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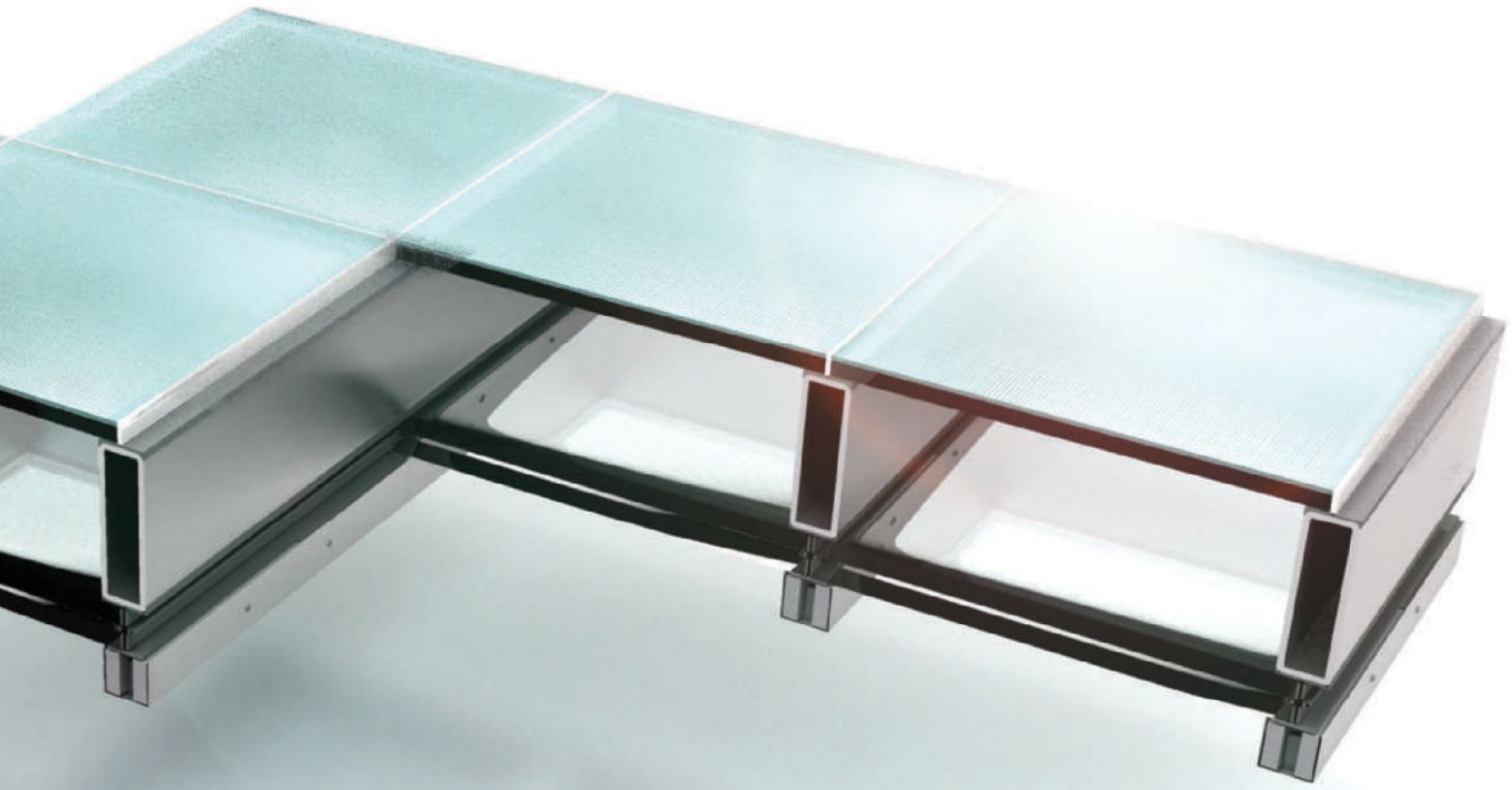
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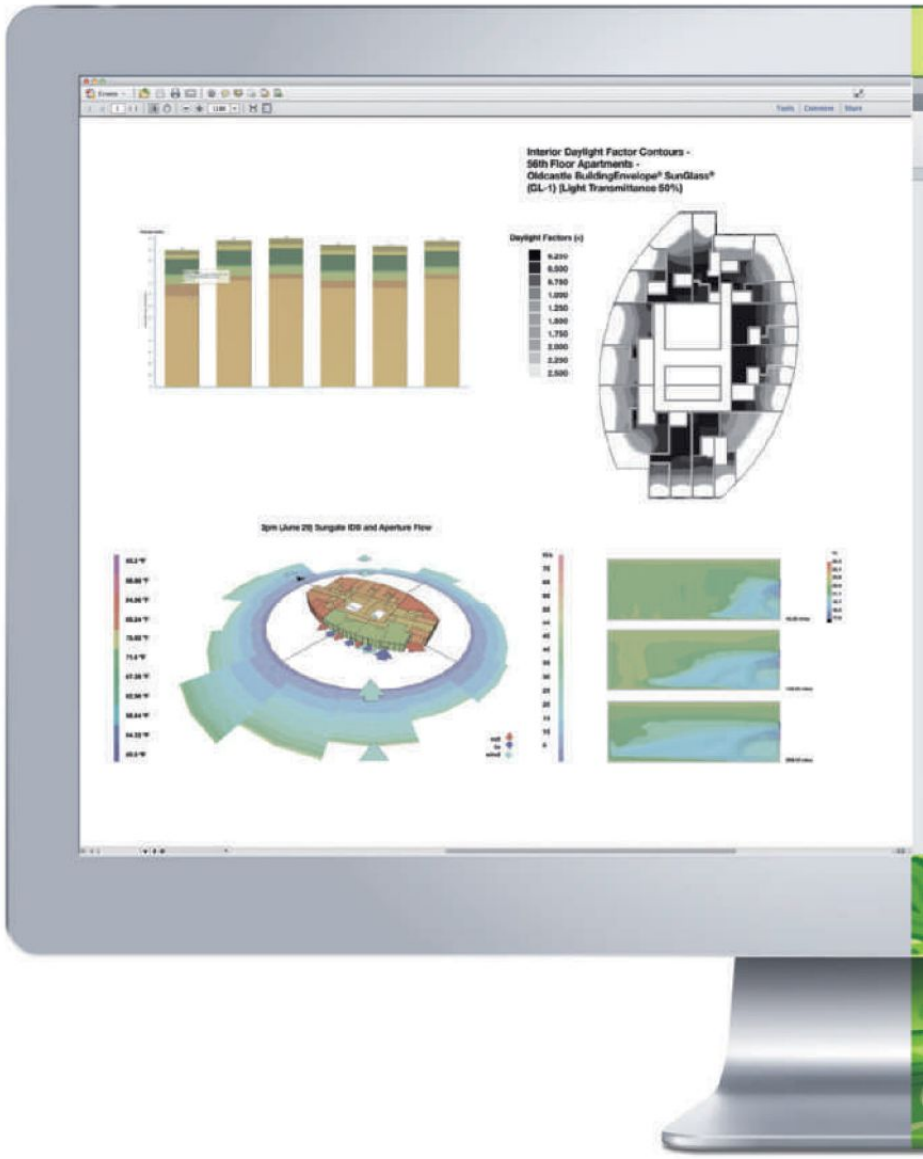
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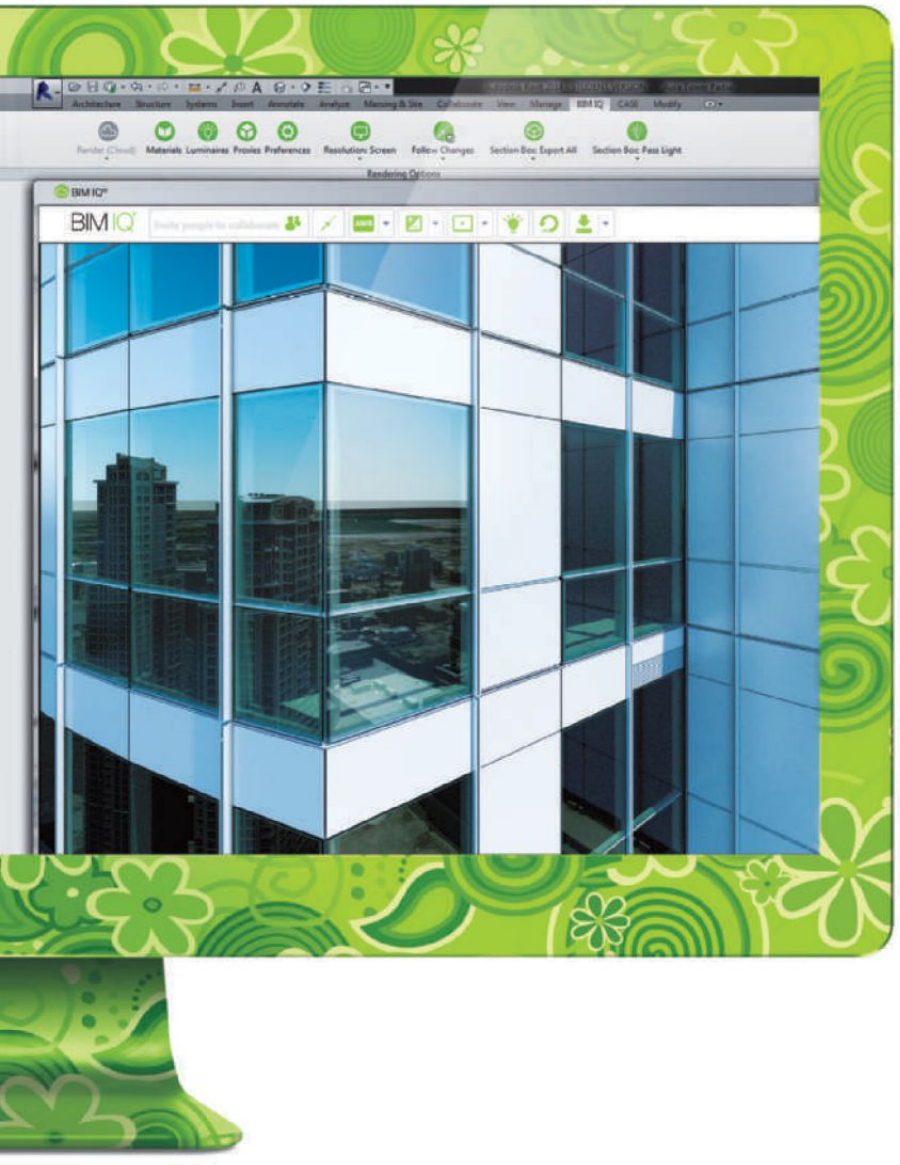


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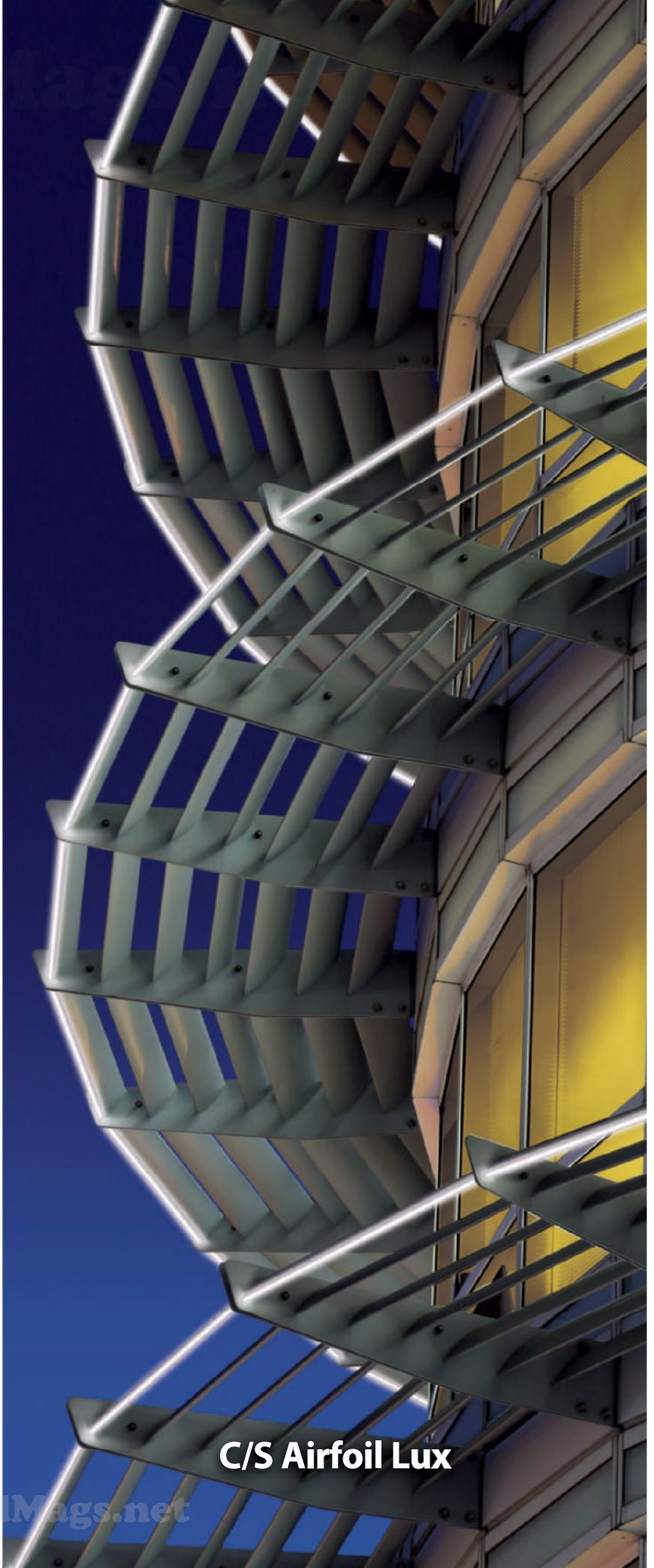
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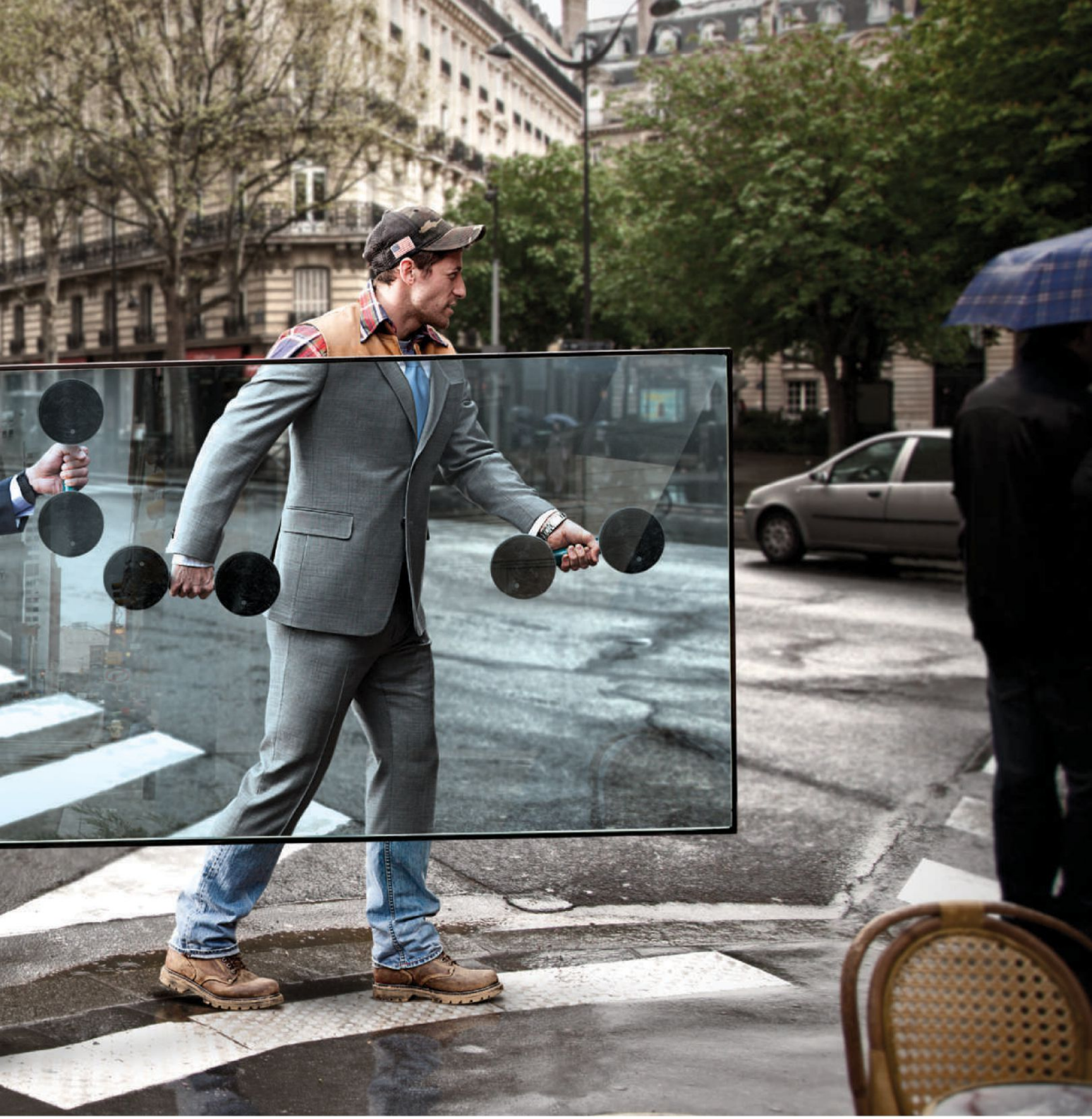
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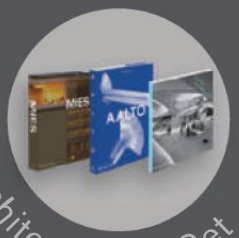
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NEW TWIST



The new ideas that poured into Lower Manhattan's rebuilding resulted in a stronger infrastructure—and some architectural gems. A key piece in the undertaking is **Pelli Clarke Pelli**'s new **Pavilion** at **Brookfield Place**, a public space serving the 35,000 commuters who use the PATH system daily. Because the system's track network runs underneath, the pavilion's soaring roof and hanging glass curtain wall could only be supported at two points. **Thornton Tomasetti** met the challenge with a pair of 54-foot-tall "basket" columns, each gathering its loads in an expressive weave of lightweight, brightly painted twisting steel tubing that spirals down to plaza level in an ever-tightening array. It is innovative design, with a twist.

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Architect: Pelli Clarke Pelli Architects
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INSIDE OUT



Want to know what goes on at the **New School**? Passersby need only glance at the institution's new **University Center** in Greenwich Village to understand that progressive design education happens here. The building by **Skidmore, Owings & Merrill** expresses the school's interdisciplinary approach through a brass-shingled facade crisscrossed by a series of glass-enclosed stairways that highlight a vivid tableau of students circulating within. The unique system encourages collaboration—and a new dialogue between campus and community that is sure to be conversation for decades to come.

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Architect: Skidmore, Owings & Merrill
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THIS PAGE: ARTHOUSE STUDENT HOUSING, BY LEVER ARCHITECTURE. PHOTO BY JEREMY BITTERMANN

ON THE COVER: FOR THIS ISSUE RECORD CREATED TWO COVERS, FONDATION LOUIS VUITTON AND BIOMUSEO, BOTH BY GEHRY PARTNERS. BOTH PHOTOGRAPHED BY IWAN BAAN

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City Life

The challenges of success for popular urban centers





DON'T BE CONFUSED if the issue of ARCHITECTURAL RECORD you're reading doesn't look like everyone else's. We created two covers this month—half our readers are receiving one, and half the other—because two very different museums, both designed by Frank Gehry, are opening in October, and each has a compelling story about its design and construction. Maybe you're looking at the magazine with the highly anticipated Fondation Louis Vuitton museum in Paris on the cover—an amazing composition of huge curving glass canopies wrapped around a white-paneled structure, which looks both grounded and about to take flight (page 80). Or maybe you have the cover that shows an aerial view of the Biomuseo in Panama City, a small, plucky concrete building with a vibrant roof of brightly colored angled metal, designed for an institution devoted to the biodiversity of that tropical region (page 90). The Paris and Panama museums were each inspired by their settings, and each displays an ingenious use of unconventional forms that is a Gehry hallmark. But, yes, they differ vastly in ambition, construction, and budget (though no one is confirming what the elaborate and finely detailed Paris project actually cost). Both covers were beautifully shot by RECORD contributing photographer Iwan Baan.

Such architectural projects are a major component of city life (images of the Biomuseo became a branding logo for Panama before the museum was even finished). And in this issue we explore the rising popularity of urban living in America, and one of the biggest problems accompanying that trend: the affordable-housing crunch. Taking three in-demand cities as case studies—Boston, New Orleans, and Portland, Oregon—we explore the forces that are pushing up the population and accelerating rents, and report on some solutions that the public and private sectors are pursuing (page 103). Our Building Types Study this month (page 129) details the designs of exemplary low-income and affordable-housing projects, focusing on those in cities with mild climates, where architects have made the most of indoor/outdoor space. We also look at market-rate and micro housing that could serve as prototypes for innovative solutions.

In New York, where RECORD is based, the drama of the housing squeeze is unfolding under Mayor Bill de Blasio, who has made the creation of more affordable housing a key goal for his administration. The challenges are enormous: this is a city where a developer of luxury condos is selling parking spaces for $1 million each, while the public housing authority's waiting list for apartments numbers 250,000 households. Caught between the super-rich and the truly needy are low- and middle-income working people, many priced out of the market by a lack of supply. Authorities have looked to the private sector to fill the gap, offering tax breaks and other incentives for including 20 percent low-income or affordable apartments in new market-rate projects. But this policy recently received unwelcome publicity with the revelation that subsidized tenants in at least one new building must use a separate entrance, dubbed the "poor door."



While a separate unequal entry and lobby is a terrible idea, mixing income levels in one complex is not. Cities thrive on diverse populations that live together in neighborhoods throughout the urban realm, sharing the transit systems and schools and patronizing varied commercial enterprises. To keep the vital socioeconomic mix in the work force requires a range of housing options—for the young and seniors, for the rich and poor, and for the vast middle in between. In most rapidly growing cities, that means creative thinking—to alter zoning, allow for greater density, encourage mixed use, revise outmoded parking requirements, and improve public transit. Keeping up the supply of housing to meet new demands will help control spiraling costs, but what we also need are new models and new ideas—and that's where architects are playing a major role in the future of flourishing cities. ■

Cathleen McGuigan

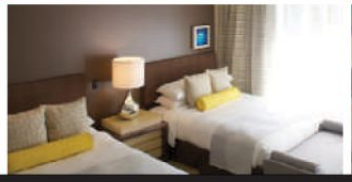
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SUCCESS STORY:
THE HOTEL WILSHIRE, LOS ANGELES





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

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

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

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

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

PROJECT SUMMARY

Dilapidated six-story building remodel:

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High-Performance Green Trends

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Precast Concrete Life-Cycle Assessment and High-Performance Design

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Looking Good: New Paper Towel Dispenser Systems Score in Appearance, Sustainability, and User Preference

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Designing Daylight Fixtures

Credit: 1 HSW, 1 GBCI CE Hour

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Managing Daylight with Automated Solar Control

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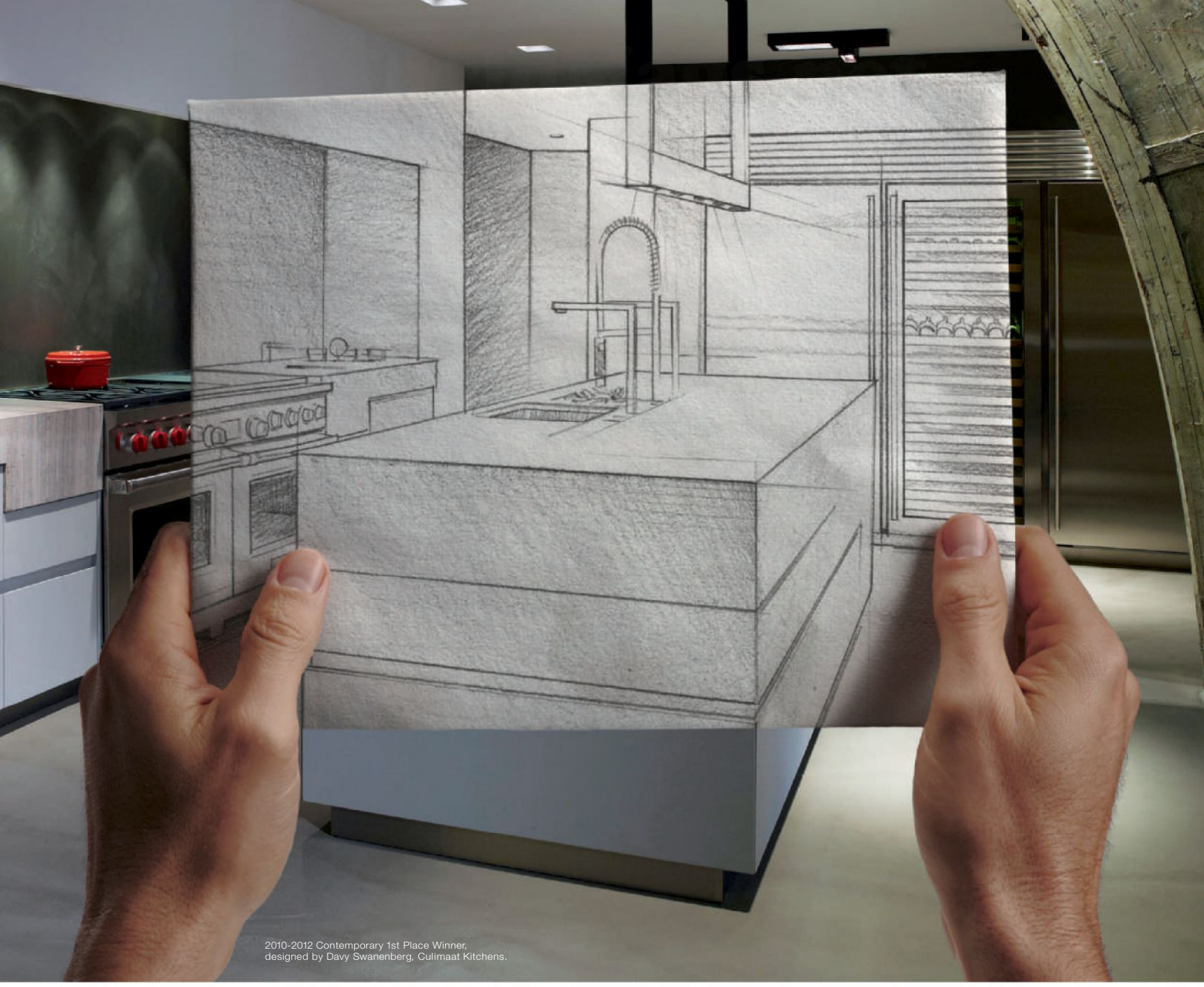
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CIRCLE 29

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perspective

Many jurisdictions have laws and rules related to what architectural interns can and cannot call themselves, and change at that level will take time.

—NCARB President Dale McKinney, on NCARB's new Future Title Task Force, charged with discussing the terminology used for candidates for licensure and architects.

Maki's Aga Khan Museum Makes Its Debut

BY LISA ROCHON



Caption TKBoreet, quamcon senibh eulisenis alis am vulput autat in ulla augiatumsny nulla facipis modolent

[KEYWORDS]

Fumihiko Maki's Aga Khan Museum is a simple rectangular volume. It shares a 17-acre site with the newly opened Ismaili Centre designed by Charles Correa (not shown).

PHOTOGRAPHY: COURTESY THE AGA KHAN MUSEUM, EXCEPT AS NOTED

TORONTO'S CULTURAL brand has moved into a new galaxy. After four years of construction, the Aga Khan Museum, designed by Pritzker Prize–winner Fumihiko Maki, opened east of the city's downtown in mid-September.

With the new, sublimely detailed 124,000-square-foot building, Tokyo-based Maki and Associates (with Toronto's Moriyama & Teshima Architects) expand the city's repertoire of museums and university buildings designed by local and international architects, including Frank Gehry, Norman Foster, Will Alsop, and Daniel Libeskind. The museum—a restrained canted box clad in a super-white Brazilian granite, with an interior courtyard open to the sky and flooded with daylight—is part of a graceful 17-acre compound. It is bookended to the west by the stunning, newly opened Ismaili Centre by legendary Mumbai architect Charles Correa. Standing below the faceted glass dome in his center's prayer hall, Correa, 84, presented a series of spontaneous meditations on architecture to the assembled members of the press at the opening of the museum and center: "There is God's sky above and God's earth below, and when you acknowledge both of them, that moves you."

The opening ceremony celebrated architectural luminaries and served as an acknowledgment that most North Americans know very little about Muslim contributions to the arts. "Here is a simple but devastating question," challenged Aga Khan Museum director Henry Kim: "How many Muslim artists from the past can you name?"

To help fill in the knowledge gap, Maki's museum doubles as a cultural center, offering live dance and music performances within the glass-walled interior courtyard and in an intimate teak-lined theater. The packed outreach schedule includes curator talks, poetry readings, and foodie events that promise to shift or, at least, rebalance the public perception of war-torn areas such as Afghanistan and Iran. Educating the public about the depth and humanity of Islamic art was always the fundamental idea behind the museum complex, as conceived more than a decade ago by the Aga Khan, the wealthy philanthropist, urban thinker, and spiritual leader of the Ismaili people around the world. To that end, the Aga Khan gifted his extraordinary art collection. Assembled over many generations by his family, this includes more than 1,000 objects

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The geometric *mashrabiya* pattern printed on the glass walls of the interior courtyard cast intricate shadows inside the museum (left). The museum (above, foreground), shares a plaza with Charles Correa's Ismaili Centre (above, shown at top left). A museum gallery receives daylight filtered through hexagonal skylights (right).



spanning 10 centuries.

Hexagonal skylights cast delicately patterned shadows into the permanent gallery on the museum's ground floor and temporary galleries on the second, where visitors are given plenty of room to inspect treasures such as the 11th-century *Canon of Medicine*, several pages of the 16th-century *Shahnameh*—considered to be one of the greatest painted manuscripts of all time—and a perfectly preserved 13th-century silk robe once worn by a Mongol nobleman. Ceramics, metalwork, and books are placed within seamless, high-security glass casework, designed by Studio Adrien Gardère of Paris. There are architectural replicas and cultural lodestones, including a reconstruction of a Mumluk fountain, which once refreshed the historic palaces of Cairo. The Bellerive Room, another reconstruction, offers a fascinating peek at the interior of the Geneva residence owned by the Aga Khan's aunt and late uncle, the Princess Catherine and Prince Sadruddin Aga Khan. The family's ceramic collection is also on display.

The museum complex exemplifies the big thinking and attention to detail that has long defined the Aga Khan Awards for Architecture and the Aga Khan Trust for Culture, an agency of the Aga Khan Development Network. Using a discreet motif, Maki's team elaborated on several geometric *mashrabiya* patterns cut into some of the teak walls in the auditorium. This pattern, inspired by the Islamic Jali screen, is also printed on the courtyard's 43-foot-tall walls of double-pane-insulated glass, casting beautiful shadows on the interior walls, ceiling, and heated stone floor.

The master plan was inspired by the vast urban dimensions of the plaza in Istanbul that links the Blue Mosque to the Hagia Sofia, said Gary Kamemoto, a director at Maki and Associates, during the museum's opening. To powerful effect, the civic plaza features five minimalist black reflecting pools offset by lush plantings of mature trees. Designed by the Beirut landscape architect Vladimir Djurovic, the plaza provides a serene urban refuge and an effective acoustical buffer from the noisy Don Valley Parkway running along the edge of the sloped site.

Toronto is North America's fourth-largest city, widely recognized as a place that sits comfortably with cultural diversity. The majority of its population was born outside of Canada, and some 150 languages are spoken within the metropolis. With that in mind, and reportedly as a thank you to Canada for welcoming Ismailis when they faced persecution in Uganda during the 1970s, the wealthy Aga Khan—renowned for founding universities and hospitals in the Muslim world as well as for his patronage of Islamic studies at Harvard University and the Massachusetts Institute of Technology—gave the $300-million museum and civic complex to Toronto. It is the first art museum that the Aga Khan Trust for Culture has built to date. ■

PHOTOGRAPHY: © KALLOON PHOTOGRAPHY (TOP, RIGHT)

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CIRCLE 30

Trimble Acquires Gehry Technologies

BY MICHAEL LEIGHTON BEAMAN

WHILE WORKING on a monumental fish sculpture for the 1992 Summer Olympics in Barcelona, Frank Gehry's office developed its own software to manage the complexities of the project and gain greater control of the design and construction process. During the design of the Guggenheim Museum in Bilbao in the late 1990s, they refined this software into what became Digital Project. By 2002, Gehry Technologies (GT) was born. A spin-off from the design office, GT offered architects the software and expertise that came from realizing Gehry Partners' complex buildings.

In September, GT announced it had spun off Digital Project into an independent company, Digital Project Inc. This followed an announcement that Trimble Navigation Limited—a company that may not be familiar by name, but one whose products are widely known and used—acquired GT (but not Digital Project) for an undisclosed amount.

That acquisition, described as a strategic alliance, is part of Trimble's broader strategy to integrate the work flow among the architecture, engineering, and construction industries. In 2011, Trimble completed the acquisition of Tekla, a BIM software platform. In June of 2012 they purchased the 3-D modeling program SketchUp from Google. Since 2009, Trimble has acquired 29 companies that produce software, including CAD, BIM, GIS, and GPS applications. With GT, Trimble gets GTeam, a cloud-based project management and collaboration platform. Perhaps the most distinctive aspect of the deal, though, is the fact that Trimble will now own GT's project-design, modeling, optimization, and management-services arm as well.

Trimble wants to treat projects as a continuum of information.

According to Steven Berglund, president and CEO of Trimble, "We're interested in the entire work process." Trimble already produces software and instrumentation used in multiple construction, surveying, and transportation fields. From mapping terrain with drones to partnerships with Caterpillar and Hilti to implement construction controls, Trimble is trying to create a company that treats projects as "a continuum of information," according to John Bacus, product-management director of Trimble's architecture division.

Gehry acknowledges that Trimble was not the first company to approach GT. When asked what motivated the decision to sell, he says, "They have the bandwidth to add [software] developers." In discussing the acquisition Gehry made it clear he wants to be able to focus on the design office with the knowledge that GT will continue to grow; Trimble's plan for incorporating GT seems to support that desire. According to Bacus, the GT professional-services division will operate independently, and the software division will be integrated into a team of developers working on AEC applications.

Trimble aspires to create an integration rare in the design and building process. The question is of how the company gets there and what part GT will play. As for Digital Project, though it is no longer part of GT, it will continue to be a core tool in GT's professional-services business. Future development, marketing, and sales of the program will continue under Digital Project Inc., which has the same shareholders GT had before Trimble's acquisition. ■



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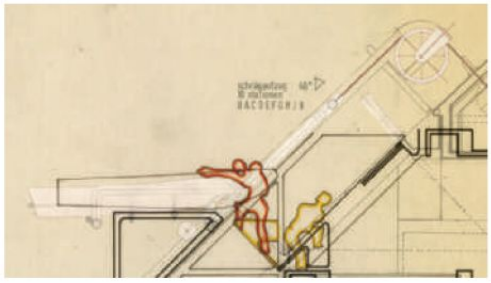
CIRCLE 32

Design Returns to NYC's Big Screens

THE SIXTH Architecture and Design Film Festival returns to Tribeca Cinemas in New York October 15–19 (RECORD is a festival sponsor). This year's lineup of 25 films is "probably the best program we've ever shown," says festival founder and director Kyle Bergman. Highlights include *Making Space: 5 Women Changing the Face of Architecture*, and the world premiere of Marco Orsini's *Gray Matters*, which presents the story of Eileen Gray. Visit adfilmfest.com for the complete listings. ■









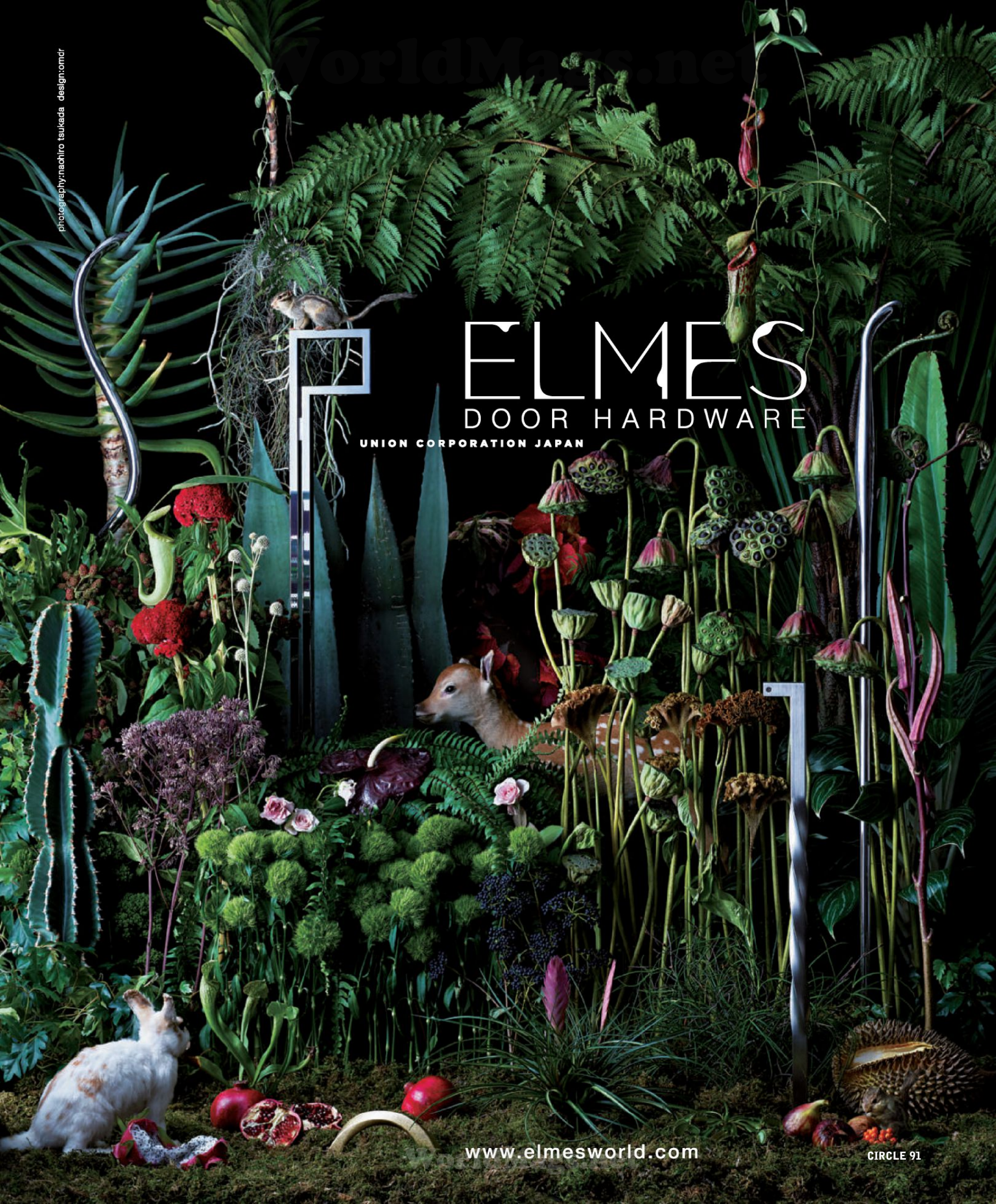
Festival films include (clockwise from left): *Neon*; *Why a Film About Michele De Lucchi*; *Gray Matters*; *DLRG, an examination of the German Life Saving Association building in Berlin*; and *Christiania–40 Years of Occupation* about a squatter community in an abandoned military base in Copenhagen.



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[NEWSMAKER]

Jeff Kowalski

BY DAVID SOKOL

IN JULY, Autodesk acquired the experimental New York design firm The Living, led by architect David Benjamin, in order to enhance its research capabilities. This union is just one effort by the software leader to engage in wide-reaching discussions about the future of design. Last year it opened Autodesk Workshop at San Francisco's Pier 9, a 27,000-square-foot playground for employees and partners to explore advanced manufacturing resources. And, more recently, a summer-residency program charged participants with writing science fiction. "We have an extraordinary talent base that can make stuff," says **Jeff Kowalski** (left), "but we also need those folks who can will new things into existence by virtue of talking and sharing stories about them." Kowalski, senior vice president and chief technology officer of Autodesk, is involved in each of these initiatives: "I figure out how the technical components fit together, and where they're heading."



Your career at Autodesk dates to 1993.

My 25-year-old self didn't think I'd be there for more than two years. Then Carl [Bass, president and CEO] and I looked at AutoCAD and realized it was a pretty significant force in the world and, if applied correctly, could change the way people were doing design. We started looking at ways for the software to embody more intelligence from the designer. It was just a drawing tool at the time.

And now it's much more than that.

What typically happens is we make a prototype, and we test it for wind loading, or energy consumption, or daylight affordances. All of these things are almost trivially analyzed inside the computer now. But if we permit the computer a more interesting role in the design process, and we change the relationship of the designer to the computer—from one of dictating everything to a conversation about goals and constraints—then we can focus on qualities that are harder to quantify, like aesthetics or comfort. I often say that I want to finally make CAD. We've been using that term since 1962, and I would like to get to the point where we have computer-aided design and not just computer-aided documentation.

Doesn't parametric design move us in this direction?

Parametricism wasn't wrong in its attempt, it was just entirely too narrow in scope and resource. The systems I'm talking about run on an infinitely elastic supply of computing out in the cloud. Because we can quickly iterate through solutions, and storage is cheap, the next time we look in the same solution area, we don't have to reiterate the same pathways.

You're not just envisioning the next version of AutoCAD or Revit, then?

One role of designers is to improve upon something that already exists. There's no reason I should have to dictate to the computer the existing form or context—it should know it. Unfortunately, we've forced designers to reiterate those objects and environments, instead of turning the eye of the computer to the world and teaching it what we're seeing.

Then the cloud kicks in?

Instead of creating a form that the computer analyzes according to your criteria, as we do today, you would describe your criteria, and the computer would generate ideas and evaluate them. The computer would then present representative solutions, and you can dive further into these archetypes, change criteria, and add connections. We move from design as a process of dictating to one of discovery.

