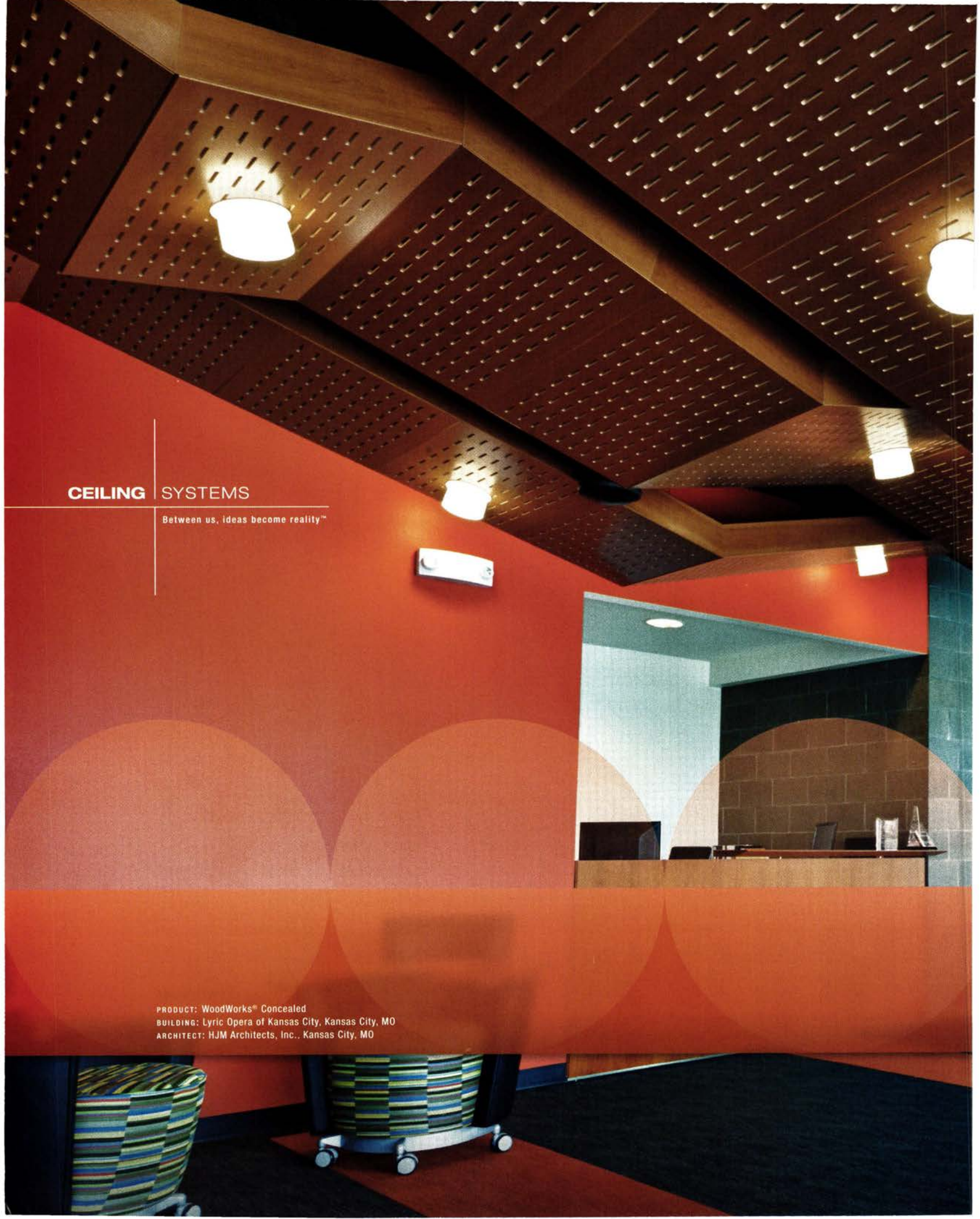
ARCHITECTURAL RECORD

THE Big ISSUE



CEILING | SYSTEMS

Between us, ideas become reality™

PRODUCT: WoodWorks® Concealed
BUILDING: Lyric Opera of Kansas City, Kansas City, MO
ARCHITECT: HJM Architects, Inc., Kansas City, MO

dramatic from every angle

WoodWorks® Concealed Ceiling Systems are engineered to be extraordinary. The warm, monolithic visual is maximized by a slim 1/4" reveal with downward accessibility. The FSC®-certified panels contain 100% biobased content that's certified by the USDA BioPreferred® Products program. Choose from a variety of standard sizes, finishes, and perforations for the ideal blend of beauty and performance. Visit our website to explore the drama of WoodWorks from all angles. **armstrong.com/woodworks 1 877 ARMSTRONG** CIRCLE 12

Separately each does its job well,

together a miracle of integration.

curtain wall

storefronts

windows

skylights

glass

Only one company can provide fully integrated building envelopes.

If you needed a hand to complete a task, would you ask five different people to each lend one finger? Of course not. While our curtain wall, storefronts, windows, skylights and glass each perform perfectly on their own—together they are unequaled. Why? Simple. Only we design, engineer, test and manufacture them as a seamlessly integrated unit. The benefits? Better, faster, more efficient—like fingers in a glove. There is only one Building Envelope Company.™ Call 1-866-Oldcastle (653-2278) or visit oldcastlebe.com.

Oldcastle BuildingEnvelope®

Engineering your creativity™

CIRCLE 14

SOLARBAN 67
SOLAR CONTROL LOW-E GLASS

CERTIFIED cradle to cradle SILVER

It'll change the way you look at neutral glass.

Introducing Solarban® 67 glass. A crisp, vibrant neutral glass that stands out from the crowd. For a sample, call 1-888-PPG-IDEA or visit **ppgideascapes.com/sb67.** CIRCLE 25

PPG IdeaScapes™
Glass • Coatings • Paint

PPG Industries, Inc., Glass Business & Discovery Center, 400 Guys Run Road, Pittsburgh, PA 15024 www.ppgideascapes.com

STAR TRACK

From Las Vegas's star-studded cast of gaming resorts to New York landmark **Yonkers Raceway**, casinos are becoming synonymous with innovative design. This historic 1890s racetrack bet its future on a 21st-century overhaul of its **Empire City Casino** by New York-based **Studio V Architecture**. With a philosophy of exploring architectural expression based on contemporary technology, the award-winning firm capped its redesign with a space-age *porte-cochère* of steel latticework clad with ETFE Teflon-coated film. The innovative entrance stunningly reinvents the casino's image and marks the first U.S. application of this cutting-edge material—showing a building need not be conventional to be a good bet.

Architect: Studio V Architecture

ARCHITECTURAL RECORD

ARCHITECTURAL RECORD: (ISSN 0003-858X) March 2014. Vol. 202, No. 3. Published monthly by McGraw Hill Financial, 1221 Avenue of the Americas, New York, NY 10020. **FOUNDER:** James H. McGraw (1860-1948). Periodicals postage paid at New York, NY, and additional mailing offices. Canada Post International Publications Mail Product Sales Agreement No. 40012501. E-mail: arhcustserv@cdsfulfillment.com. Registered for GST as McGraw Hill Financial. GST No. R123075673. **POSTMASTER:** *Please send address changes to* ARCHITECTURAL RECORD, Fulfillment Manager, P.O. Box 5732, Harlan, IA 51593. **SUBSCRIPTION:** Rates are as follows: U.S. and Possessions $72.00; Canada and Mexico $79 (payment in U.S. currency, GST included); outside North America $199 (air freight delivery). Single copy price $9.95; for foreign $11. Subscriber Services: 877/876-8093 (U.S. only); 515/237-3681 (outside the U.S.); fax: 712/755-7423. **SUBMISSIONS:** Every effort will be made to return material submitted for possible publication (if accompanied by stamped, self-addressed envelope), but the editors and the corporation will not be responsible for loss or damage. **SUBSCRIPTION LIST USAGE:** Advertisers may use our list to mail information to readers. To be excluded from such mailings, send a request to ARCHITECTURAL RECORD, Mailing List Manager, P.O. Box 555, Hightstown, NJ 08520. **OFFICERS OF MCGRAW HILL FINANCIAL, INC.:** Harold W. McGraw III, Chairman, *President and Chief Executive Officer*; Kenneth M. Vittor, *Executive Vice President and General Counsel*; Robert J. Bahash, *Executive Vice President and Chief Financial Officer*; Elizabeth O'Melia, *Senior Vice President, Treasury Operations.*

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

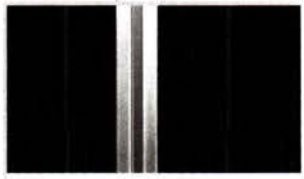
McGRAW HILL CONSTRUCTION
McGRAW HILL FINANCIAL

ABC

MPA

PRINTED IN USA

Concealed hardware provides clean exterior appearance.



Durable stainless steel edging accentuates refined fit and finish.

Beauty and the Beast.

New HPL AccentSeries.™ Beauty: Specify Wilsonart® "Madagascar" High Pressure Laminate, or one of hundreds of other selections, for a bold architectural statement, further enhanced with concealed hardware. The Beast: a durable alternative to painted metal, and an economical substitute for stainless partitions which are notorious for permanent scratches and dents. Roar.

DESIGN ECONOMICAL DURABLE BOBRICK

BUILDING VALUE SINCE 1906
BOBRICK.COM

CIRCLE 55

ARCHITECTURAL RECORD

VICE PRESIDENT, PUBLISHER Laura Viscusi, *laura.viscusi@mhfi.com*

SENIOR DIRECTOR, MEDIA OPERATIONS Brenda Griffin, *brenda.griffin@mhfi.com*
SENIOR DIRECTOR, HEAD OF MARKETING William Taylor, *william.taylor@mhfi.com*
PRODUCTION MANAGER Marilyn DeMilta, *marilyn.demilta@mhfi.com*
MANAGER, MARKETING COMMUNICATIONS Michael Nass, *michael.nass@mhfi.com*

FINANCE DIRECTOR Ike Chong, *ike.chong@mhfi.com*
FINANCE MANAGER Tom Maley, *tom.maley@mhfi.com*

ASSISTANT TO MEDIA DEPARTMENT Pina Del Genio, *pina.delgenio@mhfi.com*

ADVERTISING SALES

NEW ENGLAND AND PA: Joseph Sosnowski
(610) 278-7829 Fax: (610) 278-0936, *joseph.sosnowski@mhfi.com*
SOUTHEAST/MID-ATLANTIC: Susan Shepherd
(859) 987-9913 Fax: (404) 252-4056, *susan.shepherd@mhfi.com*
MIDWEST (IA, IL, MN, MO, WI): Martin McClellan
(312) 233-7402 Fax: (312) 233-7430, *martin.mcclellan@mhfi.com*
MIDWEST (IN, MI, OH, EASTERN CANADA): Lisa Zurick
(513) 345-8210 Fax: (513) 345-8250, *lisa.zurick@mhfi.com*
NORTHWEST: Bill Madden
(503) 557-9000 Fax: (503) 557-9002, *bill.madden@mhfi.com*
PACIFIC/TEXAS: Sherylen Yoak
(760) 568-0465 Fax: (720) 559-9818, *sherylen.yoak@mhfi.com*
KS, NE, ND, NY, SD: Risa Serin
(212) 904-6041 Fax: (212) 904-4652, *risa.serin@mhfi.com*

SPOTLIGHT SALES: Risa Serin
(212) 904-6041 Fax: (212) 904-4652, *risa.serin@mhfi.com*
WORKFORCE/ RECRUITMENT: Diane Soister
(212) 904-2021 Fax: (212) 904-2074, *diane.soister@mhfi.com*

INTERNATIONAL

GERMANY: Uwe Riemeyer
(49) 202-27169-0 Fax: (49) 202-27169-20, *riemeyer@intermediapartners.de*
ITALY: Ferruccio Silvera
(39) 022-846716 Fax: (39) 022-893849, *ferruccio@silvera.it*
JAPAN: Katsuhiro Ishii
(03) 5691-3335 Fax: (03) 5691-3336, *amkatsu@dream.com*
KOREA: Young-Seoh Chin
(822) 481-3411/3 Fax: (822) 481-3414

MCGRAW HILL CONSTRUCTION

PRESIDENT Keith Fox
VICE PRESIDENT, OPERATIONS Linda Brennan, *linda.brennan@mhfi.com*
VICE PRESIDENT, MHC PRODUCT DEVELOPMENT Kathryn E. Cassino, *kate.cassino@mhfi.com*
VICE PRESIDENT, TECHNOLOGY Isaac Sacolick, *isaac.sacolick@mhfi.com*
VICE PRESIDENT, FINANCE John Murphy, *john.murphy@mhfi.com*

WEBSITE: ArchitecturalRecord.com. **SUBSCRIBER SERVICE:** 877/876-8093 (U.S. only); 515/237-3681 (outside the U.S.). Subscriber fax: 712/755-7423. E-mail: *arhcustserv@cdsfulfillment.com*. If the Post Office alerts us that your magazine is undeliverable, we have no further obligation unless we receive a corrected address within one year. **INQUIRIES AND SUBMISSIONS:** Letters, Beth Broome; Practice, Suzanne Stephens; Books, Clifford A. Pearson; Products, Sheila Kim; Lighting and Interiors, Linda C. Lentz; Residential, Laura Raskin; Architectural Technology, Joann Gonchar; Web Editorial, William Hanley. **REPRINT:** *architecturalrecord@theygsgroup.com*. **BACK ISSUES:** Call 877/876-8093, or go to *archrecord.com/backissues*.

McGRAW HILL CONSTRUCTION
McGRAW HILL FINANCIAL

ABC

MPA

PRINTED IN USA

fireframes FireLite Family of Products Pilkington Pyrostop

We're NOT fans.

It's not like we have anything against other architectural products. We simply believe you should stick with what you know. Our knowledgeable, in-house experts know our products inside-out, so they can make your fire-rated glazing projects a breeze.

After all, we aren't fans, recessed lighting or acoustical ceiling tiles. **We are fire-rated glass and framing. That's what we know.**

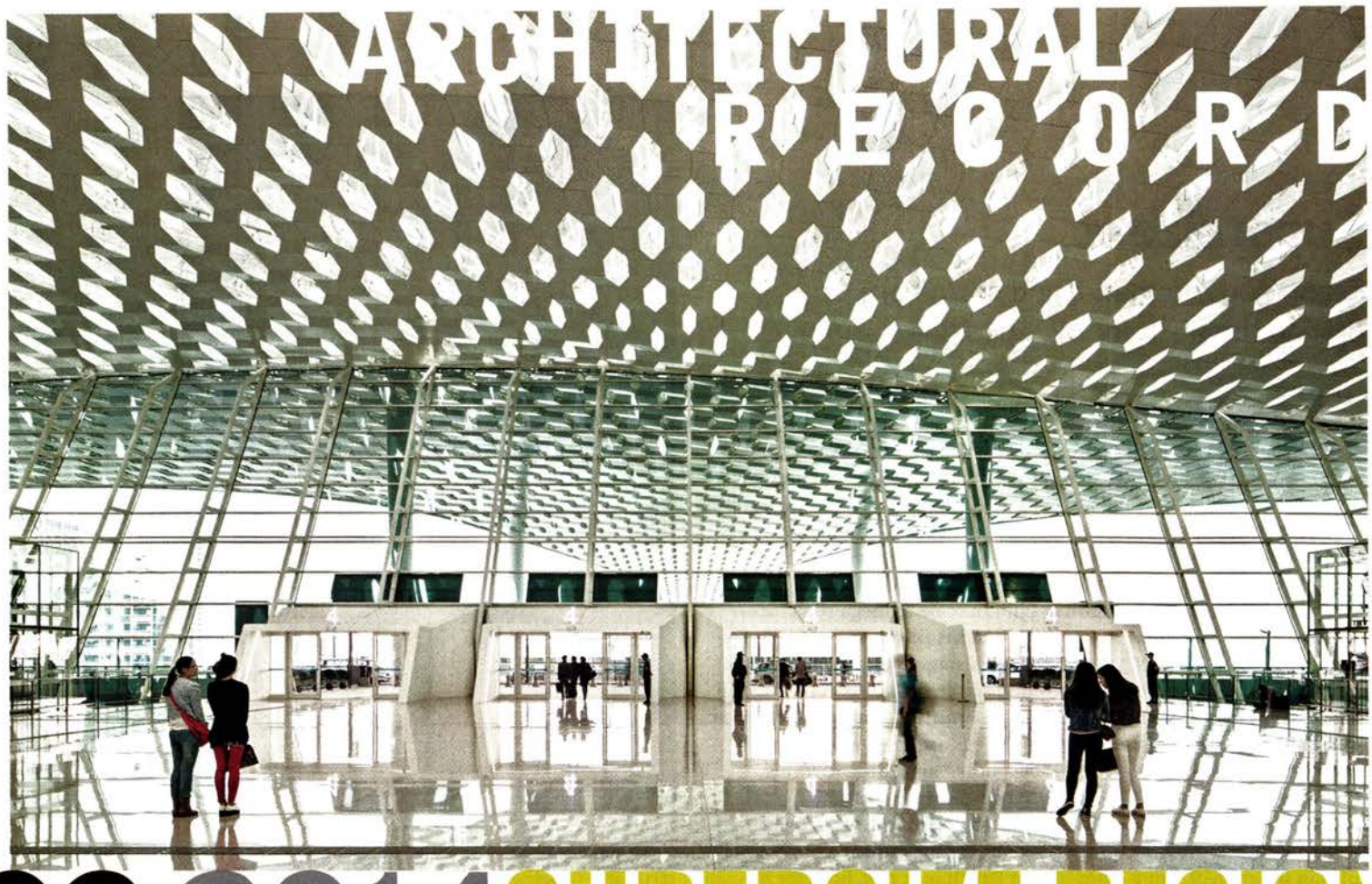
FIND A TECHNICAL GLASS PRODUCTS EXPERT NEAR YOU:
FIREGLASS.COM/CONTACTS

fireglass.com | 800.426.0279

TGP FIRE RATED

CIRCLE 15

CIRCLE 24



03 2014 SUPERSIZE DESIGN

NEWS

DEPARTMENTS

FEATURE

PROJECTS

BUILDING TYPES STUDY 944 GOVERNMENT BUILDINGS

THIS PAGE: SHENZHEN BAO'AN INTERNATIONAL AIRPORT TERMINAL 3, BY STUDIO FUKSAS. PHOTO BY LEONARDO FINOTTI

ON THE COVER: DE ROTTERDAM, BY OMA. PHOTO BY RICHARD JOHN SEYMOUR

See expanded coverage of Projects and Building Types Studies as well as web-only features at architecturalrecord.com.

This symbol denotes that enhanced content is available in our iPad edition.

Visit us at facebook.com/architecturalrecord

Follow us on Twitter at @archrecord

Supersize It

Technology, demand, and daring are driving the push for big buildings.

TWENTY YEARS ago, Rem Koolhaas published a fat doorstop of a book, *S, M, L, XL*, which included his manifesto on Bigness: "Bigness is ultimate architecture," he wrote. "Only Bigness instigates the *regime of complexity* that mobilizes the full intelligence of architecture and its related fields." Those italics are his, but any architect designing big buildings today can vouch for the complexity; the challenge is in bringing inventive design and a sense of human scale to mega-structures.

Since *S, M, L, XL* came out, Koolhaas and his firm, Office for Metropolitan Architecture (OMA), have designed some really big buildings: CCTV in Beijing, at more than 5 million square feet, was completed in 2012; the Shenzhen Stock Exchange, a 2.85 million-square-foot elegant behemoth, just opening now. Both buildings are innovative in form and engineering. (CCTV looks like "big pants," according to locals, while Shenzhen is said to be a skyscraper wearing a tutu.)

OMA also built the mixed-use De Rotterdam on the waterfront of the firm's hometown—almost petite by comparison at a mere 1.74 million square feet, but a giant in that Dutch port city, both for its scale and its muscular design (on the cover and page 108).

The three other big projects we feature in this month's Big issue are all in Asia. Working in the Far East, "you become a scale junkie," says Ole Scheeren, who was OMA's partner in charge for the CCTV building until he left the firm in 2010 to start his own practice in Beijing and Hong Kong. His Interlace housing complex in Singapore (page 102), which he designed while at OMA, is an arresting and ingenious twist on the dreary forests of residential high-rises that dominate so many rapidly growing Asian cities. Rather than build a dozen such generic structures for a new development, as his client had asked, Scheeren proposed "toppling the towers." That scheme created a huge interconnected structure, 1.8 million square feet, with a dynamic positioning of the long horizontal volumes that allows unusual views, courtyards, and other communal spaces.

In the hands of gifted architects and engineers, airports can be awe-inspiring but not necessarily lyrical. However, Massimiliano and Doriana Fuksas found poetry in the honeycomb motif they employed in the elegant, soaring curves of their new nearly one-mile-long Shenzhen Terminal, its overall shape like an immense airplane (page 84).

The challenge for architects designing vast new airports is to make them easy for travelers to navigate. In an exclusive interview with RECORD, Norman Foster, who was behind the trend toward immense terminals under a single roof, rather than separate structures, discusses strategies for breaking down the scale of one of the largest buildings in the world, his firm's Terminal 3 in Beijing. He also talks about the design of the nearly-one-mile-round donut that will be Apple's future headquarters in Cupertino, California—and how the building will be user-friendly (page 72).

Though big buildings tend to be major energy hogs, the Apple structure is being touted as "one of the most environmentally sustainable projects on this scale anywhere in the world," says Foster senior partner Stefan Behling. In this month's technology story, RECORD explores the challenges of creating a net zero energy skyscraper, the Pearl River Tower, in Guangzhou, China, by Skidmore, Owings & Merrill (page 94). Though the building did not quite achieve its ultimate goal, it successfully employs a number of innovative green strategies.

When it comes to architects who think big, it's hard to top the ambitions of Frank Lloyd Wright, even today. The Museum of Modern Art in New York has just opened its first exhibition on the architect since acquiring his archive jointly with Columbia University's Avery Library. *Frank Lloyd Wright and the City: Density vs. Dispersal* (page 41) showcases some of the master's unbuilt megaprojects with supersized artifacts. If you can get to MoMA, check out the immense model for Broadacre City (1935) and the beautiful drawing of his Mile High Illinois skyscraper (1956), itself nearly 9 feet high. Wright believed the admonition of his fellow Chicagoan Daniel Burnham to make no little plans. As Burnham said, "They have no magic to stir men's blood."

Cathleen McGuigan

Cathleen McGuigan, Editor in Chief

Change your perspective on color.

Introducing **PrismFX**™ finishes—a new coating option for Reynobond® and Reynolux® products that lets you give your building a look as dynamic as your design. This innovative paint system creates subtle color shifts in different lighting conditions. So a building that appears green, blue or silver in the morning can shift to copper, violet or gold in the afternoon. With 9 unique color-shifting combinations available, you can change people's perceptions of your building each and every day. Bring a whole new dimension to your design—with PrismFX finishes.

ALCOA

Reynobond® | Reynolux®

Alcoa Architectural Products • 50 Industrial Boulevard • Eastman, GA 31023-4129 • Tel. 800 841 7774 • reynobond.com

CIRCLE 33

LEARN & EARN

Earn your continuing education credits free online or at Architectural Record's Continuing Education App!*

IN THIS ISSUE

Open Cell Spray Foam Insulation in Commercial Buildings

Credit: 1 HSW

Sponsored by ICYNENE, Inc.

Page 147

Silence Is Golden

Credit: 1 HSW

Sponsored by Price Industries

Page 153

Recycled Material Innovations

Credit: 1 HSW

Sponsored by Bonded Logic, Inc.

Page 159

ALSO ONLINE AT ARCHRECORD.COM

Folding Glass Doors Are an Asset for Commercial Spaces
Sponsored by LaCantina Doors

Automated Shading and Light Systems
Sponsored by MechoSystems

Paintings and Coatings: Surface Preparation and Solutions to Common Paint Issues
Sponsored by Glidden Professional

Specification Guidelines – Assessing and Comparing Paint
Sponsored by Glidden Professional

Use Cementitious Wood Fiber for Great Acoustical Design
Sponsored by Tectum Inc.

Navigating Wall Assembly Fire Testing
Sponsored by DuPont Building Innovations

Template Assisted Crystallization
Sponsored by Watts

Harvesting Rain: System Design for Strategic Rainwater Capture
Sponsored by BRAE

Managing Moisture with Breathable Membranes
Sponsored by VaproShield

The Evolution of Glass and High Performance Coatings
Sponsored by Guardian Industries Corp.

Principles of Glass Selection for Facades: From Rendering to Reality
Sponsored by Guardian Industries Corp.

Noise Reduction in HVAC Duct Systems
Sponsored by Kinetics Noise Control, Inc.

Noise Control and Room Acoustics in Building Design
Sponsored by Kinetics Noise Control

Understanding Seismic and Wind Restraints
Sponsored by Kinetics Noise Control

Saving Energy during the Tenant Improvement Process: Strategies for Designers
Sponsored by the US Department of Energy's Energy Efficient Buildings Hub

Earn Free Health Safety Welfare (HSW) and Green Building Certification Institute (GBCI) credits with Architectural Record

*All Architectural Record articles and presentations count toward the annual AIA continuing education requirement. All sponsored exams are available at no charge and are instantly processed.


ARCHITECTURAL RECORD
INNOVATION CONFERENCE 2014
MAY 21, 2014 | LOS ANGELES | WALT DISNEY CONCERT HALL
MAY 21 2014 LA
BREAKTHROUGH DESIGN AT THE INTERSECTION OF ART, SCIENCE & TECHNOLOGY
FEATURING THOM MAYNE FOUNDER, MORPHOSIS AND 2013 AIA GOLD MEDALIST • BRAD CLOEPFIL FOUNDING PRINCIPAL, ALLIED WORKS ARCHITECTURE • MICHEL ROJKIND FOUNDING PARTNER, ROJKIND ARQUITECTOS • THOMAS PHIFER FOUNDER, THOMAS PHIFER AND PARTNERS • TATIANA BILBAO, S.C. PARTNER, TATIANA BILBAO • JORGE GRACIA FOUNDER, GRACIA STUDIO
Key Corporate Sponsors
AISC
reTHINK WOOD
MechoSystems Design with light?
Product Gallery Sponsors
CertainTeed
DODGE
GUARDIAN
McGRAW HILL CONSTRUCTION
REGISTER NOW & SAVE
RECORDINNOVATION.COM
800.371.3238 | #ARInnov

IMPROVING THE AIR WE BREATHE

DISCOVER THE NEW SCIENCE OF INDOOR AIR QUALITY

As people encounter more chemicals at home, at school and at work, it is critical to understand potential hazards and minimize adverse health effects. Through New Science, UL is working to mitigate emerging indoor air quality safety risks and safeguard innovation.

JOURNALS. VIDEOS. INFOGRAPHICS. TRENDS.
VISIT UL.COM/NEWSCIENCE

CIRCLE 17

Operable Landmark175™ Series
solid steel window with
Thermal Evolution technology
U.S. Patent No. 8484902

HOPE'S®
CUSTOM CRAFTED WINDOWS & DOORS

Fixed Landmark175™ Series
solid steel window with
Thermal Evolution technology
Patent pending

Photo: IMG_INK

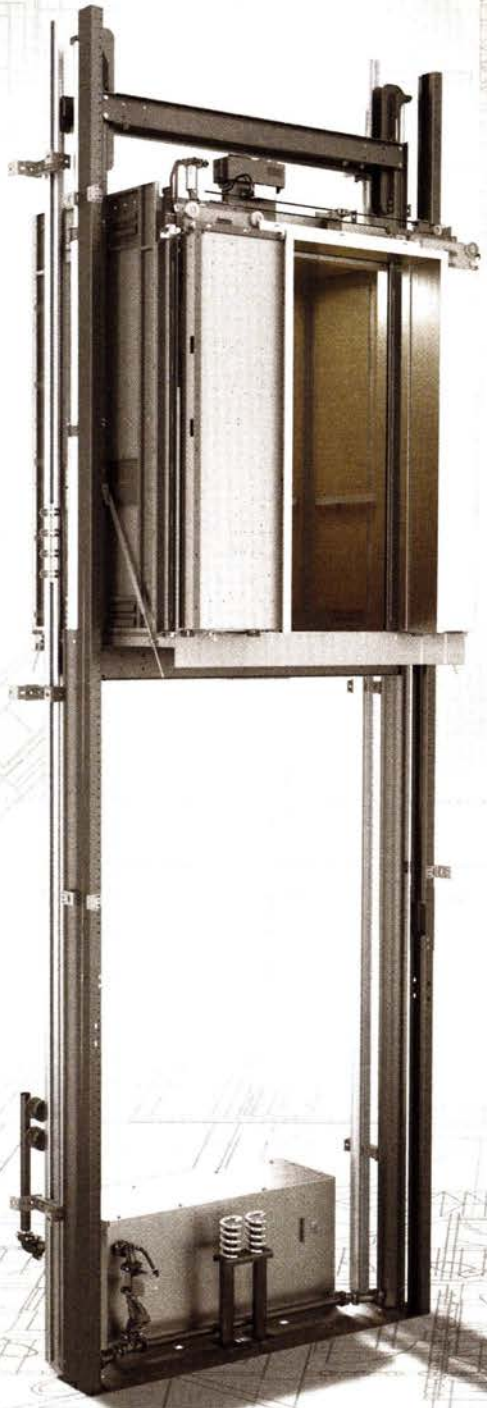
BREAK WITH TRADITION.

Traditionally, adding thermal breaks to solid steel windows meant dramatically weakening the steel materials that made them superior in the first place. Now, with Thermal Evolution™ technology, solid steel remains solid. And solid steel windows – fixed or operable – remain just as narrow and graceful as ever. Achieve an NFRC certified U-factor as low as 0.170 with enhanced condensation resistance. Ideal for new construction, retrofit, or historic preservation applications. Learn more today at **www.hopeswindows.com/evolution**

CIRCLE 26

HANDCRAFTED IN THE USA

SOLID STEEL AND BRONZE WINDOWS AND DOORS



ENGINEERING SIMPLIFIED.

enduraMRL

The first truly machine room-less elevator — perfect for low-rise buildings.

Simply more space.

enduraMRL.com

ThyssenKrupp Elevator Americas

ThyssenKrupp

CIRCLE 54


Glass that restricts fire.
Not design.
AGC
BEYOND GLASS™
PYROSAFE™ Fire-Rated Glass and Framing Systems.
AGC's Pyrosafe™ family of fire-rated glass and framing systems offers the protection and code compliance your project demands—as well as the ability to bring inspired designs to life.
Ratings of up to 180 minutes can be achieved with glass that is wireless, colorless, and distortion-free, so you can be sure your design vision will always come through.
PYROBEL® 45-120 | PYROEDGE® | PYRAN® PLATINUM | STILELITE™ FRAMING
Visit pyrosafeglass.com or call 877.376.3343 to learn more. Visit us at us.agc.com or email us at info@us.agc.com
©2013 AGC Glass Company North America, Inc. All rights reserved
CIRCLE 27

CLIMATE CHANGES. OUR VALUES DON'T.

ROXUL® insulation maintains its thermal integrity whatever the weather because we believe performance should never be anything less than you expect. Although R-values can change with temperature, with ROXUL insulation the R-value you spec is the R-value you get. **Find more value at www.rspec.com.**

ROXUL®
The Better Insulation™

CIRCLE 76

DAILY UPDATES
archrecord.com/news
twitter.com/archrecord

perspective

We don't collect buildings. We take architecture seriously, but it isn't art. Architecture is tied to function. *–Glenn Lowry, director of the Museum of Modern Art, defending the museum's decision to raze its neighbor, formerly the American Folk Art Museum, at a public discussion at Manhattan's Ethical Culture Society, January 28.*

The biodiversity museum, which sits along Panama City's Amador Causeway, is visible from great distances across the bay.

PHOTOGRAPHY: © VICTORIA MURILLO/BIOMUSEO

Panama's Instant Icon Primps for its Debut

BY BETH BROOME

AFTER YEARS of agonizing delays, an opening date is finally drawing near for Frank Gehry's iconic Biomuseo in Panama City–a project that has been in the works for over a decade.

Gehry's first built work in Latin America, the vividly hued concrete and steel biodiversity museum sits dramatically along the Amador Causeway, former site of a U.S. Army base at the Pacific entry to the Canal. Focusing on Panama's rich and diverse ecosystem, the 43,000-square-foot museum will function as an interpretive center and a catalyst for environmental stewardship. It is intended to serve as a "point of entry to discover Panama" as well, for both locals and the tourists it is hoped that the building will attract. "Down the line, the museum will have an economic impact," says Pilar Arosemena de Alemán, the current president of Fundación Amador, the foundation behind the project. "And it will be a source of pride. It will show that we Panamanians can build–and can have a project–with world standards."

In the late 1990s, Gehry, who is married to a Panamanian, Berta Isabel Aguilera, was invited to participate in a design charrette

A broad stair leads to the central open-air atrium (right), which is shaded by a system of canopies supported by an elaborate, exposed steel structure. One of the museum's five completed galleries, named the Human Footprint (above), occupies the space beneath the atrium.

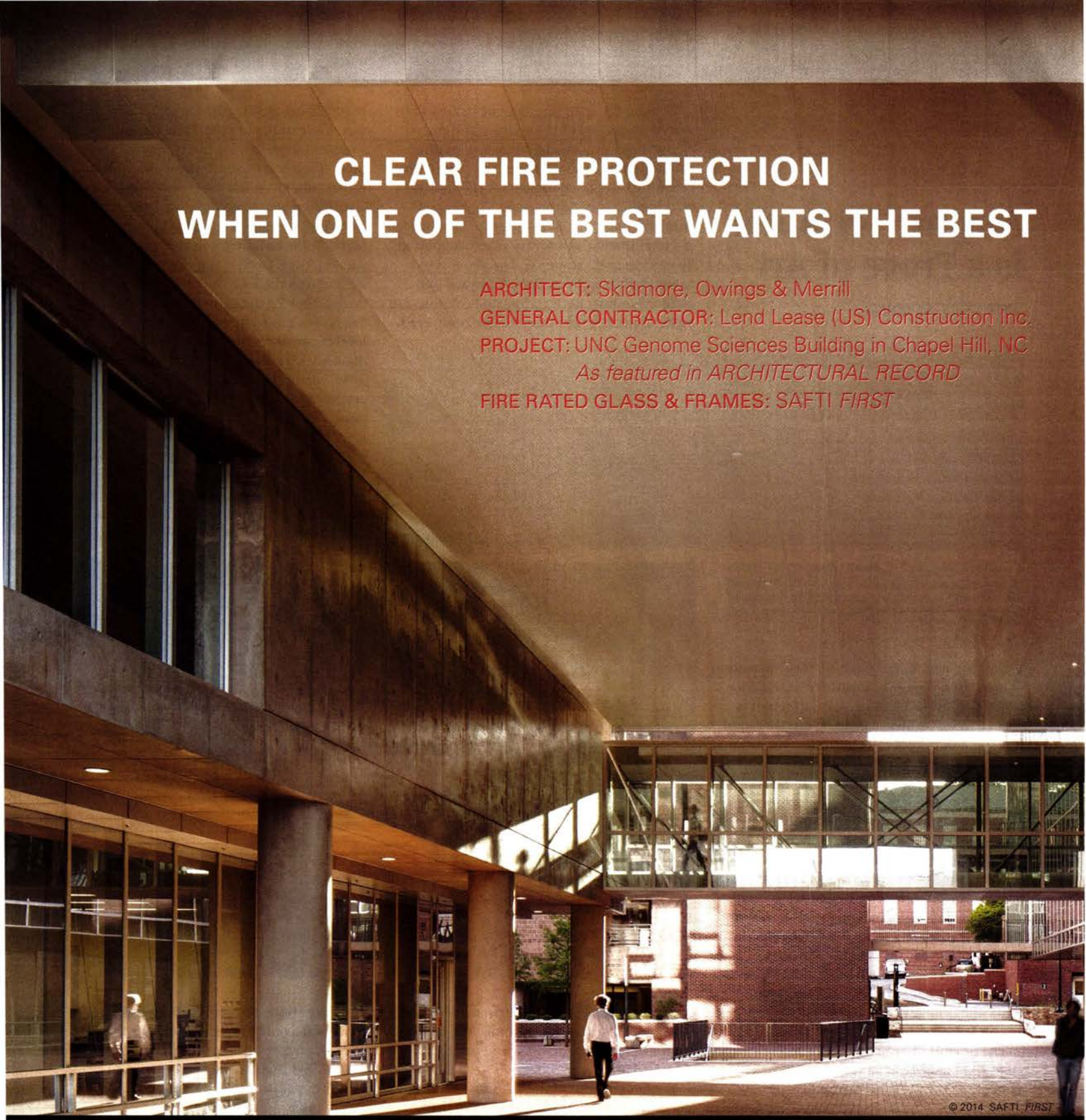
and conference focusing on the repurposing of land and buildings following the 1999 Canal transfer. Broad-brushstroke proposals for three specific sites resulted. Fueled by the enthusiastic reception of the Guggenheim in Bilbao, a group of local leaders, hoping to give Panama its own Gehry building, approached the architect to convince him to come up with a specific design for the causeway site. In 2001, the foundation was created and initial government funding was secured; in 2002, Gehry signed a letter of agreement to design the museum.

But since ground broke in 2005, construction has been on-again, off-again. The project has lived through three presidential administrations and has had trouble, in a country that lacks a strong culture of philanthropic giving, raising funds. To date, $95 million has been spent, says the museum (with just 20 percent coming from private interests) and an estimated $15 million needs to be raised for the second phase, which includes the three final galleries and a surrounding botanical garden, master-planned by landscape designer Edwina von Gal, whom Gehry brought onto the project in its early stages.

These setbacks have been further complicated by the gap between the construction standards called for by Gehry's design and the abilities of the local workforce. Many components, such as the complex steel roof and canopies, as well as the architectural concrete, are practically uncharted territory for Panamanian work crews: a number of elements have had to be reinstalled more than once. In the end, as evidenced by the concrete, which is "pop-corning" and rough-and-ready in places, the architect has had to come to terms with the local limitations and adjust its expectations. And the effects of the tropical climate, which would slow down even the most energetic worker, cannot be underestimated. "Panama has a different expectation of construction practices and procedures," acknowledges Gehry's office. "This naturally leads to a slower cadence. Although the path to completion has been longer than we anticipated, we feel the project has successfully met both our client's and our own aspirations, and we hope that it will be an exciting destination for Panamanians and visitors to the country."

Despite the roadblocks, ever so slowly, the building has risen: a muscular concrete structure shielded by an intricate roof that is a cascade of folded steel canopies in bright reds, blues, and yellows. Five of the eight interactive galleries, master-planned by Bruce Mau Design, abut the large central open-air atrium and are now installed and receiving limited visits. Visible from great distances across the Panama Bay, the building, with its aggressive form and dazzling color scheme, is quite a sight to behold in the design-challenged landscape of commercial towers that make up Panama City. "Most people in Panama have not had an architectural experience," notes executive architect Patrick Dillon, who has been on the job since its inception. Pointing out that this building is setting new standards here, he goes on, "This is why the details have to be worked out so they don't distract from this experience."

Today, as the project inches toward the finish line, the nation's attentions are focused elsewhere: on the upcoming May presidential election, which will unfold at about the same time the museum may open. This is just one more complicating factor for the project as it enters its final weeks of being a construction site before—at long last—it breaks onto the world stage as the first major work of architecture the country has seen in generations. ■



SAFTIFIRST

FIRST IN FIRE RATED GLAZING

SAFTI FIRST – Clearly the Leader in Innovation – SAFTI FIRST – Fire Rated Glass & Framing – over 35 years

CIRCLE 18

www.safti.com | 888.653.3333

Airport Terminal is a Trove of Art

BY WENDY MOONAN

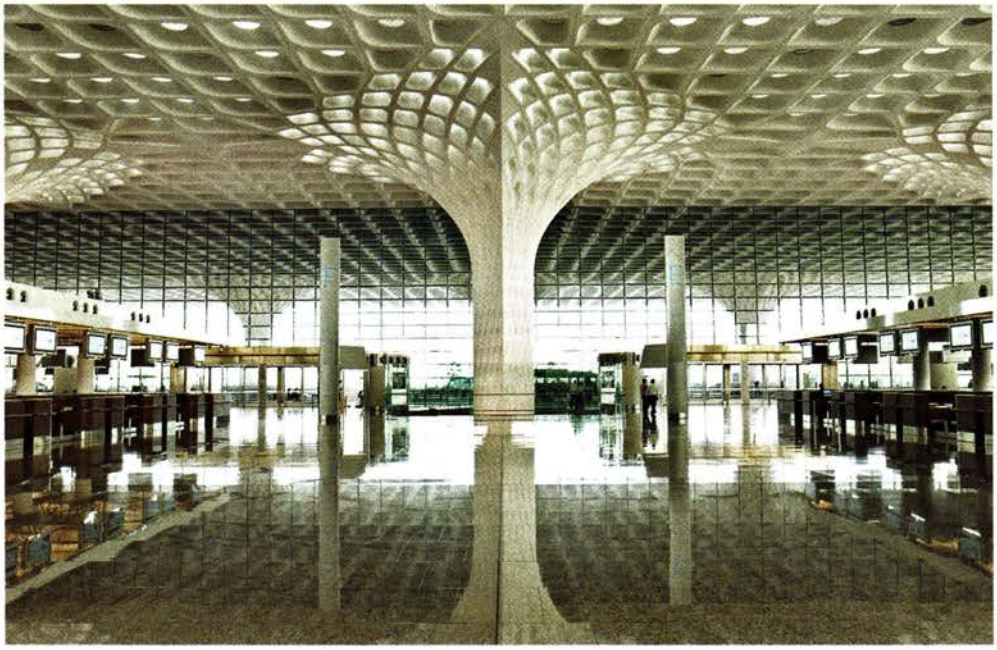
A new terminal at the Chhatrapati Shivaji International Airport in Mumbai, designed by SOM, combines domestic and international operations (above). India's national bird, the peacock, inspired the motif inside the terminal (right).

FROM THE AIR, it looks like a UFO. Descending at night into the Chhatrapati Shivaji International Airport in Mumbai, your attention is riveted by an immense glowing circle of light. It is the 17-acre roof of Terminal 2, inaugurated on February 10.

Already nicknamed T2, the new replacement terminal is a project of GVK, the consortium of private Indian companies awarded the development contract (and a 60-year lease) by the government. Sanjay Reddy, vice chairman of GVK, hired Skidmore, Owings & Merrill (SOM) after interviewing 25 firms. His brief was simple: the terminal had to look "Indian." "Sanjay was serious about it not looking like any other airport," says Roger Duffy, SOM lead architect. "He said it 'had to be of its place,' with an Indian identity. We flew all around India and brought in top Indian artists, designers, and craftsmen to help."

The program was daunting. To accommodate 40 million passengers a year—nearly twice as many as the previous terminal—the new terminal is 4.8 million square feet, has 5,000 parking spaces (possibly the largest garage in India), 188 check-in counters, 140 immigration checkpoints, 101 bathrooms, 73 elevators, 47 escalators, and 41 moving sidewalks. It also has 226,000 square feet of retail space and private lounges. The project has taken nine years from conception to completion, including four and a half of construction, and cost $887 million.

In plan, the structure is an elongated four-story *X* that allows for the consolidation of passenger processing, baggage handling, and both retail and dining in the center. The radiating piers are designed for the shortest walking distance to the gates. The central check-in pavilion, nicknamed the "headhouse," is a monumental open, airy space, supported by soaring mega-columns. The glamorous columns flare as they "grow" upward into a coffered ceiling. Both ceiling and columns are made of white-painted glass fiber reinforced gypsum (GFRG). Formglas fabricated the panels in Mexicali, Mexico and Toronto. The work is seamless, perfectly detailed and utterly spectacular.



Skylights surround the columns. There are approximately 323,000 square feet of them built into the steel roof. "The main feature of the piece is the light apertures," Duffy says. "It's all about harvesting light." (The skylights have dichroic filters to produce light saturated in color, so the floor is speckled in bright tones.)

You can also see clear through the headhouse, since a 50-foot-high perimeter glass wall surrounds it. The single-span cable wall is 900 linear meters, the longest one in the world, according to SOM. "The cable net is like a tennis racquet and actually moves," Duffy says. "The glass flexes in the wind, which is important, given the monsoons and hot sun."

Offering views and light were the architect's primary goals. "Because you can see through the building, you always know where you are," says Duffy. "You can see out to the airfield and through the rooms where people are waiting for the plane." It also helps that the roof of the parking garage is below the level of the departure gates, so passengers don't see cars, as they do in most airports.

So, what is Indian about T2? Brought in as art curator, Rajeev Sethi, a noted designer, purchased 7,000 Indian antiques for a two-mile-long, four-story art wall. He also commissioned works by contemporary artists and craftsmen. The wall includes computer animations, musical fountains, chiming angels, traditional embroidered quilts of recycled sari scraps, old temple doorways, blowups of vintage family portraits, Hindu sculptures, fantasy figures in terra-cotta, and bas-reliefs of village street life. The arrival corridor has 30 animated, mirrored murals. It is pretty wild. Soon there will be an iPhone app featuring the artists explaining their works.

Sethi also worked with fashion designers Abu Jani and Sandeep Khosla and architect Brian Edes, who designed a shimmering gold-metal mesh curtain for the immigration area, with cutouts backlit by thousands of tiny bulbs, a reference to the oil lamps ubiquitous in India. "Art was never separate from architecture in Indian tradition," Sethi says. ■

PHOTOGRAPHY COURTESY SOM: PHOTOGRAPHER, ROBERT POLIDORI / © MUMBAI INTERNATIONAL AIRPORT

Acrovyn® 4000 is designed with human health in mind.

We can prove it!

Americans spend about 90% of their time indoors. That makes the products you put into your buildings as important as what you put in your mouth. You wouldn't dream of eating something unless you knew what it contained, so why choose a building product without the same information? You no longer have to because **we disclose what Acrovyn® 4000 is made of—right on the product.** An industry first, our labeling program was developed with Perkins + Will and is supported by a multi-attribute, third-party certification. It is reassurance that **Acrovyn 4000 is designed with human health in mind.** To learn more, call 800-233-8493 or visit transparency.c-sgroup.com. Find Construction Specialties on f®, in® or @acrovyn.

cradle to cradle CERTIFIED GOLD & SILVER

Acrovyn® *Protection for tomorrow's environment*

Design Film Fest Comes to L.A.

BY DANTE A. CIAMPAGLIA

AFTER FIVE years in New York (and a couple in Chicago), the Architecture & Design Film Festival (ADFF) is expanding to the West Coast. The inaugural Los Angeles edition runs March 12–16 at the Los Angeles Theater Center in downtown L.A. (ARCHITECTURAL RECORD is a media sponsor of the festival.)

"For years, I've been wanting to bring it to L.A., but we have been waiting until we had enough momentum," says ADFF founder and director Kyle Bergman. "It feels as if the time is right."

Given L.A.'s status as the film industry's capital, and the city's history of architecture and design, it seems like a natural fit for the ADFF. But with film festivals a dime a dozen in the center of the entertainment universe, Bergman and ADFF organizers needed to set their program apart. "You have to give people a reason to brave the traffic," Bergman says.

With that in mind, the festival has a long roster of panels and presentations by filmmakers as well as designers, and Bergman thinks these will make the L.A. ADFF stand out. A pop-up bookstore stocked by Hennessey + Ingalls, the renowned art and architecture bookseller in Hollywood and Santa Monica, will help too.

But, fundamentally, the organizers expect the films themselves to be the draw.

Built on Narrow Land (2013) and *Paolo Soleri: Beyond Form* (2013) will be screened at the Los Angeles film festival.

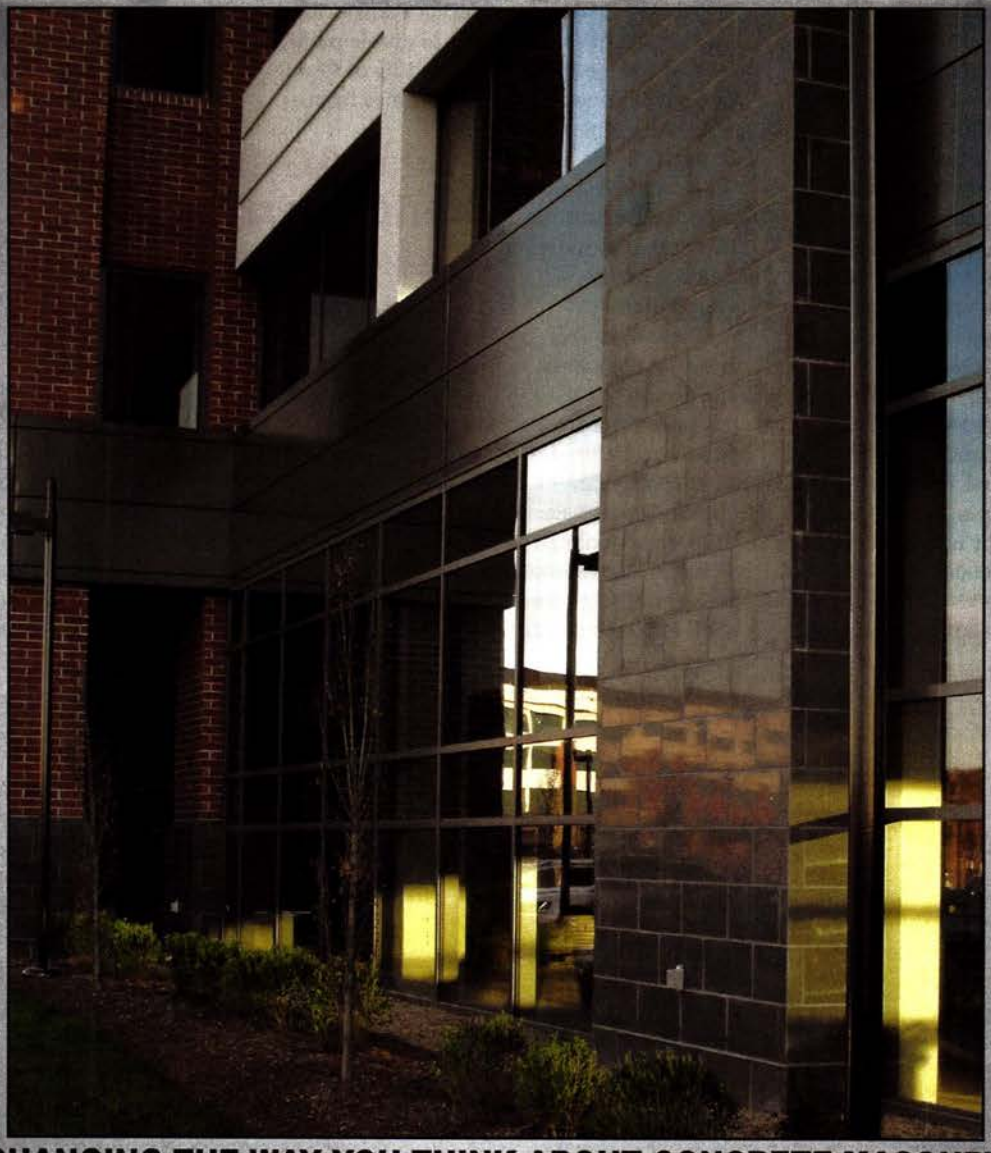
The festival opens with *If You Build It* (2012), a documentary directed by Patrick Creadon that follows a design-build class at a rural North Carolina high school. Also on the slate are several U.S. and world premieres, as well as films selected for their relevance to Los Angeles. The 24-minute *Chavez Ravine: A Los Angeles Story* (2004), for example, documents the last days of a Mexican community that was razed in the 1950s to build Dodger Stadium. The feature-length *Coast Modern* (2012), meanwhile, tracks the growth of Modernism along the Pacific coastline through the architects and designers who pioneered West Coast cool.

