for the community to gather for well-being. A "hospitality mentality" is becoming an all-important inspiration for healthcare designers. Computer desks, magazines, books, newspapers, movies on demand, 24/7 food service, whirlpools, spa services, valet parking, music and Internet accessibility are all part of the amenities common to the hotel industry that are now making hospital visits more comfortable and less intimidating. Hospital interior designers are also borrowing color palettes from the spa, hospitality and retail industries borrowing from branding initiatives that are intended to soothe or energize customers.

ACCESS TO NATURE

Ninety-five percent of all individuals who are asked how to alleviate a stressful situation respond that they are most comforted and soothed by being outdoors.[3] Furthermore, they specifically mention that they would like to engage all of their senses. Physical and mental well-being is the top concern for a hospital. The exploration of the biologically based bond between humans and nature is especially important in environments where medical technology and products seem to be an

Photo by Gregg Mastorakos: SmithGroupJJR

Nature-themed artwork, warm colors, natural materials and ample lighting provide a soothing waiting area at the Banner Maricopa Health Clinic.

COLORS OF A HEALING ENVIRONMENT

The use of nature as a design principle is not new to healthcare design or to the principles of new movements such as biomimicry. Elmhurst Memorial Hospital was designed based on the Prairie School of Design. This style was chosen to harmonize with the hospital's Midwestern, suburban Chicago location. The Prairie Style is characterized by long, horizontal lines that draw the eye to the surrounding landscape.

In harmony with nature and drawing cues from the four seasons of the Midwestern year, the colors of the Prairie style are often inspired from an earthen palette. The range of colors can include fresh new green found in spring's first growth to the deepening green leaves and grass of summer. Spring and summer also bring pops of color from flowering blooms including red, yellow, white, purple and blue. Ochre, amber, gold, fire red, oranges and deep burgundy come with the leaves and plants of fall. Browns and grays are revealed on the bare tree branches and trunks as winter arrives.

Bringing these earth tones into the hospital interior provides a soothing, calming environment that promotes healing. At Elmhurst Memorial Hospital, the use of a nature-inspired color palette helped to enhance the sense of healing and well-being that the hospital wanted to promote.

The hospital design was also influenced by the Planetree model of patient-centered care. The core components of design included these principles:

- Human interaction
- Importance of family, friends and social support
- Patient access to information and education
- Nutritional and nurturing aspects of food
- Healing environments through architecture and interior design
- Arts and entertainment programs
- Spirituality
- Importance of human touch
- Complementary therapies
- Healthy communities

Architect Anne Cox commented that the interiors at the Elmhurst Hospital were designed based on the client interest in bringing nature-inspired colors into the hospital setting to provide a calm and soothing atmosphere.

antithesis to nature. To reduce stress and pain and to replenish the human condition, design professionals are learning to add strong references to nature in healthcare environments.

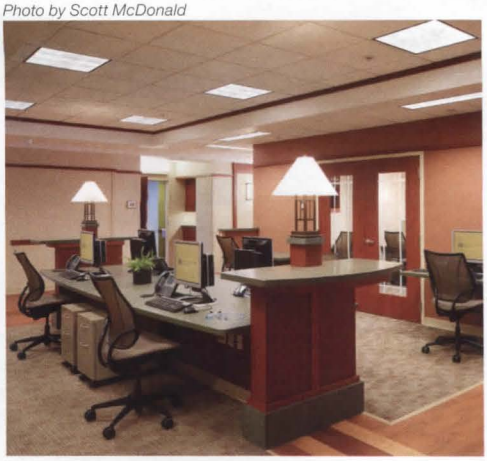
It is becoming evident that direct access to nature through daylighting and landscaping are essential to our health. In the last decade, many healthcare projects are providing healing gardens and direct access to nature from the hospital setting. In addition, landscape design is now standard practice both for exterior gardens as well as interior gardens in healthcare facilities. Healing gardens offer a way to blur the lines between indoors and outdoors. Roof gardens are providing more ways to access nature as well as changing the views from many hospital rooms. A few years ago, the introduction of daylight deep into a large institutional facility seemed costly and frivolous. Today research has proven differently giving design teams the freedom to use daylight as a standard light source for interiors.

The human experience and need for nature has been discussed and developed by numerous writers and philosophers of the 20th century. Psychologist Erich Fromm coined the word "biophilia" to describe the profound human attraction to nature.[4] *Biophilia*, a book written by entomologist Edward O. Wilson and co-authored by Steven R. Kellert in 1984, teaches the concept of this deep rooted connection to the natural world by humans and the relationship of this drive as an essential component of sustainable design.

Healthcare designer Barbara Huelat, FASID, AAHID, EDAC, has written extensively on designing with nature. She believes that exposure to natural materials and images have the benefit of reminding humans of their evolution and connections to nature. For designers like Huelat, environmentalism is a necessity, not a luxury. Biophilia has become a guideline for designing healthcare facilities that derive value from the natural world.

Another recent design movement "biomimicry" is based on the understanding of the basic principles of nature and imitating those principles to inspire design innovations. Nature teaches the design of systems and integration. The principles of biomimic design (organization, structure, diversity, color and movement) are being applied to healthcare environments.

Photo by Scott McDonald



Influenced by both the Planetree model and the Prairie School, this caregiver work station at Elmhurst Hospital is designed for the comfort of staff, patient and family access.

SENSORY DESIGN: SIGHT AND COLOR THEORY

New research suggests that our senses and sensory awareness may be vital to healing and that sensory information can evoke physiological or emotional responses that can range from serenity to anxiety. Researchers are also learning that emotional responses triggered by both the use of color and natural materials can affect physiological responses in patients. A recent study at the University of British Columbia demonstrated that using wood, a natural material, in the design of a room lowered sympathetic nervous system activation and patient stress.[5]

Using color in healthcare settings is not a new concept, and the years of hygienic white walls that symbolized cleanliness in the 20th century were only a trend that has become a stereotype for hospital decor. Using color to heal may date back to ancient Egypt and Greece, when rooms in temples were embellished with the color spectrum. The Greeks color-diagnosed a patient and placed them in a temple that radiated the color prescribed. In ancient Egypt and Greece, colors were used to evoke healing based on their understanding of the power of sunlight and the incorporation of colored crystals and gems.

See endnotes in the online version of this article.

Continues at ce.architecturalrecord.com

Architect Celeste Allen Novak, AIA, LEED AP, *specializes in sustainable design and planning in Ann Arbor, Michigan.*

Barbara Richardson, *Director, Color Marketing, Glidden Professional, an AkzoNobel Brand*

Windows on Sustainability

Advanced glazings help buildings achieve net-zero envelopes

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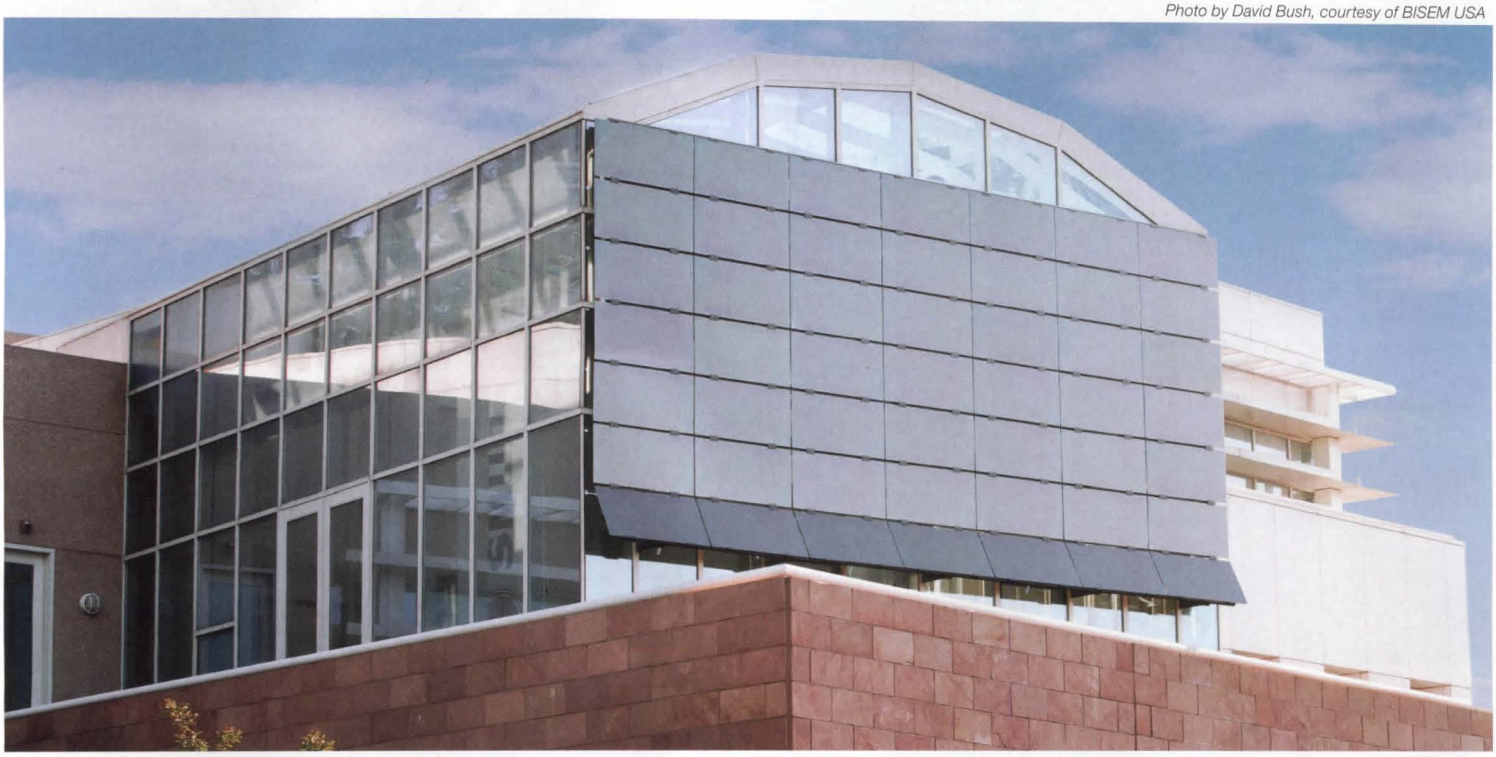
Photo by David Bush, courtesy of BISEM USA



A UL-approved BIPV curtain-wall retrofit on the Sacramento Municipal Utility District (SMUD) Headquarters in Sacramento, California.

CONTINUING EDUCATION

EARN ONE AIA/CES HSW/SD CONTINUING EDUCATION HOUR (CEH)

Learning Objectives

After reading this article, you should be able to:

1. Identify types of high-performance glass that contribute to building sustainability.
2. Specify glazing solutions that reduce building energy consumption.
3. Discuss trends in utilizing glazing products for net-zero wall systems.
4. Describe the role of building integrated photovoltaics in decreasing global carbon dioxide emissions.

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With world net electricity generation estimated to soar 77 percent by 2030, powered by fossil fuels that will generate a 39 percent rise in carbon dioxide emissions, the move is on to net-zero buildings—structures that generate as much energy as they consume. Often considered the next wave in architecture, net-zero buildings dispense with heating bills, electricity expenses, air-conditioning costs and other energy uses—and can potentially be independent of the energy grid supply. The American Institute of Architects has set a goal of net-zero buildings by 2030 and some parts of the country, notably California, will require that a building generates as much energy as it uses by that date. This article will focus on the significant role advanced glazing systems play in getting buildings toward net zero. High-performance glazings will be defined, their benefits and recent advances discussed, as well as how they fit into the rapidly emerging fields of building integrated photovoltaics (BIPV) and pre-wired curtain walls, which incorporate advanced glazings into the building envelope, replacing traditional materials with those that serve as both building skin and solar power generator.