Autodesk is also investing in advanced manufacturing, right?

Autodesk has invested very heavily in novel forms of fabrication. We find additive manufacturing and robots to be attractive; we also think about life sciences, in which you leverage processes and materials in the living world to enact the designs that we've chosen using astute computing capability. Ultimately, the audacious goal is to take some of the rationalizing and adaptive power in the computer and the design process and embody it in the object.

This recalls the cornstalk-mycelium masonry that David Benjamin devised for this summer's installation at MoMA PS1 in Queens, New York.

David and I think alike. Acquiring The Living is one case where I've violated my own principle of letting my influencers operate from their locale instead of glomming them into a self-contained organization. But the things he's driving toward match the stuff we're driving toward. I'm a computer scientist. I cannot build things; I can't really design things; I don't have the same pattern of thinking that David does. We want to show that output to the world. ■

noted

Curator Mildred "Mickey" Friedman Dies at 85

Friedman was a celebrated curator at the Walker Art Center in Minneapolis in the 1970s and 80s. She went on to curate exhibitions at other major U.S. and Canadian institutions, write books, and elevate the careers of architects she admired.

International Union of Architects Elects New Leader

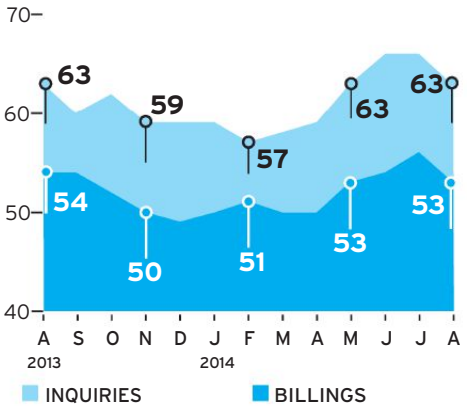
The Paris-based UIA has elected U.S. architect Thomas Vonier as its Secretary General for a three-year term. Vonier vowed to move the UIA to the forefront of global actions on habitat, urbanization, and resource use. He heads an architecture practice based in Paris and Washington, D.C.

Thomas Phifer to Design Museum, Theater in Poland

The Museum of Modern Art in Warsaw has selected Thomas Phifer and Partners to design its new building complex in Warsaw's Defilad Square. Phifer was selected after an international search and a design competition among 12 renowned firms.

Habitat for Humanity and SCI-Arc to Build Homes in L.A.

The new collaboration will have SCI-Arc students completing one house per academic year beginning this fall, when they will design the first house, followed by construction documentation during the spring semester. In summer 2015, students will work with Habitat volunteers to build the house.



ABI Continues Strong Showing

The August ABI score was 53, down from 55.8 in July (scores above 50 indicate increased billing). "A crucial component to a broader industry-wide recovery is the emerging demand for new projects such as education facilities, government buildings, and, in some cases, hospitals," says Kermit Baker, AIA chief economist.

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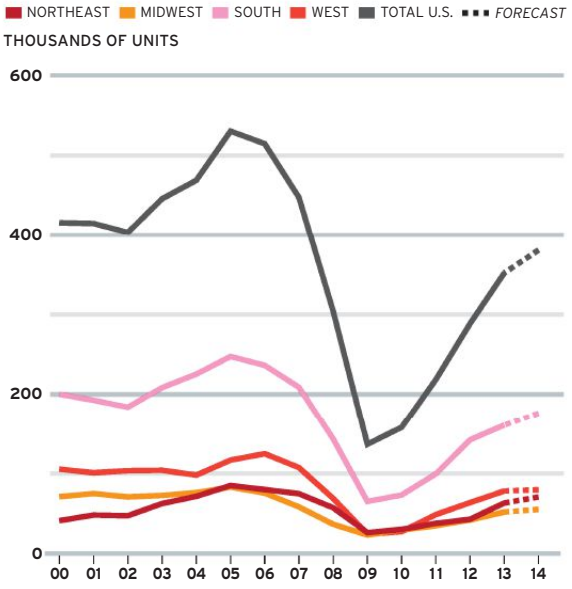
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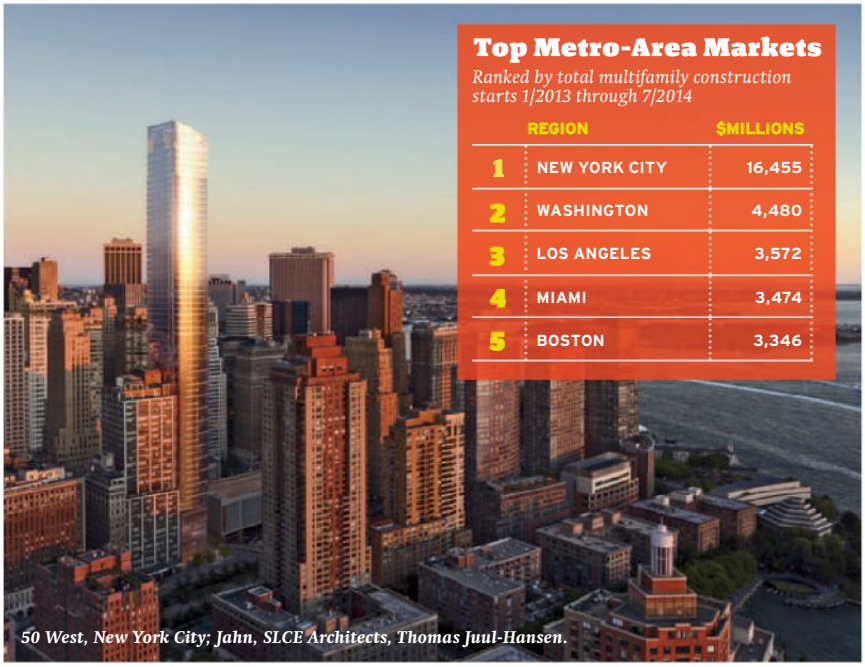
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Multifamily-Housing Starts by Region
In addition to U.S. total and 2014 forecast figures





Top Metro-Area Markets
Ranked by total multifamily construction starts 1/2013 through 7/2014

	REGION	$MILLIONS
1	NEW YORK CITY	16,455
2	WASHINGTON	4,480
3	LOS ANGELES	3,572
4	MIAMI	3,474
5	BOSTON	3,346

50 West, New York City; Jahn, SLCE Architects, Thomas Juul-Hansen.

The Dodge Index for Multifamily Construction 7/2013–7/2014



The index is based on seasonally adjusted data for U.S. multifamily housing starts. The average dollar value of projects in 2005 serves as the index baseline.

Top 5 Design Firms
Ranked by multifamily construction starts 1/2011 through 7/2014

1. SLCE Architects
2. Humphreys & Partners Architects
3. Goldstein Hill & West Architects
4. Wallace Garcia Wilson Architects
5. Elkus Manfredi Architects

Top 5 Projects
Ranked by multifamily construction starts 1/2013 through 7/2014

$450 MILLION
PROJECT: 70 Pine Street
ARCHITECTS: Stephen B. Jacobs Group, Deborah Berke Partners (interiors)
LOCATION: New York CIty

$425 MILLION
PROJECT: 626 First Avenue
ARCHITECT: SHoP Architects
LOCATION: New York City

$400 MILLION
PROJECT: 220 Central Park South
ARCHITECTS: Robert A.M. Stern Architects, SLCE Architects
LOCATION: New York City

$395 MILLION
PROJECT: 50 West
ARCHITECT: Jahn, SLCE Architects, Thomas Juul-Hansen (interiors)
LOCATION: New York City

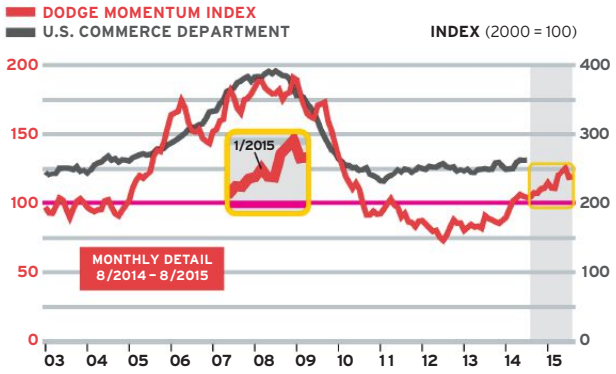
$390 MILLION
PROJECT: The Greenwich Lane
ARCHITECT: FXFOWLE, Aero Studios (interiors)
LOCATION: New York City

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perspective **house of the month**

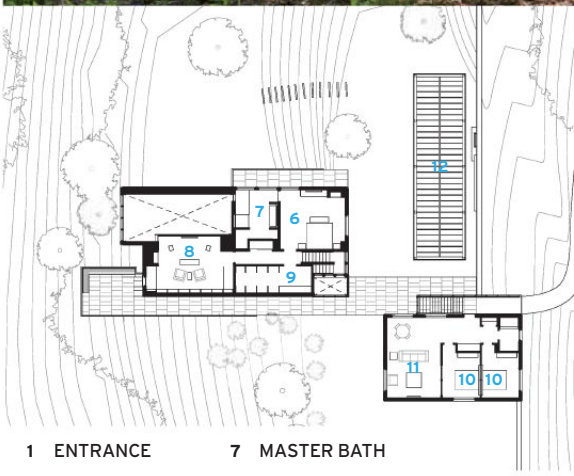
PERCHED ON SLOPING TERRAIN NEAR THE BERKSHIRE MOUNTAINS, A MODERN CABIN ANCHORS A SUITE OF STRUCTURES BY ANMAHIAN WINTON ARCHITECTS

BY JOSEPHINE MINUTILLO

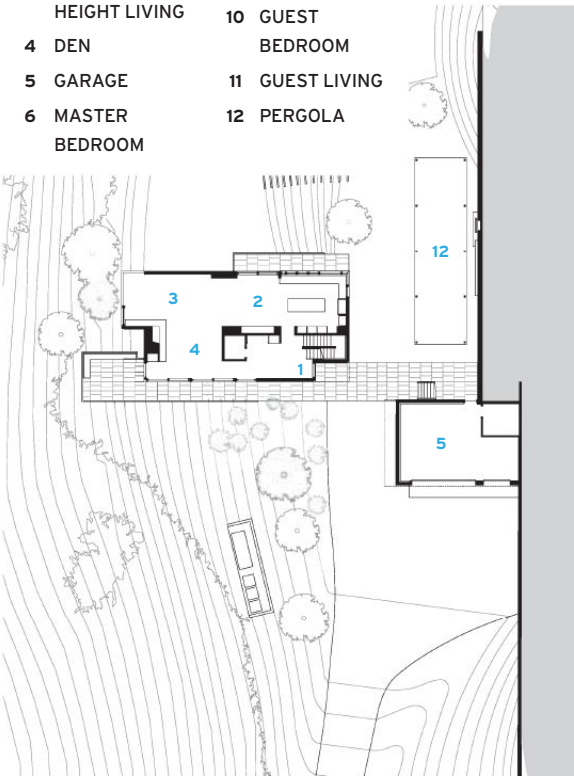








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3 DOUBLE-HEIGHT LIVING
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6 MASTER BEDROOM
7 MASTER BATH
8 MUSIC ROOM
9 CHANGING ROOM
10 GUEST BEDROOM
11 GUEST LIVING
12 PERGOLA



Western red cedar and milled aluminum clad the boxy structures on a partly leveled mountain site (above). The 4,500-square-foot main house extends over the sloping terrain beneath it and includes a terrace that cantilevers 16 feet (top right). The double-height living space overlooks treetop foliage (right).

ASKED TO DESIGN a modern cabin for a couple with passions for music and art, the Cambridge, Massachusetts, firm Anmahian Winton Architects created an ensemble of structures that is equal parts rustic and refined. The 16-acre property is nestled within the Berkshire Mountains in Red Rock, New York, near the Massachusetts border.

Two 100-foot-long board-formed concrete retaining walls cut through the steep slope to create a level plateau for the cantilevered main house, a smaller guesthouse over a garage that clings to the junction of the walls, and a long, aluminum-framed pergola for outdoor entertaining. A bluestone walkway runs by the main house to connect to the guesthouse and pergola framed by the retaining walls. Landscape architects Reed Hilderbrand helped determine which areas should be cleared to allow desirable species to flourish and breathe new life into the overgrown forest.

A hybrid steel-and-wood structure with a cast-in-place concrete base, the 4,500-square-foot main house has three levels that make up the private domain. A studio for the wife, an artisan, rests on grade, while the top floor includes a lone bedroom opposite a listening room for the husband, a music enthusiast. In between, the heavily glazed double-height space of the living room overlooks the treetop foliage surrounding the nearby meadow as the ground drops off beneath it.

Sheathed in vertical ribbons of Western red cedar delineated by factory powder-coated aluminum T-sections, the exteriors of both houses—built sequentially rather than simultaneously, in response to the recent recession—display a range of colors. The 3-foot-wide tongue-and-groove cedar boards feature three custom profiles that feature three different incised patterns, adding variety. "We treated the facades in a machinelike manner," says the architecture firm's cofounder Nick Winton, to contrast with the rusticity of the wood cladding. On the main house, milled aluminum also encloses a sunscreen perched over the entrance, and composes an embedded brise-soleil that runs along the roofline of the southern face, plus the railings of the terrace, which cantilevers 16 feet.

Interior details and furnishings are minimal. The bluestone of the outdoor walkway partially surfaces the floor of the living space; dark-stained oak covers the rest. Walls are painted stark white to better display the couple's art collection, but also so that, according to Winton, "The exterior would sing by contrast." ■

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The answer to the July issue's Guess the Architect is Pierre Chareau, who designed the Maison de Verre in Paris with Dutch architect Bernard Bijvoet in 1932. For more details, including the winner, go to archrecord.com.

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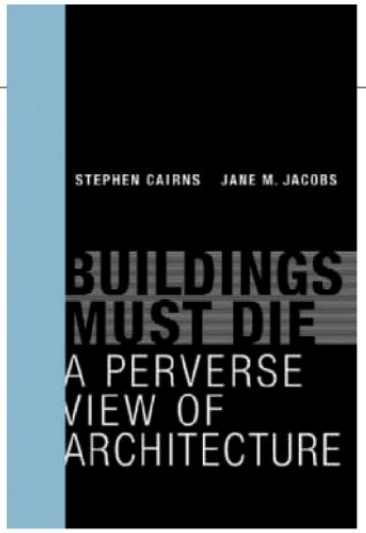
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Everything Falls Apart



Buildings Must Die: A Perverse View of Architecture, *by Stephen Cairns and Jane M. Jacobs. MIT Press, April 2014, 298 pages, $33.*

Reviewed by Aleksandr Bierig

THERE'S SOMETHING funny about architectural theory. It takes the building—one of the heaviest and most solid artifacts of human production—and evacuates it of any relation to the physical world. Houses cease to be made up of two-by-fours and vinyl siding and become ethereal conduits for spatial memory. Bricks and stone are obsessed over for their psychic weight, but little effort is made to understand how a wall is constructed, or the tortuous paths of a material to the construction site.

Buildings Must Die would seem, at first glance, to run counter to this unfortunate tendency. Authors Steven Cairns and Jane M. Jacobs—professors at Singapore satellite locations of ETH and Yale, respectively—set out to reinstill of the physical stuff of buildings and their inevitable decay and ruin. A series of words—decay, obsolescence, disaster, ruin, demolition—serve as guideposts to negotiate this relatively overlooked terrain.

Yet, for Cairns and Jacobs, these words remain just that—disembodied signifiers that fuel an often aimless wordplay. How else to explain, for instance, the reference-jumping chapter on "decay"? It begins with what "decay" means to biologists, then to physicists. It looks at Le Corbusier's obsession with newness (the opposite of decay?) and then turns to Alois Riegl's classification of the ways to perceive the physical decay of monuments. The chapter winds its way through the preservation practices of DOCOMOMO, ideas from Kevin Lynch, recent work by François Roche. And so on.

The first problem is that the authors cited do not debate one another directly or even engage in a conversation across time—they merely use the same word to describe different things. There is no attempt at constructing a history of the concept of "decay" as it has evolved within architectural thinking. Meanwhile, Cairns and Jacobs contribute very little of their own voices and add almost no original research. The places where they do—mostly case studies of structures faced with uncertain fates because of perceived physical degradation—are the best parts of the book. But these are overwhelmed by the rest, which can read like someone telling you about their architectural-theory book club. Many chapters end with a series of names—Freud, Lacan, Derrida, Deleuze—that recall only the most arcane ramblings on architecture from the past 30 years.



This is not to say there isn't something intrinsically interesting about the topic of this book. The two authors have surveyed a large range of sources on what remains a mostly overlooked subject. But it is hard to deny the irony of using such a conceptual approach to a topic that is concerned with the physical, material state of buildings. Buildings themselves, of course, have innumerable stories to tell us about the transient nature of architecture—of how an ineluctable decay haunts every seemingly stable presence. Cairns and Jacobs would have done well to listen more to the buildings and less to the theorists. ■

Aleksandr Bierig is a Ph.D. student at Harvard's Graduate School of Design and a former editorial assistant at ARCHITECTURAL RECORD.

View of Bangkok skyline with the incomplete Sathorn Unique Tower in the foreground (below, left). A crowd gathers outside Christchurch Cathedral, New Zealand, to view damage to the spire after an earthquake in 1888 (below, right). The backs of houses in Manchester, England, with fraying brick walls (bottom).





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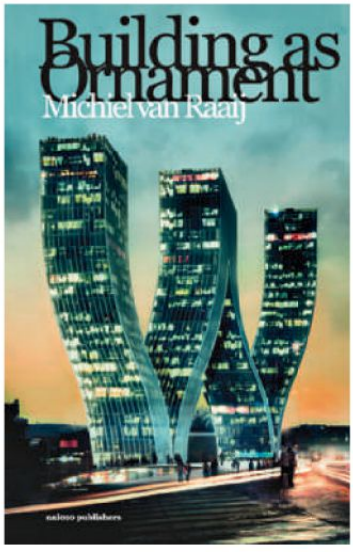
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CIRCLE 33

Building As Ornament: Iconography In Contemporary Architecture, *by Michiel van Raaij. nai010 Publishers, May 2014, 240 pages, $25.*

Reviewed by Tracy Metz

FOR MORE than a century, ornament in architecture was anathema in the Calvinist Netherlands—and elsewhere too. In his book *Building as Ornament: Iconography in Contemporary Architecture*, Michiel van Raaij, who is the editor in chief of the online architecture platform Architectenweb, interviews 10



well-known architects and architectural historians to reveal how this attitude has changed since the 1990s.

The moralism of modernism, though, has not yet completely disappeared: "A successful ornament," writes van Raaij, "represents a virtue and explains the function, status, structure and context of the building." An entire building on the scale of an ornament is one thing, but ornament for its own sake, in other words, is still not accepted by many practitioners.

According to van Raaij, buildings have not become more ornamented; instead, architecture has become more ornamental, i.e., more expressive. Here a terminology issue manifests itself: van Raaij is not talking doodads, as the word "ornament" might suggest, but rather sculptures, or even—forgive my French—icons. Ducks rather than decorated sheds, as Robert Venturi and Denise Scott Brown would say.

The 120 examples shown in the book (some built, most not) include well-publicized eye candy like BIG's swoopy W-shaped structure for the Walter Towers in Prague (shown on the book's cover); Frank Gehry's Guggenheim Museum in Bilbao; MVRDV's double tower in Seoul (at which some took umbrage because they saw in it a reincarnation of the planes flying into the Twin Towers); and Norman Foster's "erotic gherkin" for Swiss Re in London. One of the forerunners of this trend was Herzog & de Meuron, which used new materials not to articulate building components, "but to enable the building itself to 'speak' as a three-dimensional object." In a series of buildings in the 1990s for the Swiss herb-drop manufacturer Ricola, for instance, the firm experimented with images printed on glass.

Oddly, though, not all of van Raaij's examples fit his own enlarged definition of ornament. UNStudio's Mercedes-Benz Museum in Stuttgart, for example, is an abstract sculpture, an ode to sleekness and speed, not a duck. Not at all.

Van Raaij is convinced that building-as-ornament is the new normal. "Its communicative power is finding its way, slowly but surely, to the broader production of buildings." Some of the most adventurous and expressive new architecture these days is being commissioned by businesses and city agencies using it as a form of functional advertising, as a billboard in the best sense. Van Raaij's book signals a shift in the use of ornament, from an add-on to an integral part and purpose of the design. ■

Tracy Metz, an Amsterdam-based international correspondent for ARCHITECTURAL RECORD, *is the author of* Sweet & Salt: Water and the Dutch.

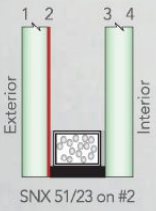
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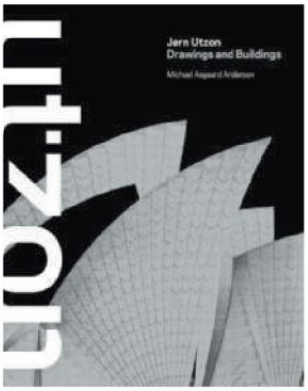


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Jørn Utzon: Drawings and Buildings, *by Michael Agaard Andersen. Princeton Architectural Press, December 2013, 312 pages, $60.*

Reviewed by Jayne Merkel

THIS HANDSOME book on Jørn Utzon, the well-known but little-understood 20th-century architect, delves into his work in a way few monographs do. Utzon, who was Danish, is best known for his Sydney Opera House, a brilliant project but one that took many years to build and encountered numerous budgetary and technical problems.



The author, Michael Agaard Andersen, concentrates on Utzon's work rather than his life. Andersen provides little biographical information, though some seeps into the text as he discusses the various building types that the architect explored, along with Utzon's collaborations, competition entries, extensive travels, and respect for landscape. He does not discuss Utzon's buildings and projects chronologically, or by type. Instead, he organizes the book by themes, titled Place, Method, Building Culture, Construction, Materiality, and Ways of Life. In some cases, this is helpful; in others, it is confusing, because he tends to change his point of view from one chapter to another.

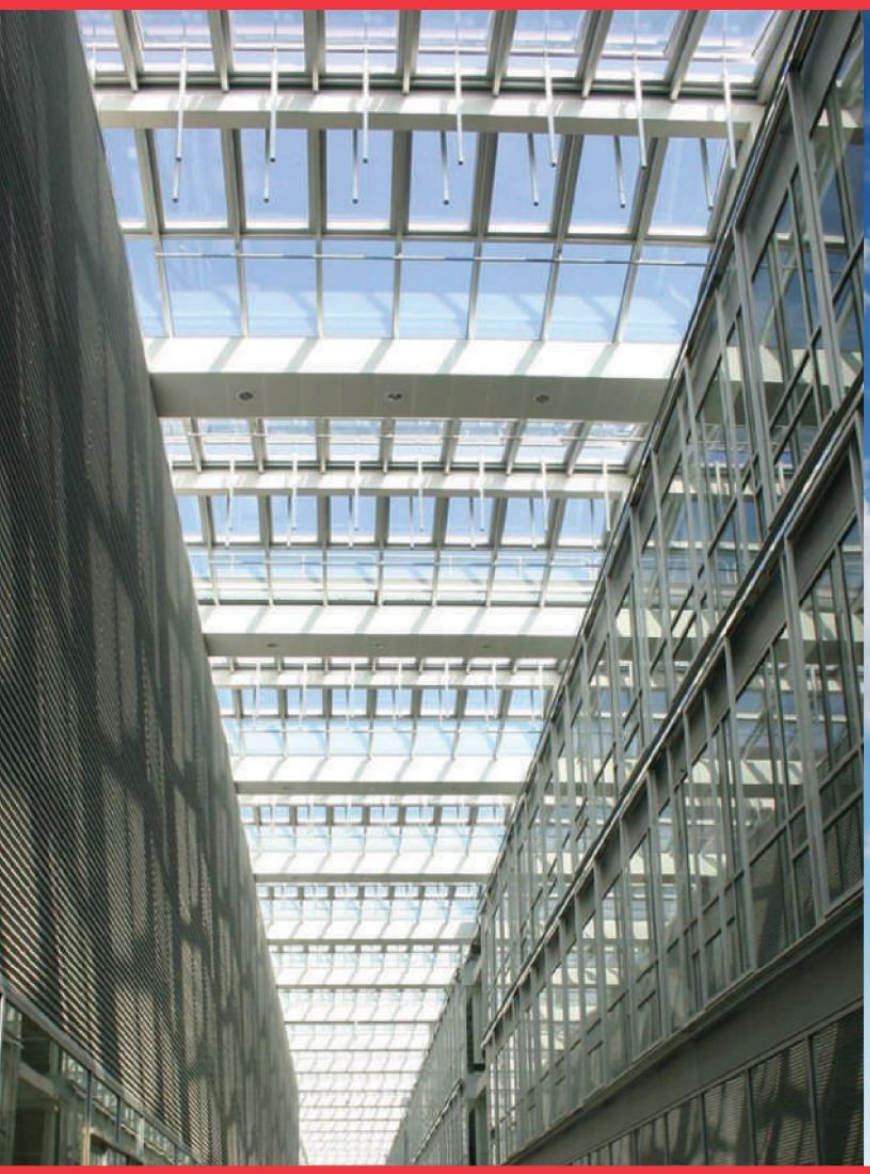
Photographs, sketches, plans, perspectives, and various types of detailed drawings illuminate the text, which has many asides and lengthy descriptions of the images, some in minuscule light–sans serif type. The book's graphic design is "modern," but not very functional.

Jørn Oberg Utzon was born in Copenhagen in 1918 and grew up in Alborg, Denmark, the son of a naval architect. During World War II, while Denmark was occupied by the Nazis, he attended the Royal Danish Academy of Fine Arts, where he studied with Kay Fisker and Steen Eiler Rasmussen. When he graduated, in 1942, he was able to go to Sweden (which was neutral during the war) and join the firm of Gunnar Asplund in Stockholm. After the war, he went to see Alvar Aalto in Finland, traveled to Mexico and the United States (where he visited Frank Lloyd Wright and Charles and Ray Eames). He later journeyed back to Mexico and to India, China, Japan, and Australia. Though he won the competition to design the Opera House in 1957, it was not completed until 1973.

Although less well known than his Sydney masterpiece, two of Utzon's most important buildings are in the Middle East—the Melli Bank in Tehran (1959–62) and the National Assembly of Kuwait, in Kuwait City (1972–85). In Denmark, major works include Bagsværd Church near Copenhagen and the Klingo Houses in Helsingør, while in Sweden there are the Elineberg Housing in Helsingborg and the Planetstaden housing project—all from the 1950s. For his family, Utzon designed two innovative houses in Denmark and two in Majorca. Andersen explains how all these buildings relate to their location's native traditions and landscapes, how they use craft and materials to express their values, and how the architect continued to innovate until his death in 2008. Despite the length and geographic reach of his career, Utzon will be remembered mainly for the Sydney Opera House and Bagsværd Church. Both have daring vaults and interiors that offer otherworldly yet down-to-earth experiences. ■

CONTRIBUTING EDITOR Jayne Merkel is author of the book Eero Saarinen.

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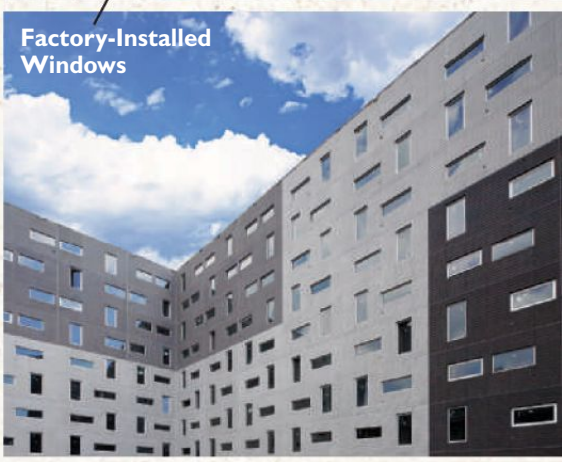
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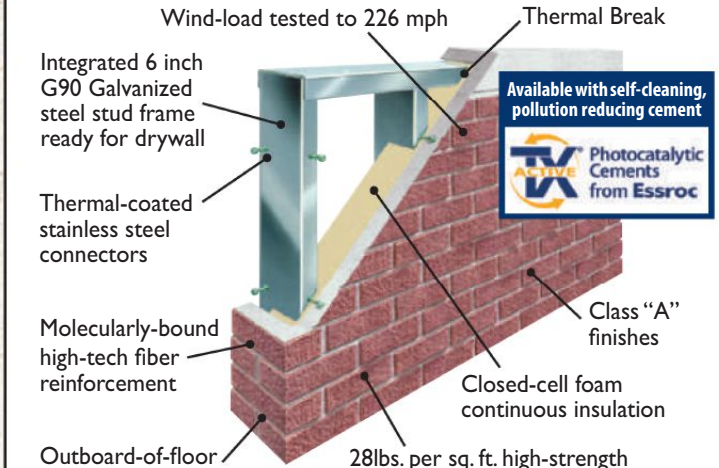
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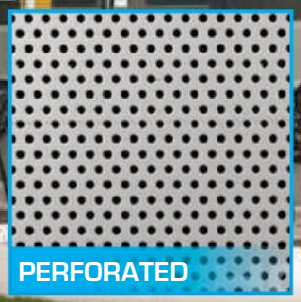
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Stress and the City

Urban centers find innovative solutions for housing their middle class.

BY RONDA KAYSEN

IT'S A WELL-KNOWN story by now: in the wake of a shift toward city living, and as housing prices continue to rise and wages stagnate, middle-class Americans are being squeezed out of urban centers. The problem is not isolated to high-cost cities. A *New York Times* analysis found that median rent is more than 30 percent of the median income in 90 U.S. municipalities, surpassing the federal government's benchmark indicating when a household becomes "burdened." Nationwide, half of renting households spend a third of their gross income on rent, while their median income hovered at $32,500 in 2012 (as compared to $50,500 for all households)—approaching its lowest level in nearly 20 years, according to the Joint Center for Housing Studies at Harvard University. To combat this trend, staving off an exodus of the workforce and addressing growing income inequality, a number of cities are experimenting with a range of innovative ideas to create affordable housing.

A mix of forces is driving up housing prices in top markets. Urban populations are growing as young Millennials and retiring Baby Boomers move to cities, while wealthy foreigners see American real estate as a safe place to invest. Add to this the fact that land and construction costs are high at a time when federal funds are dwindling, making it difficult to finance affordable developments.

Some argue that the problem is a question of supply and demand. Facing a greater need for density, cities are loosening zoning regulations, but housing advocates urge caution, worrying that an unfettered market could translate to an overabundance of luxury options without enough of the kind of housing these places need.

With no one-size-fits-all solution, cities must decide where to build housing, how to finance it, who to build it for, and how to preserve what exists. With 46.5 million Americans living in poverty—the largest number in more than half a century—the urgent needs of the poor dwarf those of the middle class. Yet without a range of housing choices, high-cost cities could lose their working class and professionals to cheaper markets. "Cities need a mix of housing types. They have people doing different jobs with a range of salaries," points out Henry Cisneros, the former housing secretary.

Affordable housing, from a policy perspective, refers to housing that includes a public subsidy, frequently in the form of tax breaks or zoning variances. For some low-income residents, Section 8 housing vouchers travel with them, subsidizing rent. In public housing, government builds and often operates the development, generally for low-income residents. Increasingly, cities are offering developers subsidies to build affordable units for middle-, moderate- and lower-income residents, within market-rate developments, known as inclusionary zoning. Potential residents enter a lottery for a chance at an apartment with rent limited to 30 percent of their gross income.

Cities rely on a federal formula known as area median income (AMI) to determine housing eligibility. In New York, for example, the AMI for a family of four living in the greater metro area is $85,900, with units available for families earning a fraction of that up to



Arquitectonica's forthcoming 606 West 57th Street (at right) in New York. The 40-story building will have 1,028 units, 224 of which will be affordable. The rendering depicts Bjarke Ingels's future Pyramid building in the background.

RENDERING: © TF CORNERSTONE

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around $150,000 a year, although income limits vary depending on the specific project. The federal government has more stringent caps, limiting federal dollars to low- and moderate-income. While some advocates for the middle class would like to see more housing at the upper end of the spectrum, others bristle at the idea of subsidizing housing for people who, by national standards, are considered wealthy, while homeless families continue to live in shelters. "There is a very real question as to whether or not policy efforts should go toward subsidizing affordable housing for people making $200,000 a year," says Barika Williams, deputy director of the New York advocacy group Association for Neighborhood and Housing Development.

To meet the needs of the poor and still build housing that benefits a city's teachers, plumbers, and, increasingly, its doctors and lawyers, takes creative thinking and a commitment from city planners, designers, and developers. A glance at three cities shows different ways to tackle the issue.

New York City: A Bold Agenda

Last year, New York ushered in a new mayor who promised to address mounting income inequality, the focus of a debate that reached a fever pitch this summer when a developer finalized plans for a so-called "poor door" separating low-income rental tenants from luxury condominium owners in the same mixed-income building.

New York has a long history of building middle-class housing, but many units have vanished as programs phase out. Mayor Bill de Blasio's agenda calls for creating or preserving 200,000 affordable units over the next decade, with nearly 60 percent of these intended for low-income households. The $41.4 billion plan—including $8.2 billion in city funds—proposes tax breaks for developers and zoning changes to allow for somewhat larger buildings. In exchange for greater density, developers would be required to set aside units for low- and moderate-income households. The plan reaches out to the city's poorest residents—those earning less than $25,150 a year—while also providing some housing for middle-income families earning up to $138,435 annually.

Some of de Blasio's critics argue that the city is too generous with tax breaks for developers who stand to make huge profits, claiming that they could include more middle- and upper-middle-income units in luxury developments without a public subsidy, since those units generate significant rental income. "Developers are lucky if they get to build in Manhattan," says New York City Council member Helen Rosenthal. Just getting a chance to build in New York, she says, should be incentive enough to provide affordable units.

Last spring, Ms. Rosenthal got to test her theory. The developer TF Cornerstone needed City Council approval to build a 1,028-unit rental building that included 216 affordable units in the Hell's Kitchen neighborhood, in Rosenthal's district. Before delivering her vote, Rosenthal required that the developer set aside four additional units for households earning 200 percent of AMI and another four for those earning 230 percent of AMI or $192,970 a year—with no additional subsidy. "Helen had a lot of leverage over us," says Jon McMillan, director of planning for TF Cornerstone. Nevertheless, he continued, "This middle-income stuff is maybe something you could actually squeeze out of a developer without giving an additional subsidy." Ultimately, TF Cornerstone agreed to the deal because families in the highest income bracket would pay $4,824 a month for a two-bedroom apartment, rivaling market rate, which was $4,817 for a Manhattan two-bedroom in July, according to realty company Douglas Elliman. The 40-story building, by Arquitectonica, will open in 2017.

San Francisco: Tech Boom and the Housing Crunch

San Francisco has some of the most progressive housing policies in the country, with mandatory inclusionary zoning and 200,000 rent-controlled apartments, accounting for more than half of the city's stock. Yet it is the most expensive city in the country for housing. Of the homes for sale, only 14 percent are within reach of the middle class, according to online residential brokerage Trulia. "There is a dire shortage of housing that is in any way accessible to anyone in the middle class," says Tim Colen, executive director of the San Francisco Housing Action Coalition. "What we're seeing is a hollowing out of the middle."

The demand has been exacerbated by the tech boom, with an influx of high-earning professionals driving up prices in a market with severe housing shortages—with an average of a mere 1,500 units built a year. Chartered buses shuttling tech employees from

Geared to young professionals, micro-apartment building 38 Harriet Street in San Francisco by Trachtenberg Architects includes 23 350-square-foot units.



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To compensate for small apartment size, 38 Harriet Street includes ample communal space, such as this patio.

the city to Silicon Valley have become a potent symbol of gentrification. Even low-end market-rate developments target young professionals, like a 160-unit building of micro apartments rising in the Mid-Market area, across from Twitter's headquarters. Rents start at $1,840 a month for a 274-square-foot studio, or $671 per square foot, which is higher than the city's average $406 per square foot. Many housing advocates and developers argue simply for increasing supply: more housing, even luxury towers, will eventually drive down prices, they say. But the city's complicated approval process makes it difficult for developers to build. Some believe that the rules should be loosened.

Not everyone agrees that just making it easier to put shovels in the ground will solve the city's housing problems. Instead, many contend that the public sector should play an active role in shaping what kind of housing is built and for whom. "Do you want a market that is targeted solely at singles or couples who are very high-income? Do you think that creates a sustainable city?" asks Noel Poyo, executive director of the advocacy group National Association for Latino Community Asset Builders (NALCAB).

In June, Mayor Edwin Lee introduced a $94 million plan to make 30,000 new or rehabilitated homes available by 2020. At least a third of them would be set aside for low- and middle-income families. Last spring, the city Board of Supervisors approved legislation to legalize in-law apartments in basements and garages of single-family homes, potentially adding thousands of units to the market.

San Antonio: Vision for a New Downtown

Every year, 26 million tourists stream into downtown San Antonio, strolling the city's River Walk. But until recently, the area, with 53,000 workers and numerous hotels, was desolate by dinnertime. Downtown has long served as the city's unofficial divider, with white, wealthier residents gravitating to the northern suburbs and poorer minorities living to the south. As the city sprawls outward, new housing engulfs inexpensive, undeveloped areas. "We're blessed with plenty of land," says John Kenny, executive director of the San Antonio Housing Trust. "But that's also the curse, because developers tend to spread out where the land is cheapest."

To draw young professionals and empty nesters back to the center, Mayor Julian Castro laid out a 10-year vision in 2010 to improve housing, retail, and culture. Providing developers with a mix of tax incentives, loans, and grants, the plan called for adding 7,500 housing units by 2020, tripling the neighborhood's stock. "The market pressures are not such that you've got developers running bananas [to build], willy-nilly," says NALCAB's Poyo. "There is real opportunity to bring everybody along."

So far, $574 million in private and public investment has delivered 3,589 new housing units, with 15 percent of them set aside as affordable housing. Market rent starts at $1,650 a month for a 1,000-square-foot apartment. (Mayor Castro's efforts propelled him to the national stage, and President Obama appointed him as housing secretary this year.)

One recent project is Cevallos Lofts, designed by Alamo Architects, which opened in 2012 with 252 units. Only 10 percent of the apartments are market-rate, while the rest target a mix of income levels, up to 200 percent of AMI. "You can't have the heroes of the public sector unable to live where they work," says Daniel B. Markson, a senior vice president of development for the NRP Group, the developer.

Ultimately, skyrocketing housing costs threaten the stability of the middle class; as urban centers grapple with this reality, many will see their landscapes reshaped and their demographics altered. While smaller cities like San Antonio do not face the same crunch that top markets do, they too walk a fine line as they try to provide quality housing for their poor and moderate-income populations while still encouraging economically diverse neighborhoods. "We are up against some really big economic forces," says Gabriel Metcalf, executive director of SPUR, an urban policy think tank. "If this were easy, we would have solved it a long time ago." ■

Ronda Kaysen, a freelance journalist, writes the Ask Real Estate column for The New York Times.



Just 10 percent of the 252 units in San Antonio's Cevallos Lofts (below), by Alamo Architects, are market rate. Amenities include a large interior courtyard with a pool and fountains (right).



PHOTOGRAPHY: © KEITH BAKER PHOTOGRAPHY (TOP); TRE DUNHAM/FINE FOCUS PHOTOGRAPHY (BOTTOM)

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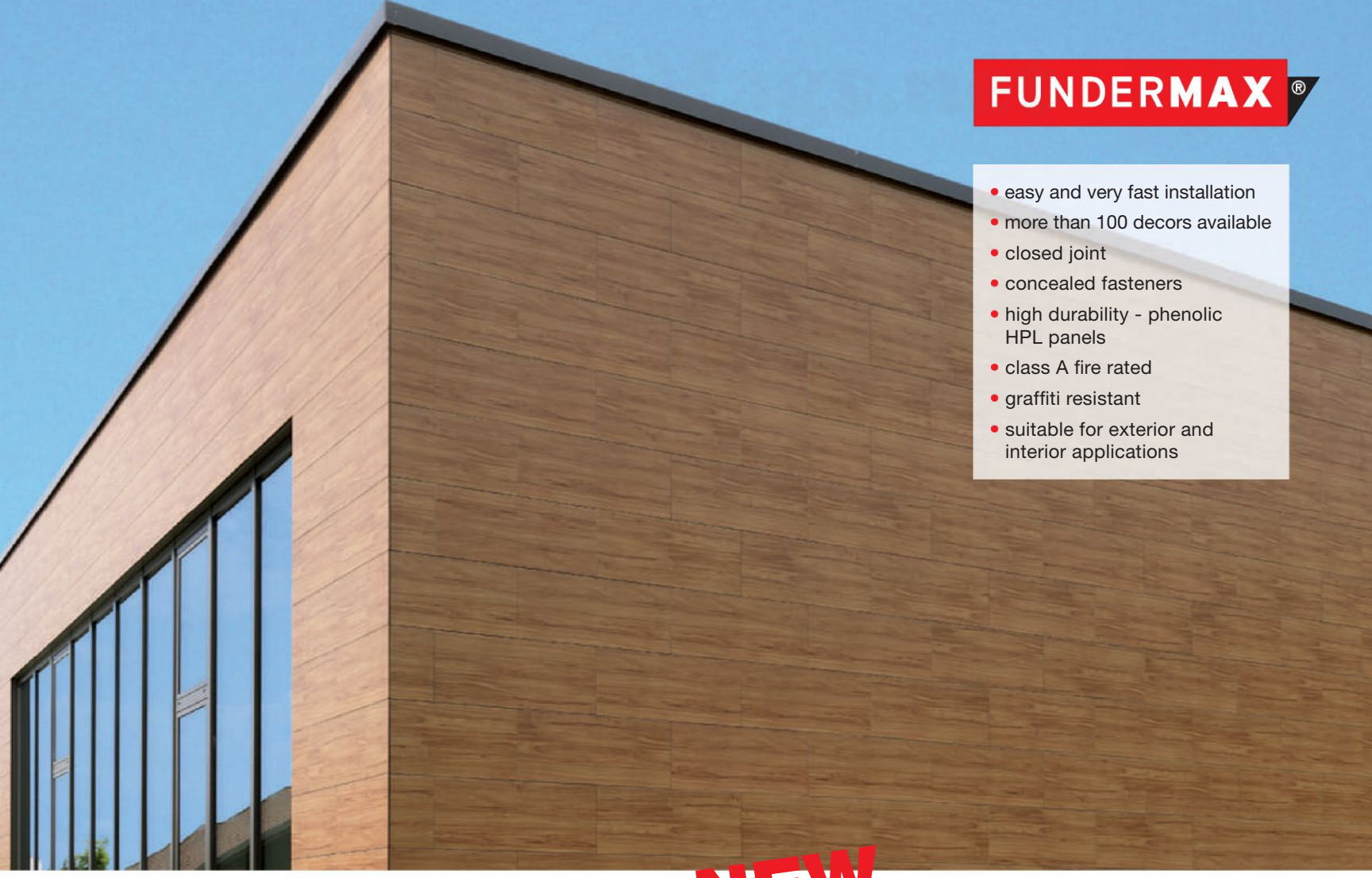
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Sugar Hill Renaissance

A low-income development by David Adjaye mixes housing with education and culture.