"It's nice to be able to bring the festival to another venue," Bergman says. "It's like curating a museum show—it's great to do it at one museum, but if it travels, all that effort can have a longer life." ■

Visit architecturalrecord.com for a full schedule of Architecture & Design Film Festival screenings and events.

PHOTOGRAPHY: COURTESY MALACHI CONNOLLY (LEFT); © AIMEE MADSEN (RIGHT)

REFLECTIVE SERIES



CHANGING THE WAY YOU THINK ABOUT CONCRETE MASONRY

FOR MORE INFORMATION ON OUR COMPLETE LINE OF ARCHITECTURAL CONCRETE MASONRY OR TO LOCATE A DEALER NEAR YOU PLEASE CONTACT US AT (800) 234-8970 OR VISIT OUR WEBSITE www.edillon.com

EDILLON & COMPANY™

AN AMERICAN OWNED COMPANY SINCE 1868

CIRCLE 23

10 U.S. Cities Tackle Efficiency

BY PETER FAIRLEY

BUILDINGS ARE the source of one-half to three-quarters of greenhouse-gas emissions in most American cities. Los Angeles, Boston, Chicago, Houston, and six more large cities have joined forces to tackle the problem by targeting their biggest buildings. "The largest buildings tend to be 3 to 4 percent of the overall number of buildings but account for 40 to 50 percent of the square footage and energy consumption. You have this terrific opportunity to work with a handful of buildings and make a big dent," says Laurie Kerr, director of the City Energy Project (CEP), which launched in late January.

CEP is, in many ways, an outgrowth of the Greener, Greater Buildings Plan, deployed under New York City's former mayor Michael Bloomberg, which included a pioneering benchmarking program mandating annual energy and water-use reporting by nonresidential buildings larger than 50,000 square feet. Kerr, who helped write New York's plan, says the data collected by the city since 2012 show that the least efficient big buildings use four to eight times as much energy as their most efficient counterparts, pointing to "a lot of low-hanging fruit" for boosting energy efficiency.

The CEP is a joint creation of the New York–based Natural Resources Defense Council, where Kerr works, and the Washington, D.C.–based Institute for Market Transformation, which has strong links to municipalities and real estate developers. Funding of $9 million over the next three years comes from Bloomberg's personal foundation, Bloomberg Philanthropies, along with the Doris Duke Charitable Foundation and the Kresge Foundation.

The least efficient big buildings use 4 to 8 times as much energy as their most efficient counterparts.

The money will help the 10 cities in the program, cash-strapped after five years of recession, by providing a CEP staffer, analytical tools to guide policy development, and networking for the city leaders. Each city is to craft its own tailored action plan this year.

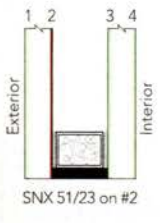
In L.A., for example, market-rate multifamily residential units are likely to be a focus since their efficiency investments to date lag behind those of commercial-property owners and affordable-housing managers, according to Ted Bardacke, L.A.'s deputy director of sustainability. Bardacke says CEP fits strategically with L.A.'s effort to phase out coal-fired power—40 percent of its electricity supply—by 2025.

One challenge for all of the CEP cities, says Bardacke, is the stubborn gap between energy-efficiency opportunities and financing. As his boss Mayor Michael Garcetti told reporters during a CEP launch call last month: "The buildings and the money are having a hard time connecting."

Kerr says reporting programs akin to New York's, already taking shape in CEP member cities Chicago, Boston, and Philadelphia, will help. The reporting is affordable for both cities and building owners, and shows the latter how much less energy they should be paying for. Bloomberg, meanwhile, is taking the energy-efficiency crusade to the world stage. In January, United Nations Secretary-General Ban Ki-moon appointed the former mayor and media tycoon to serve as his Special Envoy for Cities and Climate Change. ■

INTRODUCING GUARDIAN SUNGUARD SNX 51/23

SunGuard SNX 51/23 from Guardian is a glass industry first — the first product on the market with visible light above 50% and a solar heat gain coefficient below 0.25. Along with low reflectivity and a neutral blue color, it represents a breakthrough combination of light, appearance and solar control that meets increasingly strict energy codes. For complete performance data — and other ways to Build With Light — visit SunGuardGlass.com. Or call 1-866-GuardSG (482-7374).



SNX 51/23 on #2

GUARDIAN SUNGUARD®
ADVANCED ARCHITECTURAL GLASS

BUILD WITH LIGHT®

GUARDIAN
Glass · Automotive · Building Products

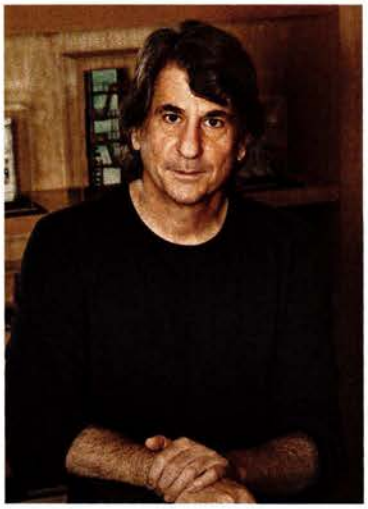
CIRCLE 63

[NEWSMAKER]

David Rockwell

BY DAVID SOKOL

SINCE 1984, David Rockwell has been upending traditional notions of an architecture commission, whether by designing outstanding Broadway theater sets or treating hospitality interiors as pleasure laboratories. At the beginning of this year, Rockwell expanded into yet another discipline: the start-up. With the Municipal Art Society's (MAS) former operations head Vin Cipolla, he has launched the company Rockwell Group Ventures (RGV), which aims to "create, incubate, invest, or co-invest in a range of design-driven enterprises in media, entertainment, and hospitality." While Cipolla still serves as MAS board president and Rockwell runs his eponymous studio, RGV is already supporting four such projects; among them, it has invested in the manufacturer Imagination Playground and in the forthcoming Broadway musical *Houdini*, for which Rockwell has designed both the equipment and stage sets, respectively. Rockwell spoke about the inspiration for the new group, and how architects can transform creativity and research into entrepreneurship.



Of RGV's portfolio of investments, one—the equipment manufacturer Imagination Playground—launched after you developed that playground system's components in 2010. Do others have a basis in Rockwell Group's past work?

All of Rockwell Group's work fits in a model of architecture and design services, but we recognized that some clients want to go beyond the limits of that traditional relationship. These things happened organically: I've been working on *Houdini* for five years; NeueHaus [a workspace in Manhattan] is about a year old, and they're looking to grow. The period from idea to reality is a long gestation, but bringing in Vin accelerates these projects and introduces his own network of like-minded collaborators to them.

Even if it happens organically, is there generally a cue that helps you identify when to turn a singular design assignment into a longer-term business opportunity?

Take the pop-up performance venue we're doing for the TED conference in Vancouver: this theater contains four or five years of research into demountable structures. RGV is about building creative muscles and trying new things; I've talked about that for a long time, and Vin was eager to do it.

There must be intellectual property to sort out.

IP is still of high concern for most architects and designers. RGV will have to explore ways to make that more directly fair.

What about potential collaborators who come to you with ideas?

There are many ways of evaluating whether something is a good fit: Can we add a huge value? Learn from it? Of course, there's no reason for us to do it if it's not driven by design, and it makes sense for Vin and me to continue working on the boundaries between entertainment, architecture, hospitality, and public space. We also want to be selective about people so that we have the best chance of succeeding from a relationship point of view.

You didn't mention a profit motive, which suggests that RGV is something of a civic undertaking.

Social entrepreneurship is absolutely a core belief, and social relevance is clearly one of the filters with which we're going to measure projects. RGV makes no sense without a bigger reason. As for the economic return, it will come. We're operating in a very lean way, so a fast return is not the goal.

How have fellow architects responded to your venturing into this business?

For years, we've had conversations with other architects about the value they're creating on a certain project and how that value may go beyond an existing relationship. In my experience, you don't pursue your passion with a sense of how it's going to end; you do it because you're obsessed, and you develop a very special expertise as a result.

Are you fashioning RGV's mission or operations according to a precedent?

Not that we can think of. But hopefully we're building on pieces of models. I've always admired the Massachusetts Institute of Technology's Media Lab as an incredible incubator of new ideas. SHoP is another impressive model, though we're not going to do design-build. RGV is really incubating a specific point of view and filter. ■

noted

Architectural League of NY Announces Emerging Voices

This year's Emerging Voices awards went to The Living, Surfacedesign, SITU Studio, Ants of the Prairie, Estudio Macías Peredo, Rael San Fratello, TALLER (MauricioRocha+Gabriela Carrillo), and Williamson Chong Architects. They will present lectures this month at the Scholastic Auditorium in Manhattan.

Harboe Architects to Master-plan Taliesen West

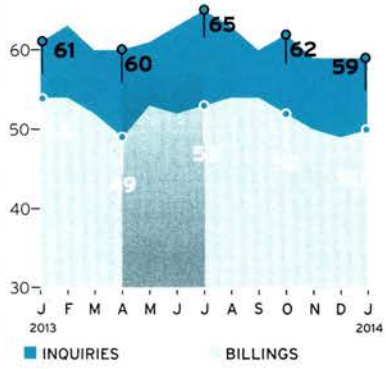
The Frank Lloyd Wright Foundation selected Chicago-based Harboe Architects to design a preservation master plan for Taliesen West (1937–59). The plan will guide the future preservation, restoration, and conservation of the site, a National Historic Landmark.

L.A.'s Broad Museum Delays Opening

Officials at The Broad museum in Los Angeles, designed by Diller Scofidio + Renfro, say the building's completion has been pushed back from 2014 to 2015 because of complications with the fabrication of its concrete and steel facade.

Former NYC Urban Designer Heads Coastal Resilience Center

Stevens Institute of Technology in Hoboken, New Jersey, has appointed New York City's former chief urban designer Alexandros Washburn to direct its new Center for Coastal Resilience and Urban Xcellence (CRUX).



Slight Uptick for ABI

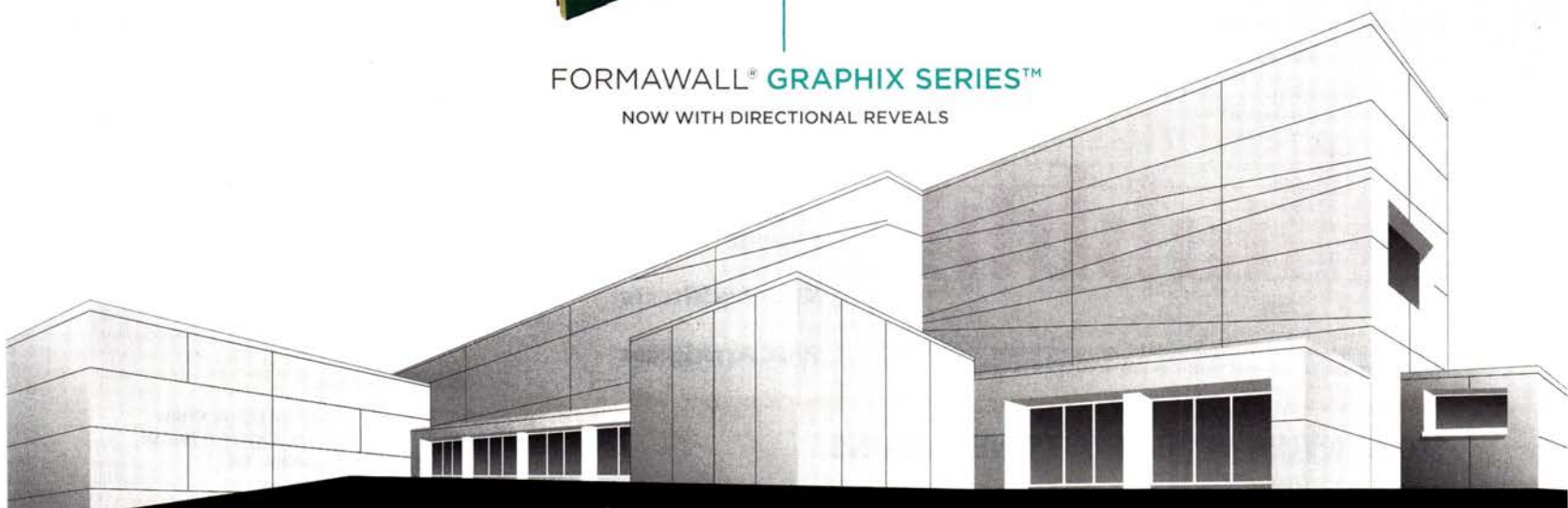
In January, the Architectural Billings Index (ABI) rose to 50.4, up from December's score of 48.6. Any score above 50 indicates an increase in billings. (Each January, the American Institute of Architects updates the factors used to calculate the ABI, resulting in a revision of recent scores.) The inquiries index slipped half a point, to 58.5 from 59.

PHOTOGRAPHY: © BLANDON BELUSHIN

OUR **INNOVATION.** YOUR **INSPIRATION.**

FORMAWALL® GRAPHIX SERIES™

NOW WITH DIRECTIONAL REVEALS



CENTRIA's Formawall Graphix Series is now improved with Directional Reveals. The improved design allows a single panel to be divided not only vertically, but also horizontally or even diagonally. Truly, Formawall Graphix Series is 'only limited by where you draw the line.'

See our complete palette of possibilities at

CENTRIAperformance.com/graphix

To learn more call 1-800-250-8675

CENTRIA | REIMAGINE METAL

CIRCLE 56

perspectivestats

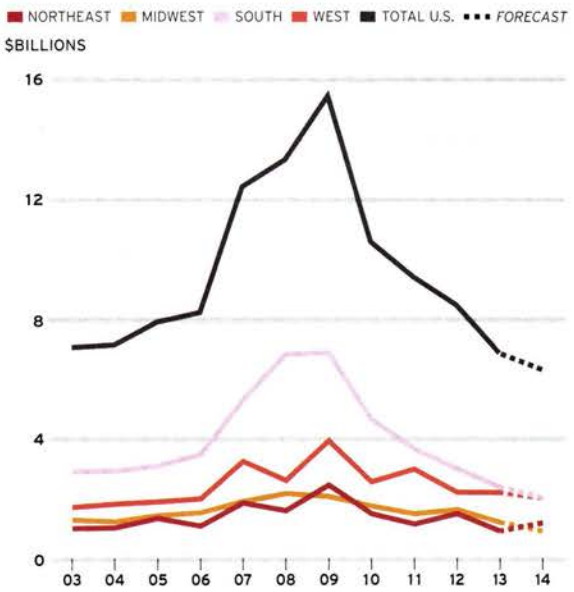
Data from McGraw Hill Dodge Analytics

MARKET FOCUS
GOVERNMENT BUILDINGS

The public building market has been hampered by the poor fiscal condition of federal, state, and local governments. Even though the economy has begun to improve, this sector's short-term outlook remains weak.

Government Building Starts by Region

In addition to U.S. total and 2014 forecast figures



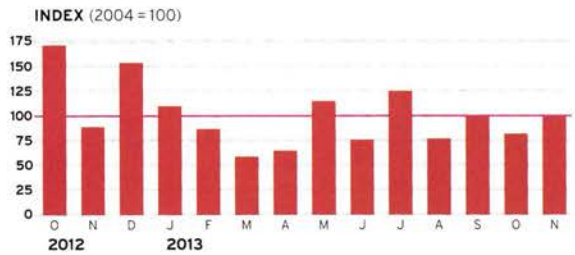
San Bernadino Justice Facility; San Bernadino, California; Skidmore, Owings & Merrill.

Top Metro-Area Markets

Ranked by total government building starts 1/2012 through 11/2013

	REGION	$MILLIONS
1	OMAHA, NE	552
2	PHILADELPHIA	456
3	SAN DIEGO	437
4	NEW YORK CITY	414
5	WASHINGTON, DC	401

The Dodge Index for Government Building Construction
10/2012–11/2013



The index is based on seasonally adjusted data for government building construction starts. The average dollar value of projects in 2004 serves as the index baseline.

Top 5 Design Firms

Ranked by government building construction starts 1/2011 through 12/2013

1. **HOK**
2. **Heery International**
3. **Skidmore, Owings & Merrill**
4. **KMD Architects**
5. **HMC Architects**

Top 5 Projects

Ranked by government building construction starts 1/2012 through 11/2013

$524 MILLION
PROJECT: U.S. Strategic Command Facility
ARCHITECT: HDR
LOCATION: Offutt Airforce Base, NE

$316 MILLION
PROJECT: Phoenix State Correctional Institution
ARCHITECTS: Heery International; Dewberry; Astorino
LOCATION: Schwenksville, PA

$245 MILLION
PROJECT: San Bernadino Justice Center
ARCHITECT: Skidmore, Owings & Merrill
LOCATION: San Bernadino, CA

$221 MILLION
PROJECT: San Diego County Women's Detention Facility
ARCHITECTS: KMD Architects, HMC Architects
LOCATION: Santee, CA

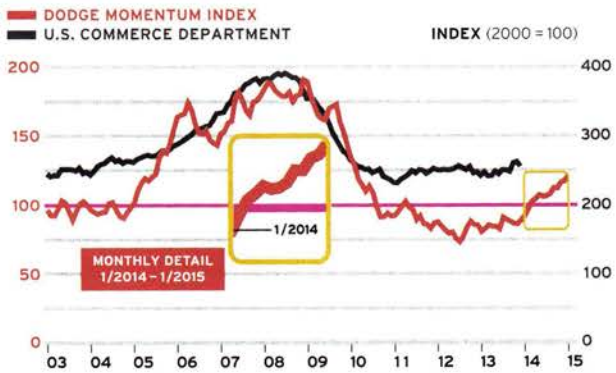
$182 MILLION
PROJECT: Benner State Correctional Institution
ARCHITECT: Moseley Architects
LOCATION: Bellefont, PA

RENDERING: COURTESY SKIDMORE, OWINGS & MERRILL

MOMENTUM INDEX POSTS NEW GAINS

In January, the Dodge Momentum Index rose 3.0% to 121.1. Except for two minor dips in June and October of 2013, the index has been on a steady climb for more than a year.

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



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

INTRODUCING 1630 SS IR CURTAIN WALL – ELITE IMPACT RESISTANCE FROM KAWNEER

High Performance. Larger Spans. Increased Impact Resistance. Kawneer's new 1630 SS IR Curtain Wall – an impact resistant 3" sightline curtain wall system – offers an additional line of defense against high winds, heavy rains and hurricanes. Having undergone rigorous testing, our new curtain wall meets increasing design pressure requirements in impact zones and can deliver larger spans. And, screw-spline architecture with both dry and wet glazing options makes the 1630 SS IR easy and fast to install. Kawneer knows how to protect buildings and occupants. **1630 SS IR Curtain Wall is performance under pressure.**

Architectural Aluminum Systems
Entrances + Framing
Curtain Walls
Windows

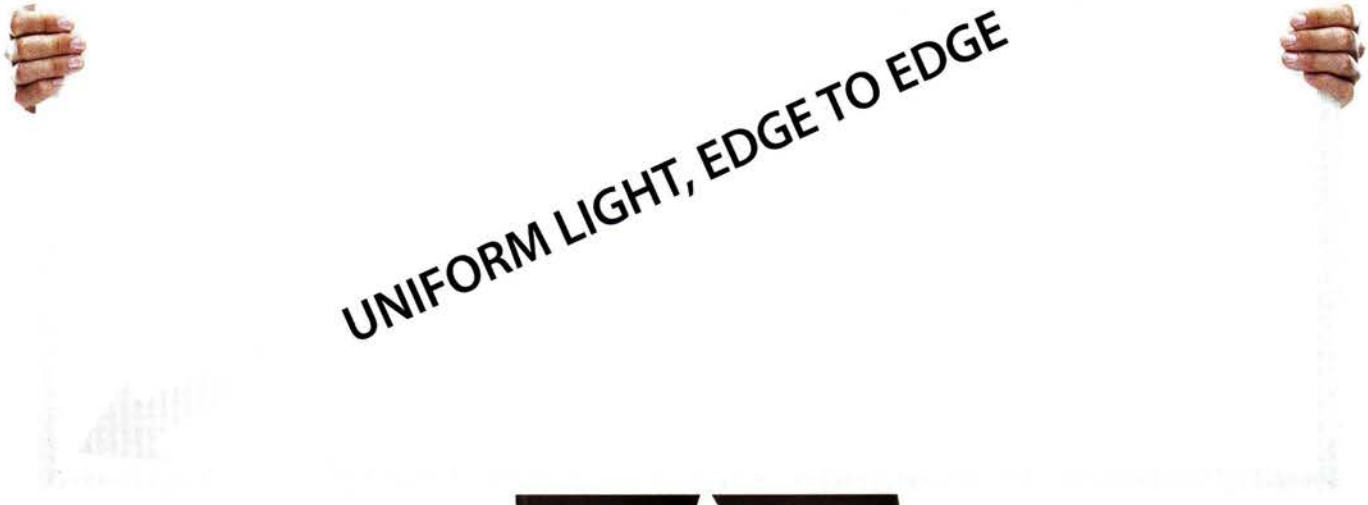
kawneer.com

KAWNEER
AN ALCOA COMPANY

CIRCLE 28

LED Panels with uniform light and up to 106 lm/W.

Available in three sizes: 1 x 4 • 2 x 4 • 2 x 2



Request a free sample of the 2x2 and see for yourself. **RABLED.COM**

RAB® LIGHTING

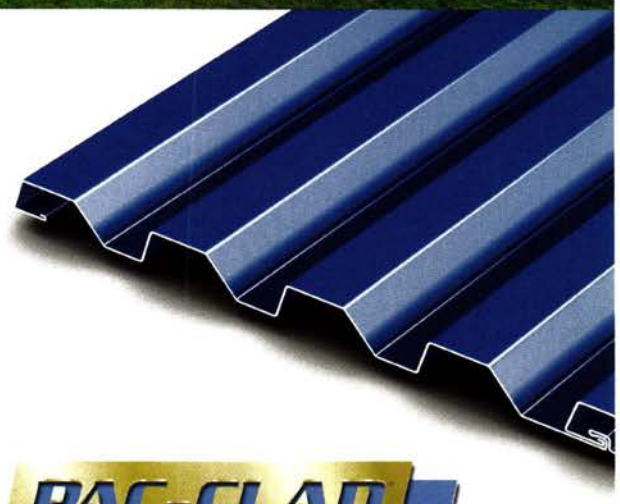
Designed beyond standards.
Engineered to perform

CIRCLE 30

Georgia State University, Atlanta, GA Architect: Richard Wittschiebe Hand Architects
Siding Contractor: Bristol Engineered Metals Material: PAC Precision Series HWP16
finished in PAC-CLAD® Kynar 500® Sandstone

Download the PAC App today!
Full product library - no internet needed.

Edgy exterior



Bold shadow lines and color options deliver a dramatic exterior with edge.

The new PAC Precision Wall Panel Series is a cost-effective solution for achieving an utterly unique look.

When construction of a 325-seat dining hall addition began at Georgia State University, cost-efficiency was top of mind, but not at the cost of style. The new PAC Precision Wall Panel Series (HWP) offered modern design options at an affordable price point. Installed horizontally or vertically, the panels create bold shadow lines for a dramatic exterior. A concealed fastener and interlocking design provides a continuous integrated appearance. With a 7/8" depth, the panels are available in 12" and 16" widths and feature a corrugated 4" profile.

The PAC Precision Wall Panel offers unmatched flexibility, available in 24 ga. galvanized and 22 ga. galvalume steel, as well as .032 and .040 aluminum. The PAC color palette includes 20 LEED Certified and 31 ENERGY STAR colors!

PAC-CLAD
Petersen Aluminum

WWW.PAC-CLAD.COM | IL: 1 800 PAC CLAD
MD: 1 800 344 1400 | TX: 1 800 441 8661
GA: 1 800 272 4482 | MN:1 877 571 2025

PACGREENINFO.COM
YOUR GREEN METAL RESOURCE

twitter facebook

CIRCLE 85

DURAVIT

DuraStyle. The new standard for your bathroom. Excellent design. Smart technology. Best price-quality ratio. Unlimited possibilities. Quality that lasts. A Duravit original. Curious? info@us.duravit.us, pro.duravit.us, **www.duravit.us**

CIRCLE 58

The face of mainstreet.

-Project: Chandler Fire Administration Building, Chandler, AZ.
-Product: Quik-Brik

Quik-Brik®

Oldcastle®
Architectural

The face of masonry.

The face of masonry. No matter where you are, chances are we're somewhere close by. In fact, you've probably seen us many times before in the places you shop, work, play, learn and live. We manufacture the brands and products used in the interiors and exteriors of civil, commercial and residential construction projects across the nation. We're Oldcastle Architectural. We are the face of masonry.

Wherever your project is, you can get any of our eight standardized colors. See all of the colors at ***quik-brik.com/ar***

CIRCLE 35

TRENWYTH® | ENDURAMAX™ | ARTISAN MASONRY STONE VENEERS™ | **QUIK-BRIK®** | AMERIMIX®

Frank Lloyd Wright, High and Low

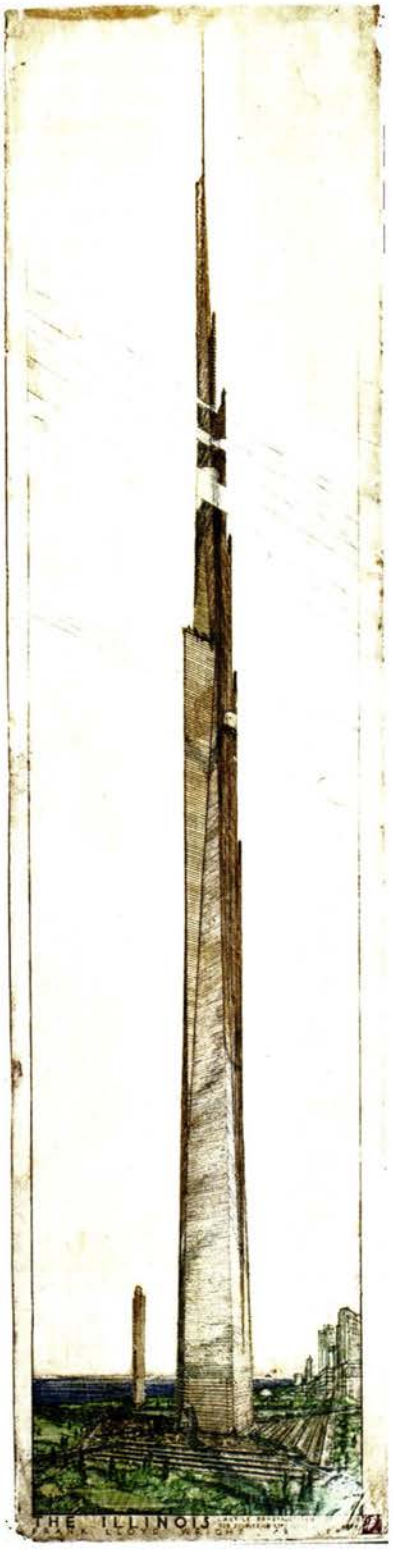
New York's Museum of Modern Art offers a fresh look at the influential architect's ideas for skyscrapers and city planning.

BY SUZANNE STEPHENS

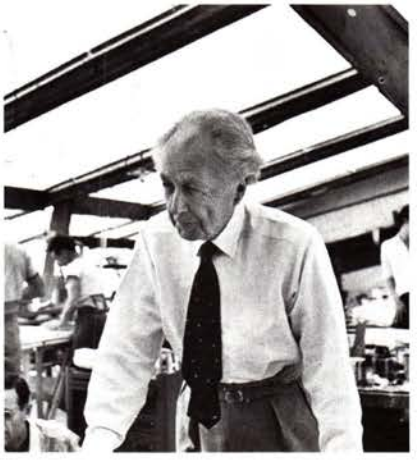
FRANK LLOYD Wright's Broadacre City, conceived in 1934–35, was the emblematic manifesto of decentralized urban planning. Its first public viewing in New York's urbanistic heart, Rockefeller Center, was heralded by ARCHITECTURAL RECORD in its April 1935 issue, and commended by Lewis Mumford in *The New Yorker* the same month. Wright explained that his city would accommodate "*little* farms, *little* homes for industry, *little* factories, *little* schools, a *little* university . . ." in four square miles, with the acre as the basic unit for 1,400 families. Interestingly, Wright included skyscrapers in his plan—but they stood apart amid open space.

During his long life, Wright (1867–1959) continually railed against skyscrapers for gloomily crowding cities—and for being mere buildings, not "architecture." But he didn't ignore the high-rise. He designed reinforced-concrete alternatives to steel-frame structures hung with masonry beginning as early as 1913 with an unrealized, Sullivanesque, 24-story tower for *The San Francisco Call* newspaper. In 1956, Wright capped his career with his scheme for the Mile High Illinois project for Chicago, where an elongated spire tops off its 548 stories.

Now Wright's projects representing two seemingly opposite obsessions—one, the skyscraper, the other, decentralized city planning—can be seen at New York's Museum of Modern Art (MoMA) in the show *Frank Lloyd Wright and the City: Density vs. Dispersal*, open until June 1, 2014. The exhibition celebrates the arrival of the Frank Lloyd Wright Foundation Archives at MoMA and the Avery Architectural and Fine Arts Library at Columbia University. The two institutions jointly acquired the archives in 2012, with the understanding that MoMA would keep the models and other three-dimensional objects, while drawings and photos would be housed at Avery. The show brings together the two collections organized by both institutions, led by



The exhibition devoted to the city planning and skyscrapers of Frank Lloyd Wright (right in 1945) features several drawings of his Mile High Illinois, Chicago Project (1956), one of which stretches to 105 inches, and combines pencil, colored pencil, ink, and gold ink on tracing paper (left). A photograph in the exhibition (below) portrays apprentices at Taliesin, circa 1952, working on the model of the H.C. Price Company tower in Bartlesville, Oklahoma, 1952–56.



PHOTOGRAPHY: © EZRA STOLLER/ESTO (TOP RIGHT); COURTESY MUSEUM OF MODERN ART AND AVERY ARCHITECTURAL AND FINE ARTS LIBRARY (2)

The Broadacre City Project, 1934-35, is dramatically presented by a model (left), 121/2 feet square, in the middle of the gallery at the Museum of Modern Art. With polychromed wood, cardboard, and paper, Wright unfolded his ideas for the low-rise 4-mile-square gridded town for 1,400 families. Also on display are drawings for St. Mark's-in-the-Bouwerie, 1927-31, where a section, a perspective cutaway, and a floor plan of a duplex apartment building is shown (below) in ink, pencil, and colored pencil on a linen window shade.

Barry Bergdoll, acting chief curator of architecture and design at the museum and a professor at Columbia, and Carole Ann Fabian, director of the Avery Library.

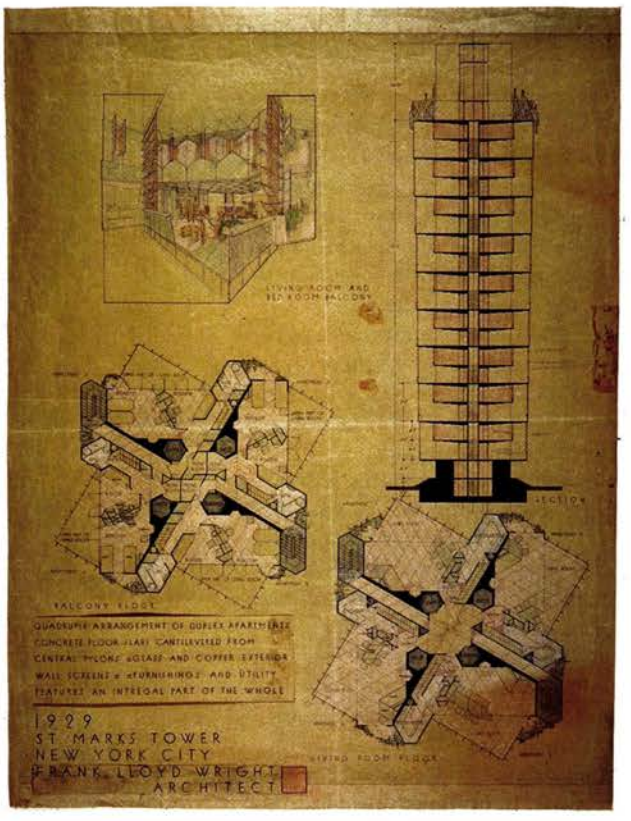
In the handsomely installed show, the Broadacre City model, 12½ feet square, sits at the center of the gallery like a raised carpet. Dark taupe walls offset Wright's lush drawings of his towers, often faintly rendered. As Wright continually looked for ways to open up the skyscraper to light and air, he experimented with massing, plan, and materials: in his unbuilt National Life Insurance Company Building for Chicago (1924–25), iridescent glass clads four connected, reinforced-concrete towers where floor plates cantilever from central pylons. In the exhibition, a faintly polychromatic axonometric of the glass curtain wall is reproduced on an LED screen so that it luminously glows within the frame.

Also on display, Wright's sections and plans for St. Mark's-in-the-Bouwerie Tower in New York (1927–31) reveal cantilevered concrete floor slabs branching out organically from a central core. A short film, *Tower of Glass* (circa 1950), arrestingly documents the completion of Wright's reinforced-concrete-with-cantilevered-slab S.C. Johnson & Son Research Laboratory Tower in Racine, Wisconsin. A model of the H.C. Price tower, in Bartlesville, Oklahoma, 1956—second (and last) of Wright's tall building projects to be realized—looms nearby. At 6½ feet high, it demonstrates well the exterior's architectonic quality, generated by his signature pinwheel floor plans. Another Wright feature—the atrium within the tower—is illustrated by drawings of the unbuilt Rogers Lacy Hotel in Dallas, 1946–47. As Bergdoll points out, the concept anticipated hotels spawned later by John Portman.

Wright based his spread-out Broadacre City on a small-is-good ethos, in which "every citizen" had a car. But he divided transportation onto levels, separating trucks, buses, cars, long-distance monorail, and pedestrians. Houses were fireproof synthetic prefab units that also incorporated natural materials; roofs were copper. Yet hovering over this low-density community were skyscrapers. How so? In 1931 Wright contended, "The skyscraper is no longer sane unless in free, green space." The towers' problem arose when they were crammed into cities like New York—unwieldy symbols of greedy commerce. So he made sure his skyscrapers were sparsely distributed in Broadacre City—surrounded by open land.

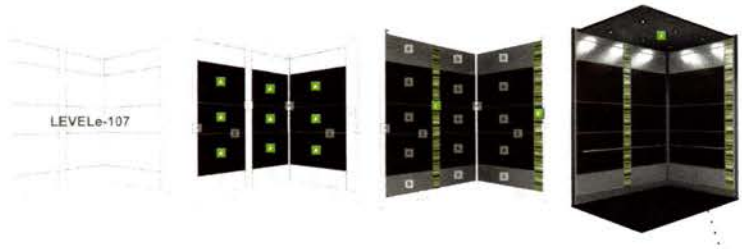
In 1956, Wright designed the Mile High Illinois—another scheme with a concrete core, but aided by suspension cables at the edges of the floor slabs, and rising from a deeply embedded "taproot" foundation. His choice of the city—Chicago—for the project may seem disingenuous. But Wright planted the tapering structure in a large greensward on the city's Gold Coast.

As Bergdoll conjectures about Wright's fascination with tall buildings, "He couldn't give it up. Wright felt he could make skyscrapers into architecture." Now one only need look at the Burj Khalifa in Dubai by Adrian Smith for Skidmore, Owings & Merrill (RECORD, August 2010, page 78), or Smith's and Gordon Gill's Kingdom Tower (page 116) under construction in Jeddah, to see Wright's profound influence. While Broadacre City is blamed today for America's overwhelming sprawl, Wright's elegant solutions to the skyscraper, no matter how high, show that the tall building *could* be artistically considered—as Louis Sullivan, his mentor, so fervently wished. Despite the twinning of Wright's obsessions, density won over dispersal. ■



ELEVATOR DESIGN STUDIO

The Elevator Design Studio is an interactive tool that puts design control at your fingertips. The intuitive step-by-step format lets you choose an elevator interior configuration, apply materials and finishes from our extensive Surfaces palette, view your progress in realistic renderings, and request budget pricing – all with a few simple clicks. Try it, and discover how easy it is to bridge the gap between creative vision and installed reality. *Get started at www.elevatordesignstudio.com*

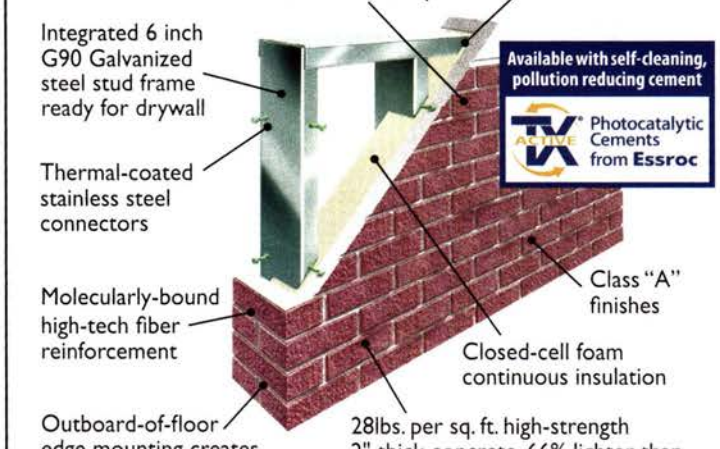


FORMS+SURFACES®

www.forms-surfaces.com

CIRCLE 36

A Winning Performance of Beauty, Strength & Economics.



- **28 lbs./sq.ft. = Lower Structural Costs, Fast Installation**
- One-Call Building Envelope Responsibility
- Factory-Applied Closed-Cell Foam Insulation
- Factory-Installed Windows
- H2Out, Pressure Equalized Sealant Joint Rainscreen

ULTRA HI-PERFORMANCE

SLENDERWALL®

Architectural Precast Concrete/Steel Stud Building Panels

www.SlenderWall.com • 1.800.547.4045

EASI SET WORLDWIDE

SLENDERWALL® is a product of Easi-Set® Worldwide, a licensor of precast products, with 68 licensed producers in 41 states & 10 countries. A subsidiary of publicly traded Smith-Midland, Delaware [SMID] ©2014

CIRCLE 60

Outsize Impact of an Inside Man

Richard Rogers Inside Out, *with essays by Jeremy Melvin, Nicolai Ouroussoff, Anne Power, and Ricky Burdett and an interview by Michael Craig-Martin. London: Royal Academy of Fine Arts and Abrams, 2013, 112 pages, $20.*

Reviewed by Jayne Merkel

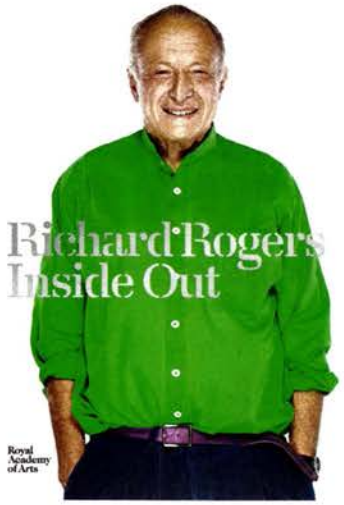
THIS COLORFUL little book—published in connection with last year's exhibition at the Royal Academy, *Richard Rogers RA: Inside Out*—explains how the architect, known for some sensational urban buildings, exemplifies the ideals with which Modern architecture was founded. His best-known works, such as the Pompidou Center, Lloyd's of London, the Bordeaux Law Courts, Madrid-Barajas Airport Terminal 4, and the Millennium Dome, may be more expressionistic and colorful than anything Mies or Gropius did, but his dedication to social change builds on the beliefs of the Modern masters—and, indeed, goes beyond what any of them accomplished.

Rogers was born in Florence in 1933. His parents moved the family to the U.K. six years later to avoid the Fascists. He was educated in England, at the Architectural Association, and in America, at Yale, where he met his first wife, Su, as well as Norman Foster and *his* first wife, Wendy. The four traveled together in the U.S. after graduation in 1962 and then practiced together in England as Team 4. In 1967, the Fosters started their own firm, and Rogers teamed up with Renzo Piano to win the competition to design the Pompidou Center in Paris. After that project opened in 1977, he set up the Richard Rogers Partnership and designed the quintessentially British institution Lloyd's of London for the city's financial district. Then came a series of buildings around the world.

As the authors of this book point out, however, Rogers's most important project has been London itself, because that is where he has been able to implement the ideas and fulfill the ideals of the Modern movement. As a trustee and chairman of the Tate Gallery, a knight and Labour peer in the House of Lords, and chief advisor on architecture and urbanism to former mayor Ken Livingston, he fostered a congestion charge on automobiles to reduce traffic in the city center, encouraged the pedestrianization of Trafalgar Square, helped revitalize the banks of the Thames, and contributed to the redevelopment of the East End in planning for the 2012 Summer Olympic Games.

In his essay, Burdett describes this work in detail. Melvin, who organized the Royal Academy show, notes that Rogers "often reminds people that architecture is a social and political art." And Power explains how Rogers's interest in cities relates to the empowerment of citizens. Together, they paint a three-dimensional picture of one of the most provocative architects of our time. ■

Contributing editor Jayne Merkel is the author of Eero Saarinen *and contributes to* Architectural Design/AD *in London.*

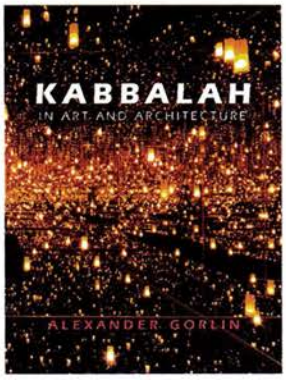


Mystical Thinking

Kabbalah in Art and Architecture, *by Alexander Gorlin. Pointed Leaf Press, 2013, 192 pages, $60.*

Reviewed by Samuel D. Gruber

This informative and heavily illustrated book is not so much about places where artists have applied principles of Kabbalah—the Jewish mystical interpretation of the universe—but where Alexander Gorlin takes readers to find them. Gorlin, a New York architect and author, uses Kabbalah as a lens for "re-reading . . . art and architecture," much as critics might interpret art through the filters of class, race, gender, or the Holocaust. The book stems from his fascination with the Kabbalistic idea of genesis expressed as light, space, and geometry, which he sees in many works of modern architecture, sculpture, and painting.

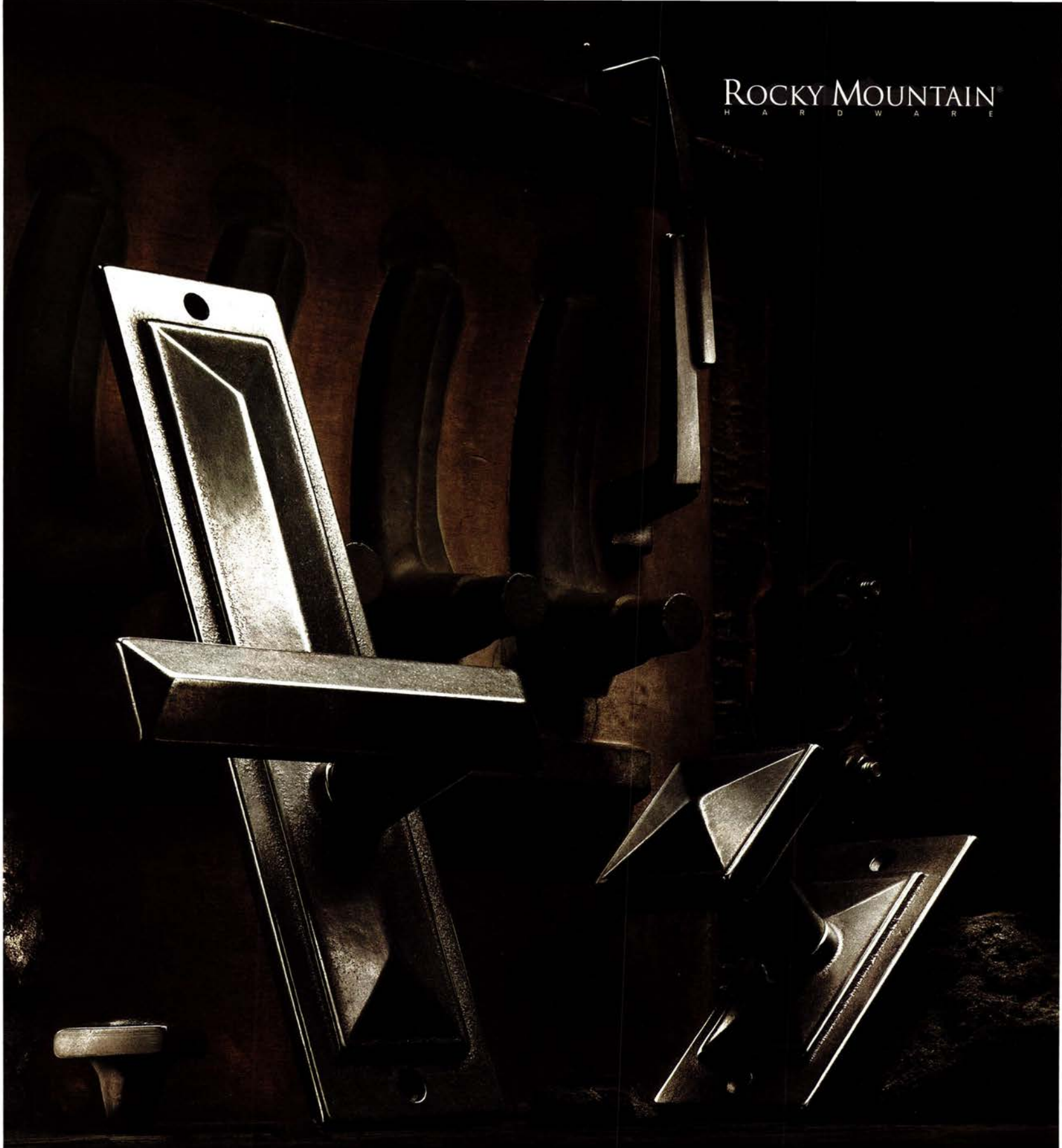


Gorlin clearly describes many of Kabbalah's themes in a manner that speaks to artists and architects. The mystical tradition is concerned with the unseen, but Gorlin focuses mostly on concepts that are expressed in terms of color, light, form, and other visual elements. He uses a language of art and architecture that readers can readily understand—even when we might be surprised to find Kabbalistic references (or echoes) in works we think we know well. Sometimes Gorlin's associations suggest deeper meaning in buildings; at other times his thoughts on buildings clarify Kabbalah obscurities. Many of the works in the book were not intended to be imbued with Jewish mysticism but rely on other mathematical, philosophical, spiritual, aesthetic, and scientific systems. The author maintains, however, that these works embody the essence of Kabbalah, too.

Gorlin immersed himself in Kabbalah when he designed his first synagogue, in Kings Point on Long Island, NY, in 1996. Looking for a structure and narrative to unite function and purpose, he found that Kabbalah "is not only a mystical system of the cosmos, but is a metaphor for the psychology of architectural creation." Gorlin's recent addition to Louis Kahn's Temple Beth El in Chappaqua, New York, includes explicit Kabbalistic references. Gorlin believes that Kahn's work—with its pure forms and voids and sharp contrasts of light and dark—often refers to ancient Jewish sources. Some contemporary architects invoke Kabbalah in their work too. Steven Holl, for example, says he used it in the lighting design at his St. Ignatius Chapel in Seattle.

The book's 10 chapters are brief essays of historical, descriptive, and analytic text followed by picture galleries. Chapters address Kabbalistic themes such as the ark, tent, and temple; heavenly palaces; the void; and vessels of light, while an epilogue examines the artist Anselm Kiefer, who has addressed the Holocaust in his work. Like Kabbalah itself, Gorlin's book pushes in many directions but remains cohesive.

The author also makes excellent use of captions, filling them with brief but insightful discussions of work by Frank Lloyd Wright, Bruno Taut, Peter Eisenman, Moshe Safdie, Daniel Libeskind, Richard Meier, Coop Himmelb(l)au, and many sculptors and painters. ■



HAND-CAST HERITAGE. Intricate details are achieved using the ancient art of lost-wax casting, while sand casting results in pieces with individual character due to the variations in each granule of sand.

DOOR WINDOW CABINET LIGHTING
PLUMBING TILE HOSPITALITY CUSTOM

10 patinas to choose from. 90% post-consumer recycled materials. Handmade in the USA.

CIRCLE 20

888 552 9497
rockymountainhardware.com

WHAT INSPIRES YOU?

Aliquippa, PA

Gateway Rehabilitation Center in Nichiha Illumination Series Architectural Wall Panels

Finding your color inspiration is up to you. Leave the rest to Nichiha.