ADVANCED GLAZINGS FOR A NET-ZERO ENVELOPE SOLUTION

The U.S. Department of Energy estimates that buildings account for some 40 percent of all energy use in the United States—more than either the transportation or industrial sectors—and 70 percent of its power plant-generated electricity. Over 30 percent of this energy is lost through poor building efficiency. Nearly every country has passed regulations to reduce buildings' energy consumption, and manufacturers are racing to develop products that meet those demands.

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. According to the National Research Energy Laboratory, the potential energy savings from the wide-scale use of advanced windows is nearly 6 percent of national energy consumption. Window manufacturers and glazing contractors are embracing new technologies to achieve ever higher energy performance through low solar heat gain coefficients (SHGC) to reduce air-conditioning loads and through low U-factors to reduce thermal transfer—key goals of commercial buildings.

DEFINITION OF TERMS

U-factor and **U-value** are interchangeable terms referring to a measure of the heat gain or loss through glass due to the difference between indoor and outdoor air temperatures. U-factor or U-value is also referred to as the overall coefficient of heat transfer. A lower U-value indicates better insulating properties. The units are Btu/(hr)(ft^2)(°F).

R-value equals a measure of the resistance of the glazing to heat flow. It is determined by dividing the U-value into 1, (R-value = 1/U-value). A higher R-value indicates better insulating properties of the glazing. R-value is not typically used as a measurement for glazing products. Both U-value and R-value are a measure of resistance to heat flow and are referenced here to help understand U-factor.

The solar heat gain coefficient (SHGC) is the percent of solar energy incident on the glass that is transferred indoors both directly and indirectly through the glass. The direct gain portion is the solar energy transmittance, while the indirect is the fraction of solar energy incident on the glass that is absorbed and re-radiated or transmitted through convection indoors. For example, 1/8-inch (3.1 mm) uncoated clear glass has an SHGC of approximately 0.86, of which 0.84 is direct gain (solar transmittance) and 0.02 is indirect gain (convection/re-radiation).

The shading coefficient (SC) is a measure of the heat gain through glass from solar radiation. Specifically, the shading coefficient is the ratio between the solar heat gain for a particular type of glass and that of double-strength clear glass, that is 1/8-inch glass. A lower shading coefficient indicates lower solar heat gain. For reference, 1/8-inch (3.1 mm) clear glass has a value of 1.00 (SC is an older term being replaced by the SHGC).

In either case, a lower number indicates improved solar control over the 1/8-inch clear glass baseline. With a long air-conditioning season, it is most important to reduce solar gain and therefore reduce air-conditioning loads.

Photo by Ben Benschneider, Artwork © Copyright, Chihuly Studio, 2012, all rights reserved

Advanced architectural glass helps architects create striking building designs while significantly reducing energy costs. Chihuly Garden and Glass House, Owen Richards Architects.

High-Performance Low-E Glass

First introduced in the 1980s, low-E commercial coatings refer to glass with low-emissivity coatings, microscopically thin metal layers that are deposited on a window surface to help keep heat on the same side of the glass from which it originated. Low-E glass reduces heat gain or loss by reflecting long-wave infrared energy, or heat, and therefore, decreases the U-value and solar heat gain, and in doing so, improves the energy efficiency of the glazing. Because of its relative neutrality in appearance and energy efficiency, low-E glass is widely used in residential and commercial buildings and is expected to continue to increase in usage in the coming years. If a higher solar gain low-E coating is specified, the higher heat load from solar transmission can burden the cooling system, causing energy costs to rise more than necessary as the air-conditioning system overworks to maintain a comfortable temperature throughout all sections of the building. In addition to controlling the solar heat gain inside a building, the correct glass can affect the size and efficiency of the HVAC equipment as well as daylighting systems. Minimizing solar heat gain through low-E coatings can actually significantly reduce the size of an HVAC unit.

The first low-E glasses had SHGCs of between 0.4 and 0.7, the SHGC being the fraction of the heat from the sun that enters through a window, expressed as a number between 0 and 1, with the lower a window's SHGC, the less solar heat it transmits. Over the years the energy codes have gotten stricter. Both ASHRAE 90.1-2010 and the 2012 International Energy Conservation Code require a maximum 0.25 SHGC in zones 1-3 (resourcecenter.pnl.gov/cocoon/morf/ResourceCenter/graphic/973) for any window-to-wall ratio up to 40 percent. Glass manufacturers keep improving on those numbers through new higher-performing low-E technologies that balance energy performance of glass and the aesthetics.

A recent study by engineering company Enermodal Engineering Inc. compared the energy savings of a new high-performance low-E coating to a standard commercial low-E coating widely used in recent years. Simulating a 175,000-square-foot 10-story office building, the study found the low-E glass to have the potential to save $2.50 per square foot of glass by downsizing the chilled water and air distribution systems. In terms of operational cost savings, annual energy costs are lowered by as much as $1.60 per square foot of glass in a building with glare and daylighting controls. In total, the higher-performance coating offered a 30 percent improvement in energy performance for a very small increase in glass cost. The return on investment would be realized in one to two years. The simulated coating offered a neutral appearance, glare control and a lower solar heat gain that enabled the downsizing of the building's HVAC system upfront, in addition to ongoing energy savings.

In general there are two ways to apply coatings to glass, through either a pyrolytic or sputter process.

Pyrolytic

Pyrolytic low-E glass is glass with low-E coating applied at high temperatures and fired into the glass surface during the "on-line" float glass manufacturing process. The high solar heat gain of pyrolytic low-E glass is good for cold climates, though it may not meet energy codes in other climes, and can be less crisp in appearance compared to other coatings.

Sputter Coatings

By contrast, sputter low-E glass is glass with low-E coating applied through an "off-line" coating process. The off-line process occurs after the float glass is produced, using a Magnetron Sputter Vacuum Deposition (MSVD) coater. Glass is put into a vacuum chamber, where ionized gas bombards the surface of a metal cathode (silver) with ions. Atoms of the desired metal are vaporized and then deposited in a thin film on the surface of the glass. The MSVD works at the molecular level to produce superior performance and offers significant advantages over "hard"

Source: Guardian Industries Corp.

Glazing Options Performance Comparison

Glazing	Monolithic I.G. Unit	% Visible Light Transmission	Solar Heat Gain Coefficient	U-Value
Clear Float Glass	Mono	89%	.84	1.0
Clear Float -No Coating	I.G. Unit	80%	.73	.47
Single Silver Low-E	I.G. Unit	50%	.39	.33
Double Silver Low-E	I.G. Unit	68%	.38	.29
Triple Silver Low-E	I.G. Unit	62%	.27	.29
Hybrid Low-E	I.G. Unit	41%	.29	.31
Reflective Coating	I.G. Unit	18%	.21	.39

(6mm clear/ 12mm airspace / 6mm clear, coating #2 surface)

(pyrolytic) and traditional "soft" coatings. By using different gasses, such as argon or nitrogen and oxygen, and by layering metallic and dielectric layers in different sequences, a wide variety of coatings can be produced to meet many design and performance requirements. In general, the MSVD process offers more coating options and improved solar, thermal and light-to-solar gain options than the pyrolytic process. Sputter coatings, offered in a wide variety of color and performance options, including post-temperable versions that can be produced efficiently in stock sizes and then fabricated nearer to the job site, can meet and exceed energy code requirements, dramatically lowering heat gain or loss while providing high visible light transmission and optimal transparency.

The commercial market for coated glass is predominantly sputter coatings, and continues to grow as the pyrolytic coatings have seen limited increases in demand.

Sputter Low-E Spectrally Selective Coatings

These coatings reflect both long-wave IR and solar near-infrared rays. In other words, they transmit a higher ratio of daylight compared to the amount of solar heat transmission. By blocking solar heat and making maximum use of daylight, spectrally selective glass can now provide a range of visible light transmission on clear float glass between 40 and 70 percent, while also offering lower reflectivity than was possible in the past, as well as a low U-factor and solar heat gain coefficient. Spectrally selective coatings, defined by the U.S. Department of Energy as glass with a light to solar gain of 1.25 or better, can significantly improve building heating, cooling and electric lighting, to the point of downsizing HVAC equipment, which reduces initial capital investment and ongoing energy costs. Spectrally selective coatings can be applied on clear or low-iron glass as well as various types of tinted glass to produce "customized" glazing systems capable of either increasing or decreasing solar gains according to the aesthetic and climatic effects desired. The Department of Energy further maintains that computer simulations have shown that advanced window glazing with spectrally selective coatings can reduce the electric space cooling requirements of new buildings in hot climates by more than 40 percent. Spectrally selective low-E coatings are available with one, two or three layers of silver; each layer improves the coatings selectivity.

Sputter Low-E Hybrid Coatings

These multifunction coatings have medium reflectivity but with higher light transmission which provides improved transparency. In comparison to older, low light-transmitting reflective coatings, manufacturers have added low-E performance and brightened the exterior appearance while still transmitting considerable light and achieving a low SHGC. Originally developed for residential markets, low-E coatings had low color, reflection and high transmission. Manufacturers modified those films to increase the exterior reflection, which can be an asset in the commercial marketplace, while lowering the transmission, which can increase the heat loads. In short, hybrids were modified to have lower transmission, higher reflection and very good solar properties including low U-values and low shading coefficients.

Many Coating Options

Sputter low-E and hybrid coatings come in many color and performance options utilizing one, two and three layers of silver, sandwiched within other metal layers. These coatings represent the best available performance in high light transmission and low solar heat gain coefficient.

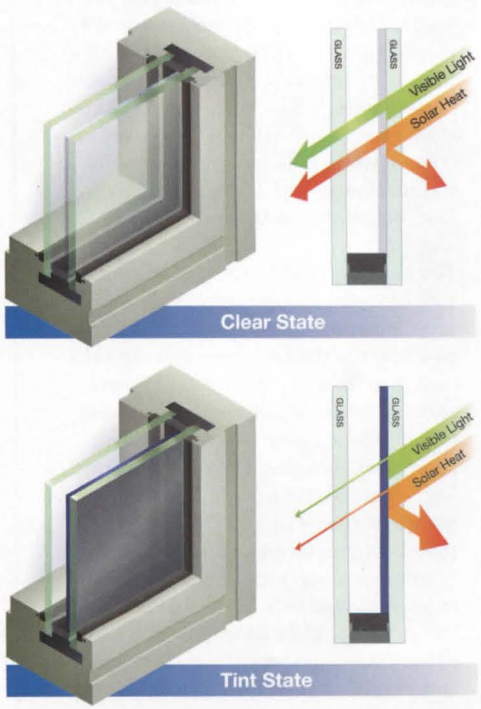
Depending on how it is fabricated, low-E glass can have a neutral clear appearance and very high light-to-solar gain rations. High-performance products offer a variety of appearance and light transmission options with superior solar energy control. These products can save thousands in upfront and ongoing costs. For a comparison of various low-E products, see the chart above.

Electrochromic Glass

Dynamic glass is a category of next-generation windows that can change traditionally static performance characteristics such as visible light transmittance and solar heat gain coefficient. Technologies 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 light respectively. EC, LC and SPD technologies have the advantage of electronic control of glass performance, enabling intelligent controls that can be integrated with occupant schedules, lighting levels or algorithms to increase building energy efficiency.