BY JAMES S. RUSSELL



PHOTOGRAPHY: © KRISTINE LARSEN

WHERE A GARAGE once stood, the Sugar Hill Development rises like a charcoal escarpment interrupting the steep descent of busy 155th Street from the rocky spine of upper Manhattan. This prominent corner at St. Nicholas Avenue is suffused with African-American history. The Sugar Hill neighborhood was once the center of black wealth, especially during the 1920s cultural ascendance known as the Harlem Renaissance. The building's saturated color draws attention to itself, while a rose pattern embossed in its precast-concrete panels recalls one often found in wallpaper from the '20s.

The Sugar Hill Development has something to say. With apartments for people with very low incomes (including some formerly homeless residents), an early-childhood-education program serving 200, and a related 17,500-square-foot Children's Museum of Art & Storytelling, "the project represents the epitome of what we want to do in terms of housing," said New York City Mayor Bill de Blasio at a press event in June. De Blasio was elected last year partly on his pledge to build and preserve 200,000 units of affordable housing, though Sugar Hill began under Michael Bloomberg.

The project shows both what is possible for such housing to achieve and how difficult is de Blasio's task.

London-based David Adjaye, who worked with local housing specialist SLCE, buried about a third of the building in the steeply sloping site. A band of floor-to-ceiling glass runs around the building on the entry level, contrasting with the visual weight of the 11 floors of apartments above. An intimate entry plaza will be animated with children, visitors, and residents when all of the project's components are occupied, since entrances to the housing, school, and museum all open onto it. Kids started playing on a terrace below when school began in September.

The education spaces, bathed in daylight, take advantage of east-facing views of the Harlem River and nearby Yankee Stadium. The glass along 155th Street puts the children on display above passersby as the street drops off, a feature supported by Ellen Baxter, the director of the nonprofit developer, Broadway Housing Communities, as a cheerful advertisement of the value of prekindergarten education.

The lobby of the museum (scheduled to open in the spring of 2015) draws visitors past a small sculpture courtyard, then descends one level

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The 191,000-square-foot building makes the most of a sloping site, providing entrances to all of its key components on St. Nicholas Avenue (right) and tucking parts of its early-education center and children's museum on lower floors. The building steps down 155th Street (opposite) and overlooks St. Nicholas Place (above).

to a landing where a window looks into a skylit gathering space below. The corridor divides generous, high-ceilinged display space from a suite of classrooms that borrow sun from the skylight.

Mixing the mutually reinforcing early-education center and the storytelling museum "helps children succeed academically from the get-go" says Baxter. "These are resources not available in low-income communities like this one, where 70 percent of children are born into poverty."

Inside, the architects brought touches of character and domesticity to small but functional apartments that range from studio to three-bedroom. Hardwood floors in the dwellings and stone tiles in the residential hallways survived value engineering.

Residents, who are starting to move in this month, will share a planned rooftop terrace and garden. Outdated energy standards required windows that are smaller and less varied than those shown in Adjaye's renderings, affecting both the units and the building's exterior, where they advertise Sugar Hill's budget constraints and institutional character. One regulator insisted on unsightly, energy-wasting through-wall air-conditioning units—a crude way to mask the noise of 155th Street and less efficient than a central air system.

Eschewing the pink and beige bricks that usually clad affordable housing, Adjaye called for precast panels tinted charcoal gray with a striated texture and the embossed roses. The pattern is most visible in raking light, and almost disappears on dull days.

With a broken funding process endemic to "affordable" housing, Sugar Hill's benefits will be difficult to replicate at the scale de Blasio hopes to achieve. A gift from the Sirius Fund, a foundation, allowed Broadway Housing Communities to acquire the site. Sugar Hill needed 14 other funding sources from federal, state, and local governments as well as several banks deploying Federal New Market tax credits. Each contributor operates with different criteria and on different cycles, requiring an elaborate and expensive syndication process to reconcile. The education and museum programs also added to construction, financing, and regulatory complexity. Some nine city agencies will have signed off on the project before it can fully operate.

This Byzantine process is one reason why the total project cost for the 191,000 square-foot building was $89 million, only $59 million of it for construction..

The project's 124 apartments attracted a staggering 48,000 applications and Baxter's team has been filtering applicants according to exacting requirements: 40 income tiers (as low as $18,000 for a family of four, who would pay as little as $460 per month), with apartments set aside for nearby residents, city employees, the formerly homeless, and people with disabilities.



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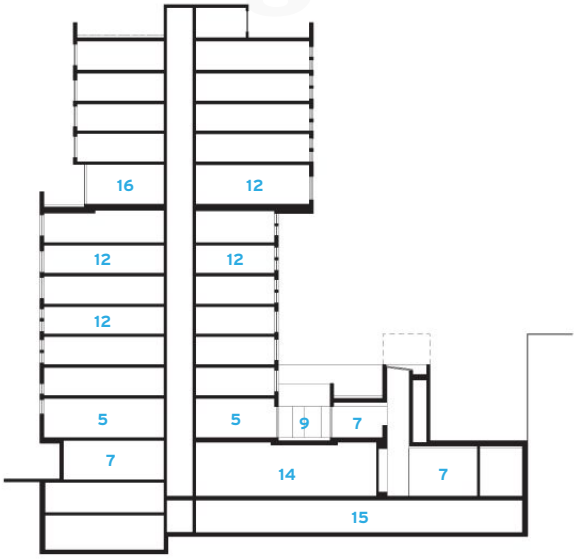
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The building's charcoal-gray precast-concrete panels have a striated texture and an embossed rose pattern long associated with the neighborhood (below). The pattern is most visible in raking light and almost disappears on overcast days.



Adjaye says he likes the ambiguity of the brooding exterior, but the clumsy workmanship and irregular gaps between panels unfortunately evoke the stigmatizing low-income housing that blights too much of New York. "I wanted to see a different palette," says Adjaye, who noted that one of his earlier projects, the Dirty House in London, had been criticized for its contrast to its surroundings, but is now embraced. "I believe the project will succeed in its use and what it offers—a very low-cost but signature building." ■

James S. Russell is a New York-based architecture critic and the author of The Agile City, *published in 2011.*



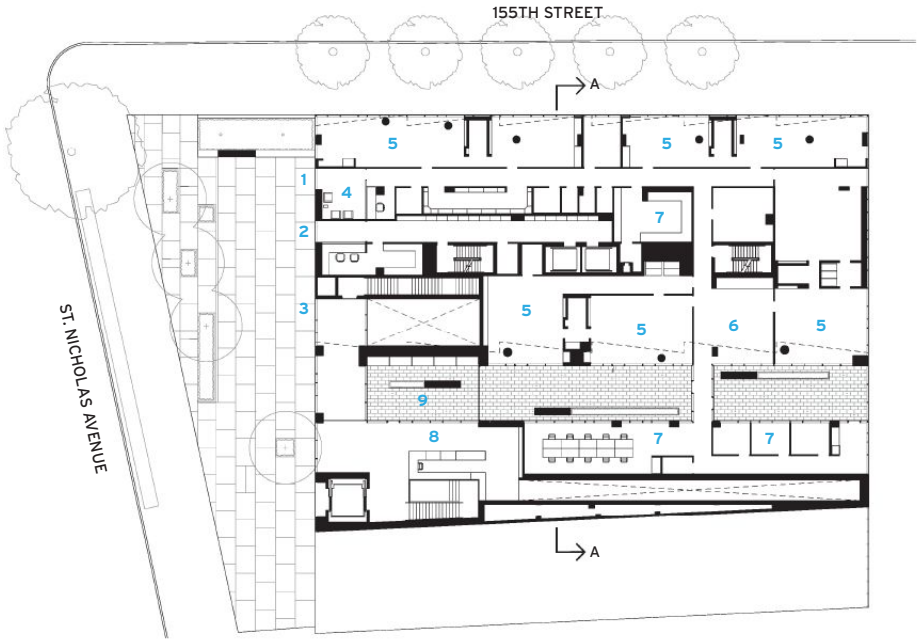
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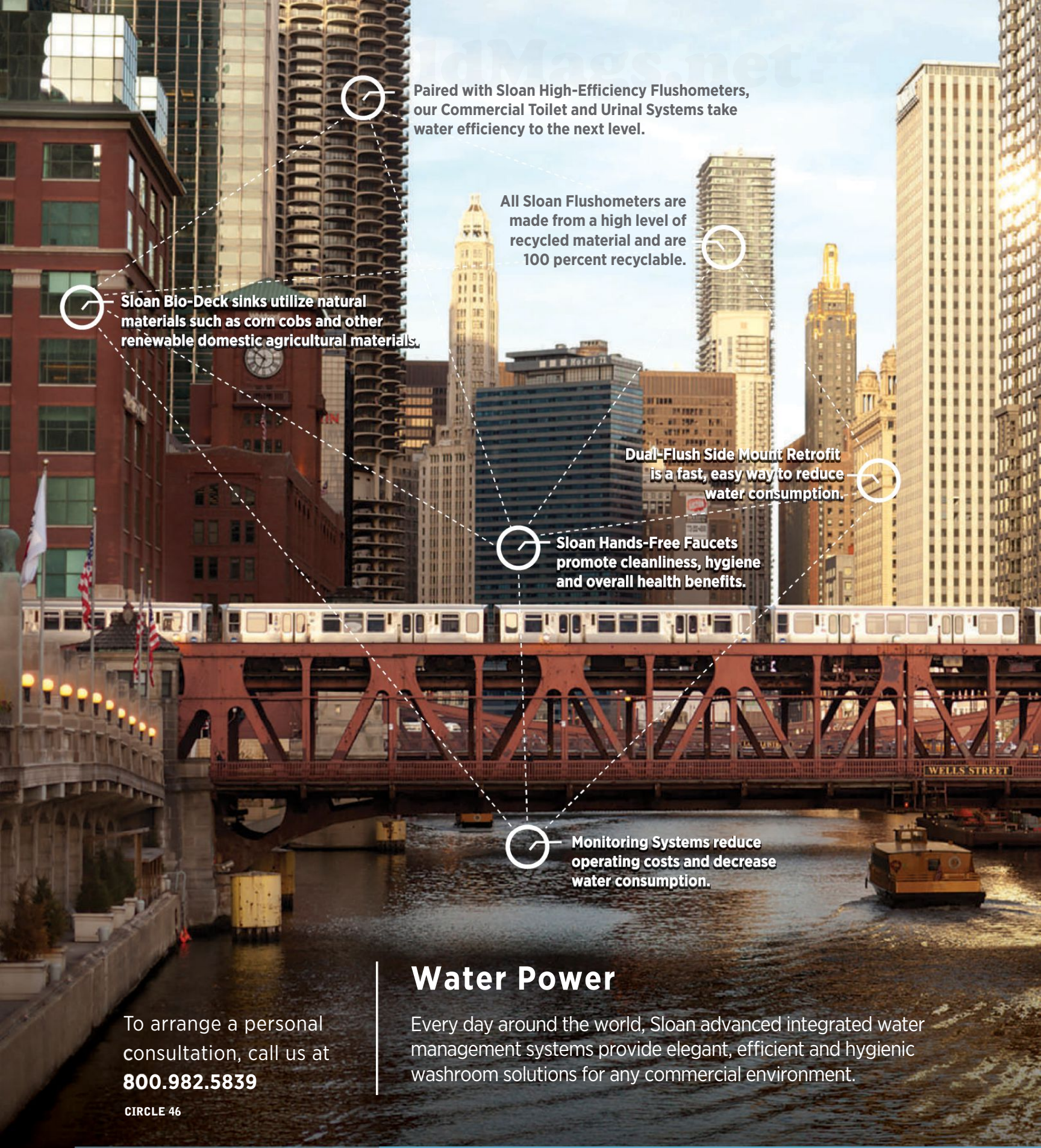
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2 RESIDENTIAL ENTRY
3 MUSEUM ENTRY
4 EARLY-EDUCATION RECEPTION
5 CLASSROOM
6 READING ROOM
7 OFFICE
8 MUSEUM SHOP/CAFÉ
9 MUSEUM COURTYARD
10 STUDIO APARTMENT
11 ONE-BEDROOM APARTMENT
12 TWO-BEDROOM APARTMENT
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Flute Collection

Rocky Mountain Hardware rockymountainhardware.com

Hospitality designer Roger Thomas draws on the classical fluted columns of Greece for his new line of door and cabinet handles and pulls. The collection includes 14 lever, pull, grip, and knob styles, as well as complementing escutcheons, all accented with micro grooves. Cast of 90% post-consumer recycled bronze, the pieces are offered in 10 standard finishes. CIRCLE 200

Cradle to Cradle Acrovyn Doors

Construction Specialties c-sgroup.com

The manufacturer made news when it announced this year at AIA that its standard Acrovyn door models received Cradle to Cradle Bronze certification—making it the first company to achieve the designation for a door. The interior doors—composed of particleboard, a mineral core, and chemical-of-concern–free adhesives and fire retardants—are available in 15 wood-grain patterns, 60 solid colors, or two simulated metal finishes. CIRCLE 205

Custom Designed Rolling Steel Doors

Cornell and Cookson cornellcookson.com

In their closed, secured position, Cornell and Cookson's rolling steel doors can now function as a billboard, wayfinding or main-entrance signage, or simply decorative backdrop for passersby. The company has developed a new process to bake custom color imagery onto the doors, from photorealistic graphics and faux textures to company logos and typography. CIRCLE 201

AA 6400/6500 Thermal Window

Kawneer kawneer.com

Designed to meet the climate challenges of northern regions, these windows feature framing and pressure-equalized cavities that aim to deliver exceptional thermal performance and condensation resistance. Additionally, because the interior side is dry-glazed, the units are easily reglazed in the field. The aluminum frames are offered in 4" or 5" deep versions, and can be specified in different colors for the interior and exterior faces. CIRCLE 204

Swing Doors

LaCantina Doors lacantinadoors.com

The slim stile and rail profiles—from 2¾" to 3⅝"—of LaCantina's Swing Doors allow for larger open areas that bring in more natural light and outdoor views. To meet different climate and aesthetic needs, the framing system can be specified in aluminum, aluminum with thermal breaks, aluminum with solid wood core, and a dual finish featuring an aluminum exterior and wood interior. CIRCLE 202

Santa Monica Door Sets

Baldwin Hardware baldwinhardware.com

The streamlined designs offered in the Santa Monica series are inspired by the modern houses that dot California's coast. Suitable for entrances or corridor, patio, or French doors, the collection includes five levers, four rosettes, a handleset with either mortise or multipoint lock, and a square deadbolt. The hardware is composed of solid forged brass and offered in 19 finishes ranging from distressed oil-rubbed bronze to satin nickel. CIRCLE 203



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FROM WALLCOVERINGS TO ACOUSTICAL PANELS AND DECORATIVE TILES, THE LATEST FINISHES ARE REFRESHING COMMERCIAL AND RESIDENTIAL SPACES. **BY SHEILA KIM**



New Patterns by Ronald Redding

York Wallcoverings has introduced new styles by Ronald Redding Designs that add a touch of glamour to textures and materials found in nature. Metallic Cork (above) possesses a shimmery, bark-like appearance formed by a thin layer of painted and distressed cork that randomly reveals a metallic-finished ground behind it. Dyed and pressed sheets of crystalline mica are laminated onto nonwoven paper in Terra Mica. Natural Leaves, just as its name suggests, presents a field of foliage created by a process that eliminates the pulp of magnolia leaves while preserving their veins. Other designs include Petit Sisal, Flashy Woven, and Bamboo. yorkwall.com **CIRCLE 206**

Designtex + Charley Harper

The whimsical illustrations of artist Charley Harper provide an antidote to sterile health-care settings, thanks to a new high-performance wallcovering and textile collection from Designtex. Developed with Todd Oldham, steward of the Harper Archive, it includes Space for All Species (below), a digitally printed PVC-free covering based on the artist's 1964 tile mural for the Cincinnati Federal Building.
designtex.com **CIRCLE 207**





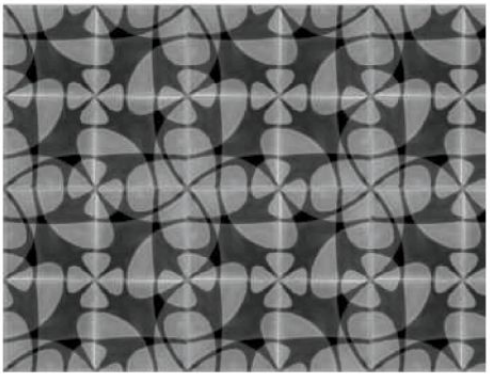
Cast Stone Dimensional Panels

Architectural Systems is adding visual interest to interior and exterior walls with this modern take on stone. The panels are offered in styles ranging from stacked rows and chiseled faces to wood-grain patterns. Composed of 90% recycled quarried stone and resin, they are eco-friendly, UV- and frost-resistant, and Class A fire rated.
archsystems.com **CIRCLE 208**



PlybooSound

Pulling double duty as both a decorative and acoustical wall panel, Smith & Fong's PlybooSound is a bamboo product that dampens noise using either standard fiberglass backing (for an NRC of 0.5) or the new QuietWall chamber system, which was developed with the Utah-based acoustician Real Acoustix and is integrated into the bamboo panels (achieving an NRC of 0.7 to 0.8). The 4" wide x 8" high panels are ¾" to 1" thick, depending on acoustical specification, and are available with any of the company's designs.
plyboo.com **CIRCLE 210**



Nature's Net

These cement tiles from Tesselle feature an abstract three-tone motif that, when grouped, connect to create continuous organic patterns or random compositions, depending on tile orientation. Available in nine colorways—from a mustard or blue palette to a neutral cream or gray—the 8" square tiles are made to order and can also be custom colored.
tesselle.com **CIRCLE 209**

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

products **briefs**

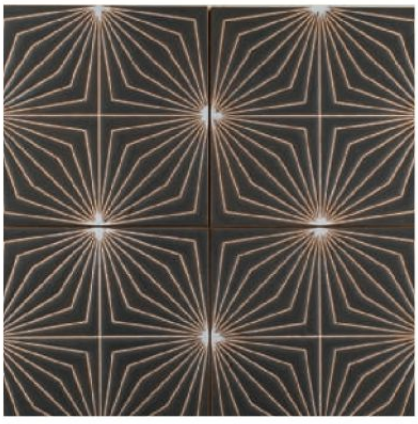


BuzziBlox Penta

BuzziSpace has introduced a new shape to its BuzziBlox wall-panel series, which is a modular line that helps dampen sound. The five-sided Penta (above) has a poplar frame, foam filling, and a fabric cover, and comes in three depths, from 1½" to 4¾", allowing designers to create topographies. buzzispace.com CIRCLE 211

Expanded Hand-Painted Series

Fireclay Tile has gained the expertise and artistry of recently acquired Kibak Tile and its founder Susanne Redfield. Her new designs are the foundation for the Contemporary, Mediterranean, and Moroccan hand-painted collections (below), which are composed of 70% recycled clay and created using a 16th-century wax-resist technique. Available in two sizes. fireclaytile.com CIRCLE 212









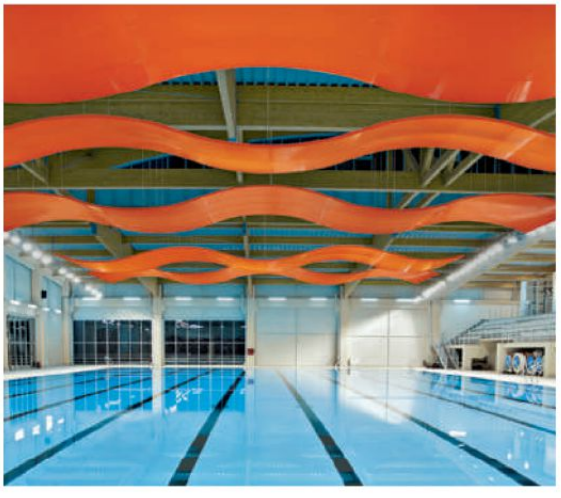
Flight Series Tiles

Two architecture- and construction-management-school grads turned entrepreneurs are giving new life to decommissioned military aircraft: Flight Series Tiles are made entirely from aluminum salvaged from old B-52s. The metal is smelted into blocks and then sliced into ⅛"-thick tiles in three sizes for interior use, ranging from walls and backsplashes to wainscoting. And because the process creates random imperfections, each unit is unique. flightseriestiles.com CIRCLE 213



Serpentina for Pools

Armstrong's curved and undulating Serpentina metal ceiling systems have been tweaked for use in indoor pool areas: All of the components are constructed of noncorrosive stainless steel and aluminum. They are available in a range of powder-coat colors and perforation styles, and can reduce noise with acoustical fiberglass-filled lay-in bags. armstrong.com CIRCLE 214

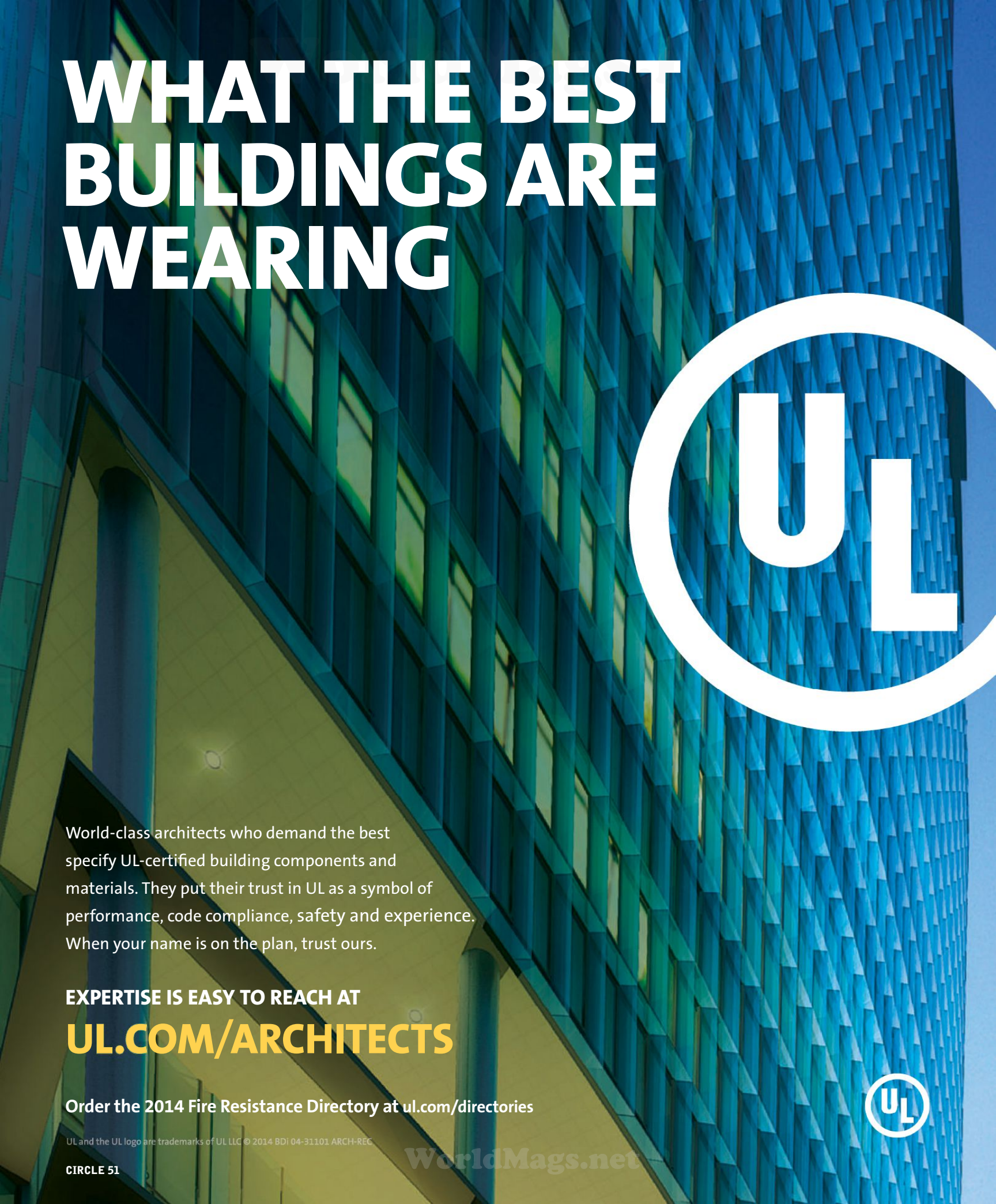




Hospitality Collection by Bart Halpern

Bendheim's newest decorative glass panels get a bit of sparkle by encapsulating Bart Halpern's textiles woven with metallic threads. The fabrics—offered in champagne, gold, copper, silver, and black—are laminated with low-iron glass for use as partitions, doors, railing infill, and wall cladding, among other applications. Panels are offered in sizes of up to 60" wide by 120" high in thicknesses from 5/16" to ¾". bendheimarchitectural.com CIRCLE 215

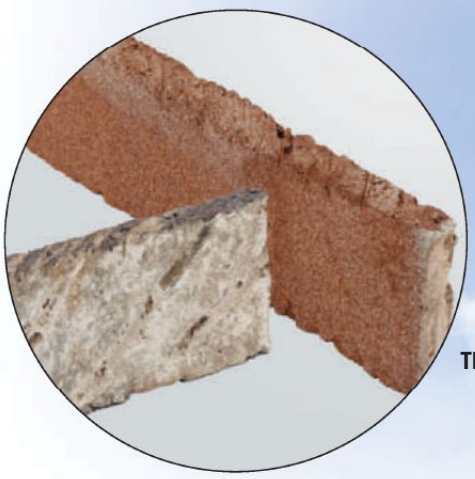
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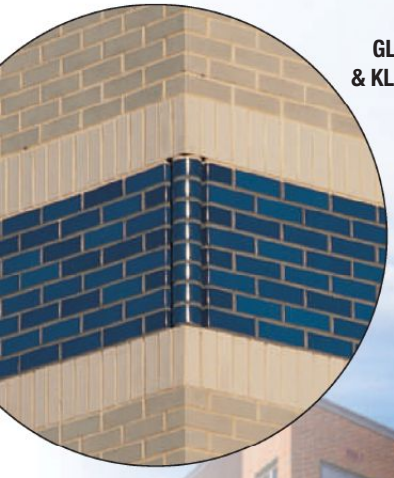
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GEHRY'S NEW MUSEUMS



IMAGE: COURTESY FRANK GEHRY

At first look, the Fondation Louis Vuitton museum in Paris (shown here in an early sketch) seems vastly different from the Biomuseo in Panama City: in scale, in materials, in setting. The Paris project is more ethereal, elegant, and urbane, whereas the museum in Panama is more rooted, though jubilant and whimsical. But they share some common qualities. Formally, both house their programs in containers that are cloaked in fanciful canopies, giving each a strong sense of movement and expression. These two projects, opening this month, illustrate Gehry's range and fluency in creating buildings that respond to and enrich the places around them.

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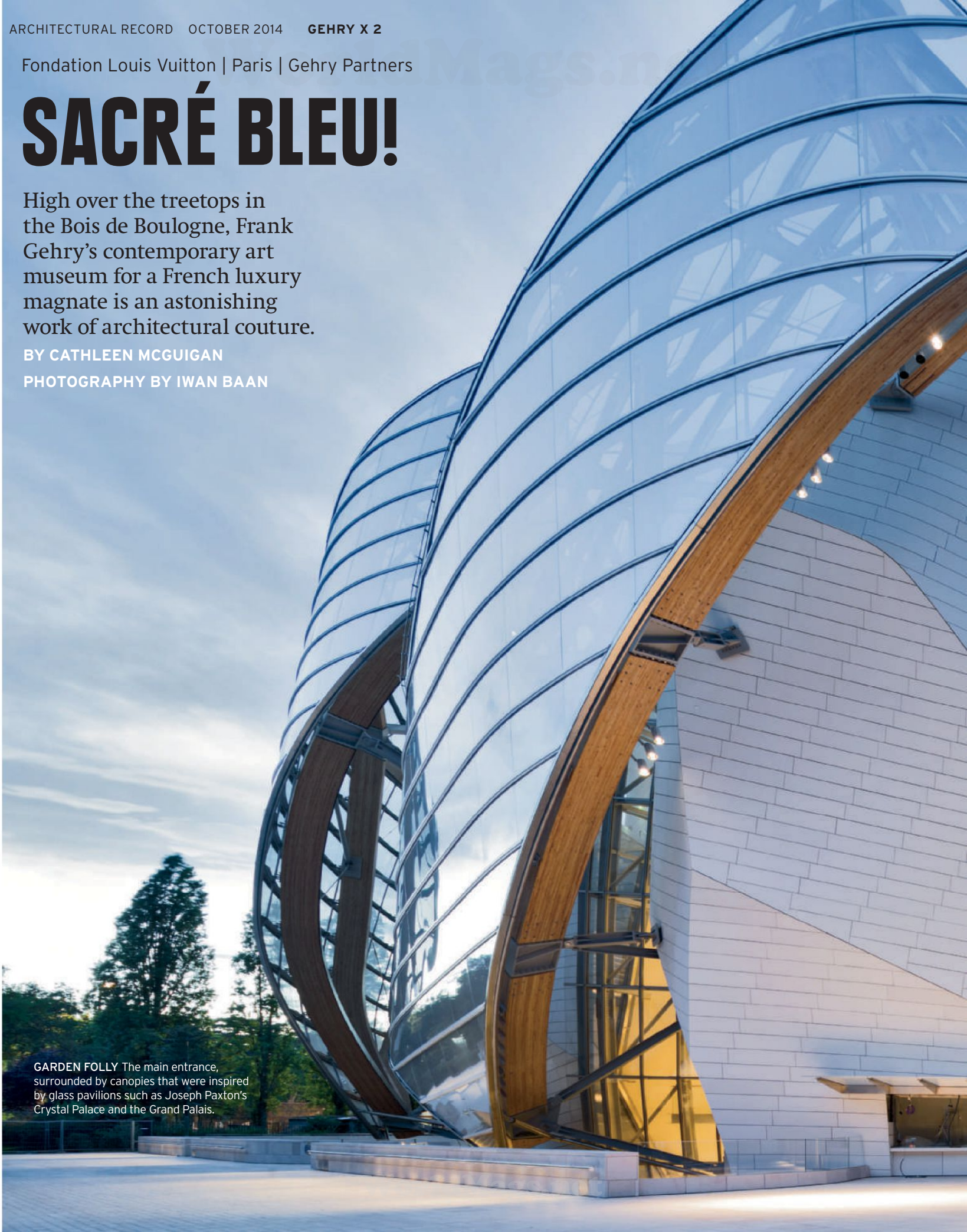
Fondation Louis Vuitton | Paris | Gehry Partners

SACRÉ BLEU!

High over the treetops in the Bois de Boulogne, Frank Gehry's contemporary art museum for a French luxury magnate is an astonishing work of architectural couture.

BY CATHLEEN MCGUIGAN

PHOTOGRAPHY BY IWAN BAAN



GARDEN FOLLY The main entrance, surrounded by canopies that were inspired by glass pavilions such as Joseph Paxton's Crystal Palace and the Grand Palais.





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TRIM THE SAILS
Anchored in a water feature above the cascade to the east (opposite) or viewed from the Jardin d'Acclimatation to the north (above), the building shows off the elaborate web of steel and wood elements that hold the curving glass canopies aloft. The base of the building, below grade, is French limestone, the same stone used for the lobby floor.

The Fondation Louis Vuitton (FLV), designed by Frank Gehry, may appear transparent, but it is a building that doesn't easily give up its secrets. Encountering it for the first time—huge and billowing, as if the vast, curving glass sails that wrap the exterior are tilting into the wind—is amazing and a little confounding. Without a surrounding cityscape against which to gauge the scale of this surprise of a building, it looms above the leafy treetops of the Bois de Boulogne in western Paris as if it were a garden folly made for giants.

Paris resists change, and this unusual project sparked controversy along the way, not least because it was a large, privately built structure planned within the city's beloved 2,000-acre public park. The client, Bernard Arnault, chairman and CEO of the consortium of luxury companies LVMH Moët Hennessey-Louis Vuitton, acquired the concession to the 50-acre Jardin d'Acclimatation, inside the northern edge of the Bois, as part of a business deal, and was allowed to create a museum there, on the footprint of a defunct bowling alley. Over the protests of some Parisians, FLV eventually won approval for a higher building—just under 160 feet—so long as the design was considered suitable for the site. "It had to be a kind of garden building," says Gehry, referring to such glass structures as Joseph Paxton's Crystal Palace or the Grand Palais in Paris. "I know this doesn't look anything like those, but the idea for doing something in the Jardin came from those antecedents."

But you can't put paintings under glass, so the building is actually composed of two discrete parts. The multilevel 126,000-square-foot museum, with a concrete-and-steel structure, is largely clad in 19,000 fiber-reinforced high-performance concrete panels (its white, irregular jutting and curving shapes have been dubbed "the icebergs"). Surrounding it is "an ephemeral dress," as Gehry calls it, open to the air and composed of 12 large floating translucent glass sails, attached to the structure via an elaborate web of steel and wood members (page 85). Arnault fell in love with Gehry's first design in 2006, and in the Beaux Arts tradition of the *esquisse*—a preliminary drawing that embodies the essence of the idea—it remained the basis of what was eventually created. This is not how the architect usually works; he and his team tend to develop a design over time, building model after model to test ideas. "Every time we varied from the first model," says Gehry, "Bernard would say, 'But, Frank, I love that one.' Not that it was pushing me to do something I wasn't happy with."

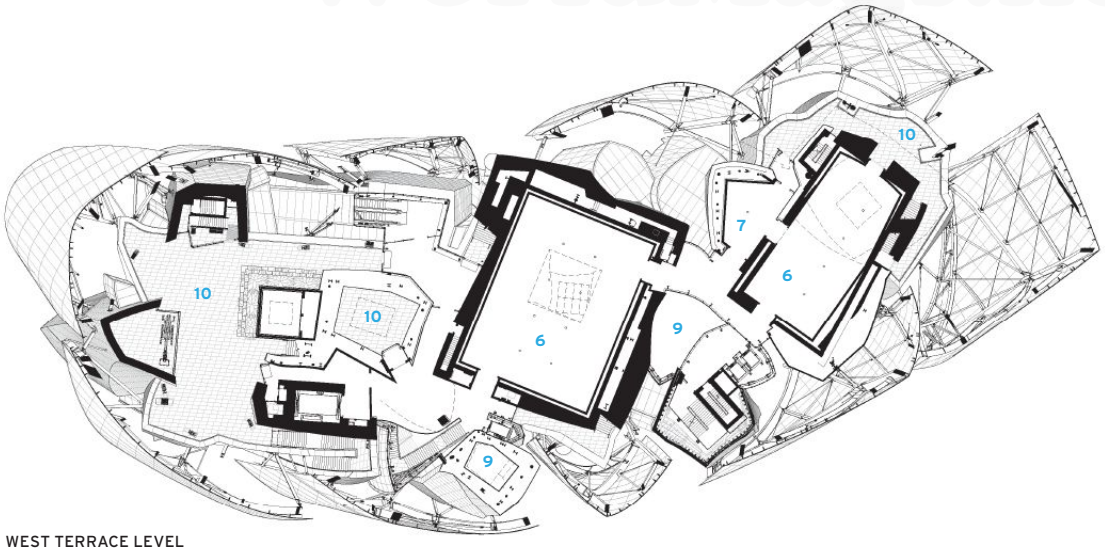
Almost every news article about the fashion magnate terms him "the richest man in France," and, with the FLV, he commissioned an extraordinary piece of architectural couture. Opening this month, the museum will be filled with contemporary art from Arnault's personal collection and that of LVMH, and with a number of works created specifically for the building by artists such as Olafur Eliasson, Ellsworth Kelly, and Taryn Simon. (Ironically, the museum sits on the avenue du Mahatma Gandhi, named for the father of modern India who famously disavowed all worldly goods.)

Besides the idea of a garden pavilion, the architect was inspired by the 19th-century Bois de Boulogne itself, built under Napoleon III, with its man-made lakes and Grand Cascade. The glass-walled main entrance on the south side

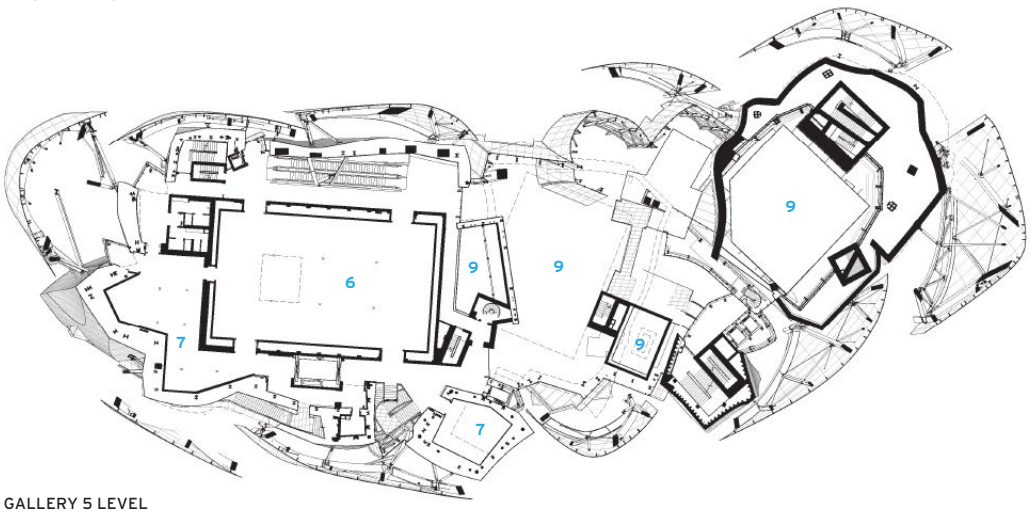
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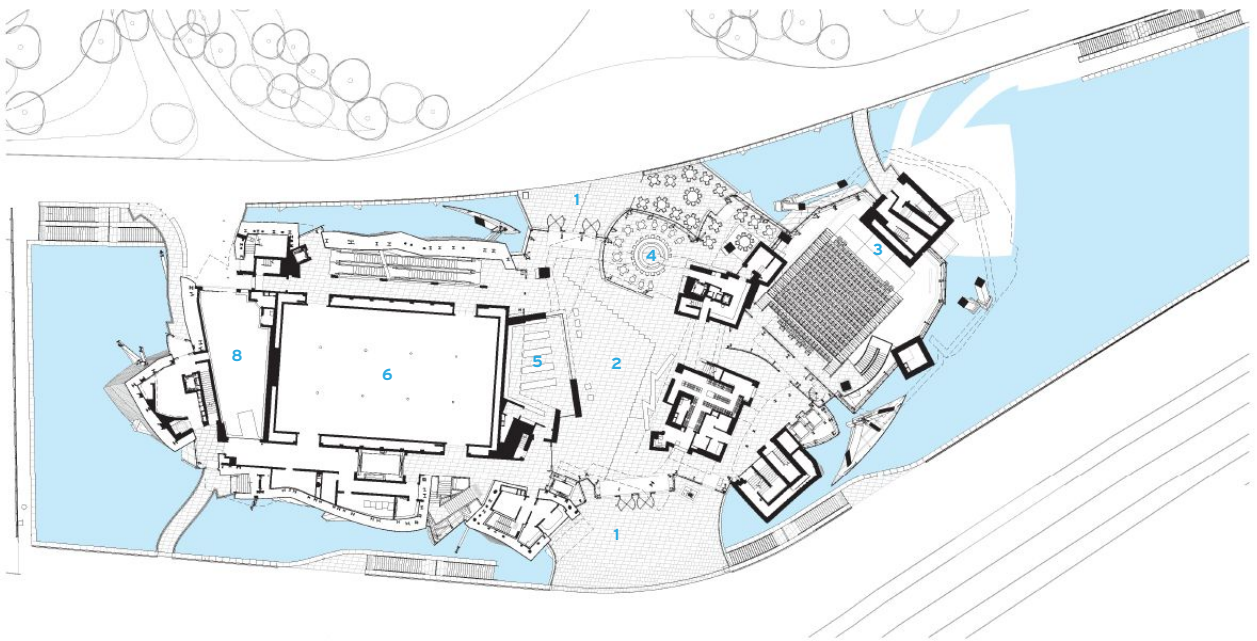


WEST TERRACE LEVEL



GALLERY 5 LEVEL

1 ENTRANCE
2 LOBBY
3 AUDITORIUM
4 CAFÉ
5 BOOKSTORE
6 GALLERY
7 "CHAPEL"
8 LOADING DOCK
9 OPEN TO BELOW
10 TERRACE



GROUND FLOOR

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1



2



3



4

THE FONDATION Louis Vuitton in Paris is a complex building—actually, two structures in one. The museum building is a concrete-and-steel structure largely clad in 19,000 white concrete panels. Surrounding it are 12 curving translucent canopies, or sails, made of 3,600 glass panels supported by steel and wood members—the second structure. To complete this tour de force of building technology, the project team coordinated the design, engineering, fabrication, and construction using Gehry Technologies Digital Project software (see News, page 28). Four hundred users shared information from the same 3-D model to create efficiencies, speed delivery, and cut waste.

1 The superstructure is concrete and steel, with concrete floor slabs and walls, and also employs steel girders, trusses, and columns. Steel and wood members, dubbed "the tripods," are attached to the building's superstructure to support the glass canopies or sails.

2 Nineteen thousand white fiber-reinforced high-performance concrete panels—about 60 percent of them unique—clad the forms called the icebergs. Some panels are flat, some slightly curved, others folded or creased. They were cast in silicone molds at a factory in France and installed on an armature of welded steel that is curved and bent to form the contours and shapes of the icebergs' design.