At Nichiha we can help you harness the power of your imagination. We can take your vision and make it a reality. Nichiha's Color Xpressions and Illumination Series make it possible for you to take virtually any color and bring it to life in the form of a high performance *Architectural Wall Panel*. Our meticulously engineered fiber cement panels manage moisture, deflect the elements and play nicely with virtually any budget. We find that inspiring...don't you?

NICHIHA
fiber cement
the power of possibilities™

Tap into the power of possibilities at **nichiha.com/colorxpressions**

866.424.4421 nichiha.com ©2014

CIRCLE 62

ARCHITECTURAL
RECORD

Guess the Architect Contest

ENTER NOW!

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

CLUE: THE TOWER, 1,380 FEET HIGH, WAS THE TALLEST IN ITS COUNTRY WHEN IT WAS COMPLETED OVER A DECADE AGO. NOW ITS NEIGHBORS CAN LOOK DOWN ON IT.

The answer to the February issue's Guess the Architect is **MINORU YAMASAKI**, who designed Bibbins Hall at the Oberlin College Conservatory of Music in Oberlin, Ohio, in 1963. Last year, Westlake Reed Leskosky completed a renovation and expansion. For details, including the winner, go to archrecord.com.

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

PHOTOGRAPHY: © MAIER II; KEVIN G. REEVES, COURTESY WESTLAKE REED LESKOSKY (BOTTOM)

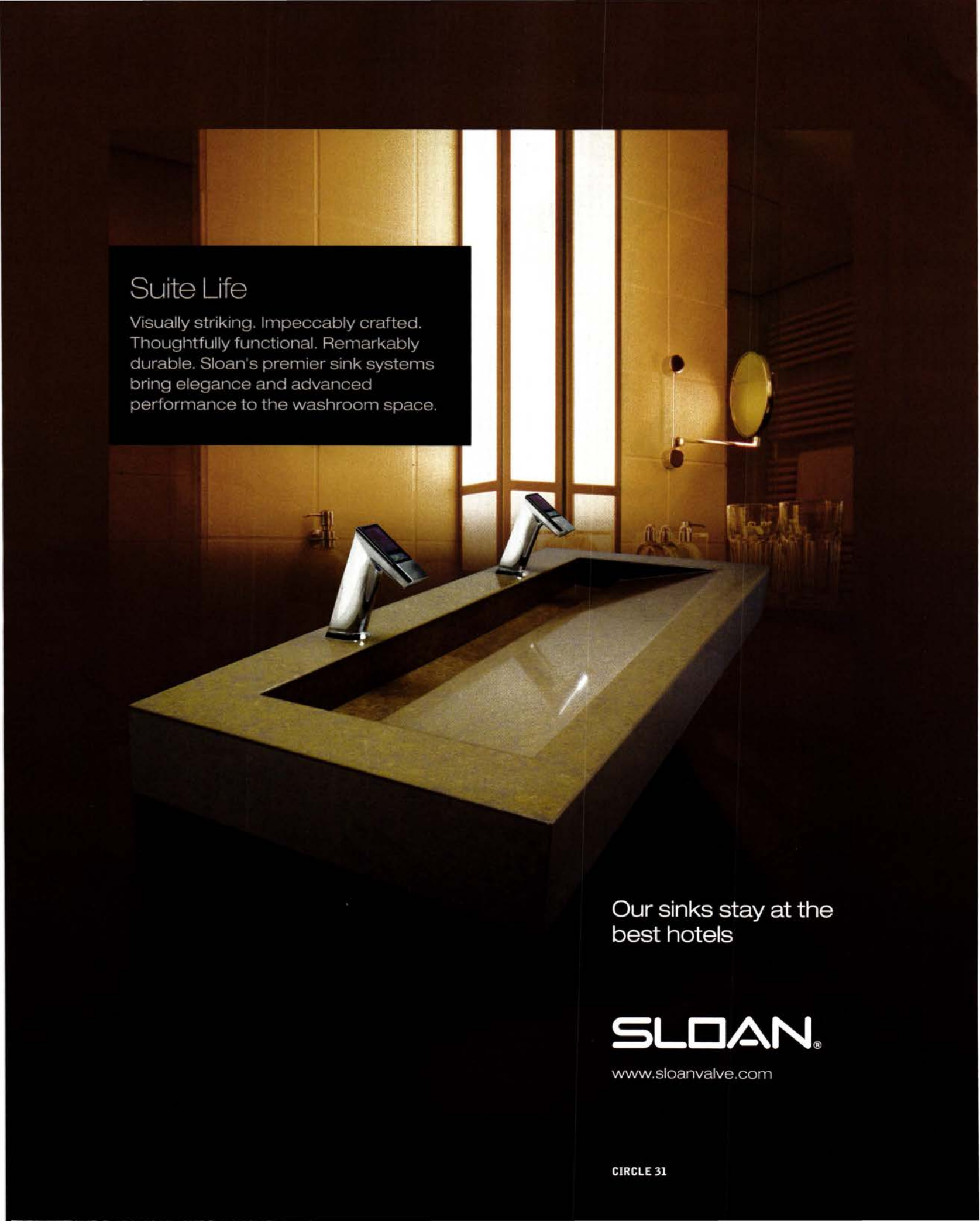
Öko Skin | a sustainable and convenient alternative to wooden slats

| Sustainable glassfibre reinforced concrete
| Maintenance free - neither painting nor staining
| 10 colors, vivid surface
| 2 sizes: 70.87" x 5.78" x 1/2" (1800 x 147 x 13 mm)
70.87" x 11.89" x 1/2" (1800 x 302 x 13 mm)

Distributed by fibreC North America
1-877-740-0303 (toll free) | Email: usa@fibreC.com
www.fibreC.us/okoskin

[öko skin]
BY RIEDER

CIRCLE 39


Suite Life
Visually striking. Impeccably crafted. Thoughtfully functional. Remarkably durable. Sloan's premier sink systems bring elegance and advanced performance to the washroom space.
Our sinks stay at the best hotels
SLOAN®
www.sloanvalve.com
CIRCLE 31


AMICO APEX02 Expanded Aluminum Mesh
Rotman School of Management
KPMB Architects
It's okay to park and stare.
(We'll let you know if they're coming.)
APEX Expanded
PEAK Perforated
SUMMIT Grating
Architectural Metals
AMICO
A GIBRALTAR INDUSTRIES COMPANY
www.amicoarch.com | 800.366.2642
CIRCLE 34

Belden delivers more.

BELDEN
THE BELDEN BRICK COMPANY

The Standard of
Comparison since 1885

An ISO 9001:2008 Registered Quality Management System
An ISO 14001:2004 Environmental Management System

330.456.0031
www.beldenbrick.com

CIRCLE 40

Double Monarch - 3-5/8" x 7-5/8" x 11-5/8"

6" ThinWall - 5-5/8" x 3-5/8" x 11-5/8"

8" Double Thinwall - 7-5/8" x 7-5/8" x 11-5/8"

More Colors, Sizes, Shapes & Textures

The Belden Brick Company is proud to give customers more choices. With a selection of more than 300 colors, 20 different sizes, 13 textures and unlimited shapes, Belden Brick offers the widest range of products to choose from.

That is why since 1885, The Belden Brick Company has been recognized as the quality leader in the brick industry.

BEGA

New Compact Floodlights

LED, Halogen, and H.I.D. light sources
Very narrow, narrow, or wide beam distributions

BEGA sets the standard

BEGA-US
www.bega-us.com
(805) 684-0533
No. 149

CIRCLE 21

perspective **house of the month**

A HOUSE IN THE WOODS BY WILLIAM REUE MELDS ORGANIC AND GEOMETRIC FORMS IN THE LANDSCAPE. BY NICOLE ANDERSON

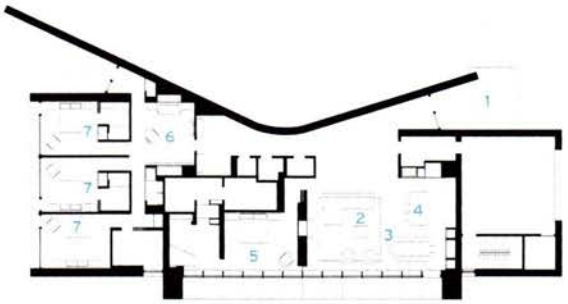
A Cor-Ten steel wall (far left, top) defines the north elevation. On the south face, Reue framed the expanse of windows in fiber cement board panels and clad the flanking ends in bluestone (far left, bottom). Floor-to-ceiling windows in the bedroom (left) and living room (below) open to sweeping views of the mountains.

AT ONE OF their first meetings, William Reue's client handed him a piece of paper bearing a rough sketch of the home that she had been imagining for the last 25 years. Her preliminary drawing centered on a curving Cor-Ten steel wall. And it was this defining feature, calling to mind Richard Serra's monolithic sculptures, that served as the starting point for the 4,800-square-foot retreat in upstate New York.

Sitting at the foot of the Shawangunk Mountains, the house, sheltered by Norway spruces, overlooks the expanse of the Hudson Valley. Its exterior is defined by the curved wall and a block-like mass of local bluestone. Radial-saw marks from the manufacturer left streaks on the stone cladding, making the house appear as if it has been "cut from the earth," says Reue.

The owner, a single woman, wanted public and private spaces for herself and her guests. The 125-foot-long steel wall on the north face inflects circulation inside the house around its bent form, and through the communal spaces—the living and dining areas and kitchen, where it gradually terminates in the secluded guest quarters on the southwest end. To amplify the light, Reue topped the house with a gently sloping roof above floor-to-ceiling windows, and painted the drywall of the curved interior surface off-white.

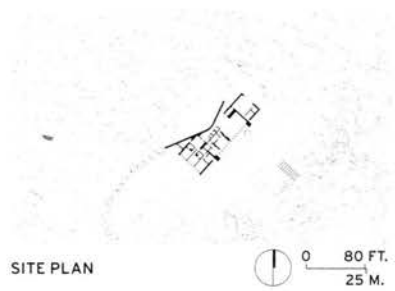
The architect implemented a number of energy-saving solutions for the LEED-Silver residence, from using structural insulated panels (SIPs) to employing rainwater harvesting and geothermal heating systems. With its green technologies and warm palette, the house fits into its forested landscape while minimizing its environmental footprint. ■



FLOOR PLAN

0 20 FT. 6 M.

1 ENTRY
2 LIVING
3 DINING
4 KITCHEN
5 MASTER BEDROOM
6 DEN
7 GUEST BEDROOM

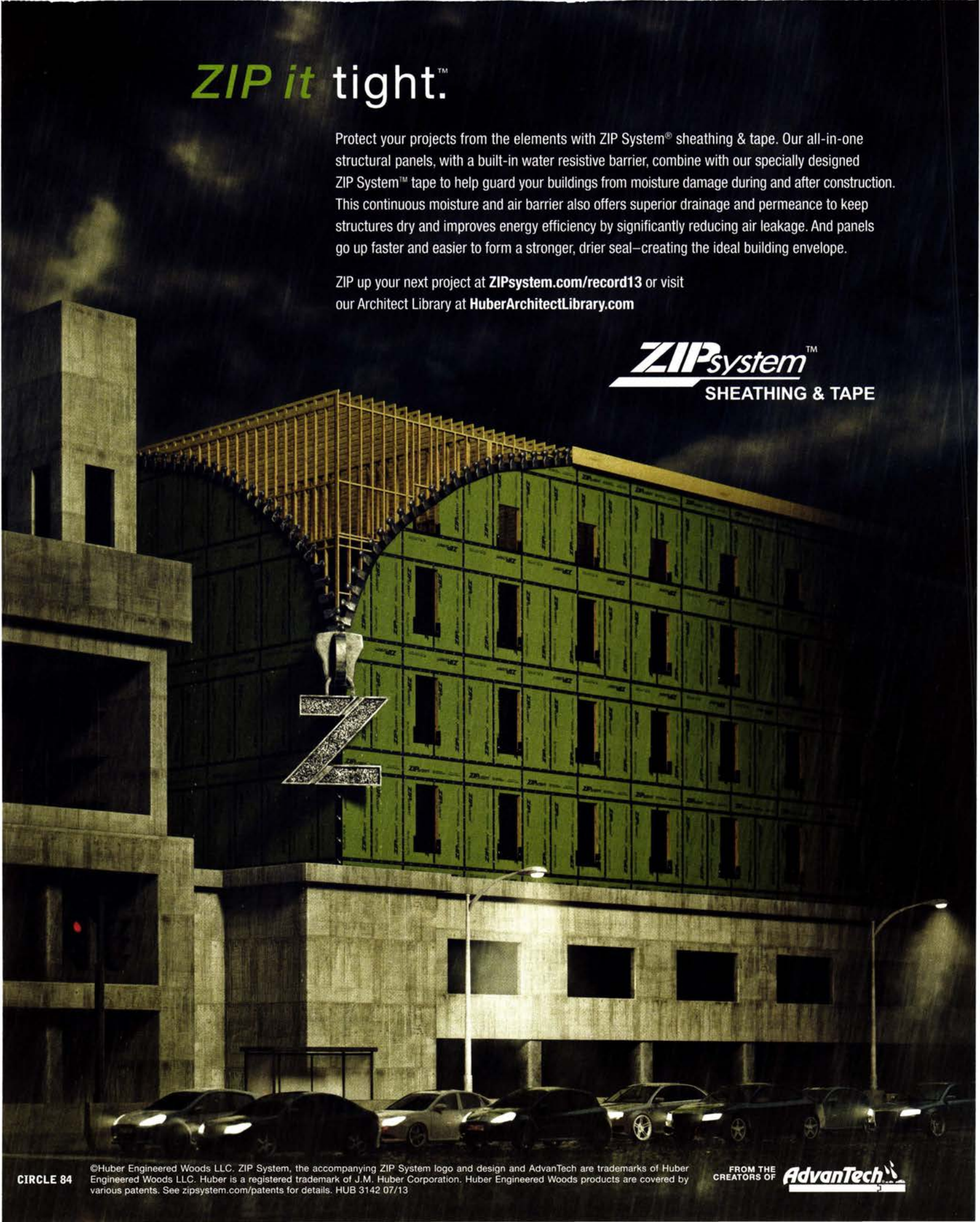


SITE PLAN

0 80 FT. 25 M.

PHOTOGRAPHY: © STEVE FREIHON

View additional images at architecturalrecord.com.


ZIP it tight.™
Protect your projects from the elements with ZIP System® sheathing & tape. Our all-in-one structural panels, with a built-in water resistive barrier, combine with our specially designed ZIP System™ tape to help guard your buildings from moisture damage during and after construction. This continuous moisture and air barrier also offers superior drainage and permeance to keep structures dry and improves energy efficiency by significantly reducing air leakage. And panels go up faster and easier to form a stronger, drier seal–creating the ideal building envelope.
ZIP up your next project at ZIPsystem.com/record13 or visit our Architect Library at HuberArchitectLibrary.com
ZIPsystem™
SHEATHING & TAPE
CIRCLE 84
©Huber Engineered Woods LLC. ZIP System, the accompanying ZIP System logo and design and AdvanTech are trademarks of Huber Engineered Woods LLC. Huber is a registered trademark of J.M. Huber Corporation. Huber Engineered Woods products are covered by various patents. See zipsystem.com/patents for details. HUB 3142 07/13
FROM THE CREATORS OF AdvanTech

products **building envelopes**

ATTRACTIVE SYSTEMS THAT NOT ONLY PROTECT AGAINST THE ELEMENTS BUT CONTRIBUTE TO SUSTAINABILITY.
BY SHEILA KIM

Seeing the Light

credits

ARCHITECT:
Marble Fairbanks

GENERAL CONTRACTOR:
Summit Construction

SOURCES

GLASS:
Pulp Studio (fritted); TGP (channel); J.E. Berkowitz

CURTAIN WALL SYSTEM: Kawneer

RAINSCREEN:
Swisspearl

NEIGHBORHOOD BEACON The long forms of channel glass echo the frit pattern of the first-floor curtain wall (top). Glass wraps the west and north facades (above, left) while the sides hidden from street view are clad in a cement-composite rainscreen system. The word "search" is projected by the sun (above) through stenciled glass in the roof's parapet.

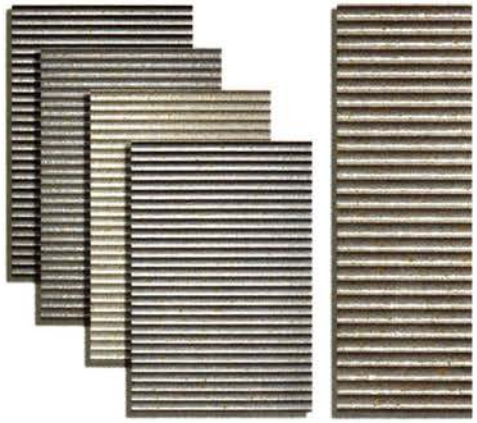
IN THE five months since its completion by Marble Fairbanks architects, the new Glen Oaks Branch Library in Queens, New York, has become a neighborhood hub. With a luminous new envelope, the LEED-Gold, steel-framed building is attracting a crowd of regulars even before the doors open each morning.

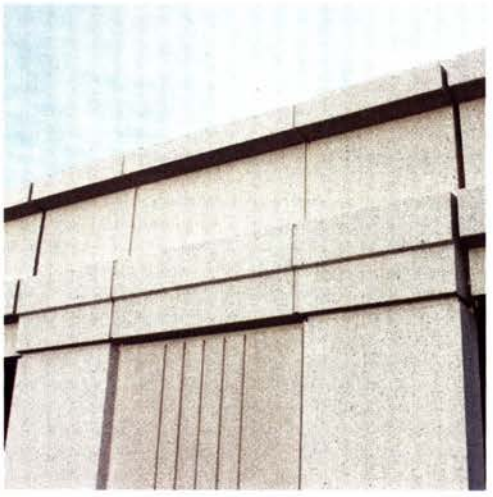
At the ground level, glazing on the west and north facades forms a literal and figurative window onto the community. The Brooklyn-based firm created a pattern of frits on the insulated glass to provide shade, but also as an inventive reference to neighborhood demographics: bars are varied in length to represent the prevalence of each of the area's 30 languages (based on numbers derived from the most recent census). "There's an algorithm that creates a tab length for every language," explains Karen Fairbanks, partner at the firm. The architect left the middle portion of the glass clear, allowing ample daylight to flood the interior and reach the partially exposed subgrade floor. The pattern repeats at a child's eye level, where the architects inserted among the bars the word "search" translated into each of the 30 languages. "It's a word that means a lot of things," says Fairbanks. "It relates to research in libraries, but also [to searching] in the digital sense."

Textured channel glass, shaping the entry vestibule and the second level's west facade, echoes the bar motif and adds privacy. Nanogel insulation is sandwiched between each pair of interlocking single-glazed channels, giving portions of the facade a glowing, milky appearance and reducing solar heat gain. On the north side, a storefront reintroduces the "search" motif on a larger scale through an elaborate trick. The sun projects the word onto the curtain wall through a stenciled glass parapet in the roof, and as the sun moves throughout the day, "search" drifts down the glass and onto the curtain wall's steel fins.

PHOTOGRAPHY: © EDUARD HUEBER/ARCH PHOTO

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





Custom-Glazed Terra-cotta Tile
Telling Architectural tellingarchitectural.com
The exclusive North American supplier of Argeton's terra-cotta rainscreen systems, Telling now offers in-house glazing for the German brand's cladding. This application enhances performance by lowering the porosity of the glazed tiles, rendering them more resistant to atmospheric pollution as well as graffiti. Matte, medium, and high-gloss finishes are offered. CIRCLE 205

PrismFX
Alcoa Architectural Products alcoa.com
Alcoa has introduced a new finish for its Reynobond aluminum-composite cladding that creates a dramatic visual effect. Shown installed on a business park complex in Warsaw, Poland, PrismFX shifts color as sunlight conditions change throughout the day. Nine base colorways are available, with or without Duragloss 5000, a high-performance coating that can withstand saltwater corrosion and extreme temperature shifts. CIRCLE 210

HX32 Single-Hung Tilt Window
EFCO efcocorp.com
An expansion of EFCO's Xtherm fenestration line, HX32 is a single-hung tilt window. Its 3¼"-deep frame is thermally isolated from the glass with glass-reinforced nylon struts, resulting in a U-factor as low as 0.35. Frames come in clear, champagne, light- to dark-bronze, and black anodized finishes, and optional internal muntins can be added to replicate historical grid windows. CIRCLE 206

PVA Fiber Reinforced SlenderWall
SlenderWall slenderwall.com
A precast-concrete cladding system, SlenderWall is now available with polyvinyl alcohol (PVA) fiber reinforcement. The PVA is dispersed throughout the concrete to form a molecular bond, resulting in increased tensile strength and resistance to corrosion and cracking. Each panel's interior frame consists of 6" 16-gauge galvanized-steel studs spaced vertically at 2' intervals. Installed, the system can withstand a wind load of 226 mph. CIRCLE 209

Baguette Panel Rainscreen
Shildan shildan.com
This new terra-cotta baguette panel rainscreen system uses vertical or horizontal aluminum attachments and can be customized in lengths of up to 10' to create striking textured facades. For a mixed-use building in Brooklyn, New York, CookFox Architects specified the panels in three shades of gray to produce a ribbed appearance and to reference colors of adjacent buildings. CIRCLE 207

Reliance-HTC
Oldcastle BuildingEnvelope oldcastlebe.com
A triple-glazed curtain wall system, Reliance-HTC offers both excellent thermal and acoustical performance. Front-set, using either captured or SSG vertical mullions, the glazing system is able to meet ASHRAE thermal comfort standards for climate zones 1–8 thanks to polyamide insulating strips on all vertical and horizontal members, in combination with low-E insulating glass. CIRCLE 208

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

COLLABORATE... ANYWHERE

When it's your job to call the shots, you need to be able to make decisions from anywhere, at any time. Bluebeam® Revu® combines powerful PDF markup and measurement capabilities with an integrated cloud-based collaboration solution, Bluebeam Studio™. Studio enables you to store an unlimited number of PDFs and any other file type in the cloud for free, and review and annotate the same PDFs with project partners around the world together in real time or on your own time, regardless of Internet connection, from a desktop, tablet PC or iPad.

CIRCLE 64

An **innovative** integration of steel components with open web **design** for low, mid, and high-rise structures.

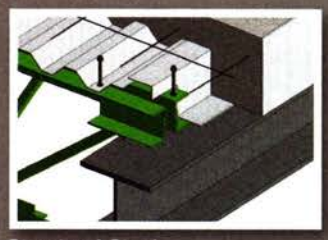
The **Ecospan Composite Floor System** uses a unique configuration of components with high strength-to-weight ratios that allows for longer spans, shallow floor depths, greater rigidity and enhanced performance – without sacrificing aesthetics.

Made with 99% recycled steel joists and 70% recycled steel decking, Ecospan provides open web structural components with a lighter weight composite design for elevated floor construction.

ECOSPAN®
COMPOSITE FLOOR SYSTEM

www.ecospan-usa.com

CIRCLE 65

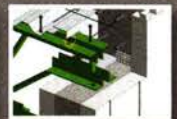


Structural Steel

Ecospan is a great choice for **structural steel** and it's compatible with **any** wall framing system.

Masonry

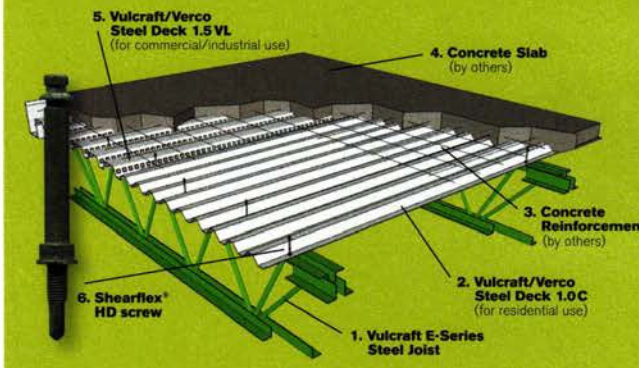
Light Gauge Steel Stud



Insulated Concrete Forms (ICF)

Concrete

Economical Fast Safe Strong



Ecospan is the natural choice for:

- **Senior Living and Care Facilities**
- **Apartments**
- **Condominiums**
- **Student Housing**
- **Military Housing**
- **Hotels and Resorts**
- **Medical Facilities**
- **Office Buildings**
- **Mezzanines**

THE VULCRAFT BIM EVOLUTION

NUCOR
VULCRAFT/VERCO GROUP

Ecospan Composite Floor System
Nucor Vulcraft National Accounts
6230 Shiloh Road, Suite 140
Alpharetta, GA 30005
(678) 965-6667
888-375-9787

Versatile Quiet Green

products workplace

THE OFFICE GOES MODERN WITH THE HELP OF MINIMALIST AND EDGY FURNISHINGS, FROM A MONOLITHIC CONFERENCE TABLE TO PSYCHEDELIC WALL PANELS. **BY SHEILA KIM**

Span Conference and Worktable

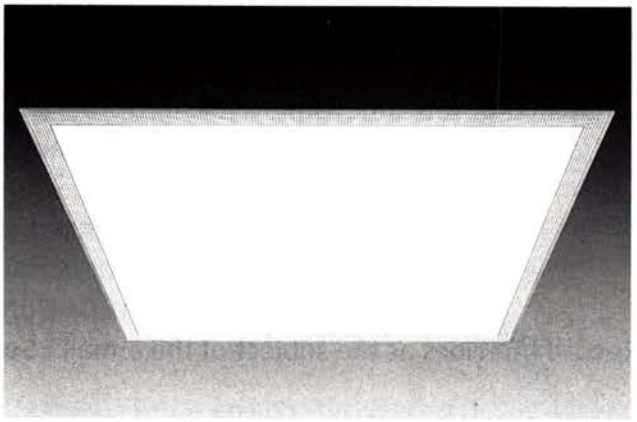
An antidote to staid conference room furniture, this ultra-slim table by Davis is engineered to support a top as long as 144". Made with an aluminum sheet affixed to a lightweight substrate on four tubular legs, Span is available in a wood veneer or white acrylic finish in 11 sizes.

davisfurniture.com **CIRCLE 200**

Telios

A recessed LED panel with a slim frame, Focal Point's Telios fixture integrates seamlessly into, and flush with, typical grid ceilings. Four different light outputs—from 2,309 to 3,945 lumens—are offered, in color temperatures ranging from 3,000 to 4,000 K. The 1" frame, composed of 20-gauge steel, is powder coated in a satin finish. The frame is also available with a perforated pattern and a colored acrylic insert to produce a backlit dotted border.

focalpointlights.com **CIRCLE 204**



Type-32 by Diego Grandi

Milan-based architect Diego Grandi puts an urban spin on this faux-bois porcelain tile line. Called Type-32, the collection consists of large-format planks—up to 118" long—with two layers of screen-printing, the first replicating a wood grain, the second featuring one of four different oblique line patterns. Combined, the tiles produce a herringbone effect with a graphic twist. Part of Lea Ceramiche's Slimtech 5Plus series, the tiles are 1/5" thick and available in six colors.

ceramichelea.it **CIRCLE 203**

Ecoustic Moov

A panel system from textile company Unika Vaev, Ecoustic Moov absorbs sound while creating wavelike dimension on walls. Each 19¾" unit combines a felt-covered hyperbolic-curve face with a sound chamber tile behind it to achieve an NRC of 0.9. The back tile is easily screw-mounted onto the wall, while the felt, available in 15 colors, is affixed to the tile with Velcro.

unikavaev.com **CIRCLE 201**

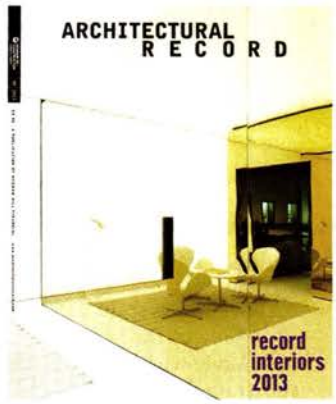
Chiara by Noé Duchaufour-Lawrance

Inspired by the shapes of flower petals, Bernhardt Design's Chiara is a sculptural lounge chair with a seat-and-back shell that gently curves to support and cradle the sitter. Available in a range of fabrics and leathers from the company's textile division, the shell features edge-stitch detailing and a tailored seat pad. Its four-prong, polished-aluminum base houses a self-return swivel mechanism.

bernhardtdesign.com **CIRCLE 202**

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

2014 CALL FOR ENTRIES Record Interiors



The editors of ARCHITECTURAL RECORD are currently inviting submissions for the 2014 Record Interiors issue. All architects registered in the United States or abroad, as well as interior designers working in collaboration with architects, are welcome to submit interiors-only projects that have been completed in the last year. The projects may be new construction, renovation, or adaptive reuse; commercial or residential; domestic or international. Special consideration will be paid to works that incorporate innovation in design, program, building technology, sustainability, and/or materials. The winning projects will be featured in the September 2014 issue.

The fee is US$75 per entry. Download the official entry form with submission and payment instructions at architecturalrecord.com/call4entries. E-mail questions and submissions to ARCallForEntries@mhfi.com. (Please indicate **Record Interiors** as the subject of the e-mail.) **Submissions are due May 30, 2014.**

A NEW SLANT ON EXTERIOR METAL WALL PANELS

Tapered metal wall panels by Dri-Design.
Select material, direction, depth, color and/or angle.

Expect Dri-Design's true dry joint rain-screen technology, affordability and sustainability.

ADVANTAGES:

- No sealants, gaskets or butyl tape in the panel joints, means no dirty streaks or a legacy of maintenance for the building owner.
- Panels are not laminated nor a composite—they will never delaminate.
- Sustainability - Dri-Design panels are made with recycled content, are 100% recyclable and can be repurposed. At Dri-Design we make panels the world can live with.
- Fully tested to exceed ASTM standards and the latest AAMA 508-07 for pressure equalized rain-screens. Miami-Dade approved.
- Available in any anodized or Kynar color on aluminum, plus VMZINC, stainless steel, copper and titanium.
- Interlocking panel design makes installation quick and easy.
- Dri-Design is economical. Our highly automated manufacturing process makes panels in seconds.

dri-design®
WALL PANEL SYSTEM

Call 616.355.2970 | www.dri-design.com

Job: Tishomingo Health Clinic
Architect: James R. Childers Architects

Come see us at AIA Chicago, June 26 - 28, 2014 - booth # 4225

CIRCLE 32

EXPERIENCING BOLD DESIGN BEGINS WITH A STRIKING ENTRANCE

2013 ANNUAL DESIGN REVIEW

Trahan Architects' Louisiana Sports Hall of Fame and Northwest Louisiana History Museum project took a contemporary approach that combined bold and practical elements into an imaginative modern design. The architects looked to CRL-Blumcraft® 1301 Series 'All-Glass' Entrance Systems that contain the slimmest door rail profile in the industry, allowing for virtually uninterrupted glass viewing areas to elevate the high-concept building's modern aesthetic. 1301 Series Entrance Doors are the original. Often imitated but never matched, this system provides the most glass with the least metal of any entrance door system on the market.

This award-winning project serves as just one example of C.R. Laurence 's ability to provide architects and designers with well-engineered products for a wide range of projects of varying sizes, aesthetics, timelines, and performance criteria.

PROJECT: Louisiana Sports Hall of Fame and Northwest Louisiana History Museum
SPECIFICATION: CRL-Blumcraft® 1301 Series Entrance System with Floating Header and PA100 F Series Panic Handles
AWARD: ARCHITECT's 2013 Annual Design Review: Bond Category - Best Cultural Project

BLUMCRAFT®
A DIVISION OF C.R. LAURENCE CO., INC.

CRAFTING INSPIRED DESIGN SOLUTIONS FOR OVER A CENTURY

crl-arch.com/blumcraft

CRL® US ALUMINUM

CIRCLE 68

MKTG_3_3/14

Soap, sink and dryer, all in one. The word 'finally' comes to mind.

Clean + Rinse + Dry = A Sink That Makes Sense

Introducing the first completely touchless, all-in-one lavatory system. By placing a more efficient soap dispenser, faucet and hand dryer side by side, we've given users more personal space, while keeping water off the floor. Sometimes the best ideas are simple ones.

Advocate

Exclusively Bradley

clean + simple

Bradley | 1.800.BRADLEY | www.BRADLEYCORP.com/Advocate

CIRCLE 46

the twenty-fifth annual

ACCENT ON ARCHITECTURE GALA

Join 600 national leaders in design, government, business, and education for the nation's premier celebration of leadership in architecture and design.

THURSDAY, APRIL 24, 2014

Learn more and find out about attending AAF's Accent Gala at archfoundation.org or by contacting Doreen Wills at 202.787.1011 or dwills@archfoundation.org

PRESENTED BY THE
American Architectural Foundation

THURSDAY, APRIL 24, 2014 THE ANDREW W. MELLON AUDITORIUM **WASHINGTON, DC**

CONGRATULATIONS *to the* 2014 ACCENT ON ARCHITECTURE GALA HONOREES

The Keystone Award
Presented by AAF

Chicago Architecture Foundation
Lynn J. Osmond, Hon. AIA, CAE, President & CEO, accepting

The Architectural Record Good Design is Good Business Lifetime Achievement Awards
Presented by Architectural Record

Novartis
Patron Award
Patrick Lobdell, AIA, NCARB, Director of Design, accepting

STUDIOS Architecture
Architecture Award
Todd DeGarmo, FAIA, LEED AP, CEO & Principal, accepting

The Joseph P. Riley Jr. Award for Leadership in Urban Design
Presented by AAF in association with the United States Conference of Mayors

The Hon. Carolyn G. Goodman
Mayor of the City of Las Vegas

The Hon. Oscar B. Goodman
Former Mayor of the City of Las Vegas

THANK YOU TO OUR 2014 ACCENT ON ARCHITECTURE GALA SPONSORS *as of 1/31/2014*

BENEFACTOR STUDIOS Architecture • United Technologies Corporation **MEDIA PARTNER** Architectural Record | McGraw Hill Construction **VISIONARY** American Institute of Architects • Armstrong Ceiling Systems • DLR Group • Gensler • Las Vegas Convention and Visitors Authority • U.S. Green Building Council **STEWARD** BKV Group • Cannon Design • Cuningham Group Architecture • David M. Schwarz Architects Charitable Foundation • Forsgate Industrial Partners • Humanscale • J+J Flooring Group • Jacobs • The JBG Companies • K&L Gates • Perkins+Will • Porcelanosa USA • SHW Group • Skyline Design • Steelcase Inc. • Vornado/Charles E. Smith • Wallace Roberts & Todd, LLC • Weidlinger Associates Inc.

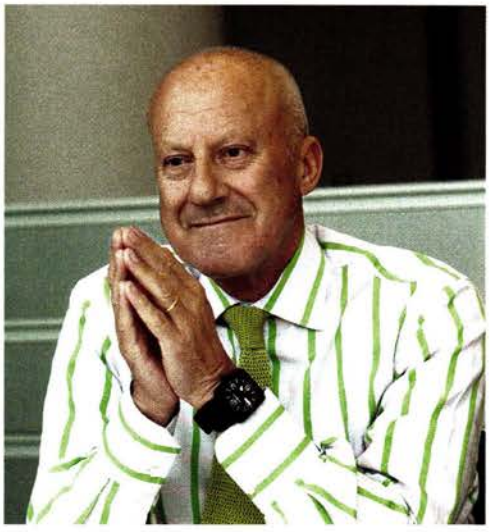
WITH SPECIAL THANKS TO OUR 2014 GALA LEADERSHIP COMMITTEE Kenneth P. Baker, Assoc. AIA, Assoc. IIDA, Gensler • S. Richard Fedrizzi, U.S. Green Building Council • Anthony Greenberg, The JBG Companies • Diane Hoskins, FAIA, LEED AP, Gensler • Bryce D. Pearsall, FAIA, LEED AP, DLR Group • John Syvertsen, FAIA, LEED AP, Cannon Design


Cool by Design
Torsion >> Bright Nickel with Maple Blades
THE MOD-ERN FAN CO
A Collection of Ceiling Fans
Designed by Ron Rezek
Celebrating the modern idiom
modernfan.com
CIRCLE 38

Asking Mr. Big

Foster+Partners has designed megaprojects around the globe, from airports to skyscrapers. How are super-size buildings, such as Apple's future headquarters, shaped for the people who will use them?

BY CATHLEEN MCGUIGAN



AS FOUNDER and chairman of Foster+Partners, Norman Foster has created projects at every scale but may be best known for such innovative tall buildings as the Hong Kong and Shanghai Bank Headquarters in Hong Kong (1986), the Swiss Re tower in London, a.k.a. "the Gherkin" (2004), and the Hearst Tower in New York (2006). The firm's airport projects include Hong Kong's Chek Lap Kok (1998) and Terminal 3 in Beijing International Airport (2008), which is one of the largest buildings in the world. Foster spoke with RECORD editor in chief Cathleen McGuigan about large-scale architecture and the human experience.

ARCHITECTURAL RECORD For much of your career, you've grappled with the issue of scale in very big buildings. The Beijing airport is nearly 14 million square feet. How did you manipulate the scale to make it a place people can navigate?

NORMAN FOSTER Beijing is clearly an enormous building, but everybody I know who's been through it sees it as a very friendly building. That comes from the handling of light and color and level changes. And it comes from the feeling that you're connected to the outside. You have a reference to the sky through the natural lighting. You also have this color spectrum on the interior, where the roof canopy changes from orange and reds through to gold and yellow—evocative colors—and the same color range echoes in reverse order across the width of the building. Then, as I say, there is the constant reference to the outside—the fact that you don't feel you're being led down blind alleys. You always have this sense of knowing where you are—you always have a sense of space.

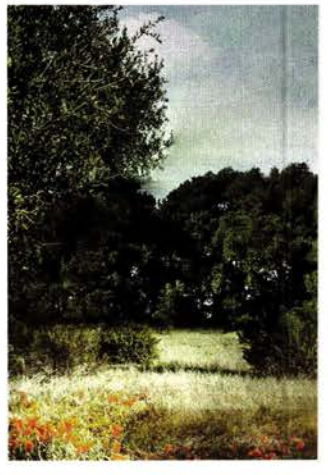
As airports got bigger and bigger, you reversed the idea of separate terminals and made the roof a unifying structure. That was very bold, if you think about it, because it makes the building so immense.

Yes. I usually get hoots of derision when I say this, but the Hong Kong and Beijing airports are essentially compact buildings. I'll try and explain what I mean. Heathrow is now five terminals. Landing at one and having to be trucked to another is not the greatest experience in the world. In actual fact, it's probably one of the worst, the most alienating. So although these buildings we're talking about are enormous, they're actually quite compact compared with the experience of five or six separated terminals.

If you compare these very large buildings in terms of the area enclosed by the amount of external wall, they're very efficient, so they consume less energy.

They're also a better experience, because you're not leaving one terminal, going outside, onto a road, or into a tunnel, or onto a train to get to another terminal. You're not worrying about what the hell is happening to your bags as they leave one place and you hope that they end up in the other place. Overall, it's a better experience—it's more sustainable, it's more economic. And, architecturally, it's more interesting. The same is true with the very large Apple building.

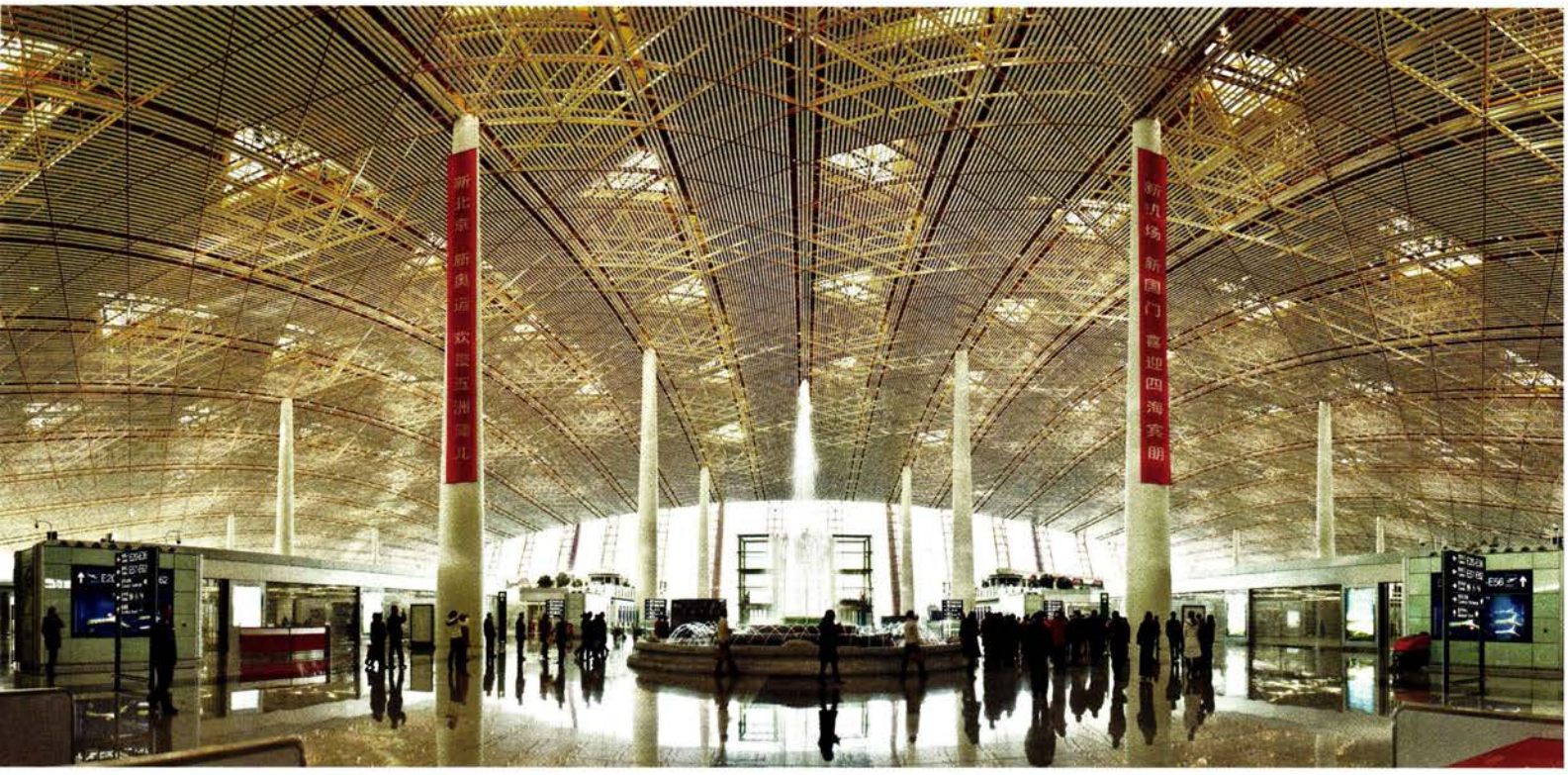
Yes, the Apple headquarters you've designed for Cupertino, California, will have 12,000



PUT A RING ON IT
Renderings of Apple's new headquarters, with almost 3 million square feet of floor area and a circumference of nearly one mile. Amenities include a restaurant for more than 2,000 people, cafés, jogging and biking trails, and fruit orchards.

View additional images at architecturalrecord.com.

PHOTOGRAPHY: © NIGEL YOUNG/FOSTER+PARTNERS (OPPOSITE, LEFT); IMAGES: CITY OF CUPERTINO (2)



LET'S FLY AWAY Opened in time for the 2008 Beijing Olympics, Foster's terminal, at 14 million square feet, is one of the largest buildings in the world. A changing spectrum of traditional Chinese colors–from red to gold–under the roof canopy helps travelers navigate the vast spaces (above and right). Fifty million people per year are expected to pass through by 2020.

employees in one building.

You could compare that with a typical university of the same size. Traditionally, you're probably talking at least 16 or 17 buildings. The Apple building will occupy the site much more tightly than what was there. It was the former Hewlett-Packard site, and, just in the last month, we demolished all the buildings that were there. It was a large number of them. [The new Apple construction will cover 13 percent of the site, while the two dozen former HP buildings, in total, covered much more, according to Foster's office.]

So what made the form of a ring the logical choice for this building?

It's interesting how it evolved. First of all, there was a smaller site. Then, as the project developed, and the Hewlett-Packard site became available, the scale of the project changed.

Meanwhile, the reference point for Steve [Jobs] was always the large space on the Stanford campus–the Main Quad–which Steve knew intimately. Also, he would reminisce about the time when he was young, and California was still the fruit bowl of the United States. It was still orchards.

We did a continuous series of base planning studies. One idea which came out of it is that you can get high density by building around the perimeter of a site, as in the squares of London. And in the case of a London square, you create a mini-park in the center. So a series of organic segments in the early studies started to form enclosures, all of which were in turn related to the scale of the Stanford campus. These studies finally morphed into a circular building that would enclose the private space in the middle–essentially a park that would replicate the original California landscape, and parts of it would also recapture the orchards of the past. The car would visually be banished, and tarmac would be replaced by greenery, and car parks by jogging and bicycle trails.

Remember, the main building caters to 12,000 people, but the wellness center–the fitness center–is probably responding to the

PHOTOGRAPHY: © NIGEL YOUNG/FOSTER+PARTNERS (TOP); FU XING PHOTO (BOTTOM)

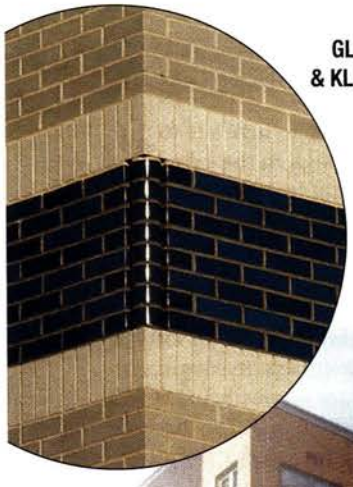
FACEBRICK

THIN BRICK

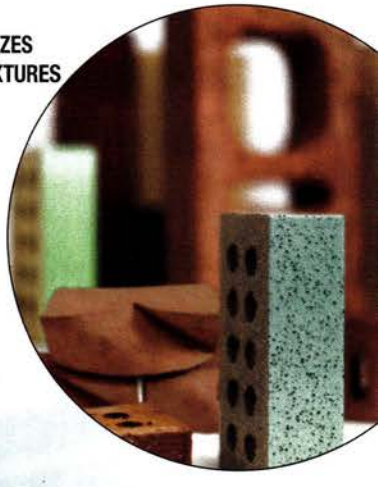
PAVERS

Diversity of products for amazing results

Make the most of diversity in brick from Glen-Gery. Free your imagination to take full advantage of an architectural resource that truly defies limitations.



GLAZED & KLAYCOAT



SHAPES, SIZES COLORS & TEXTURES

Glen-Gery Brick

An Oldcastle® Company

610.374.4011 • www.glengerybrick.com

CIRCLE 45

TECHS AND THE CITY The new European headquarters of Bloomberg in the heart of London, currently under construction, is designed in two parts, with a pedestrian arcade that restores the route of a historic street (top). The 10-story sandstone building features vertical bronze blades on the facade (above).

needs of the entire Apple community in Silicon Valley, which is 20,000-something. Also, another building on the site is the presentation center, which will allow Apple to do the kind of things like product launches that otherwise would require space in San Francisco or wherever. And, a bit like the airport, where you have one building—although it is in itself quite large—it is essentially compact.

I understand what you're saying about the efficiencies. But how do you bring a sense of human scale, and how will people move around? In an airport, you have people movers. At Apple, they will be able to cross the center of the park to get to the other side, but how will people move around the almost mile-long circumference of the ring?

If you take the 176-acre site, it is much closer to move around or across a space in one very large building than it would be to walk to the other end of a 170-plus-acre site to another building. Although in the extreme cases the distances might be large, they are not really when compared with a conventional campus, where you're walking from one building to another.

Of course, you have got an enormous range of skills in this building—from software programmers, from designers, marketing, retail—but you can move vertically in the building as well as horizontally. The proximity, the adjacencies are very, very carefully considered.

Remember also that the scale is broken down by cafés and lobbies and entrances. Then, a significant segment of that circle is the restaurant, which opens up to the landscape. You have four-story-high glass walls, which can literally move sideways and just open up into the landscape. So the social facilities break down the scale.

And of course you have the benefit of jogging and cycling trails—more than a thousand bikes will be kept on the site—and also pathways and landscaping connections.

There's also the buried car park. You won't look out of your window and see row after row of parked cars.

Although they are polar opposites, in terms of functions and their forms, the scale of an airport as an experience is broken down rather like the city itself—you do get contrast, you do get variety. And the same is true in the Apple building. You do enter a lobby that

PHOTOGRAPHY: COURTESY BLOOMBERG L.P.

Rolling casters, 900-pound beds, boiling coffee, 10,000 heels, splashing chemicals.

Good thing you specified the most durable, high-quality, trusted flooring in Healthcare.

- Performance that stands up to foot traffic and heavy rolling loads.
- Tested to meet and exceed ASTM Standards and real-life situations.
- Easy maintenance options that positively influence the bottom line.
- Spaces that look beautiful year after year.

Armstrong is Healthcare's Most Trusted Brand.

Call your rep for more details or visit ***www.armstrong.com/commercialflooring***

Armstrong®

COMMERCIAL FLOORING

Architect: *Bundy, Young, Sims & Potter, Inc.* ***Building:*** *Texhoma Christian Care Center, Wichita Falls, TX* ***Products:*** *LVT: Natural Creations® ArborArt®, Mystix®, EarthCuts®*

CIRCLE 67

relates to the spaces in that segment of the circle. There's easy seating, there's a café outside, and it's got its own bicycle park. It has its own connections to the landscape and has certain things that will be close in terms of the inner park—it might be adjacent to a pool, for example.

You said these enormous buildings are like cities in microcosm, but these places we're discussing are not in city centers. What about big buildings in the urban context?

Yes, whenever there is an intervention of a building in a city, we try to see whether that building can in some way give something back to the city of which it's a part. With Swiss Re, it tightens at the base to create a very pleasurable space, which is shared as an open-air café in that very dense part of the city.

With Bloomberg in London, we are creating a pedestrian arcade again, which is a continuation of an historic route that had been obliterated by an early 1960s building, since demolished. [The Bloomberg European headquarters in London is a block-long stone structure with bronze details. It is designed in two parts connected by sky bridges, which will cross the arcade. Now under construction, it is scheduled to open in 2016.]