Probably the most energy efficient, and the only one of these technologies to have passed the ASTM standard for accelerated environmental durability, is electrochromic glass, which adapts to changing conditions—somewhat like sunglasses for a building—switching from clear to tinted on demand. With the flip of a switch, electrochromic glass can change from fully transparent to a fully darkened state and potentially in between states as well, allowing control of heat and glare in buildings without the need for shades, blinds or any type of window treatment or external shading device. Unlike permanently tinted windows, occupants enjoy unobstructed views. Whether automated, or manual, the tint level of the window can be adjusted to settings that match changing needs. It should be noted that electrochromic glass can take a short period of time to change, with the time required in-

Source: Guardian Industries Corp.



	Tvis	Rout	Rin	SHGC
EC clear and clear	58%	18%	20%	0.46
EC clear and triple silver low-E	45%	16%	14%	0.28
EC fully tint and clear	3%	7%	17%	0.09
EC fully tint and triple silver low-E	2%	7%	13%	0.07

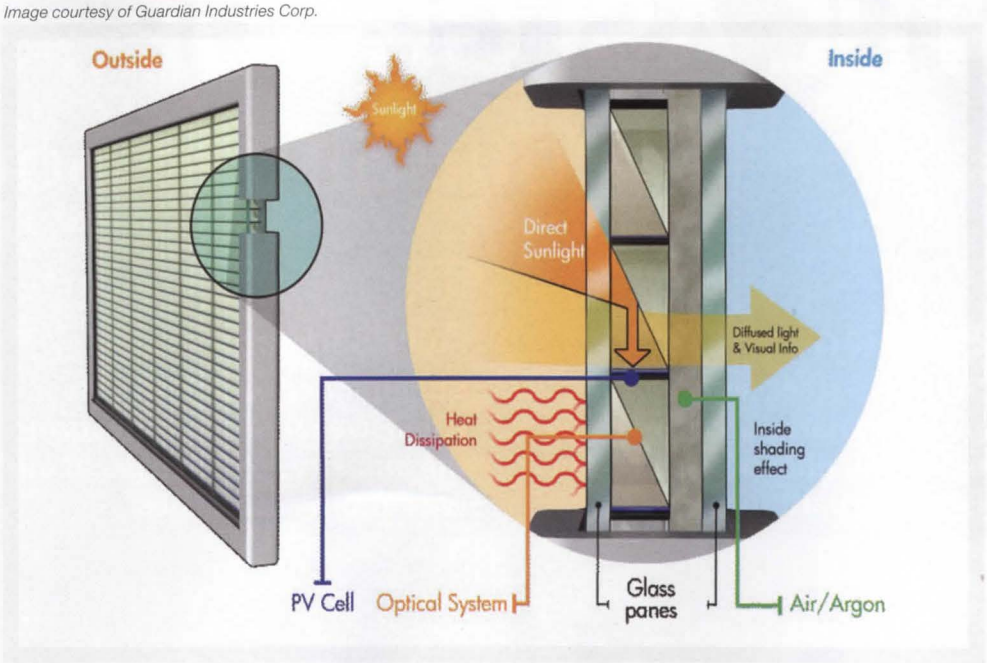
Low-voltage electrical current is applied to the optically active layers in the electrochromic coating, which adjusts the level of tint.

creasing as the glass size increases. Typical times would range between 10 and 30 minutes for commercial glass sizes.

Depending on project design, this glass technology has the potential to dramatically reduce HVAC energy consumption and peak power usage, which can result in a significant reduction in operating costs. Office lights can be dimmed in the mornings, further reducing costs. In short, electrochromic technologies enable designers to use more glass while still meeting or exceeding building energy codes and standards and improving occupant comfort.

In an electrochromic glass, a thin assembly of several layers is sandwiched between two pieces of glass, which are transparent electronic conductors. Low voltage applied to the conductors moves the ions between layers, which sparks the color change. Reversing the voltage restores transparency to the window. The power required to operate one 60-watt incandescent light bulb is enough power to operate more than 1,800 square feet of electrochromic glass.

Image courtesy of Guardian Industries Corp.



PVGUs incorporate advanced optics to turn sunlight into electricity.

Photovoltaic Glass Units

Photovoltaic glass (PV) has a significant part to play in getting buildings to net zero. Traditionally the building roof has been the province of PV products in the form of PV panels that needed their own support system and were limited by the space available. Most PV materials used in roofs are crystalline silicon; they have conversion efficiency of up to 13 percent and are typically opaque and rigid. Newer, thin-film PV cells are manufactured by depositing ultra-thin layers of semiconducting materials on glass or stainless steel sheets, and are a better fit for integration into building glazing materials. Thin-film PV is being integrated into vision glass for windows, skylights and facades, and opaque PV glass can also be produced for use as spandrel glass that, when coupled with PV vision glass, effectively turns the entire building envelope into an electric power generator, without the need to install PV panels separately on the roof.

In a new category of green building material, manufacturers have combined proprietary optics, high-efficiency crystalline silicon, advanced materials science and simulation software to create a highly efficient photovoltaic glass unit (PVGU), essentially photovoltaics in a standard double-pane window form, known in the industry as an insulating glass unit or IGU. Virtually an insulated window with integrated photovoltaics, the PVGU is an energy-generating alternative to the IGU, while leveraging its modularity, ease of installation and acceptance by the design and building industry. This technology can offer high light transmission, significant up-front savings on HVAC systems and on-going energy costs, all while generating electricity for the building.

Opaque PV glass can also be produced to use as spandrel glass which shields structural building components such as columns, floors, HVAC systems, electrical wiring and plumbing from view. With intense market competition, the price of opaque PV spandrel has come down to a level that begins to approach insulated glass, making it a cost-effective solution especially on a sunny southern exposure. Manufacturers are offering an increasing range of glass configurations in both PV vision and spandrel glass. When combined, PV vision glass and opaque spandrel glass effectively turn the entire building envelope into an electric power generator.

The most advanced example of a PVGU is a high-density unit that uses prisms to collect direct sunlight by having a thin layer of monocrystalline silicon solar cells sandwiched horizontally between two layers of glass to form an individual tile, which acts as a cell. An internal plastic reflective prism directs sunlight onto the solar cells. Softer daylight and less intense horizontal rays are admitted through the window, minimizing glare and heat, creating a view for occupants and generating the same level of power of a roof top solar panel at the same orientation—in short, breaking the existing trade-off between high module efficiency and low transparency.

PVGUs offer a serious alternative to IGUs, and can have up to three times the power density while achieving low solar heat gain and a very high light-to-solar gain while optimizing daylighting and improving U-values. Optimal PVGU potential would be on the south, east and west facades of a building.

In November 2011, two existing windows on the south side of North America's tallest building, the Willis Tower, formerly the Sears Tower, were replaced by PVGUs. Each window is about one square meter and capable of generating 120W of power. Energy harnessed by the transparent solar windows is expected to reduce heat gain, and therefore cooling costs as well. If the experiment succeeds, the Willis Tower may increase its PVGU installation, becoming a virtual vertical solar generation farm.

Putting it All Together—BIPVs and Pre-Wired Curtain Walls

While the contribution of high-performance glazing is key, it can be even more successfully leveraged as part of a whole system approach to the energy design of a building. Industry experts say that significant energy reduction in a building—up to 60 percent—can be achieved from factors like early planning, high-efficiency HVAC systems, extra insulation, daylighting, energy-efficient lighting, rooftop energy production, and energy storage. Achieving the final 40 percent of energy reduction is the real challenge and requires a paradigm shift and/or new technologies.

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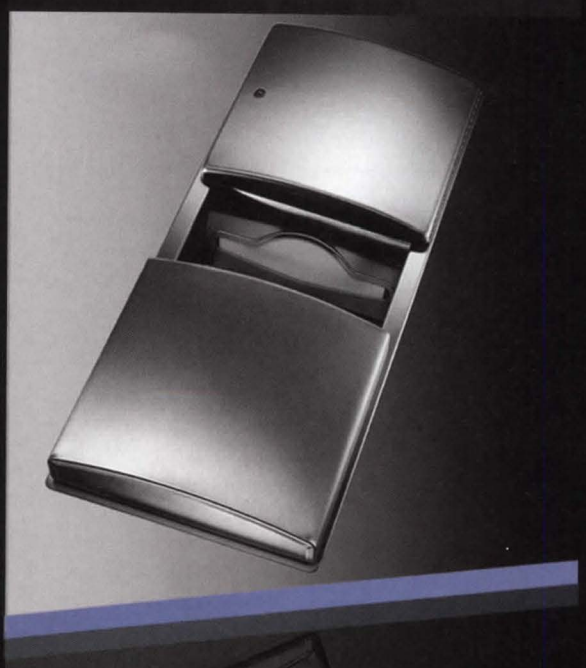

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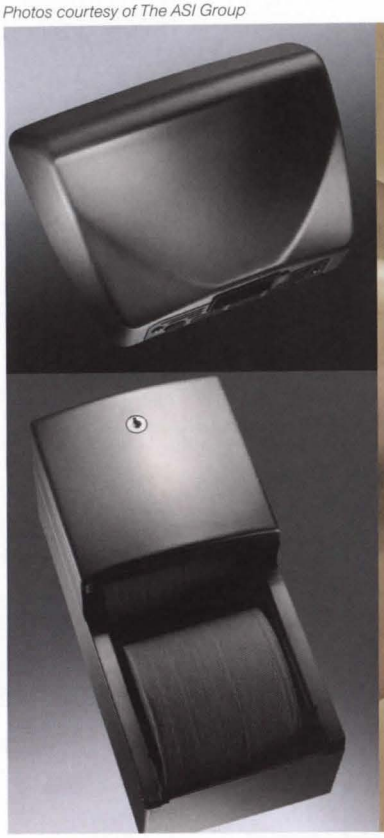

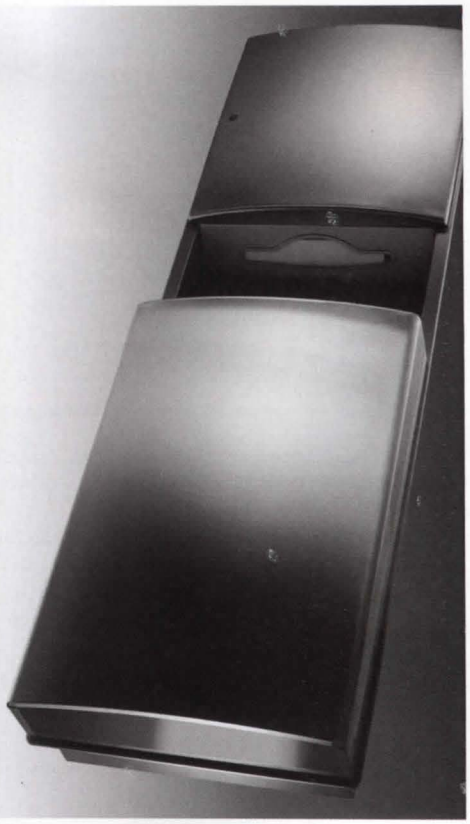

A Practical Guide to 2010 ADA-Compliant Restroom Design

Sponsored by The ASI Group | *By Jeanette Fitzgerald Pitts*

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Learning Objectives

After reading this article, you should be able to:

1. Explore the reasons accessible design is important in professional practice.
2. Explain the latest changes in accessibility requirements as they apply to restroom design.
3. Address key considerations for creating compliant restrooms.
4. Select restroom equipment that is compliant with the latest ADA accessibility standards.

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The rules defining acceptable accessible design have recently changed, forcing many in the design community, from seasoned and senior architects to junior associates and other design professionals, to take a closer look at the new Americans with Disabilities Act (ADA) Standards for Accessible Design. On March 15, 2012, the revised regulation, the 2010 ADA Standards for Accessible Design, also referred to as the 2010 ADA Standard, became the new, legally enforceable requirement for ensuring a space is readily accessible to and usable by individuals with disabilities.