3 A secondary structure of steel and wood elements, curving and straight, to support the glass sails, is attached to the tripods. All wood members are glue-laminated Austrian larch, with embedded stainless-steel rods and steel connection plates.

4 Three thousand six hundred curving glass panels—each unique—make up the 12 sails or canopies. The laminated-glass panels are fritted for translucency and to reduce the solar gain. The glass was fabricated in Italy and installed on a tertiary structure of stainless steel, which was then attached to the secondary structure of wood and steel members.

credits

ARCHITECT: Gehry Partners – Frank Gehry, principal in charge; Meaghan Lloyd, chief of staff; Edwin Chan, Craig Webb, design partners; Larry Tighe, managing partner; Thomas Kim, project architect

ARCHITECT OF RECORD: Studios Architecture, Paris office

ENGINEERS: RFR + T.E.S.S. (facade); Setec Batiment (structural, m/e/p)

CONSULTANTS: Atelier Lieux Et Paysages (landscape); L'Observatoire International, Ingelux (lighting); Nagata Acoustics, LAMOUREUX (acoustics)

GENERAL CONTRACTOR: VINCI Construction

CLIENT: Fondation Louis Vuitton

SIZE: 125,900 square feet

COMPLETION DATE: October 2014

SOURCES

CANOPY STRUCTURE: Hess Timber; Eiffage Construction Metallique

GLASS CANOPY: Eiffage Construction Metallique

CLADDING ON "ICEBERGS": Ductal by Lafarge

STONE CLADDING: Rocamat

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of the museum looks across the stone-floored lobby toward doors on the north that lead into the Jardin d'Acclimatation —the children's park where, Gehry likes to think, the young Marcel Proust once played. Proust did write about walking around the Bois's lakes, and the FLV is set in its own little pool of water, with a cascade that runs down tiled steps to the east of the building, outside the auditorium, one level below the lobby. The auditorium, which can seat up to 350 people in a flat or raked configuration, has glass walls on three sides; Ellsworth Kelly created five bright mono-colored paintings for the space, as well as a screen of colorful vertical stripes. The lower level also contains two large, flexible galleries and one small one, with poured resin floors (as in all the museum's galleries); those rooms, like the auditorium, allow glimpses of the reflecting pool outside.

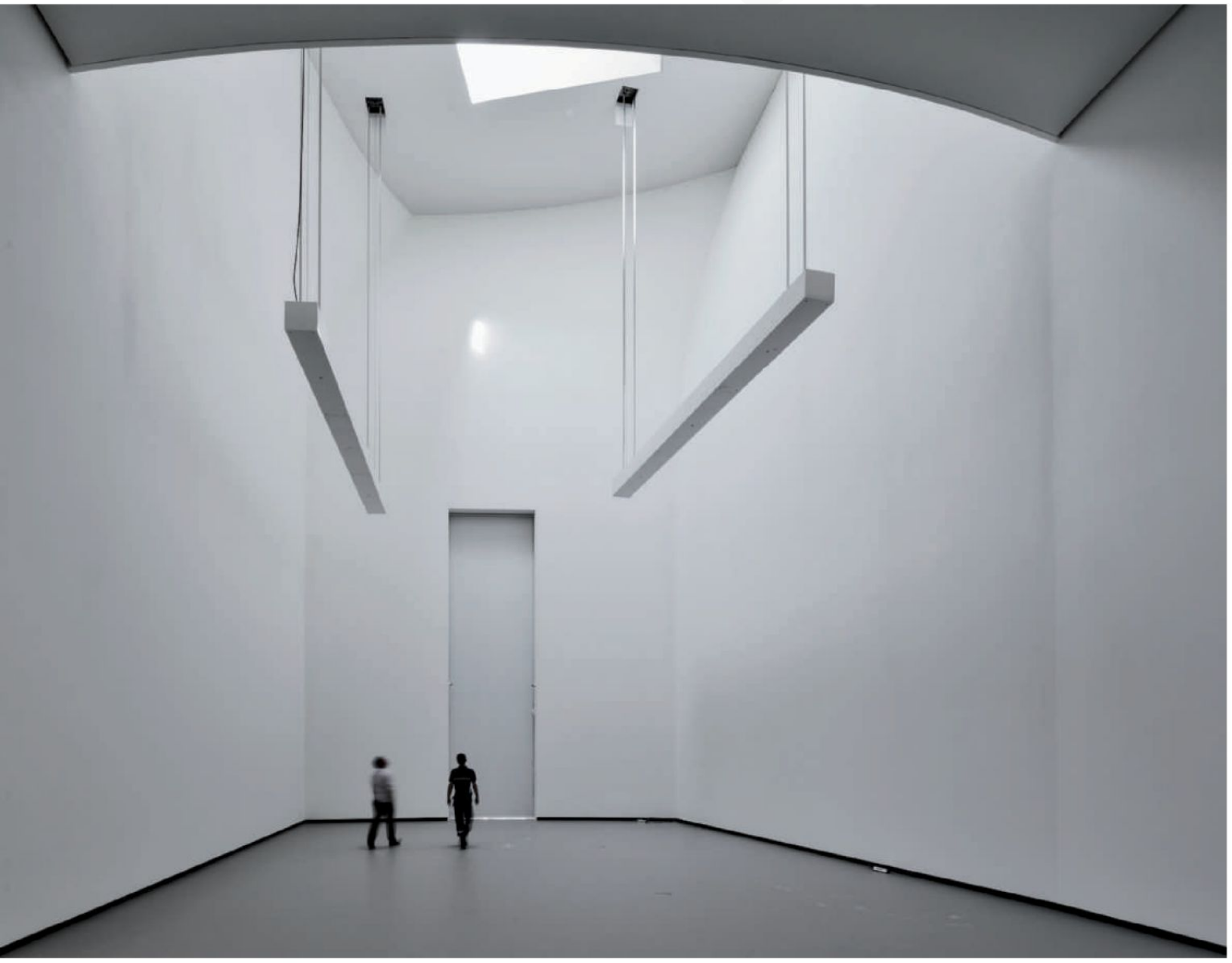
Off the main lobby is another big gallery, as well as a café and bookstore. Above the ground floor, in plan and section, the interior becomes particularly complex, with varied levels and half-levels and a number of circulation options (as well as dedicated fire stairs). The numbers of the floors sound like couture sizes: an elevator lists its stops as -1, -0, 0, +0.

One main stair is west of the entrance; another stair to the east is enclosed in a tower that exposes the gray steel armature supporting the exterior concrete panels—a backstage look at the building's construction that feels like being inside a battleship. A glassed-in escalator on the north side of the museum provides close-up views of the exuberant exterior—onto a chunk of an iceberg, or inside a taut, curving glass sail, braced by the enormous steel and wood structural elements.

Up the stairs or escalator, seven more large and small galleries jockey for position on mezzanine and full-floor levels. The white, mostly orthogonal rooms were empty when this

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writer visited but will be filled with works by such artists as Christian Boltanski and Jeff Koons. They are not standard white boxes but designed so that no galleries are identical; several odd-shaped, intimate rooms are referred to as "chapels." On the upper levels, the lofty galleries have a special grandeur; each features a skylight tucked up into an even higher softly sculpted cove, which casts beautifully diffused daylight. "We didn't want to MoMA-ify it," says Gehry, of the austerely regular galleries of New York's Museum of Modern Art. In one spectacular space, half the gallery ceiling is nearly 30 feet high while the other half soars to 55 feet, with indirect light spilling down from a light well.

For some visitors, the peak experience may come upon leaving the upper galleries to emerge onto one of the multilevel terraces that top the museum. Here the sculptural forms surrounding the skylight coves pop up, and a visitor is enveloped by the ballooning glass sails—12 canopies composed of 3,600 unique panels of curved, laminated, fritted glass, mounted in stainless-steel frames, and supported by the elegantly joined steel and laminated-wood members. It provides one more close-up of the building's luxurious, highly refined custom-crafting, without revealing all the mysteries of its construction. The elaborate placement of the sails' supports—and the decision to include wood "for its humanity," says Gehry—is expressive as well as structural.

Thanks to the ever-changing skies of Paris, the glass sails are constantly transformed—one moment transparent, and, the next, silvery opaque and reflecting the passing clouds. The steel and wood elements cast a network of shadows. And finally, from high on a terrace, the architecture becomes "a frame for the city," says Gehry. The building opens up not only to the sky and the treetops but beyond, to Paris itself. ■

LIGHT FANTASTIC
Each of the largely orthogonal, lofty galleries is somewhat different, with unique softly sculpted light wells (opposite). In one gallery, half the ceiling soars from nearly 30 feet to 55 feet high (above).

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WE'LL ALWAYS HAVE PARIS
The view from a terrace toward the city beyond, where Gehry designed one other project, the American Center (1994), now the Cinémathèque Française.



Biomuseo | Panama City, Panama | Gehry Partners



CENTER STAGE The Biomuseo sits along the Amador Causeway, former site of a U.S. Army base. A onetime officers club (at left) houses offices and ancillary space for the museum. Recent landfill and the city's rapidly growing skyline are visible in the distance.



A museum becomes an instant icon for a developing nation while upping the ante for design excellence.

BY BETH BROOME

PHOTOGRAPHY BY IWAN BAAN

PANAMANIA

Years before Frank Gehry's dazzling Biomuseo completed construction in Panama City, its memorable form—a collision of riotously colored folded metal canopies—became a hopeful emblem of the developing country's arrival on the world stage. Ubiquitous in travel promotions and even emblazoned on the side of some of Copa Airlines' fleet, the building was pegged to become a symbol of national pride. But as construction of the 44,000-square-foot project dragged on over a decade (RECORD News, March 2014, page 23)—while countless slapdash commercial towers sprouted up, changing the urban landscape with shocking speed—many locals have looked on with detached bemusement. "They call it the museum that never ends [*que nunca termina*]," a cabdriver said, laughing on a recent ride out to the building, located dramatically along the Amador Causeway at the Pacific entry to the Canal.

In a culturally bereft city, with few offerings for tourists who stop over en route to the jungle, mountains, or beaches, hopes were high for creating Panama City's own Bilbao. Gehry, who is married to a Panamanian, was a natural "get" for the organizers, who roped the architect in to a design charette and conference held in the late 1990s that was focused on the repurposing of land and buildings following the 1999 Canal transfer. Amador, the site of a former U.S. Army base, emerged as a prime spot for a high-profile project. A foundation was created in 2001, and ground broke in 2006.

Now the $95 million first phase of the building is finally complete, with the opening scheduled for October 2. The Biomuseo is really an interpretive center, showcasing the isthmus's wealth of natural resources and diverse ecosystem through eight galleries (five are open so far), planned by Bruce Mau Design. The curves and acute angles of some of these spaces, which flank a central open-air atrium, are needlessly fussy. But they also convey the design's architectural ambitions. The galleries are each distinct: from a narrow corridor activated by a zigzagging window wall with views to the bay and the distant skyline, to an amoeboid hall, illuminated by a single swooping oculus and home to a menagerie of life-size plaster-cast species of the past and present. The centerpiece is the "Panamarama," an immersive

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theater housed in an orange cube-shaped volume. Immense projections on three walls, as well as the ceiling and glass floor, depict (to the beat of a thumping soundtrack) dramatic footage of the country's landscapes and wildlife. The Biomuseo's second phase, scheduled for completion in the winter of 2016, will include the installation of the remaining galleries, as well as an aquarium.

The steel canopies refer to the typical metal roofs of Panamanian and former Canal Zone architecture, and their bright hues are said to be inspired by the guacamaya macaw. Intended to reflect Latin American culture, the tumult of color is a rather simplistic and garish interpretation. But there is another way of looking at it: "The architect captured very well the idiosyncrasies of the Panamanian people," said one visitor recently. "Colorful and unruly [*desordenado*]." Atop the building's robust concrete structure, the roofs form an elegantly jumbled, sculptural form. Standing alone on a spit of land, the building, festooned in its fantastical plumage, is a grand gesture. But it has many subtleties too, such as the gentle roll in the café roofline, which echoes the swoop of the Bridge of the Americas at the mouth of the canal in the distance. One of its greatest moments is its soaring, central atrium, which, like the surrounding park (a rarity here), is free to the public. Shaded by the canopies and open on its sides, in the typical fashion of buildings in the tropics, it forms a dynamic public space, cooled and animated by the breezes that cross the causeway as the fierce heat beats down above. Muted reflections of the bright colors brush the unpainted undersides of the metal roof—a subtle but stunning counterpoint to their brash outward appearance.

Pointing to significant delays, some might say that Gehry (as well as the client) should have been more sensitive to the limitations of the local workforce, which had little to no experience with architectural concrete or intricate geometries and steelwork. However, the building—the architect's first in Latin America—has raised the standard for design and construction to a challenging height. Much of the exposed concrete was poured over and over again before being deemed acceptable. And to realize the roof geometries required a 6-millimeter tolerance, according to executive architect Patrick Dillon, of local firm Ensitu, who has been on the job since its inception. "We took on a task that nobody else had taken on before in Panama—building something of this complexity and quality," he says.

In a country whose unbridled growth has been driven principally by commercial interests, with little regard for architectural excellence or civic investment, the Biomuseo sets an optimistic tone. With its difficult path to completion largely behind it, the building has emerged a triumph that will serve as a model for the value of design—for Panama and for the people there. ■



THE FULL SPECTRUM A broad concrete stair (above) is the main entry to the central atrium (opposite). With its metal roofs, deep overhangs, and open sides, this public space takes its cues from typical tropical architecture; an open-air gallery occupies the area below. Each of the museum's spaces is defined by a unique, vibrantly hued volume (below).



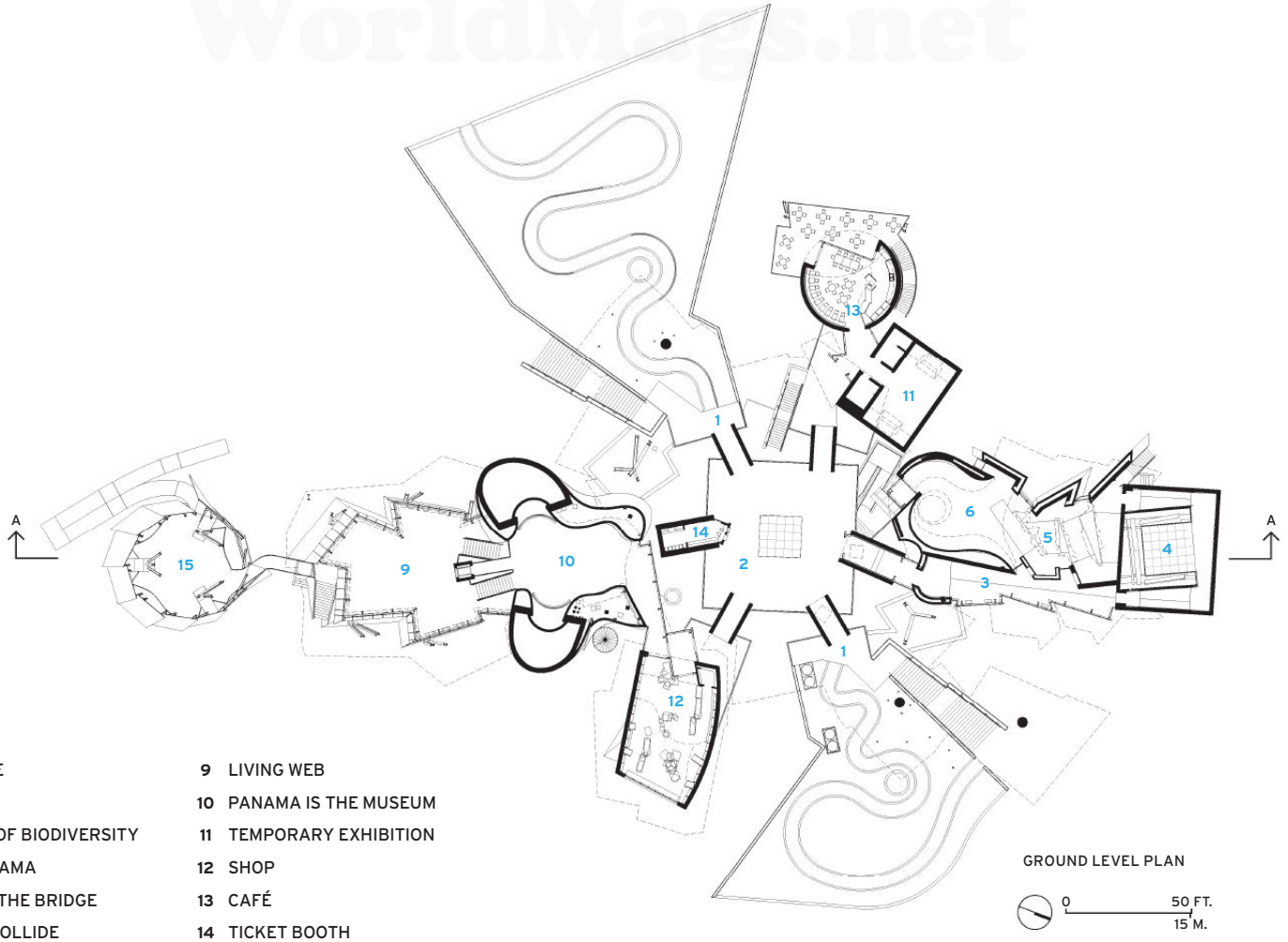
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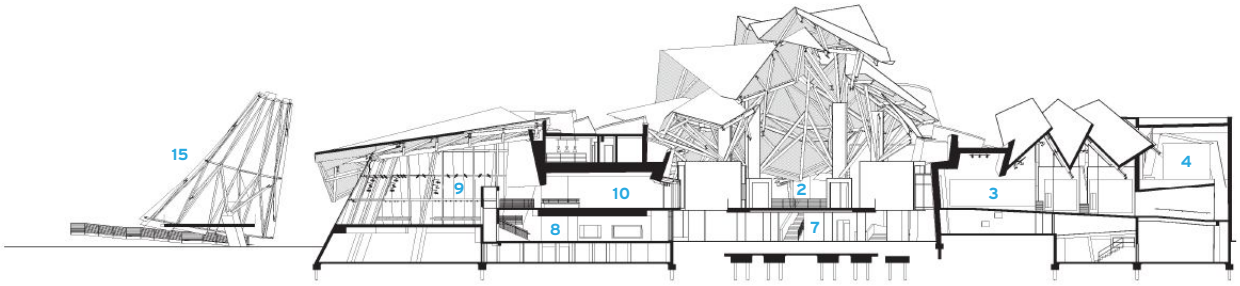
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1 ENTRANCE
2 ATRIUM
3 GALLERY OF BIODIVERSITY
4 PANAMARAMA
5 BUILDING THE BRIDGE
6 WORLDS COLLIDE
7 HUMAN PATH
8 OCEANS DIVIDED
9 LIVING WEB
10 PANAMA IS THE MUSEUM
11 TEMPORARY EXHIBITION
12 SHOP
13 CAFÉ
14 TICKET BOOTH
15 BIRD PAVILION (FORTHCOMING)

GROUND LEVEL PLAN

0 50 FT.
15 M.



SECTION A - A

0 50 FT.
15 M.

credits

ARCHITECT: Gehry Partners – Frank Gehry, principal; Larry Tighe, project partner; Anand Devarajan, project designer; Bill Childers, project architect

EXECUTIVE ARCHITECT: Ensitu – Patrick Dillon, project manager; Brenda Goti, Zitta Pozo, Claudia Gomez, Oscar Ramirez, Jorge Kiamco, team

CONSULTANTS: Bruce Mau Design (exhibition design); Magnusson Klemencic Associates/O.M. Ramirez (structural)

GENERAL CONTRACTOR: Ingeniena R-M

CLIENT: Fundación Amador

SIZE: 44,000 square feet

COST: $95 million (phase I)

COMPLETION DATE: September 2014

SOURCES

METAL ROOFING/CURTAIN WALL: Permasteelisa

GLASS: Viracon

WHEELCHAIR LIFT: Thyssen Krupp

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SHADES OF GRAY
The exterior's bright colors reflect off the unpainted undersides of the atrium roof (above). The steel structure is revealed in the narrow Gallery of Biodiversity (far left), where a jagged window wall looks out to the bay and skyline beyond. Swooping interior forms, such as the curving walls and oculus of the Worlds Collide gallery (left), were a challenge for the local workforce.

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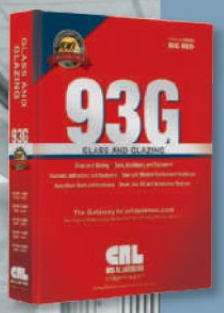
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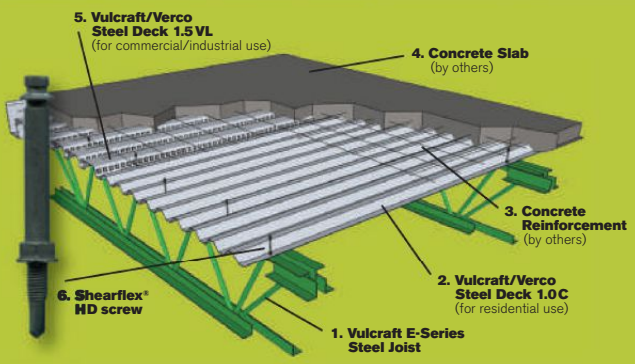
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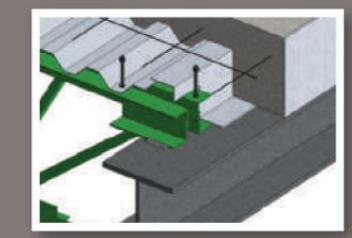
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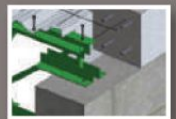
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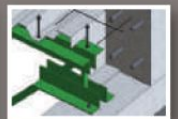


Structural Steel

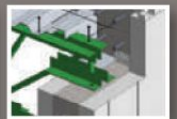
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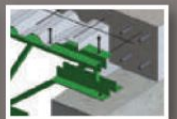
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CIRCLE 63

IN-DEMAND CITIES

AS THE APPETITE for urban living in the U.S. increases, cities are facing a need for housing not seen in decades. In this special report, we look at three metropolitan areas working to accommodate growing populations. In Boston, as people follow the tech sector and other enterprises into the urban core, the city is reinventing its historic neighborhoods and creating new ones. Portland, Oregon, is racing to keep up with an influx of newcomers seeking the much-hyped quirkiness that the city has embraced as a brand. In the wake of Hurricane Katrina, New Orleans has emerged as a hub for new industries—from technology to film—attracting a population enchanted by its unique history and culture. Despite high demand pushing up housing costs, all three cities are struggling to maintain economically diverse communities—an essential ingredient of a thriving urban center.



PHOTOGRAPHY: © JEREMY BITTERMANN

THE STEEL BRIDGE ACROSS THE WILLAMETTE RIVER IN PORTLAND, OREGON

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BOSTON

WITH THE BIGGEST BUILDING SPREE SINCE THE GREAT FIRE OF 1872, MIDDLE-CLASS HOUSING GETS SQUEEZED

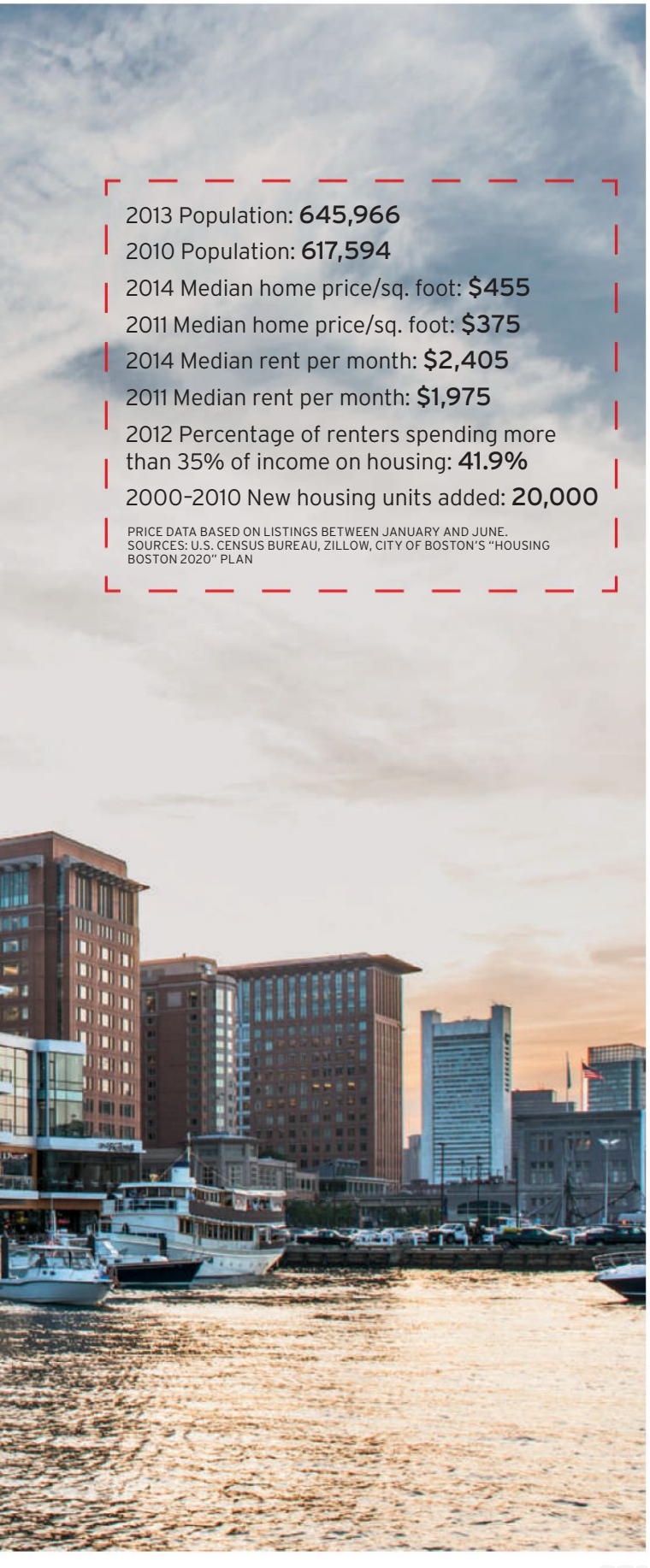
BY CATHERINE TUMBER

PHOTOGRAPHY BY PETER VANDERWARKER



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2013 Population: **645,966**
2010 Population: **617,594**
2014 Median home price/sq. foot: **$455**
2011 Median home price/sq. foot: **$375**
2014 Median rent per month: **$2,405**
2011 Median rent per month: **$1,975**
2012 Percentage of renters spending more than 35% of income on housing: **41.9%**
2000–2010 New housing units added: **20,000**

PRICE DATA BASED ON LISTINGS BETWEEN JANUARY AND JUNE.
SOURCES: U.S. CENSUS BUREAU, ZILLOW, CITY OF BOSTON'S "HOUSING BOSTON 2020" PLAN

Boston is at a crossroads—one that is every bit as transformative as the epic battle between the Brahmin establishment and the emerging Irish political class in the 19th century. When, in 2013, Mayor Thomas M. Menino decided to step down after 20 bumptious years at the helm, 12 contenders vied for the office, endlessly debating how to balance the "old" and the "new" Boston. Veteran political analyst and WGBH public radio pundit Peter Kadzis observed that only one issue commanded the candidates' consensus: the housing crisis. "On that, you didn't see the usual sniping and cheap shots. The issue is just too serious."

If "old" Boston perfected the roguish arts of ward politics and closed-door deal-making, "new" Boston runs along two axes: the demographic shift to majority-minority status by 2000 and, since then, the stunning rise of the innovation economy, fueled by such world-class institutions as MIT, Harvard, and Massachusetts General Hospital. Layered over these coordinates is the national move toward urban living among Millennials and empty-nesters. The trend is particularly acute in Boston, with its large stock of prewar housing, architectural treasures, extensive public rail transit, Olmsted-designed Emerald Necklace park system, and the country's third-highest Walk Score. Also ranking third-highest are Boston's housing prices, just behind those of New York and San Francisco.

By pledging to bring about "one Boston," labor leader and Irish-Catholic state legislator Martin J. Walsh won the 2013 mayoral contest with support from the old Irish establishment and the new-immigrant and African-American vote. It remains to be seen whether the new mayor's calls for unity—his recognition that cities do not flourish, economically or culturally, without engaging the full spectrum of civic participants—will translate into solid accomplishment. What is clear, though, is that a more united Boston cannot be forged without affordable housing.

When people say "Boston," they usually include the cities of Cambridge, Somerville, and Brookline, by reason of history, contiguity, and shared density. The population of the city proper, 645,966, is brought up to around 890,791—about the size of San Francisco—with the inclusion of its three sisters. The city of Boston, however, has been the prime beneficiary of two decades-long projects: the Boston Harbor cleanup project (ongoing) and the Central Artery/Tunnel Project, or "Big Dig" (completed in 2007). Together these opened up downtown to the waterfront and to new land primed for economic, residential, and recreational development relatively undisturbed by NIMBY conflicts.

Mayor Menino's signature project was to redevelop the industrial South Boston waterfront as the Seaport District. He anchored the 1,000-acre area with Rafael Viñoly Architects' 2004 Boston Convention and Exhibition Center and multiple high-end hotels. The project turned Boston into one of the country's top-10 convention sites. The Menino administration also helped the cramped but popular Institute of Contemporary Art (ICA) move from Back Bay to an acclaimed cantilevered structure by Diller Scofidio + Renfro. The firm's first built project in the United States, it abuts a new, still-growing 36-mile Harbor Walk.

Next, the mayor conjured the tech side of new Boston almost from whole cloth. In 2010, Menino marked out the Seaport District for a new innovation initiative—to date, the largest innovation district in the country. Facing land pressures in Cambridge's IT- and biotech-rich Kendall Square, near MIT, this year Vertex Pharmaceuticals moved its headquarters to what is now dubbed the Seaport Innovation District, opening two 18-story LEED-Gold towers designed by Elkus Manfredi and Tsoi/Kobus. In March, its developer, the Fallon Company, broke ground on a third commercial tower adjacent to the ICA. Anchor tenant Goodwin Procter, a law firm, will relocate from the Financial District. Also nearby is the new District Hall, designed by Hacin + Associates, described as "the world's first freestanding public innovation center." Across the way, an area of once-decrepit older warehouses called Fort Point has morphed from a down-low arts community

SEAPORT INNOVATION DISTRICT The 2004 construction of the Boston Convention and Exhibition Center, the ongoing Boston Harbor cleanup and 36-mile Harbor Walk, and the recent arrival of businesses—new and old—has resulted in a thriving waterside hotel and restaurant scene.

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to a warren of co-working spaces; light-industrial, design, advertising, green-tech, and startup firms; and housing. All in all, some 5,000 jobs and 200 workplaces of various sizes have materialized in the Seaport Innovation District since its 2010 launch, and the numbers pledged are growing expeditiously.

So too is housing demand, which is being met mainly by high-rise luxury-condo developers in the Seaport Innovation District, throughout downtown, and beyond. To accommodate young "creative" workers with live-work sensibilities, and to take pressure off multi-bedroom middle-class housing, the city has issued permits for 353 so-called micro units of under 450 square feet in the Seaport Innovation District. In what has been called the "micro-housing paradox," rent is nonetheless soaring—for example, to $1,200 for 337 square feet and $2,450 for 597 square feet in the Fort Point Factory 63 complex—thanks in part to the market for such spaces among older adults with more means.

The waterfront's success is fueling other changes. Although the Financial District (just across the Rose Fitzgerald Kennedy Greenway) has lost long-standing tenants to the Seaport and Back Bay, its predominantly '70s-era office space is attracting new companies, such as PayPal and smaller firms priced out of Fort Point. Meanwhile, the older commercial center will soon be surrounded by high-rise residential development. A few blocks away in Downtown Crossing—the once-bustling central retail district—Millennium Partners is erecting a 1.1 million-square-foot mixed-use project, which includes a slender 56-story tower with luxury condos and retail, designed by Handel Architects. "The Hole," as locals call the site, sat fallow for six years after the iconic Filene's department store, designed by Daniel Burnham in 1912, closed and was partially demolished. Millennium has preserved the facade and is fitting out its interior with offices and retail. On the other side of the Financial District, CBT Architects' 29-story 45 Stuart Street project, with 404 luxury rentals, is under way.

Under Menino's watch, Boston has been gradually coaxed from its traditional aversion to height—for better or worse. On the northwest side of the city, near the Big Dig–created Zakim Bridge, the 14-story Lovejoy Wharf project, designed by Robert A.M. Stern Architects and ADD Inc., is rising over the banks of the Charles. A model of transit-oriented development located near the North Station commuter-transit hub, it will be the first multi-unit residential project in the city without parking and will also house Converse world headquarters, which is relocating from suburban North Andover. In the pipeline as well are six more residential high-rise projects, including a hotel-and-condo development at 1 Dalton Street, designed by a partnership of Cambridge Seven Associates and John Hancock Tower architect Henry Cobb, near Back Bay's Christian Science Plaza. At 60 stories, it will be tallest residential structure in the city—at least so far.

With its knowledge-based economy and the rising market for pedestrian-friendly urbanism, Boston is undergoing the largest building spree since the Great Fire of 1872. Some have grumbled that it is disproportionately centered in the downtown core, but as Boston Redevelopment Authority (BRA) Deputy Director for Urban Design Prataap Patrose, points out, "The breakdown in investment is about half and half." Major construction is also under way in the Fenway, Copley, Longwood Medical, and Northeastern and Boston University areas, as well as in the Roxbury Dudley Square neighborhood, and near Brighton's WGBH studios, where New Balance is building a new world headquarters as part of a development called Boston Landing.

Boston officials take pride in having the largest percentage of "affordable housing" of any major U.S. city: 19.4 percent (according to a 2013 report), compared with a 5 percent national average. By this they mean subsidized housing (in which residents must meet income requirements), including new multi-unit (10 or more) construction mandated, under Menino, to be 13 percent affordable or to have fees paid into a fund for building low-cost housing elsewhere. While some of these are earmarked for moderate to middle incomes, the approach doesn't come close to alleviating the middle-class-housing crunch in Boston, where the median household income is $53,136





RENDERING: © COURTESY HANDEL ARCHITECTS

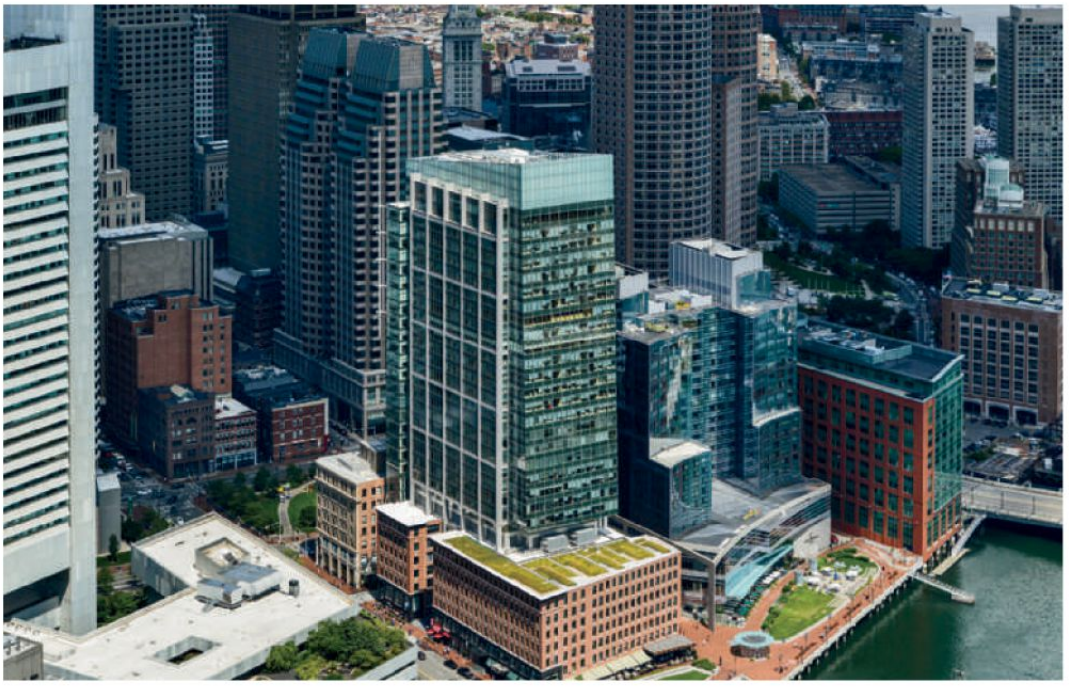
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THEATRE DISTRICT Residential construction has followed in the wake of the Ritz-Carlton's move to this formerly seedy neighborhood, restored during Mayor Menino's reign. The 15-story, 256-luxury-unit Millennium Place (above, at right) is another new building by the developer of the nearby Filene's project.

FILENE'S AND MILLENNIUM TOWER Soon after Filene's department store—designed by Daniel Burnham in 1912—went out of business in 2006, the complex's two newer buildings were demolished, leaving a giant crater in the Downtown Crossing shopping district. The new mixed-use project by Millennium Partners (opposite) preserves the facade and will include a 56-story luxury condo and retail tower by Handel Architects.



ATLANTIC WHARF CBT Architects' Atlantic Wharf, opened in 2011, is the city's first sustainable high-rise. Perched between the Harbor Walk and the Rose Fitzgerald Kennedy Greenway, the LEED Platinum mixed-use project houses 86 residential units, retail, restaurants, public space, and several smaller offices, including the Boston Society of Architects (designed by Höweler + Yoon).

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and the median owner-occupied housing price is $374,700. The city's cost of living since 2005 has risen twice as fast as homeowner incomes, and three times as fast for renters. (It doesn't help that there have been questions about how the affordable-housing fund has been managed.) This means, for example, only 7 percent of South Boston's plentiful family-size housing is accessible to middle-income households.

Economist Barry Bluestone, of Northeastern University's Dukakis Center for Urban and Regional Policy, who puts out a periodic Greater Boston Housing Report Card, recently documented the dramatic 25 percent increase of the 20-to-24-year-old population since the 1990s. During the same time, the population of older Millennials of child-rearing age dropped by almost 11 percent. Similar trends are afoot in Cambridge and Somerville. "What is happening," Bluestone said in an interview, "is that students, young professionals, and multi-generational immigrants are doubling up in three- or four-bedroom apartments and pricing single families out of the market." It is a classic supply-and-demand scenario that compelled Menino, on his way out of office, to call for an increase of 30,000 housing units by 2020.

His successor, Walsh, has pledged to reform the BRA, the only such entity in the country that combines planning and economic development functions and thus, some people charge, gives mayors too much incentive to help private developers, to the exclusion of public planning interests. The new mayor has also convened a special housing committee to address the city's mid-market housing pressures.

Meanwhile, gentrification pressures are mounting across lower-income, predominantly minority neighborhoods such as Roxbury, parts of Dorchester, and Mattapan. Here and elsewhere, federally subsidized privately developed affordable housing projects time out after 15 years, while BRA-funded programs expire after 30. In a red-hot real-estate market like Boston's, it is all too tempting to opt out and revert to market rates. But at least one section of Roxbury/North Dorchester, more than half of the 62-acre "Dudley Triangle," is protected. In the aftermath of the 1970s busing crisis, the nonprofit Dudley Street Neighborhood Initiative formed to reverse the neighborhood's legacy of disinvestment, and later launched a model urban-community land trust on city-owned land—the first with eminent-domain authority. The Dudley land trust is now home to 225 units of neo-traditional affordable housing (with 250 more in the pipeline) a new community center, a charter school, and an urban farming project. It remains to be seen whether, and how, the Walsh administration will stem gentrification in other nearby low-income neighborhoods.

Walsh's own legacy project may lie in another one of Boston's far-flung neighborhoods: Lower Allston—an area rich with middle-class housing—where Harvard University owns 50 percent of the land and has long-standing plans to expand. In anticipation of the expansion, the city of Boston and the university engaged in a land swap, in 2007, that involved moving a low-to-moderate-income nonprofit housing complex—built some 40 years ago—to another site called Charlesview Residences in the Allston-Brighton neighborhood, which expanded its size and includes both affordable rentals and market-rate condos.

Whether Mayor Walsh, who rode a populist tide to victory, can build enough housing to meet the demand caused by Boston's influx of newcomers—many of them affluent—remains to be seen. One thing is for sure, though: with Boston's longstanding history of housing and land-use innovation—from building the country's first subway system and now the largest innovation district, to constructing a model community land trust—the city has an abundance of experience to draw from, should it summon the political will. ■

Catherine Tumber is a visiting scholar at Northeastern University's School of Public Policy and Urban Affairs and author of Small, Gritty, and Green: The Promise of America's Smaller Industrial Cities in a Low-Carbon World.





CHARLESVIEW RESIDENCES After an ambitious plan by OMA for Harvard's Allston expansion was replaced by a more incremental approach, the university and the city engaged in a land swap in which a deteriorated nonprofit housing project was moved to a nearby location. The new neo-traditional Charlesview Residences (above) includes affordable rentals and market-rate condos.

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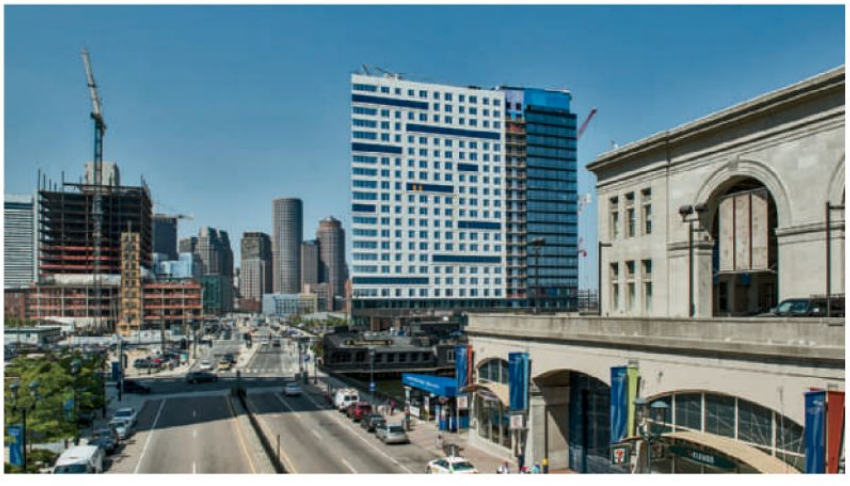


DUDLEY SQUARE The historic center of the Roxbury neighborhood is now in the crosshairs of gentrification thanks to significant public investments, including transit upgrades. The city is nearing completion on the Bruce C. Bolling Municipal Building (left), by Mecanoo Architecten and Sasaki Associates, which links three historic buildings and will house the downtown Boston Public School headquarters, as well as retail and public space.