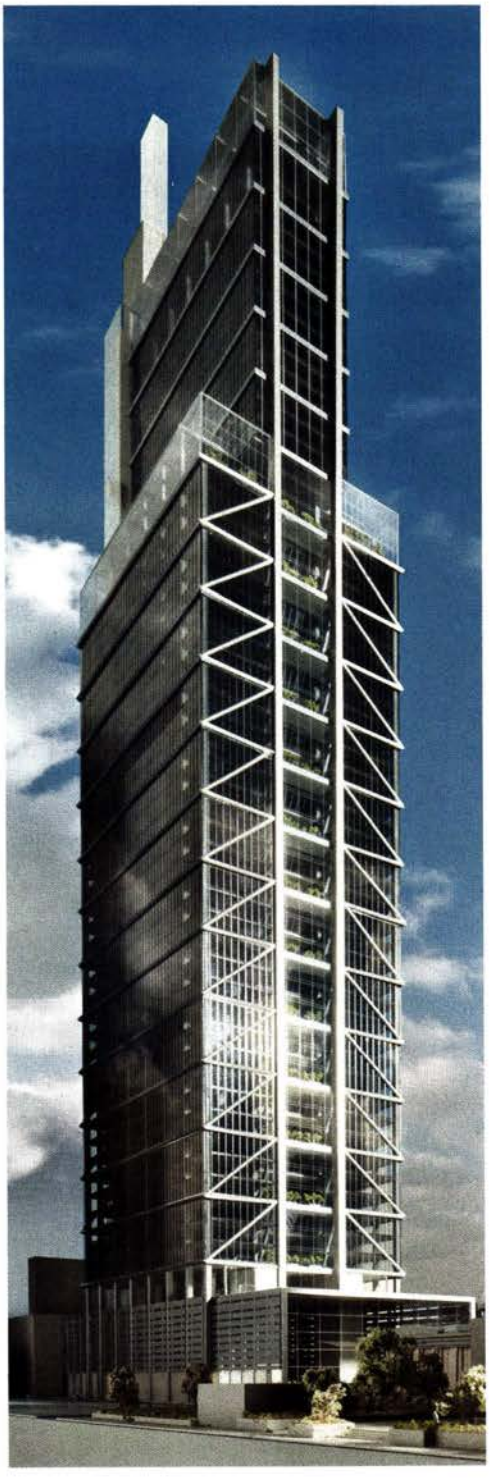
The Bloomberg building is not so tall—10 stories. But what about taller buildings? There's a difference between managing the scale of an airport design or the Apple project, with vast horizontal spaces, versus the scale in a skyscraper. You're currently developing 425 Park in New York, at 687 feet, and Comcast in Philadelphia, which, at 1,121 feet, will be the highest building outside New York or Chicago. How do you manage human scale in the high-rise, so that it is not just a stack of pancakes?

If you look at both 425 Park and Comcast, they're very different buildings and quite different functions. Comcast is a vertical series of Silicon Valley–style lofts for working, and 425 is an office building.

Yes, yet both have public amenities on the ground floor. Comcast will have a flexible civic space; 425 Park will have an outdoor space in front of the lobby to showcase contemporary art. Also 425 has three setbacks as the building goes up 41 stories—with sky gardens or event spaces that mark those shifts.

What are some other strategies you've employed in tall buildings to break up the scale and monotony of the floor plates and make varied spaces that engage the people who use them?

All of these tall buildings, back to the Hong Kong and Shanghai Bank, invoke devices which are socially generated but which in turn consciously destroy the totally anonymous stack of offices and engage with the human systems—the internal views, the cafés, the landscaping, the gardens in some cases. The spiral in Swiss Re, for example, which is continuous and laps around, intervenes with the regular stack of the floors. On a smaller scale, at the base of the Hearst Tower is an internal plaza, which everybody who comes into the building has to pass through, alongside a waterfall. These are all scale devices. They all come back to your key word: scale. ■



TOWERS OF POWER 425 Park (rendering, far left), designed with three setbacks, will be the first new full-block office building on New York's Park Avenue in 50 years. Comcast Innovation and Technology Center (left) in Philadelphia, at 1,121 feet, will be the tallest building in the U.S. outside New York and Chicago and will have street-level urban spaces, and sky gardens for tenants, as does 425 Park.

PHOTOGRAPHY: © DBOX/FOSTER+PARTNERS (2)

"If you can draw it, we will build it. In steel."

American structural steel is the ultimate American construction material.

- **American steel mills produced 7.7 million tons of structural steel in 2013.**
- **The USA is a net EXPORTER of structural steel.**
- **One American job is created for every 45 tons of structural steel produced, fabricated and erected in America.**
- **American workers fabricate structural steel at 1,800 local fabrication shops, the vast majority of which are family businesses.**

Structural steel enables government projects to achieve Security, Architectural Excellence, and Sustainability. AISC's Government Projects Initiative is helping America's structural steel industry better serve the federal and military construction market. Let's discuss how we can make structural steel the material of choice on your next government project.

Contact:
Larry Flynn
312.670.5437
flynn@aisc.org
www.aisc.org/government

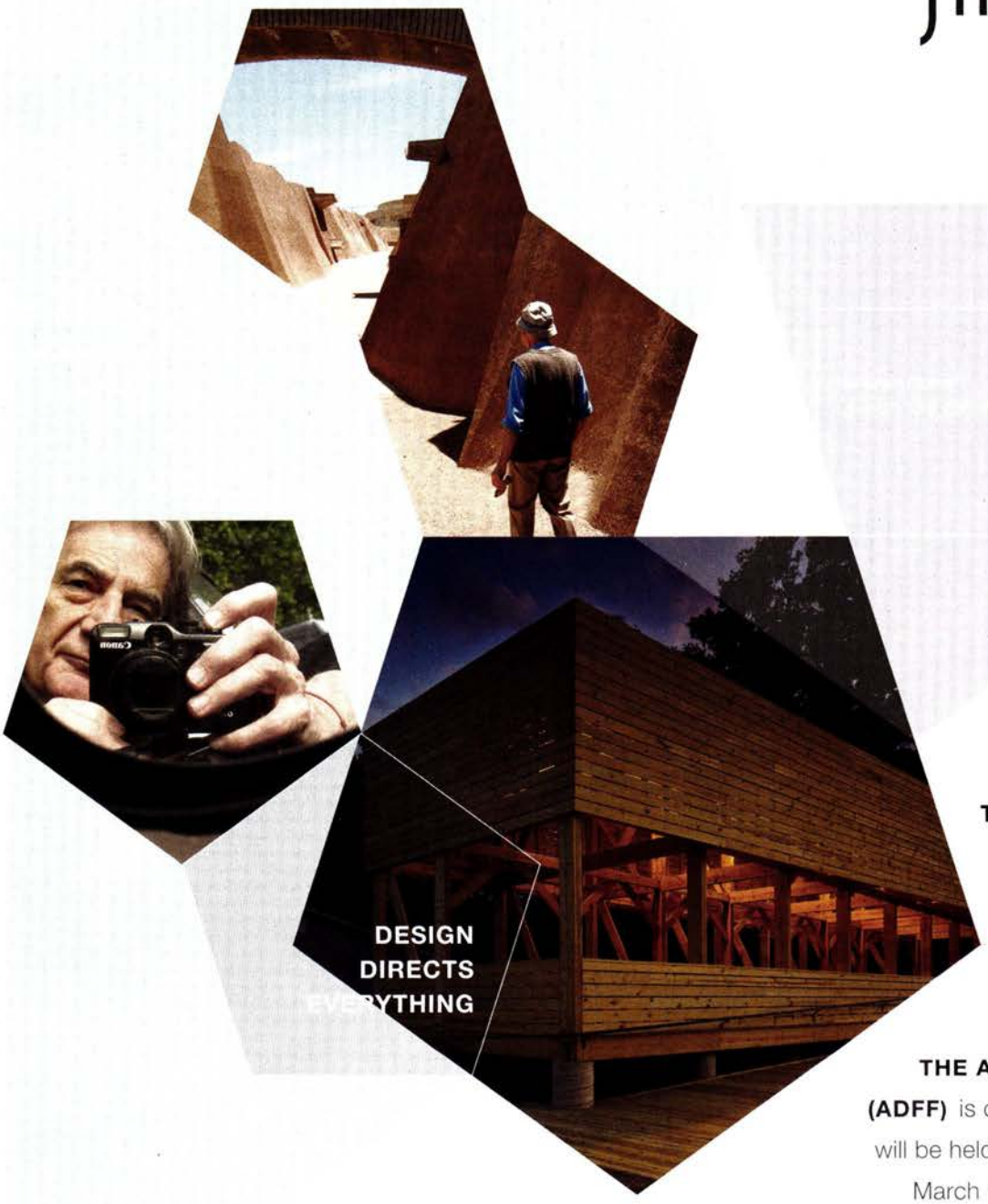
There's always a solution in steel.

312.670.2400
www.aisc.org/madeinamerica

National Geospatial-Intelligence Agency Headquarters, Springfield, Va.
AISC 2013 IDEAS² steel-frame building award recipient
Photo Paul Warchol

CIRCLE 72

architecture & design film festival



LA

MARCH
12-16

LOS ANGELES THEATRE CENTER
514 S Spring St

THE ARCHITECTURE & DESIGN FILM FESTIVAL (ADFF) is coming to the West Coast! The five-day festival will be held downtown at the Los Angeles Theatre Center March 12th–16th. Featuring more than 30 films, panel discussions, and Q&A's with design leaders and filmmakers from around the world. Tickets on sale at:

ADFILMFEST

CARL HANSEN & SØN
PASSIONATE CRAFTSMANSHIP

Benjamin Moore®

CIRCLE 88

ARCHITECTURAL RECORD · dwell · Architizer™ · The Theatre Center · The Standard · Hennessey + Ingalls · AIA|LA · nbbj

carlhansen.com

EVERY PIECE COMES WITH A STORY

architecture & design

THE DREAM CHAIR WILL BE ON DISPLAY AT THE ARCHITECTURE AND DESIGN FILM FESTIVAL
MARCH 12 - 16 AT LOS ANGELES THEATRE CENTER.

WWW.ADFILMFEST.COM

| DREAM CHAIR | DESIGN TADAO ANDO · 2013

Leading Japanese architect **Tadao Ando** collaborated with the furniture experts at **Carl Hansen & Son** to create the **Dream Chair – a tribute to Hans J. Wegner, the undisputed master of chair design.** The result is a sculptural and comfortable lounge chair crafted from a single piece of plywood – and imbued with a beautiful floating expression.

Showroom: 304 Hudson St., New York, NY. 10013
Telephone: 1 212 242 6736

CARL HANSEN & SØN
PASSIONATE CRAFTSMANSHIP

CIRCLE 89

THE GREATEST GLASS WITH THE GREATEST NUMBER OF POSSIBILITIES.

Architects and glazing contractors throughout the world turn to Viracon for proven architectural glass products, innovative design solutions and professional services. **Start your next landmark project at viracon.com.**

VIRACON®

GLASS IS EVERYTHING™

Reflections at Keppel Bay | Architect: Daniel Libeskind

CIRCLE 82

Big has a bad rap. Big buildings—either vertical or horizontal—are often soulless, monotonous, or intimidating. Beyond a certain size, is real architecture possible? The projects examined here, all more than a million square feet, confront the gargantuan challenges—and solve them in ingenious ways. For example, a residential complex in Singapore (The Interlace, shown on this page) broke from the model of towers-in-a-park by stacking horizontal volumes in dynamic clusters. This strategy created greater connectivity and a more human scale, while allowing light and air to penetrate inside. The other projects here also tackle the problems of scale, sustainability, and human engagement. It's clear that, as the world's cities grow and become more dense, supersize designs are going to be a significant part of the urban fabric.

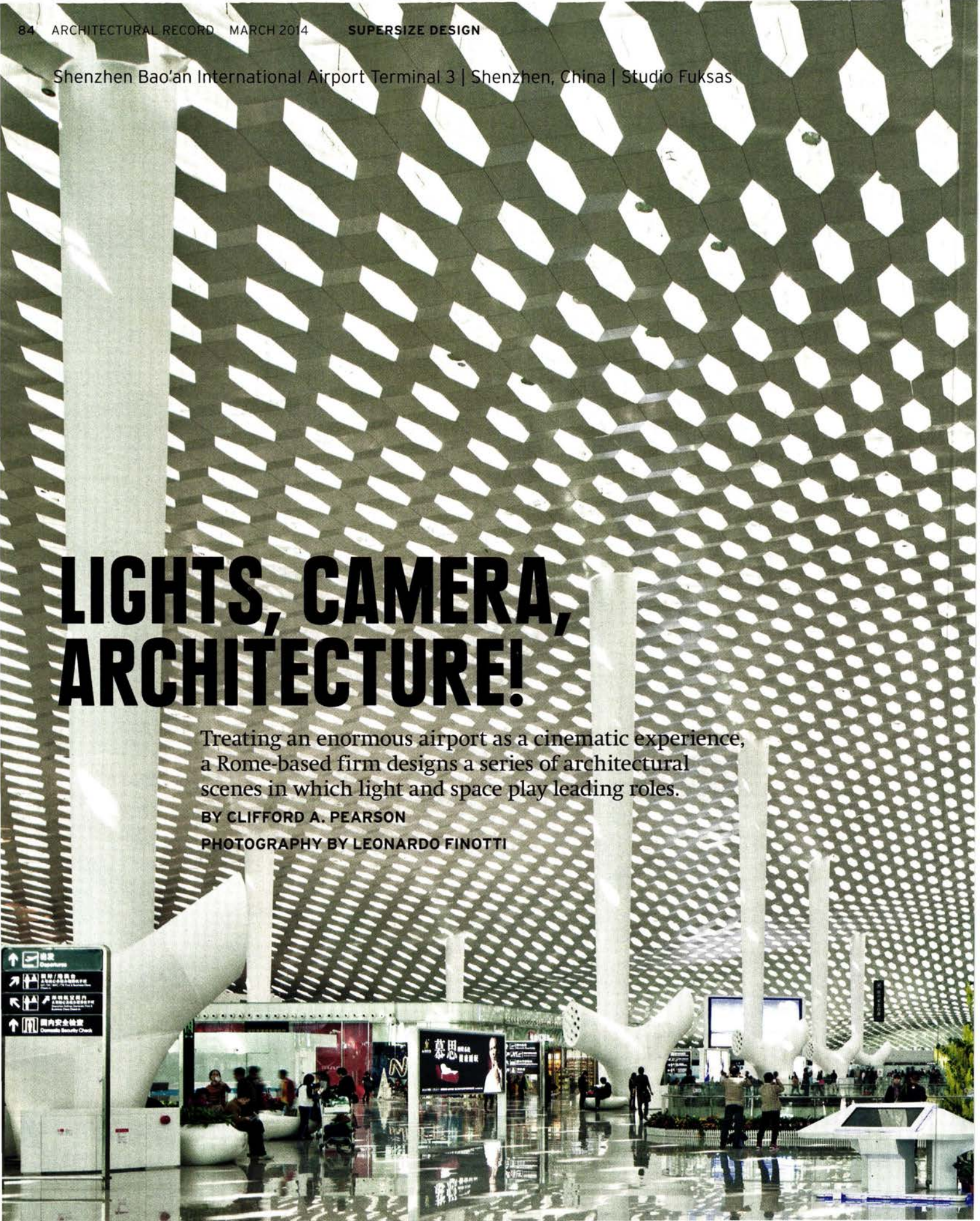
Shenzhen Bao'an International Airport Terminal 3 | Shenzhen, China | Studio Fuksas

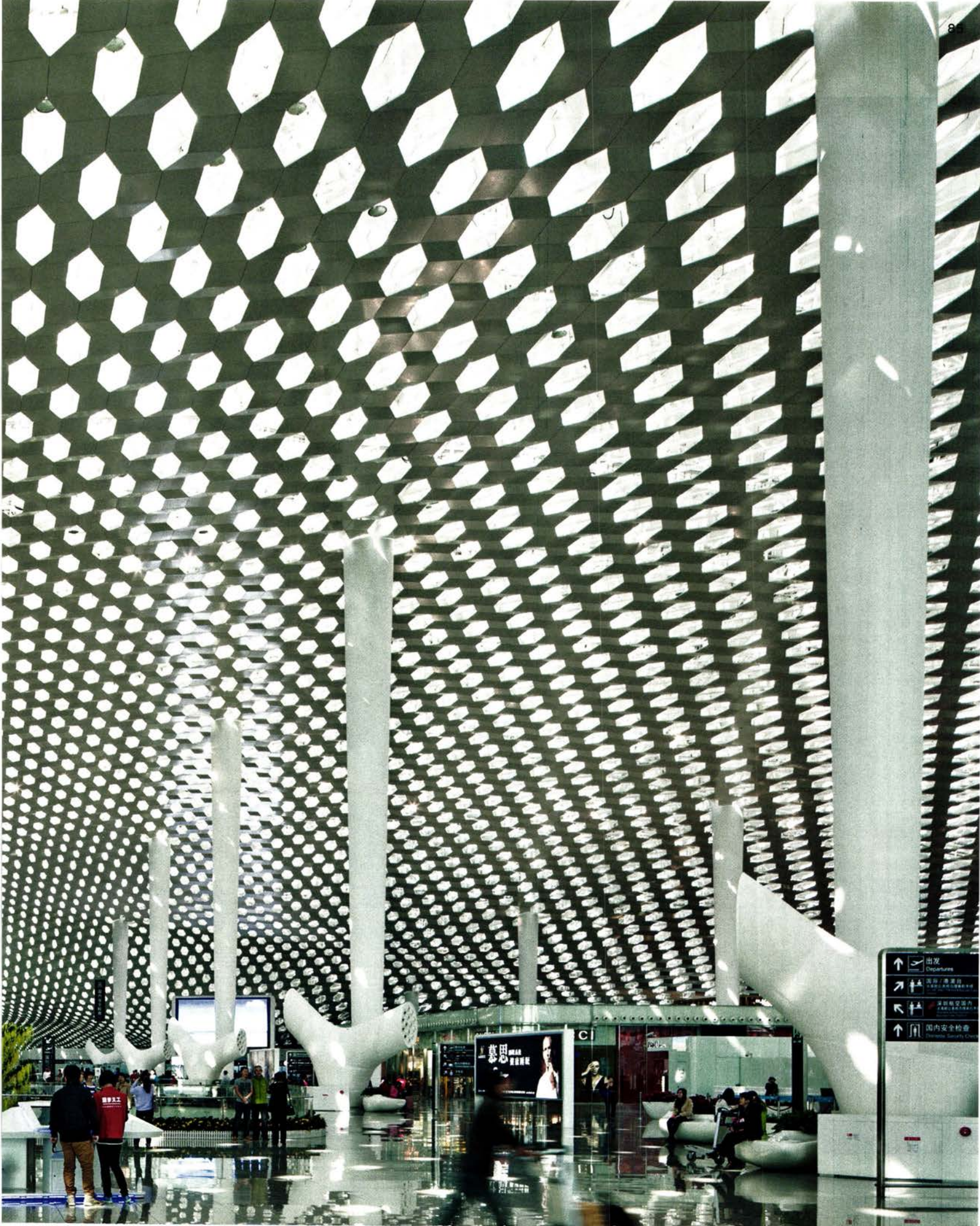
LIGHTS, CAMERA, ARCHITECTURE!

Treating an enormous airport as a cinematic experience, a Rome-based firm designs a series of architectural scenes in which light and space play leading roles.

BY CLIFFORD A. PEARSON

PHOTOGRAPHY BY LEONARDO FINOTTI




出发
Departures
国内安全检查

View additional images at architecturalrecord.com.

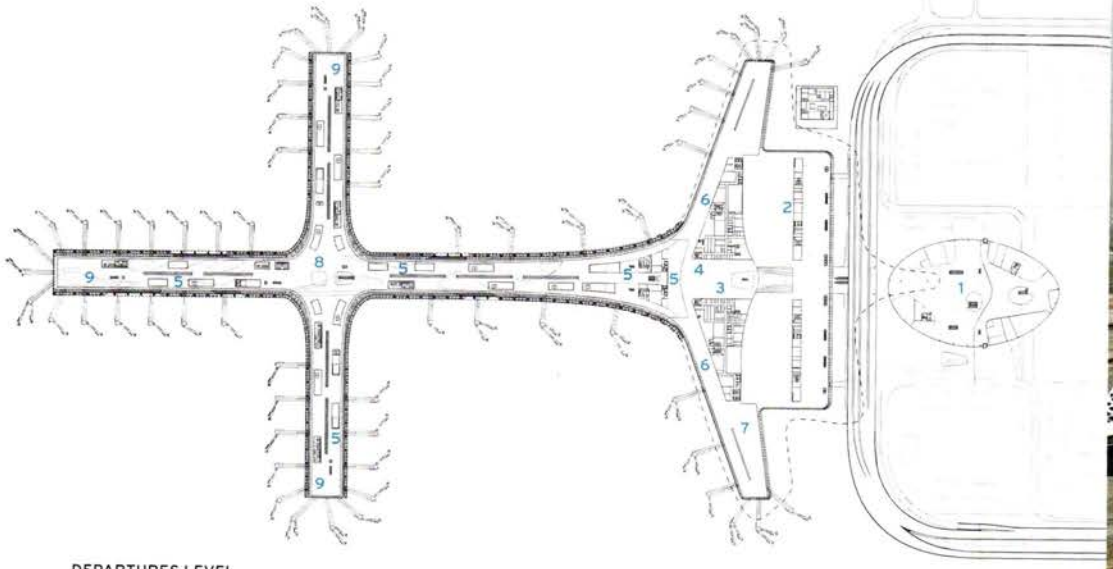
SPACE ODYSSEY
Although vast, the departures hall is given definition by its undulating ceiling, and scale by freestanding "trees" that supply air and electric light (previous spread). A canopy at the terminal's south end extends to an oval ground-transportation center (left and above). As in the departures hall, folded-metal panes form hexagonal openings in the soffit of the canopy.

I learned a lot about architecture from Hitchcock," says Massimiliano Fuksas, referring to Alfred, not Henry-Russell. "The way he edited his films and used montage to move them forward affected my approach to design." When developing his scheme for the enormous (5.4 million-square-foot) airport that opened this past November in Shenzhen, China, the Rome-based architect and his wife and partner Doriana thought of the building as a movie speeding along at 24 frames per second, fast enough for it to seem both continuous and ever-changing.

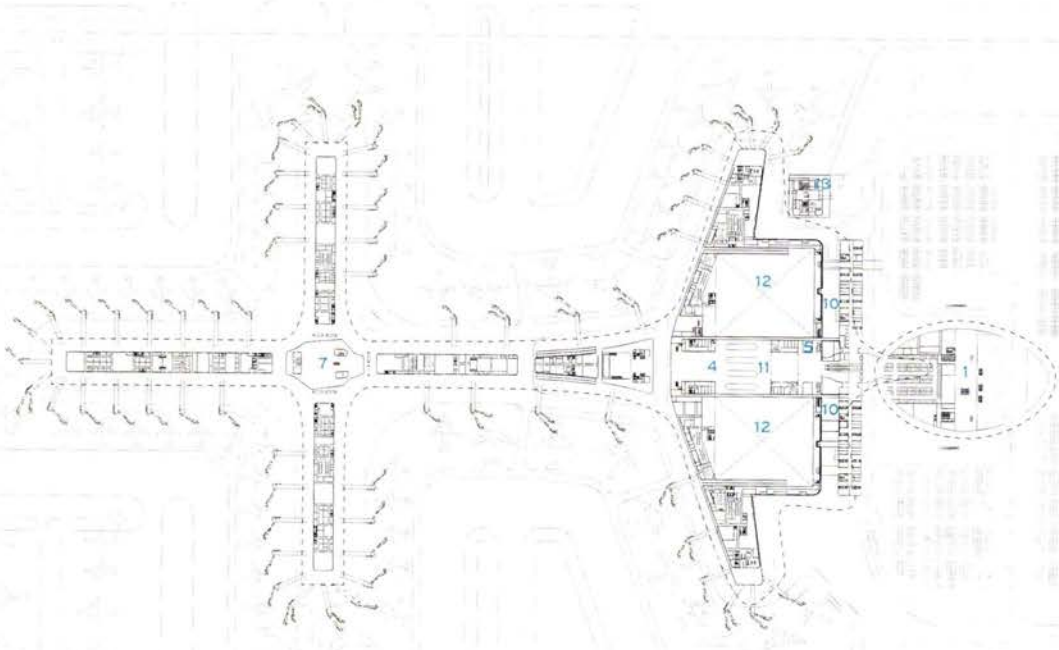
Size doesn't intimidate Fuksas. "We designed the Fiera in Milan in 30 days and built it in 27 months," he says, talking about the 2.1 million-square-foot trade fair complex, which features a nearly mile-long glass canopy (RECORD, August 2005, page 92). For Shenzhen Bao'an International Airport Terminal 3, which replaces a pair of nearby structures built in 2002 (ancient by Chinese standards), Fuksas knew that the basic organization had to be straightforward: departures on the top level, arrivals below, and a large drop-off/pick-up area at one end. The key was manipulating scale—making a gargantuan structure feel welcoming and understandable, while keeping it visually interesting for its entire length.

Fuksas won the competition to design the project in 2008, beating out Foster + Partners, Foreign Office Architects, von Gerkan Marg und Partner, Kisho Kurokawa, and Reiser + Umemoto. The fact that he had never designed an airport turned out to be an advantage, he says, since the client wanted a fresh approach that would make this terminal different from all others. The conceptual spark for the project came from an unlikely source. "Doriana and I were in New York and someone gave us a gift," recalls the architect. "As we opened it, we noticed the wrapping paper had a honeycomb pattern. It could be flat or bent and it was always beautiful."

By rolling a honeycomb surface into a tube, the architect and his team could create a unified structure in which walls



DEPARTURES LEVEL



ARRIVALS LEVEL

0 500 FT. 150 M.

1 GROUND-TRANSPORTATION CENTER
2 OFFICES
3 SECURITY CHECKPOINT
4 PASSPORT CONTROL
5 RETAIL
6 INTERNATIONAL DEPARTURES
7 BAR
8 INFORMATION
9 DOMESTIC DEPARTURES
10 GARDEN
11 BAGGAGE CLAIM
12 BAGGAGE HANDLING
13 VIP BUILDING

FLIGHT PATH
The new terminal stretches almost a mile, with 63 contact gates and another 15 remote gates accessed by shuttle buses.


349
350
348

and roof form a continuous element. To strengthen the tube, the architect made it a double-layered steel structure with enough space in between for access by maintenance workers. While the outer layer is made of flat panels of metal and glass, the inside layer is a three-dimensional lattice of folded metal pieces forming hexagonal openings. Puncturing the inner skin improves ventilation and pulls warm air away from people in the building, a critical factor in a hot climate like Shenzhen's. And the three-dimensional nature of the openings means they look different depending on the position of the viewer. Straight on, they are equal-sided hexagons; from an angle, they flatten out. So as you walk through the building, its envelope seems to flicker and dance as if it were an old film strip.

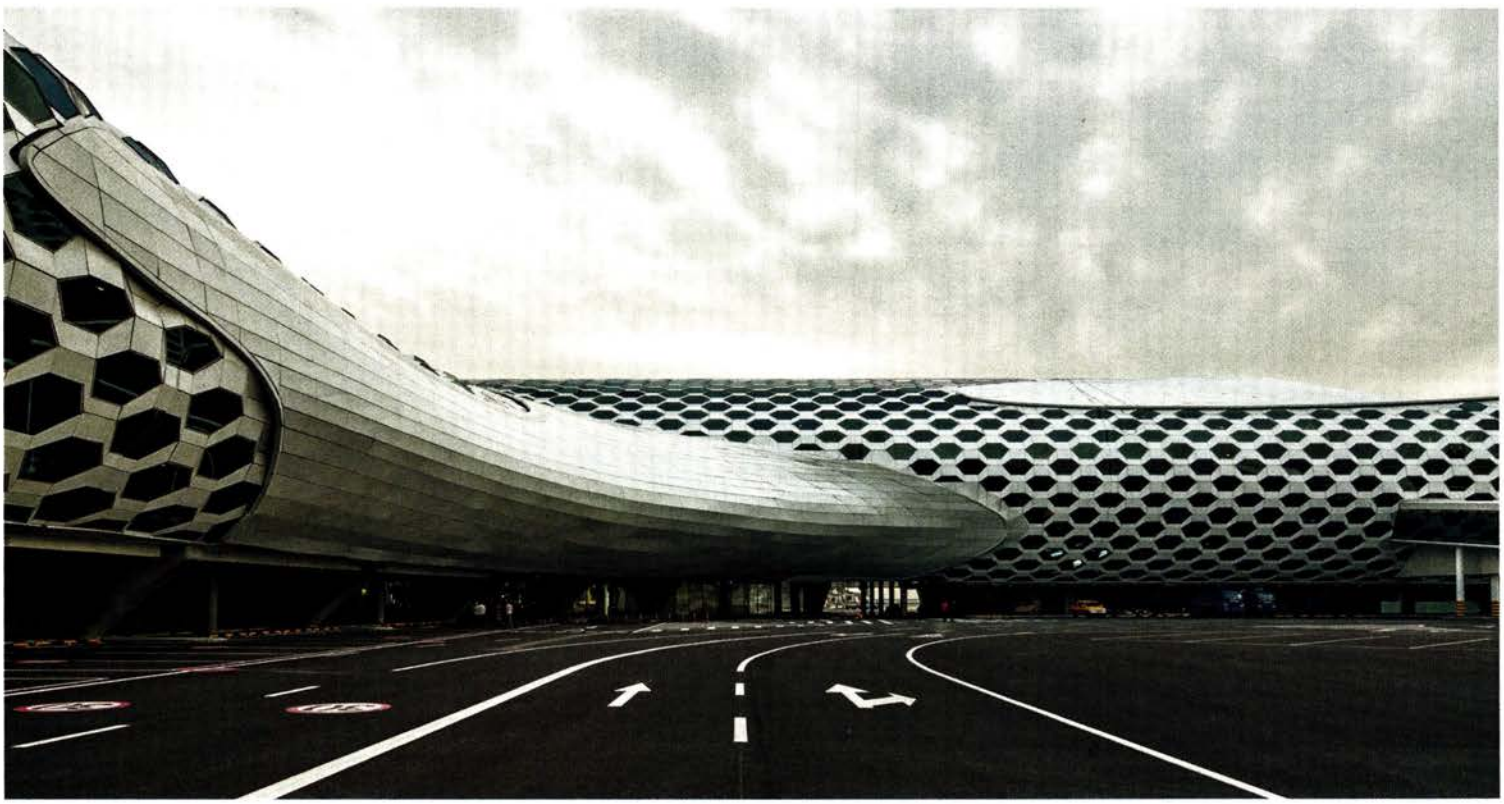
To vary the experience further, the architect scooped out a series of oblong skylights from the terminal's shell, lining the inner surface with sensuous curves that bring in extra daylight and animate the interior spaces. Throughout the building, the honeycomb surface changes character to break down the enormous scale of the project and tell people where they are. So the departure hall's folded-metal ceiling becomes a flat surface with punched openings in the arrivals concourse. And in an oval ground-transportation center on the southern end of the site, the ceiling is a flush plane with a pattern of perforated and solid hexagons.

Fuksas envisioned the sprawling interiors as an artificial landscape with a rolling ceiling above and about 250 white polycarbonate "trees" rising from the floors to supply cool air and electric light. While the tubular structure of the 0.93-mile-long concourse allows for roof spans of up to 260 feet, some columns were necessary. To reduce the visual impact of the columns, though, the architect tapered them

STRUCTURAL EFFICIENCY The terminal was built as a steel tube on a concrete substructure (below) to help speed construction, so the project could be completed in three years. Hexagonal openings in the interior skin are formed by aluminum panels, some that fold out and others that fold in (opposite). To reduce costs, the architect limited the types of panels to create the honeycomb surfaces.

credits

ARCHITECT: Studio Fuksas – Massimiliano Fuksas, Doriana Fuksas, partners
ARCHITECT OF RECORD: Beijing Institute of Architectural Design
ENGINEERS: Knippers Helbig Advanced Engineering (structural, facade, and parametric)
LIGHTING DESIGNER: Speirs + Major Associates
GENERAL CONTRACTOR: China State Construction Engineering
CLIENT: Shenzhen Airport (Group)
SIZE: 5.4 million square feet
COST: $992 million
COMPLETION DATE: November 2013




20
78
14
19
14-20
心与世界共飞扬
三号厅
VIP3

at the base and wrapped them in the same white polycarbonate as the freestanding air-trees. A simple palette of materials and colors (mostly whites and grays) plus polished-granite floors create an almost surreal sense of space and volume. It's not surprising to discover that Fuksas studied painting with de Chirico. "Doriana's idea was that the people in the building would provide the color," says Fuksas.

Working with the Beijing Institute of Architectural Design (BIAD), which served as the architect of record, Studio Fuksas delivered a terminal that can service up to 45 million passengers a year, a 58 percent increase from the old facility and a figure that makes it the fourth-busiest airport in China (after Beijing, Shanghai, and Guangzhou). The $992 million project, built in just three years, has 63 contact gates and 15 remote gates accessed by shuttle buses. A master plan envisions two more phases—one to be completed in 2025, which will add remote gates and connect the ground-transportation center with Shenzhen's subway system, and another in 2035.

Environmental concerns shaped much of the project. In addition to the porous ceiling that pulls warm air away from travelers and filters daylight, windows are oriented to mitigate solar gain and photovoltaics operate on the roof of a VIP building on the southeast part of the site. Future phases will add enough PVs to generate 10 MW of energy, says the client.

As in a Hitchcock movie or a de Chirico painting, the interior scenography of the Shenzhen airport seems both familiar and strange: its undulating ceiling and sweeping curves draw us forward while adding a delicious note of suspense by obscuring what comes next. ■

GETTING AROUND
Retail "boxes" stand inside the main departures concourse (left). On the arrivals level (above), flat ceilings give a different character to the space. (The scope of work for Studio Fuksas included designing stainless-steel counters at the gates and flight-information boards, as well as check-in "islands" and the retail boxes.)

CEU

Pearl River Tower | Guangzhou, China | Skidmore, Owings & Merrill

TOWERING AMBITION

The architects and engineers behind an office building in rapidly expanding Guangzhou put super green before supertall.

BY JOANN GONCHAR, AIA

PHOTOGRAPHY BY TIM GRIFFITH

NEW CROP The Pearl River Tower is one of many tall buildings that have recently sprouted in Guangzhou's new business district (above). Currently, three towers are taller, including the immediately adjacent Pinnacle, a 1,181-foot-tall skyscraper that resembles the Empire State Building (opposite).

In the realm of supertall skyscrapers, the recently completed Pearl River Tower (PRT) in Guangzhou, China, isn't that tall. At 1,020 feet, it is the 59th-tallest tower in the world, and just 36 feet taller than the 300-meter (984 feet) minimum that constitutes one widely held definition of a supertall building. It isn't even the tallest in Guangzhou's new business district, where shiny office and hotel towers are arranged—much like tchotchkes on a coffee table—around a park that covers a subway station and a vast underground shopping mall.

But even though it isn't among the tallest of the supertall, the 2.3 million-square-foot PRT, conceived as the headquarters of a state-owned tobacco company and as office space for lease, was built with lofty aspirations. Architects and engineers from Skidmore, Owings & Merrill (SOM), who were awarded the project through a design competition held in late 2005, aimed to make the skyscraper ultra-green: they set their sights on a net zero energy building.

They developed this goal well before the architecture and engineering professions had reached consensus about what the term net zero energy meant. But they say their objective was a building that generates the same amount of energy as it uses on an annual basis, taking into account the energy that is lost in power transmission. Their ambition was a tower that had no impact on overall fuel consumption, explains Roger Frechette, SOM's former mechanical engineering lead on the project and now a principal at Interface Engineering.

As it turns out, the project faced several technical and regulatory challenges that made the net zero goal elusive. Furthermore, almost all of the PRT's 71 floors remain empty, even though the tower was completed last April: the Guangdong Tobacco Corporation's planned move into 10 floors near the top of the tower, as

CEU

well as the leasing of the rest of the building, is on hold as a result of a government reevaluation of its policies regarding state-owned enterprises.

But even in its currently almost empty state, the building merits a close look for its highly integrated approach to sustainability—an approach that helped the PRT earn LEED Platinum—one of only a handful of supertall towers to attain this status. According to its LEED scorecard, the building is estimated to use an impressive 44 percent less energy than a similar tower built to the American energy standard ASHRAE 90.1-2007.

Curiously, the project's competition did not call for an ultra-green, or even a sustainable or energy-efficient building. Instead, it stated that the tower should allow "nature and mankind to exist in harmony," says Zhiming Ye, managing director Guangzhou Pearl River Tower Properties, a subsidiary of the tobacco company. The net zero target came from SOM, in part, as a means of differentiating its entry, says Frechette. The "goal galvanized the team," he says.

In their quest for net zero, the designers questioned conventional thinking about energy efficiency. "We unpacked everything we normally assume about buildings," says Gordon Gill, senior design architect on the project until late 2006, when he founded a new firm with Adrian Smith, also formerly with SOM.

The PRT team proposed 18 tightly coordinated strategies for shaving the tower's energy use, for recovering energy, and for generating power, using technologies that were state-of-the-art. "It wasn't that they hadn't been implemented elsewhere," says Richard Tomlinson, SOM managing partner, "but we put them together in a way that hadn't been done before."

The ultimately realized building has a double-story lobby handsomely outfitted with a fritted glass ceiling and suspended metal panels that reflect daylight deep into its interior. On top of this are five floors of restaurants and other amenities for workers and for visitors to an adjacent conference center, and then four zones of office floors.

The glass-clad, composite structure of concrete and steel incorporates most, but not all of SOM's originally proposed strategies. It has generally rectangular floor plates and a subtly concave south elevation, a slightly convex north elevation, and a bullet-shaped roof. The PRT is further sculpted to provide inlets or ports for what arguably is the project's only truly exotic technology—two pairs of building-integrated vertical axis wind turbines (VAWTs) inserted at floors 25 and 50.

The result is a tower that resembles an outsize smart phone or some other sleekly designed consumer electronic. But the shape is not arbitrary, insist the designers. The PRT's contours, along with its orientation (13.6 degrees off the new business district's orthogonal grid), are intended to capture prevailing southerly winds to maximize the VAWTs' electricity generation. It is also meant to make the most of the performance of photovoltaic (PV) panels that are integrated into the glazed roof and incorporated into shading louvers mounted on the narrow east and west facades. In addition, the configuration serves to minimize exposure of the broad south face to intense late-day sun. With the PRT, "form follows performance," says Gill.

Early plans for the building included a third system for generating electricity—natural-gas-fired microturbines—on top of the two renewable-energy technologies. But even though they were essential to the net zero goal, the micro-

LIGHT-FILLED LOBBY
The building's main entry (left) is on its south side, where projecting louvers create a portico-like space and bounce daylight deep into the double-story lobby (above). Curved metal ceiling panels and fritted glass enhance the light and airy effect.

turbines were one of a handful of technologies eventually eliminated from the final scheme (a geothermal heat-exchange system was also abandoned because testing revealed that the groundwater was too warm).

The microturbines proved impractical because local regulations prohibited the PRT from selling excess power back to the grid. Without them, the building is expected to produce about 332 megawatt-hours per year (132 from the VAWTs and 200 from the PVs), offsetting just a portion of its energy load.

In addition to the highly visible VAWTs and the PVs, the building incorporates less immediately apparent measures that should make substantial contributions to the building's performance. One example is a set of integrated technologies for controlling the climate on the office floors. These include a raised-floor displacement ventilation system, a double-wall facade with a 9-inch-wide cavity, and a radiant ceiling made of coved metal panels that elegantly house daylight-responsive LED lighting. The elements are designed to work in concert to keep temperatures and humidity in check, even during Guangzhou's sticky summers, but use significantly less energy than a typical variable air volume (VAV) system.

This combination of systems cools the office floors by circulating chilled water through copper tubing in the ceiling panels. It ventilates the spaces from below, through the raised floor. And, by drawing return room air through the curtain wall cavity, directing it through ceiling ducts to the air-handling units, it prevents the sun from heating up the interior surface of the facade. The use of a low-E coated insulated glazing unit for the double-skin wall's outer lite, as well as auto-

credits

ARCHITECT: Skidmore, Owings & Merrill – Richard F. Tomlinson II, managing partner; William F. Baker, structural partner; Luke Leung, MEP director; Jaime Velez, interior design director; Thomas Kerwin, former managing director; Adrian Smith, consulting design partner; Roger Frechette, former MEP director; Gordon Gill, former senior design architect; Shean-Horng Chien, project manager; Yue Zhu, technical architect

ARCHITECT OF RECORD: Guangzhou Design Institute

CONSULTANTS: Pivotal Lighting Design (lighting); Rowan Williams Davies & Irwin (wind tunnel testing); SWA Group (landscape)

ENGINEERS: Skidmore, Owings & Merrill

GENERAL CONTRACTOR: Shanghai Construction Group

CLIENT: Guangzhou Pearl River Tower Properties

SIZE: 2.3 million square feet

COST: withheld

COMPLETION DATE: April 2013

SOURCES

CURTAIN WALL: JiangHo

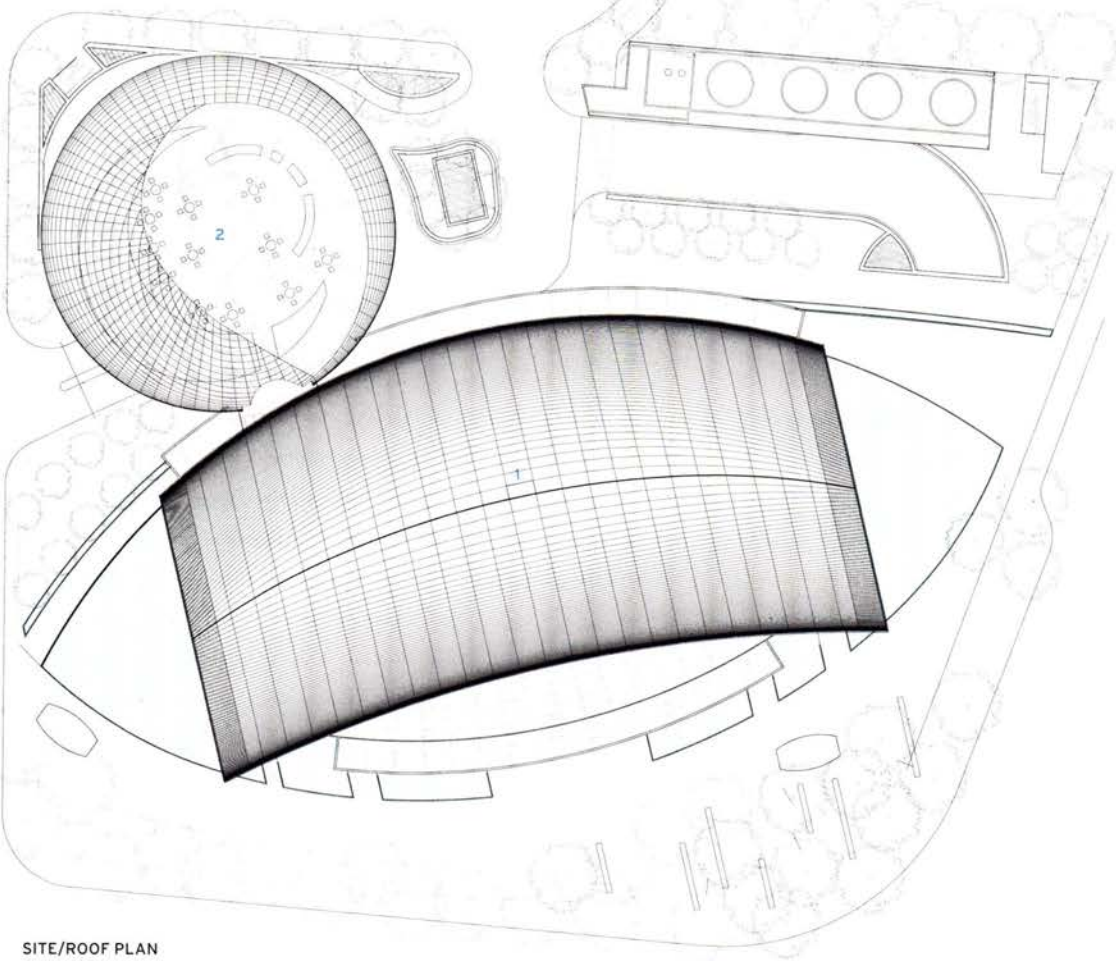
GLAZING: Southern China Glass

WIND TURBINES: Windside

RADIANT CEILING: Trox

ELEVATORS: Otis

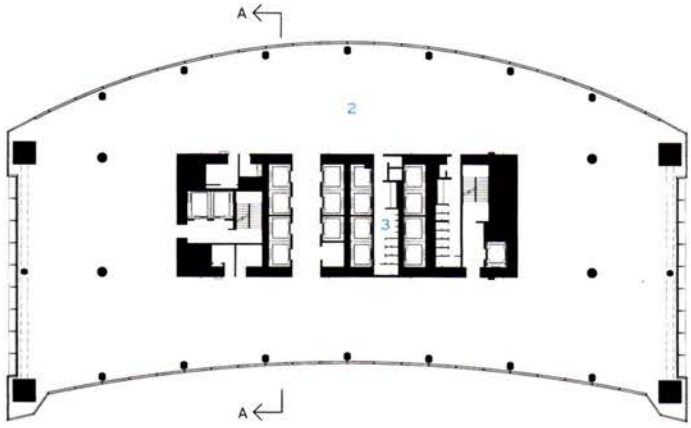
FACADE MAINTENANCE SYSTEM: Cox



SITE/ROOF PLAN

0 60 FT. 20 M.

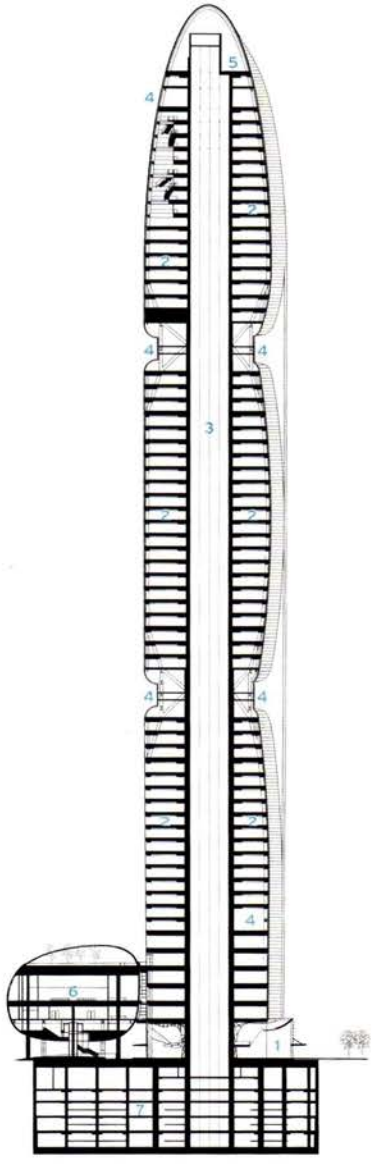
1 OFFICE TOWER
2 CONFERENCE CENTER



TYPICAL FLOOR PLAN

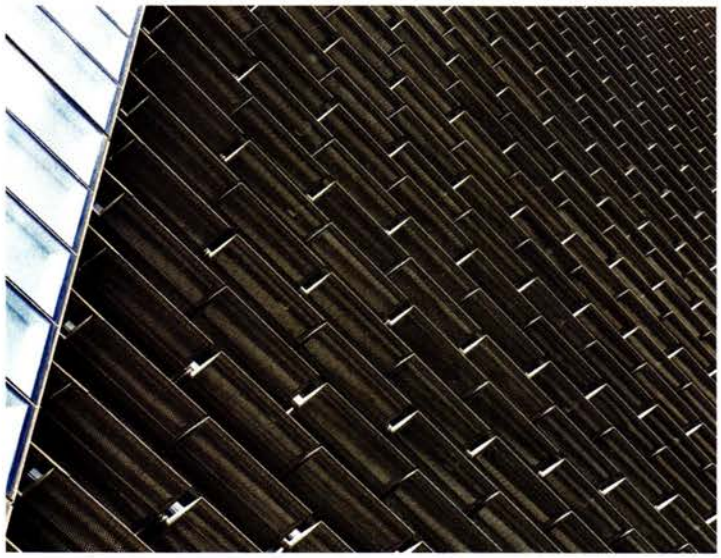
0 60 FT. 20 M.

1 MAIN LOBBY
2 OFFICE SPACE
3 CORE
4 MECHANICAL
5 BUSINESS CLUB
6 CONFERENCE CENTER
7 PARKING

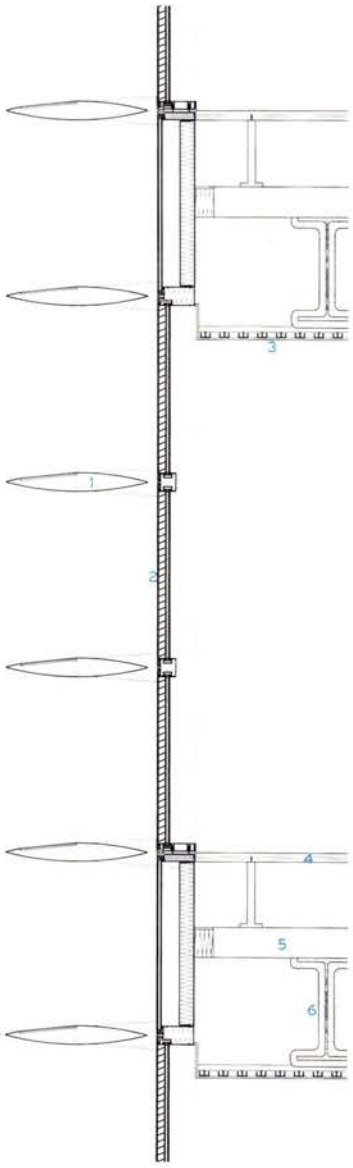


SECTION A - A

0 60 FT. 20 M.