This new standard has even broader reach than its 1991 predecessor, applying to newly designed and constructed or altered state and local government facilities, public accommodations, commercial facilities, recreational facilities, detention facilities, courthouses and more, and includes a number of significant and material changes to the existing accessibility requirements. "The new ADA standard has been changed just slightly enough that even experienced design veterans, if they're not paying attention, can make mistakes," says Judy Girod, FASID, CID, director of interior design at Lothrop Associates in New York.

Restrooms are one of the room types where there are a considerable number of ADA stipulations to satisfy and where many of the newly revamped regulations apply. The 2010 ADA Standard stipulates that "where toilet rooms are provided, each toilet room shall comply..." so, generally speaking, any restroom designed in a local or state government building, public accommodation, commercial facility, recreational facility, detention facility, courthouse, etc. is required, by law, to be in compliance with the ADA. The requisite mix of toilet compartments, necessary clear floor space, turning space, door placement and fixture mounting height are just a few of design elements that are addressed and regulated in the ADA Standard.

For example, the 2010 ADA Standard mandates that "where toilet compartments are provided, at least one toilet compartment shall

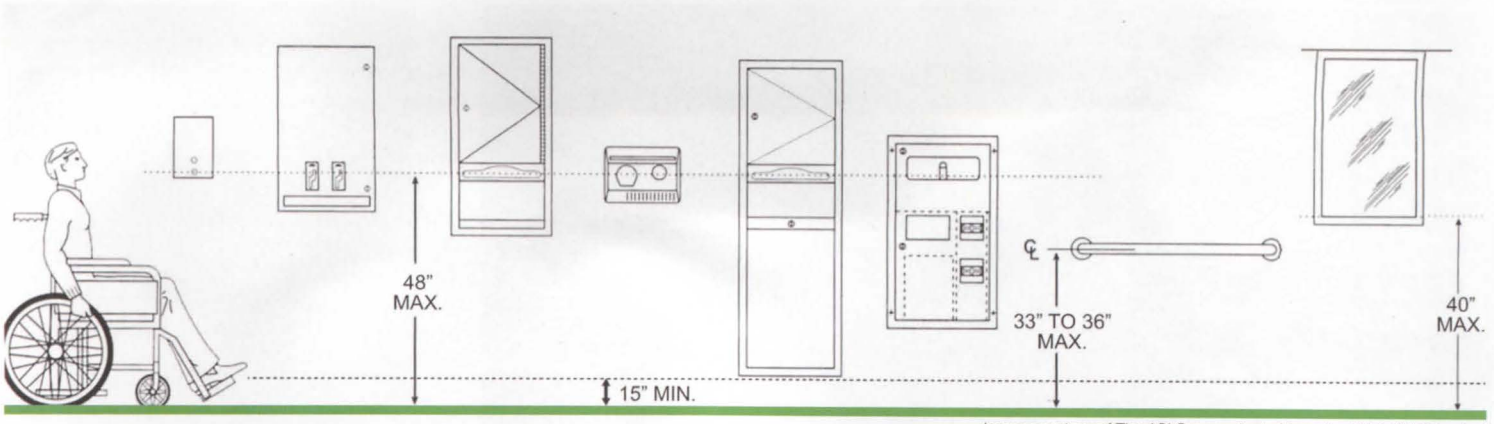

Image courtesy of The ASI Group adapted from the 2010 ADA Standard

The 2010 ADA Standard has lowered the maximum height of the acceptable reach range to 48 inches and now provides acceptable placement ranges, instead of absolute placement values, making compliance easier.

comply with 604.8.1." Section 604.8.1 details the specifications for a wheelchair-accessible stall. So another way to read the ADA mandate is that wherever toilet compartments are provided, at least one toilet compartment shall be wheelchair accessible, as defined by the ADA. The standard also states that one ambulatory stall is required for every six water closets located in the toilet room or when the combination of urinals and water closets totals six or more fixtures.

The standard also imposes strict regulations on the lavatory area in a restroom. "Where lavatories are provided, at least one shall comply with ADA Section 606 and shall not be located in the toilet compartment" (2010 ADA Standard, Section 213.3.4). Section 606 addresses important topics such as mounting height, turning room, clear floor space requirements, etc. Generally speaking, the ADA sphere of influence is so broad that unless the building or project space is specifically identified as an exception, at least one ADA-compliant sink and toilet compartment is required for each restroom.

It is important to note that the ADA is not a building code; it is civil rights legislation, so the potential penalties for non-compliance carry some significant bite. Beyond delaying a Certificate of Occupancy, facilities that are found to be in violation of the ADA standard can incur steep fines and even be targeted in lawsuits by the Department of Justice (DOJ). Regarding fines, the first offense can carry a civil penalty of $55,000 and a second offense $110,000 and so on. The DOJ has the ability to bring class action lawsuits on behalf of individuals with disabilities, and if there's a finding of liability, there could be a significant monetary burden on a facility. The DOJ can also seek damages for people who are aggrieved and injunctive relief that will force a facility to make the required changes.

In short, the 2010 ADA Standard applies to many of the restrooms standing, under construction or currently being designed in the United States. Compliance is important not only to ensure that individuals with permanent or temporary disabilities can use the space, but also to protect the facility and its ownership from the potential fines and legal action that non-compliance can invite.

CHANGES IN THE 2010 ADA STANDARD THAT APPLY TO RESTROOMS

The 2010 ADA Standard contains significant changes to the original ADA stipulations and many of those modifications apply to designing accessible restrooms. The restroom-specific changes include: lowering the maximum reach range, increasing the clear floor space required around a water closet, and changing the placement requirements for the centerline of the water closet itself.

New Reach Ranges

The 2010 ADA Standard defines a reach range with minimum and maximum heights for the operable mechanisms on fixtures and accessories. The intent of the reach range is to ensure that a disabled person, perhaps sitting in a wheelchair or using a cane, will be capable of reaching and operating the paper towel dispenser, baby changing table or other restroom equipment.

The new acceptable, unobstructed reach range is now between 15 and 48 inches AFF, according to the 2010 ADA Standard.

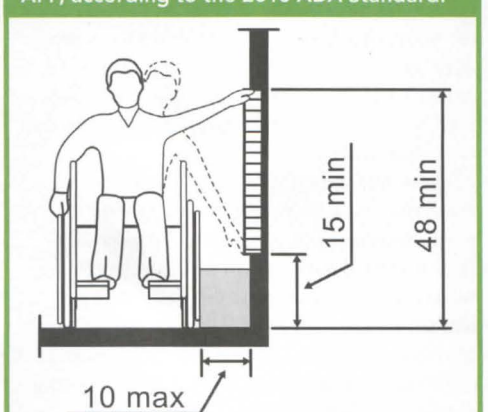

Image courtesy of The ASI Group adapted from the 2010 ADA Standard

The reach range defined in the 2010 ADA Standard incorporates significant changes to the reach range mandated by the 1991 standard. Under the 1991 standard, the reach range was dependent upon the type of approach that would be used. The maximum height for an unobstructed side approach was 54 inches above finished floor (AFF), whereas an unobstructed front approach had a lower maximum height of 48 inches AFF. The 2010 ADA Standard has consolidated the two reach ranges into one. Now the maximum acceptable height for hand dryer push buttons, or any other operable mechanism, is 48 inches AFF and the lowest acceptable height is 15 inches AFF, regardless of approach.

Compliance issues can arise when a designer is detailing the mounting heights of restroom equipment and forgets that the reach range mandates the position of the operable mechanism (i.e., the towel slot, the push knob) and not the top or bottom of the accessory. Many times accessories shown on interior elevation drawings are positioned in terms of the top or bottom of the accessory, instead of detailing the maximum dimension to the operating part.

Now Including Standards for Children

Another difference between the 1991 standard and the 2010 ADA Standard (section 308.1) is that the 2010 standard outlines acceptable reach ranges for children according to age. These reach ranges are intended to be used when elements like coat hooks, lockers, toilet compartments, lavatories, and other fixtures and accessories will be primarily used by children.

The 2010 ADA Standard provides an advisory specifically focused on specifying toilet compartments for children's use (section 604.9). The table on the next page provides additional guidance for specifying toilet compartments for children according to the age group served and reflects the differences in size, stature and reach ranges of children ages 3 through 12. It is suggested that the chosen specifications correspond to the primary user group.

Forward or Side Reach	Ages 3 and 4	Ages 5 through 8	Ages 9 through 12
High (maximum)	36 in (915 mm)	40 in (1015 mm)	44 in (1120 mm)
Low (maximum)	20 in (510 mm)	18 in (455 mm)	16 in (405 mm)

Fixture/Accessory	Ages 3 and 4	Ages 5 through 8	Ages 9 through 12
Water Closet Centerline	12 inches (3055 mm)	12 to 15 inches (305 to 380 mm)	15 to 18 inches (1120 mm)
Toilet Seat Height	11 to 12 inches (280 to 305 mm)	12 to 15 inches (305 to 380 mm)	15 to 17 inches (380 to 430 mm))
Grab Bar Height	18 to 20 inches (455 to 510 mm)	20 to 25 inches (510 to 635 mm)	25 to 27 inches (635 to 685 mm)
Dispenser Height	14 inches (355 mm)	14 to 17 inches (355 to 430 mm)	17 to 19 inches (430 to 485 mm)

Increased Clear Floor Space Around the Water Closet

Clear floor space (CLFS) is defined as the minimum unobstructed floor or ground space required to accommodate a single, stationary wheelchair and occupant. The 2010 ADA Standard is increasing the amount of clear floor space that is required around a water closet. According to section 604.3.1, clearance around the water closet shall be 60 inches minimum measured perpendicular from the side wall, 56 inches minimum measured perpendicular from the rear wall for a wall-hung water closet, and 59 inches minimum measured from the rear wall for a floor-mounted water closet. This increased clear floor space is allowed to overlap the water closet, grab bars, toilet paper dispensers, sanitary napkin disposal units, coat hooks, shelves, accessible routes and turning space. No other fixtures or obstructions shall be located within the required water closet clearance.

New Centerline for the Water Closet

Under the 1991 standards, the centerline for the water closet, which refers to the space from the side wall to the center of the toilet, was required to be an absolute 18 inches. Under the 2010 ADA Standard, the centerline of the water closet must fall within an established range of 16 inches minimum to 18 inches maximum from the side wall or partition. The centerline of the water closet in an ambulatory-accessible compartment can be between 17 and 19 inches from the side wall or partition.

Construction Tolerances

Arguably one of the most anticipated changes in the 2010 ADA Standard is the inclusion of construction tolerances. "Speaking practically about restroom design, it is quite common that there may be a slight variance in the measurement identified in the drawing and the actual tile and porcelain implementation. It is usually close, but rarely exact," explains Michael Chambers, FAIA, FCSI, CCS, principal at MCA Specifications in Ukiah, California. "In the old standard, if the toilet was not exactly 18 inches at the centerline, it was non-compliant. The 2010 ADA Standard recognizes the reality of construction tolerances and has replaced many of the absolute values with acceptable ranges for placement."

ADDITIONAL CONSIDERATIONS FOR ADA-COMPLIANT RESTROOMS

Many of the 2010 ADA Standard's requirements that apply to restroom design remained the same from one standard to the other, but they are no less critical to creating compliant restrooms. Here we will review seven key considerations that must be incorporated into any ADA-compliant design.