SEAPORT INNOVATION DISTRICT Among the latest in a spate of projects recently completed on the revitalized South Boston waterfront, District Hall (above) is described as "the world's first freestanding public innovation center." Designed by Hacin and Associates, it includes classrooms, collaborative work and meeting spaces, and a restaurant with harbor views. The Fort Point neighborhood is crowded with old industrial brick buildings, which for decades were home to artists. Fort Point now houses entrepreneurial firms and residential buildings, such as Factory 63 (middle, left), a former shoe factory built in 1908, which has been converted into 38 apartments. In recent years, there's been a flurry of construction on onetime parking lots in the District, yielding buildings such as the 21-story, mixed-used 100 Pier 4 apartment complex (bottom, left), by ADD Inc. (with the Seaport World Trade Center in the foreground).

PHOTOGRAPHY: © FRANCINE HOUBEN (OPPOSITE, TOP); GUSTAV HOILAND (TOP RIGHT)

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NEW ORLEANS

AS A CITY MOVES FROM RECOVERY TO RENAISSANCE, IT STRUGGLES TO REMAIN AFFORDABLE

BY WILLIAM HANLEY

PHOTOGRAPHY BY BRYAN TARNOWSKI



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2013 Population: **378,715**
2010 Population: **343,829**
2014 Median home price/sq. foot: **$100**
2011 Median home price/sq. foot: **$105**
2014 Median rent per month: **$1,395**
2011 Median rent per month: **$1,065**
2012 Percentage of renters spending more than 35% of income on housing: **54.6%**

PRICE DATA BASED ON LISTINGS BETWEEN JANUARY AND JUNE.
SOURCES: U.S. CENSUS BUREAU, ZILLOW

Even on a particularly airless late-summer evening, the appeal of the Bywater, a once-working-class New Orleans neighborhood just downriver from the French Quarter, cuts through the oppressive humidity. Rows of century-old shotgun houses and Creole cottages—some brightly painted, others romantically disheveled—line overgrown blocks crisscrossed with telephone wires. On some weeknights, ramshackle corner bars serve free red beans and rice as musicians hold court in packed rooms. Every now and then, a train whistle echoes through the otherwise sleepy streets. The whole neighborhood has long had a languorous, tumbledown charm.

But now, at one of several culinarily ambitious cafés, restaurants, and bars to open in the last few years, you can order a sampling of small plates inspired by street food from around the world or, down the street, sip a brunch cocktail made with rye, bitters, and fennel foam. It's a delicious development, but it has many New Orleans residents nervous about the changing neighborhood.

In the nine years since Hurricane Katrina, gentrification has accelerated in Bywater, along with Faubourg Trémé, St. Roch, and other downtown districts rich with historic houses, as New Orleans has become a magnet for newcomers. The poster city for disaster recovery has given way to a place making headlines for its art, film, and technology scenes. This phenomenon has drawn many new arrivals who gravitate toward the neighborhoods that embody the city's cultural life. Bywater rents for new listings have climbed by 20 percent every year going back to 2011. Along with post-Katrina displacement, shuttered schools, and other factors, these soaring housing costs have pushed out many longtime residents.

Since Katrina struck in 2005, the population of New Orleans has rebounded from an estimated 158,353 shortly after the disaster to more than 378,000 (it was 484,674 before the hurricane). The majority of that gain—80 percent, according to some estimates—represents returning residents. The population has been recovering throughout the city, with half of its neighborhoods reaching 90 percent of their pre-Katrina figures as of June. But growth has been concentrated along the Mississippi River—historically the most favored real estate due to its location on the highest ground in the flood-prone city—as well as in the Central Business District and in Mid-City where a $2-billion hospital complex is expected to attract even more residents in the next few years.

Developers have responded to the influx by building new multi-unit housing. Though some projects include designated affordable apartments, the majority are market-rate. And as housing costs rise in the neighborhoods most in demand, they threaten to squeeze out low- and moderate-income

CRESCENT PARK The first section of a new promenade along the Mississippi River—with a design overseen by Eskew+Dumez+Ripple—opened in February. The 1.4-mile stretch of green space brings a new civic amenity to the rapidly gentrifying Bywater neighborhood.

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families and render these areas more economically, racially, and socially homogeneous. Meanwhile, some of the most heavily flood-damaged parts of the city remain in recovery mode—from Katrina and from the decades of poverty, crime, and depopulation that preceded the storm. "What we have is a small, growing city embedded in a larger city that has lost a significant percentage of its population," says Richard Campanella, a geographer at the city's Tulane University.

In the Central Business District, developers have begun converting underused commercial towers into amenity-rich apartment buildings, in addition to constructing new residential structures. One of the most prominent ground-up projects is the South Market District, a $200 million mixed-use development rising on four former parking lots. "By 2010, it was clear that New Orleans was not only recovering but was really being reinvented," says Matthew Schwartz, cofounder and principal at Domain Companies, the project's developer. "With the entrepreneurship movement, film, and other industries, the face of the economy was changing, and we saw a new demand for high-quality multifamily emerging." The first component of the three-phase development, which includes a 209-apartment building with 22,000 square feet of retail space by Humphreys & Partners Architects and a parking garage by Eskew+Dumez+Ripple, is scheduled for completion this month.

The pressure for new multi-unit residential buildings has also extended to lower-scale parts of the city. "People want to live in neighborhoods they can walk around," says Wayne Troyer, founder of the New Orleans architecture firm Studio WTA. "They want corner stores and restaurants, and they want their bicycles to be their primary means of transportation." Troyer's firm recently completed a market-rate-residential conversion of a former hosiery factory in the historic Marigny neighborhood. Troyer also designed a new six-story apartment building for a site nearby, working with developer Sean Cummings, but it sparked a public outcry about its proposed 75-foot height, and the city council refused to grant a height waiver for the project. The architect and the developer are now working on a new apartment building in the Bywater near the first completed phase of Crescent Park, a promenade along the Mississippi River levee. "New Orleans is in the quality-of-life business," says Cummings, "and there is really no richer, more joyful quality of life than what exists in these historic neighborhoods."

But quality of life comes at a premium. Even though the population is still below its pre-Katrina level, the median rent in the city rose by 25 percent between 2004 and 2012—from $688 to $861 per month on existing leases—and the percentage of renters who spend more than 50 percent of their income on housing rose from 24 to 36 percent in the same period. These figures have prevented some locals who left after Katrina from returning, particularly those who lived in public housing. After the hurricane, the Housing Authority of New Orleans negotiated agreements with developers to transform all of the city's public-housing sites—those badly damaged by the storm as well as those that weathered it unscathed—into mixed-income residential neighborhoods. The idea was to replace mismanaged, dangerous projects with modern units that did not isolate poverty. But many saw the move as a cynical land grab, ceding increasingly

HIGH-DENSITY HOUSING As desire for residential space in downtown New Orleans has grown, developers have begun transforming commercial buildings in the Central Business District into housing. HRI Properties recently converted the Hibernia Bank tower (top), a 1921 landmark, into mixed-income housing. Demand has also led to new construction, such as 930 Poydras (left), a luxury rental building designed by Eskew+Dumez+Ripple.

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NEW ARRIVALS Bywater and other neighborhoods with a stock of historic Creole cottages (middle, left) and shotgun houses (middle, right) have been magnets for a recent wave of migration to New Orleans. With them have come new businesses, such as Bywater Yoga (top) and Maurepas Foods (right), known for its eclectic and inventive menu. They join more traditional offerings, such as Frady's One Stop Food Store (above), an unassuming market with a reputation for excellent po' boys.

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valuable sites to developers and squeezing out residents with low incomes. (Razing the Lafitte housing projects raised particular ire as they were considered better designed and maintained than others and sustained little hurricane damage.) The city once had 6,000 public-housing units. When the last conversion is complete, the redeveloped sites will have 4,000 low- to moderate-income homes, of which 1,800 will be public housing. Residents left out of the new housing plan were pushed into the federal Section 8 program, where the waiting list, with 13,000 names, has been closed for five years. "We do have a lot of vacant land to develop new housing," says Gregg Fortner, new director of the housing authority. "Right now, we are assessing our opportunities. Then comes the hard part: identifying funding."

In the meantime, a constellation of groups has taken up the challenge of building affordable housing for many different income levels—from Brad Pitt–backed Make It Right to more grassroots organizations. The Jericho Road Housing Initiative, a nonprofit affiliated with the city's oldest Episcopal church, has acquired 75 vacant parcels and existing houses in Central City, a neighborhood notorious for crime and blighted properties. To date, the group has built 30 houses that it has sold below cost to low- and moderate-income buyers after helping them secure financing. It also has plans to partner with other nonprofits and a for-profit developer to build new rental units among owner-occupied houses. "Most of the single-family rental units in our target neighborhood are substandard," says Jericho Road's executive director, Nicole Barnes. "We want to create homes that will elevate the overall quality and become tipping points for their blocks."

Neal Morris has brought an entrepreneurial strategy to building affordable rental housing with his company Redmellon. "There are an estimated 40,000 vacant houses in New Orleans," says Morris, who buys empty historic buildings and, with Atlanta-based Kronberg Wall Architects, renovates them using a combination of low-income-housing and historic-preservation tax credits, among other incentives. "I always say, I don't build housing for a living—I layer subsidies," he says. Morris makes the enterprise profitable by working in batches of 40 or so houses at a time, and he manages the completed portfolio, currently 300 rental units, through a separate company. The houses are primarily in desirable neighborhoods near the river, and the subsidies that Redmellon uses require that they remain affordable or low-income rentals for 15 to 35 years.

To make historically blighted but less expensive parts of town better places to live, the New Orleans Redevelopment Authority (NORA) has aimed to facilitate improvements on a neighborhood scale. "Right after Katrina, we were focused almost exclusively on housing," says NORA director Jeff Herbert. "Now we're looking at longer-term transformation projects." NORA's Lot Next Door Program, for example, helps residents acquire and maintain vacant land adjacent to their homes. The organization also provides financing and grants to jumpstart the revitalization of commercial streets.

To assure that improvement projects do not drive up housing costs, many in New Orleans have called on the city to provide protections for longtime residents. "Our stock of housing, close to jobs and to transportation, has always been a beautiful, historic commodity available to the local population. No one had to compete for it. But now there is a lot of pressure," says Maurice Cox, director of the Tulane School of Architecture's City Center and the former mayor of Charlottesville, Virginia. "I believe public policy can temper the market and protect people, but it's always a game of catch-up."

Rising housing costs are hardly unique to New Orleans, but here they touch on a particular anxiety. The city's culture—from second-line parades to Creole cuisine to historic architecture—is what attracts newcomers. Take away the social and economically diverse groups who maintain those traditions—a possibility made all too conceivable by Katrina's mass displacement—and all that remains are beautiful but empty streetscapes. ■







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STREET LIFE One strategy for fighting blight in New Orleans has been enlivening commercial corridors. The historic St. Roch Market (above), which will become a multi-vendor food hall, and the New Orleans Healing Center (left) both stand along St. Claude Avenue. A revitalization initiative on Oretha Castle Haley Boulevard in Central City includes Eskew+Dumez+Ripple's renovation of a fire-gutted school (below) into a fresh-food market (opening this month). A culinary museum and a jazz-performance venue are also under way on the boulevard.

PUBLIC HOUSING OVERHAUL After Hurricane Katrina, the city's stock of public housing was cut by more than two thirds, as projects—damaged or not—began to be redeveloped into mixed-income communities. The new developments, based on New Urbanist principles and featuring designs that mimic traditional New Orleans architecture, include the Guste Homes (opposite, top), Marrero Commons (opposite, middle, with the former Calliope housing awaiting demolition in the foreground), and Faubourg Lafitte (opposite, bottom).



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PORTLAND

OREGON'S LARGEST CITY EMBRACES HIGH-DENSITY LIVING

BY LAURA MIRVISS

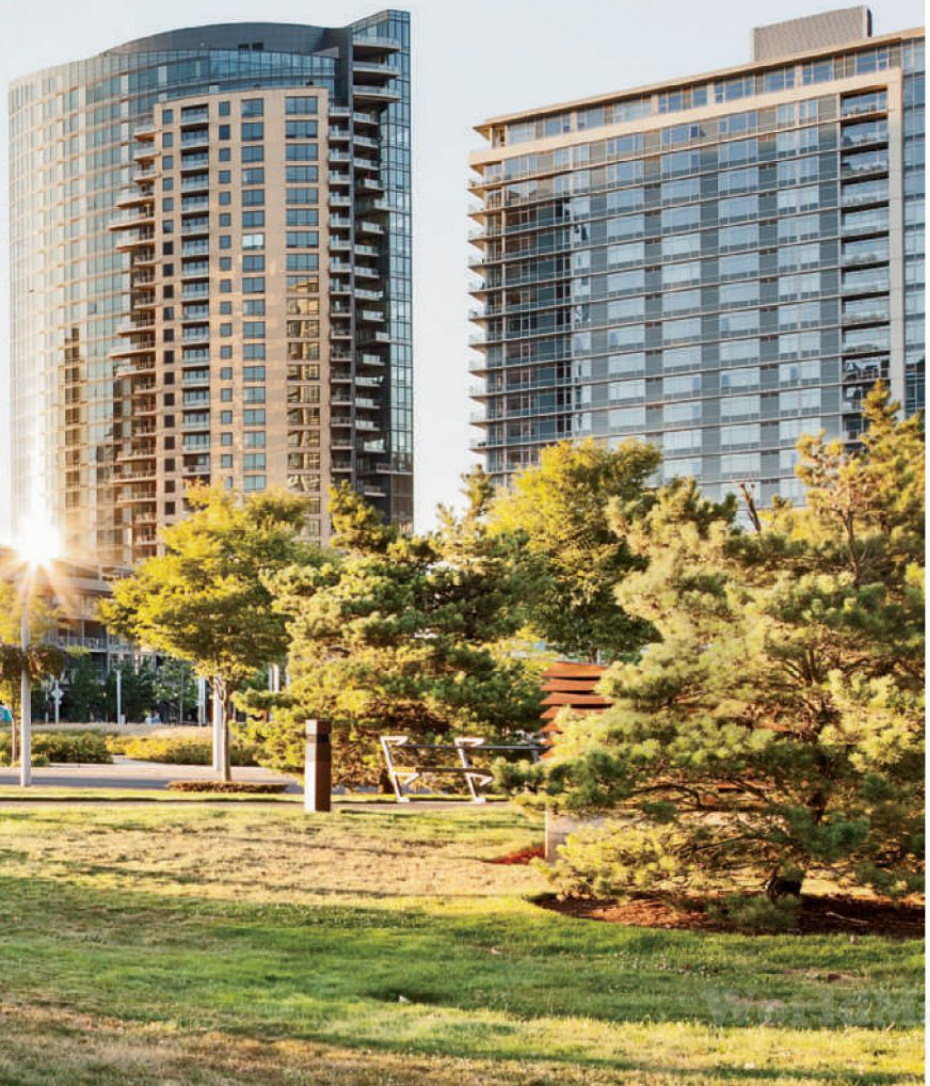
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2013 Population: **609,456**
2010 Population: **583,776**
2014 Median home price/sq. foot: **$225**
2011 Median home price/sq. foot: **$150**
2014 Median rent per month: **$1,310**
2011 Median rent per month: **$1,100**
2012 Percentage of renters spending more than 35% of income on housing: **45.2%**

PRICE DATA BASED ON LISTINGS BETWEEN JANUARY AND JUNE.
SOURCES: U.S. CENSUS BUREAU, ZILLOW



Portland is a strange land—a place where curbside compost is picked up more frequently than garbage, where the first new bridge over the Willamette River in 40 years doesn't allow private cars, and where the mayor would like to build tiny houses for the homeless on public property. Portland's ongoing collective quest for self-improvement has made it the quirky cousin to the flashier Seattle and San Francisco. "It's much more easygoing," says Eric Cress, who fled the Bay Area in 2006 to develop real estate here. "Portland is a lifestyle city—the way San Francisco was about 25 years ago."

Cress is not the only one who has embraced the mellow Portlandia culture. The city's population is growing fast, and, with it, an insatiable demand for new housing. Visitors passing through almost any part of Southeast Portland will inevitably see new apartment complexes, either brand-new or in the works.

Portland is in the midst of its biggest multifamily housing boom since the late 1990s. The rental vacancy rate is around 3 percent, and new housing is changing the fabric of the city, inserting itself as multi-unit infill structures in an already dense downtown and disrupting some single-family-home neighborhoods. Portland's demographics also are shifting, thanks to an influx of millennials and economic refugees priced out of Seattle and San Francisco.

Still, the construction binge is barely making a dent in a city whose metropolitan area of 2.3 million is growing by 25,500 people a year. And affordable housing is even harder to come by: more than 20 percent of households spend more than 50 percent of their income on housing. Portland lacks a policy that would meet demands for middle- and low-income housing, partly owing to Oregon's ban on inclusionary zoning (the only other state to have such a ban is Texas). What limited affordable-housing stock exists is mostly on the outskirts, where public transportation is least accessible, though there has been a concerted effort in recent years to locate new affordable developments, like Holst Architecture's Glisan Commons, near a broadening network of transit lines.

Increasing density would seem to be the answer—though Portland is already a dense city by law. In the 1970s, the city created an urban growth boundary to prevent sprawl and encourage high-density development downtown and in selected areas. One of the most famous urban-planning programs in the nation included investment in public transportation, parks, and pathways. Today, you can drive 20 minutes anywhere outside the city and be surrounded by farms, fields, or forest.

While there are few height restrictions downtown,

SOUTH WATERFRONT A swath of once-blighted industrial land along the Willamette River has been redeveloped for several luxury residential towers as well as affordable housing. The first condo projects, completed between 2006 and 2008, were designed by THA Architecture, TVA Architects, GBD Architects, and Perkins+Will. GBD did the master plan.

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Portland often caps infill development at four stories in traditional residential neighborhoods. So many multifamily projects are built at that scale—most of them standard-form boxes of little distinction. But Portland has one the highest numbers of architects per capita in the nation, and now such leading firms as THA Architecture, Holst, GBD, Lever, Skylab, WPA, and ZGF are designing sculpted forms that add to the character of the street. The new buildings are unobtrusively idiosyncratic, sensitive to the context but gently making their architectural mark. Both young architects and more established design firms here are helping to reshape their city—from the established Pearl District to a reinvented SE Division Street and the up-and-coming South Waterfront.

SE Division is the densest and arguably most successful of these recent revivals. For decades a sleepy thoroughfare of two-story single-family houses, interspersed with auto-repair shops and overgrown vacant lots, it has become, almost overnight, one of Portland's most popular neighborhoods. In 2006, the city's zoning was changed to encourage mixed-use infill development, and now there are multifamily housing projects on almost every block. The street's success—e.g., coolness factor—and architectural distinction is in large part the visionary work of Eric Cress's Urban Development + Partners (UD+P), whose unusual business model is focused on long-term investment.

When land prices plummeted during the recession, UD+P snagged five lots and tapped three leading local architects—Works Partnership Architecture, THA, and Stack—to design LEED-certified buildings, all with courtyards and light-filled units, targeting renters in their 20s and 30s. Most mid-rise residential buildings in Portland are wood framed, but UD+P's buildings rely on more durable light-gauge-steel frames and composite decks of metal plating and concrete. "If you have a short-term investment horizon, it doesn't make sense to build with concrete and light-gauge steel because you're just going to flip the building," says Cress, whose company continues to own and operate its properties.

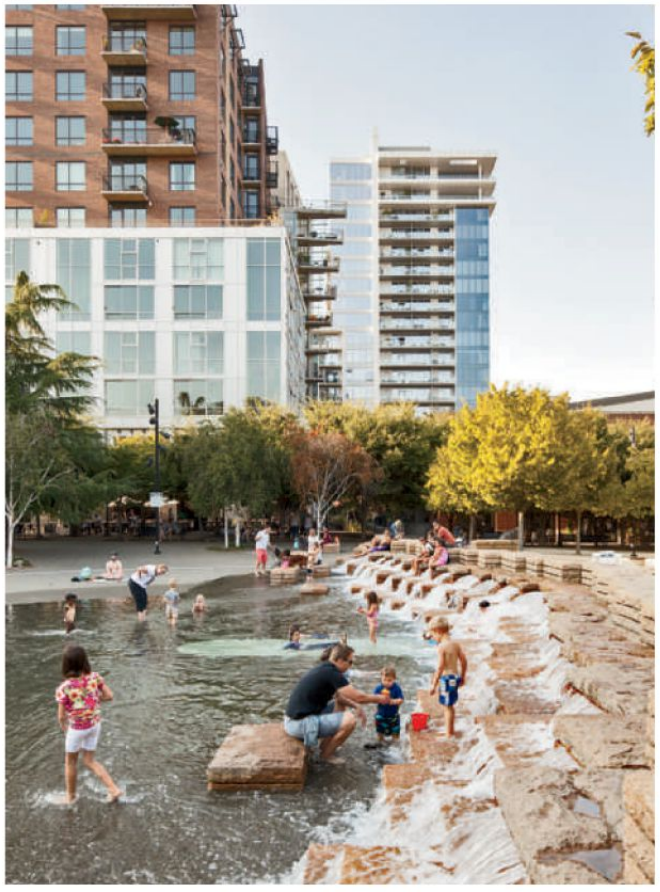
With alluring ground-floor retail space in well-designed buildings, UD+P has attracted coveted local artisanal food businesses and chefs with growing reputations for its properties. On a spring night, the line is out the door at Salt & Straw, a self-described "farm-to-cone ice-cream shop," with a rather unusual menu—flavors include Bone Marrow and Smoked Bourbon Cherries, and Tomato Water Olive Oil Sherbet. Next door, a small French bakery called St. Honoré Boulangerie makes all of its breads with flour produced by sustainable wheat farmers in the Pacific Northwest. Both are the ground-floor tenants at a THA-designed four-story, 37-unit stucco building with balconies on the upper levels.

Across the street, THA wrapped 30 units around an interior courtyard, eliminated all interior hallways and designed flexible live-work spaces in back for small businesses. With studios renting for $1,295 per month and one-bedrooms ranging from $1,425 to $1,595, UD+P is getting almost double the average rent per square foot in Southeast Portland.

Perhaps the most artful facade on the street belongs to the 30-unit building by Works Partnership Architecture at 33rd and Division, on an 8,000-square-foot corner site next door to THA's latest project. An S-shaped form in plan, the building's facade is alternately light and dark, with gray-black cement shingle cladding interrupted by glazed voids.

Across town, a public-private initiative has transformed the Pearl District from a place of industrial blight into a successful high-density





PEARL DISTRICT In 2002, Jamison Square, a 0.9-acre pocket park designed by Peter Walker & Partners, was the first completed park in the Pearl District redevelopment master plan. Two more followed. The parks are interspersed between high-rise condos near the waterfront.

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ARTHOUSE Located in the Pearl District, the ArtHouse opened this summer as the first ground-up residence hall for students at the Pacific Northwest College of Art (left). Designed by Lever, the six-story, 46,000-square-foot building contains 50 dwelling units, a lobby, café, bike room, and outdoor courtyard.

NORTH WILLIAMS Every day, thousands of cyclists commute between Northeast Portland and downtown on North Williams (below). The street is also bursting with infill projects, from multifamily to a striking black office building, the Stem, designed by MOSI Architecture and a local creative agency, The Felt Hat.



SE DIVISION STREET Urban Development + Partners (UD+P) has built five new multifamily housing projects along SE Division Street, including 3339 SE Division, designed by THA Architecture (below, left), and 33rd & Division, designed by Works Partnership Architecture. Trendy restaurants and retail, like the artisanal ice-cream shop Salt & Straw, have leased ground-floor space in UD+P's buildings, adding to Division's reputation as a foodie destination.





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mixed-use development over the past 15 years. Between blocks of condos, the city called for small public parks—Jamison Square, designed by landscape architect Peter Walker, was the first to open in 2002. Some of Portland's leading architecture firms had breakout projects in this area, including Allied Works' conversion of a 1908 warehouse into the offices of advertising agency Wieden+Kennedy—site of the human bird nest/conference room made famous on the TV show *Portlandia*.

Today, the Pearl District is looking beyond Whole Foods or the Dr. Martens U.S. headquarters for its next phase of urban revival. The Pacific Northwest College of Art, a small private art institution that has doubled the size of its student body and faculty in the last seven years, wants to raise its profile by expanding in the neighborhood. Allied Works completed a master plan for a new campus in 2005, and its $30 million conversion of a former post office into the college's main academic building is slated to open in January.

Nearby, Thomas Robinson of Lever Architecture has just completed ArtHouse, the first student residence hall. The six-story, 50-unit structure is clad with shimmering painted metal panels shaped like chevrons, a textured facade that gives the building a depth like that of some of the old historic brick buildings that still dot the district.

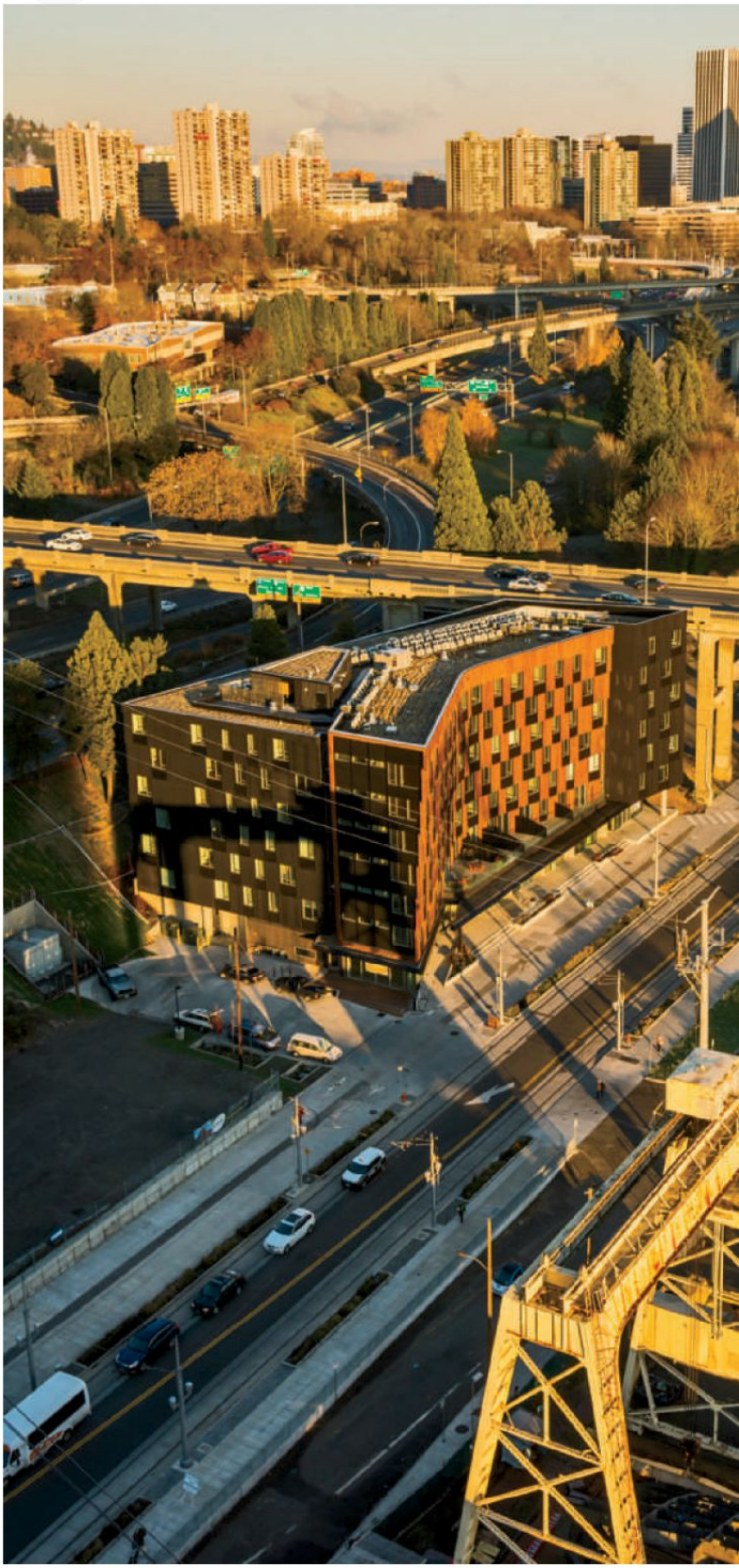
Meanwhile, Portland's industrial South Waterfront is the next neighborhood staging a comeback. Once a bustling manufacturing and shipbuilding center along the Willamette River, the area had become a 130-acre brownfield by the early 2000s. But the city sees a future innovation district here, and has teamed up with property owners, ranging from Oregon Health & Science University (OHSU) to an old shipbuilding family.

In 2002, its $1.3 billion plan (phase one) called for major infrastructure cleanup, stormwater collection and treatment, and new public transportation. It also called for parks, luxury and affordable housing, and a new OHSU research center.

By 2006, OHSU had completed a 412,000-square-foot research building as well as a $57 million aerial tram to run between the South Waterfront and its older campus up the hill. The first of the "eco-friendly" luxury residential towers opened, along with a new streetcar line.

While the recession slowed down some plans, the South Waterfront rebounded quickly. In June 2014, OHSU opened a 500,000-square-foot Collaborative Life Sciences Building, the largest academic building in Oregon, designed by Portland-based Sera and L.A.-based CO Architects. In fall of 2015, the city is scheduled to open Tilikum Crossing, a 1,720-foot-long pedestrian, bike and public-transportation bridge connecting the South Waterfront to other parts of the city.

The South Waterfront's last large blank slate is a 33-acre site owned by the Zidell shipbuilding family. The first new project there is the Emery, a seven-story, 88,000-square-foot housing complex aimed at OHSU medical students and faculty with ground-floor retail. In a nod to the neighborhood's gritty industrial history, the architects, ZGF, clad the building with a weathering-steel rainscreen and black metal panels. The eastern facade steps out at each floor, giving the appearance that the building, like a ship's hull, is leaning forward toward the water to the east. Compared to its enormous new neighbors, the Emery is relatively low-scale and quiet. "It's in the Portland psyche to start off modest," says ZGF partner Eugene Sandoval. "The work coming out of Portland is not about a trend. It's more about craft and diligence and maturity rather than making a big splash." ■

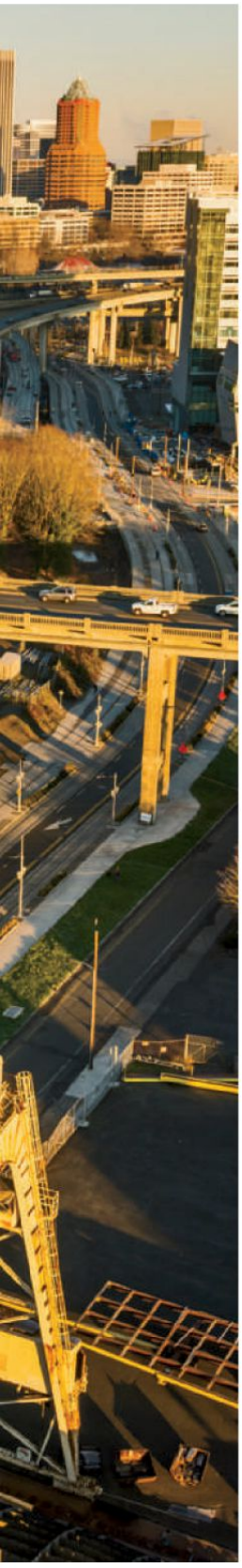


PHOTOGRAPHY: © BRUCE FORSTER

THE EMERY In the South Waterfront, ZGF's 118-unit apartment complex aimed at students and faculty at Oregon Health & Science University (OHSU) opened in October 2013. Rents range from $999 per month for a 450-square-foot studio to $3,000 per month for a two-bedroom.

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PHOTOGRAPHY: © ANDREW POGUE

GLISAN COMMONS Holst Architecture, a 22-year-old Portland firm known for its well-designed market-rate multifamily work, recently has entered the affordable-housing sector. Its second completed project in this category is Glisan Commons, a $13 million five-story, 67-unit LEED Platinum building in the emerging Gateway District in east Portland. The ground floor is the headquarters of Ride Connection, a nonprofit that provides transportation for the elderly and disabled.



SHORELINE
Large bould

SOUTH WATERFRONT In 2006, Oregon Health & Science University (OHSU) opened its first building in the South Waterfront, the $150 million 16-story Center for Health & Healing. The LEED Platinum 412,000-square-foot facility was designed by GBD. An aerial tram also opened that year to shuttle OHSU affiliates from the new building to the old campus up the hill.

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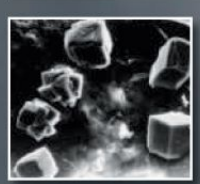
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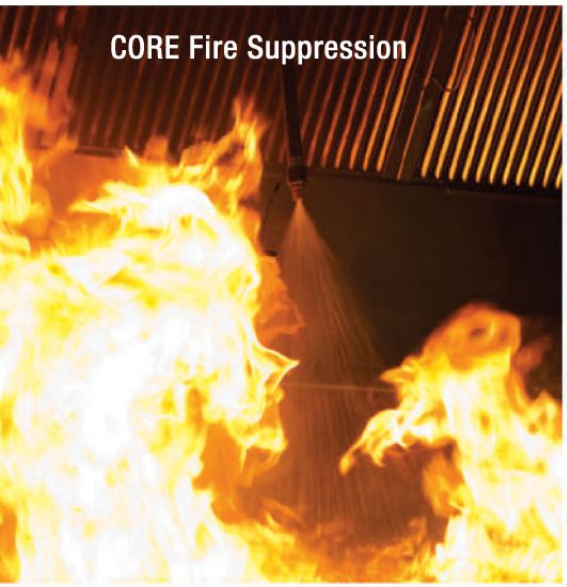
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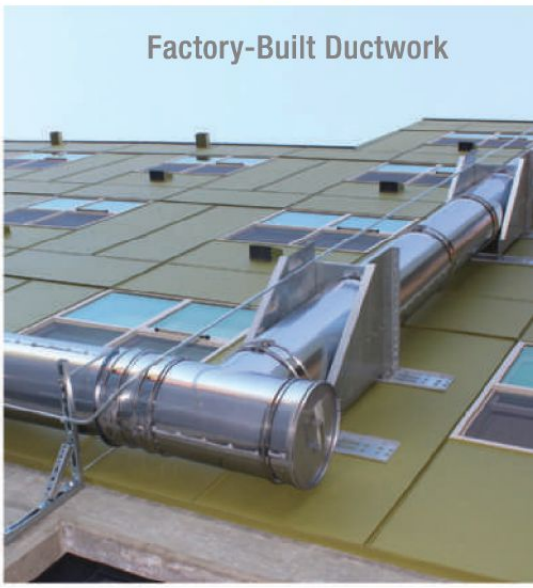


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CIRCLE 70

MULTIFAMILY HOUSING



When Bill de Blasio made affordable housing a central issue in his campaign for mayor of New York last year, he struck a nerve with voters not just in his hometown but around the country. In cities emerging from the Great Recession, economic success has created a housing crisis for many low-income and middle-class residents. In the following pages, we show projects that address this problem and offer a range of solutions—from a complex in Fort Lauderdale, Florida, that brings together low-income families and seniors to a mid-rise market-rate condominium in Los Angeles that presents an alternative to that city's low-rise sprawl, to a dramatic redevelopment of a failed public-housing project in San Francisco.

PHOTOGRAPHY: © BRUCE DAMONTE

HUNTERS VIEW REDEVELOPMENT, BLOCKS 5 AND 6, BY PAULETT TAGGART ARCHITECTS

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616 20th Street | San Francisco | Stanley Saitowitz/Natoma Architects

SLICE OF LIFE

A new condominium building in an old waterfront section of San Francisco sparks up the neighborhood with its serrated facade.

BY SUZANNE STEPHENS

PHOTOGRAPHY BY BRUCE DAMONTE

"WHEN I WAS looking for an apartment, I saw the facade and immediately called my real-estate agent," says Mark Chila, a resident of 616 20th Street in San Francisco. "I was lucky: the condominiums were almost sold out." In designing the south elevation of a 16-unit housing block in the Central Waterfront area near Pier 70, architect Stanley Saitowitz created vertical fins of fiber-cement and glass panels as a brise-soleil to shield the interiors from glare. But the knife-pleat array also gives the trim five-story building an arresting visage—a reinterpretation of the historic bay window—in the polyglot area known as Dogpatch.

The formerly working-class neighborhood on the bay is now attracting an upper-middle class, owing to growth of the city's tech and health-care industries since the 1990s. But the area is still dotted with Victorian cottages, along with a mix of old warehouses. "There are two competing scales," notes Saitowitz, who wanted to meld the smaller domestic one with the repetitive masses of the industrial waterfront buildings. Nevertheless, the South African–born architect stayed within the modernist vocabulary of an architecture defined by its rigor, rationality, and economy of means. At 616 20th, a wood-frame structure sits atop a concrete base that contains 3,000 square feet of commercial space (still unoccupied) above a 10-car garage in the basement.

Saitowitz and three colleagues had originally purchased the 5,525-square-foot property to develop themselves. After he had designed it and got the various governmental approvals, the foursome decided to sell the project to Tipco Construction, which built it. Between October and December 2013, the two-bedroom condominiums sold out at an average of $775,00 per dwelling, not including two priced at a below-market rate to fulfill the city's affordable-housing requirement. (These went for about $220,000 each.)

One reason the occupants responded so quickly to the design could be the plan's efficiency—a Saitowitz trademark. One resident, Amir Azari, a marketing manager, says, "The plan is the best. It was marketed as a one-bedroom condo with a den, but [the den] can serve as a second bedroom because of the sliding doors." For his part, Chila, an art director for an ad agency, says about his spare, high-design interiors, "I am a minimalist, and Stanley did a great job maximizing the space." Sliding etched-glass pocket doors divide the bedrooms (or bedroom and den) from the living/dining area. At the core of each unit is the "pod," consisting of an elongated kitchen facing the living/dining area and, behind it, the bathroom. Here a small corridor separates a closet at the rear of the kitchen from the linear bathroom, and internally connects one bedroom to the other room.

Whereas the facade's sawtooth profile, oriented to the bay, helps expand the sense of space within the units facing south, the north elevation is sheathed in floor-to-ceiling panels of etched and clear glass. Clear-glass panels slide away to allow residents views of a planted courtyard in a nearby housing complex, as well as a garden terrace below. (Balustrades, also of glass, offer a sense of security to those who have seen Alfred Hitchcock's *Vertigo* once too often.) Saitowitz inventively conformed to a city zoning regulation that requires 25 percent of the site to remain as open space by including the terrace and a stepped-back configuration on the upper floors of the building's rear.

Although the market-rate, 820-square-foot, open-plan apartments are not conceived to accommodate most families, they appeal to the community of young professionals and artists seeking flexible living arrangements for varied households. And they suggest more affordable uses: recently Saitowitz adapted his condominium to a modular scheme for student rental apartments. Working with Nautilus Group, a private developer and builder, he has designed a prototype with five two-bedroom units of student housing in Oakland, near Mills College. After testing the waters with this project, now under construction, Nautilus will turn its attention to a five-stack complex of 80 two- and four-bedroom units near the University of California, Berkeley, campus. If all goes well, the essential goal of expanding the sense of space and light through a well-thought-out plan should remain intact in spite of economic differences between the two forms of housing. ■



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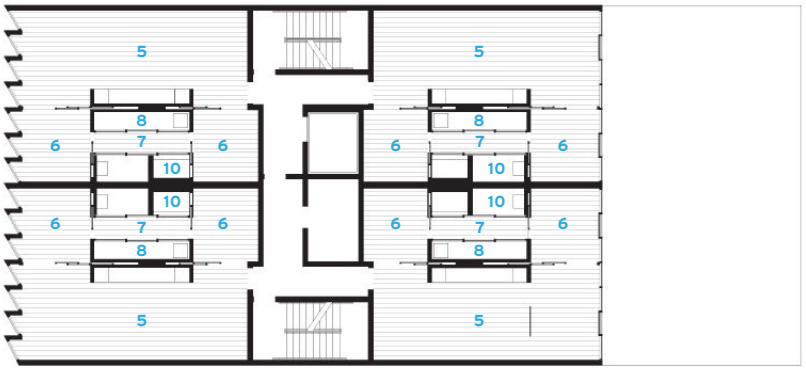


JAGGED EDGE
The pleated facade of the condominium apartments hovers over a concrete base containing the entrance (on left), a commercial space (at center, marked by temporary signage) and a ramp (visible lower right) leading down to the garage.