DOUBLE DUTY
Mounted on the narrow east and west facades (above and right) are louvers that incorporate PV panels, which allow the fixed horizontal elements to simultaneously provide shade and generate electricity.



1 LOUVER WITH INTEGRATED PHOTOVOLTAIC
2 GLAZING
3 RADIANT CEILING
4 RAISED FLOOR
5 FLOOR SLAB
6 BEAM

EAST/WEST FACADE DETAIL 0 3 FT. 1 M.

CEU

mated blinds enclosed within the cavity, also helps mitigate solar gain.

These systems are designed to deliver other benefits, in addition to saving energy. Elements such as the vaulted ceiling and the curve of the north and south facades should make for architecturally interesting work spaces once the office floors are fitted out. And features like the double-skin curtain wall should improve the occupants' comfort. Not only does it help maintain tolerable temperature and humidity levels, it also reduces the penetration of noise from the exterior. The skin provides health benefits as well, since it is less prone to air leakage than a conventional curtain wall. This is a particular concern in China's cities, where air quality is poor, points out mechanical engineer Luke Leung, an SOM director. If outdoor air does leak into the vented cavity, it is simply returned to the exhaust airstream, where it is flushed of contaminants, he explains.

The approach to cooling and ventilating the tower also helped the owner more effectively take advantage of the allowed zoning envelope. Because the PRT's climate control systems required little ductwork, the designers were able to reduce the typical floor-to-floor height by almost 12 inches without sacrificing ceiling height. This in turn permitted the addition of five floors the owner would not otherwise have been able to build.

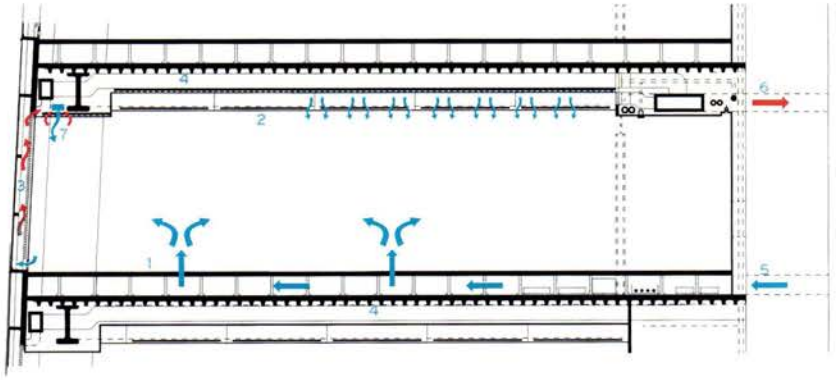
Other features also perform double duty. For instance, the PVs on the building's west and east faces provide shade while generating electricity. The four inlets containing the VAWTs offer another example. Their shape and location were determined primarily with the aim of taking advantage of the Venturi effect to accelerate the velocity of the wind rushing through them, and therefore increase their power generation potential. However, the holes also serve to reduce the pressure differential between the building's windward and leeward facades—a phenomenon that was confirmed by wind-tunnel testing, says Shean Chien, SOM project manager. This reduction allowed the use of less steel and concrete, saving both money and embodied energy (the energy consumed in the manufacture of building materials and in construction).

This level of integration, with sustainability measures serving multiple purposes, is what makes the PRT noteworthy, even if it is—for the time being at least—almost empty, and even if it falls short of the original net zero goal. Net zero, according to many of those involved in the project, is a particularly tough mark for a tall building to reach, not to mention a supertall building.

According to Leung, as a building grows taller, it generally consumes more energy per unit area. Elevators and other building systems, such as those for plumbing and HVAC, require more power in taller structures, he explains. Several sources point to challenges on the power-generation side: skyscrapers do not offer the type of large, unobstructed horizontal surfaces that are best suited for mounting PVs.

In contrast, Frechette maintains that there is no technical reason that a skyscraper can't be net zero. However, he notes that there are important financial considerations. "Tall buildings are typically a bigger investment and therefore represent a much larger risk," he says. "It is easier to test new ideas on a smaller scale."

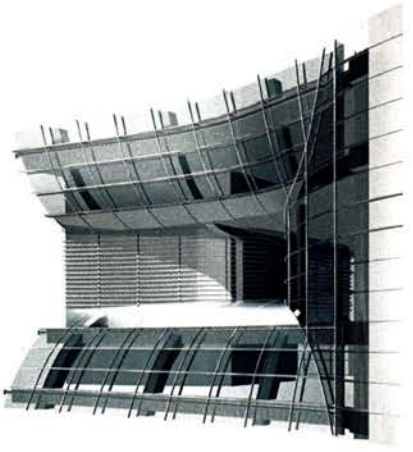
For his part, the client, Ye from Guangzhou Pearl River Properties, is clearly proud of the tower. He is especially pleased with those features, like the quality of its air, that should improve the working environment of its occupants. If he were to have the chance to build another supertall building, he says he would strive to achieve an even more sustainable design. "There is always room for improvement," he notes. However, better energy performance would not be achieved at the expense of its users. "We'd want to make sure the building would be practical and that it would meet the functional needs of tenants." ■



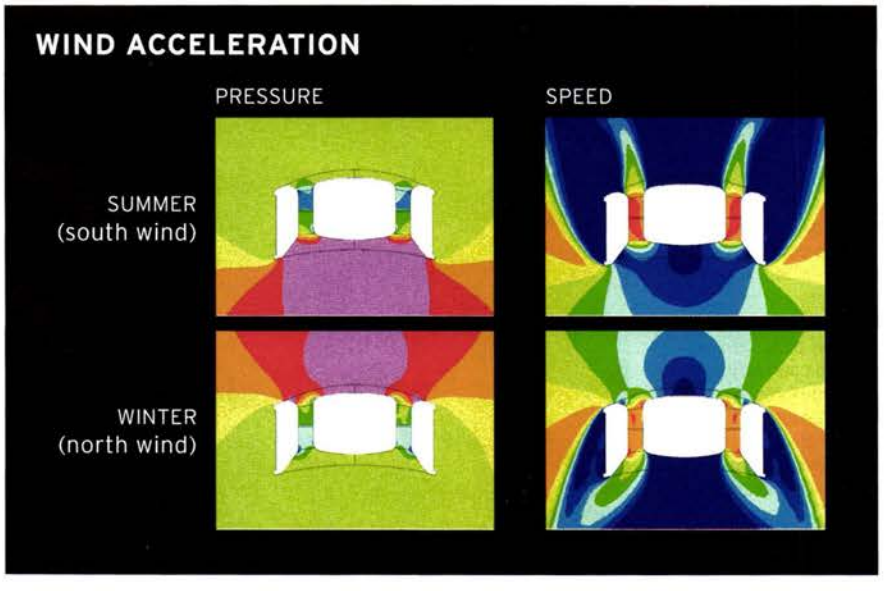
CLIMATE CONTROL DIAGRAM

1 RAISED FLOOR
2 RADIANT CEILING
3 CURTAIN WALL CAVITY
4 FLOOR SLAB
5 AIR SUPPLY
6 RETURN AIR
7 FAN COIL

CURVED AND COVED
The office floors benefit from a coordinated set of systems, including a curved double-skin curtain wall with integrated shades, a coved radiant ceiling, and raised-floor displacement ventilation.



SCULPTED AND SHAPED The tower's envelope includes four inlets or ducts (above), each containing a vertical axis wind turbine (left). CFD modeling (bottom) helped designers shape the ducts to accelerate the speed of the wind rushing through them and therefore increase the electricity-generating potential of the turbines.



Continuing Education

To earn one AIA learning unit (LU), including one hour of health, safety, and welfare (HSW) credit, read "Towering Ambition" and complete the test, at no charge, at architecturalrecord.com. Upon passing the test, you will receive a certificate of completion, and your credit will be automatically reported to the AIA. Additional information regarding credit-reporting and continuing-education requirements can be found online at ce.construction.com.

Learning Objectives

1 Outline the definition of net zero energy developed by the Pearl River Tower (PRT) design team.

2 Explain how the PRT is shaped and oriented to optimize the power generation potential of its photovoltaic panels and vertical axis wind turbines.

3 Describe the set of coordinated systems devised to keep the PRT's office floors comfortable while saving energy.

4 Discuss the financial, regulatory, and technical challenges associated with designing an energy-efficient supertall tower.

AIA/CES Course #K1403A

FOR CEU CREDIT, READ "TOWERING AMBITION" AND TAKE THE QUIZ AT CE.CONSTRUCTION.COM, OR USE OUR FREE ARCHITECTURAL RECORD CONTINUING-EDUCATION APP, AVAILABLE IN THE ITUNES STORE.

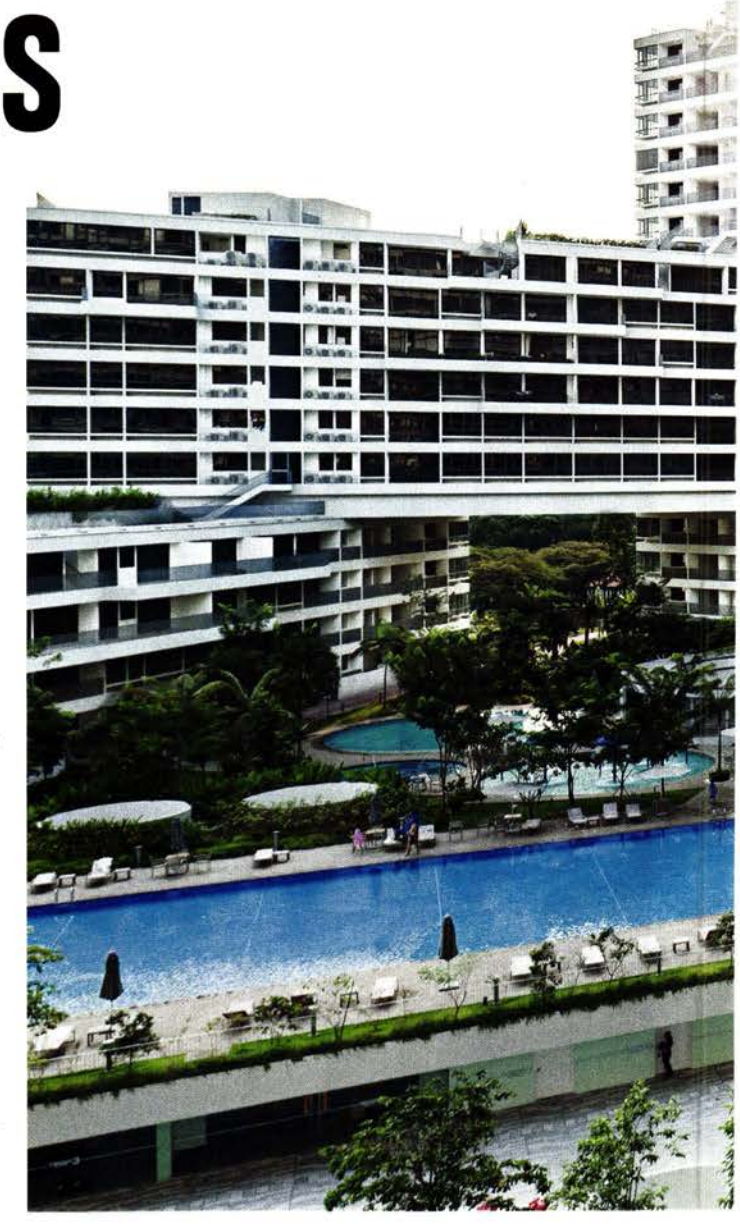
The Interlace | Singapore | Office for Metropolitan Architecture

STACK THE DECKS

Architect Ole Scheeren hypothesized that dense urban residential living didn't have to occur in an isolating skyscraper—and he was right.

BY LAURA RASKIN

PHOTOGRAPHY BY IWAN BAAN



HORIZONTAL HIGH-RISE
The Interlace's 31 building blocks weave around lush shared courtyards with amenities like a lap pool. The circular podium at the end of the pool will soon become a waterfall feature (right). Underground parking (not pictured) keeps the courtyards pedestrian-friendly. Openings in the plinth mean that the parking garage is flooded with daylight.

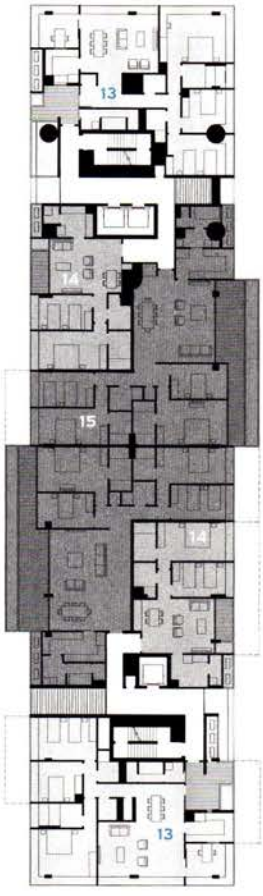
Ole Scheeren is no stranger to megaprojects. As a former partner and director at the Office for Metropolitan Architecture (OMA), he led the design and construction of the 5.1 million-square-foot CCTV Headquarters in Beijing (RECORD, November 2012, page 86) and was the lead designer of the MahaNakhon Tower in Bangkok, which, when completed in 2016, will be the tallest in the city at 77 stories and 1,030 feet.

In 2010, Scheeren left OMA to open his own firm, Buro Ole Scheeren, with offices in Beijing and Hong Kong, and he has continued this large-scale work with a mixed-use tower rising in Kuala Lumpur, another under construction in Singapore, and a cultural center in Beijing. "I think architects always battle an ironic position. Once you have a certain amount of success, you are only associated with that success," says Scheeren.

At a superficial glance, the Interlace—a 1.8 million-square-foot apartment complex with 1,040 units—is another of these projects, the design of which Scheeren completed before he

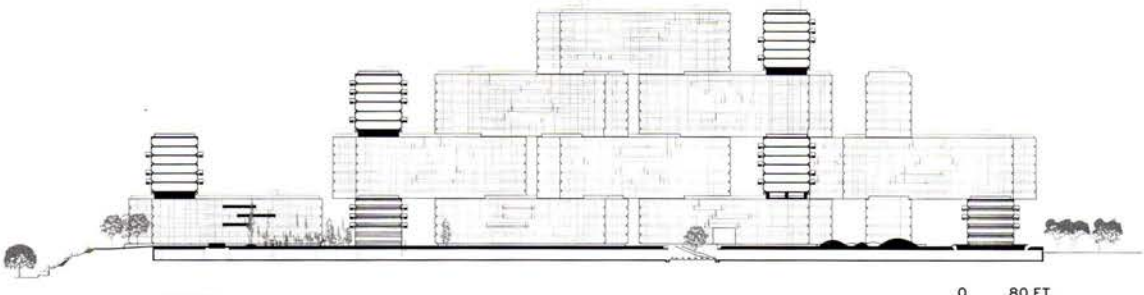
View additional images at architecturalrecord.com.

SITE PLAN



TYPICAL BLOCK PLAN

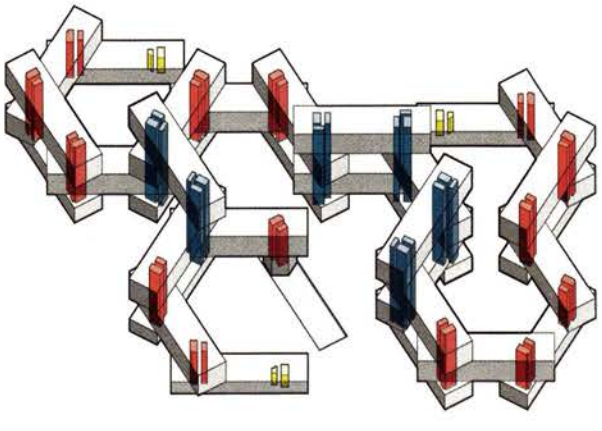
0 16 FT. 5 M.



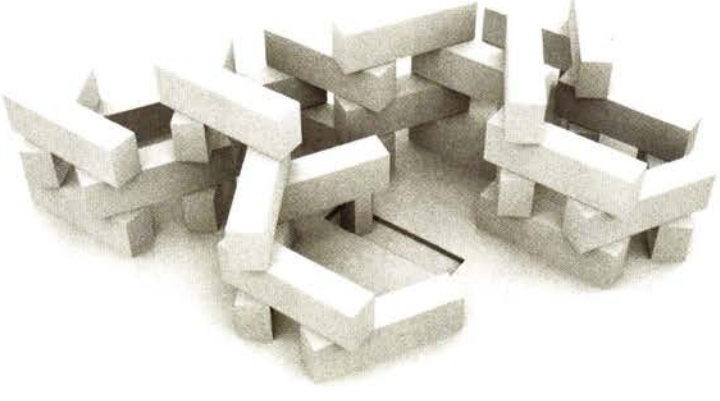
SECTION A - A

0 80 FT. 25 M.

1 ENTRANCE
2 LAP POOL
3 CHILDREN'S POOL
4 LEISURE POOL/OUTDOOR DINING
5 BAMBOO GARDEN/PICNIC AREA
6 THEATER PLAZA
7 LOTUS POND
8 JACUZZI/HOT TUB
9 PICNIC/PLAY AREAS
10 CLUBHOUSE/MANAGEMENT CENTER
11 TENNIS COURT
12 1 KM JOGGING TRACK
13 3 BEDROOM UNIT
14 2 BEDROOM UNIT
15 PENTHOUSE



CORE STRENGTH The diagram above shows the blocks' shared cores. Red = two elevators, one stair; blue = two elevators, two stairs; yellow = one elevator, one stair.



left OMA, that threatens to further pigeonhole the architect. It is a breathtaking one, made up of 31 six-story rectangular blocks that appear woven, and are arranged on top of each other at angles. The flush, white-painted concrete facades are occasionally interrupted by slender horizontal balconies, from which greenery will cascade as it grows. The building snakes around and through its roughly rectangular 20-acre site like a line of toppled dominoes.

But this isn't big for big's sake. The Interlace is smart architecture, and its intelligence is inextricable from its context. Singapore is crowded with drab residential high-rises—any attempt at "design," if it was there to begin with, has been whitewashed by a slavish adherence to developers' strict economic-efficiency ratios. This leads to "self-referential, isolated, vertical extrusions that leave very little sense of community," says Scheeren. A good example is d'Leedon, Zaha Hadid's seven 36-story residential towers, still under construction, that show almost no sign of their creator's outrageous signature. "Singapore is one of the most refined and ruthless markets," says Scheeren. "If you do not hit certain efficiency targets, you simply cannot build." This economic pressure has forced architects into a design "straightjacket," he says.

Scheeren believed he could break free of these constraints even while working within them. Singapore is home to 5.3 million people, with the government projecting there will be 6.9 million by 2030. "There is a need for increased density and also a sense of privacy and individuality," says the architect, who believes that both the look and feel of a village can be maintained at a large scale. The question he wanted to answer was: "How could we gain some of these qualities back so there is a sense of togetherness and a texture that expresses that visually?"

In 2007, CapitaLand, the largest residential developer in Singapore, behind Hadid's project and many others, commissioned Scheeren to design what became the Interlace. It sits in a lush greenbelt to the west of the downtown core, about two miles from the National University of Singapore and a mile from the ocean. Originally, CapitaLand proposed 12 towers for the site, each 24 stories tall, which would have

WARP AND WEFT
Seen from a distance in its entirety, the Interlace's blocks appear woven together. A 1-kilometer walking and running track winds around and through the property, doubling as the fire-access route (above). The hexagon pattern on the underside of the blocks creates more visual interest if looking up from below, as it is tempting to do (next page).

credits

ARCHITECT: Office for Metropolitan Architecture (OMA) – Ole Scheeren, partner in charge, lead designer; Eric Chang, associate; Toby Wong, Andrew Lo, Erik Amir, project architects (see complete list online)

EXECUTIVE ARCHITECT: RSP Architects Planners & Engineers

ENGINEERS: Arup (structural, facade); RSP Architects Planners & Engineers (structural); Squire Mech (mechanical); T.Y. Lin International Group (civil, structural, construction, inspection)

CONSULTANTS: ICN Design International (landscape); Arup (sustainability); 2x4 (graphic design); Lighting Planners Associates (lighting); Acviron Acoustics Consultants (acoustical)

GENERAL CONTRACTOR: Woh Hup

CLIENT: CapitaLand Residential Singapore

SIZE: 1.8 million square feet

COST: withheld

COMPLETION DATE: September 2013

RESIDENTIAL TRANSFORMER
Because the entire building is such a bold, abstract figure, Scheeren mostly kept the lines of the individual blocks clean, fitting balconies, air-conditioning ledges, and windows into the same plane (opposite). Green roofs and decks are abundant and become an extension of the living spaces (above).

resulted in about 115 feet of residual space between the towers, "like a mini-Manhattan in the middle of nowhere," says Scheeren. Instead, he "toppled the towers," making the vertical horizontal. Taking blocks 230 feet long and 54 feet deep, he arranged them in hexagons and then rotated them 120 degrees. This allowed for around 200 feet of space between the towers and views out—to the tropical forest, ocean, and other buildings nearby—at every turn.

The architect varied the concrete buildings' height—among 6, 12, 18, and 24 stories—by stacking the volumes in different configurations. "It's still a skyscraper, but it reads entirely differently," says Scheeren. The points where the volumes overlap—again, hexagons—become the "megacores," which contain services and circulation. The megacores are made of six columns that help support the blocks.

Though the unified form is enormous by any measure, the effect on the ground, or from a balcony, is never oppressive. "It's both defined and yet totally permeable," says Scheeren, and he's right. This is in part achieved by an interconnected series of eight courtyards that knit the structures together, each with a slightly different program. The building volumes shade these spaces, which are meant to inspire community and are filled with greenery and water features. They also serve as the circulation path leading to each core. Though OMA did not design the individual units' interiors, Scheeren made sure not to sacrifice the spatial quality of the two-, three-, and four-bedroom apartments (and penthouses) for an expressive exterior. The generous units have simple finishes and ample windows, however bland.

Scheeren moved to Beijing in 2004 to oversee the design and construction of CCTV, and he lived in Bangkok in the 1990s. He has long had a fascination with building for the tropics, and the tug-of-war between nature and the man-made. With the Interlace, he wanted to make the complex appear to disappear—after a few years, the plantings hanging off of its terraces and roofs, as well as those in the courtyards, should begin to stake their claim on the building. "Here, things are overgrown. There is something quite spectacular in a way about that power of nature," he says. The architect also conducted solar studies and put many passive systems in place, capitalizing on prevailing northern winds. The permeability of the open-block structure allows breezes to pass through them and over water features, making a recent 85-degree day feel cool.

With people still moving in, it is unclear whether the Interlace will be successful in creating the kind of communal society Scheeren envisioned. A couple of cab drivers and some local architects question the complex's location, away from the central business district and lacking easy access to amenities (some stores and services are planned for the building's ground level). Private development in Singapore is extremely expensive, and most residents live in public housing (80 percent, according to the Housing & Development Board, or HDB, with 95 percent of them owning their flats). In comparison, the Interlace is among the more affordable. Whether or not it becomes a prototype for high-density living in Singapore or other cities, Scheeren has successfully demonstrated that strict regulations don't have to dictate a poor quality of life or design. "Just because no one has done it doesn't mean it's impossible to think about it differently," he says. ■

De Rotterdam | Rotterdam | Office for Metropolitan Architecture

BRINGING XL BACK HOME

Having completed huge projects in Asia, Rem Koolhaas and his Office for Metropolitan Architecture apply their strategies for building extra-large to the small city in which they are based.

BY HUGH PEARMAN

STANDING TALL
Rising from the Wilhelminapier, the 1.74 million-square-foot complex brings together residential, office, and hotel components on top of a plinth that has shared spaces for conferences, restaurants, shops, and recreation.

When I went to Rotterdam to see the largest single building in The Netherlands, the eponymous De Rotterdam by OMA, it reminded me of something. But I couldn't put my finger on it. Walking back over UNStudio's elegantly sculptural 1996 Erasmus Bridge crossing the River Maas, I turned to take a photograph. Back home in London, I showed it to a friend. "Easter Island statues," she said, instantly. Spot on. It's surely not intended, but it's there: the hauteur, the sense of enigmatic ancestor-guardians lining the water's edge, but also the anonymity. The Polynesian statues are simplified representations of human heads. They vary, but there is no individual human expression. Like De Rotterdam, they are mostly arranged on strongly expressed horizontal plinths.

In the case of this building (and it is one building, though it reads as several), OMA's founder Rem Koolhaas originally proposed different facade treatments for the main functions (apartments, offices, hotel). But then came the moment—one of several such rethinks in the stop-and-start 17-year gestation of this project—when costs had to be shaved. Koolhaas and his design partners Ellen van Loon and Reiner de Graaf decided to apply a uniform proprietary cladding system to the whole complex, liked the result, and stuck to it through many more changes over the years, including at one point, a 40 percent increase in size. As built, it has well over half a million square feet of aluminium-framed-glass curtain wall hung on its poured-concrete structure, and finally cost $475 million altogether ($338 million for construction). But take with a pinch of salt the architect's claim that it has built a "vertical city." It's a very large and imposing chunk of upmarket real estate, which is not the same thing. It is, however, large enough to command this flat, watery urban landscape and to shift one's perceptions of the city. The big thing around here used to be the Erasmus Bridge; with De Rotterdam as a backdrop, it now seems smaller than before.

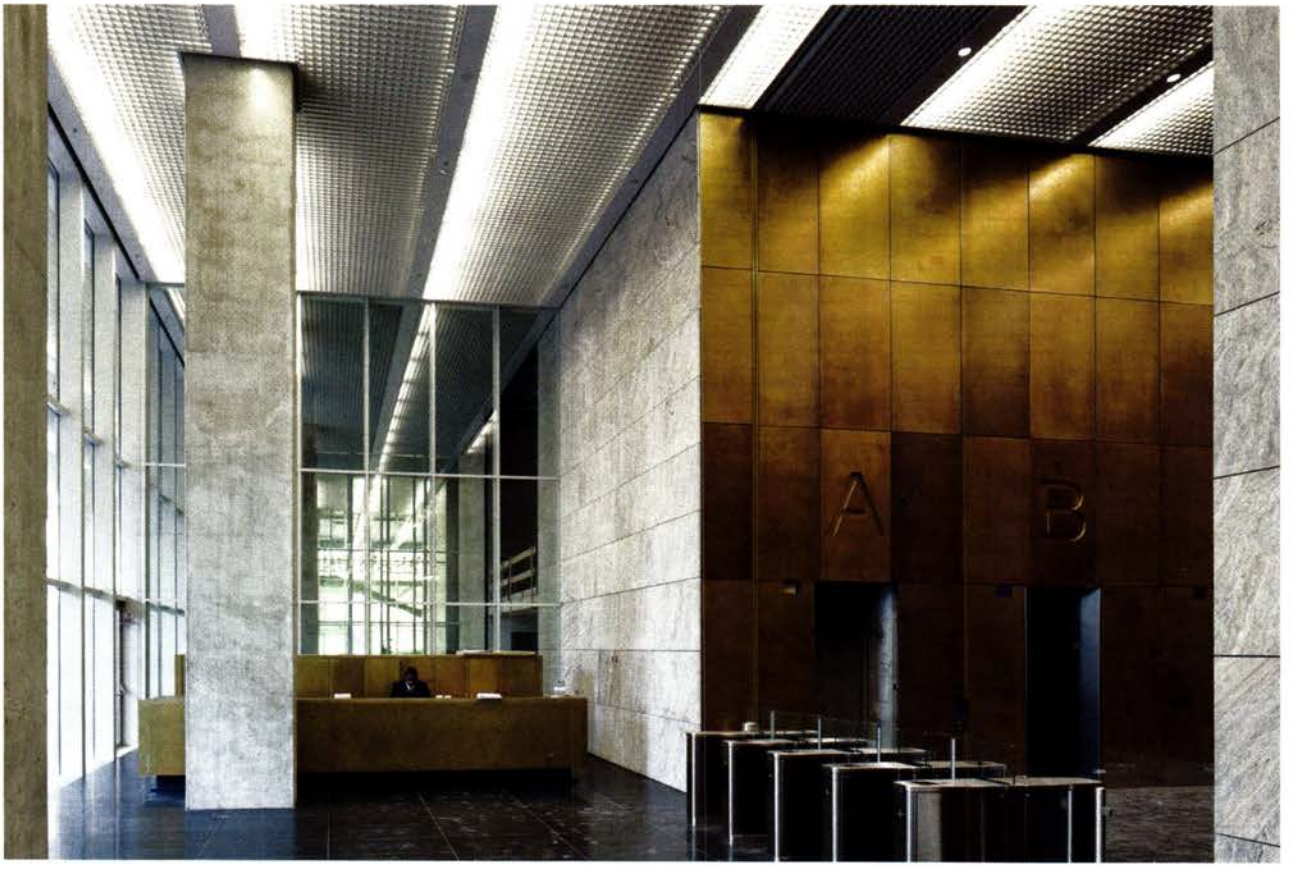
Koolhaas, of course, has written persuasively about "bigness" as an architectural determinant, eclipsing the more usually cited design generators of composition, scale, proportion, and detail. However, the rhetoric and the reality are at odds here: this building is a highly considered piece of architecture, even if its initial impact is meant to be that it's just an assemblage of generic blocks. Its design was shaped by the presence of the nearby bridge and sweeping roadway: this is intentionally a moving-picture building, your view of it shifting as you cross the bridge. As with OMA's scheme for a building at Ground Zero in Manhattan, which it visually resembles (see box on page 113), it is a waterfront structure designed to present different characters as you move past—sometimes solid, sometimes broken.

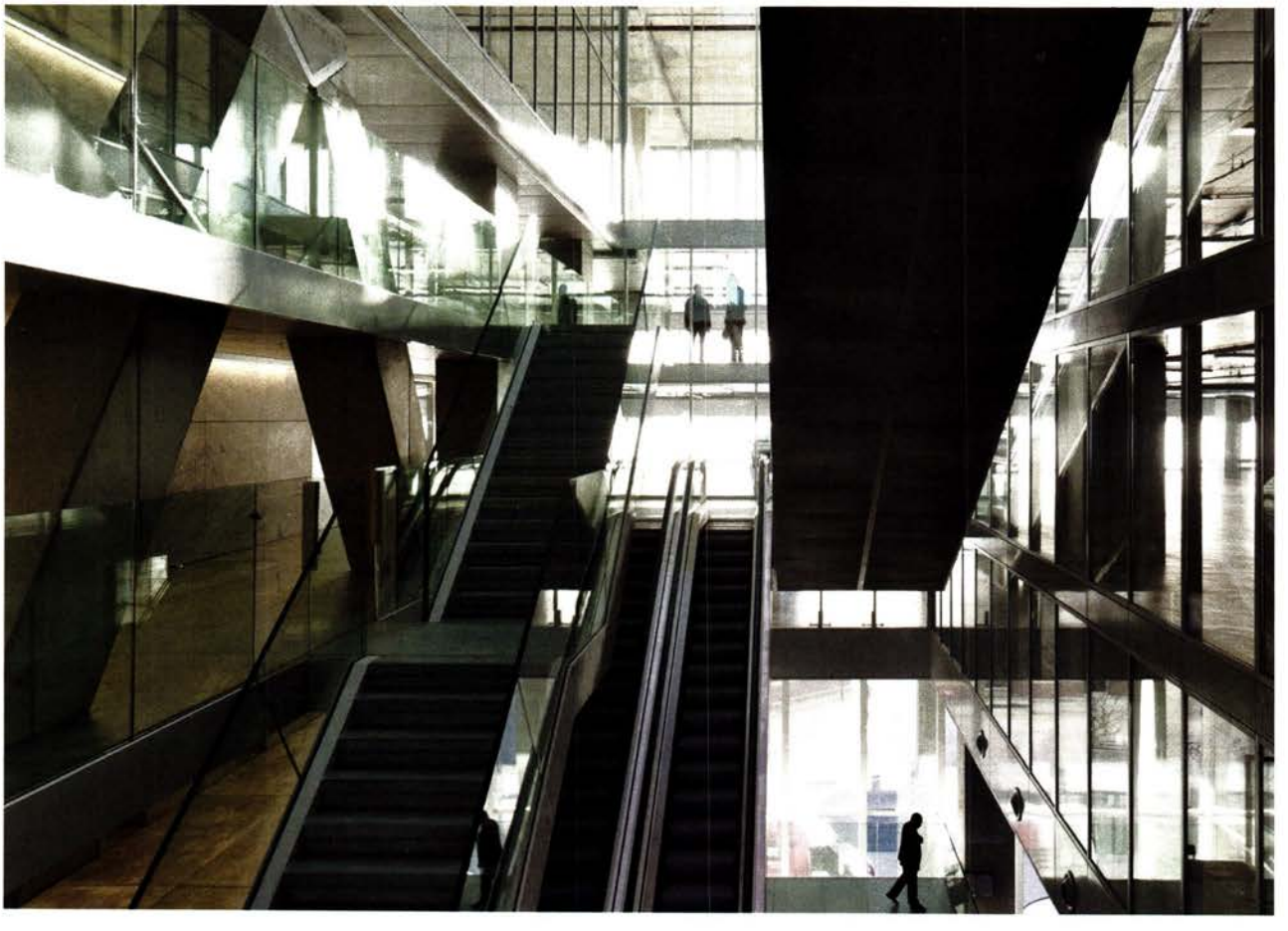
Once inside, you notice traces of the OMA design hand, from reception desks through triple-height lobbies, right down to indicator panels in the lifts and the design of the hotel rooms, bars, and restaurants. While the interiors have a somewhat industrial aesthetic in places, elsewhere the firm juxtaposes fine detail and rich materials—brass, timber, translucent plastics.

De Rotterdam is named for the succession of Dutch ocean liners of that name which used to depart from the Wilhelminapier: some of the old dockside brick buildings still remain near the new complex. It is part of an urban regeneration project that includes earlier residential and office towers by Álvaro Siza (2007–10), Renzo Piano (1997–2000), Norman Foster (1995–2000), and Mecanoo (1999–2002). These form a motley bunch, none being anywhere near the best work of the architects in question. Despite—or maybe because of—having taken the longest to complete, OMA's De Rotterdam is clearly the king of this architectural jungle. It is 350 feet wide, 490 feet high and 118 feet deep. Its almost cartoon-like rendering of blocks does not alter the fact that it has something else, which you could call class. It has authority and presence without stridency.

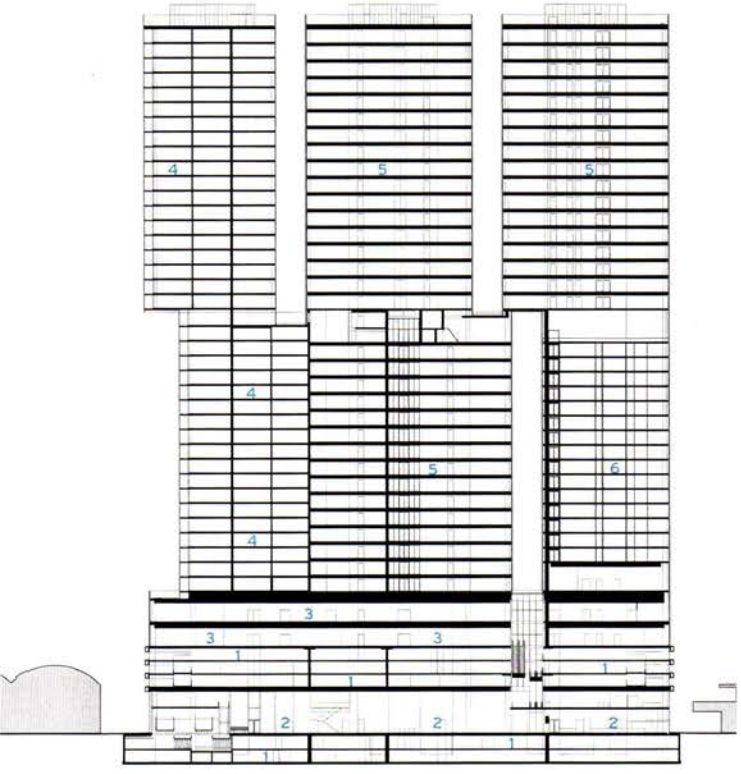

CAFE
ROTTERDAM

URBAN ANCHOR De Rotterdam acts as the fulcrum for the redevelopment of the Wilhelminapier area, which includes (from bottom to top of photo, above) the Erasmus Bridge by UNStudio and buildings by Renzo Piano, Álvaro Siza, Mecanoo, and KCAP Architects. OMA designed areas in the building's plinth, such as the office lobby (opposite, top) and vertical circulation for the restaurants (opposite, bottom).





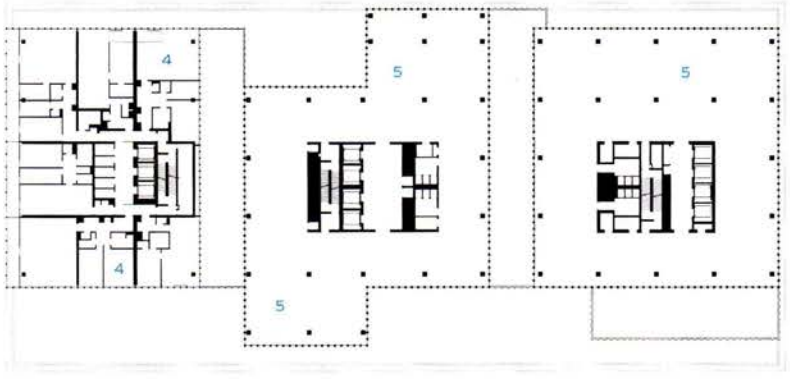
PHOTOGRAPHY: © IWAN BAAN (EXCEPT AS NOTED)



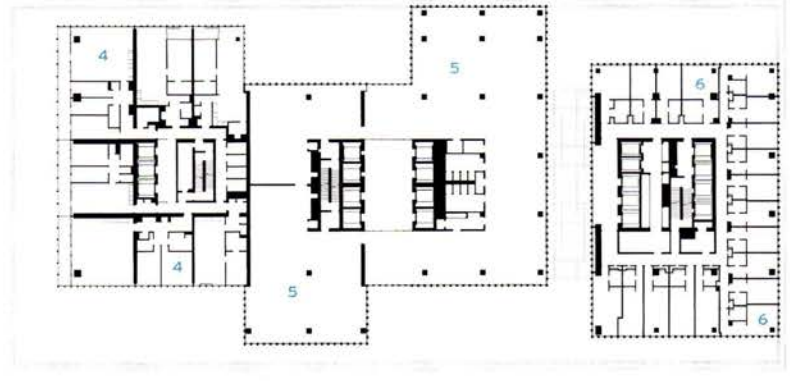
SECTION A - A

0 60 FT.
20 M.

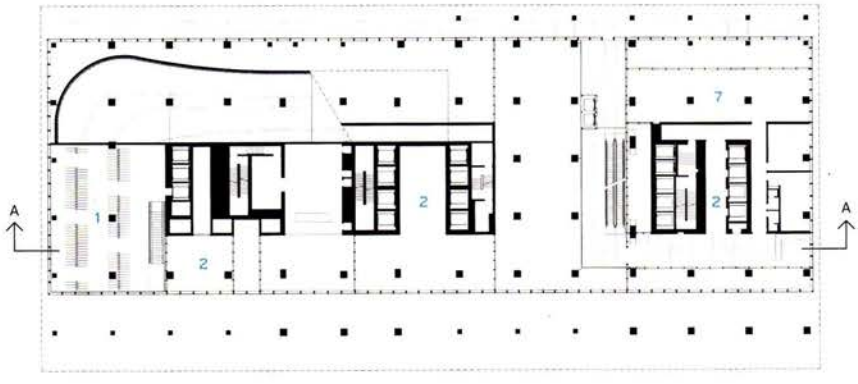
1 PARKING
2 LOBBY
3 PUBLIC
4 RESIDENCES
5 OFFICES
6 HOTEL
7 MEETING



TYPICAL HIGH-RISE FLOOR



TYPICAL LOW-RISE FLOOR



FIRST FLOOR

0 30 FT.
10 M.

credits

ARCHITECT: OMA – Rem Koolhaas, Ellen van Loon, Reiner de Graaf, partners in charge; Kees van Casteren, project architect

ENGINEERS: Corsmit/Royal Haskoning (structural); Arup (structural advisor during schematic design)

GENERAL CONTRACTOR: Züblin

CLIENT: De Rotterdam CV

SIZE: 1.75 million square feet

COST: $475 million (total); $338 million (construction)

COMPLETION DATE: November 2013

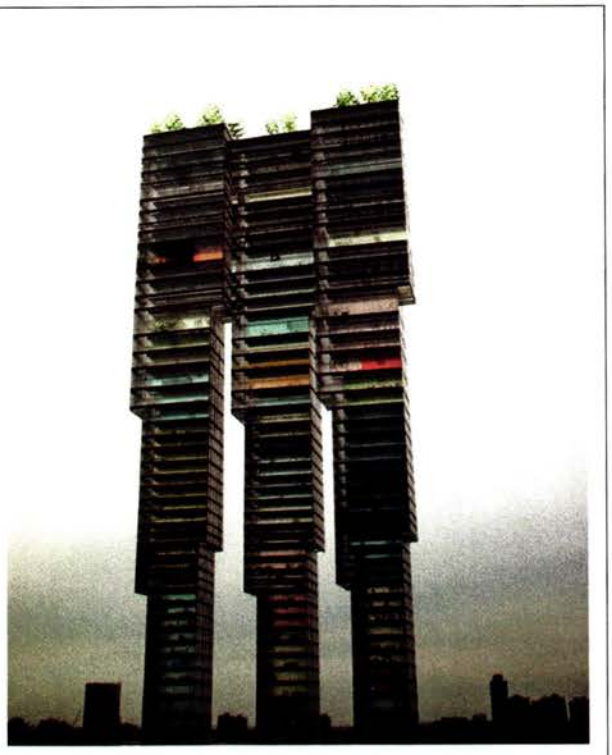
SOURCES

ALUMINUM FACADE UNITS (OFFICES, HOTEL PLINTH): Scheldebouw (Permasteelisa)

ALUMINUM FACADE UNITS (RESIDENTIAL): TGM

ALUMINUM FACADE LOUVERS: Jazo

SKYLIGHT IN ATRIUM: Brakel Atmos



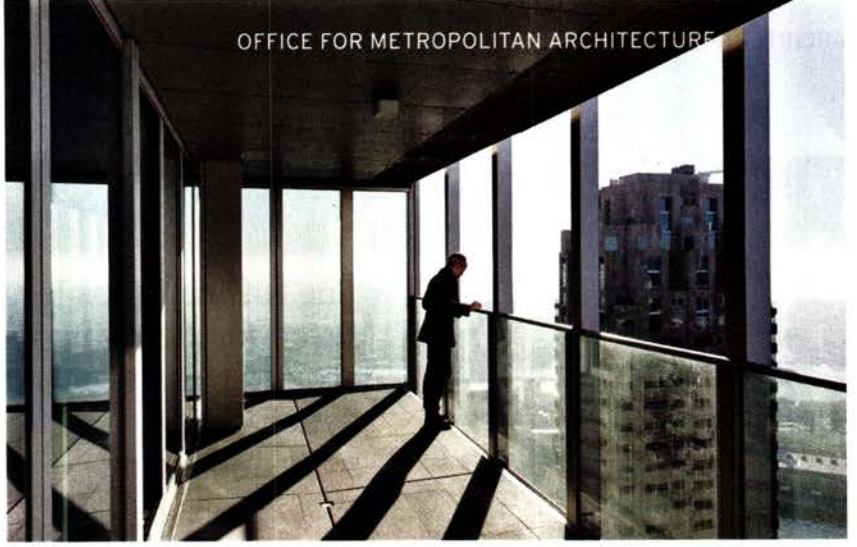
Tracing a Building's DNA

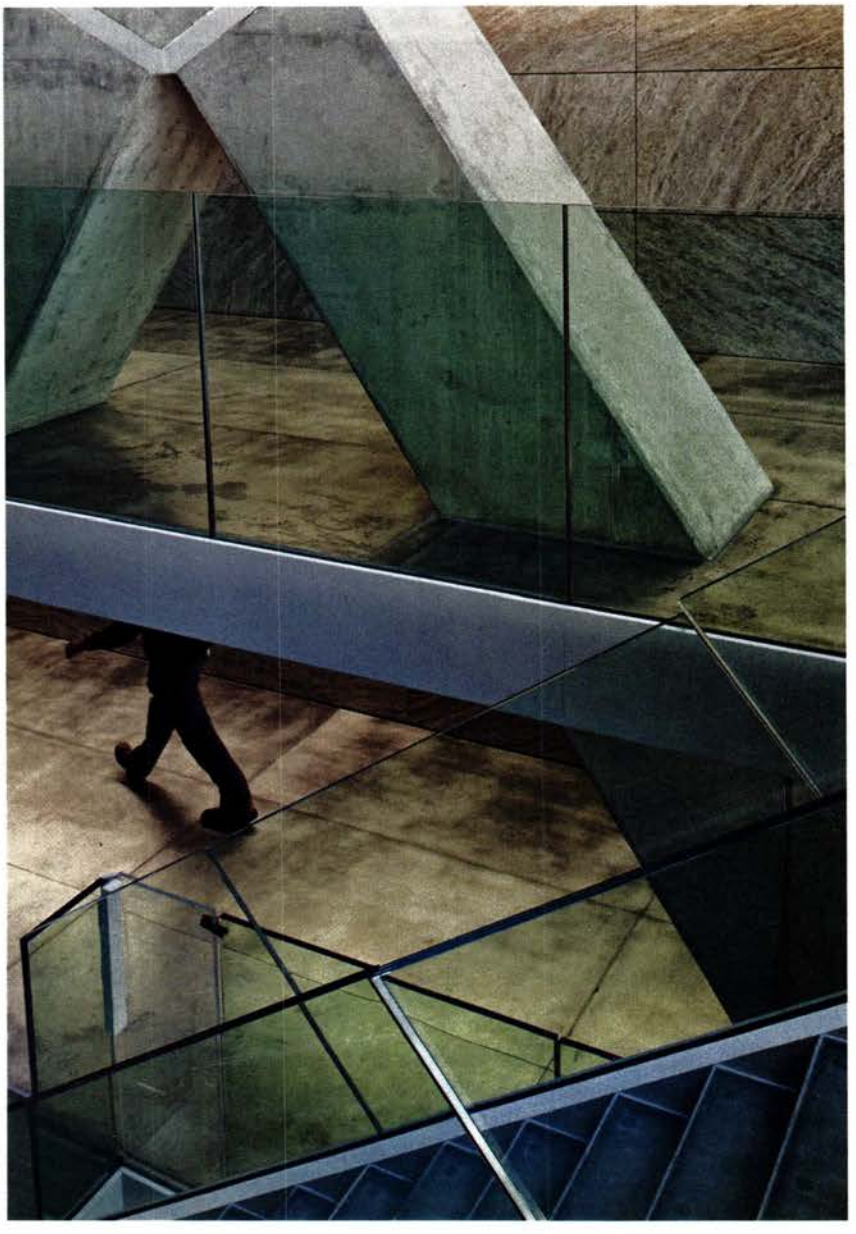
For a special issue of *The New York Times Magazine* in September 2002, the newspaper's architecture critic Herbert Muschamp invited a number of architects to propose designs for various sites at Ground Zero in Manhattan. OMA devised a scheme for a mixed-use building with the same program and tripartite organization as De Rotterdam.

The 1.74 million-square-foot project has a broadly tripartite mix of functions: 240 apartments in the western tower, 775,000 square feet of offices in the center, and a 278-room hotel at the eastern end, though the functions overlap in places. In the podium there are conference and restaurant spaces, retail, a health club, and a multilevel 650-vehicle garage. Parts of the building, though, remain empty. The podium provides a continuous tall arcade at ground level, approached from the rear, non-river, side. On the inside, a long concourse connects the various reception lobbies. This drawn-out communal space can be confusing and offers some odd juxtapositions: in the approach to the main restaurant and bar, for example, you stare across an atrium to the cars in the garage. The building is so big that, in places, you feel the client hasn't worked out what to do with it all.

As a built diagram of stacked, split volumes, defined entirely by property economics, De Rotterdam tries its best not to be iconic. Yet it has that strange, otherworldly Easter Island presence. Rem and OMA have constructed a totem to market forces. I struggle to love it, but can't help admiring its obstinate strength of character. ■

Hugh Pearman is the architecture critic of The Sunday Times *(UK) and the editor of the* RIBA Journal.





GOOD BONES As it has done in large Asian projects like the CCTV tower in Beijing and the Shenzhen Stock Exchange, OMA exposed the building's structural frame on the inside and used it as an important element in spaces such as the stair hall for restaurants and bars (above). Generous balconies on the residential section of the project provide city views from the apartments (top).

IMAGE: COURTESY OMA (TOP, LEFT)

BIG BIGGER BIGGEST

The future looms large for seven forthcoming projects around the globe that demonstrate ambition in scale and form.

BY ANNA FIXSEN

FAKE HILLS, BEIHAI, CHINA Weary of the humdrum residential buildings that are rising en masse in urban China, Beijing-based architect Ma Yansong and his team at MAD Architects sought to design a complex that could address demand for affordable housing and yet be iconic. The firm found a solution in an architectural mash-up of a high-rise and a "groundscraper": the aptly named Fake Hills places a 636-foot tower alongside a rollercoaster form that undulates along a half-mile strip of shore on the South China Sea. Once completed in 2015, the 5.3 million-square-foot structure will include a roof platform for public spaces featuring swimming pools, tennis courts, and gardens.

KINGDOM TOWER, JEDDAH, SAUDI ARABIA Chicago-based firm Adrian Smith + Gordon Gill designed the Kingdom Tower to claim the title of world's tallest skyscraper. At a height of at least 3,280 feet, it will be taller than two and a half stacked Empire State buildings and at least 568 feet above its soaring older sibling, the Burj Khalifa, designed by Adrian Smith while he was at SOM. The tower is the crown jewel of Kingdom City, a new $20 billion development. To evoke the fronds of desert plants, the aerodynamic, high-efficiency tower rises above the Red Sea on a triangular base. When completed in 2019, the 5.7 million-square-foot building will include offices, a Four Seasons Hotel, luxury apartments, 59 elevators, and a cantilevered saucer-shaped observatory near the top at level 157.