Maintain Clear Width Dimensions

The 2010 ADA Standard mandates that specific clear width dimensions must be maintained throughout an accessible route so that a person with a disability can move freely through the space, without being required to weave around a room full of obstacles. Specifically the code identifies the clear width of the accessible route shall be 36 inches minimum and also requires that door openings provide a clear width of 32 inches minimum. Openings more than 24 inches deep shall provide a clear opening of 36 inches minimum.

The most common places where clear width compliance issues are found are at vestibule entry points and at passageways through the walls. The problem often arises from a simple measuring mistake. Clear openings with swinging doors, for example, must be measured between the face of the door and the stop, where the door is open 90 degrees. One way to avoid an issue in these areas is to identify these clear width dimensions on the drawings where they occur. Designers can stipulate a "minimum clear" or to "hold this dimension" on the drawing, where necessary.

Provide Clear Floor Space

As mentioned previously, clear floor space describes the minimum unobstructed floor or ground space required to accommodate a single, stationary wheelchair and occupant. The 2010 ADA Standard requires a 30-inch by 48-inch clear space minimum at every fixture, accessory and operable piece of hardware in a restroom, with the exception of the water closet which now requires a larger clear floor space. This requirement ensures that a person in a wheelchair can roll up to the fixture or accessory, such as a toilet cover dispenser, with either a forward or parallel approach, and use it appropriately.

The sheer number of fixtures and accessories typically found in a restroom can make it challenging for a designer to carve out enough

Stipulate "minimum clear" on the drawing to safeguard important clear width dimensions.

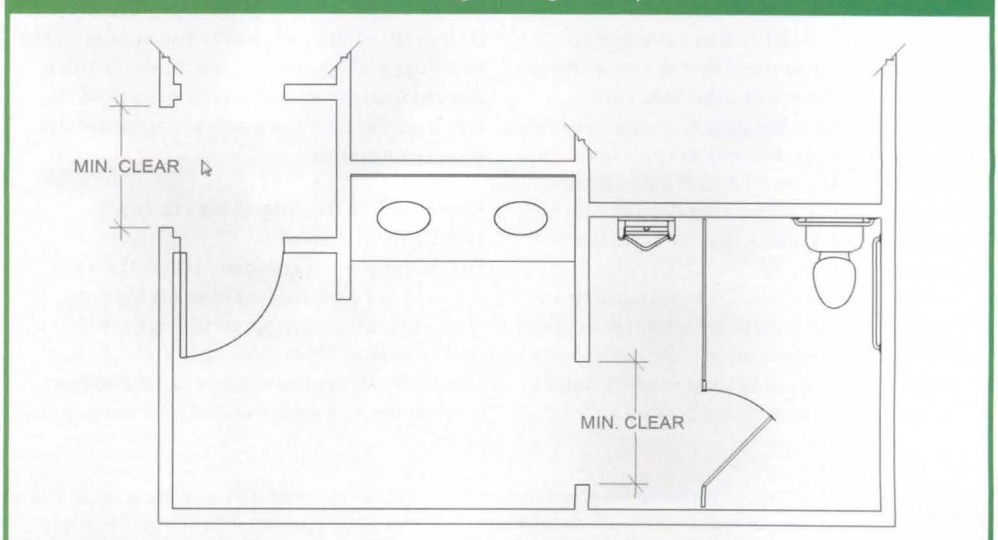

Image courtesy of The ASI Group adapted from the 2010 ADA Standard

Photo courtesy of The ASI Group

In this non-compliant example, the seat cover dispenser does not have the requisite clear floor space for wheelchair use.

clear floor space to be compliant. In fact, not providing enough clear floor space to accommodate a wheelchair at every accessory is one of the most common ADA violations seen in restrooms. Unfortunately, creating acceptable clear floor space is slightly more involved than simply drawing a 30-inch by 48-inch rectangle under each fixture or accessory on the floorplan. Clear floor space for a sink can include the space underneath the sink all the way to the wall, if there is appropriate clearance for a wheelchair and occupant to fit underneath the sink. Clear floor space for accessories and sinks must adjoin the accessible route or path of travel through the restroom. And, generally speaking, door swings may not impinge on clear floor space.

Turning Space Required

There are only three room types that are required by the ADA to offer adequate turning space. They are dressing rooms, hospital patient rooms and restrooms. In the restroom, turning circles are only required in the main toilet room, not in the accessible stall, and designers may use either a turning circle or T-shaped space to meet the requirement.

In the 2010 ADA Standard, section 304.3.1, the turning circle is defined as a space of 60 inches in diameter minimum that also includes knee and toe clearance in compliance with section 306. Section 306 defines acceptable knee and toe clearance as the vertical space between 9 inches and 27 inches AFF with a minimum depth requirement of 11 inches deep at 9 inches AFF for toes and 8 inches deep at 27 inches AFF for knees.

The parameters of the T-shaped turning space are a 60-inch-square minimum with arms and base that are a minimum of 36 inches wide. Each arm of the T shall be clear of obstructions 12 inches minimum in each direction and the base shall be clear of obstructions for 24 inches minimum. The T-shaped turning space will also include knee and toe clearance complying with 306, identical to the turning circle requirements, but are only required at the end of either the base or one arm.

Turning space and the required clear floor space for fixtures and accessories are allowed to overlap. When the requisite turning space must occur underneath another restroom fixture or accessory, make certain that the appropriate under-counter clearance for knees is provided.

Clear Door Swings

The 2010 ADA Standard specifies a number of conditions to ensure that individuals with disabilities can enter and exit the restroom without excessive hardship and can occupy a restroom space without being forced to constantly maneuver around an opening and closing door. To that end, in typical restroom applications, doors are not allowed to swing into the clear floor space that belongs to any fixture or accessory; however they are permitted to swing into established turning areas.

As part of the accessible route, restroom doors shall provide a minimum clear width of 32 inches and there must be enough clear floor space on either side of the door to accommodate the door swing and maintain the minimum clear width of 36 inches along the path of travel. Safeguard compliance in these problematic areas by indicating the clear width dimensions on the drawings and being cognizant of the fact that dimensional errors and even the depth of the finish on the door can erode the requisite clear width minimums.

Remove Protruding Objects from the Path of Travel

For the purpose of restroom design, the basic definition of a protruding object is anything that extends more than four inches from the vertical surface between 27 and 80 inches AFF. Generally this applies to paper towel dispensers, hand dryers and semi-recessed trash containers, but can include signs, wall sconces, shelves, window sills, etc. Keep protruding objects out of the path of travel by positioning signage a minimum of 80 inches AFF, locating protruding dispensers in corners outside of the path of travel, and exploring the growing number of restroom accessories that are being designed in thinner frames, eliminating the presence of protruding objects in the restroom space altogether.

Create an Accessible Route or Path of Travel

An accessible route is defined in the 2010 ADA Standard as a continuous, unobstructed path connecting all accessible elements and spaces of a building. It is essentially the path that a disabled person uses to enter any space and move through it to the last accessible fixture. In the case of a restroom, the accessible route is the path that a person with a wheelchair, cane or cast would use to open the door, enter the restroom, travel past the regular stalls to reach the wheelchair-accessible compartment and then traverse back to use the accessible sink, hand dryer and even the baby changing station before leaving.

The 2010 ADA Standard requires that a 36-inch minimum width must be maintained along the entire path of travel. While door swing is not allowed to impinge upon the mandated width of an accessible route, both designated clear floor space areas and turning space are allowed to overlap with the 36-inch-wide path of travel.

There is a common misconception that if a fully abled person can weave his or her way through a restroom to the wheelchair accessible stall, the path of travel mandate has been satisfied. In reality, the space must provide enough clear floor space, turning radius and under-counter clearance for a person with a wheelchair or cane to move through the space without being forced to maneuver around obstructions and without the threat of protruding objects creating potential safety hazards.

Many of the 2010 ADA Standard's requirements that apply to restroom design remained the same from one standard to the other, but they are no less critical to creating compliant restrooms.

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Rear-Projection Tiled Digital Media Walls

Modular video building blocks provide high-impact solutions for interior spaces

Sponsored by Christie® for Christie MicroTiles® | *By Barbara A. Nadel, FAIA*

Vibrant, rear-projection tiled digital media displays inform and educate viewers in real-time at the London Stock Exchange, London, UK.

Communications guru Marshall McLuhan coined the phrase, "The medium is the message," in the 1960s, as a commentary on culture and technology in a changing society. Since the early days of black and white television, to the portability of smartphone videos, communicating messages through new and evolving forms of high-resolution video technology and digital displays has captivated audiences and consumers worldwide.

Digital displays are widely seen in public and commercial spaces, connecting people with information, entertainment and brand messages in real-time and on-demand. One of the newest formats, rear-projection tiled digital display walls, delivers ultra-sharp, high-contrast images and a vibrant color spectrum.

Rear-projection tiled digital displays can be used as unique design elements to enhance and enliven public interior spaces. Global applications and building types include corporate spaces, museums, retail environments, stadiums and sporting venues, universities, airports, broadcast sets, command centers, and live events, such as conventions, trade shows and conferences.

DISPLAYS AS DESIGN ELEMENTS

Effective digital displays have a lasting, measurable impact. Technologies are available to control energy efficiency and costs, and are compatible with sustainability principles.

Digital media displays enhance the built environment by complementing and elevating the experience of being in a public space. The displays can engage an audience with customized messages, eye-catching dynamic visuals, multimedia videos and interactive social gaming. Vibrant digital media displays inform, educate and entertain viewers, whether they are seeking information in a fast-paced business environment, such as the London Stock Exchange, learning about auto racing at the NASCAR Hall of Fame, or viewing product information at the Fresh retail store in New York City, in the store or from the street.

DIGITAL TECHNOLOGY FORMATS

To understand the benefits of rear-projection tiled digital media walls, it is helpful to review the basics of various digital technology formats. There are three commonly used technologies: light-emitting diode (LED) screens, flat panels and traditional rear projection.

The outdoor advertising industry often uses **LED screen displays** on large billboards along highways or in major city centers such as New York's Times Square or London's Piccadilly Circus. Two specific characteristics of LED displays present serious obstacles to indoor use.

First, the brightness of most LED displays ranges from 2,000-6,000 nits, which is well suited for outdoor applications in direct sunlight, but too bright for most indoor environments.

Second, LED displays are made up of thousands of small light-emitting diodes that combine to produce visuals that appear crisp from a distance. However, the closer viewers get, the worse the images look because of what's called the pixel pitch. The pixels on an LED display wall are spaced much further apart than with flat screens or rear projection, making them better suited for longer viewing distances. Even with the most densely populated LED screens, where LED clusters are spaced 3 mm apart on centers, viewers should be standing at least 30 feet away. Closer spacing generally produces a sharper image as there are more pixels in a given area. A pixel pitch of

less than 0.6 mm provides super-fine quality images even when viewing from up close.

Liquid crystal display (LCD) and plasma flat panels found in public and commercial spaces are very similar to the consumer models found at home, except typically they have been optimized for longer operation and offer a greater range of inputs and integrated features. Nevertheless, even commercial flat panels are prone to image retention over time, and lack the richly saturated colors of LED-based rear projection.

Within the last few years, flat panels with relatively small bezels have entered the market. These can be tiled together to form a single canvas with image-to-image gaps between each panel of 2 to 6 mm. Although the size of these seams is ground breaking for flat panels, they remain large enough to disrupt the image at typical viewing distances.

Traditional rear projection is another option for digital media displays in large spaces, but challenges also exist. These systems may require special optical film on glass to eliminate shadows or silhouettes. In addition, the physical requirements of traditional rear-projection displays frequently demand unimpeded access to the rear of the projection media for servicing. Those arrangements are often difficult to achieve in existing spaces, unless the displays are mounted above and out of the way, and therefore out of natural sightlines.