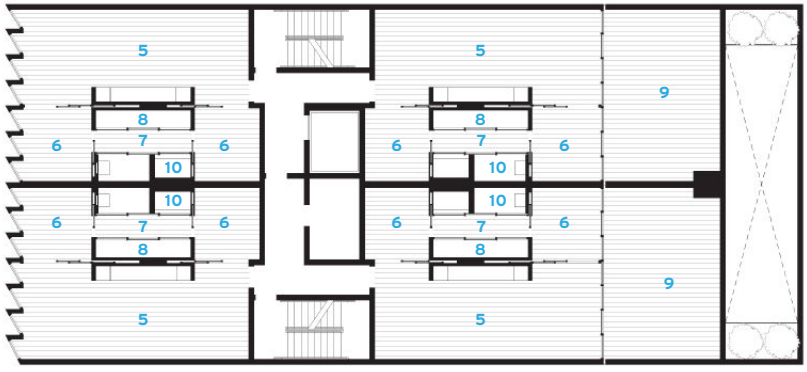
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1 LOBBY
2 COMMERCIAL
3 GARAGE RAMP
4 GARAGE
5 LIVING/DINING
6 BEDROOM/DEN
7 INTERIOR HALL
8 CLOSET/LAUNDRY
9 TERRACE
10 BATH



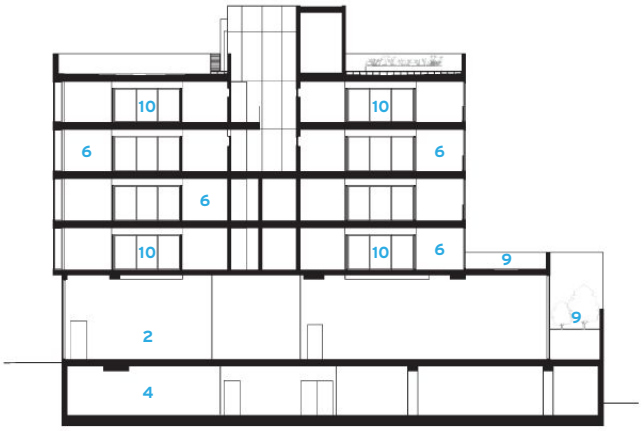
FLOOR PLANS THREE TO FIVE



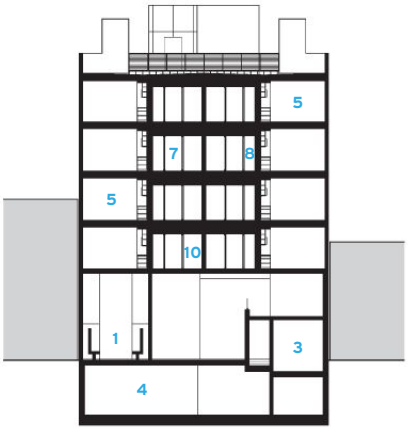
SECOND FLOOR



GROUND FLOOR



SECTION A - A



SECTION B - B

credits

ARCHITECT: Stanley Saitowitz/Natoma Architects – Stanley Saitowitz, principal; Neil Kaye, project architect; Markus Bischoff, Daniel Germain, team

ENGINEERS: Santos & Urrutia Structural Engineers (structural); Robert Wong (m/e/p)

CONSULTANTS: Walsh Norris & Associates (acoustical)

CLIENT AND GENERAL CONTRACTOR: Tipco Construction

SIZE: 23,000 square feet

CONSTRUCTION COST: withheld

COMPLETION DATE: October 2013

SOURCES

EXTERIOR CLADDING: Hardie Plank and Hardie Reveal

METAL WINDOW FRAME: Bonelli Enterprises

CANTILEVERED GLASS RAILINGS: C.R. Laurence

SLIDING DOORS: Kaiser Glass

QUARTZ KITCHEN COUNTERTOPS: Caesarstone

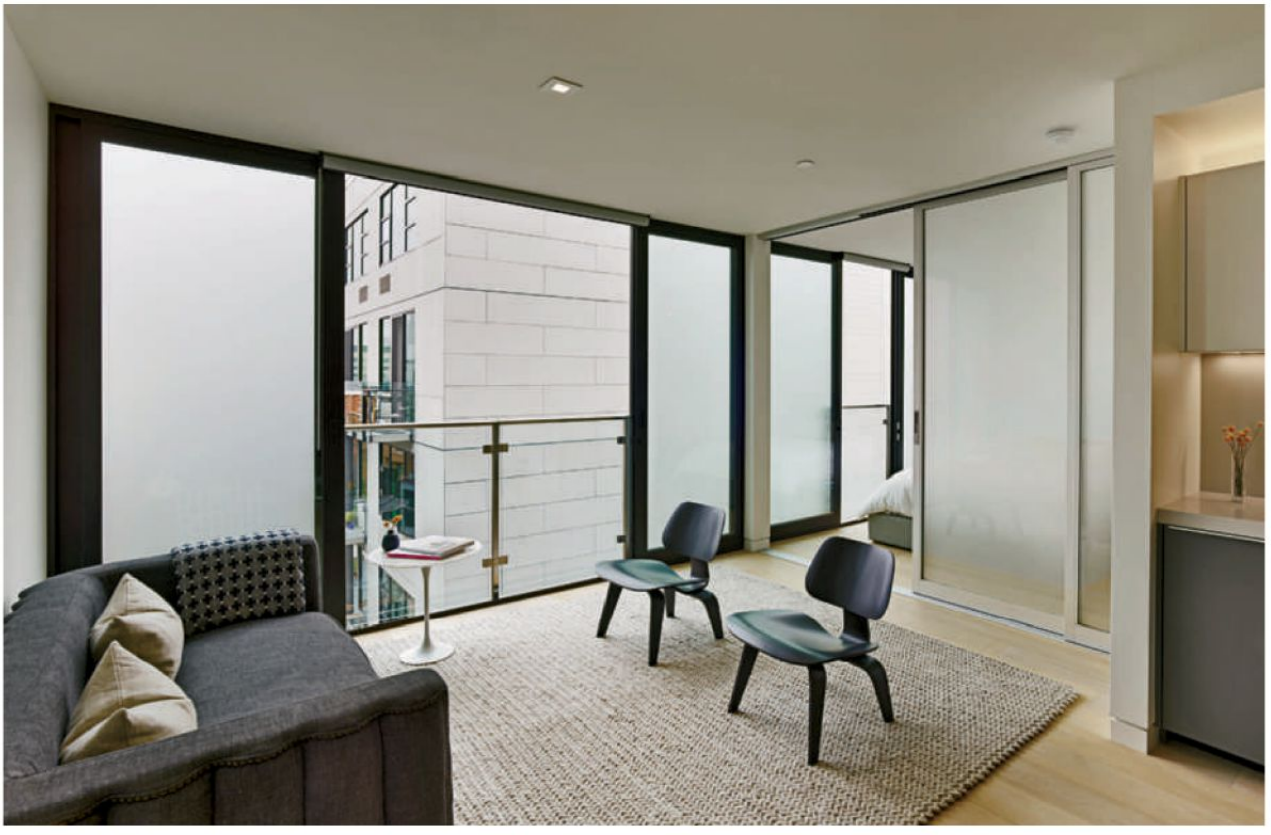
BATHROOM TILE: Daltile

PLUMBING: Toto (toilet); Hansgrohe (fixtures)

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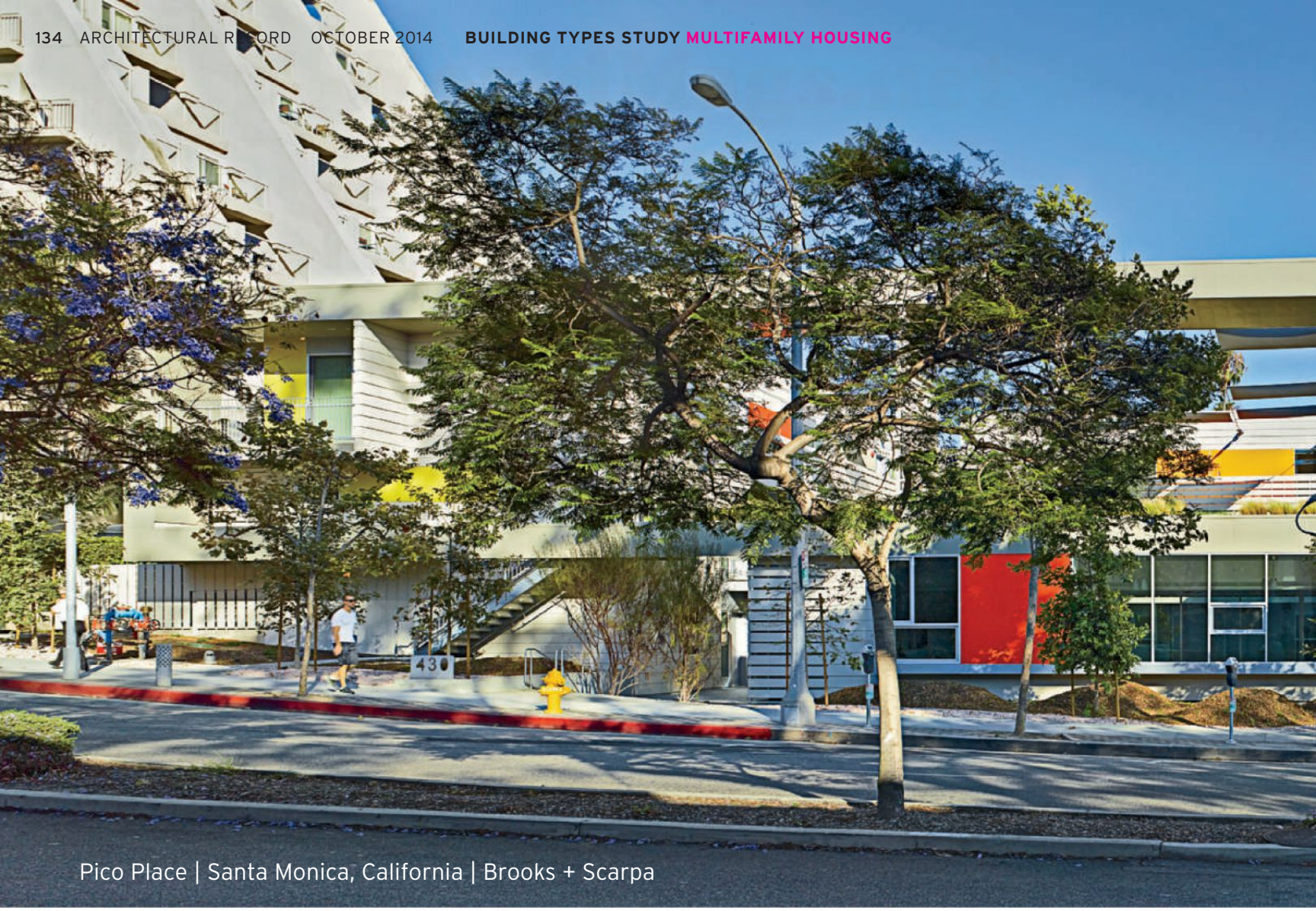
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TRADING SPACES
For the south-facing apartments, operable windows with angled projections let in daylight but reduce glare (above), which is also mitigated by the oak floors. Sliding etched-glass panels close off the bedroom or den from the open living/dining area (right). On the north side, etched glass alternates rhythmically with clear-glass panels that slide back to open up the view. Glass balustrades add to the sense of transparency.

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Pico Place | Santa Monica, California | Brooks + Scarpa

YES, IN MY BACKYARD

A sympathetic design raises the bar for affordable housing in a not-so-affordable city.

BY DEBORAH SNOONIAN GLENN

Affordable housing in Santa Monica sounds like an oxymoron. In 2013, the city's average monthly rent of $2,328 was the priciest in Los Angeles County. Adding insult to injury are local homeowners who fear that buildings for lower-earning households will be eyesores that drive down property values. But that doesn't stop nonprofit developer Community Corporation of Santa Monica from finding places to construct them and tapping good architects to design them. The latest project to refute NIMBYism's premise is Brooks + Scarpa's Pico Place. The attractive complex animates a nondescript block near the city's civic core and provides apartments for families of low to moderate income, earning from 30 to 60 percent less than the area median income (AMI).

Principals Angela Brooks and Lawrence Scarpa have charted these waters before. In 2002 they built Colorado Court less than a mile away for the same client, and it became the first multifamily project in the country to achieve a LEED rating (earning Gold certification), won scores of awards, and cemented their reputation as leading architects for affordable housing in Southern California. At Pico Place, which earned a LEED Platinum certification, the pair deployed some strategies that have worked at past projects to minimize structural, mechanical, and energy requirements, but eschewed the one-size-fits-all mentality that stigmatizes this building type. "We're now able to make some broad decisions quickly so that we can spend more time tailoring each project to its site and context," says Brooks.

This approach paid dividends here, where the location complicated a straight-

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STREET SCENE Balanced massing and a variety of cladding materials unite in a dynamic facade along bustling Pico Boulevard. Trees and low hillocks of colorful succulents along the main elevation absorb airborne dust, withstand drought, and offer a contrast to orthogonal building forms.





PHOTOGRAPHY: © JOHN LINDEN, EXCEPT AS NOTED; TARA WUJCIK (BOTTOM)

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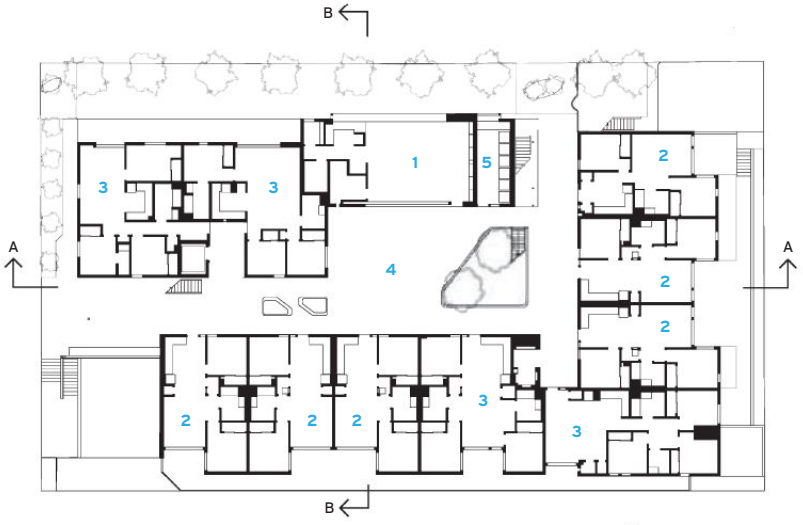
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1 COMMUNITY ROOM
2 TWO-BEDROOM UNIT
3 THREE-BEDROOM UNIT
4 COURTYARD
5 LAUNDRY
6 OPEN TO COURTYARD
7 PARKING GARAGE





THIRD FLOOR



GROUND FLOOR

0 20 FT.
6 M.

credits

ARCHITECT: Brooks + Scarpa – Lawrence Scarpa, lead designer; Angela Brooks, principal-in-charge; Emily Hodgdon, project architect; Mark Buckland, Ching Luk, Sri Sumantri, Silke Clemens, Brad Buter, design team

ENGINEERS: Weidlinger Associates (structural); E2DI (m/e/p); Barbara Hall (civil); IRC (roofing/waterproofing)

CONSULTANTS: PEG Office of Landscape + Architecture (landscape); Veneklasen (acoustics)

GENERAL CONTRACTOR: Benchmark Contractors

CLIENT/OWNER: Community Corporation of Santa Monica

SIZE: 41,000 square feet

PROJECT COST: $10 million

COMPLETION DATE: August 2013

SOURCES

CLADDING: James Hardie (siding); Omega (exterior cement plaster)

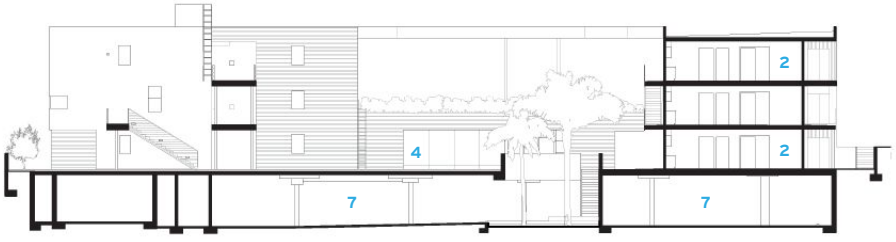
METAL: KLA Sheet Metal

WINDOWS: Milgard (aluminum); CRL/U.S. Aluminum (storefront)

DOORS: Fleetwood; Total Door Systems; Haley Architectural Doors

SHADES: SARK Custom Awnings

GREEN ROOF: Weston Solutions



SECTION A - A

0 20 FT.
6 M.



SECTION B - B

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BREEZE WAY
Exterior exit stairs are pleasant to use and add depth to the facade (opposite). A planted roof helps keep the community room cool (left), while retractable glazed panels allow it to open to the courtyard. Most apartments are entered through the courtyard (below); overhead fabric shades act as a visual shield from guests staying in the adjacent high-rise hotel (in background).



PHOTOGRAPHY: © TARA WUJICK (OPPOSITE)

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PHOTOGRAPHY: ©TARA WUJCIK (CENTER AND OPPOSITE)

MATERIAL MATTERS Fiber-cement siding, perforated aluminum-zinc coated sheet-steel panels, and integral-pigment stucco are durable and easy to maintain, suiting the complex's modest operating budget.

INSIDE OUT Two- and three-bedroom layouts were designed without hallways to maximize usable space (above). Palm trees rising from the subterranean garage add a layer of privacy and greenery (right).

forward program. The firm was asked to design a 32-unit complex of affordable family apartments, with a laundry room, community room, and code-mandated underground parking. The area has a 35-foot height restriction, and the long, narrow, sloped site (once five contiguous, down-at-the-heels lots) is ringed by a hodgepodge of structures: a high-rise hotel; single-family houses; a low-rise 1940s office building; and, across Pico Boulevard, the fenced-in campus of Santa Monica High School. The beach is a few blocks to the west. It's a hectic place, both visually and literally.

Brooks and Scarpa's scheme mediates these eclectic surroundings, providing privacy and mitigating street noise. The architects arranged two three-story buildings—one rectangular, one L-shaped—to form an interior courtyard. Three-bedroom units occupy the corners, while the two-bedroom units sit within the legs of the L adjacent to the hotel and the site's southern edge. "This layout uses the footprint efficiently and allows for stacking similar or identical floor plans," says Brooks. A single-story volume that fills out the main elevation along Pico Boulevard houses the community and laundry rooms. Walking into the complex, one feels a logical transition from chaos to calm. The entrance and public spaces face and engage the street, while the courtyard beyond offers a sheltered gathering spot. The hubbub finally fades as residents enter their private quarters.

Brooks calls the hefty frame that ties together the facades along Pico Boulevard "our big design gesture," its scale and weight a nod to the adjacent hotel. It forms balconies and a planted roof on the second level and a protective "eyebrow" on the third. The glazed community room and white stucco cladding with bright accent panels add a beachy vibe—we're definitely in SoCal—while recycled fiber-cement siding underscores the site's horizontal, linear nature. The interplay of these surfaces, and siding of different widths, orientations, and spacing, echo the ebb and flow of foot and street traffic. Varied parts form a pleasing whole, a sentiment reflected in the surrounding area's diversity.

Within the complex, thoughtfully designed circulation creates a collegial atmosphere that encourages interaction. Walkways, bridges, and stairs knit together buildings and floors, and the open courtyard permits long sight lines across the property. Because Community Corporation's projects are built without air-conditioning, the architects took advantage of the temperate climate by allowing access to units from outdoors instead of a sealed, double-loaded corridor. Floor plans allow daylight and ocean breezes to pass through; many apartments have private balconies too.

Even the parking area encourages neighborliness. The architects opened it up to the courtyard and added a staircase, a move that, as they learned on an earlier project, eliminated the need for pricey ductwork in the garage. "People skip the elevator, because they're drawn to the light that spills down from above. It just feels easier to take the stairs," says Brooks.

Within walking distance of bus stops, prime employment, and commercial centers—civic and corporate office buildings, the Third Street Promenade retail district, the Santa Monica Pier—and the new $48.3 million Tongva Park, Pico Place's location is enviable, but eminently practical for low-income families in particular. Since many of them can't afford a car, living near work, public transit, and services offers them more opportunities and improves their quality of life dramatically. The astute design here makes the case that high-quality housing can and should be accessible to everybody—not just those who can pay a premium for it. ■

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

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Dr. Kennedy Homes | Fort Lauderdale, Florida | Glavovic Studio

SUNSHINE STATE OF MIND

A low-income housing project, open to the subtropical climate and respectful of its neighbors, brings together seniors and families.

BY CLIFFORD A. PEARSON

PHOTOGRAPHY BY ROBIN HILL

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APPROPRIATE BEHAVIOR
By orienting buildings to catch prevailing winds and using breezeways and projecting elements to shade balconies and windows, Glavovic made the project work with the climate.

Set between an historic neighborhood of mostly single-family houses on one side and a busy thoroughfare on the other, the Dr. Kennedy Homes—a low-income housing project for both seniors and families—negotiates the differences between competing conditions and interests. Walking around the 8.5-acre site in Fort Lauderdale, you notice what ties the complex together rather than what might pull it apart: the balconies and outdoor walkways that offer residents views of their surroundings, the breezeways and shaded courtyards that connect indoors and out, and the rolling landscape that features more than 440 native trees.

The 132-unit project replaced a public housing project from 1941 that consisted of nearly 50 one- and two-story buildings spread out evenly over a superblock, with minimal connections to the rest of the city. Built for whites only, the earlier complex was desegregated in 1968 by federal mandate. When the city Housing Authority proposed demolishing the old concrete-block structures in 2010, some people criticized the plan for ignoring the project's historic value, and others feared that poor residents would be moved out permanently.

Responding to community concerns, the city kept the number of dwelling units in the new complex the same as before—132—even though Fort Lauderdale needs more affordable housing, and zoning would have allowed 212 units on the site. Glavovic Studio, the local architecture firm hired to design the project, reacted to neighborhood sensitivities as well, placing the two largest buildings along heavily trafficked Broward Boulevard on the north and setting the smallest ones on the south, adjacent to the Sailboat Bend historic district.

Margi Nothard, the founder and design director of Glavovic, had designed mostly civic buildings in the area, including the Young At Art Museum and Broward County Library and the ArtsPark at Young Circle. She lives in Sailboat Bend, so she understood the concerns of the neighbors while also being committed to improving public housing. "I see low-income housing as part of the public realm," says Nothard. "We need to weave it into the community as a whole."

So she approached the job as an urban-design challenge, reinforcing Broward Boulevard with a pair of five-story buildings—one for seniors and one for families—and designing two- and three-story structures that have pinwheel-shaped plans and step down to the scale of low-rise neighbors. She wasn't able to reintroduce through streets into the superblock, but she did add a pair of driveways on the east and west to open the project to the rest of the city. She also redesigned the housing project's ground plane, transforming a flat, undifferentiated topography into a more engaging landscape of winding paths, small hills, and planted swales that retain rainwater so the rest of the site stays dry.

"My first charge to Margi," says Scott Strawbridge, the director of development and facilities for the housing authority, "was to build us a park and then fit housing in it." One advantage of erecting just 132 units was the amount of green space that it left. According to Strawbridge, 54 percent of the site is open space, and 90 mature canopy trees were preserved, though a few had to be moved. "We located the buildings to accommodate the trees," which shade the apartments and create attractive places to walk, explains Nothard.

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URBAN MOVES
The largest buildings face busy Broward Boulevard (left) and help hide parking behind them (opposite, bottom). Made of stucco-covered concrete block, the project was constructed for $16 million or $92 per square foot. Residents enter the pinwheel-shaped buildings through a secured gate and a covered patio (below).

The $16 million project encompasses eight new apartment buildings and three existing single-story structures renovated as community spaces. Twenty percent of the dwellings house people making 28 percent or less of the area's median income ($56,400 per year) and 80 percent serve those making 60 percent or less of the AMI. Monthly rents range from $376 for a 650-square-foot one-bedroom unit to $1,117 for a 1,085-square-foot three-bedroom apartment.

The Fort Lauderdale Housing Authority owns the project, but brought in a private company, Carlisle Development, to build it and operate it jointly with the city for 15 years. Funding came from mostly low-income-housing tax credits, along with some state money and private-equity investment. "We're divorcing ourselves from the old model of public financing and are now partnering with the private sector," says Strawbridge.

Environmental concerns played an important role in shaping the project, which earned a LEED Gold rating. All of the apartments in the six pinwheel buildings and the great majority of those in the two larger buildings are accessed from single-loaded outdoor hallways, so they enjoy cross-ventilation and daylight from at least two sides. "Most residents here can't afford to run air-conditioning all year round, so catching breezes is important," says Nothard.

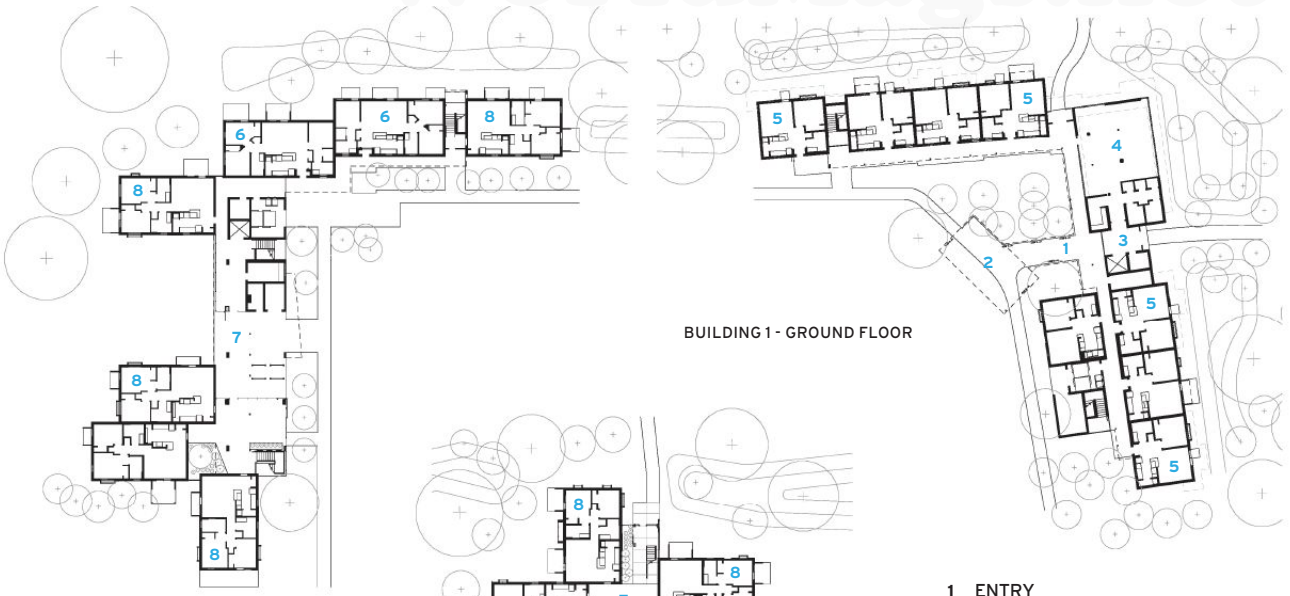
Almost all of the units have a small outdoor space, whether a balcony, terrace, or patio. Security was a critical issue, so Nothard made sure residents at home can see people as they approach from near and far. The site is not fenced, but there are gates at the entrances to covered patios at the center of each pinwheel building, secured lobbies in the big buildings, and surveillance cameras all around. Crime is "way down" from the days of the old project, says Strawbridge. The main complaint now is the size of the units, even though they are larger than before. "I love it here, but I wish it was bigger," says Shirley Carson, who lives in a 945-square-foot two-bedroom apartment.

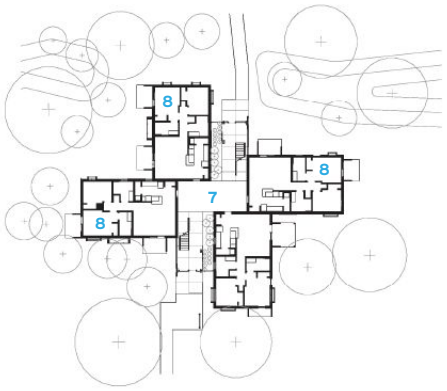
With its projecting balconies, dashes of color, and myriad outdoor spaces, the Dr. Kennedy Homes brings the spirit of southern Florida living to people who in the past could rarely afford it. ■



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0 30 FT.
10 M.

1 ENTRY
2 PORTE COCHERE
3 LOBBY
4 COMMUNITY ROOM
5 ONE-BEDROOM APARTMENT
6 THREE-BEDROOM APARTMENT
7 COVERED PATIO
8 TWO-BEDROOM APARTMENT

REACHING OUT
The architects fitted many buildings around the site's 90 mature trees and added hundreds more (opposite, top). Almost every apartment has at least one small outdoor space such as a balcony or terrace (opposite, bottom-left). Three existing buildings were renovated as community space (opposite, bottom-right).



A BUILDING 1 (SENIORS)
B BUILDING 2 (FAMILIES)
C BUILDING 3 (FAMILIES)
D RENOVATED BUILDING (COMMUNITY SPACE)

credits

ARCHITECT: Glavovic Studio – Margi Nothard, partner in charge; Terence O'Connor, project architect; Diane Barry, Pascal Campi, Glenda Puente, Leonardo Riano, Michael Seal, project team

ENGINEERS: Bryntesen Structural Engineers (structural); HSQ Group (civil); Franyie Engineers (mechanical)

CONSULTANTS: Fred Stresau (landscape); Lighting Dynamics (lighting)

GENERAL CONTRACTOR: BJ&K

CLIENT: Carlisle Development Group

OWNER: Housing Authority of the City of Fort Lauderdale

SIZE: 174,300 square feet

CONSTRUCTION COST: $16 million

COMPLETION DATE: March 2014

SOURCES

WINDOWS: All American Windows

ACRYLIC ENTRANCES: 3form

LAMINATED HURRICANE GLASS: Technoglass

GLASS BLOCK: PPG

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PHOTOGRAPHY: © TEODORA DAKOVA (BOTTOM, LEFT)

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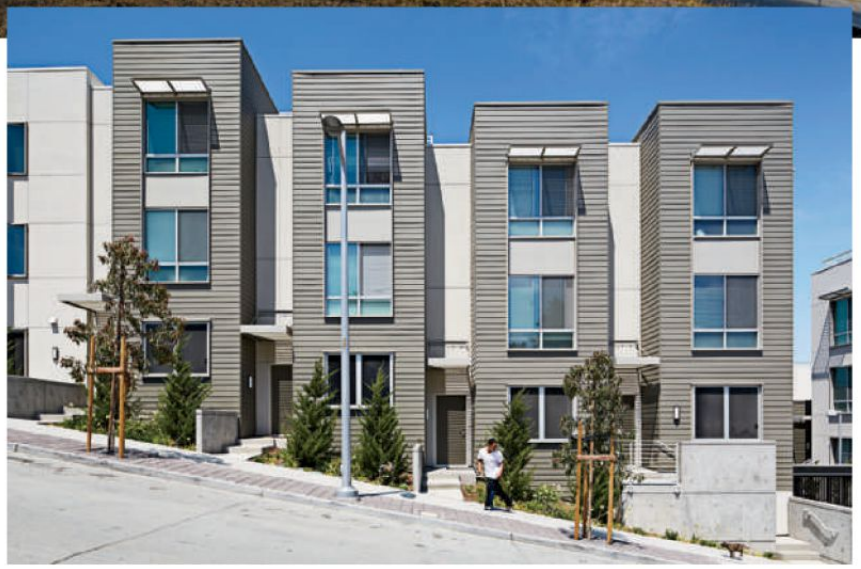
Hunters View Redevelopment | San Francisco | Paulett Taggart Architects

SECOND TIME AROUND



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The reimagining of two city blocks is helping to shape a new identity for one of San Francisco's bleakest neighborhoods.

BY LYDIA LEE

PHOTOGRAPHY BY BRUCE DAMONTE

Mention "the projects" to San Francisco residents and they are likely to think of long rows of low-rise apartment buildings, painted pink and other pastel hues, terraced along the hills on the southern edge of the city. Despite its candy-color structures, Hunters View, a development within the city's Bayview Hunters Point neighborhood, was ranked among the worst public-housing projects in the United States, according to a 2007 survey by the U.S. Department of Housing and Urban Development (HUD).

Hunters View had its beginnings during World War II, when temporary barracks were erected for naval shipyard workers. At the time, the architects minimized the expense of excavation and infrastructure by designing long buildings that followed the contours of the hillside, putting in as few roads as possible. Inhabitants were not afforded the luxury of outdoor space; the buildings were separated by a "no-man's land" of unattended terrain. In 1954, the barracks were retooled as public housing, which, by 2010, had gotten so dilapidated, only about half the units were occupied.

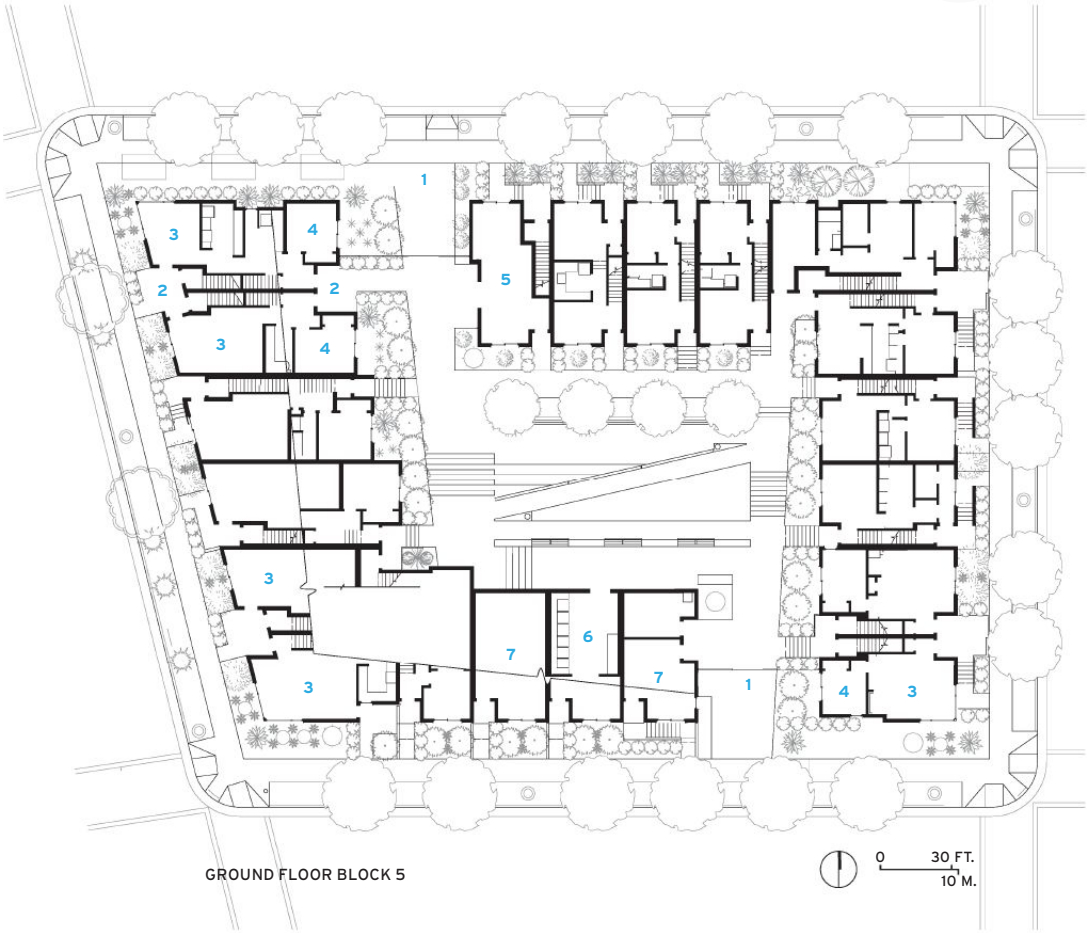
Today, the 22-acre area is being completely reinvented through the city's new HOPE SF program, a public-private partnership that combines city, state, and federal funding for affordable housing and infrastructure with investments by local developers. Hunters View is the program's debut project. The three-phase redevelopment, estimated to cost upward of $500 million, notably avoids displacing residents, who stay in existing housing and move into new units as they become available. The critical first phase, begun in 2010 and completed last year for $80 million, includes 107 public-housing units, all new streets, and a public park. It gives a sense of what the future of large-scale public housing could be. "We tried to set a new standard for public housing with a development that does not look like public housing and feels like a part of San Francisco," says architect Daniel Solomon, whose team worked on the project initially as WRT/Solomon ETC and later as Mithun | Solomon. The firm designed the master plan, aiming to increase the number of residences from 267 to as many as 800—a third of which will be market-rate. The firm also set the stage by designing the first block of affordable units and a public park at the top of the hill.

To diversify the architecture within the master plan and create the feeling of an established neighborhood, the development team, led by the John Stewart Company, tapped different architects to handle the various parcels. In addition to the Solomon-designed buildings, the first phase includes two blocks designed by local firm Paulett Taggart Architects. Notably different from what was here before, the buildings are distinguished by their reassuring, contemporary archi-

TERRACED APARTMENTS
The development was redesigned with streets aligned to create view corridors to downtown (top). From the street, the buildings read as individual townhouses (above). A cheerful orange wall highlights mailboxes and laundry facilities, accessed via the shared outdoor space (opposite).

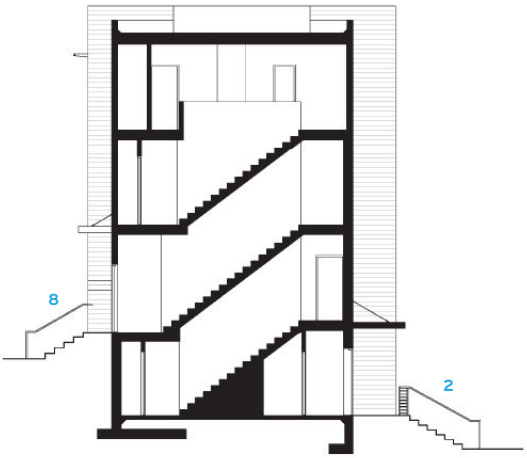
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GROUND FLOOR BLOCK 5

1 COURTYARD ENTRY
2 DWELLING-UNIT ENTRY
3 LIVING/DINING
4 BEDROOM
5 TRASH
6 LAUNDRY
7 MECHANICAL
8 ENTRY TO UPPER UNIT



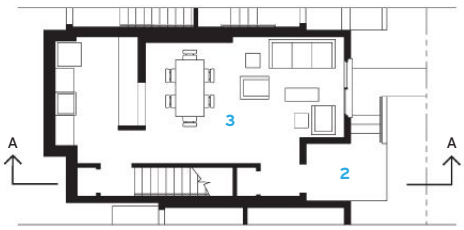
SECTION A - A



SITE PLAN



TYPICAL UNIT SECOND FLOOR



TYPICAL UNIT FIRST FLOOR

0 10 FT.
3 M.

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tecture and could easily pass for market-rate townhouses elsewhere in the city. Eighty units are replacements for existing public housing, for which families earning as little as 10 percent of the area median income (AMI) pay 30 percent of their income as rent. The remaining 27 apartments, rented at a fixed rate, are funded through HUD's Low-Income Housing Tax Credit (LIHTC) program, and allocated to households making less than 45 percent of the AMI ($49,950 for a family of four).

Architect Paulett Taggart and her team were guided by the 73-page master plan, which outlines six main strategies: superimpose a uniform street grid on the uneven topography; align buildings so they face the street; use stairs and ramps to connect steep streets; articulate the buildings to give the impression of narrow parcels and avoid an institutional scale; align streets to provide view corridors; and create public parks on promontories. For the buildings themselves, a set of design guidelines within the plan promotes community and safety.

"We wanted these two new blocks to have the scale, rhythm, and texture of San Francisco," says Taggart. "By breaking down the scale, [we make] the buildings feel accessible to the individual." The main challenge was building on such a steep site—which has an up to 20 percent grade—and making the common spaces accessible for everyone, including those with disabilities, while at the same time controlling costs. On each block, the architects arranged a pair of L-shaped three- and four-story wood-framed buildings around a secure central courtyard; the units are designed as stacked townhouses that step down the street. Following well-established best practices in public housing, Taggart avoided double-loaded corridors and unwatched common spaces in favor of single-loaded galleries and stoop entrances. Then she gave each unit a strongly defined entryway with a metal grille canopy over the front door. No candy colors here: clad in fiber-cement siding and stucco, one block is dark olive and cream with

MASTER PLAN
To break up the massing, the architects designed a series of volumes with differing heights. Metal awnings over doors and windows punctuate them as "eyes on the street" (above). To reconnect the development with the city, the busy Fairfax Avenue, which had come to a T-stop at the edge, was redesigned as a throughway.

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LIVING ROOMS
Modest finishes, such as gypsum-board walls and ceilings and vinyl-plank floors, distinguish the airy units from market-rate housing (left and below). Outside, the buildings are clad in durable fiberboard siding and panels (opposite). A long wheelchair-accessible ramp is integrated into the courtyard's landscape.

light-green accents, and the other block is taupe and cream with red and yellow accents.

According to the architects, the courtyards were particularly tricky to design, given the sloping site and a requirement that they be visible from the street. Taggart and her firm collaborated with landscape architect Gary Strang of GLS, strategically placing the gated entrances to the courtyards on diagonal corners in order to minimize the change in grade. On one block, the catty-corner entrances are linked by wide wheelchair-accessible ramps that double as kid-friendly spaces, interspersed with landscaped areas. Mailboxes and shared laundry facilities, painted bright hues to stand out as communal zones, are accessed from the courtyards to encourage neighborly mingling.

The only economies that distinguish these units from market-rate housing, says Taggart, are the modest interior finishes: the walls and ceilings are gypsum board, most of the flooring is vinyl plank, the baths have sheet-vinyl floors and solid-surface fixtures.

Taggart and her firm are currently working in conjunction with David Baker Architects on the design of two additional blocks and 107 more affordable public-housing units for Phase 2 of Hunters View. (Phase 3 is scheduled to begin in 2016.)

While it may be a bit too early to measure the results of the ongoing redevelopment, anecdotal evidence has been promising. According to Isaac Latchison, a 47-year-old building maintenance worker who has been living at Hunters View since he was 4 years old, the neighborhood is starting to feel like a community once again. "It feels like somebody cares," he says. "Things are moving in the right direction." ■

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



credits

ARCHITECT: Paulett Taggart Architects – Paulett Taggart, principal; Roselie Enriquez, project manager; Christian Cutul, Chenglong Tsai, project architects

ENGINEERS: Structural Design Engineers (structural); Carlile Macy (civil); Timmons Design Engineers (m/p); FW Associates (electrical)

CONSULTANTS: GLS Landscape|Architecture (landscape); Auerbach Glasow French (lighting); Charles M. Salter Associates (acoustics); Gale Associates (waterproofing)

GENERAL CONTRACTOR: Cahill Contractors; Nibbi Brothers

CLIENT: Hunters View Associates; San Francisco Housing Authority

SIZE: 67,800 square feet

CONSTRUCTION COST: $22.2 million

COMPLETION DATE: May 2013

SOURCES

FIBER-CEMENT CLADDING: James Hardie (plank siding); Eternit (rainscreen panels)

WINDOWS: International Window

DOORS: Kawneer (storefront system)

LIGHTING: Lumec, Selux (courtyard); Teka (unit entries)

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Cloverdale749 | Los Angeles | Lorcan O'Herlihy Architects

SCREEN TEST



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On a midblock infill site, a pristine box wrapped in layers of clean-edged metal is a stylish antidote to its surroundings.

BY SARAH AMELAR

PHOTOGRAPHY BY LAWRENCE ANDERSON/ESTO



Los Angeles' reputation as a reluctant metropolis—a city without much in the way of urban lifestyle—has been well deserved. Just 15 years ago, you'd be hard-pressed to describe its most densely built areas as residential (or desirable). Fed by the culture of freeways, the city's predominant housing type has been the quasi-suburban sprawl of single- or two-family houses, intermingled with "dingbats," those small, boxy, cheaply constructed buildings with a couple of stories of apartments over grade-level parking and grandiose names such as "The Capri" or "La Traviata."