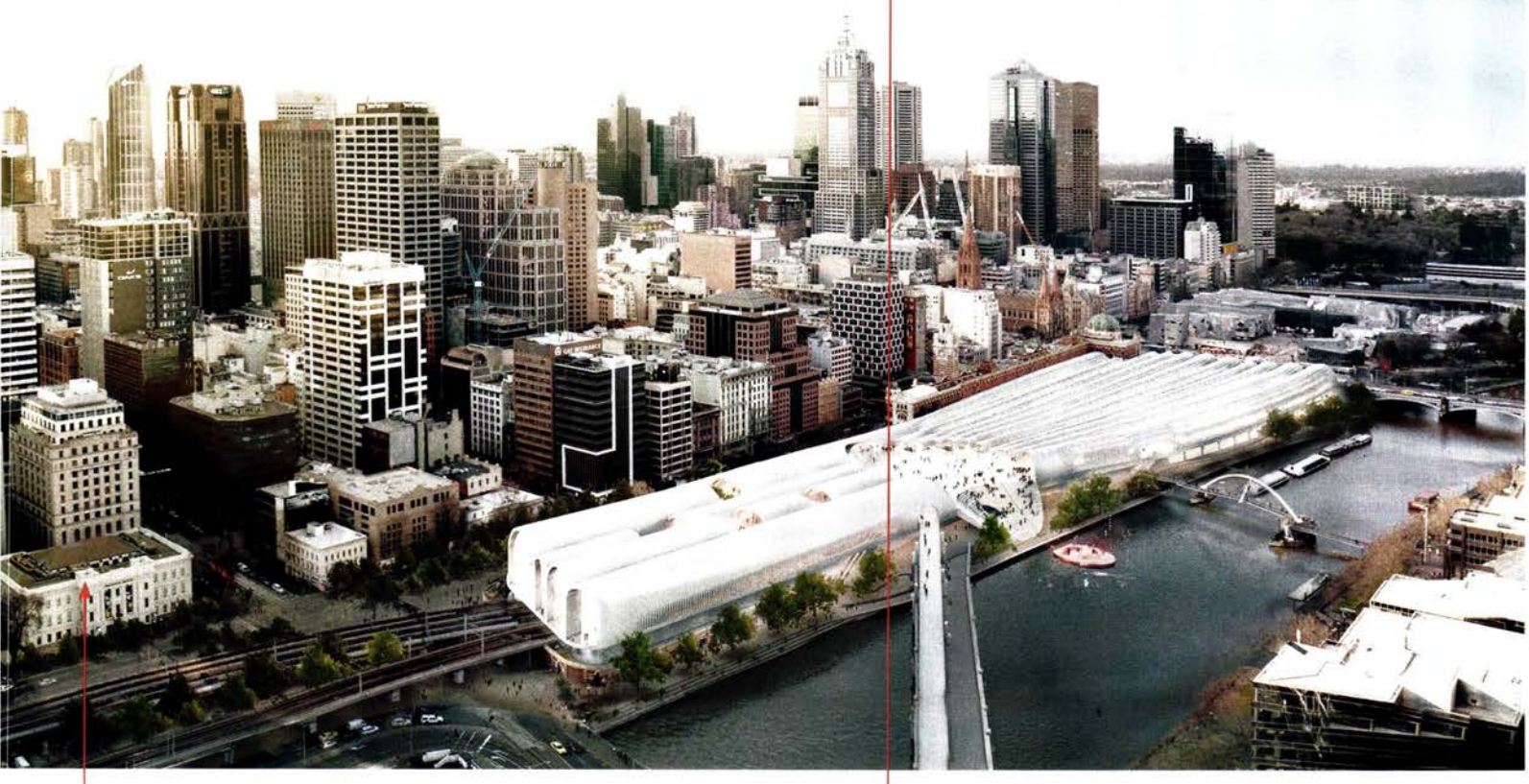
PHOTOGRAPHY: © MAD ARCHITECTS (BOTTOM); JEDDAH ECONOMIC COMPANY/ ADRIAN SMITH + GORDON GILL

MARINA LOFTS, FORT LAUDERDALE, FLORIDA For his upcoming residential project, Bjarke Ingels of the Danish firm **BIG** took the split-level to the next level—30 levels, in fact. Marina Lofts, a 1.3 million-square-foot three-building complex that will straddle an existing 250-boat marina along the bank of the New River, will contain 856 residential units (starting at a millennial-friendly $1,100 per month), restaurants, and retail. The split structures divided Fort Lauderdale residents: in a controversial move, an 80-year old rain tree, one of the largest specimens in the United States and a local landmark, will be transplanted to a park to make way for construction in late 2014.

KAZAKHSTAN ASTANA WORLD EXPO Last October, **Adrian Smith + Gordon Gill** beat out firms including Zaha Hadid, UNStudio, and Snøhetta to build Kazakhstan's world exposition, EXPO-2017, in Astana. The 19 million-square-foot site will include 1.3 million square feet of exhibition space and cultural pavilions for more than 100 countries and 7.4 million square feet of residential development, as well as parks, hotels, and retail. The development's centerpiece, the Kazakhstan Pavilion, is a quarter-million-square-foot orb with a specialized skin for mitigating solar glare. While EXPO-2017 lasts only three months, the firm designed the buildings so that, post-show, the main structures can be converted into an office park, and other buildings can be repurposed as well. Construction will begin in April.

SHANGHAI TOWER, SHANGHAI When Shanghai's Pudong district was planned more than two decades ago, it was dotted with clusters of warehouses and factories. Now the region is home to the city's Lujiazui financial district and will boast the world's second-tallest skyscraper when **Gensler**'s Shanghai Tower opens later this year. At 2,073 feet—surpassing its statuesque neighbors, the Jin Mao Tower and the Shanghai World Financial Center—the tower comprises 5.6 million square feet of offices, gardens, shops, and hotels. The building's 120 degree twist enables it to withstand typhoon-force winds.

PHOTOGRAPHY: © ADRIAN SMITH + GORDON GILL ARCHITECTURE (TOP); BIG (INSET); ROGAN COLES (BOTTOM)



FLINDERS STREET STATION, MELBOURNE In August 2013, officials in Melbourne announced Swiss firm Herzog & de Meuron, along with Australian firm Hassell, as the winners of a competition to revitalize Flinders Street Station, a turn-of-the-century train hub. The station's original 1899 design included an unrealized arched roof with three large vaults. The architects used this scheme as the dominant motif in their entry, creating linear vaulted spaces that align over each track. The 1.2 million-square-foot building will incorporate a cultural center and an amphitheater. The government is conducting a feasibility study for this project.

432 PARK AVENUE, NEW YORK CITY Rafael Viñoly's 432 Park Avenue will be the western hemisphere's tallest residential structure when completed in 2015. Rising nearly 1,400 feet, it will soon be joined by a pack of sky-high glamazons overlooking Central Park, including Norman Foster's 425 Park Avenue and Christian de Portzamparc's One57. Developed by CIM Group, the 96-story building features a gridded facade of 10-by-10 foot windows and will have 30,000 square feet of amenities containing a lounge, restaurant, terraces, and spa.

PHOTOGRAPHY: © DBOX FOR CIM GROUP & MACKLOWE PROPERTIES (TOP); HERZOG & DE MEURON (BOTTOM)

Aesthetics and Craftsmanship —
Creating richer architectural spaces through products
that are stunning in their design, material and finish.

CIRCLE 73

ELMES
www.elmesworld.com

The Duro-Last® difference:
More boots on the roof.

We have a small army of trained technicians who are dedicated to one supreme objective. They make sure your Duro-Last roof is watertight and trouble-free. It takes boots on the roof to assure performance. That's why we can offer industry leading warranties – and that's the Duro-Last difference.

Visit **duro-last.com**
or call to find out more.
800-248-0280

Edge-to-Edge & Deck-to-Sky™

DURO-LAST®
THE WORLD'S BEST ROOF®

Lightweight concrete has many faces at Tournesol Siteworks. **We knew you wanted lightweight pots and site furnishings for your rooftop projects, but love the modern look of refined concrete.** Whether we're making the incredible TWIG bench, our industry-leading pots, or other Australian-designed site furnishings, you know **we'll be casting each lightweight Glass-Fiber Reinforced Concrete (GFRC) part with extraordinary care.** Explore your options at tournesolsiteworks.com/lightweightconcrete.html

Tournesol SITEWORKS

BETWEEN LANDSCAPE +ARCHITECTURE

tournesolsiteworks.com | 800-542-2282

CIRCLE 70

Images, listed clockwise: 1) Barnes & Noble, Palo Alto, CA; 2) Westin Hotel, Pasadena, CA; 3) Pebble Stool; 4) Disney Concert Hall, Los Angeles, CA; 5) Embarcadero Center, San Francisco, CA.

Blending history with Creative Solutions...

Challenge...

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

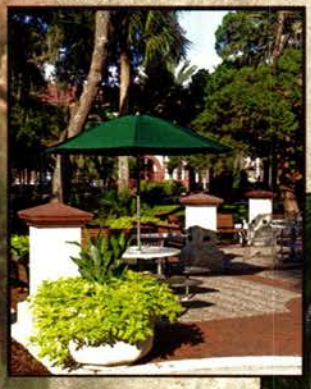
Solution...

Pine Hall Brick StormPave® permeable clay pavers provide an effective way to drain away stormwater while at the same time, picking up colors of the nearby building - in line with local historic-district guidelines.

The 5,300-square-foot space has become a popular gathering spot for students.

The plaza is paved in gray as the primary color with autumn as the accent.

Permeable Clay Pavers...Beautiful and Sustainable



The Plaza at Kenan Hall/Flagler College in St. Augustine, Florida
Landscape Architect: Sharon Fowler of Hauber Fowler & Associates
Builder: A.D. Davis Construction
Mason Contractor: Paverscape Inc.
Distributor: Oldcastle Coastal

CLAY GENUINE PAVERS

2011 BRICK IN ARCHITECTURE AWARDS

Winner of the 2011 BIA Silver Award
Paving and Landscape Architecture

Pine Hall Brick™

earth friendly...naturally green

www.americaspremierpaver.com | 800.334.8689

CIRCLE 43

Housing in Santa Monica / DE Architects AIA / Santa Monica CA **/** Product: **Facade /** Finish: Gold

Facade. Natural wood for exteriors.

Facade is a high density laminate timber panel. Manufactured from kraft paper treated with thermoset resins, pressed under high pressure and temperature and finished with natural timber veneers highly resistant to UV radiation and atmospheric agents. Facade includes Everlook®, a special overlay that dramatically increases the normal life of the panel, improving UV resistance and colour stability. It also allows for the development of new panels with an extensive range of finishes.

Facade construction

A. PVDF Antigraffiti overlay B. Everlook® C. Natural timber veneer
D. HPL balancer E. Natural timber veneer F. Balancing film

PEFC
PEFC/14-35-00042

www.parklex.com

COMPOSITES GUREA, S.A. Zalain Auzoa, 13 - 31780 Bera - Navarra (Spain) [t] +34 948 625 045 [f] +34 948 625 015 - parklex@parklex.com / **USA:** 7353 Pittsford-Victor Rd. (Rt. 96) Victor, NY 14564 - **Eastern USA / phone:** 585 924 1590 - delforte@parklex.com - **Western USA / phone:** 360 451 1130 johnson@parklex.com - **California / phone:** 310 396 9991 info@fcpcusa.com

CIRCLE 41

Parklex®

From Trash to Treasure

Brooklyn, New York

The Sunset Park Material Recovery Facility, designed by Selldorf Architects, speaks volumes about the future of waste management in urban environments.

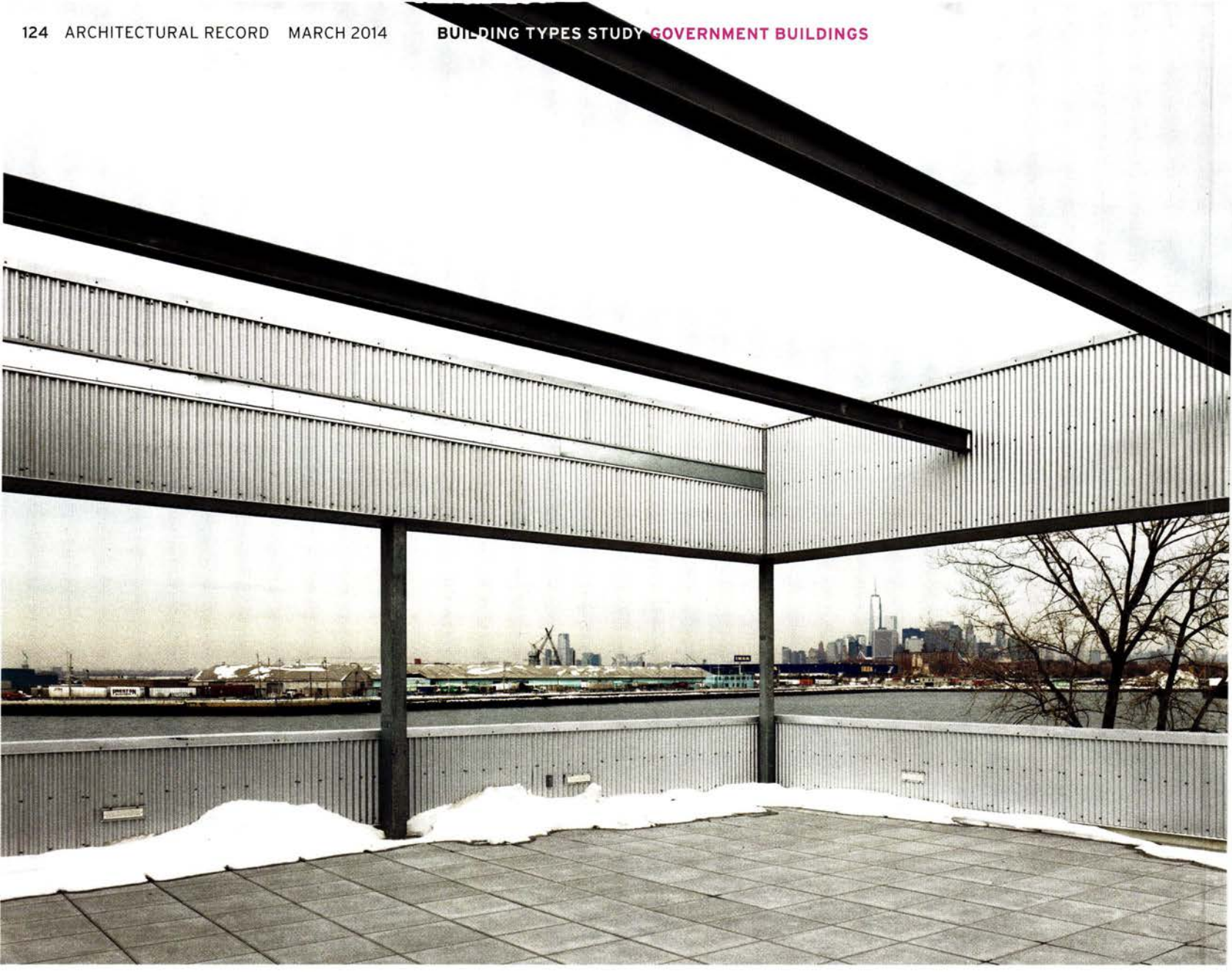
By Jennifer Krichels

GARBAGE IS a big part of life in New York: the metropolis generates 11,000 tons of waste every 24 hours. From receptacles to bags to trucks, trash is part of the tableau of almost every street on any given day. What it is, how much there is, and where it goes is becoming an increasingly big business—one that not only affects the economy but also quality of life.

Last year, New York launched its largest recycling push in 25 years, aiming to double its efforts by 2017 and, in so doing, save taxpayers $60 million annually by reducing the number of garbage trucks on the streets. Part of this plan involves a long-term contract with the international waste-management company Sims Municipal Recycling to process and sell all the metal, glass, and plastic, and half of the paper collected curbside in the five boroughs. The contract could even give money back to the city if there is a good market for post-consumer paper or metal.

PHOTOGRAPHY: © MARC LINS

THE SUNSET PARK MATERIAL RECOVERY FACILITY

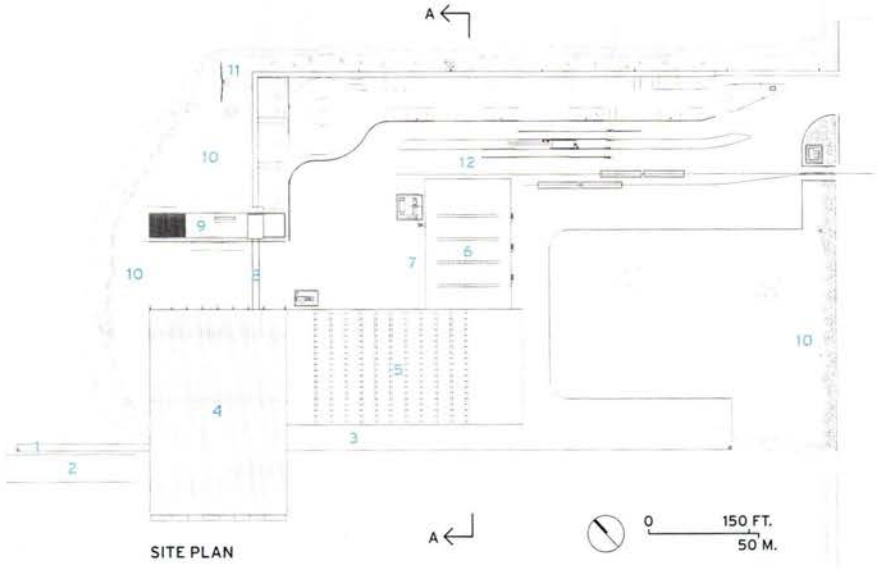


But tax savings alone don't win the hearts of New Yorkers who might have to live next to a sanitation facility. After an 11-acre city-owned pier in Sunset Park, Brooklyn—the former site of a New York Police Department vehicle impoundment lot—was chosen, outcries from local community groups were heeded. The $110 million investment in building a new recycling plant had to work for the neighborhood's residents, not just the city infrastructure. So in 2009, Sims and three city agencies—the New York City Economic Development Corporation, and the Departments of Sanitation and Small Business Services—hired Selldorf Architects, a firm headed by Annabelle Selldorf, known for creating beautifully spare galleries and residences, to design the master plan and buildings.

Walking through the Sunset Park Material Recovery Facility feels like an experience designed for people rather than for a truck full of yogurt containers. While the architects organized the site plan around operational requirements, they also devised a series of courtyards and hierarchical volumes that lend a walkable, urban scale to the place. Three big boxlike structures, made of steel with a high-recycled content, house a tipping facility (the building where the majority of inbound material arrives by barge), a sorting and processing plant, and a warehouse to store the resulting bales before they are shipped out by truck or freight rail. Pushed to the southern edge of the pier, these functional spaces are arranged to make room for a crucial element to the north, a Recycling Education Center that contains a cafeteria and Sims's administrative offices. The center is flanked on two sides by landscaped grounds and bioswales, providing occupants access to a verdant waterfront in good weather. Large windows and a second-floor terrace show off the sparkling panorama of the Manhattan skyline and a glimpse of the Statue of Liberty in the distance.

The center is open to the public and will host conservation-themed exhibitions designed by the multidisciplinary studio Whirlwind Creative, and educational events for schoolchildren and adults. Employees and visitors can arrive by car, bike, or on foot along an allée, away from truck and future rail deliveries. "When the places that are necessary to make the

PHOTOGRAPHY: © NIKOLAS KOENIG (EXCEPT AS NOTED); MARC LINS (OPPOSITE, BOTTOM); JOHN MAJORS, AERIAL & ARCHITECTURAL PHOTOGRAPHY OF NEW JERSEY (OPPOSITE, CENTER)



SITE PLAN

1 MOORING PIER
2 BARGE
3 BARGE UNLOADING
4 TIPPING BUILDING
5 PROCESSING BUILDING
6 BALE STORAGE BUILDING
7 TRUCK DOCK
8 PEDESTRIAN BRIDGE
9 RECYCLING EDUCATION CENTER/ADMINISTRATION
10 BIOSWALE
11 WIND TURBINE
12 RAIL LOADING

HIGHER PURPOSE
A terrace for visitors and employees in the Education Center offers skyline views (above). The master plan separates hard functions, like truck deliveries, from landscaped roads and pedestrian paths (center). Sustainable features include New York City's largest photovoltaic array to date and a future wind turbine that will generate 25 percent of the plant's power. The tipping building has clerestories that flood the interior with daylight (bottom).

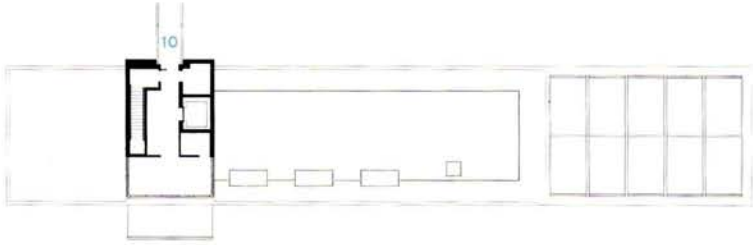
city function become more humane and considerate spaces, that changes the city, and the spirit in the city," says Selldorf.

The team worked with Parks Department landscape designer Mark Vaccaro to develop the green spaces, one of the largest being a placeholder for future expansion on the east side of the property. Early on, Sims presciently raised the site 4 feet using recycled glass and crushed rock from New York's Second Avenue subway excavation as landfill, placing the structures (still under construction) out of Hurricane Sandy's reach in 2012 and above the water level shown on FEMA's 100-year-flood map.

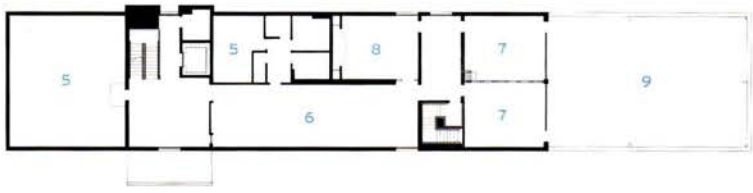
Groups approach the tipping building and its mountain of freshly dumped recyclables along a 70-foot-long bridge leading from the education center. The new facility will inspire visitors by its behind-the-scenes industrial grittiness. But the buildings' forms have an elegant efficiency, especially the gently sloping roof of the tipping building, which shelters barge deliveries and creates clerestories around the perimeter. These openings, along with skylights that pierce the ceiling, let sunlight stream over the procession of conveyor belts and into the adjacent sorting shed.

"Our job was to organize things around the requirements," says Selldorf. The building was designed to be inexpensive as well as efficient, but its details transform the whole. Cladding with a finely corrugated profile breaks down the mass of the industrial buildings, its anodized finish, uniform throughout, reflecting light in a gentle way. Again, the human experience is foremost; in the noisy space, visual calm creates order. For the tipping building, Selldorf flipped structural elements inside out, revealing delicate tendons of structural cross-bracing between trunk-like steel columns. The gesture is simple, yet produces a carefully considered drama. This is, after all, a building where nothing is wasted. ■

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



THIRD FLOOR EDUCATION CENTER



SECOND FLOOR EDUCATION CENTER

GROUND FLOOR EDUCATION CENTER

1 LOBBY
2 CAFETERIA
3 OFFICE
4 CONFERENCE ROOM
5 MECHANICAL
6 EXHIBITION
7 CLASSROOM
8 THEATER
9 TERRACE
10 PEDESTRIAN BRIDGE
11 BARGE
12 BARGE UNLOADING
13 PROCESSING BUILDING
14 RECYCLING EDUCATION CENTER
15 BALE STORAGE BUILDING
16 TRUCK DOCK
17 RAIL LOADING
18 VIEWING PLATFORM
19 COVERED WALKWAY

SECTION A - A

credits

ARCHITECT: Selldorf Architects – Annabelle Selldorf, principal; Sara Lopergolo, partner

ARCHITECT OF RECORD: Steven Gambino Architects

ENGINEERS: RRT Design & Construction (facility); Bollegraaf/Van Dyk Recycling Solutions (equipment); DSi (structural); Moffatt and Nichol (marine and foundations, civil); GZA (geotechnical); Senon (m/e/p)

CONSULTANT: Mark Vaccaro (landscape design)

CLIENT: Sims Municipal Recycling

SIZE: 125,000 square feet

COST: $110 million

COMPLETION: December 2013

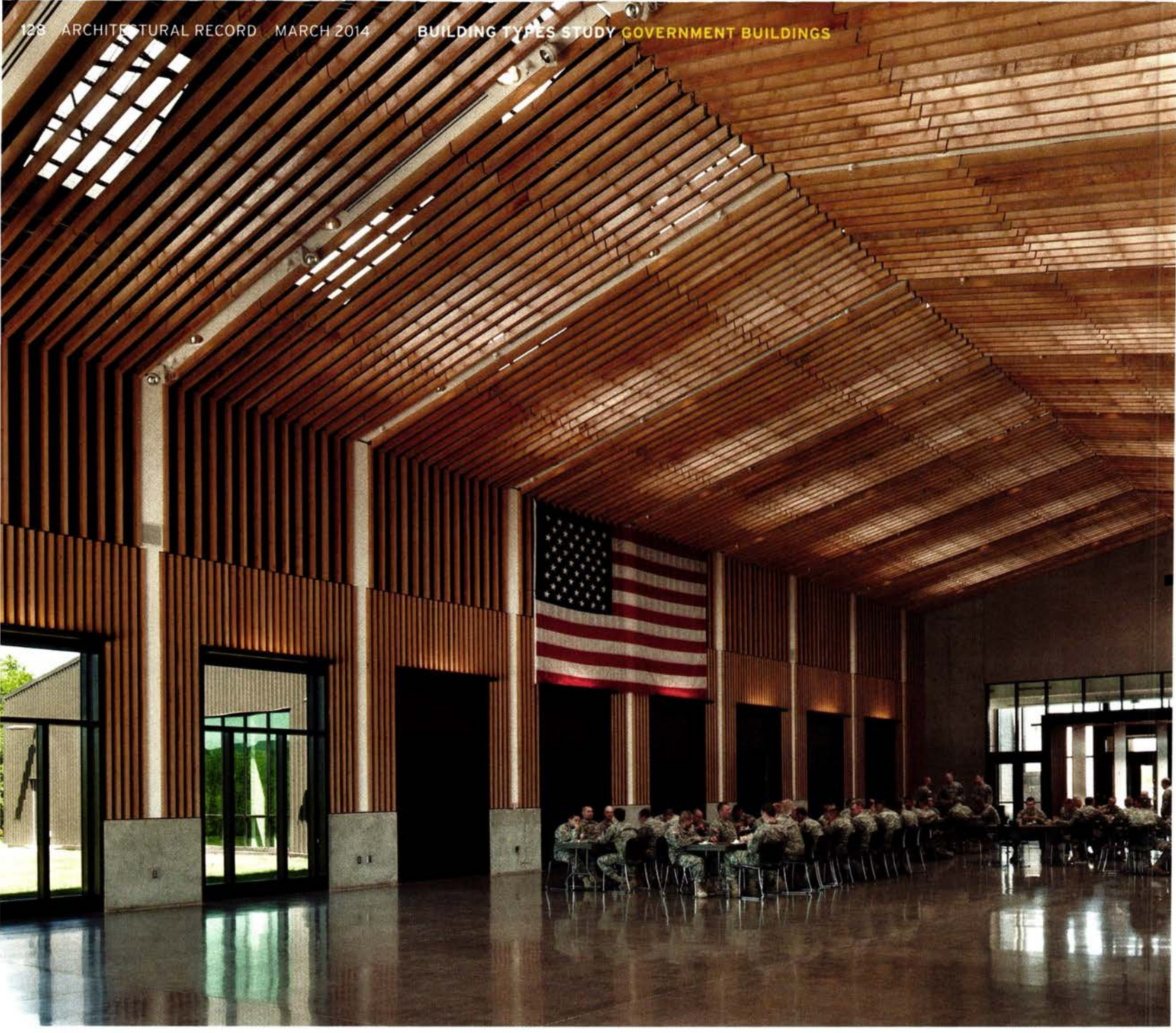
SOURCES

PRE-ENGINEERED STRUCTURE: Nucor Building Systems

CLADDING: Fabral (corrugated)

PHOTOVOLTAICS: Suntech

GREEN GIANT Community and school groups can watch the sorting of recyclables from viewing platforms that connect to the Education Center by a 70-foot-long footbridge (above). Selldorf controlled scale and light throughout the facility with a carefully selected corrugated profile and exterior placement of pre-engineered structural details (below). Recyclables await processing in the tipping building (opposite, bottom).



Marching Orders

Dallas, Oregon

THA Architects embraces a barnlike vernacular for the Colonel James Nesmith Readiness Center.

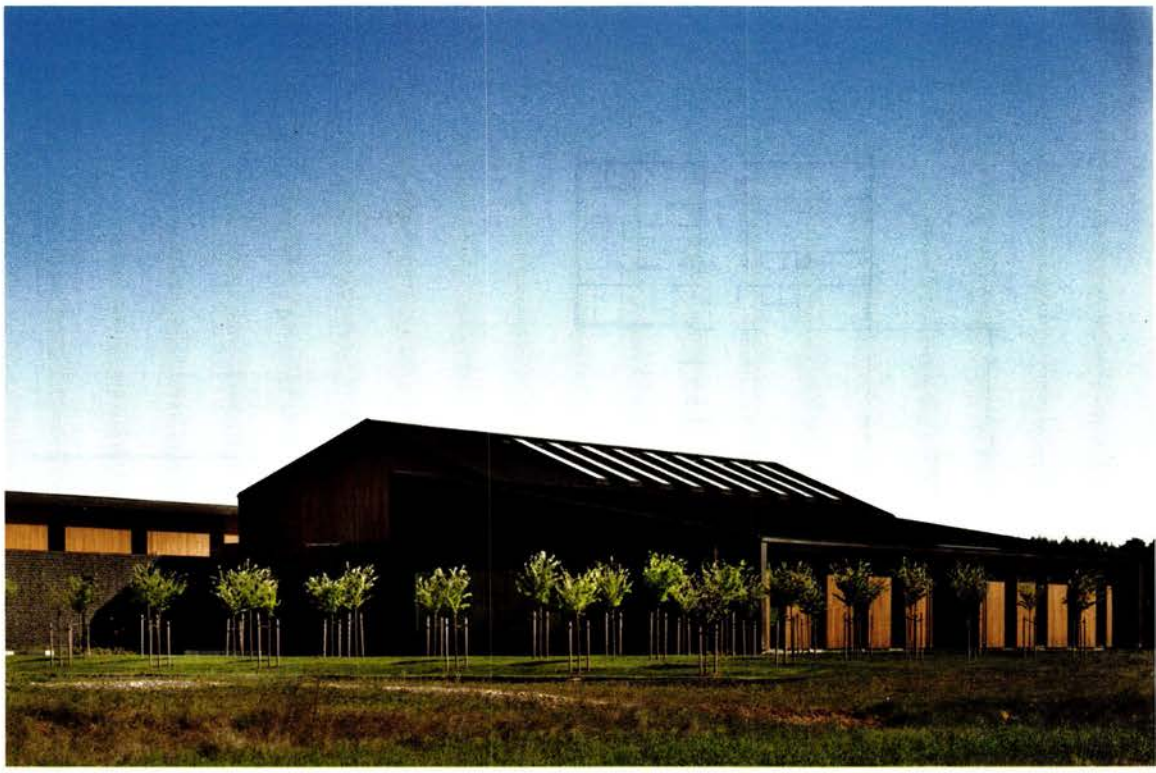
By James Gauer

Photography by Lara Swimmer

THE MILITARY does not leap to mind as the most likely patron of distinguished design. But the Colonel James Nesmith Readiness Center, a new facility for the 162nd Engineer Company of the Oregon National Guard, in Dallas, Oregon, could change that thinking.

THA Architecture joined forces with contractor Lease Crutcher Lewis in a design-build competition to win this 40,000-square-foot project, which accommodates assembly, administration, training, recruiting, and family support in an artful assemblage of interconnected sheds and outdoor spaces. These buildings, where concrete-shear walls are combined with CMU and cold-formed-metal bearing walls, are clad in a cedar rainscreen and metal panels. Nestled in the lush agricultural landscape of the Willamette Valley, their forms recall the ad hoc vernacular of local barns, but

View additional images at architecturalrecord.com.



NATURAL AND OFFICIAL In the barnlike assembly hall used for both military and community functions (above), slatted screens of Douglas fir conceal HVAC equipment, acoustical panels, and skylights. The assemblage of sheds (right, top) is clad in wood and metal. The glazed southwest end of the assembly hall (bottom right) opens onto a terrace.

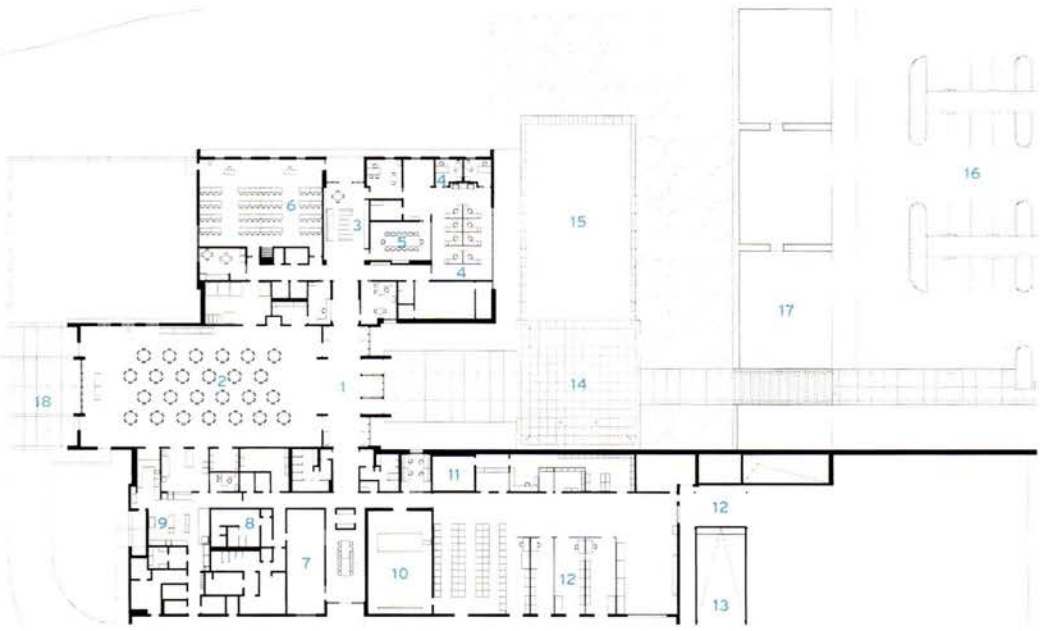
are organized with military precision.

Although "readiness center" is the new term for armory, this facility also serves as a rural community center for such events as trade shows, dances, and polling booths. It needed to be both welcoming and secure—a paradox at the heart of project designer David Keltner's *parti*, which distinguishes community functions (such as fire department events, town celebrations, fund-raisers, and the like) from military training and official ceremonies, but allows them to share a large central space.

"Procession was integral," says Keltner. "The arrival sequence—through grassland fields and filbert orchards—provides a transition from rural landscape to military formality." To the one side of the processional path is a long wall of gabions that screens secured service yards. On the other is a swale, also gabion-edged, in which collected stormwater takes on symbolic significance. A wooden bridge over the swale marks the place at which, explains Keltner, "citizen soldiers move from civilian life to military life."

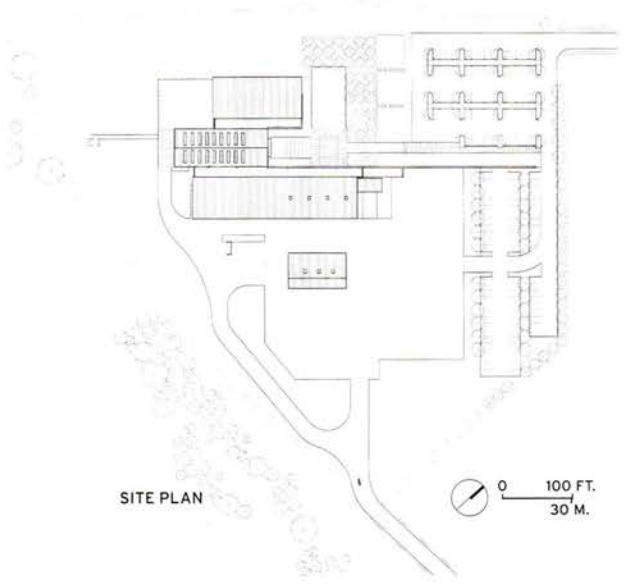
The processional path establishes a central axis and leads to a monumental assembly hall flanked by military spaces on the southeast and administrative spaces on the northwest. Ahead are a terrace and panoramic pastoral views. This spatial arrangement is articulated not only in a rigorous plan but also in a hierarchical section: the central space is enclosed in a tall volume with a gabled roof; flanking spaces in lower volumes are sheltered by flat and shed roofs.

References to armories and agricultural buildings inform the design. The gabion walls recall the thick masonry of old armories and nod to the work of the U.S. Army Corps of



FIRST FLOOR

1 ENTRANCE
2 ASSEMBLY HALL
3 LIBRARY
4 OFFICE
5 CONFERENCE ROOM
6 CLASSROOM
7 FITNESS ROOM
8 SHOWERS
9 FOOD SERVICE
10 TRAINING SIMULATOR
11 WEAPONS VAULT
12 LOADING DOCK
13 LOADING RAMP
14 FLAG COURT
15 GRASS LAWN
16 PARKING
17 STORMWATER SWALE
18 TERRACE



SITE PLAN

credits

ARCHITECT: THA Architecture – Jonah Cohen, principal in charge; David Keltner, project designer; Stefee Knudsen, project manager; Derek DeVille, project architect

ENGINEERS: Catena (structural); KPFF (civil); Glumac (m/e)

LANDSCAPE: Place Studio

CONTRACTOR: Lease Crutcher Lewis

CLIENT: Oregon Military Department

SIZE: 40,000 square feet

COST: $17.3 million (total)

COMPLETION DATE: October 2013

SOURCES

GLASS: Oldcastle BuildingEnvelope

ROOF HATCHES: Bilco

MOISTURE BARRIER: Carlisle Coating and Waterproofing

VERNACULAR PRECISION
The entry hall of the Readiness Center (above) features a rich material palette: it includes exposed concrete walls and highly polished concrete floors, rough-sawn cedar boards within the dark metal door and window surrounds, and tall white-oak pivoting panels. Beyond the panels (opposite), visitors find the monumental assembly hall.

Engineers. The central gabled shed housing the assembly hall alludes to traditional granges. "The material palette reinforces the 'welcoming and secure' theme," explains Keltner. "The basalt-filled gabions and metal roof and wall panels—both dark, hard materials—suggest a secure protective shell. Entry points welcome you with frames of rough-sawn cedar siding recessed under overhanging roofs."

The wood palette extends into the lobby and assembly hall—where it provides an elegantly textured counterpoint to highly polished concrete floors—in the form of 11-foot-tall rift-sawn white-oak doors on pivot hinges and slatted screens of Douglas fir on walls and ceilings. These conceal HVAC equipment and acoustic panels while modulating illumination from skylights. Recalling the interior structure of wooden barns, the rhythm of the wood slats, says Keltner, "gives the spaces a human scale, warmth, and light."

How did the Oregon Military Department (OMD) become a patron of architecture so ambitious it has already garnered six prestigious design awards? Much of the credit goes to its director of installations, Colonel Christian Rees, an Oregon native who, after graduating from Cornell on an ROTC scholarship, served six years of active duty and then returned home to earn a M.Arch. at the University of Oregon. Since going to work for OMD's Installations Division, he has campaigned to meet the goals established by the federal government in the General Services Administration's Design Excellence Program.

Rees declines to take credit for this astonishing project, saying, "I found many people in my organization hungry for better design." Besides affording a place where the military can train or the high school can hold a party, the OMD director sees architecture as a recruiting tool. "The Guard," he explains, "is a volunteer force. Well-designed facilities help recruit and keep talented persons by providing a setting noble enough to honor their service." ■

James Gauer is an architect and book author living in Victoria, British Columbia.

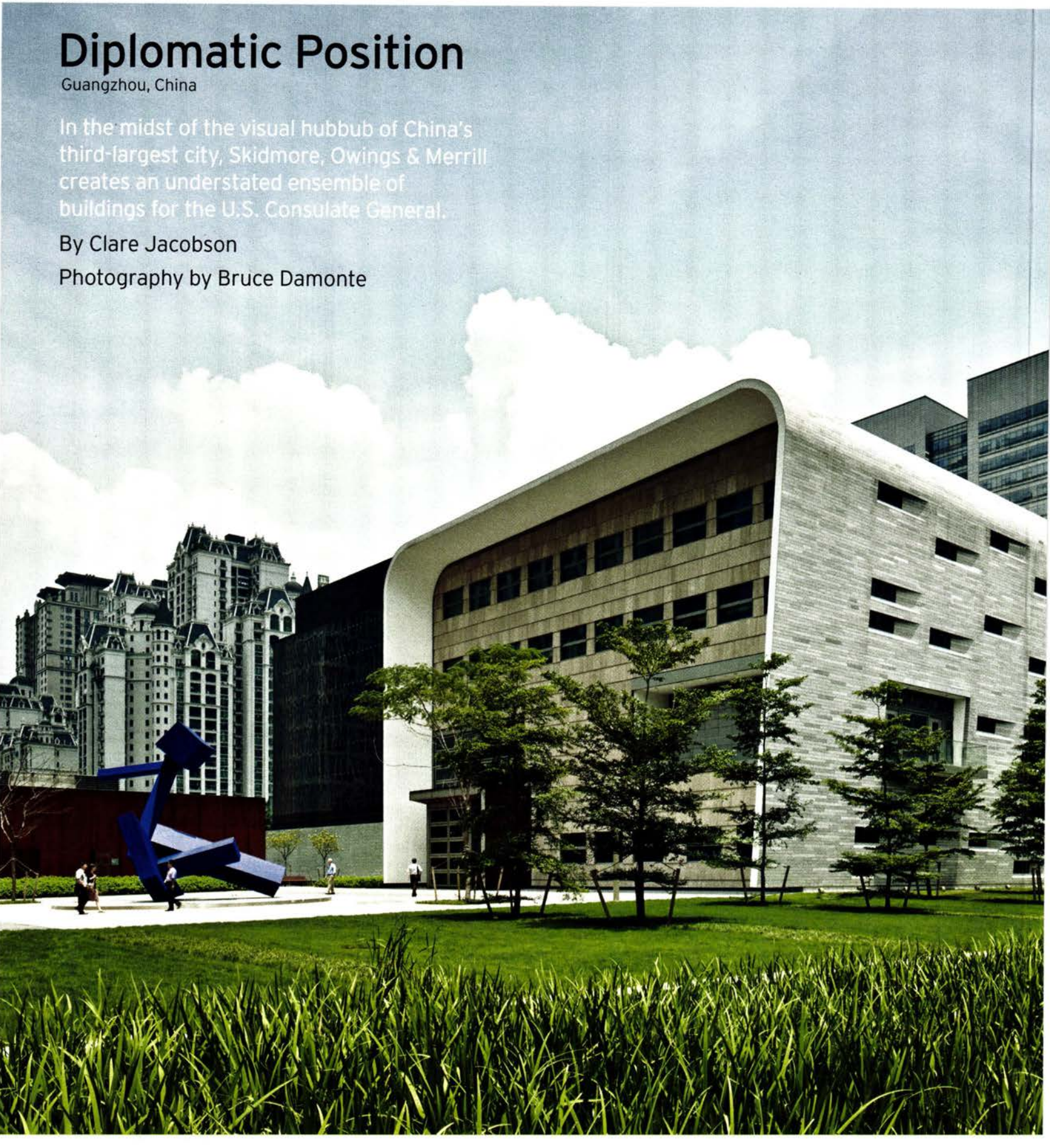
Diplomatic Position

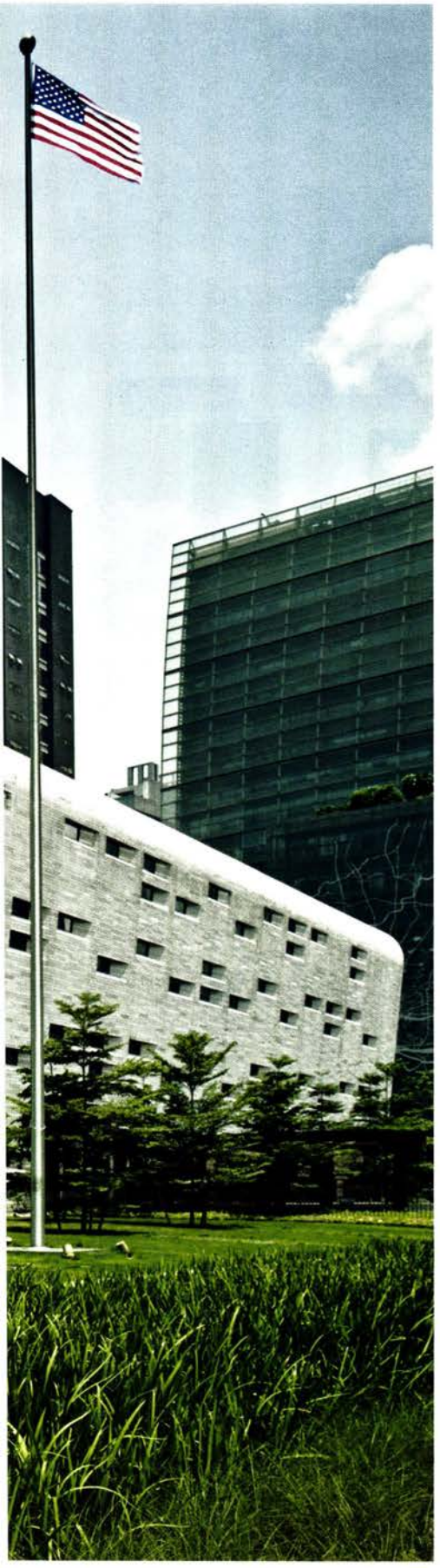
Guangzhou, China

In the midst of the visual hubbub of China's third-largest city, Skidmore, Owings & Merrill creates an understated ensemble of buildings for the U.S. Consulate General.

By Clare Jacobson

Photography by Bruce Damonte





IN CONTEXT
The consulate's seven low-rise buildings, which dot a parklike 7.4-acre site (right), are dwarfed by their surroundings in Guangzhou's burgeoning central business district. The complex has several site-specific pieces by contemporary American artists, including a monumental steel sculpture by Joel Shapiro (left), which dominates a plaza in front of the main Consulate Building's entrance for dignitaries.

THE U.S. CONSULATE General in Guangzhou, China, makes only the quietest of claims within the city's noisy new business district. Designed by Skidmore, Owings & Merrill (SOM), its seven low-rise buildings—offices, screening facilities, a warehouse, and a residence for Marines—dot a 7.4-acre site in the burgeoning Pearl River New Town. Zaha Hadid's opera house lies catercorner to it, and Wilkinson Eyre's supertall IFC Guangzhou and KPF's soon-to-be-supertaller CTF Guangzhou are close by. China's tallest structure, the Canton Tower, for telecommunications equipment, looms across the river. The consulate—built with a warm palette of stone, wood, glass, and weathering steel—is, by comparison, subdued.

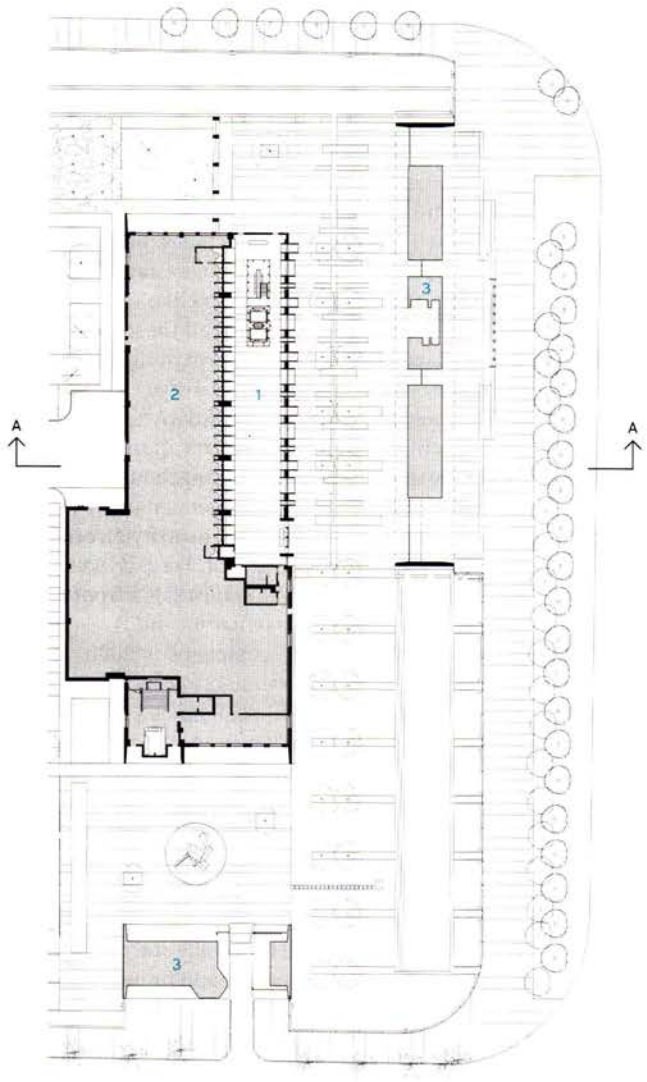
Much of the complex's humility has to do with its scale. With its tallest buildings a mere four stories—the maximum allowed for the consulate by Chinese authorities—it is dwarfed by the surroundings. Adding to this modesty is its parklike atmosphere. Though setbacks for security are part of the reason for all the green space, the effect, ironically, is of an open enclave landscaped with lush indigenous plants. "We are an oasis in the middle of a bustling central business district," says Consul General Jennifer Zimdahl Galt. The greening, along with similarly low-key sustainability measures, helped the project achieve LEED Silver certification.