Many rear-projection systems use lamps to generate their bright images. These lamps are rated to last for months, not years, before needing replacement. The cost of the lamp bulbs, and the labor associated with changing them, has typically ruled out projection systems as viable options for most digital signage projects.

However, a new approach to tiled rear-projection systems has overcome these challenges. Through the use of **digital light processing® (DLP®)** technology, LEDs instead of lamps and a small tile form factor, issues associated with digital displays in interior areas—such as physical space, maintenance and cost—are resolved. These rear-projection tiles are video building blocks that can be organized in almost any size or shape, without thick, unsightly seams between units, or compromises on contrast and clarity found in other formats. These display modules have super-fine pixels that are viewable from any distance, with superior viewing angles.

BENEFITS

Digital displays are a high-performance solution for communicating information, videos and advertising in interior public spaces. Tiled digital display walls using rear-projection technology can provide several benefits to designers, owners and end users who view the media wall, including the following:

An asymmetrical hexagon with a passageway in the middle fuses mission, message and architecture at Perimeter Institute for Theoretical Physics in Waterloo, Ontario, Canada.

Image quality. Rear-projection tiled digital display walls provide vivid, rich colors and deep blacks, high brightness with no glare, ultra-high resolution, and excellent image quality up close, at a distance, or at any angle.

Versatility. Their modular video building block format presents maximum design freedom. Architects and designers can create any size or shape media display to complement any architectural space or feature.

Sustainability. Rear-projection tiled digital displays are suitable for Leadership in Energy and Environmental Design (LEED) projects, and can consist of as much as 80 percent recyclable and 90 percent recoverable materials.

Reliability and longevity. The combination of proven DLP® and LED technology used in rear-projection tiled digital displays means they are a sound investment over time. No moving parts, a long-lasting LED light engine, sturdy frames and housing, and durable screens all contribute to longevity and reliability.

Simplicity. Rear-projection tiled digital displays are typically designed to be easy to use and simple to operate. They are lightweight building blocks, and the screen pops off in the front for servicing—a notable advantage over standard LCD or plasma flat-panel displays.

SELECTION CRITERIA

There are many considerations when planning, designing and selecting tiled digital displays for interior spaces, including design issues, sustainability, image quality, interactivity, operations, maintenance and life-cycle costs.

SPACE PLANNING AND DESIGN ISSUES

Rear-projection digital display tiles are video building blocks that can be assembled to create any size and almost any shape. Instead of trying to determine where to locate large, standard-size rectangular screens, rear-projection digital display tiles allow architects design flexibility to fit the displays to a variety of orientations for any interior environment or architectural element, such as floors, walls, ceilings and even curves.

By having more options for orientation of large-scale, high-impact displays, building owners can have confidence their digital message—the content that is conveyed by the medium—reaches their intended audience within their space or facility.

A typical rear-projection tiled digital display unit measures 12 inches high by 16 inches wide and 10 inches deep. The diagonal screen size is 20 inches. The units weigh about 20 lbs each, making them lightweight enough to stack or string together.

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Learning Objectives

After reading this article, you should be able to:

1. Identify the characteristics of digital technology formats used for media displays.
2. Evaluate design, sustainability, operations, maintenance and cost analysis planning criteria for rear-projection tiled digital displays.
3. Analyze the benefits of rear-projection tiled digital media walls for use within interior spaces of various building types.
4. Examine the importance of image quality, color calibration and content for creating effective digital displays.

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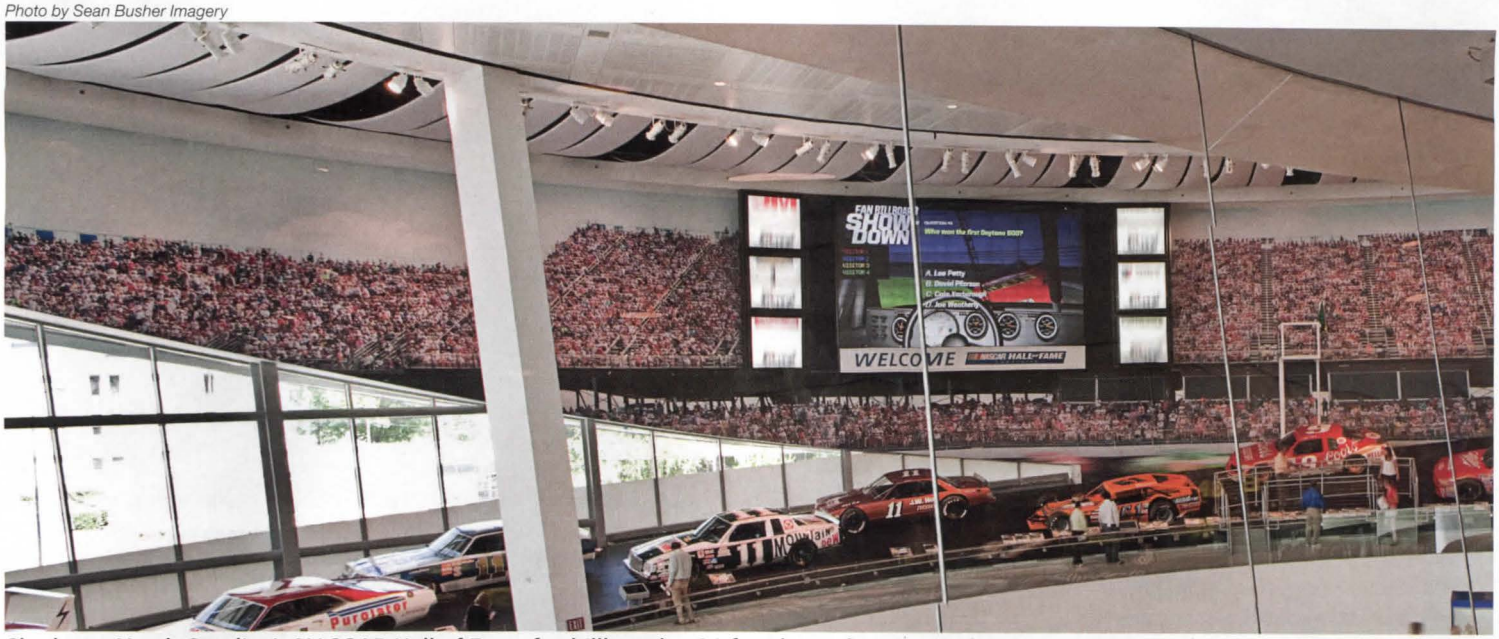
Photo by Sean Busher Imagery



Charlotte, North Carolina's NASCAR Hall of Fame fan billboard, a 24-foot by 14-foot array of rear-projection digital display tiles, integrates high-impact visuals with brightness and clarity when viewed at any angle in a large space.

Generally, a minimum clearance of 2 inches is required behind the tile units for air flow, ventilation and cabling. Larger displays may require additional back space to ensure the air behind each tile is within the operating range of 41 to 104 degrees F (5 to 40 degrees C). An inlet at the bottom of the unit allows ambient air circulation, along with vents and fans behind the display screen. The unit will automatically shut off if overheating occurs.

Each tiled unit contains a sturdy metal housing that allows the creation of a standalone display up to five tiles high, as long as the display is adequately secured to prevent tipping. Usually, the weight of each tile when stacked above five units high must be transferred to a separate supporting structure. Brackets are typically available to attach to the rear of each tile, enabling them to be mounted to a superstructure.

Rear-projection tiled digital displays can be mounted in a variety of orientations:

Wall-mounted. Floor pedestals are available, and the units can be tied back to walls and ceilings.

Suspended. Tiles can be suspended from riggings attached to the ceiling, provided a bracket is used on each tile.

Angle-mounted. Brackets can be installed on each tile for angle-mounting, with an angle of up to 20 degrees from vertical.

Floor-mounted (facing up). Rear-projection tiles are suitable for floor mounting, but cannot support bearing weight in this orientation.

Due to their light weight and small size, these modular units can fit through doorways and service elevators, and are ideal for retrofitting existing buildings where large flat-screen rectangular panels may not fit into every installation space, corridor, elevator or narrow areas.

Software is typically available for architects to design and visualize how a display will look, render the tiles and video content in a 2D or 3D space, and determine how many tiles are required.

Seams delineating the separate screen units within a total display configuration are often highly visible among arrays of various digital formats. With the highest resolution LED screens, the gap between each pixel may range from 1 to 3 mm and becomes visible at short distances. With flat panels, the smallest seams between panels are about 6 mm for LCD and 2 mm for plasmas. The seams may be misaligned in the grid, which can distract from the media, and emphasize glare in the corner of a screen.

Compared to LED, flat-panel LCD and plasma screens, rear-projection tiled digital media walls can produce a nearly seamless digital canvas, with seams between the modular units as narrow as 1 mm, and no limit to the number of tiles in a display. As a result, these modular tiled video building blocks can blend into any environment, allowing audiences to focus on the message, and not the medium or the technology.

Content is generally fed to the media wall from a custom cabinet that can be located near the display rack, or in a control or server room within the facility.

SUSTAINABILITY

Several characteristics impact the sustainable qualities of digital displays, including energy consumption over the entire product life cycle, durability, ergonomics, reusability and recyclability. Some characteristics depend on the project application, while other factors include the costs associated with:

- Manufacturing, installation and servicing a display
- Installing or updating a display with a short life cycle, versus installing a display with a longer life cycle
- Lost productivity and revenues resulting from poor ergonomics
- Relocating or modifying a display within a building during renovations, change of use or new tenants
- Disposal and recycling

Energy Consumption

Energy-efficient manufacturing processes can be measured and audited to ensure environmental targets are met. Energy savings can be achieved with rear-projection tiled digital displays because the overall brightness can be adjusted to an appropriate level for the ambient light environment, saving energy and increasing product longevity.

Most tiled flat-panel screens and rear-projection systems offering high resolution and comfortable brightness levels range in efficiency from 0.3 to 1.5 watts per candela. A typical calibrated rear-projection tiled digital display operates at approximately 0.9 watts per candela. A candela is a standard international unit of luminous intensity, that is, power emitted by a light source in a particular direction.

Servicing

Ease of servicing and maintenance is important for facilities with limited staff or locations

where trained maintenance crews must travel to the site. Many conventional tiled displays cannot be serviced from the front, or require complex brackets or machinery to expose a panel in the middle or bottom of an array. Newer formats of rear-projection tiled digital display walls can be serviced from the front, by removing the screen, revealing three components that each take less than 15 minutes to replace.

Durability

Rear-projection tiled digital displays use highly reliable and long-lasting LED illumination and DLP® technology, with no consumables or moving parts that require periodic replacement or recalibration.

Ergonomics

Controlling the brightness of a display to suit the environment is important for visibility. Rear-projection tiled digital displays offer ideal levels of controlled brightness for indoor high ambient light environments, and are comfortable for close-up viewing.

Unlike LCD, plasma and surface-mounted LED displays, rear-projection tiled digital displays are cool to the touch and do not radiate heat to the viewer, making them ideal for indoor spaces and touchscreen applications where people are close to the display. Rear-projection tiled digital displays are suitable for noise-sensitive environments, such as broadcast sets and some corporate spaces. Each tile contains two high-efficiency fans, which run only as fast as they need to, keeping noise levels to a minimum.

Reusability

The physical form and system design of rear-projection tiled digital displays makes them easy to disassemble and reassemble to fit in any space or application, thereby prolonging the useful life of the product. This is a major advantage during renovations, tenant turnover or spatial reconfigurations of large venues, such as sports facilities and convention halls. Rear-projection digital display tiles are able to support practically any image resolution, so that the system will not become outdated as requirements for new content, resolutions and applications evolve over time.