But the urban character of Los Angeles is evolving. Downtown—an area that was, for decades, dead by night—is seeing the emergence of hip restaurants, hotels, apartments and lofts, many in reclaimed, once-grand office buildings. And even in neighborhoods with more established multifamily dwellings, developers are beginning to exploit the residential potential of long-overlooked infill lots.

Just last year, one of those tight midblock parcels became the site of Cloverdale749, a condo building designed by Lorcan O'Herlihy Architects (LOHA) in the Miracle Mile, or Mid-Wilshire, district. About 3 miles from Downtown and within walking distance of Museum Row, the structure occupies a transitional edge between a neighborhood of freestanding houses and a major commercial corridor.

Modestly scaled yet decisively urban, the project began with a query from the client: Could LOHA find a way to fit more than four units comfortably within the 6,700-square-foot lot? "This is the kind of question we're pretty experienced with," says principal Lorcan O'Herlihy. "LOHA has been very interested in L.A.'s urban culture—in the discussion about how the city is changing significantly."

Analyzing the zoning and code parameters, his team designed a four-story, 11,000-square-foot building with a total of six units, each spanning two floors. Below-grade parking, deftly configured to pack in the 12 required spaces, was essential to the solution.

For O'Herlihy, however, it wasn't just a matter of maxing out the lot, but also of creating homes with individual thresholds to the outdoors—and layers of privacy within the city. So Cloverdale749 fills the allowable building envelope, except where LOHA recessed the blocky volume to give each grade-level apartment its own small entry court, or outdoor vestibule. The trade-off: a small sacrifice in square footage in exchange for a substantial gain in the quality of the experience. Edged by windows, these semiprivate areas open the interiors to breezes and daylight from multiple exposures.

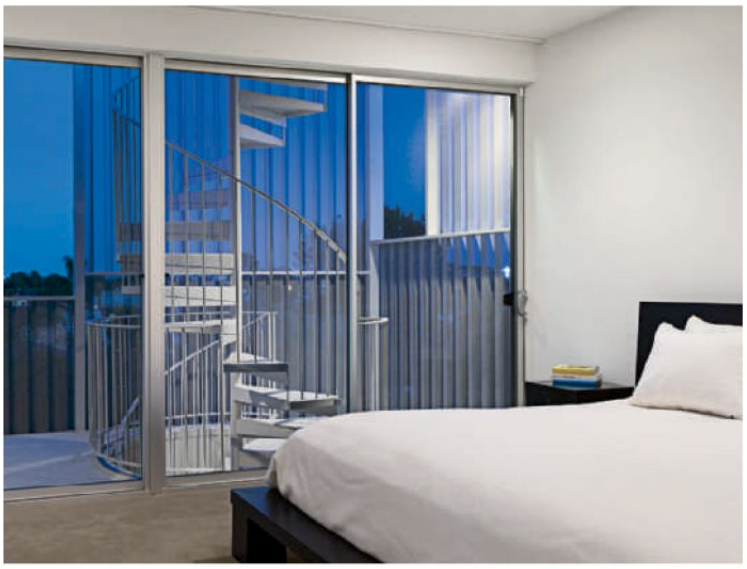
As in LOHA's previous multifamily buildings, Cloverdale749 has no internal corridors. Instead, the circulation was pushed to an exterior edge, promoting spatial efficiency, also allowing cross-ventilation through the units, all of which extend the entire width of the floor plate. (The three upper apartments also have private roof decks, permitting additional airflow through the roof bulkhead.)

In advancing passive cooling while modulating levels of privacy, the cladding strategy was also instrumental. LOHA wrapped the wood-framed building in corrugated steel panels, both perforated and solid, creating a nuanced composition from off-the-shelf industrial siding. Veil-like,

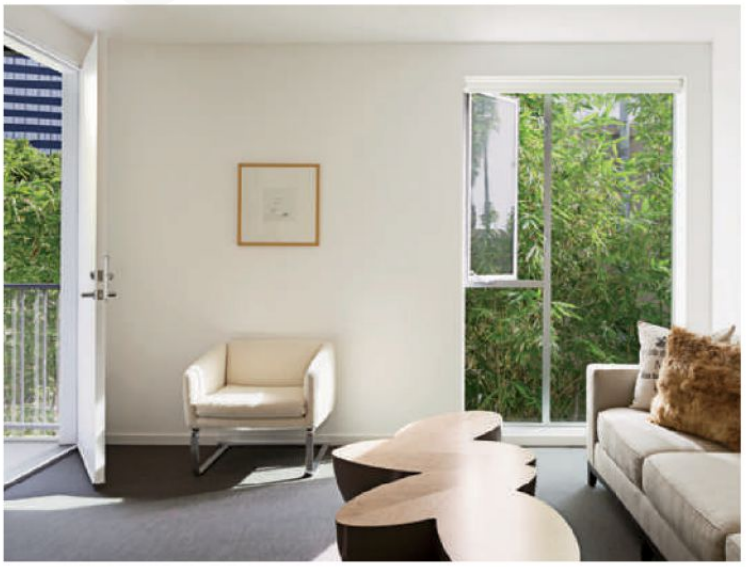
PLEATS, PLEASE
The building's six units are all two stories. With corrugated metal cladding, both solid and perforated, the architect achieved layers of privacy. The facade is white-on-white, except for dark-brown stucco lining such semi-outdoor spaces as balconies (opposite), walkways, and entries. The variety of window openings reflects the uniqueness of each unit (above).

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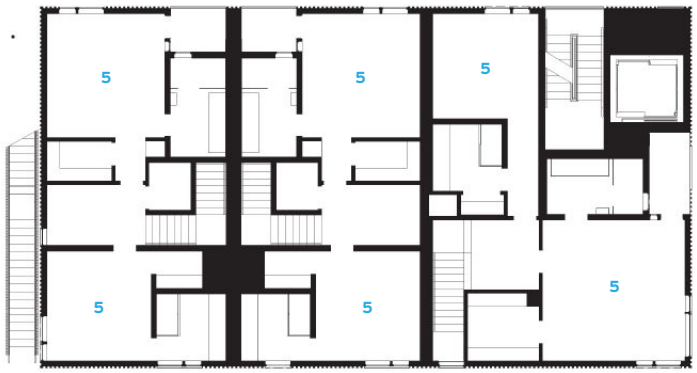
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VEILED VIEW Rising three stories, a private outdoor spiral stair connects an upper level apartment's two floors and the roof deck. (The apartments also have indoor, straight-run staircases.) The perforated screen provides for views out, but not in.

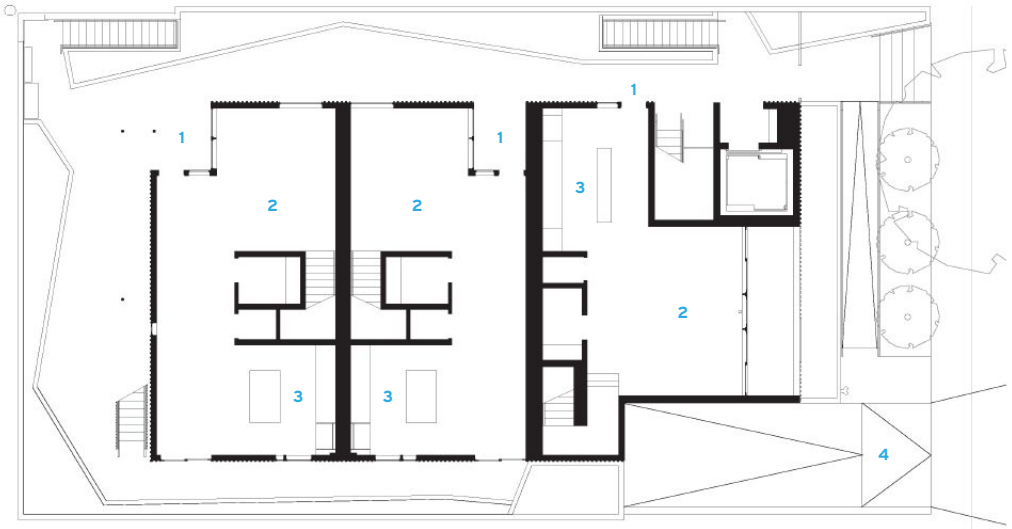


TIGHT SITE On this urban infill lot, live bamboo was planted as a green buffer between Cloverdale749 and its neighbor. Every apartment spans the entire width of the building, providing for cross-ventilation.



SECOND FLOOR

1 APARTMENT ENTRY
2 LIVING
3 KITCHEN
4 PARKING ACCESS
5 BEDROOM



SITE PLAN



credits

ARCHITECT: Lorcan O'Herlihy Architects – Lorcan O'Herlihy, principal; Donnie Schmidt, project director; Alex Morassut, project manager; Dana Lydon, construction adminstration

CONSULTANTS: John Labib + Associates (structural); MNS Engineering (mechanical and plumbing); Amelect (electrical); Harvey Goodman Civil Engineering; Palumbo Design (interiors); LINK Landscape

GENERAL CONTRACTOR: Fortis17

CLIENT: Papalian Capital Partners

SIZE: 11,000 square feet

CONSTRUCTION COST: $2.6 million

COMPLETION DATE: May 2014

SOURCES

CLADDING: Metal Sales

SLIDING DOORS: Milgard

DOOR HARDWARE: Schlage

CARPET: Shaw

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the porous material simultaneously conceals and reveals: discreetly screening balconies along the street facade, it offers views out but not in. The diaphanous skin both defines the building volume and visually dematerializes it—a tension that shifts with the daylight and, by night, with illumination from within. And, in purely practical terms, the sheer layer shades the interior (even with great expanses of glazing), minimizing heat gain while ushering in breezes.

O'Herlihy has experimented before with facades of solid and perforated metal panels on Los Angeles apartment buildings, most notably at Formosa 1140 (RECORD, July 2010, pages 91–93). But there, horizontals play energetically against verticals in a vibrant red-and-orange facade. By contrast, Cloverdale749 has an almost entirely white-on-white palette and an exterior composition accentuating the vertical rhythms of the pleated and fluted metal panels (with a nod, says the architect, to the elongated lines of a vintage Art Deco tower nearby).

Cloverdale749's striking whiteness (with deep-brown stucco in the shadowy recesses) was also influenced by its context—but, in this case, was chosen as an antidote, says O'Herlihy, to the "ubiquitous beige or yellow" of neighboring apartment buildings. This isn't a faux Tuscan villa, currently the favored model for small condo buildings in Los Angeles, but a work in pure-white, clean-edged metal, celebrating, as he puts it, "the Modernist ethos."

Rather than striking a single note, however, this minimalist palette becomes a foil for the play of light and shadow across the facades' vertical ridges and patterns of perforation. And instead of repeating a formulaic rhythm over the elevations, LOHA allowed the unique conditions of each unit—views, adjacencies, exposure to sunlight, and point of entry—to dictate varied design decisions that, in turn, animate the exterior composition.

Inside, the apartments have lofty ceilings (just under 10 feet), open plans in the main living spaces, wide-plank oak floors, dark wenge kitchen cabinets, and daylighting through the extensive glazing, as well as clerestory windows.

The client and architect anticipated these condos' attracting 30- or 40-something buyers in creative lines of work, and that prediction has hit close to the mark. Current owners include people in graphic design and screenwriting, and other areas of the film industry. Even during construction, the project drew local attention. One couple living down the street, for example, tracked its progress from the start and snapped up a unit as soon as it was ready. All the condos, ranging in size from 1,500 to 1,800 square feet, sold well, fetching up to $900,000, with the quality of the design commanding higher prices than similarly sized nearby units.

"The influx of accomplished, relatively young people choosing to live in the city seems to be driving a demand for quality design," says the architect. "You can take great ideas from single-family houses and apply them to apartments, but that wasn't always the expectation in Los Angeles. Now clients are saying, 'I want good architecture, not flimsy stucco boxes with tacked-on windows.'"

With its attention to detail and invention, authentic materials, and individualized solutions, Cloverdale749 may be part of an emerging new breed. Born in the Los Angeles sunshine, it is, in many respects, the anti-dingbat—until now an exceptionally rare species in this town. ■

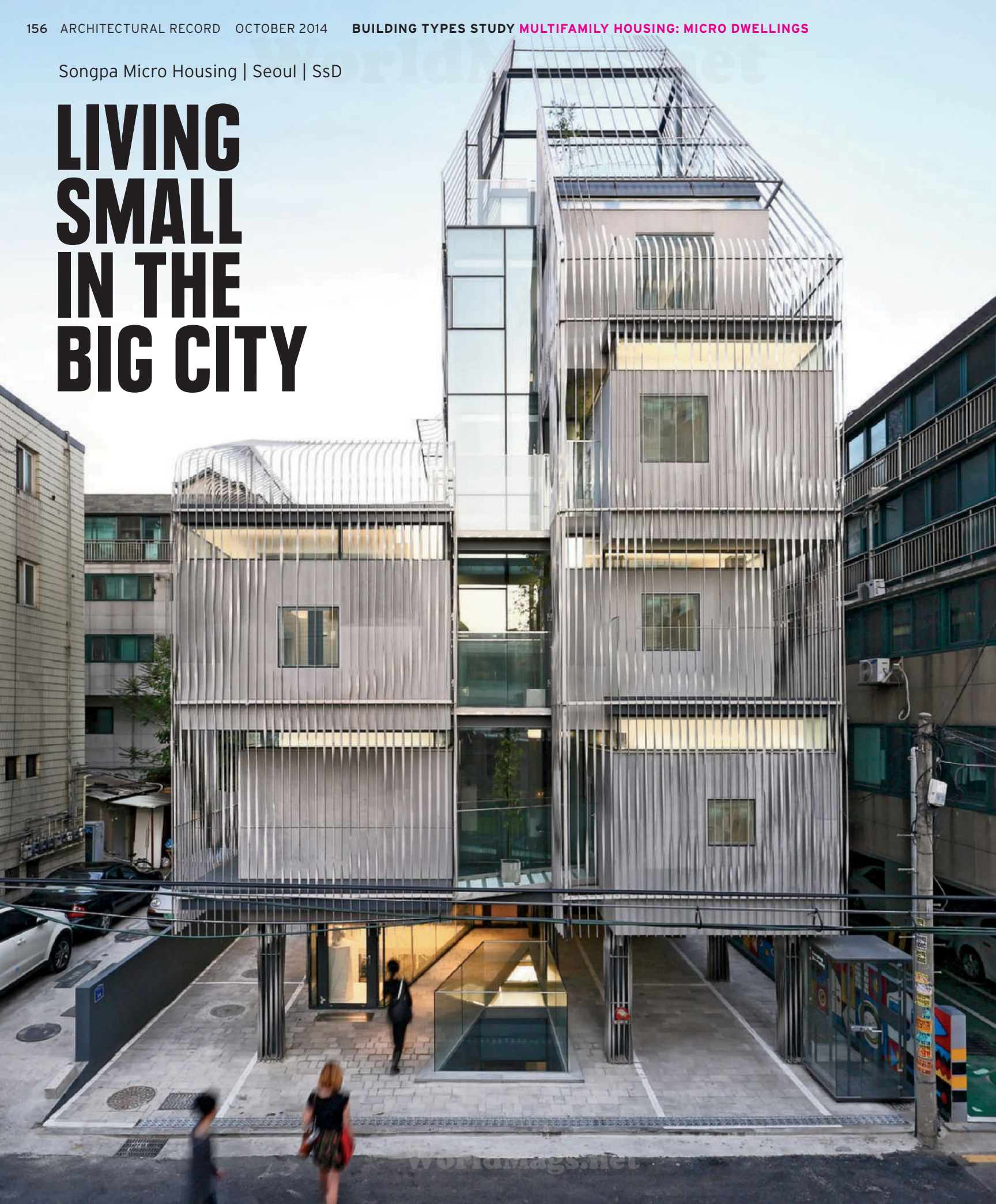


PRIVATE PASSAGE Dispensing with interior corridors, the circulation runs along the building's exterior. Each of the three units entered at grade has its own private entrance zone, a small, recessed area that sets up the entry sequence through a series of thresholds.

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Songpa Micro Housing | Seoul | SsD

LIVING SMALL IN THE BIG CITY



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Adapting to a changing program, an inventive project in Seoul mixes micro and small apartments with arts-focused functions.

BY CLARE JACOBSON

PHOTOGRAPHY BY SSD

Although they used repetitive units and simple construction in their Songpa Micro Housing in Seoul, Jinhee Park and John Hong of Single Speed Design (SsD) brought variety and style to the 5,500-square-foot project by animating the spaces in between and around the tiny apartments. Wrapped within a striking container of stainless-steel louvers and enhanced with outdoor and shared spaces, the eight residences subvert the monotonous forms of most micro housing. By design—and ultimately by the client's changes to that design—the project shows that this building type can play a flexible role in a city's mix of housing.

SsD stacked six stories of 120-square-foot boxes, pushing some forward and others to one side to create narrow balconies on the roofs of the units below. Picture Tejo Remy's Chest of Drawers for Droog, not your grandmother's credenza. The cement-panel boxes were constructed on-site using two sets of dimensions to add variety and were then placed within a structural steel frame. The stainless-steel scrim around the dwelling units presents a unified front to the street while providing privacy to outdoor decks, and hiding messy gas pipes. Eight variations in the bending of the steel give the screen a flowing rhythm.

The units themselves are tiny, but SsD designed built-in furniture—including Murphy beds and pullout tables—to give them a bit more space and a unified aesthetic. These interiors were prefabricated and then installed in only two days. (Park began her career as an industrial designer and brought her experience to the task.) A claustrophile will find comfort in the walk-in-closet-sized space, with its neat white doors and drawers, while a claustrophobe will appreciate design strategies that open up the space. For example, clerestory windows run the perimeter of each apartment, creating the effect of a floating ceiling. In addition, private

BOX SET
The six-story building, with its stacked boxes set behind a steel screen, stands out in a neighborhood of apartment blocks and light commercial buildings (above). The architects pushed parking spaces to one side to free up the ground floor for an entry plaza (opposite).

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decks and small porches offer some breathing room. Wide hallways, furnished with ottomans, provide light-filled communal areas. The outdoor spaces have the added benefit of not being included in the gross floor area calculation, so the building could be a bit bigger. And the corridors are not counted toward parking requirements, so a welcoming entry plaza replaces the more typical ground-floor parking lot.

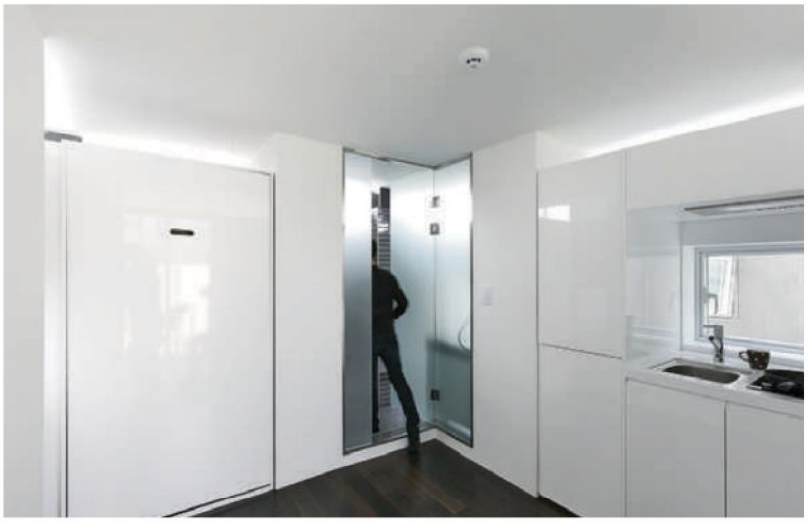
The project, which replaced a four-story multiuse structure, stands on a quiet block lined with brick and concrete residential buildings in Seoul's Songpa District. The district has little of the style of the nearby Gangnam neighborhood. Instead of Gucci and galleries, Songpa is characterized by apartment buildings and light commercial structures.

In South Korea, young people have traditionally lived with their parents until they marry, so neighborhoods offer mostly multi-bedroom apartments. But Korean society is changing. According to government figures, population growth in the country has declined from 16.32 percent in 1960 to 1.53 percent in 2010. One- and two-person households accounted for 48.1 percent of the housing market in 2010 and are projected to increase to 68.3 percent in 2035. Micro housing that can serve this population has some precedents in Korean society, including *goshiwon* (short-term one-room sleep and study spaces for students); *goshitel*, *oneroomtel*, or *livingtel* (longer-term rental apartments); and *officetel* (buildings that combine studio apartments with work spaces). Park says developers have recently rushed in to build micro housing, taking advantage of new low-interest construction loans designated for *doshihyung saenghwal jutek* (urban living housing) for one- or two-person households.

SsD notes that the design of its Songpa building differentiates it from other micro-housing projects. "We pushed the client to do something more interesting," Park says. The clients—members of a local family headed by Chanill Lee, who owns several hospitals and has an interest in art—were receptive. They had visited SsD's White Block Gallery (RECORD, December 2012, page 68) and agreed with Park and Hong that an innovative design could attract a creative clientele and better compete against projects by big developers. The size of the Songpa units, smaller than Seoul's more typical 200- to 300-square-foot micro housing, also makes









TIGHT FIT Jinhee Park used her training as an industrial designer to good advantage, approaching the project as a machine for living. The interiors of the 120-square-foot micro units were prefabricated off-site and installed in just two days. Murphy beds, pull-out tables, and all kinds of built-ins make the most of every square inch (top, middle, and above). After the client decided to change the program a bit, some micro units were combined into 240-square-foot apartments (above, left). All of the dwellings have monochromatic finishes and clerestory windows that help make the spaces feel bigger.

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them more affordable.

As the project progressed, the original plans changed, and half of the floors were redesigned for the Lees' own use: a basement meant to be a work studio for resident artists was built as a café and toy store, second-floor units were converted into an art gallery, and the fourth floor was remade into an apartment for the family's daughter. In addition, some of the 120-square-foot micro units were combined into 240-square-foot one-bedroom apartments. This means that only five of the planned 16 micro units were built. Yet the modules proved adaptable to changes in the program.

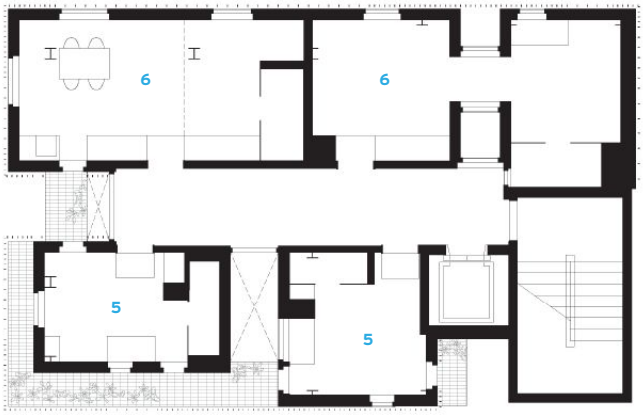
With the new mix of units and uses, it is unclear if the building will produce the kinds of social interaction that SsD had originally planned—such as residents congregating in the wide corridors and talking to each other from various bridges and balconies. But the innovative scheme should attract a design-focused clientele. In a perfect ending, the society they choose to make there will be as creative as the building that contains it. ■



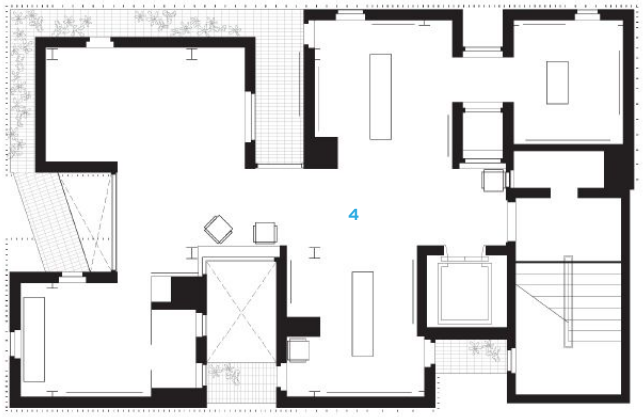
COMMUNAL SPIRIT The spaces between the dwelling units help distinguish the project from most other micro-housing developments. Wide corridors and short bridges, for example, encourage residents to hang out together and interact (above and left).

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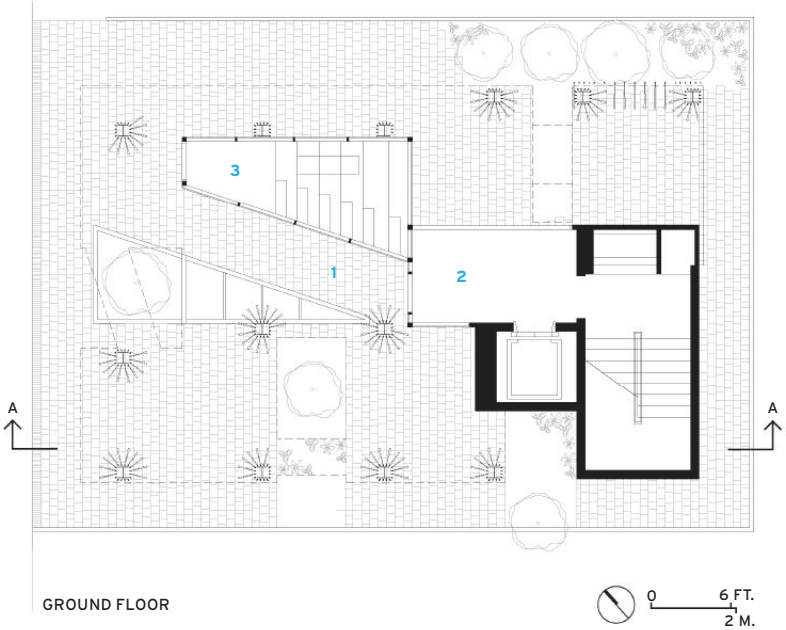


THIRD FLOOR



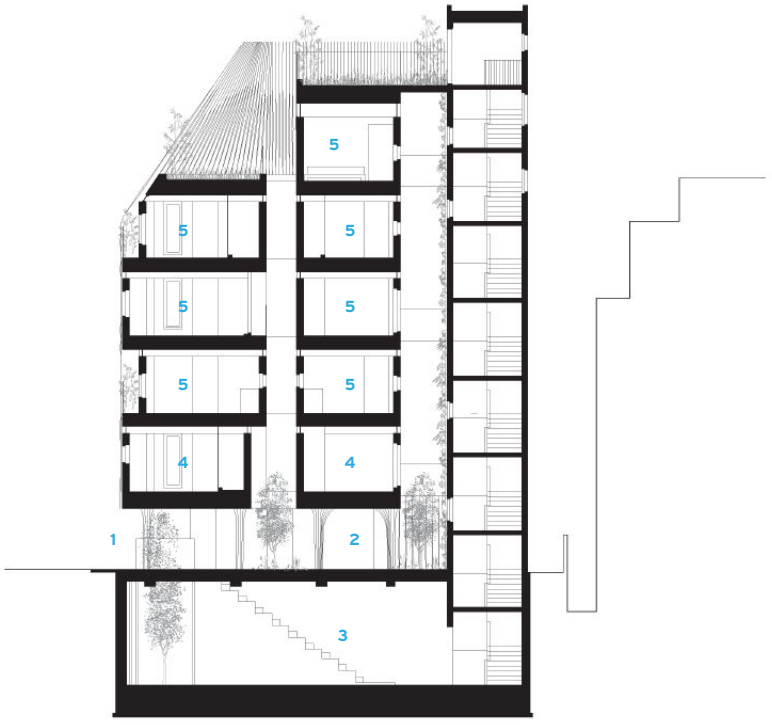
SECOND FLOOR





GROUND FLOOR

0 6 FT.
2 M.



SECTION A - A

0 6 FT.
2 M.

1 ENTRY
2 LOBBY
3 CAFÉ/TOY STORE
4 GALLERY
5 SINGLE UNIT
6 COMBINED UNIT

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TUCKED AWAY
Originally envisioned as a work studio for artists living in the building, the basement space now serves as a café and toy store (left). A glass box on the ground floor offers views and access to the café (right).



credits

ARCHITECT: SsD – Jinhee Park, principal in charge; John Hong, collaborating principal; Seung-hoon Hyun, project manager; Taylor Harper, Allison Austin, Evan Cerilli, Mark Pomarico, Yufeng Zheng, Victor Michel, Virginia Fernandez Alonso, design team

ARCHITECT OF RECORD: Dyne Architecture

ENGINEERS: Mirae Structural Design Group (structural)

GENERAL CONTRACTOR: Kiro Construction

CLIENTS: Chanill Lee, Donguk Lee, Jayoung Lee

SIZE: 5,500 square feet

CONSTRUCTION COST: $1.5 million

COMPLETION DATE: June 2014

SOURCES

CEMENT PANELS: Sinkwang

CURTAIN WALL: Parker E&C Korea

CABINETWORK AND WOODWORK: Madein

PERMEABLE PAVING: Zauum Uniblock

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THE BIG SQUEEZE



As cities wrestle with an affordable-housing crisis, some people see micro units as one option to explore.

BY JOSEPHINE MINUTILLO

Chances are, if you live in a city, you live alone. More than half of all adults living in New York, Austin, Denver, and Seattle live by themselves; in Washington, D.C., 71 percent of adults are single. In the United States as a whole, the number of single-person households has quintupled since 1960 and now represents 27 percent of the total, according to census figures. This dramatic change in demographics, coupled with the recent economic crisis and growing environmental concerns among the general population, is affecting attitudes about lifestyle. This country's love affair with everything big is beginning to sour as some Americans shift from having more and consuming more to being content with less—particularly when it comes to house size. A smaller home means less to heat, less to furnish, and less to maintain. And, generally speaking, less out of pocket.

Living smaller is not something new. Architects have been grappling with the challenges of designing small spaces for over a century. It started, not surprisingly, in cities, as the switch to industrial societies made the demand for affordable worker housing far exceed the supply. Dutch architect J. J. P. Oud designed the

PHOTOGRAPHY: © KLAAS VERMAAS (THIS PAGE); COURTESY DAVID BAKER ARCHITECTS (OPPOSITE)

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innovative Kiefhoek low-rise housing project in Rotterdam in 1925, a key example of the *existenzminimum* (minimum subsistence dwelling). Built for 300 families, it was restored in the 1990s and remains in use.

In the United States, efforts to improve the squalid living conditions of tenement dwellers led to projects like the now-landmarked apartment houses on Manhattan's Upper East Side built by the City and Suburban Homes Company at the turn of the last century (where this writer happily resided for several years in a rent-stabilized studio). Within the buildings, generous courtyards provide light and air in every room of the units, which average 370 square feet.

At about the same time, local authorities in cities throughout the country passed legislation requiring exposure to light and air in dwellings and setting a minimum size. But those very laws enacted at the turn of this century to protect the quality of housing—which include density and parking regulations—have until recently hampered developments of the *existenzminimum* of today, namely the micro unit. Targeted at young, college-educated individuals, the micro unit serves as a center-city option for those who prefer to have their own space rather than cramped quarters (often illegally altered) with roommates.

"The thought was that only poor people would live in such tiny apartments," says David Baker, a San Francisco architect who is working on two market-rate micro-unit developments. "But micro units have become a viable housing niche product."

A 2012 change to San Francisco codes reducing the total minimum area of a newly constructed legal residential unit from 290 square feet to 220 square feet, including closets and bathroom, has opened the market to a novel type of housing. David Baker Architects is currently designing 1174-1178 Folsom, a 42-unit rental project in the South of Market (SoMa) neighborhood with apartments ranging in size from 290 to 380 square feet. The firm is also working on 388 Fulton in fashionable Hayes Valley, a for-sale development that combines two-bedroom apartments and micro units.

Both projects feature some communal space, such as an outdoor deck and courtyard for all residents to use. "Micro housing is not a trend but a demand. People would rather be in the thick of things in a small space than a commute away in a big space," says Baker. "Some think it's immoral, but driving 70 miles to work—is that a good idea?"

New York requires units to be at least 400 square feet in most parts of the city. The renovation of an existing 425-square-foot brownstone loft on Manhattan's Upper West Side gave Specht Harpman Architects the opportunity to bring high design to a small walk-up apartment. Though oddly configured, the unit had the advantage of 25 feet in height and access to a roof terrace. The architects created four separate levels, including a cantilevered bed pavilion, that flow into each other. "It was like playing a game of Tetris," recalls Louise Harpman. "And everything inside does double duty." Stairs feature built-in storage, and the kitchen contains fully concealed appliances and a countertop that wraps into the raised living platform to accommodate an entertainment system.

While this was a one-off project for the firm, Scott Specht has been passionate about micro housing since his days as an architecture student. It was then that he first experimented with the zeroHouse, a prototype design for a small, fully





THEN AND NOW At J. J. P. Oud's Kiefhoek housing project in Rotterdam, apartments built in 1925 have 650 square feet and their own entrance porch (opposite). In San Francisco, David Baker Architects has designed 388 Fulton (top) and 1174-1178 Folsom (above), projects that bring micro units to fashionable neighborhoods.

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ON THE LEVEL
Specht Harpman's Manhattan micro loft incorporates four levels in a 25-foot-tall space (drawing, bottom). A cantilevered bed pavilion is clad in dark wood (far left). Two sets of stairs, including one from the sleeping area to a roof terrace, feature built-in cabinetry and drawers (left).

self-sustaining modular home that can be built anywhere. Though he has raised early investment money to develop the project, it has yet to be realized. In the meantime, the firm is now designing a 12-unit micro-loft building in Austin. "We're not promoting an ascetic lifestyle," says Harpman. "We're just reacting against the McMansionization of housing."

In Seattle, where regulations are less restrictive than those of New York, a number of micro-unit developments have already been built and are renting for an average of $660, half the price of a typical one-bedroom. But even New York is moving forward, albeit tentatively, with this type of housing. A waiver by former mayor Michael Bloomberg has allowed a micro-unit development in the Kips Bay neighborhood of Manhattan to get started. Now under construction and expected to open next summer, the nine-story building features 55 prefabricated apartments that range in size from 265 to 360 square feet. Designed by nArchitects, the building combines subsidized and market-rate residences, with 40 percent of the units reserved as affordable housing and several set aside for veterans. While rents for market-rate units have yet to be determined, affordable ones will range from $940 to $1,800 a month.

Mimi Hoang and Eric Bunge, the principals at nArchitects, were not initially on board with the idea of micro housing. "Our first take was that it was horrific to put people in such small spaces," says Bunge. But after remembering the substandard 350-square-foot East Village apartment the married couple shared for several years when they first moved to New York, he started to think differently. "We recognized [the micro unit] as a necessary type and that we could have an impact on making it a better prototype."

The firm's Kips Bay building is designed to be fully accessible and to exceed building codes for light and air. The small units are broken up with different flooring materials, because, as Bunge says, "Spaces feel bigger when you divide



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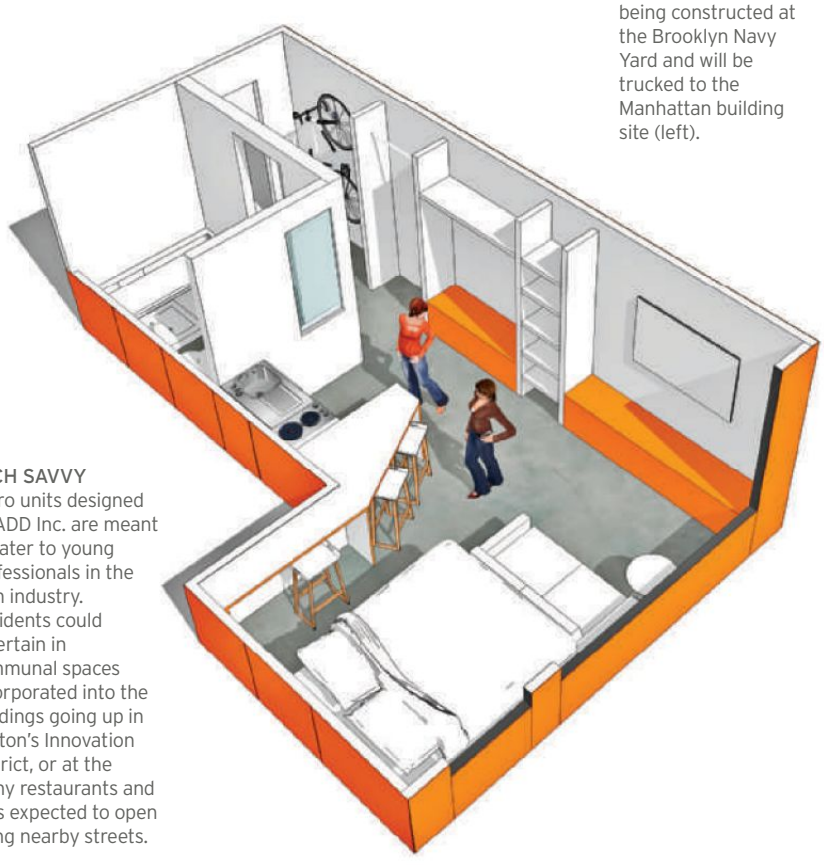


them and populate them with things." The 9-foot-8-inch ceiling heights offer a spacious feeling and provide overhead storage. "The proportional relationship of the tall space and very large windows that are typical in luxury and larger apartments create a loft-like feeling here," says Bunge.

Current New York mayor Bill de Blasio has not excluded micro units in his plan to build hundreds of thousands of affordable-housing units. In Boston, Thomas Menino relaxed existing building codes when he was mayor, allowing for the construction of micro units in the city's waterfront Innovation District to lure young tech workers. Local firm ADD Inc. is currently designing two high-rise projects that include micro units—which rent for 10 to 20 percent less than traditional studios—on lower floors, with luxury apartments on higher floors. "We struggle with affordability in these types of projects," says ADD principal Tamara Roy. "But those units are definitely at the lowest price point in a very desirable area."

Critics of micro housing say it is just a way for developers to make more money by squeezing more apartments into a building, and that people tend not to live in tiny spaces for long, so that rapid turnover results in rapid deterioration. The micro-unit projects in New York City and Boston—and to some extent San Francisco, which has capped the number of such developments allowed to be built—are test cases to determine if compact living is a fad or a real housing alternative for a growing population of singles, childless couples, and seniors who see the city as their living room. ■

SMALL MINDED
A micro-housing project in New York by nArchitects has tall ceilings to provide overhead storage and a loft-like feeling. Sliding glass doors give the impression of a terrace (above). The apartment modules are currently being constructed at the Brooklyn Navy Yard and will be trucked to the Manhattan building site (left).



TECH SAVVY
Micro units designed by ADD Inc. are meant to cater to young professionals in the tech industry. Residents could entertain in communal spaces incorporated into the buildings going up in Boston's Innovation District, or at the many restaurants and bars expected to open along nearby streets.

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Approaching Zero

Design teams reach the once-elusive goal of creating buildings that produce as much energy as they consume.

By Joann Gonchar, AIA

A BUILDING that produces all the energy it requires, without sacrifices to its operations or concessions of human comfort, might sound like pie in the sky. But according to the New Buildings Institute (NBI), 160 commercial and institutional buildings in the U.S. are targeting or have achieved net zero energy—meaning that, over the course of a year, they produce at least as much energy from renewable sources as they consume. Although 160 admittedly is a small number, only two years ago the nonprofit institute's count was less than half of that, at 60 buildings. What's more, these aspirations are no longer limited to small demonstration projects: net zero energy buildings (NZEBs) now encompass everything from schools to federal office buildings and laboratories, and many have large, sophisticated programs.

A net zero building will have a vastly reduced energy appetite—a necessity if all of its energy needs are to be met with renewable sources, since its power production capability will generally be limited by the number of photovoltaics (PVs) that will fit on the roof. However, such buildings' achievement is not measured in comparison to some theoretical baseline, as is the practice with green building rating systems like LEED. "We are no longer talking about buildings that are 20 or 30 percent better than code," says William Maclay, author of the recently published book *The New Net Zero* and founder of an eponymous architecture firm focused on sustainable design, based in Vermont. An absolute evaluation method has replaced a relative one, he explains: "The new metric is zero."

Although "net zero" has an inherent clarity, there is still some

J. CRAIG VENTER INSTITUTE

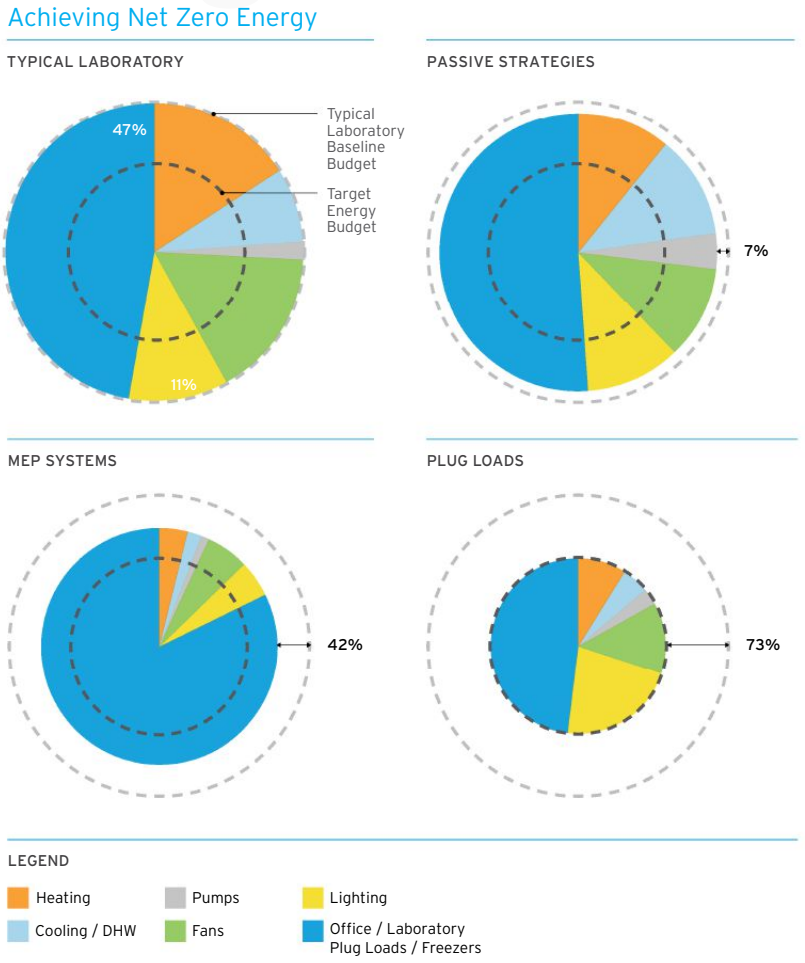
The new 45,000-square-foot research and office building for the Venter Institute in San Diego, designed by ZGF (above), has 26,000 square feet of rooftop PVs expected to cover all of its energy needs. The project team gradually chipped away at the energy use of a typical lab by first employing passive architectural strategies, then devising the most efficient building systems possible, and lastly by focusing attention on plug and process loads (opposite).