The complex replaces five leased spaces scattered throughout Guangzhou, allowing the consulate to make a unified statement within the city. The general public, diplomats, and staff each enter the site at three dedicated one-story security screening facilities, each clad in local granite and topped with a green roof. The pavilion at the site's eastern edge serves as the public entrance and as the consulate's front door, says San Francisco–based Craig Hartman, SOM design partner for the Guangzhou project and for the firm's U.S. Embassy in Beijing, completed in 2008.

The main building on the lot is the Consulate Building. Granite-clad concrete wraps four stories in an inverted U, forming both roof and facade. Rounded roof corners allow Guangzhou's heavy rains to roll down into the landscape. Horizontal windows dot the stone facade. Some are positioned low to provide views for workers sitting at their desks. Others are set high to help bring light deep into the interior.

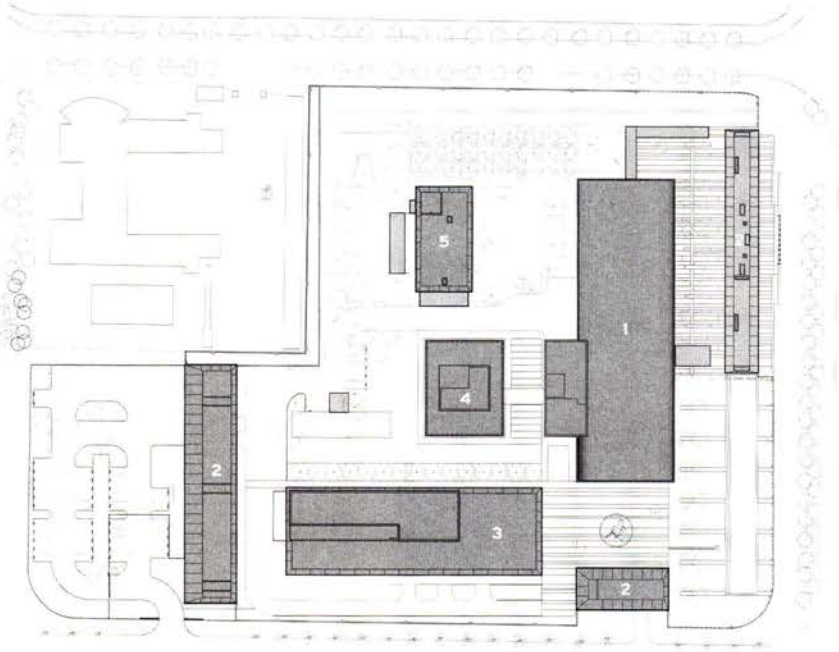
The public enters the building through the double-story Lincoln Hall, which has louverlike teak slats hung from its walls and ceiling. Daylight penetrates through them and also through deep-set windows. Several types of local stone stripe the floor, and an installation by video artist Jennifer Steinkamp brightens one wall.

The hall is a lively place, hosting up to 2,500 consular visits each day and as many as 200 people for evening lectures and other events. Applicants for non-immigrant visas wait here. Visitors for other services—the Guangzhou Consulate is the only



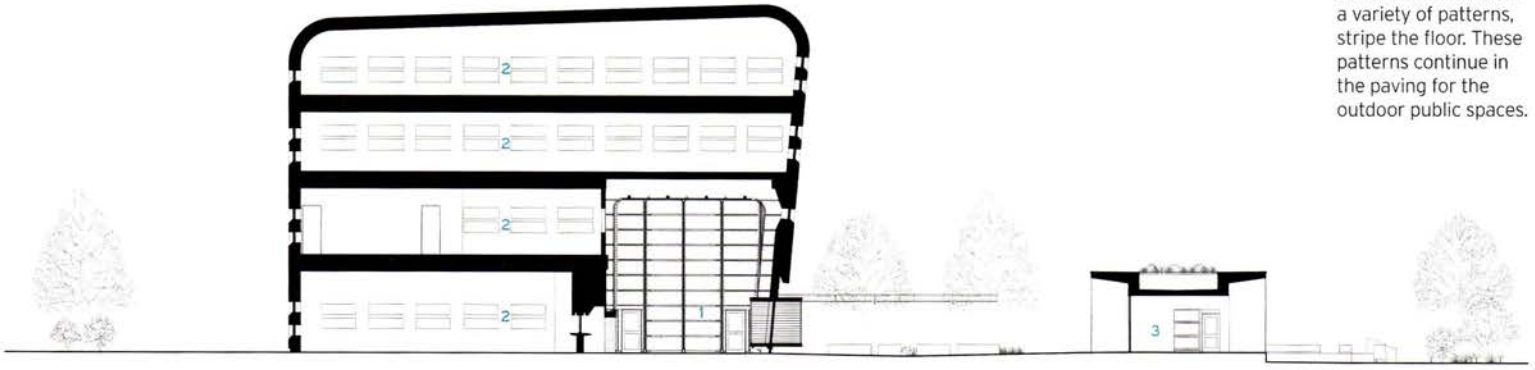
PARTIAL SITE PLAN

1 CONSULATE BUILDING
2 SECURITY SCREENING
3 WAREHOUSE
4 OFFICE SPACE
5 RESIDENCE



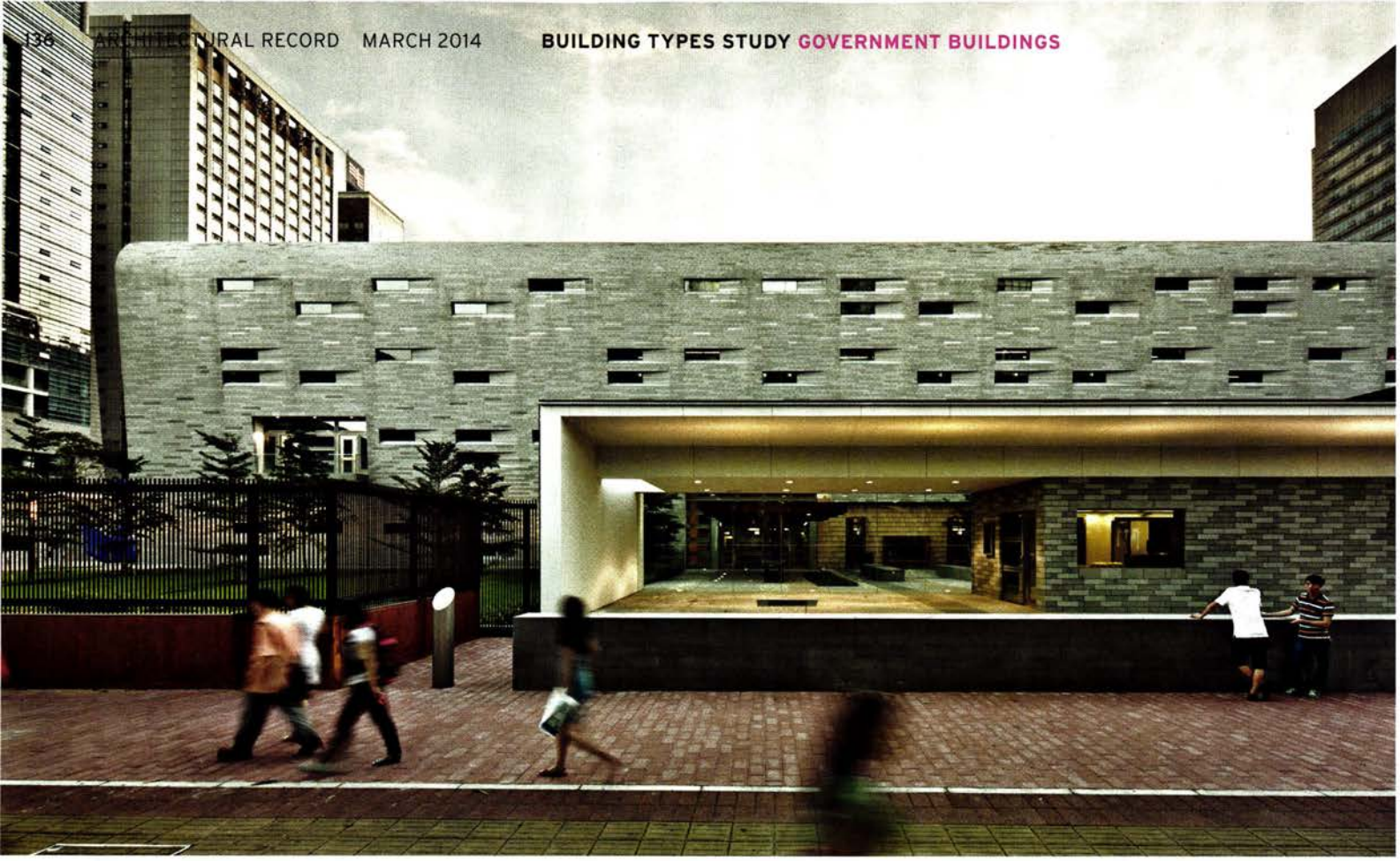
ROOF/SITE PLAN

1 LINCOLN HALL
2 OFFICE SPACE
3 SECURITY SCREENING



SECTION A - A

QUIET WARMTH
Applicants for non-immigrant visas wait in the double-story Lincoln Hall (opposite). The room's defining feature is louverlike teak slats hung from the walls and ceiling. Several types of stone from southern China, set in a variety of patterns, stripe the floor. These patterns continue in the paving for the outdoor public spaces.



STREET VIEW The complex's front door is a low-slung structure for security screening at the eastern edge of the site. A glass wall incorporated into the screening facility and an openwork fence of weathering steel allow passersby to see the main Consulate Building beyond.

place in China that processes adoptions and immigrant visas—take a glass elevator to more typical upper-floor offices. It seems generous—in a friendly American kind of way—that the consulate offers its grandest space to its Chinese guests.

A sense of approachability pervades the project. While the concrete wall on the north perimeter does not exactly say, "Come on in!" the public eastern entrance is more inviting. It has an openwork fence of weathering steel (Hartman refers to it as a "picket fence"), and its security-screening facility incorporates a glass wall so that passersby can see the Consulate Building. Galt says this transparency sends a "powerful message about . . . how we are open and welcoming."

The U.S. has had a varying history with its buildings abroad. The modern designs of the 1950s and '60s, by some of America's leading architects, were meant to symbolize democracy through their openness. A security-led approach prevailed in the 1970s and '80s. The Standard Embassy Design program, using stock designs, began in 1999. In 2010, the Bureau of Overseas Buildings Operations (OBO) announced the Excellence in Diplomatic Facilities program, which put quality architecture back in the mix. Projects by Morphosis for Beirut and Tod Williams Billie Tsien Architects for Mexico City are under way. "Representing the U.S. is not just about representing U.S. policy," says Lydia Muniz, OBO's director. "It's about representing American ingenuity and creativity."

Of all the responsibilities—including functionality, security, and sustainability—that the U.S. Consulate General in Guangzhou bears on its rounded shoulders, the one most difficult to assess is how well it conveys a national identity. There is no iconic feature such as the grand colonnades of so many classic U.S. embassies (and even SOM's Beijing Embassy) to suggest its civic purpose. In fact, this consulate is so unobtrusive it could be mistaken for a school. Hartman admits that the subtlety of the design is in part a reflection of his personal ethos. But he also suggests that the building is intentionally self-deprecating. "When we build representations of our values, the architecture should reflect a certain level of modesty," he says. "It shouldn't be a spectacle." This attitude toward its Guangzhou neighbors is understandable, even laudable. But to represent the diversity of America, being benign yet bold might be better. Still, opting for quiet amid the noise of Guangzhou may be the boldest statement of all. ■

credits

ARCHITECT: Skidmore, Owings & Merrill – Craig Hartman, design partner; Gene Schnair, managing partner; Keith Boswell, technical director; Eric Keune, Kye Archuleta, project architects, design; Kevin Krage, project manager; David Diamond, senior technical designer; Carlos Gonzalez, security officer; John Kuchen, Sandy Greig, technical designers

CHINESE ARCHITECT/ENGINEER: Guangzhou Design Institute

ENGINEERS: Skidmore, Owings & Merrill (structural, civil, m/e/p/fp)

CONSULTANTS: Tom Leader Studio (landscape); Claude R. Engle Lighting Consultants (lighting); Cerami & Associates (acoustics); Weidlinger Associates (blast)

GENERAL CONTRACTOR: B.L. Harbert International/China Huashi Enterprises

SIZE: 150,000 square feet

COST: $256 million

COMPLETION DATE: June 2013

SOURCES

GREEN ROOF: Sempergreen

SKYLIGHTS: Super Sky

ELEVATORS: Otis

AMBIENT LIGHTING: Lightolier

DOWNLIGHTS: Lithonia Lighting

Coming Soon...

The Industry's Most Advanced PVC Manufacturing Line.

CARLISLE
SYNTEC SYSTEMS

Carlisle SynTec Systems is the only single-ply roofing manufacturer to produce PVC, TPO, and EPDM membranes. With a new state-of-the-art manufacturing line under construction in Greenville, IL, Carlisle provides the widest selection of PVC products and can ensure that all of its Sure-Flex® PVC membranes and accessories are compatible and produced to the highest quality. From 10-foot-wide sheets and fiberglass reinforcement to FleeceBACK® and KEE enhancements, Carlisle has a PVC membrane that will suit your needs.

Experience the Carlisle Difference | 800-479-6832 | www.carlislesyntec.com

CIRCLE 47

We built a better way to access AIA Contract Documents.

Transform the way you access, edit, and manage design and construction documents and forms with ACD5.

AIA Contract Documents®
Powered by ACD5

- Create, share, and edit over 180 contracts and forms online with a Mac or PC
- Get editable contracts as you need them — one at a time, bundles of documents, or unlimited use of the entire AIA portfolio of documents
- Easily save and manage your personal custom clauses and templates for future use

Find out the benefits of working on your terms at aia.org/ar. CIRCLE 74

James F. Battin U.S. Courthouse – Billings, MT
Architect: NBBJ, Seattle, WA
Photo Credit: Gage Brothers Concrete Products, Inc.

PCI Precast/Prestressed Concrete Institute

High Performance Precast Appeals to the Courts

The 147,000 sq. ft. James F. Battin United States Courthouse was designed and built in just 27 months, making it the fastest delivery of a federal courthouse in modern history. The high performance precast concrete envelope not only provided speed, but also the blast resistant protection and aesthetic versatility the project demanded. The high performance building also achieved an energy cost savings of more than 40-percent relative to industry code. High Performance precast concrete provides versatility, efficiency, and resiliency all in one system.

Discover **High Performance** Precast

Versatile | Efficient | Resilient

For more information and free continuing education, visit

www.pci.org/hpprecast

CIRCLE 97

OUR OPEN DOOR POLICY

Begins with the specification and continues all the way through installation.

Whether your automatic entrance is custom-built or a standard solution, Horton has a solid reputation for responding to the needs of the architect and specifier. With innovative products, custom finishes and unparalleled service, Horton will work with you to bring your vision to life. We value your feedback and are listening to what you say. Please continue the conversation at **wwww.hortondoors.com/opendoor**.

Horton
AUTOMATICS

CIRCLE 75

Financial Incentives for Energy Efficiency

For Our Design Firm

We've developed a reputation for including energy-efficient systems in every project, whether it's a retrofit or new construction. And being knowledgeable about the incentives available from *New Jersey's Clean Energy Program*™ means our clients save money up front and year-after-year on their utility bills.

We're Building Our Business On A Solid Foundation.

Visit NJCleanEnergy.com/ALLY to learn about incentives available for your clients' energy-efficient projects.

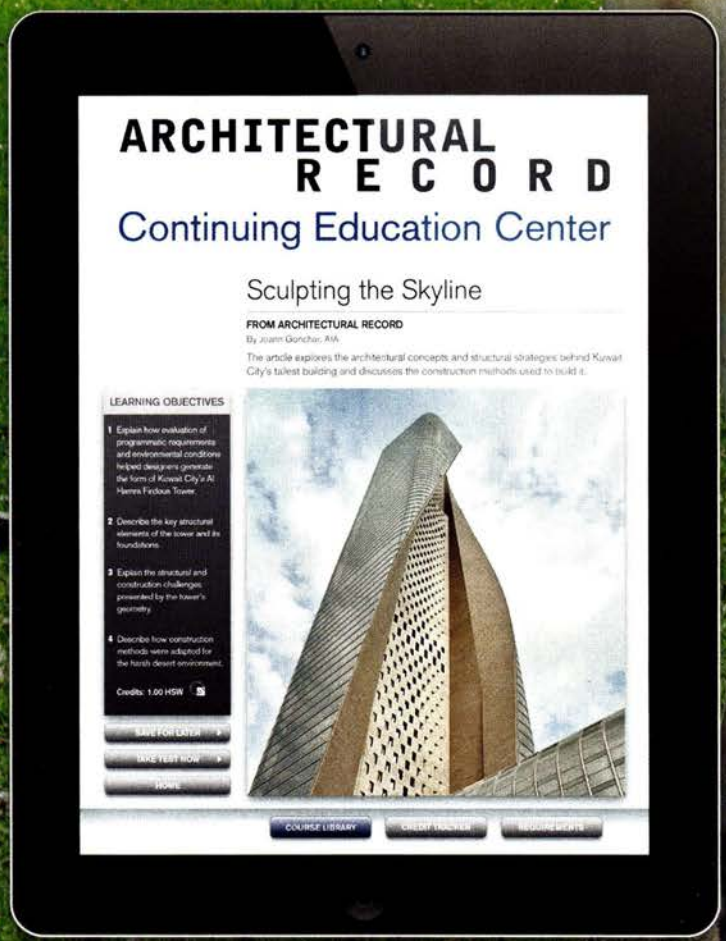
CIRCLE 48

New Jersey SmartStart® BUILDINGS

New Jersey's Clean Energy PROGRAM™ Your Power to Save njcleanenergy.com

SCHOOLYARD.

Introducing the Architectural Record CEU App. The only app that allows you to fulfill credits and track your progress without Internet access.



Download free at iTunes. Sponsored by Armstrong

CONTINUING EDUCATION

In this section, you'll find three compelling courses highlighting creative solutions for tomorrow's buildings—brought to you by industry leaders. Read the courses and then go to our Online Continuing Education Center at archrecord.com to take the tests free of charge to earn AIA/CES Learning Units (LUs).


p147

Open Cell Spray Foam Insulation in Commercial Buildings

Sponsored by ICYNENE, Inc.

BE PM SU CREDIT: 1 HSW


p153

Silence Is Golden

Sponsored by Price Industries

AC IN PM CREDIT: 1 HSW


p159

Recycled Material Innovations

Sponsored by Bonded Logic, Inc.

AC BE PM SU CREDIT: 1 HSW

CATEGORIES

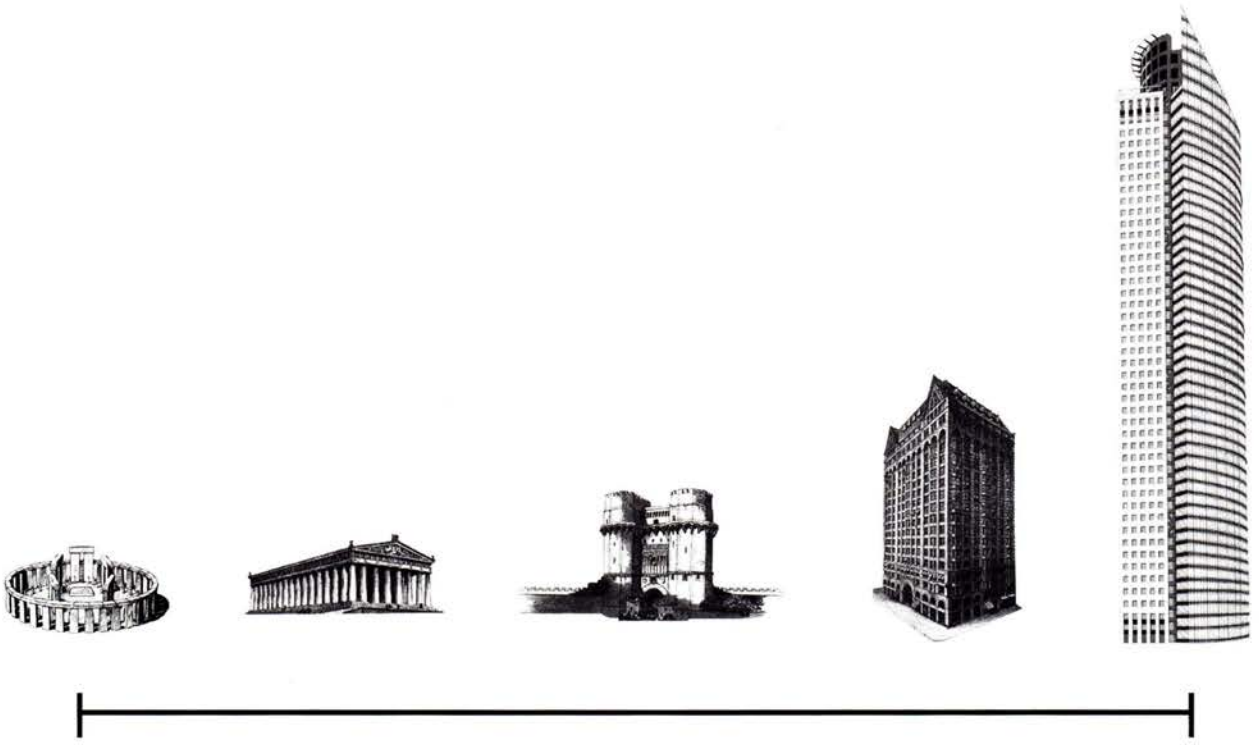
AC ACOUSTICS

BE BUILDING ENVELOPE DESIGN

IN INTERIORS

PM PRODUCTS AND MATERIALS

SU SUSTAINABILITY



Architecture has evolved. **Insulation too.**

Architects and builders trust Icynene, the industry leader with the most comprehensive and innovative portfolio of high-performance spray foam insulation for modern buildings. With an impressive R7 per inch, our next-generation closed cell product, Icynene ProSeal™, sets a new benchmark in performance, applicability and range. Are you ready to evolve your next project? Learn more at: **www.icynene.com** CIRCLE 93

ICYNENE®

The evolution of insulation.™

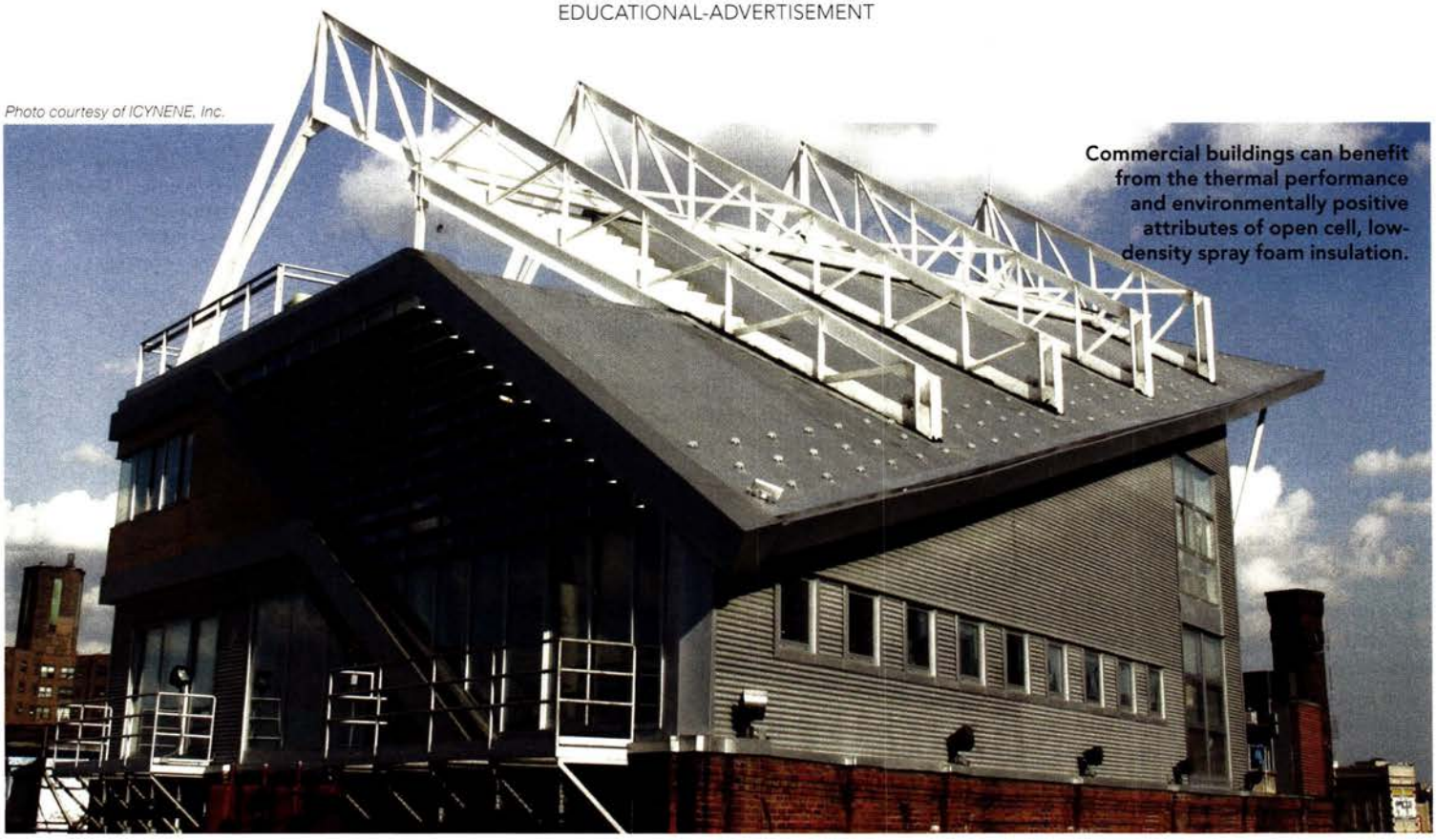


Photo courtesy of ICYNENE, Inc.

Commercial buildings can benefit from the thermal performance and environmentally positive attributes of open cell, low-density spray foam insulation.

Open Cell Spray Foam Insulation in Commercial Buildings

A high-performance affordable option for wall and roof assemblies

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

When selecting insulation products to use in building designs, architects have a broad range of choices. Foam insulation products are often selected because they have typically and rather consistently been shown to provide superior overall thermal performance, thus contributing to greater energy and operating cost savings in buildings. In particular, open cell spray foam insulation can insulate and air seal wall and roof/attic assemblies in commercial buildings quite effectively, economically, and efficiently. Also known as ½-pound foam because of its relatively lighter weight and density, it has often been associated with residential construction. However, its air-sealing characteristics, ability to minimize moisture and temperature-related issues, and capacity to enhance the performance of a wide variety of building types make it ideal for commercial projects. In fact, it has been successfully used for over 25 years in commercial and light commercial projects throughout North America.

OVERVIEW OF OPEN CELL LOW-DENSITY SPRAY FOAM INSULATION

Spray foam insulation of all types rely on using two distinct manufactured ingredients that are mixed and formed in the field by skilled applicators. Typically, these applicators will use equipment that is mounted in a trailer or truck. Flexible hoses carry the needed ingredients from there to a hand-held gun that both mixes and sprays the combined product onto the surfaces being insulated. As soon as the two parts are mixed, a chemical reaction begins causing the liquid mixture to foam, expand, and eventually take its final shape. This customized on-site application means that the sprayed insulation readily conforms to the shape and geometry of the surfaces it is being applied to while its chemical make-up provides the needed properties for it to adhere to those surfaces.

Within the industry, there are several common types of spray foam insulation that are distinguished from each other based on their relative density and manufacturing make-up. For purposes of this article, we are going to

CONTINUING EDUCATION

EARN ONE AIA/CES HSW LEARNING UNIT (LU)

Learning Objectives

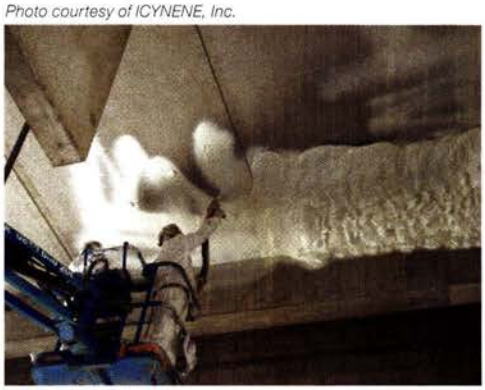
After reading this article, you should be able to:

1. Identify the characteristics of open cell spray foam that make it suitable for high-performance roof/attic assemblies and exterior wall assemblies.
2. Investigate the inherent energy performance and cost-saving effectiveness of low-density open cell insulation when insulation and air barrier are provided in one.
3. Recognize the ability of open cell spray foam insulation to combat moisture infiltration into construction assemblies and add to building durability.
4. Assess the various ways that open cell insulation contributes to environmentally sensitive and green buildings.

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.

AIA/CES COURSE #K1403E

Photo courtesy of ICYNENE, Inc.



Open cell, low-density spray foam insulation is applied in a continuous application against wall sheathing or roof decking.

focus on low-density, open cell insulation. For context, low-density foam is commonly installed with a density of approximately ½ pound per cubic foot compared with medium-density foam that installs at a density of approximately 2 pounds per cubic foot. Some high-density foam is also available at approximately 3 pounds per cubic foot. The ingredients used in the mixing process determine the reaction that takes place to form the cells within the insulation. Those cells can be open to each other allowing some interaction or closed to each other forming distinct and separate closed cells.

Open cell spray foam insulation effectively blocks heat transfer with a tested R-value of approximately R-3.5 to R-3.7 per inch. Its lower density gives it a comparatively softer make-up than denser closed cell insulation which means that it can seal around the edges and perimeter of stud cavities and any penetrations in a flexible manner. Some of the other benefits of open cell insulation are tied to this lighter, softer, and more flexible makeup. Acoustic control, for example, is enhanced in wall assemblies due to its sound-absorptive properties, more so than with rigid insulation. Should water infiltrate the assembly for any reason, its vapor permeability means that the material can dry both toward the interior and the exterior as may be preferred. As a material, it does not provide a food source for mold, meaning it won't grow in the insulation in a wall assembly. And the cost of open cell spray foam insulation is generally very attractive and competitive when compared to labor and materials for other types of insulations.

Low-density open cell spray foam insulation can be used in many common commercial building envelope locations such as exterior walls where it is sprayed from the inside against sheathing or roof/ceiling assemblies where it is similarly sprayed inside of sheathing or roof decks. It can also expand the horizon of better performance opportunities compared with fibrous or rigid board insulation options because of its inherent airtightness. This is particularly true in non-typical locations such as cathedral ceilings, domed ceilings, cantilevered floors, unconditioned space separations, arches, and other unusual shapes. Further, it is particularly good at filling in and sealing around irregularities in any of these locations such as plumbing, electrical, telecommunications and other service lines, junctions, or entry points.

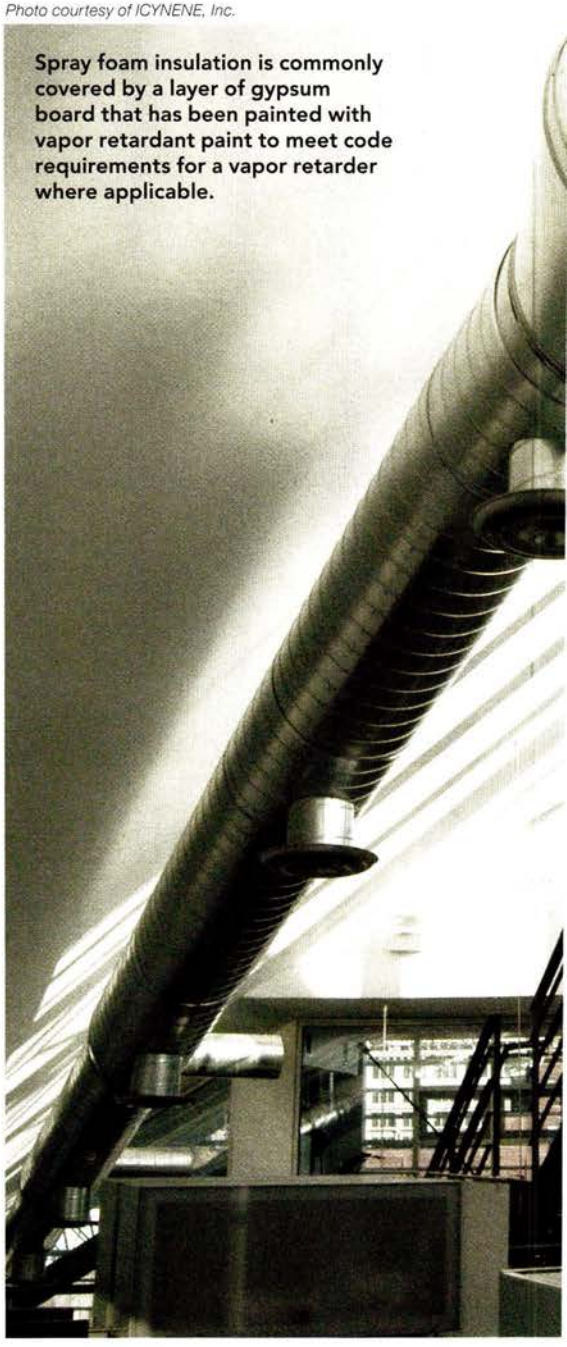
When it comes to code compliance, many low-density spray foam products are approved for all construction types indicated in the International Building Code (IBC) including type I, II, III, IV, and V construction (check with the manufacturer for specific compliance details). Low-density spray foam can also be used in assemblies that require a fire rating and can meet specific IBC fire requirements for the use of plastics in wall assemblies. When used in framing cavities, the IBC is clear about requiring a protective barrier, designated as a thermal barrier, such as a layer of ½-inch gypsum board (or an intumescent coating) on interior surfaces. When it comes to attic spaces there is a little bit of ambiguity between the requirements for vented versus unvented attics. In vented attic spaces, the IBC currently requires spray foam to be covered with an ignition barrier which could be made from a number of possible materials. There are no specific provisions dealing with unvented attics although some light commercial buildings contain these spaces. Hence, an ignition barrier may or may not be required, subject to a specific architect's design or local building code interpretation. There is a general exception for products that have been tested and can show that they do not require an ignition barrier.

INTEGRAL AIR BARRIER CREATES OPTIMAL BUILDING PERFORMANCE

For commercial projects, open cell spray foam insulation delivers very high building performance by providing three distinct capabilities in a one-step application. First, it controls conductive heat flow through an assembly by virtue of its direct insulating value. This is enhanced by the fact that not only is the spray foam's tested R-value as good or better than most batt-type insulations, but a proper installation also fills completely all available spaces. In typical stud wall cavities, that means that irregularities from framing can be filled around rather than restricting or compromising the amount of insulation installed as may happen with rigid or batt-type insulation. R-values are also maintained over time since spray foam holds its shape such that sagging, settling, and other potential incomplete insulation installations that cause gaps or voids are not likely with spray foam insulation.

A second means of optimizing performance

Photo courtesy of ICYNENE, Inc.



Spray foam insulation is commonly covered by a layer of gypsum board that has been painted with vapor retardant paint to meet code requirements for a vapor retarder where applicable.

with open cell spray foam comes from its inherent ability to prevent air from flowing through it unlike fiberglass insulation which does allow air flow. This trait of the spray foam helps to eliminate convective heat currents and moisture flow in wall and ceiling cavities. Convection inside a framing cavity can reduce the effective R-value of a construction assembly and help draw unwanted moist air into framed areas. By eliminating this activity, performance is maintained and the damaging effects of moisture can be controlled or eliminated.

Third, and perhaps as significant as R-values, is the ability of the open cell spray foam to act as a full, integral air barrier that controls air leakage into and out of construction assemblies

and the building. In fact, spray foam insulation has been used in many buildings specifically to seal openings, penetrations, and gaps around doors and windows. Because of this air sealing quality, it can also be an effective barrier that minimizes airborne moisture transfer. Keeping unwanted moisture out of wall assemblies has long been a goal of successful design, thus these properties are significant. Its softer make-up compared to higher-density foams also means that it can flex and adjust to continue to provide an effective air seal even as the building may settle, expand, or contract over time.

The significance of the air barrier qualities of spray foam insulation has been observed and studied by independent research organizations.

UNION WHARF, BALTIMORE, MARYLAND

The 280-unit Union Wharf apartment development overlooks the Inner Harbor of the Patapsco River in the trendy and historic area of Fell's Point in Baltimore. The $72-million project by The Bozzuto Group incorporates a range of green and modern features, including a 150-foot infinity edge pool, a fitness and yoga center, as well as a cyber cafe. Completed in 2013, Union Wharf complements its historical surroundings and is walking distance to restaurants, bars, parks, museums, theaters, and art galleries.

Photo by Patrick Ross Photography 2013

Photo courtesy of ICYNENE, Inc.

The Challenge

Situated on a wharf in the heart of Baltimore, the four-story community presented a number of challenges that encouraged architectural firm, Hord Coplan Macht, and Bozzuto Construction contractors and subcontractors, including local spray foam contractor AC&R Insulation, to think outside the box to ensure the building was constructed as envisioned and on schedule.

Given that it was located in a historic area, the site offered contractors very limited options and space for delivery and parking, which also meant that storage space for building materials was at a premium. This prompted Bozzuto Construction to think of new ways to bring their materials onto the site and maintain open access routes for other contractors.

In addition to the site's space restrictions, Bozzuto Construction Company needed to ensure that all teams were able to work efficiently enough to meet their well-thought-out construction schedule. And of course, jobsite safety for all contractors and site visitors was a priority at all times.

In order to create an energy-efficient and environmentally sensitive building, Union Wharf was designed to achieve LEED® Silver certification. This required the use of sustainable materials, including durable and energy-efficient insulation, to ensure it met sustainability requirements while also providing the desired thermal performance and occupant comfort.

The Solution

By addressing the multiple challenges that contractors faced, innovation flourished. Contractors were allowed to locate their trailers on floating barges docked in Baltimore's Inner Harbor, which freed up the limited available on-site space. Additionally, the use of portable equipment devices allowing for the movement of construction materials from one floor to the next made sure that subcontractors had the ability to move needed materials without obstructions or impediments. A 150-foot tower crane was also employed to bring materials and equipment into the building which helped ensure there were minimal delays during construction. For any materials that required protection from the cold Baltimore winter nights, temporary heater boxes were fabricated on-site to keep the materials warm.

Union Wharf also included a number of energy-efficient and green building features which Bozzuto Construction also addressed, including the use of low-density spray foam insulation. Local spray foam contractor AC&R Insulation was recruited to install both low-density open cell spray foam insulation and some medium-density spray foam into the 280-unit apartment community. More than 50 sets of foam containers were used throughout the project and the insulation subcontractors ensured that job-site safety was maintained both during the spray application and 24 hours after application. While both of these insulation materials provide thermal comfort and air sealing, they individually offer additional benefits for both the designers and the residents. The low-density open cell spray foam provides excellent thermal performance and sound absorption properties, ensuring a more comfortable, quieter living space without disturbance from neighbors or outside traffic.

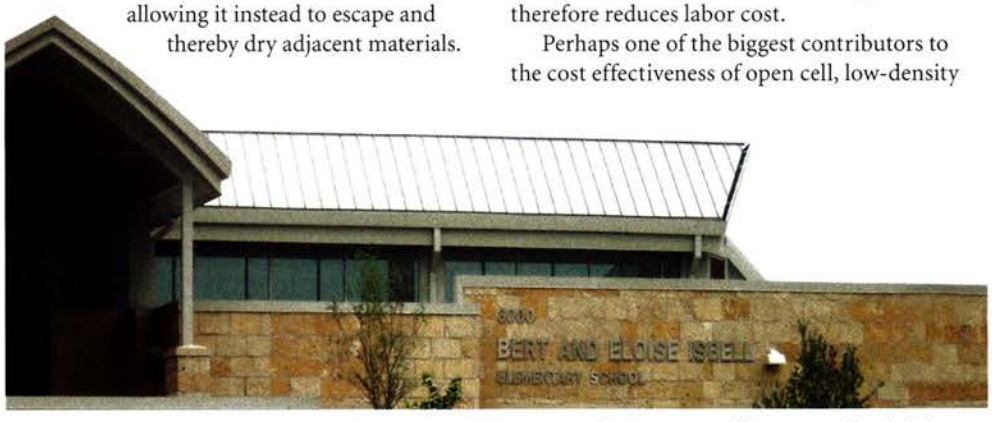
The Result

Union Wharf has been one of the most successful and fastest leasing apartment communities that Bozzuto has undertaken in its 25-year history. The community has become a shining example of modern, sustainable living in Baltimore and is on track to achieve LEED Silver accreditation from the U.S. Green Building Council.

The National Research Council of Canada (NRCC) in particular has produced a Wall Energy Rating factor that compared the performance delivered during controlled testing versus the expected performance based on nominal R-values. In these tests, spray foam consistently performed at more than 90 percent of nominal R-value whereas air-permeable, fibrous insulation performed in the range of 35 percent to 65 percent of nominal R-value even with a plastic vapor barrier in place. The study concludes that, without a proper air barrier, insulation alone cannot deliver optimal energy efficiency and comfort. This is why air barriers are now a mandatory provision of energy codes and industry standards such as ASHRAE 90.1. Further, the NRCC study found that low-density open cell foam was the most effective air barrier material out of the insulation and air barrier alternatives studied.

It should be noted that while open cell insulation is an effective air sealant, it does allow water vapor to diffuse through it. Hence, in cold climates (climate zones Marine 4 and higher), a warm side vapor retarder (e.g. vapor retardant paint) will be needed to control vapor diffusion in an exterior wall or unvented attic assembly.

Overall, the use of spray foam insulation, then, goes beyond just R-values and truly addresses a comprehensive way to optimize energy efficiency, making the thermal performance arguments for using open cell spray foam insulation very compelling. It has the highest expansion (100 to 1) of any spray foam insulation product, giving it the ability to flow into and seal cracks and gaps. It has the widest application envelope (temperature and humidity), giving it maximum flexibility to mesh with tight construction schedules and deadlines. It doesn't trap moisture, allowing it instead to escape and thereby dry adjacent materials.



Architects and building owners such as school districts seeking energy efficiency, affordability, and long-term durability can help eliminate any "green premium" by considering choices for insulation used in their buildings.

Photo courtesy of ICYNENE, Inc.

Image courtesy of ICYNENE, Inc.

FOR THE SAME PROJECT:

Drums of open cell insulation required **Drums of closed cell insulation required**

Part of the cost-effectiveness of open cell low-density spray foam insulation is directly tied to its greater yield in comparison to medium-density foam.

COST EFFECTIVENESS OF OPEN CELL INSULATION

Achieving the multiple properties of thermal insulation and air sealing in a single step obviously saves labor and material costs compared to other multi-component assemblies. This is usually seen as the first and most obvious contributor to the cost effectiveness of open cell spray insulation. Some architects and designers working in cold climates (all of Canada and Zones 5 to 8 in the U.S.) may still select medium-density foam thinking that they can also get an integral vapor barrier in the one product. However, the cost difference between the higher-density foam is much greater than the cost of using a simple vapor retarder. There may be other reasons to consider medium-density foam, but the cost effectiveness changes when the density of the foam changes.

From an installation standpoint, open cell low-density foam can be applied in a single continuous application without regard for depth. This is in contrast to most closed cell medium-density insulation that is limited to 2-inch lifts to allow setting and curing. Hence, the open cell installation is quicker and therefore reduces labor cost.

Perhaps one of the biggest contributors to the cost effectiveness of open cell, low-density insulation is its inherently high yield. In this context, yield is a measure of the coverage capability of foam. Low-density foam has a yield that is three to four times higher (100:1 versus 30:1) than medium-density foam. In practical terms, that means that one drum each of the two ingredients needed to create low-density foam covers the same portions of a building that would require three drums each of ingredients for medium-density spray foam. This simple math directly contributes to making open cell low-density foam more cost effective than other alternatives.

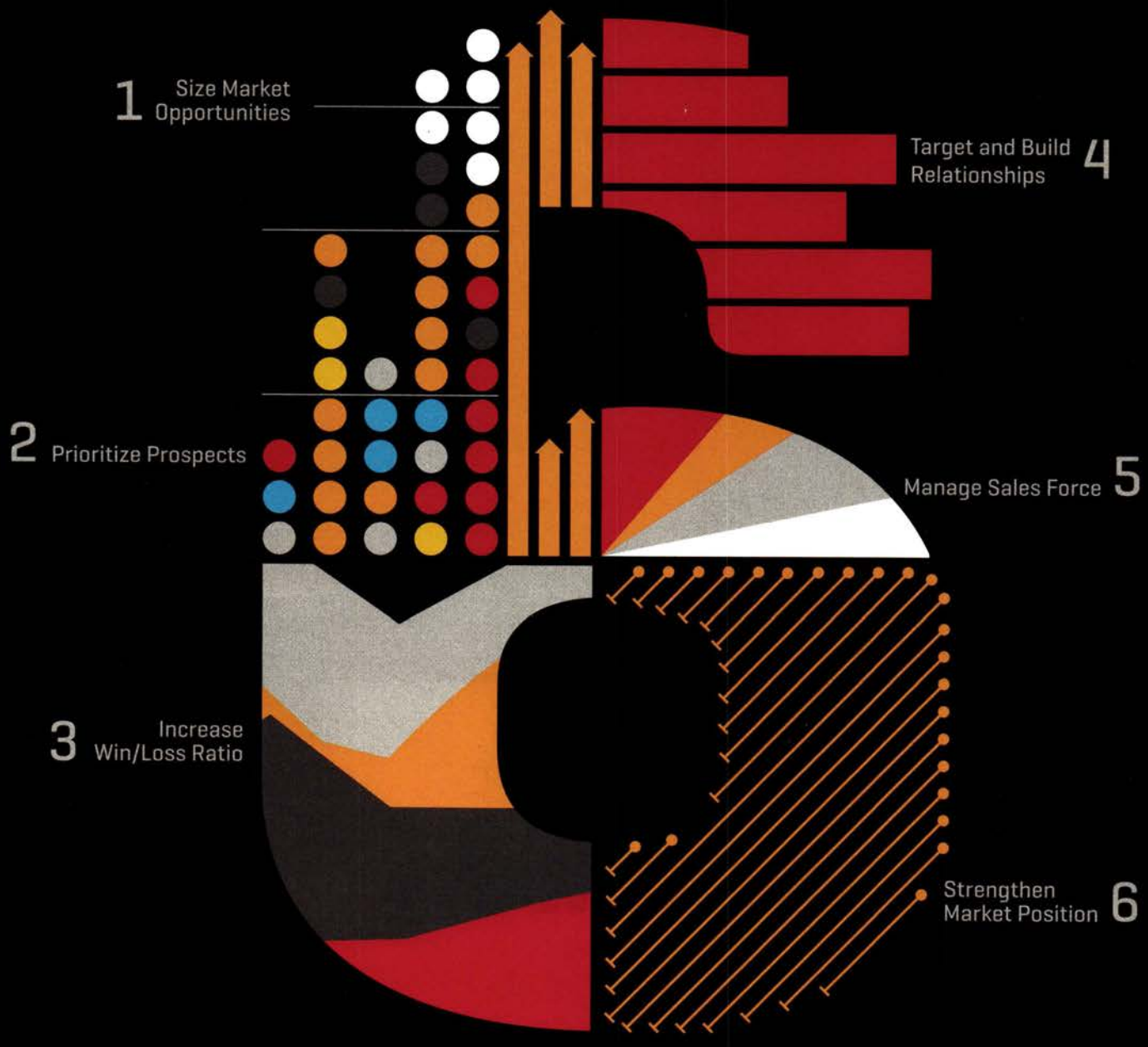
ENHANCING BUILDING DURABILITY WITH OPEN CELL INSULATION

Durability of a construction assembly and a building relies on the integrity of materials remaining intact during the full service life of the building. The biggest common threat to that integrity is damage from moisture seeping into enclosed cavities and causing damage to materials or structural components of a system. According to ASHRAE, moisture damage contributes to 90 percent of all building and building material failures. Moisture issues in commercial buildings contribute to the corrosion of metal components (i.e. ducts, framing) and the general degradation of other building materials (gypsum sheathing, ceiling tiles, wood products, etc.). Unwanted moisture in building systems can also create the growth of mold and poor indoor air quality thus affecting the health of the occupants.