Recyclability and Safe Materials

Many rear-projection tiled digital displays include a solid metal housing and removable internal components, which typically total 80 percent recyclable and 90 percent recoverable materials.

For installations in the European Union (EU), many rear-projection tiled digital displays comply with the Restriction of Hazardous Substances (RoHS) directive, and do not include phosphorous, mercury or toxic liquid coolants. RoHS is a directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment. It took effect in July 2006 across the EU, and is required to be enforced in each member country.

Photo by Quarry Integrated Communications

The superfine resolution of the nearly seamless interactive digital canvas allows content to be viewed close-up, at any angle. Light-absorbing, no-glare, acrylic screens are robust, durable and cool to the touch. University of Waterloo Faculty of Arts, REAP Program, Waterloo, Ontario, Canada.

LEED Innovation Credit

Rear-projection tiled digital displays are compatible with the goals of LEED-certified buildings. Under the LEED system, products are preferred if they meet the ENERGY STAR standards for energy efficiency. Although projectors are not currently rated by ENERGY STAR, some leading manufacturers of rear-projection tiled digital displays support the development of an ENERGY STAR specification for projection-based products.

Digital display products cannot directly earn LEED points, but they can contribute to the sustainability of architectural projects. Under the "Innovation in Design" section of LEED, there is an opportunity for architects to apply rear-projection tiled digital displays as an educational tool for occupants. This may help to earn an innovation credit.

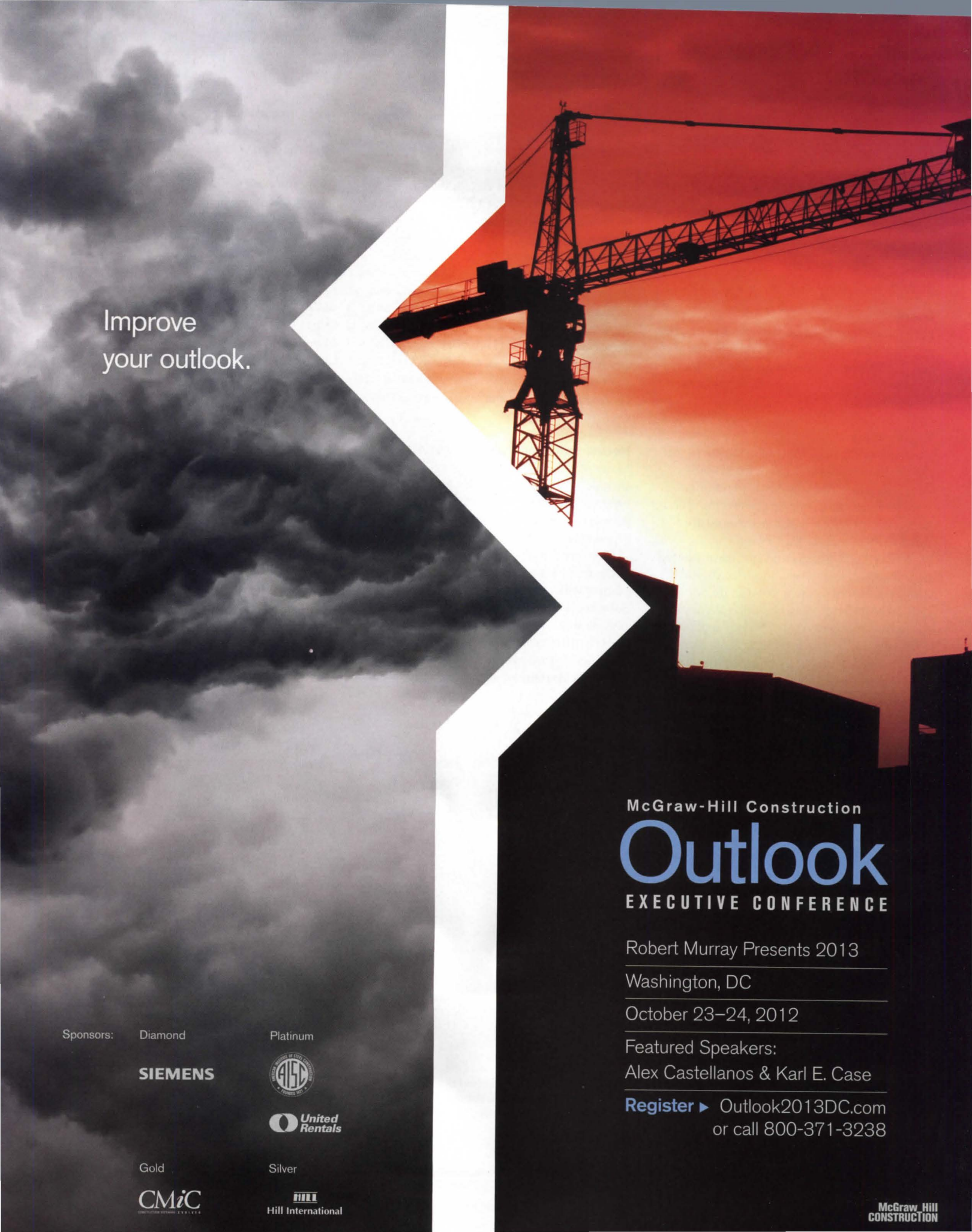
IMAGE QUALITY

Rear-projection tiled digital displays are designed for superior image quality in high ambient light environments, without glare or reflections, so the message and images are always clear. Using the strengths of DLP® and LED technology, rear-projection tiled digital displays have higher resolution, substantially brighter images and a wider color palette than conventional LCD and plasma displays. Therefore, display images remain crisp and clear at any viewing distance or viewing angle. This is not possible with some other forms of digital technology where images are distorted at close range. LED displays look best from afar, but lose clarity when viewed up close.

Color space is a term describing an abstract model of how colors are represented in a triangle where each point is red, blue and green. The color mixing within a digital color display is the color space. Some digital displays are limited to the colors they can produce, depending on the size and shape of their color space. Flat-panel screens typically have a weaker color space than rear-projection tiled digital displays which offer more saturated colors and a bigger color space. A wider color gamut (i.e. color space) results in a richer color palette which can reproduce logos and branding colors with accuracy and high ambient effect.

Continues at ce.architecturalrecord.com

Barbara A. Nadel, FAIA, principal of Barbara Nadel Architect, in New York City, specializes in security, planning, programming and design of civic buildings. She is editor-in-chief of Building Security: Handbook for Architectural Planning and Design *(McGraw-Hill, 2004).*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New and Upcoming Exhibitions

Field Conditions
San Francisco
September 1, 2012–January 6, 2013
This exhibition at the San Francisco Museum of Modern Art bends and blurs the boundaries between conceptual art and theoretical architecture, using the notion of the "field" to frame an investigation into the construction, representation, and experience of space. Nearly 30 works in various media by both contemporary artists and practicing architects will be on view, including pieces by Tauba Auerbach, Daniel Libeskind, Rafael Lozano-Hemmer, Sol LeWitt, and Lebbeus Woods. For more information, visit sfmoma.org.

Anri Sala: Two Films
Detroit
September 7–December 30, 2012
Albanian-born artist Anri Sala's films *Dammi i Colori* and *Long Sorrow* are the focus of this new exhibition at the Museum of Contemporary Art Detroit. The films are portraits of communities in crisis and reflect on the human condition during periods of political unrest. Although the films are distinct artworks, both reveal the connective tissue between cities and people. Related programming includes artist talks, musical concerts, lectures, and more. For more information, visit mocadetroit.org.

Vision in a Cornfield
Detroit
September 7–December 30, 2012
Vision in a Cornfield is a multidisciplinary collaboration among various Detroit artists, musicians, and poets, including members of the band Destroy All Monsters and the artist collectives Ogun and Apetechnology. The exhibition brings Detroit's music, art, and automobiles together to celebrate urban creativity. At the Museum of Contemporary Art Detroit. For more information, visit mocadetroit.org.

The Drawing Center Reopening
New York City
September 13, 2012
The Drawing Center will reopen this month after a yearlong hiatus in a newly expanded facility at 35 Wooster Street, with significant alterations to the building's architecture and facade. The reopening will extend to a series of community activities on Saturday, September 15, including guided tours of the exhibitions; artist-commissioned DrawNow! projects, which bring drawing into the streets of SoHo; and family workshops. For more information, visit drawingcenter.org.

Building: Inside Studio Gang Architects
Chicago
September 24, 2012–February 24, 2013
Studio Gang Architects is a team of 40 architects, designers, and thinkers who have produced some of the most inventive and award-winning architecture today. Featured not as a survey or retrospective, Studio Gang Architects projects at this exhibition at the Art Institute of Chicago will be showcased in an engaging workshoplike environment that reveals the practice's creative processes as they address pressing contemporary issues through architecture. For more information, visit artinstituteofchicago.org.

Detroit Disassembled
Washington, D.C.
Opening September 30, 2012
In this exhibition at the National Building Museum, Andrew Moore examines the tragic beauty of the unsettled and unsettling territory of a ruined Detroit. Thirty monumentally scaled photographs depict the windowless grand hotels, vast barren factories, collapsing churches, offices carpeted in velvety moss, and entire blocks reclaimed by prairie grass. These images disclose how the forward march of the assembly line has been thrown spectacularly into reverse in Detroit. For more information, visit nbm.org.

Open House New York
New York City
October 6–7, 2012
This annual citywide cultural event offers rare access to hundreds of sites, behind-the-scenes tours, on-site talks, performances, and family activities that exemplify the best of New York City's built environment and culturally rich neighborhoods. This year's event will feature a slew of new sites, including recreation and housing complexes, private residences, museums, architecture studios, and performance spaces. The event spans the five boroughs. For more information, visit ohny.org.

Ongoing Exhibitions

Skyscraper: Art and Architecture Against Gravity
Chicago
Through September 23, 2012
A selection of contemporary artworks that consider the form, technology, myth, and message of the modern skyscraper. Over 50 international artists working in the 20th and

dates&events

21st centuries are featured with works ranging from film and video to painting, sculpture, and photography. At the Museum of Contemporary Art. For more information, visit mcachicago.org.

The Homestead Project: A Residence Reimagined
Rockland, Maine
Through September 23, 2012
This exhibition at the Farnsworth Art Museum features the designs of 10 architectural firms, including Pei Cobb Freed & Partners Architects. The participating firms have been asked to present designs for a theoretical house on the same lot as the existing Homestead, the Farnsworth family home, dating to 1850. The architects' schemes meet the needs of an imaginary 21st-century Farnsworth family. For more information, visit farnsworthmuseum.org.

MADE4YOU: Design for Change
Vienna
Through October 7, 2012
MADE4YOU: Design for Change showcases more than 80 design examples from both young designers and well-known studios and companies, including Amazon and Apple. The show was developed in collaboration with leading designer Hartmut Esslinger and examines the crucial role of design in facilitating social and technological transformations in the 21st century. At MAK Exhibition Hall. For more information, visit mak.at.

Now Boarding: Fentress Airports + the Architecture of Flight
Denver
Through October 7, 2012
Celebrating the work of Curtis Fentress, the first and only airport architect to receive the AIA's Thomas Jefferson Award, this exhibit examines the delicate balance of innovation and function in the Denver-based architect's groundbreaking designs. *Now Boarding* brings together film, digital art, animation, models, drawings, photographs, and full-scale architectural elements to illustrate the full spectrum of the design process behind Fentress's work. At the Denver Art Museum. For more information, visit denverartmuseum.org.