▶ Continues at ce.architecturalrecord.com

Peter J. Arsenault, FAIA, NCARB, LEED AP, *practices architecture, consults on green and sustainable design, writes on technical topics, and presents nationwide on all of the above. www.linkedin.com/in/pjaarch*

Six ways Dodge builds your business

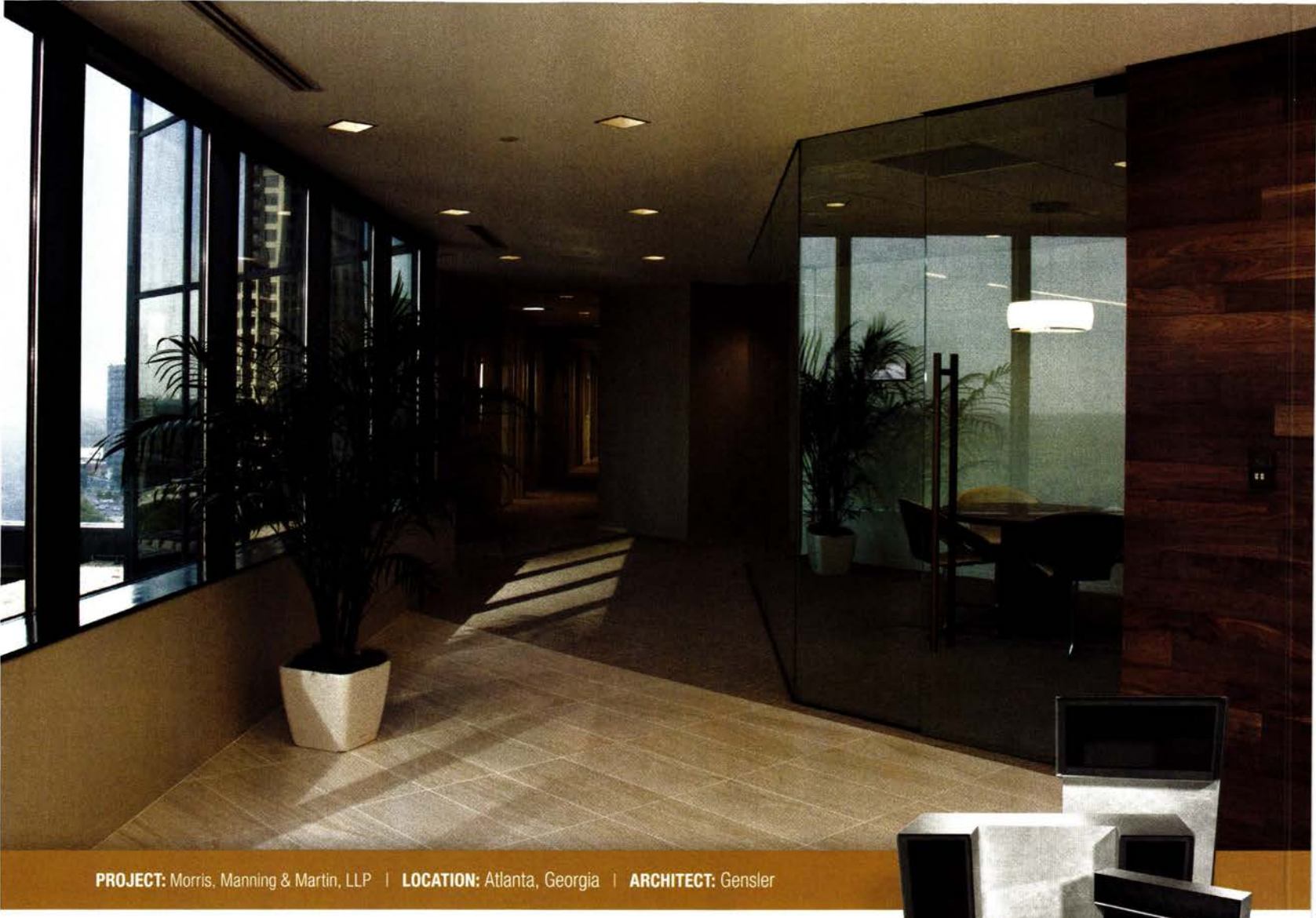


DODGE

Essential intelligence to build on

McGRAW HILL CONSTRUCTION

Call 877-958-6836 or visit DodgeBuildsBiz.com



PROJECT: Morris, Manning & Martin, LLP | **LOCATION:** Atlanta, Georgia | **ARCHITECT:** Gensler

FROM PUBLIC TO PRIVATE
CROSS TALK SILENCERS

OPTIMIZING THE ACOUSTIC ENVIRONMENT

The design team created luxuriously quiet and intimate spaces for Morris, Manning & Martin, LLP by integrating Noise Control products such as Cross Talk Silencers, Thin Line Return Dissipaters, and Return Air Canopies. Price's expansive range of Noise Control solutions allow for endless design possibilities without compromise.

WHY USE PRICE NOISE CONTROL?

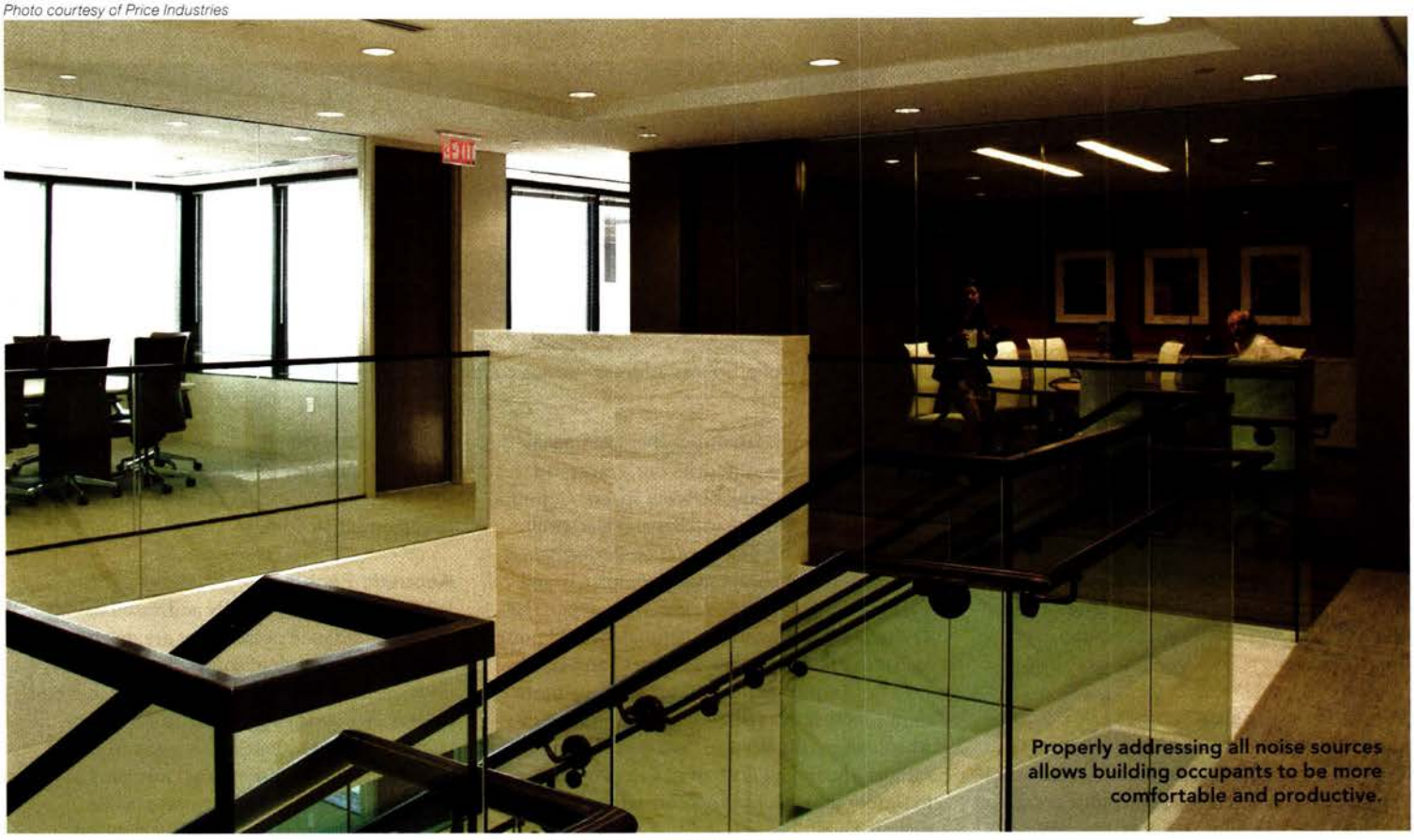
+ Maximize Privacy: Minimize noise flanking.
+ Laboratory Tested: Reliable performance data.
+ Custom Applications: Endless design flexibility.
+ LEED: School & Healthcare applications.

price® The Science of Comfort™

Visit **priceindustries.com** or call **1.866.430.0969.**

CIRCLE 91

Photo courtesy of Price Industries



Properly addressing all noise sources allows building occupants to be more comfortable and productive.

Silence Is Golden

The invisible challenge: Optimizing the acoustic environment

Sponsored by Price Industries | *By Alex Michaud, M.Sc.*

As building systems continue to evolve, noise remains the same—acceptable or annoying. The former often goes unnoticed and the latter requires attention. Noise is the number one occupant complaint in many projects. Various research indicates that hospital patients complain about noise more than anything else. For those who travel, it should come as no surprise that noise is the biggest complaint among hotel guests. Even in restaurants, noise was the number one complaint in Zagat's latest national dining survey. Various studies indicate that noise can negatively impact occupants by ultimately lowering productivity and increasing stress levels. This "invisible" problem is loud and clear.

While building systems may change, noise is a constant condition that is best addressed during the design process. Unfortunately, this is not always the case and noise is often addressed in the final design stages or after customers move in and the complaints start. Solutions to most "noise problems" typically require the examination of multiple paths, and how they interact with each other and relevant building systems. By properly addressing all noise sources, offices can become more productive, conference room meetings more effective, and hospital patients more comfortable. A firm grasp of the basics can go a long way towards achieving spaces that allow occupants to maximize the intended use, whether it be sleeping, working, learning, or eating.

ACOUSTICAL CHARACTERISTICS

There are several acoustical characteristics that occupants typically notice when entering a space. The first is often background noise, that is, how loud or quiet a space is. Another is how reverberant a space is. When there are surrounding occupied spaces, the noise isolation (or lack thereof) provided by building assemblies can become apparent. While these metrics can directly impact the occupants, they can also influence the decision to rent or buy a building or space. Class A office space, for example, typically achieves lower background noise levels than Class B or C, which is one

CONTINUING EDUCATION

EARN ONE AIA/CES HSW LEARNING UNIT (LU)

Learning Objectives

After reading this article, you should be able to:

1. Discuss the effects of unwanted noise on human productivity and wellness.
2. Describe acoustical metrics that directly impact building occupants and influence the value of a space.
3. Compare key methods of reducing noise in the built environment in terms of effectiveness and ease of implementation.
4. Explain the importance of, and methods for, increasing speech privacy and intelligibility in offices and educational environments.

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.

AIA/CES COURSE #K1403F

reason why it commands a higher price per square foot. Integrating acoustics into the client dialogue early helps optimize the design process and end result for everyone involved.

Three Aspects of Noise

Noise can be thought of in three distinct aspects—source, path, and receiver. Every project has these three aspects, though they vary in number (one source vs. many) and importance (the receiver is an intern vs. the CEO). In many cases, noise control products can be applied to improve various conditions. Each project is unique with varying limitations such as budget or space. Understanding project parameters and available noise control products allows for the most effective design solution. The illustration above depicts some common noise conditions in a typical office setting and products to address them. Blue arrows indicate air flow and yellow waves indicate noise. The noise control products in yellow are often referred to as air transfer silencers and are discussed later.

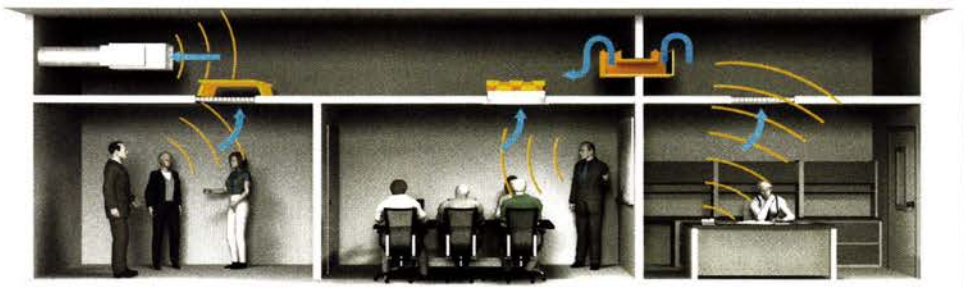
Sound Transmission

Idealized lab-rated sound transmission loss is often described using STC (Sound Transmission Class), a lab measurement of the noise reduction provided by a building assembly. Examples of typical building assemblies with STC ratings include walls, ceiling, and floors. Other sound transmission field measurements are ASTC (Apparent Sound Transmission Class) and NIC (Noise Isolation Class) depending on field conditions. These field measured ratings are typically five points lower than the corresponding lab rating because of flanking paths such as cracks and holes (piping penetrations, mullion conditions, etc). The table below simplifies the description for common noise change perception, whether from a sound source or building assembly's noise isolation performance. To be clear, STC points and dB are not equivalent, but for the sake of simplicity and perception they are used interchangeably in this discussion.

Field construction quality impacts drywall partition performance; often the joints are not properly finished, which decreases overall noise isolation. Over time, a partition's noise isolation performance may deteriorate. For example, if the caulk sealing a joint dries out, cracks can allow for noise to flank between spaces. Common elements such as light switches and electrical outlets also reduce noise isolation performance, since they're not always sealed completely and the plastic assemblies have lower mass than the drywall that was removed. Ultimately, field noise isolation provided by poor construction can vary from equivalent laboratory STC by more than 15. Operable partitions are even worse when comparing lab and field noise isolation ratings; the spread is often in excess of 10 due to flanking paths, improper installation, and operable wall size.

Several guidelines to optimize a wall construction's acoustic performance in the field include using two layers of overlapping drywall on each side of the stud between noise-sensitive spaces, selecting lighter-gauge metal channel studs, staggering electrical outlets and switches so they are not in the same stud space, filling stud cavities with sound-absorbing material, and sealing all joints and penetrations completely using non-hardening caulk. Just adding 2 inches of sound-absorbing material in a stud cavity for example can improve STC performance by at least 2 to 5 depending on the overall wall construction. One of the easiest methods to identify noise leaks is to perform a light test. Turn the lights off on one side of a building assembly and look for light leaking in on the dark side. Wherever there is light, there is the potential for noise to leak. Unfortunately if you're afraid of the dark, this is a horrible method.

Image courtesy of Price Industries



Noise control products address various conditions.

Source: Price Industries

Change in sound dB	Human Perception
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	Twice or 1/2 as loud
20	Four times or 1/4 as loud

NOISE SOLUTIONS

There are a variety of solutions on the market to decrease noise and increase building occupant satisfaction.

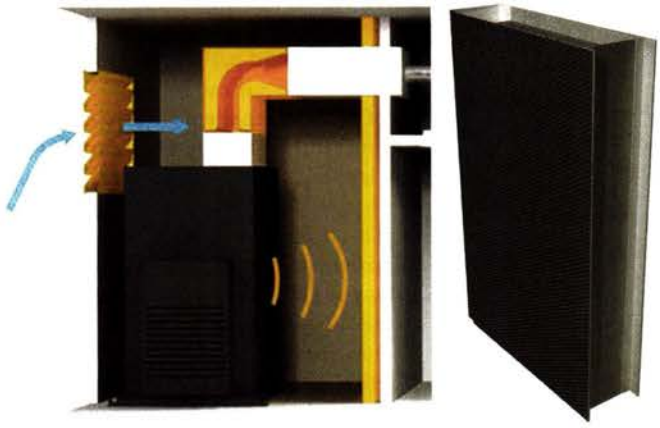
Acoustic Panels

While duct noise is usually addressed using silencers, radiated noise issues are not always caught due to a lack of communication and understanding among the different trades on a project. Acoustic panels can greatly reduce the transmission of radiated noise from rooftop units, generators, and internal mechanical equipment, and also reduce noise inside mechanical rooms because of their sound absorption properties. When used to fabricate large air plenums, acoustic panels have several advantages over drywall. Acoustic panels are less susceptible to moisture, can be easily cleaned, and provide equipment noise reduction because of the perforated liner much like a silencer. Drywall, on the other hand, often increases equipment noise due to its high reflectivity. In addition, drywall does not handle moisture very well, is not as durable as an acoustic panel, and is prone to more field installation variability as described earlier.

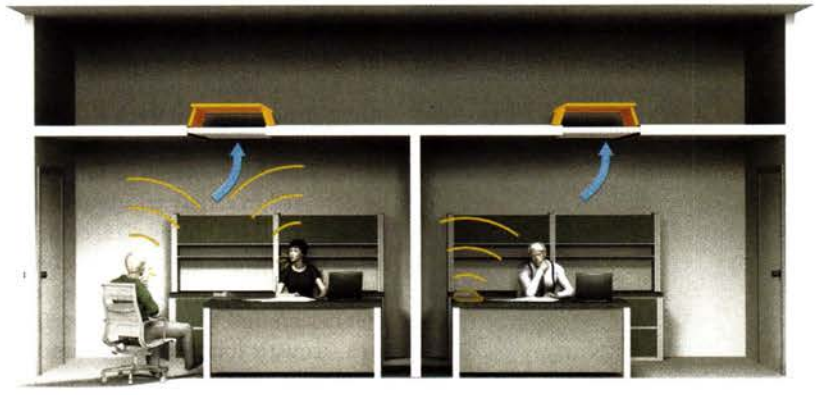
Acoustic panels are an engineered product available in various thicknesses utilizing a sandwich construction with various internal absorptive media options. Fiberglass insulation is the most common media, but they can also use foam, natural fibers, or mineral wool, depending on the application. Acoustic panels are manufactured in a controlled environment and final assembly occurs on the project site, so there is reduced variation in assembly performance. Insulated tongue-and-groove joints reduce possible flanking that could occur with traditional H-channel or non-insulated joints. Many projects utilize field-fabricated panels built by sheet metal contractors. Drawbacks of these site-constructed panels include a lack of lab-rated performance data, reduced material and paint options, and decreased consistency across projects.

Often used as noise barriers outside or to surround noisy equipment such as generators, acoustic panels typically consist of a solid casing

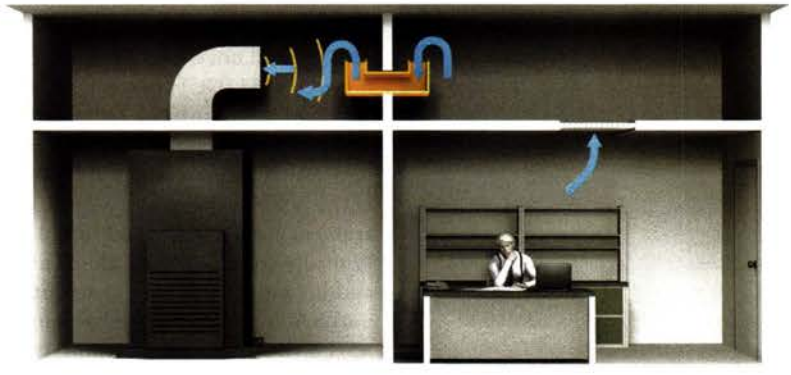
Images courtesy of Price Industries



A typical acoustic panel application and assembly



Plenum noise flanking is reduced by air transfer silencers.



Cross talk silencers can reduce air transfer noise flanking.

side and perforated liner side. The perforated side typically faces the noise source because it is highly effective at absorbing sound. Acoustic panels can also improve partition and slab noise isolation performance (STC) by being placed between a noise source and existing building assembly. This is effective for targeted noise treatment. For example, if there were a conference room directly above a mechanical floor or equipment, acoustic panels could be installed in the mechanical room below the conference room to provide additional noise isolation performance for the overall slab assembly. Other alternatives like moving the equipment or adding mass to the slab are not always viable options.

Air Transfer Silencers

Air transfer silencers can provide additional noise reduction to ensure that overall partition assemblies provide adequate noise isolation or speech privacy. For example, two adjacent rooms separated by a non-full height wall can be negatively impacted by noise flanking through the common ceiling plenum. As depicted in the accompanying illustration, this noise path can be reduced by using air transfer silencers at return grilles with the added benefit of reducing visibility into the plenum space. Projects often utilize non-full height walls between private spaces as a way to reduce cost. Unfortunately, if the resulting flanking path is not properly addressed, the relevant private space's effectiveness is also reduced.

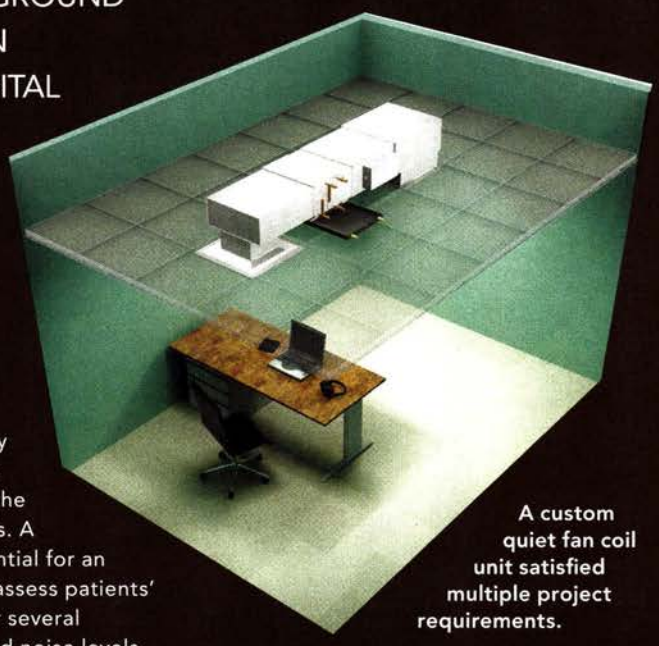
Another common condition is when a full height wall (floor to deck) requires transfer air between spaces, but must maintain a specific STC rating. Mechanical room partitions, for example, are often designed to have a minimum STC-50 rating, but often also require penetrations for return air. One method for achieving both return air transfer and noise isolation requirements is to use a cross talk silencer, as depicted in the accompanying illustration. This product has lab-tested performance and can be sized appropriately to satisfy project design requirements.

Noise and light transmission are additional issues that are often overlooked during the design process. By addressing both of these issues, air transfer silencers allow for more flexible space layouts and mechanical equipment placement. They also can result in significant construction cost savings because of their simplified installation. Lined return boots are often recommended, but they have several drawbacks. For one, lined return boots are usually field fabricated with no reliable performance data. They also require additional labor due to support requirements and their height often limits installation especially in crowded or shallow plenum conditions. An air transfer silencer on the other hand can be installed directly below mechanical equipment in addition to having lab performance and minimal labor costs.

It's important to clarify that air transfer silencers do not provide the same amount of noise reduction as HVAC-duct silencers. Rather, air transfer silencers allow for the overall STC or CAC (Ceiling Attenuation Class) to be preserved. Most ceiling tile manufacturers

LOWERING BACKGROUND NOISE AT BOSTON CHILDREN'S HOSPITAL

Image courtesy of Price Industries



A custom quiet fan coil unit satisfied multiple project requirements.

Almost 3 out of every 1,000 children born in the U.S. have a hearing impairment. The Audiology department at Children's Hospital Boston at Waltham is instrumental in providing the gift of hearing to many of these children, through detailed assessment and the application of hearing aids. A quiet environment is essential for an audiologist to accurately assess patients' needs and progress. After several years dealing with elevated noise levels emanating from a fan coil unit located above his office, the head of audiology at Children's challenged his facilities team to fix the problem. The issue had become increasingly pronounced as consultations in the space increased and a dramatic noise reduction was required. The director of hospital engineering for Children's set an aggressive background noise goal close to NC-30 for the space. The path to a solution required close collaboration, product innovation, and rigorous performance testing.

Because hearing aids can be more sensitive than the human ear, background noise in the examination room can interfere with the audiologist's ability to assess the patient's needs and progress. In the office of the head of audiology, the room's fan coil unit was positioned directly above the consultation area. The consultation process requires very low background noise, and the industry standard fan coil unit in place was not performing to the necessary level. Several months of adjustments to the unit, ventilation, and duct work failed to net a significant improvement. Initially the project's acoustical consultant measured NC-51 in the space with the fan coil running at 365 cfm using acoustically lined duct. The diffuser was located directly above the doctor's head when seated at his desk, making opportunities for sound attenuation extremely limited. The significant space restrictions would make NC-30 a challenging goal. A replacement unit would need to be accommodated in a space no larger than four ceiling tiles. Further adding to the acoustic challenge was the requirement that no exposed fiberglass liner was allowed on the project. A custom-designed fan coil unit contributed to a significant noise reduction in the space by achieving an estimated 15 dB noise reduction at the original 365 cfm with only a 20 percent reduction in air flow to 290 cfm. For reference, a 15 dB reduction is typically perceived as being three times quieter.

provide CAC ratings for suspended ceiling systems. CAC measures the noise reduction between two adjacent rooms by accounting for the sound path through the ceiling and common overhead plenum. The purpose of air transfer silencers is to ensure that any air transfer openings are not noise flanking paths—this is often the weak link that reduces noise isolation performance. This noise reduction is also relevant for air moving equipment radiated noise, such as fan coils, terminals, and exhaust fans. Because air transfer silencers provide more noise reduction than typical ceiling tile, they eliminate any noise flanking path that would otherwise create a hot spot in the occupied space directly below.

Acoustic Louvers

Acoustic louvers provide another method for reducing noise transmission in applications with limited space. Available in depths between 6 inches and 12 inches, acoustic louvers provide reasonable lab-rated noise attenuation while allowing for air flow between spaces, such as mechanical rooms and the outdoors. Acoustic louvers can be designed to satisfy façade aesthetic requirements including size, color, and material. The main variable to consider is airflow. Unlike a typical architectural louver that has around 45 to 50 percent free open area, acoustic louvers have around 25 to 30 percent free open area and, as such, have reduced air flow capacity. Proper coordination with the mechanical engineer typically allows for the inclusion of acoustic louvers and in many cases can free up additional mechanical room space because of their compact design.

BACKGROUND NOISE

Background noise is often described using noise criteria (NC) curves, a series of octave-band curves defining acceptable sound pressure levels from 63 to 8,000 Hz. It is best to measure NC levels at occupant ear height at the loudest location in a space during ambient conditions. Background noise is typically governed by mechanical equipment and industry guidelines of acceptable levels as outlined by various organizations including ASHRAE (HVAC Applications 48.3).

▶ Continues at ce.architecturalrecord.com

WHY ARCHITECTS LOVE US TO PIECES

sweets.com

Meet the new addition to our line

UltraTouch+™
Sound Control System

Sound isolation... Simplified.

Introducing UltraTouch+ Sound Control System, a combination of high-density batt insulation and vibration damping strips that gives you the first practical "Acoustical System in a Bag." And because it's brought to you by Bonded Logic, it's made from recycled denim.

UltraTouch+ installs easily with perforated batts and included damping strips. For more information scan the code below.

CIRCLE 95

* Proven increase in Decibel Reduction (STC)
* Eliminates the need for two layers of drywall
* Simple installation
* Provides a thermal break
* R13 Thermal performance

www.BondedLogic.com

All photos courtesy of Bonded Logic, Inc.

Natural cotton fibers used in denim can be recycled, broken down, processed, and turned into effective building insulation batts to help improve thermal and acoustic performance in buildings.

Recycled Material Innovations

Designing with sustainable natural fiber insulating products

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

Reduce, re-use, and recycle has been a popular mantra of recent times for good reasons. The historic "cradle to grave" approach relies on extracting raw materials (the cradle), processing them, shipping them, using them for a while, and sending them to a landfill (the grave) when we are done using them. By contrast, diverting materials from a landfill and giving it new life as a new product has been the basis for an enlightened sustainable approach championed by architect William McDonough in his well-known book *Cradle to Cradle*.

McDonough goes beyond the realm of just buildings and looks instead at the bigger picture of how products and materials of all types can be interrelated to many other things during their total life cycle to influence design processes, manufacturing, effective performance, and lifestyles in general.

A great example of this approach is found in using recycled natural fibers from other sources for building insulation. By definition, natural fibers are those that come from natural resources such as forestry or agricultural products. In particular, building insulation that uses recycled natural fibers from trees (in the form of cellulose) or from cotton plants capture the true spirit of "cradle to cradle" by giving materials a new life instead of going to the landfill. Just as important, this sustainable type of insulation has been shown to perform exceptionally well in terms of optimizing energy performance in buildings and effectively reducing sound transmission as an acoustic control measure.

CONTINUING EDUCATION

EARN ONE AIA/CES HSW LEARNING UNIT (LU)

Learning Objectives

After reading this article, you should be able to:

1. Investigate the historical development of the use of natural fiber materials for insulation products.
2. Identify the green and sustainable characteristics in the types of insulation made from recycled cellulose materials.
3. Assess the thermal and acoustical performance of green building insulation made from rapidly renewable and recycled cotton fiber textiles.
4. Explore some of the emerging trends and market demands for the use of insulation made from recycled natural materials.

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.

AIA/CES COURSE #K1403D

Historically, buildings in the U.S. had more mass from heavy structural members. Insulation became more important as buildings became lighter and needed to control heat flow better.

HISTORICAL USE OF NATURAL FIBERS IN BUILDINGS

European settlers arriving in this country and Canada in the 1600s and 1700s likely discovered quickly that the climate was a little different than along the Mediterranean Ocean. Seeking ways to keep homes warmer, they appear to have relied on large wood-burning fireplaces that radiated excessive amounts of heat. Some of that heat surely ended up being stored in the massive structural elements of the home such as logs or large timbers in forested areas, sod in the Midwest prairie, or directly in the massive stone and brick used in the fireplaces. There was little if any thought given to insulation as we know it today, but there certainly was thought given to keeping out drafts. It was common to find blankets made out of wool or other fabrics being used to hang down in front of doors or other openings as a means to prevent drafts from blowing into a main working/living area. The blankets would also help to contain heat around an area that had a fireplace, in effect acting as very rudimentary insulation.

During the 1800s and early 1900s, the country became more developed and heavy mass construction gave way to lighter wood-framed cavity walls with balloon framing. This meant that buildings had less mass to store heat and more need to hold in the heat that was being created in a fireplace, a stove, or a furnace. Recognizing this need, resourceful homeowners began to stuff the framing cavities with familiar and available natural materials to keep them warm the way a blanket would. Materials like newspaper, cardboard, cotton, straw, sawdust, hemp, and corncob are all believed to have been used based on findings in older buildings. There is also the suggestion that sheep's wool was used as insulation in some cases although that should not be confused with rock-wool which is literally made from stone ingredients.

Following World War II in the 1950s, the first manufactured natural fiber material began to become available. Some innovative companies ahead of their time began collecting recycled newspaper and put it through a grinding and dust removal machine, breaking up the fibers to create a fluffy end product. Once a fire retardant was added, it was offered as a blown-in building insulation product, although it was not widely or commonly used right away. That all changed in the 1970s when the oil embargo focused everyone's attention on energy and conservation in particular. Literally hundreds of small companies began offering blown cellulose as building insulation for existing and new buildings and its use gained significant popularity. Because of this upsurge in activity and a need for identifying standards for this product, the U.S. Consumer Products Safety Commission (CPSC) issued regulations in the late 1970s that addressed technical requirements for settled density, corrosiveness, critical radiant flux, and smoldering combustion. This was all good for the consumer because it provided some consistent quality control that could be monitored and corrected where need be. However, it was not economical for many of the smaller companies to implement all of the needed testing and quality measures which meant many decided to consolidate with others, become larger on their own, or go out of business altogether.

Over the past 20 years or so, the current green building movement has increased the need and demand for effective and environmentally sound building insulation. Increasing awareness of the role that recycled material choices can play in green buildings has spawned new innovations, new products, and new ways to capture material otherwise headed to landfills. At the same time, a recognized premium has been placed on rapidly renewable materials that can be used to fabricate products rather than depleting a finite source of limited materials. This includes things like forestry and agricultural products that can be grown sustainably, harvested, and grown again. These motivators have meant that blown cellulose insulation has matured and developed as a product with variations and improvements to make it suitable for differing commercial and residential building applications. It has also spawned an interest in finding other recycled materials such as cotton textiles that can be

Cellulose insulation has a post-consumer recycled content of up to 85 percent and can be more effective and economical overall than other insulations with the same R-value per inch.

CASE STUDY: AMERICAN APPAREL RECYCLES TEXTILES INTO INSULATION

American Apparel, located in downtown Los Angeles, California, has a strong and long-standing commitment to reducing, re-using, and recycling. For years, they have paid close attention to all the textile, paper, cardboard, and plastic by-products from their clothing manufacturing and distribution operations. Through their effective in-house recycling efforts, nearly 8 million pounds annually of by-products are diverted from landfills and incinerators. More importantly, these items are returned to the manufacturing stream for re-use as consumer and industrial products.

Recently, this progressive company partnered with a national natural fiber insulation company located in close proximity to their plant. As a result of this business agreement, their new textile waste items are efficiently moved from the waste stream and into a new manufacturing stream. This waste stream is then converted to high-quality padding and insulation products all with minimal transportation impact. This insulation is produced in the same general location as the waste is generated, creating an efficient upcycling program.

"We evaluated the entire chain of collecting, transporting, and processing our waste into environmentally and economically valuable products, and this company is a great partner in those efforts," says Harry Matusow, director of recycling for American Apparel. "This company and their affiliates share our concern for efficiency, positive environmental impact, and manufacturing of premium products." This type of innovative and cooperative partnership allows for an effective means to easily and efficiently transform textiles that would otherwise be wasted into a useful, sustainable, and effective insulation product.

captured and used to create batt type insulation products with superior characteristics for use in commercial and residential buildings of all types. Recycled cotton textiles are also being used in various ways to create very effective acoustic insulation products or being integrated into other building product systems. We will take a closer look at these insulation products and their increasing popularity in the following sections.

CELLULOSE INSULATION

Cellulose insulation today is commonly manufactured by national companies to meet standards and regulations and then installed by local contractors. Like most large businesses, the manufacturers distribute their products throughout wide geographic areas. There is certainly not a cellulose insulation plant in every community or even every state, but cellulose insulation is readily available in every part of the U.S. Many of the manufacturers are part of a national trade association known as the Cellulose Insulation Manufacturers Association (CIMA). It was first established in 1982 as the Cellulose Industry Standards Enforcement Program (CISEP) as a voluntary program to enforce and document conformance of the CPSC regulations issued just a few years prior. They also addressed relevant ASTM testing standards for building products such as fire resistance. As the industry matured and the national companies became more established, CIMA became a full association of manufacturers in 1992.

Under the CIMA and ASTM standards, cellulose insulation is commonly made from up to 85 percent recycled content (post-consumer). The primary ingredient is still recycled newspaper that is hammer milled to break apart the pages and fibers so it can become insulation. The small remainder of additional ingredients includes additives that give the insulation some of its more desirable properties. For example, cellulose insulation is treated with fire retardants achieving a Class 1 Fire rating to meet all federal, state, and local fire safety requirements. Some manufacturers have even qualified for two- and three-hour firewall designs using cellulose insulation.

Manufacturers have further enhanced their products to create some variations being offered for different applications. Dry spray products minimize the use of water, making them well suited for retrofit into existing buildings. Wet spray products are used in new construction to make them more self-supporting, thus reducing the chance of the product settling. For deep applications in attics and roof areas, stabilized products are available that keep them from settling down on themselves. For applications where dust may be a concern either to occupants or building operations, dust controlled products are available.

All of these types of cellulose insulation have seen increased popularity due to their very "green" recycled content but also because of their effective characteristics and benefits. For example, cellulose insulation is denser than fiberglass so it reduces convection currents in framing cavities and helps slow air infiltration. R-values of cellulose insulation are R-3.6 to R-4.0 per inch, making them comparable to or better than other loose fill insulation products. Perhaps more importantly, however, cellulose easily insulates closed cavities, irregular shaped areas, or hard-to-reach spaces, meaning that it fills the framing cavity completely. From an indoor air quality standpoint, no harmful hydro-fluorocarbons of any type are used and no formaldehyde is present in the insulation, meaning there are no harmful emissions or air quality concerns. Further, cellulose insulation is very good at wicking any moisture or water out of the insulation, avoiding any buildup that could produce mold. Overall, cellulose insulation is found to be a very good, green, and cost-effective type of blown-in insulation.

▶ Continues at ce.architecturalrecord.com

Peter J. Arsenault, FAIA, NCARB, LEED AP, *practices architecture, consults on green and sustainable design, writes on technical topics, and presents nationwide on all of the above. www.linkedin.com/in/pjaarchh*


SEARCH SWEETS
Sweets.com
Find all the product information you need, all in one place.
*77,000 Registered Users
8,937 Products
2,821 Product Catalogs
863 Green Information
2,193 Project Galleries
4,786 Specifications
30,920 CAD/BIM
907 3D Models
Armstrong World Industries
MasterFormat Classification:
09 51 00 Acoustical Ceilings
Product Catalogs •
Green Information •
Project Galleries •
Specifications •
CAD/BIM •
3D Models •
Anacosti
Davis Colors
MasterFormat Classification:
03 35 19 Colored Concrete Finishing
Product Catalogs •
Green Information •
Project Galleries
Specifications •
CAD/BIM
3D Models
EFCO Corporation
MasterFormat Classification:
08 41 00 Entrances and Storefronts
Product Catalogs •
Green Information •
Project Galleries •
Specifications •
CAD/BIM •
3D Models •

Advertisers Index

Get Free Information
from our advertisers! Fill out this Reader Service Card and send back today or go to **ArchRecord.com > Products tab > Reader Service**

Publisher is not responsible for errors and omissions in advertiser index.
To access PDFs of all full-page or larger ads appearing in this issue, go to **ArchRecord.com > Products tab > Product Ads**

Get more info at **www.sweets.com**

PRODUCT SPOTLIGHTS

Advertisement

ROOFING, SIDING, THERMAL & MOISTURE PROTECTION

PERIMETER/ROOF EDGE SYSTEMS

$$ | G | NEW

Petersen Aluminum Corporation

PAC Perimeter Systems are high-performance roof edge solutions for low-slope buildings. Petersen offers a complete line of fascia and coping systems for a wide variety of commercial applications.

Product Application:

- University of Texas at Dallas Student Housing Living/Learning Center II, Richardson, TX

Performance Data:

- Produced in 12-ft.-0-in. lengths for extra cost savings
- Exceptional wind uplift protection

www.PAC-CLAD.com
800.722.2523 | **Contact:** Blake Batkoff

Circle 154

CLASSIFIEDS

POSITION VACANT

WWW.SMPSCAREERCENTER.ORG
Find marketing/BD professionals with A/E/C experience. Call 800-292-7677, ext. 231

CIRCLE 81

CIRCLE 49

ENR + DODGE

2014 Global Construction Summit

MAY 13-14, 2014

NEW YORK CITY

$ EARLY BIRD: $495

About the Event

The ENR-Dodge Global Construction Summit brings together industry professionals from the major construction markets around the world to explore growth opportunities, investigate solutions to the most pressing challenges and share guidance on what is required to compete on the international playing field. ENR has hosted delegates from more than 20 countries representing the Asia-Pacific, North American, South American, European, and Middle-East construction markets.

Silver Sponsors:

bluebeam

EarthCam Webcam Technology

REGISTER NOW

enrglobalsummit.com

800.371.3238

#ENRGCS

New and Upcoming Exhibitions

UMMA Table & Objects
Los Angeles
March 14–April 20, 2014
The SCI-Arc Library presents an installation of Florencia Pita's work, *UMMA Table & Objects*, originally commissioned for the University of Michigan Museum of Art. The installation explores the provocations and intersections of digital technology, material experimentation, and ornament in the work of the Argentina-born, Los Angeles–based architect and designer. It traces the evolution of Pita's design ideology through installation pieces, urban design, tableware, furniture, and architecture, as well as small adornments. For more information, visit sciarc.edu.

The Space Between
New York City
April 3–May 17, 2014
The Space Between, an exhibition of new work by photographer Marc Yankus, will be on view at the ClampArt gallery. The exhibition—Yankus's fourth solo show at the gallery—explores the fine line between urban reality and architectural fiction through surreal portraits of buildings. *The Space Between* presents images subtly altered to show a New York City that exists on an aesthetic plane where imagination and documentation meet. For more information, visit clampart.com.

Ongoing Exhibitions

City in a City: A Decade of Urban Thinking by Steven Holl Architects
Los Angeles
Through March 9, 2014
This exhibition of the work of Steven Holl Architects, held at MAK Center for Art and Architecture at the Schindler House, presents six urban projects in China, designed with focus on shaping public space, green strategies, hybrid programs, structure, and light. Included are three built works: Linked Hybrid in Beijing, Vanke Center/Horizontal Skyscraper in Shenzhen, and Sliced Porosity Block in Chengdu, as well as three yet-to-be-built works: Porosity Plan in Dongguan, Eco-City in Tianjin, and the Qingdao Culture and Art Center. Concept watercolors of each building are on view, along with models and construction documents. For more information, visit makcenter.org.

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

The Playground Project
Pittsburgh
Through March 16, 2014
The Playground Project presents some of the most outstanding and influential playgrounds from Europe, the United States, and Japan from the mid- to late 20th century in order to prompt a reconsideration of our own time and the way we approach childhood, risk, public space, and education. The project, on display at the Heinz Architectural Center at the Carnegie

Museum of Art, also puts the concept of play into the foreground as an important way of thinking. For more information, visit ci13.cmoa.org.

Transforming Cityscapes: Winning Entries of the Eighth Ibero-American Architecture and Urban Design Biennial (IAUB)
Washington, D.C.
Through March 16, 2014
The IAUB focuses on lifetime achievements, outstanding works of architecture, publications, research projects, and ideas presented by architects and architecture students. Every two years, a jury of representatives from each field selects the best projects from among architectural and urban design initiatives in the countries comprising the Ibero-American community (Spain, Portugal, and the nations of Latin America). This exhibition, at the Art Museum of the Americas, includes architectural and urban planning projects, publications, research, proposals, and videos from 2009–11. For more information, visit museum.oas.org.

Samara: A Mid-Century Dream Home
Williamsport, Pennsylvania
Through March 29, 2014
Frank Lloyd Wright's *Samara: A Mid-Century Dream Home* explores the relationship between an architect and his clients Dr. John and Kay Christian as they worked together to create one family's definition of an American dream home. Through original objects and furniture, architectural fragments, rare archival materials, historic photographs, and video footage, this exhibit explores the creation of a Wright house made into a family home. Samara was constructed between 1954 and '56 in West Lafayette, Indiana, and was based on Wright's Usonian houses—modest-sized, affordable, environmentally sensitive dwellings—of which he created over 100 designs. At the Pennsylvania College of Technology. For more information, visit pct.edu.

Erasmus Effect: Italian Architects Abroad
Rome
Through April 6, 2014
This exhibition aims to document a very particular aspect of contemporary Italian architecture: that of an ever-growing number of young architects who choose to move to other countries. Showing productions by established international companies and the projects and built works of young Italian studios, *Erasmus Effect* sheds light on both the migrant architects' achievements and the way their diaspora has produced a dense net of collaborations and transnational ateliers. At the MAXXI National Museum of XXI Century Arts—Rome. For more information, visit fondazionemaxxi.it.

James Turrell: A Retrospective
Los Angeles
Through April 6, 2014
This Los Angeles County Museum of Art retrospective explores nearly 50 years in the career of James Turrell. The exhibition includes early geometric light projections, prints and drawings, installations exploring sensory deprivation and seemingly unmodulated fields of colored light, and recent work with holograms. One section is devoted to the Turrell masterwork-in-process, *Roden Crater*, a site-specific intervention into the landscape just outside Flagstaff, Arizona, presented through models, plans, photographs, and films. The exhibition includes a separately ticketed installation, *Light Reignfall*, from the artist's *Perceptual Cell* series, with a limited number of tickets available. For more information, visit lacma.org.

Almost Anything Goes: Architecture and Inclusivity
Santa Barbara, California

Through April 13, 2014
The Museum of Contemporary Art Santa Barbara (MCASB) welcomed six prominent Los Angeles–based architects to present original designs that are anything but architecture. The spirit of inclusivity in this exhibition owes to a particular set of conditions particular to Los Angeles, including a recession-driven dearth of building projects, new digital technologies, growing ecological concerns, and a renegade spirit of experimentation unburdened by the weight of tradition. For more information, visit mcasantabarbara.org.

How Architects, Experts, Politicians, International Agencies, and Citizens Negotiate Modern Planning: Casablanca Chandigarh
Montreal
Through April 20, 2014
Held at the Canadian Centre for Architecture, this exhibition suggests a new historiography of modern urbanism based on two major experiments from the early 1950s: new residential neighborhoods in Casablanca, Morocco, planned by Michel Écochard and a team of young French and Moroccan architects, and Chandigarh, the new capital of Punjab in northern India, conceived by a team consisting of Le Corbusier, Pierre Jeanneret, Maxwell Fry, Jane Drew, and local architects and planners. The exhibition aims to foster fresh discussions about cities in multiple locations outside western geopolitical and cultural boundaries. For more information, visit cca.qc.ca.

Frank Lloyd Wright and the City: Density vs. Dispersal
New York City
Through June 1, 2014
This exhibition at the Museum of Modern Art (see page 41) celebrates the recent joint acquisition of Frank Lloyd Wright's extensive archive by MoMA and Columbia University's Avery Architectural and Fine Arts Library. Through an initial selection of drawings, films, and large-scale architectural models, the exhibition examines the tension in Wright's thinking about the growing American city in the 1920s and '30s, when he worked simultaneously on radical new forms for the skyscraper and on a plan for low-density urbanization of the American landscape titled Broadacre City. For more information, visit moma.org.

Lectures, Conferences, and Symposia

Architectural Ceramics in the 21st Century: Design and Preservation of Contemporary & Historic Architecture

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

ARCHITECTURAL RECORD
Innovation Conference
Los Angeles
May 21, 2014
ARCHITECTURAL RECORD brings its acclaimed Innovation Conference to Los Angeles, a city

known for blurring the boundaries among urbanism, architecture, and landscape. Topics range from the merging of landscape and architecture to the growing influence of Mexico's architects and to the integration of contemporary art, technology, and design. Confirmed speakers include Thom Mayne, Brad Cloepfil, Michel Rojkind, Thomas Phifer, and Tatiana Bilbao. At Walt Disney Concert Hall. For more information, visit construction.com/events/2014/innovation-la.

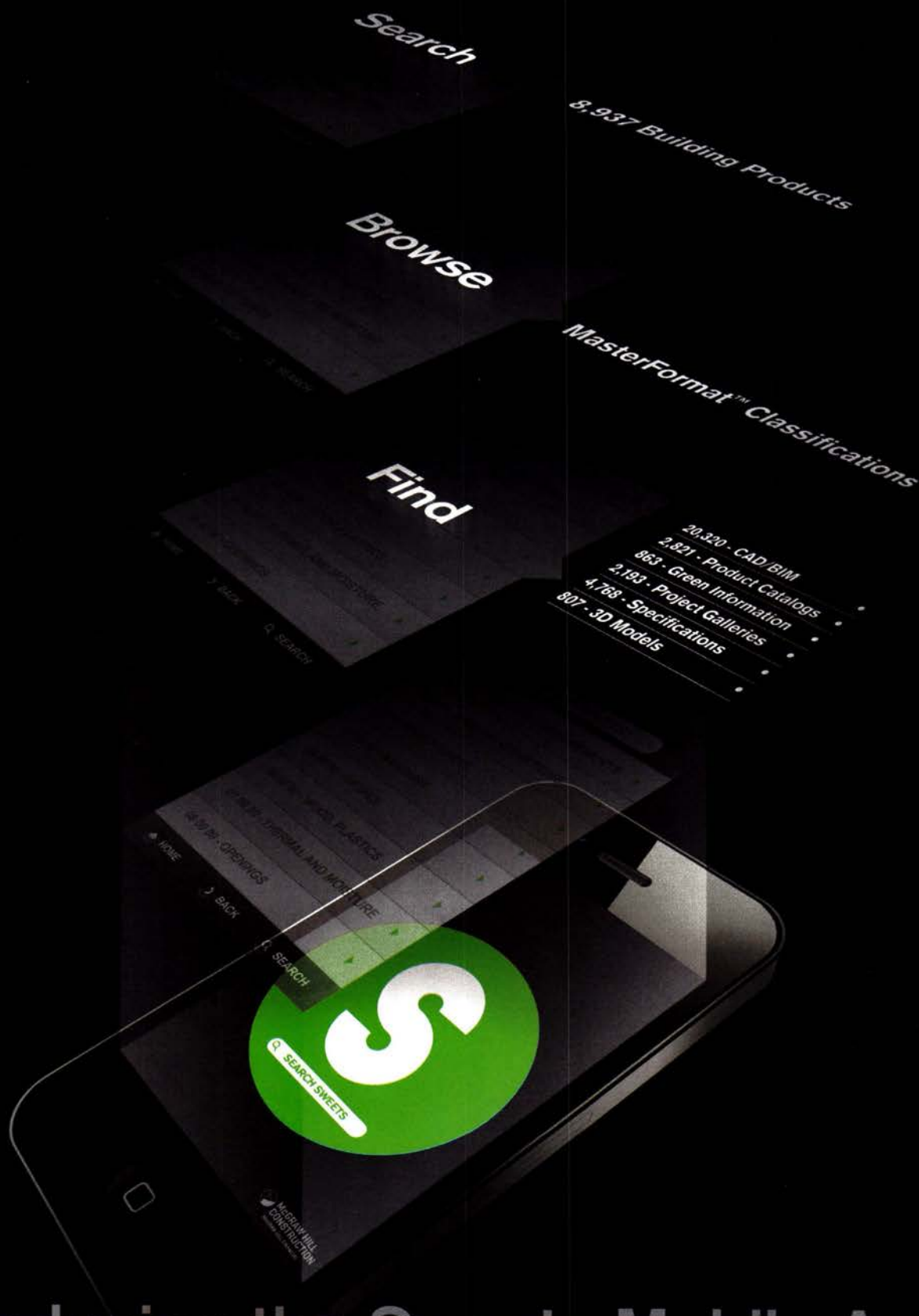
Competitions

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

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

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

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



Introducing the Sweets Mobile App

Download the Sweets Building Products App at the iTunes Store or Google Play.

snapshot

PROJECT SPACEPORT AMERICA
LOCATION NEW MEXICO
DESIGNERS FOSTER + PARTNERS

ON A BARREN patch of desert in New Mexico's Jornada del Muerto basin, just 50 miles west of the site where scientists detonated the first nuclear weapon, Foster + Partners took on an extraordinary task: to construct the world's first private hangar facility for spaceflight. Spaceport America, which broke ground in 2009 after the London-based firm won an international competition, contains a mission-control center, astronaut-preparation rooms, and a super-hangar, which houses up to two double-fuselaged carrier jets and five spacecraft specialized for suborbital tourism. The spaceport is supported by a heavy concrete core and anchored in the rust-colored soil by winglike earth berms, while a shell of steel sweeps over the structure. From the vantage point of a nearby historic trail—traversed by Native Americans, Spanish conquistadors, pioneers, and, soon, astronauts—the spaceport hovers on the horizon like a flying saucer. "I'd like to think you could have found this building on Tatooine or something," Foster senior partner Grant Brooker jokes, referring to the planet from the *Star Wars* saga. Brooker recalls being inspired by photographs of early cosmonauts readying themselves for their extraterrestrial voyages. "All great transport buildings are about seeing and anticipating the journey," he said. "In this building, it's about exploring the excitement of the journey—feeling, hearing, and seeing the jets." Would the architect like to go into outer space himself? "I'm available," Brooker says. *Anna Fixsen*

PHOTOGRAPHY: © NIGEL YOUNG / FOSTER + PARTNERS