Notes from the Archive: James Frazer Stirling
Montreal
Through October 14, 2012
Featuring more than 500 original architectural drawings, models, videos, and photographs, this exhibition aims to deepen knowledge of Stirling's unique approach to the

design process, underline the fundamental importance of historical and modernist references in his work, and demonstrate continuity in his thinking throughout his career, from his early years as a student to his final projects. At the Canadian Centre for Architecture. For more information, visit cca.qc.ca.

George Nelson: Architect, Writer, Designer, Teacher
Bloomfield Hills, Michigan
Through October 14, 2012
Organized by the Vitra Design Museum in Germany, this exhibition is the first comprehensive retrospective of Nelson's work. As design director at the furniture manufacturer Herman Miller for more than 20 years, Nelson was responsible for the production of numerous furnishings and interior designs that became modern classics. More than 120 objects, including chairs, benches, desks, cabinets, lamps, and clocks, as well as over 50 historical documents, such as drawings, photographs, architectural models, and films, form the core of the exhibition. Visit cranbrook.edu.

New Nordic: Architecture & Identity
Humlebæk, Denmark
Through October 21, 2012
The first exhibition in a new series at the Louisiana Museum of Modern Art, *New Nordic* explores the relationship of architecture to culture and identity. The series deals with architecture as a field where collective memories and narratives are reflected materially and spatially, particularly how certain special "Nordic" features recur in architecture. For more information, visit louisiana.dk.

Palladio Virtuel
New Haven, Connecticut
Through October 27, 2012
This new analysis of the work of Renaissance architect Andrea Palladio by Peter Eisenman and Charles Gwathmey is on view at the Yale School of Architecture Gallery. It represents the culmination of 10 years of study of Palladio's villas by Eisenman, adding an important contribution to the 16th-century master's already robust legacy. For more information, visit architecture.yale.edu.

Designed to Win
London
Through November 18, 2012
This exhibition at the Design Museum explores the ways in which design and sports combine, pushing the limits of human endeavor to achieve victories of increasing wonder. From the design of F1 cars to running shoes, bikes, and carbon-fiber javelins, the quest for enhanced function is endless. Visit designmuseum.org.

California's Designing Women, 1896–1986
Los Angeles
Through January 6, 2013
Presented at the Autry National Center, this unprecedented exhibition honors 46 women designers and includes more than 200 examples of textiles, ceramics, furniture, lighting, jewelry, clothing, and graphics. These functional and decorative objects—from Arts and Crafts to Art Deco to Mid-Century Modern and beyond—exemplify California's national and international reputation for unrestrained creativity. For more information, visit theautry.org.

A Long-Awaited Tribute: Frank Lloyd Wright's Usonian House and Pavilion
New York City
Through February 13, 2013
In 1953, six years before the Frank Lloyd Wright–designed Solomon R. Guggenheim Museum opened to the public, two of his structures—a pavilion and model Usonian house—were built on the future site of the museum to house a temporary exhibition displaying the architect's lifelong work.

This exhibition at the Guggenheim Museum comprises selected materials from the Solomon R. Guggenheim Museum Archives, highlighting the first Wright buildings erected in New York City. For more information, visit guggenheim.org.

Lectures, Conferences, and Symposia

Cersaie
Bologna, Italy
September 25–29, 2012
With more than 1,000 participants from nearly 140 countries, this ceramic-tile and bathroom-furnishings show at the Bologna Exhibition Centre is one of the leading trade fairs in the world. Visit cersaie.it.

MADE Expo
Milan
October 17–20, 2012
Explore eco-friendliness and new technologies at this international building and design show at the Fiera Milano Rho. Ranging from the world of building sites to that of design and architecture, MADE offers specialized operators a complete overview of products and technologies for living solutions. For more information, visit madeexpo.it.

AIA Europe International Conference & Chapter Meeting
Hamburg
October 18–21, 2012
Attendees of this annual conference will study the HafenCity development taking shape at Hamburg's old harbor. As a redevelopment of former industrial land, it expands the city-center area by 40 percent. Attendees will be exposed to one of the largest concentrations of recent construction in Europe, including the centerpiece Elbphilharmonie and buildings by Herzog & de Meuron, Richard Meier & Partners, Behnisch Architekten, and others. Visit aiaeurope.org/hamburg.

India Study Tour: Urban Development Immersion Program
Mumbai
December 2–8, 2012
The weeklong study tour to Mumbai, organized by the Urban Vision, is aimed at a select and diverse group of experienced architects, urbanism practitioners, and real-estate and infrastructure professionals. The tour is designed to facilitate dialogue on a wide spectrum of issues relating to architecture, the built environment, planning, city building, real estate, and infrastructure development. The

application deadline is October 1, 2012. For more information, visit theurbanvision.com.

Competitions

Silestone Design Contest
Submission Deadline: September 30, 2012
Silestone, a leader in natural quartz surfacing, recognizes designers on the forefront of creative kitchen design. From bold backsplashes to innovative islands, Silestone is seeking designers who celebrate the influence of color and push the envelope of design possibilities. The first-place winner will receive a six-day trip to Spain and $2,500. Visit silestoneusa.com/contest.

Architecture at Zero 2012
Submission Deadline: October 1, 2012
Architecture at Zero 2012 is a net-zero-energy design competition open to students and professionals worldwide. The challenge is to create a net-zero-energy student-housing or administrative-office building design for the University of California, Merced. As part of the challenge, entrants will also be asked to create a diagrammatic district energy plan for the Bellevue Gateway development. For more information, visit architectureatzero.com.

AlterMALL Competition
Registration Deadline: October 4, 2012
This open-ideas competition seeks innovative, cutting-edge, contemporary proposals for indoor, noncommercial leisure spaces. Participants are invited to submit their proposals for a new type of indoor public space that responds to the present social needs and is integrated in an urban site. The competition is open to all architects, designers, architecture students, and other people around the world interested in the topic. Participants can submit proposals individually or as a team of up to five people. For more information, visit opengap.net.

Battery Conservancy Americas Design Competition: Draw Up a Chair
Submission Deadline: October 30, 2012
This open-call opportunity for designers across North, Central, and South America and the Caribbean welcomes designs for innovative portable outdoor seating for the Battery, the 25-acre green oasis at the southern tip of Manhattan overlooking New York Harbor. The Battery Conservancy will fabricate the winning design for use in its new Battery Green, scheduled to open to the public in 2014, adjacent to the park's Broadway entrance. For more information, visit thebattery.org.

Innatur_2 Competition
Registration Deadline: November 27, 2012
Organized by Opengap, the second edition of this open-ideas competition seeks innovative, cutting-edge, and contemporary proposals to address the challenges of implementing architecture in a protected natural environment. Participants are invited to find spaces that promote a deep understanding and assimilation of nature and promote synergies between nature and the building itself. For more information, visit opengap.net.

eVolo 2013 Skyscraper Competition
Late Registration Deadline: January 15, 2013
eVolo magazine invites architects, students, engineers, designers, and artists to redefine skyscraper design through the implementation of novel technologies, materials, programs, aesthetics, and spatial organizations. There are no restrictions in regards to site, program, or size. What is a skyscraper in the 21st century? Established in 2006, the annual competition is one of the world's most prestigious awards for high-rise architecture. Visit evolo.us.

E-mail information two months in advance to recordevents@mcgraw-hill.com. For more listings, visit architecturalrecord.com/news/events.

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- Unfading Green Slate flooring

www.vermontstructuralslate.com
802.265.4933 | **Contact:** Craig Markcrow

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www.InfinityDrain.com
516.767.6786 | **Contact:** Info@InfinityDrain.com

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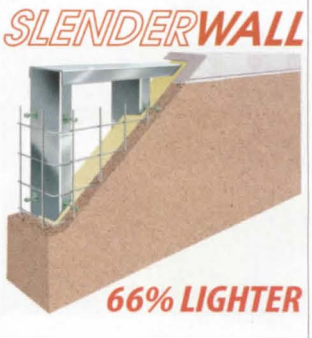

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www.slenderwall.com
800.547.4045 | **Contact:** Rick Groves

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www.PAC-CLAD.com
800.PAC.CLAD | **Contact:** Blake Batkoff

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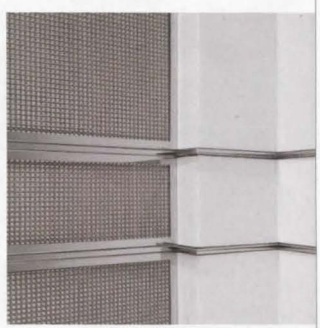

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- Calgary Zoo, Calgary, Canada
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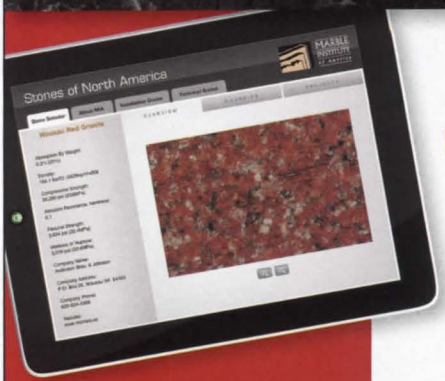

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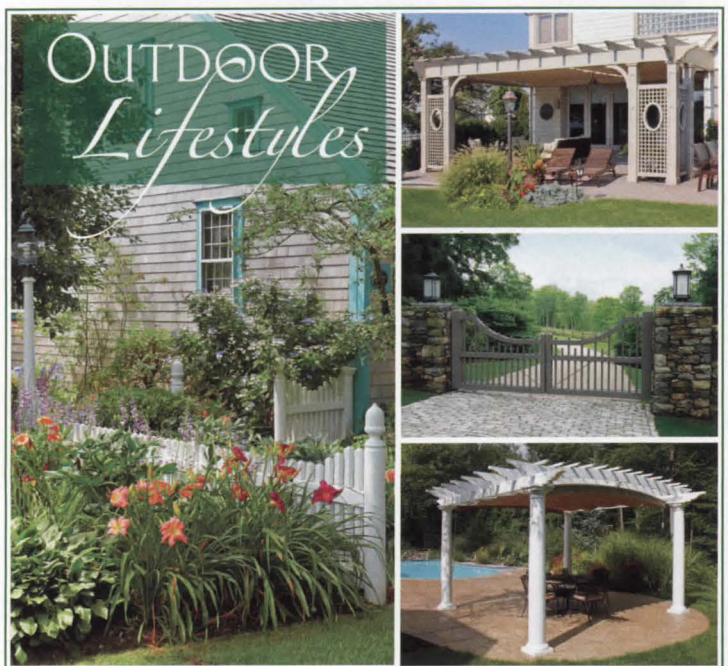

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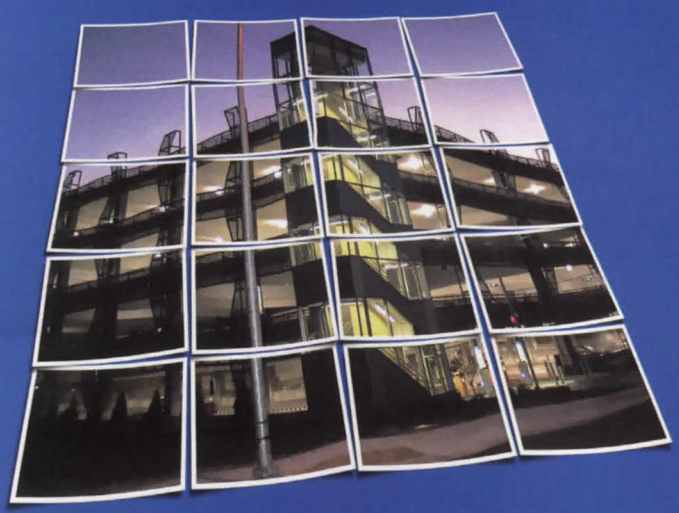

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