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debate among members of the design and construction community about what exactly constitutes an NZEB. Within the generally agreed upon net zero rubric, a number of variations are possible: all of the renewable energy required for operations could be produced within the building's footprint, or it could be supplied from within the boundaries of its property. Another alternative is that the structure is powered by fossil fuels, such as natural gas, burned on-site, as long as this consumption is offset by renewable energy that the building produces. Depending on who is creating the standards, any one of these examples may or may not qualify as a net zero building.

Only one organization offers a national third-party certification program for NZEBs—the International Living Future Institute (ILFI). It actually requires that buildings be net *positive*: in order to qualify under the latest version of ILFI's certification system, buildings must generate a small surplus of energy with on-site renewable energy, enough to satisfy 105 percent of the project's energy needs on a net-annual basis. Combustion is not permitted, even with biomass or biogas harvested or captured on a building's surrounding property. The logic behind the restriction is that such on-site resources are available to only a small number of projects, explains Brad Liljequist, technical director of the Living Building Challenge, ILFI's certification program. "We want a vision that can transform the whole economy," he says.

One of the most ambitious recent buildings aiming for net zero operations is the J. Craig Venter Institute in La Jolla, California. Named after the institute's founder and CEO—one of the first scientists to sequence the human genome—the 45,000-square-foot Spanish cedar–clad building surrounds a central court with wet labs, computational research facilities, and office space, and sits on land leased from the University of California, San Diego, that overlooks the Pacific Ocean. Designed by ZGF and completed last February, Venter has 26,000 square feet of rooftop PVs expected to cover all of its power needs—no small feat, considering that laboratories are notorious energy hogs.

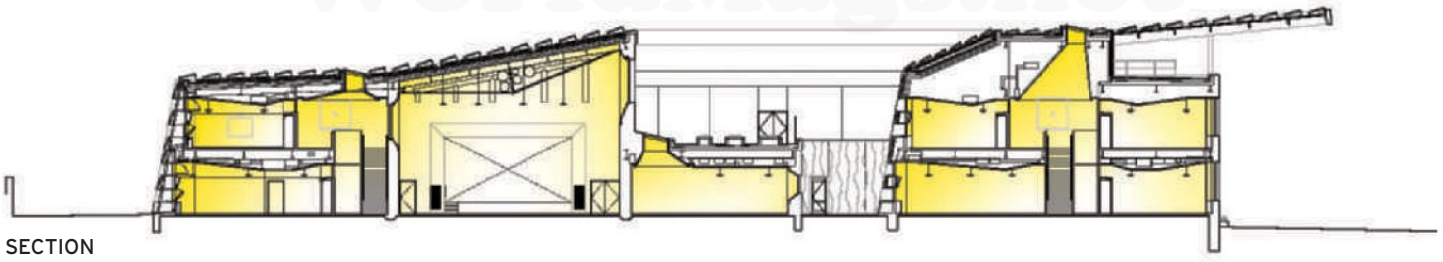
Ted Hyman, ZGF managing partner, explains that the project team gradually chipped away at a typical laboratory's energy use in a design process that is not uncommon for high-performance buildings. The team first applied passive architectural strategies (proper orientation, deep overhangs, and a tight building envelope) and then devised the most energy-efficient building systems possible.

As a final step, Venter's design team took aim at the building's so-called plug and process loads (PPLs)—those loads not related to general lighting, heating or cooling, or other systems that provide comfort to the occupants. They are created by devices like printers and computers and other appliances powered by AC outlets, and by equipment that supports activities such as cooking and refrigeration. Architects and engineers rarely attempt to accurately predict or reduce such consumption, since they typically have little control over these unregulated loads. But in this case, they have actively worked toward reducing PPLs by surveying Venter's existing labs and making recommendations for new equipment and operating practices.

Other projects that have strategies for keeping PPLs in check include PS 62 Richmond, a $70 million pre-K through 5th-grade school under construction on New York's Staten Island. The 69,000-square-foot build-

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SECTION

ing, designed by Skidmore, Owings & Merrill (SOM) and slated for completion in the fall of 2015, aspires to be the first net zero school in the Northeast. Bruce Barrett, a vice president at the city's School Construction Authority (SCA), points to the cafeteria, where the team is working closely with the Department of Education's food-service provider to make meal preparation as energy-efficient as possible. Barrett also cites the faculty lounges, which will be equipped with coffee machines and refrigerators, among other amenities, to discourage teachers from bringing their own power-hungry appliances into their classrooms. The view from these lounges into the two-story building's inviting central court should offer extra inducement for teachers to make use of the shared facility, according to the project team.

Naturally, other architectural features as well as building systems will play a crucial role in helping PS 62 reach net zero. For instance, the corridors are ingeniously offset so that the same skylights illuminate the hallways on both the first and second floors. By employing daylight-sharing techniques, such as interior clerestory windows and ceilings contoured to reflect sunlight, the corridor skylights will also help illuminate the classrooms. The school will have many state-of-the-art features, including an ultra-high-performance building envelope, an 80-well geoexchange system, and demand-control ventilation. As its source of renewable energy, about 2,000 PVs will wrap the roof, south-facing elevations, and the canopy over the parking lot. The panels are estimated to generate 662 mWh per year.

It isn't unusual for projects to take several years to reach net zero performance. In the summer of 2010, a design-build team that included architecture firm RNL, Haselden Construction, and Stantec's mechanical engineers completed the first 220,000-square-foot

PS 62 RICHMOND

The New York City public school designed by SOM for a site on Staten Island (right) will derive its renewable energy from PVs covering the roof and south-facing elevations. To minimize reliance on electric lighting, the building is configured so that skylights help illuminate both first- and second-floor hallways and adjacent spaces (above).





RESEARCH SUPPORT FACILITY An office building on the Golden, Colorado, campus of the National Renewable Energy Laboratory comprising three wings (left) relies on a number of tightly coordinated strategies to achieve net zero, including narrow floor plates to facilitate penetration of daylight, and insulated precast cladding chosen for its ability to increase the steel structure's thermal mass.

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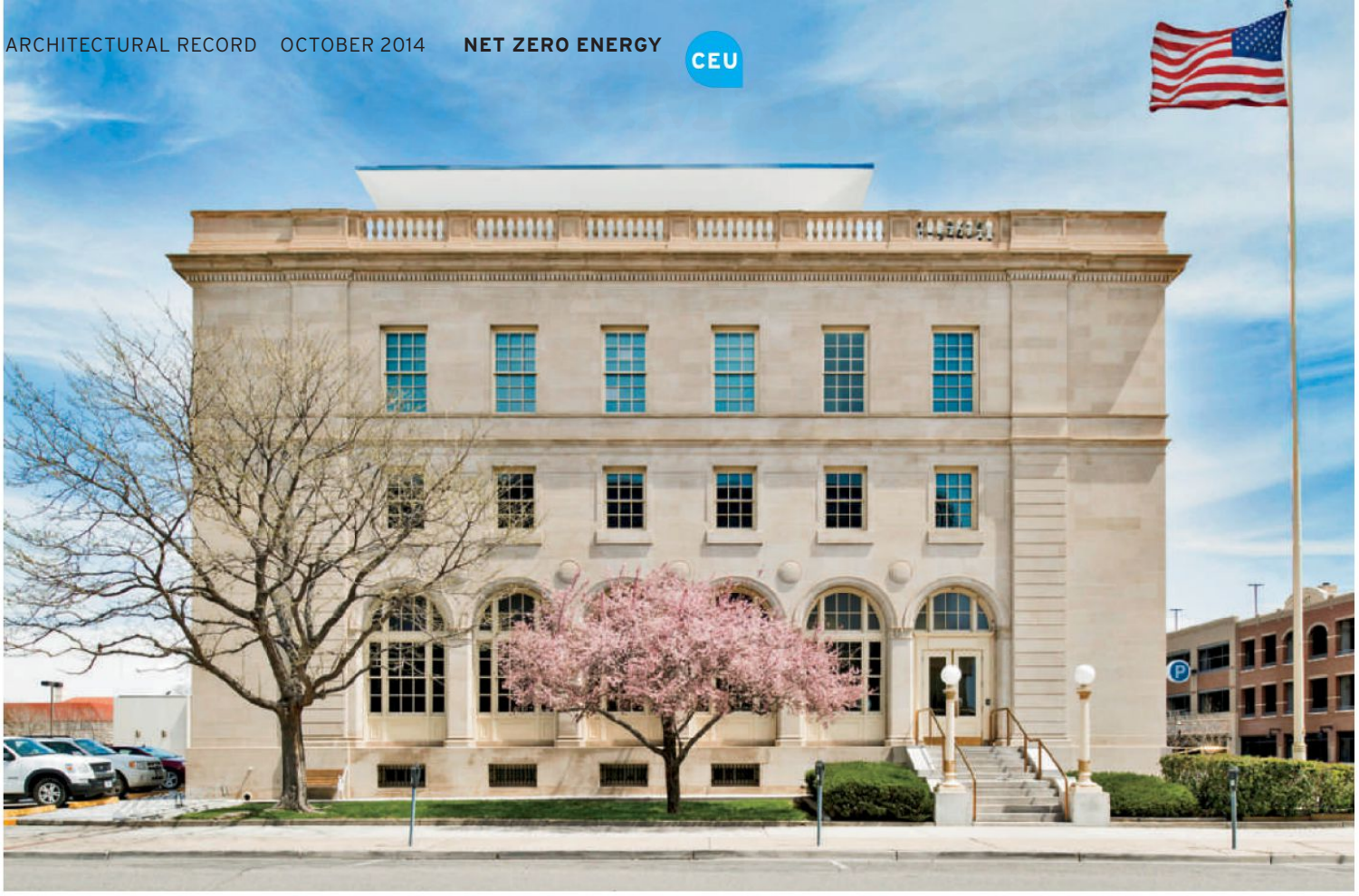




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As part of its $15 million revamp of a nearly 100-year-old Renaissance Revival structure, Westlake Reed Leskosky removed dropped ceilings in the gracious entry lobby (above). New energy-conserving systems include fluorescent and LED lighting with wireless controls and variable refrigerant flow heating and cooling. The rooftop PV array, barely visible from the west side of the building (top), was designed so that it wouldn't impinge on views of the southern, principal facade.

phase of a Research Support Facility at the National Renewable Energy Laboratory (NREL) in Golden, Colorado (RECORD, December 2010, pages 120–126). Just over a year later, the same team finished a 138,000-square-foot expansion. But only in April 2014 did NREL document the first complete year of net zero operations for the office complex, which has PVs on the roofs of its three wings as well as over two parking lots, and relies on a number of readily available energy-efficiency technologies combined in unusual ways. Reaching net zero is an ongoing process, explains Shanti Pless, an NREL senior research engineer. "It requires robust commissioning, metering, and tenant engagement, and then recommissioning," he says.

One building in the process of working toward its net zero goal is the Wayne N. Aspinall Federal Building and U.S. Courthouse in Grand Junction, Colorado. The project team of architecture-and-engineering firm Westlake Reed Leskosky and design-builder Beck Group proposed the target as part of its $15 million renovation of the nearly century-old Renaissance Revival structure, even though the objective was considerably more ambitious than the one set by the client, the General Service Administration (GSA), for LEED Silver certification and a 30 percent reduction in energy use when compared to the energy standard ASHRAE 90.1. Achieving net zero is likely to make Aspinall the first such building on the National Register for Historic Places.

In addition to restoring historic details and finishes, the firms' overhaul of the 42,000-square-foot structure, completed in early 2013, includes variable refrigerant flow heating and cooling tied to a 32-well geothermal system, dedicated outdoor air with heat recovery, and new fluorescent and LED lighting with wireless controls. The combined effect of these and other strategies was to cut Aspinall's energy use intensity (EUI)—that is, energy use as a function of a building's size—approximately in half. It went from 42.6 KBtu per square foot per year prior to the renovation to 21.2 afterward, without counting the contribution of the 123-kW PV array on the roof.

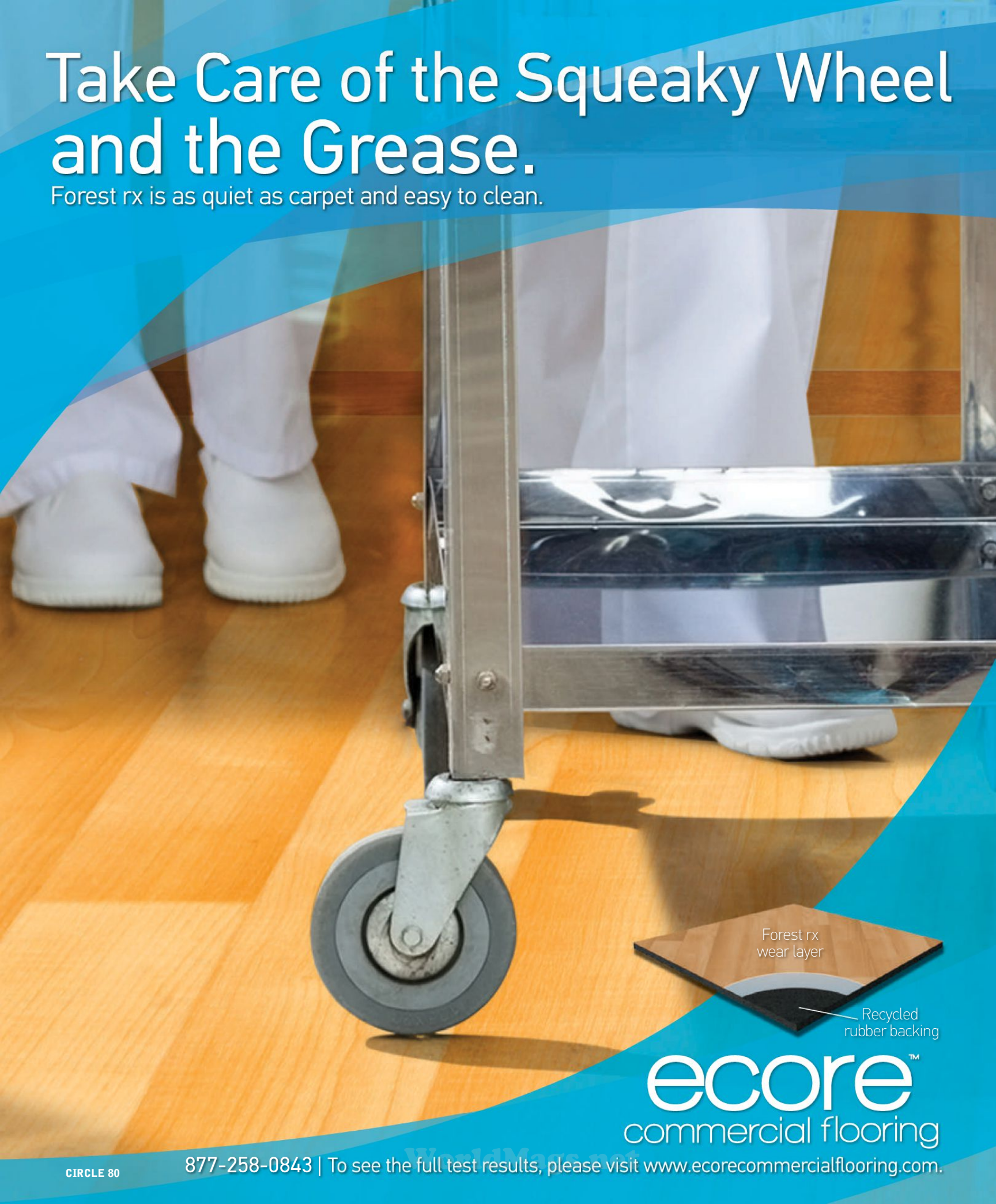
Although the reduction is impressive, it is not quite sufficient to achieve net zero. For the 12-month period ending in August 2014, the building ran at a net EUI of 7.1, according to Roger Chang, Westlake Reed Leskosky's director of engineering. He points to a number of problems identified during an ongoing measurement and verification period, including diminished power production caused by dust accumulating on the PVs during dry conditions and ice forming on the panels during severe winter weather; higher than expected nighttime plug loads; and incorrect thermostat settings. To remedy the situation,

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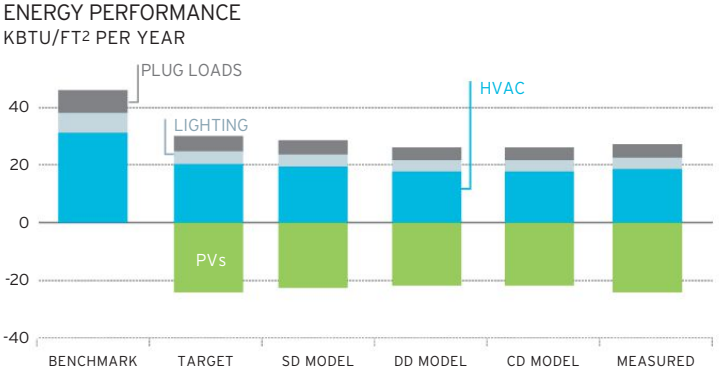
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DAVID AND LUCILE PACKARD FOUNDATION

The EHDD-designed headquarters for the Packard Foundation makes the most of the benign Los Altos, California, climate with a central courtyard (above). Despite equipment-operating problems, the building hit its net zero mark after its first year of occupancy (right).



settings and controls have been adjusted and the GSA has instituted an incentive program to encourage occupants to reduce their energy use. The plan now, Chang says, is to monitor the building closely over the next two or three years before installing additional PVs over a nearby parking lot if necessary.

Such teething pains, common with recently completed projects—both renovations and new construction—can easily derail net zero efforts. This was almost the case at the new 50,000-square-foot headquarters EHDD designed for the David and Lucile Packard Foundation, in Los Altos, California, which opened in 2012. During a particularly severe cold snap a few months after the nonprofit moved in, two of Packard's air-source heat pumps failed. For about two months, the building's fans and its two functioning heat pumps were kept running almost continuously, driving energy use way up, says Eric Soladay, a managing principal at Integral Group, the project's mechanical engineer. Even so, the headquarters consumed less electricity in its first year of operation than its 285 kW of rooftop PVs produced, owing to several tightly coordinated energy-conserving features like long and narrow floor plates that help maximize daylighting, an extremely thermally efficient exterior envelope, and a sophisticated building management system. In September 2013, Packard earned ILFI's net zero certification, making it the largest building to earn this distinction so far. "Usually the first year is considered training and the second year is when we start the verification process," says Soladay. "Doing it in one year was a push."

The biggest challenge remaining, experts say, is bringing the costs associated with ultra-energy-efficient construction down. But they also say the necessary technologies are becoming more readily available, more reliable, and less expensive. For example, according to ZGF's Hyman, chilled beams were considered exotic when he started working on Venter seven years ago, but now the heating and cooling devices are "practically ubiquitous."

Barrett, meanwhile, points to rapid improvements in LED lighting. As a result, PS 62 will rely almost exclusively on LEDs, even though tried-and-true fluorescent lighting was specified in the 2012 bid set. Because designers anticipated that LEDs would be a viable alternative by the time the school neared completion, the contract stated that the owner would provide final direction on lighting fixtures at a specific point in construction. A similar arrangement for the solar panels will allow the school to benefit from the latest developments in PV technology.

Peter Rumsey, a San Francisco Bay Area mechanical engineer who has been involved in at least 15 net zero projects, including Packard and Venter, predicts that costs will fall enough to spur a wave of net zero construction in the next five to 10 years. He sees particular promise in the retrofit market, especially of one- and two-story buildings, where the ratio of roof area to occupied area is advantageous for achieving net zero. "The vast majority of buildings in the U.S. are two stories or less," he points out. "There is tremendous potential." ■

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Learning Objectives

1 Define net zero energy.

2 Outline the necessary steps that project teams typically follow during the design process in order to create an ultra low-energy building.

3 Discuss some of the challenges that project teams often face during the post-occupancy measurement and verification phase for net zero buildings.

4 Define terms relevant to net zero buildings, such as "plug and process loads" and "energy use intensity."

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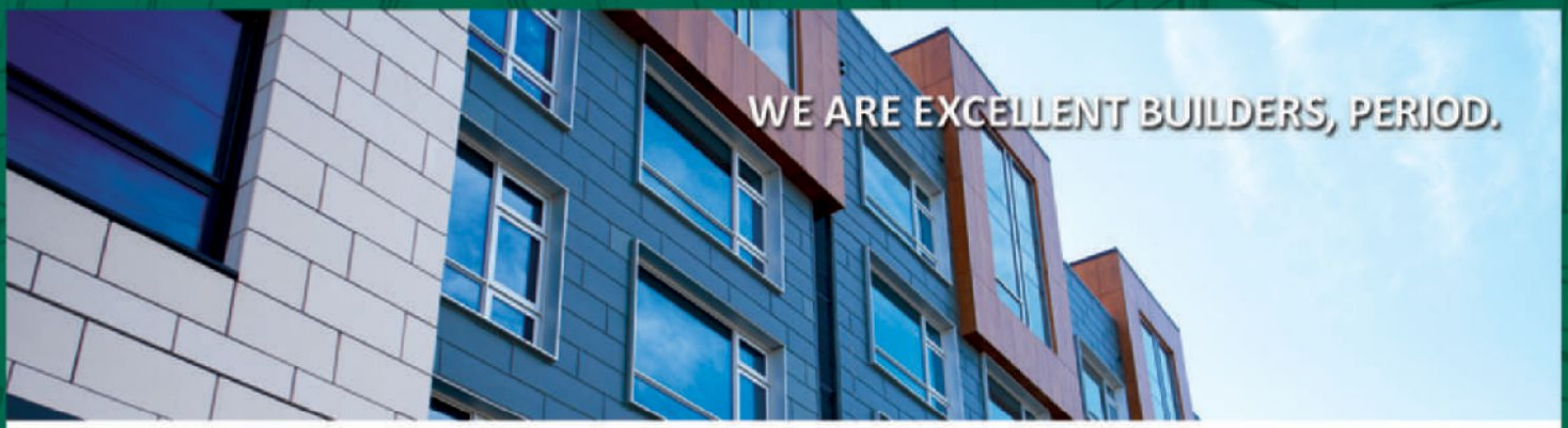
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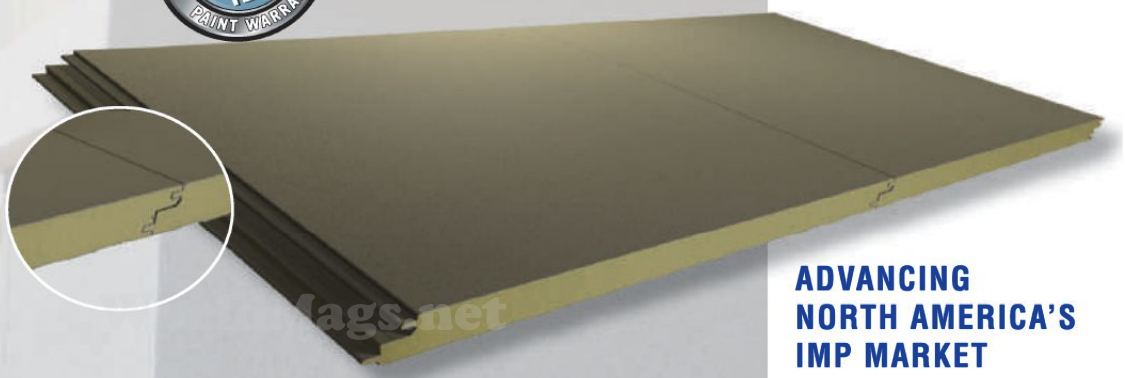
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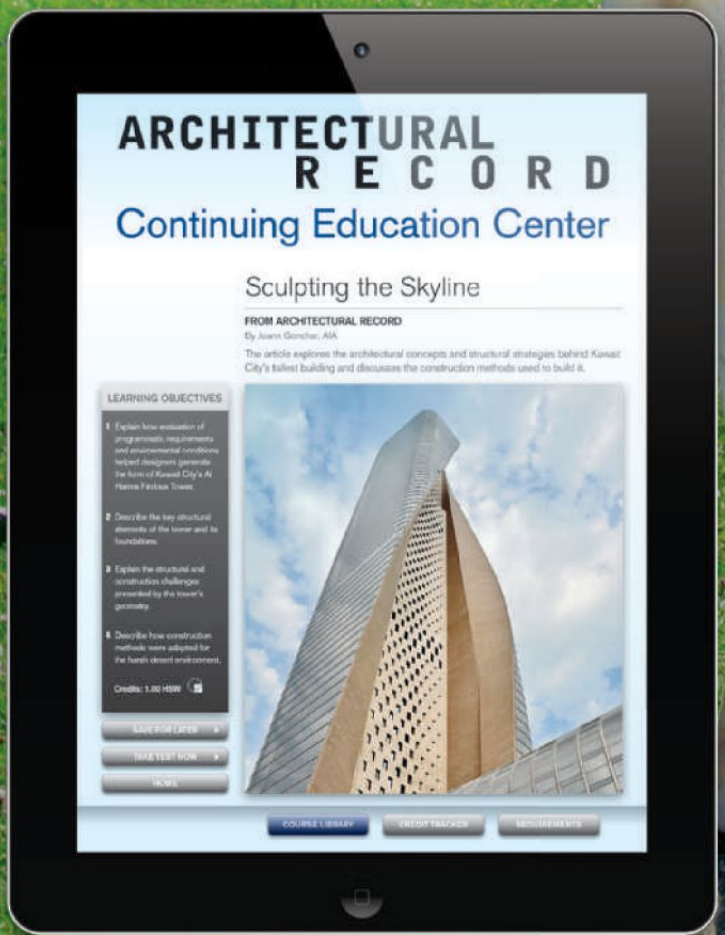
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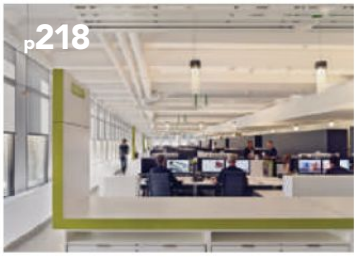


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Innovations in Multifamily Housing

New product options provide more creative design opportunities with better performance

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



Signs of economic recovery are being observed in many areas following the recent recession. Financing is more accessible, the job market has improved, and construction is picking up again as a result. In particular, new or renovated multifamily housing has been documented as one of the most active building types under design and construction. While there seems to be a variety of reasons behind this activity, they all spell good news for architects engaged in this market. As commonly happens, lots of activity breeds lots of innovation. This is definitely true among architects but it is also true among product manufacturers and suppliers across a wide spectrum of building components used in multifamily housing.

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Learning Objectives

After reading this article, you should be able to:

1. Identify and recognize the trends in the multifamily residential market that are driving an active and robust demand for this type of construction.
2. Investigate the design potential and innovative opportunities to create multiple family buildings that are flexible in use and sustainable by nature.
3. Assess the functional contributions of drainable air barriers and window systems as they contribute to energy-efficient, green, and sustainable design.
4. Determine the opportunities for interior design options using movable interior partitions and efficient built-in appliances.

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MARKET TRENDS BREEDING INNOVATION IN MULTIFAMILY HOUSING

Statistics for American households from the U.S. Census Bureau have been analyzed and reported on recently in numerous business and professional publications. They document a clear trend for an increasing need for multifamily housing both now and in the foreseeable future. One important aspect to understand, however, is that this trend will certainly vary by geographic region and over time. When looking at a region such as the Washington, D.C. metropolitan area for example, the George Mason University Center for Regional Analysis has shown that new multifamily permits peaked there in 2012 and development slowed a bit as units were absorbed by the market. While they estimated 19,000 units to be delivered in 2014, they also identified a need for about 66,000 households to require multifamily housing in 2015. So while there may be some normal ebbs and flows, the trend there is still definitely on the upswing.

All of this is consistent with the work of several national organizations that focus on multifamily housing. The National Apartment Association (NAA, www.naahq.org) published a 2014 forecast indicating that across the 100 largest metropolitan areas in the U.S., completed apartment units are expected to climb to about 231,000 units in 2014. That is an increase over the 187,000 units brought to market in 2013 and a notable jump from only 78,000 completed new units when the market bottomed out in 2011. For context, the National Multifamily Housing Council (NMHC, www.nmhc.org), which defines a rental apartment building as one with five or more units, recognizes 17.3 million individual apartments currently operating in the U.S. They point out that nearly 89 million Americans rent their housing—almost one third of all Americans and over 14 percent of all households. The NMHC estimates that construction of apartment communities built between 2008 and 2013 added an average of 210,000 new apartment homes per year worth more than $32 billion annually and providing jobs to over 270,000 workers. From a market trend perspective, NMHC has determined that apartment living now attracts a wide variety of people including those who prefer to rent even though they could readily afford to buy. Citing Professor Arthur C. Nelson, presidential professor and director of metropolitan research at the University of Utah's College of Architecture and Planning, the NMHC indicates that in order to meet emerging housing demands between now and 2020, half of all new residences built will need to be multifamily rental units.

Rounding out the picture, an affiliate of the National Association of REALTORS, the Institute of Real Estate Management (IREM, www.irem.org) has noted that many investors have begun turning their attention away from prime residential development locations and instead are looking at urban fringe areas. These up-and-coming neighborhoods attract young, upwardly mobile renters and pedestrian commuters. This trend implies opportunities for the transformation of dubious urban areas into vibrant, attractive, sustainable, and thriving neighborhoods with a mix of multifamily housing and urban amenities. IREM has also recognized and embraced the trend of green buildings and sustainable design in multifamily housing that improves financial performance, boosts property values, and makes a positive environmental impact.

Within the context of these larger trends and responses, building design and construction firms have brought their own creativity to multifamily housing by using a variety of available products and materials in innovative ways.

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Multifamily housing is taking many forms and appealing to people with different income levels, in different localities, and in different living arrangements for a whole variety of reasons.

IMPROVED CONSTRUCTION TECHNIQUES

Owners and developers have always wanted good construction quality and good economic value. Increasingly, particularly with condominium-type projects where the users become the owners, there are also demands for energy efficiency and long-term sustainability even beyond minimum code requirements. In multifamily housing, meeting these needs economically has meant improving the design and construction of the building envelope, particularly in exterior walls. It is also not surprising that various types of wood-framed construction have been used for these purposes when allowable by code. Standardized construction methods using readily available materials coupled with general time and cost savings are often cited for this choice.

When looking at the construction of framed walls, updated codes have recognized that good energy performance is about more than U-factors or R-values and requires attention to properly managing water, air, and moisture in those walls. Each of these are addressed in different ways. Controlling rain water involves the "four D's" of water managed design: deflection of water away from the wall, drainage of water that does get in, drying of the wall materials, and durability of all components. By contrast, controlling moisture, which is water in a vapor state, involves preventing it from diffusing through materials or infiltrating by moisture-laden air into a wall assembly. To assure proper performance, the codes have focused on three particular areas that are intended to improve the construction of framed multifamily walls. Specifically, they call for the proper use of vapor barriers, air barriers, and water-resistive barriers (WRBs), all discussed further as follows:

Vapor Barriers/Retarders

Codes require framed walls to have a vapor barrier or retarder installed on the "warm" side of a wall. The intent is to prevent gaseous water vapor from diffusing directly through building materials into a wall assembly. The requirements will vary by location such that in northern climate zones, an interior barrier is required while in southern climate zones it needs to be on the exterior. The type of barrier/retarder also varies by climate zone based on the amount of permeability (perm rate) they provide. There are three classes identified simply as Class I (.01 perm or less), Class II (0.1 – 1 perm), and Class III (1 – 10 perms). As a practical matter, the material used for this barrier can vary by location from low-permeability plastic sheeting, to kraft paper facing on insulation, or vapor retardant interior paint.

Air Barriers

Air barriers are addressed separately in the codes and are intended to be used to control the infiltration and exfiltration of air through a wall assembly. Unwanted air flow in building walls pushes out conditioned air and allows unconditioned air to enter, thus requiring additional energy to heat or cool the interior. Air barriers help lower energy requirements by reducing this air exchange in buildings and have been shown to save as much as 15 to 20 percent on space conditioning costs. Air barriers are also important in managing vapor or moisture since they can prevent moisture-laden air from penetrating into wall assemblies. If this moisture is not stopped, it can be absorbed by the materials or condense into water drops. This increases the moisture content of building materials, which can then deteriorate, compromise the structure, and potentially cause health concerns from mold and mildew. Effective air barriers reduce the possibility of moisture entering wall assemblies in the first place, thus reducing the moisture accumulation and damage potential.

Water-Resistive Barriers (WRBs)

In addition to vapor and air barriers, building codes require water-resistive barriers (WRBs) under all cladding systems to prevent water penetration into building assemblies. WRBs can be as simple as traditional asphalt-impregnated building paper or be as multifaceted as a high-performance, non-woven building wrap made from a synthetic sheeting material. The advantages of a modern synthetic wrap product over building paper include a WRB that is more breathable, more durable, and more easily sealed along the seams to create a continuous barrier over a variety of materials and in different configurations. Further, if the synthetic WRB is breathable and non-perforated, then it can also

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Double glazed fiberglass windows with low-E glass were a good fit for the Beranger Condos in Gresham, Oregon.

double as a continuous exterior air barrier, meeting the code requirements for both in a single layer.

When a high-performance building wrap is used as the WRB in a multifamily housing project, it takes advantage of several innovative advances in their development. First, as an engineered product, it creates a weather barrier behind exterior cladding to protect the sheathing and reduce water intrusion into the wall cavities. This is important in all wall systems since all cladding will likely allow some degree of water intrusion at some point. It is also particularly important in rainscreen assemblies where water is expected to enter behind a cladding material and is allowed to drain away. Second, as a vapor permeable or breathable product, WRBs allow water or moisture to escape, thus allowing any damp or wet materials to dry in a relatively short amount of time. During this drying, WRBs maintain their water resistance because they are constructed with pores that are large enough to allow moisture as a vapor to pass through but too small for water as a liquid to pass. Third, as an air barrier, a WRB will be an energy-efficient means to stop air infiltration and exfiltration through walls.

A significant innovation has come about by recognizing that WRBs can be enhanced to very effectively serve as a drainage component that contributes directly to the longevity and sustainability of the rest of the wall. It has been noted that traditional construction techniques such as masonry walls manage water and moisture by using a space or gap between the sheathing layer and the masonry veneer (cladding) to allow any accumulated water to exit through weep holes. Similarly, rainscreen installations use a gap between the cladding and the sheathing to allow water to drain away harmlessly. In any wall construction, failure of water to drain away can damage the cladding, or worse, the rest of the wall assembly. As such, there has been an interest in providing a similar drainage gap between building wraps and cladding.

The conventional means to create a gap in a framed wall system is to use furring channels or strips. This will work, but requires more labor, time, and cost as a result. One innovative alternative that has become recognized as a best practice solution is to use a drainable WRB building wrap that provides its own integrated method of drainage. For example, at least one manufacturer creates this gap by bonding 1.5-mm propylene spacers to a high-performance WRB building wrap. This depth is large enough to provide a true drainage space between the sheathing and cladding material. In essence, it acts as a full rainscreen system in miniature, without the added labor or cost. Further, it will work with all types of cladding systems, particularly those that can be moisture sensitive, such as wood or fiber cement siding.

When specifying WRBs/building wraps for multifamily housing projects, it is important to recognize that there are literally dozens of building wrap products available with wide variations in performance and cost. While most are made from polyethylene or polypropylene plastic, they can also vary in water resistance, drainage efficiency, water vapor transmission or breathability, ability to impede air flow, durability, tear resistance, cold weather flexibility, flammability and smoke developed ratings. Selecting a WRB that excels in all of these areas will assure best results overall. Beyond that, however, it is important that the WRB can be sealed properly and fully along the seams without undue penetrations from staples or nails. Some manufacturers offer full sealing systems that avoid the use of nails and staples and instead use a compatible adhesive, sealant, or tape.

Photo courtesy of Tamlyn



Continuous water-resistive barriers (WRBs) are required by code and provide improved construction performance.

Equally important are the details of how the WRB deals with openings in the wall such as doors and windows. Being able to flash and seal the WRB properly with window and door flashing materials will assure that water draining down the face of a drainable WRB will flow away properly and not behind other building elements into the wall.

OPTIMIZING PERFORMANCE WITH WINDOWS

Windows are an integral and important part of any multifamily wall system and as such, they need to address a variety of design criteria. The desire to provide views and natural light needs to be balanced with energy efficiency in the wall system. Energy costs need to be contained by controlling air drafts, solar gain, and heat loss. Occupant comfort needs to be addressed by avoiding air drafts, glare, and overheated spaces. Increasingly, particularly in urban areas, windows play an important role in resisting unwanted noise from outside sources as well. In coastal areas, resistance to the elements and weather including hurricanes becomes a factor. Developers are of course concerned about all of these things since properly addressing them can lead to higher rents in rental properties or purchase prices in condo units. Given all of these various design and user needs, it is not surprising that there are a lot of options and choices in window products being used in multifamily housing that take advantage of the most current technology and product design innovations.

Envelope Analysis

In order to fully account for the impact of windows on building performance, they should be looked at as part of an overall envelope analysis with an emphasis on the contributions offered by glazing types, air sealing, occupant comfort, and improved aesthetics. This is an important step on any project but especially on the renovation of existing buildings, particularly if the building is being converted

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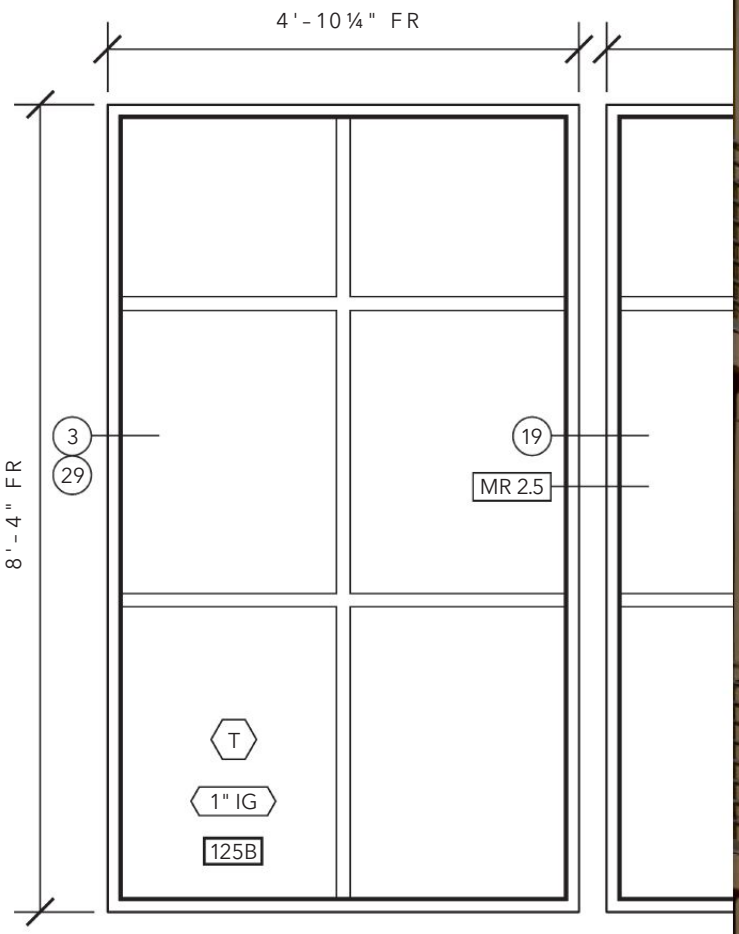
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from some other use (i.e. warehouse, school, etc.) into multifamily housing as has become very popular in many areas. This analysis can be done in-house by architectural firms using available computer modeling software or by working with window manufacturers who have customized software to analyze the options of different window systems in a given building envelope system. Either way, a baseline building can be modeled and the relative changes can be compared by modeling specific window designs, types, and options.

Testing and Standards

Pre-glazed window products are categorized in four standardized classes as identified by the American Architectural Manufacturers Association (AAMA), which is a non-profit trade association of manufacturers and others in the fenestration industry. Using the classifications of R, LC, CW, and AW, windows can be selected that are manufactured and tested to perform under increasing weather and structural demands related in part to the height of a building.

The National Fenestration Rating Council (NFRC) has developed the widely accepted NFRC Rating System to identify the overall energy performance in windows. This uniform rating and certification process quantifies the key elements of fenestration performance starting with the total product thermal transmittance (U-factor) of the window unit not just the U-factor of the glazing. It also identifies the solar heat gain coefficient (SHGC) and visible light transmittance (VT) of a particular window unit so those important factors can be identified. In some cases, they also identify the air leakage (AL) and condensation resistance (CR) of a window product as well. In short, all of these elements can be specified according to the design needs of a multifamily building and verified in the field by the factory-applied NFRC certification label.

NFRC certification is also recognized as the only means for a window unit to qualify for ENERGY STAR certification. The ENERGY STAR label is awarded by the U.S. Environmental Protection Agency to products that achieve superior energy performance compared to baseline minimum requirements. For windows, this means that the U-factor and SHGC values need to meet strict minimum levels under NFRC certification in order to earn the ENERGY STAR label. The levels were first established in 1998 and have been updated several times with the most recent standards effective in January of 2010. Updated performance levels for windows are anticipated to take effect in 2015.

Among the biggest difference between manufactured windows and their performance is the material used for the sash and frames. The common choices for multifamily housing are summarized as follows:

THE FOUR AAMA PERFORMANCE CLASSIFICATIONS FOR WINDOWS

- **R CLASS** – 15 psf design pressure – best for one- and two-family dwellings or small multifamily buildings.
- **LC CLASS** – 25 psf design pressure – best for low- and mid-rise multifamily buildings.
- **CW CLASS** – 30 psf design pressure – best for low- and mid-rise buildings where larger sizes, higher loading requirements, limits on deflection, and heavier use are expected.
- **AW CLASS** – 40 psf design pressure – best for high-rise and mid-rise buildings with increased loading and limits on deflection or where frequent and extreme use is expected.

Clad Wood Windows

Wood is one of the best thermal performing materials to use in a window frame system since it provides relatively high thermal resistance and excellent insulating ability. As a result, thermal bridging through the frame is reduced compared to metallic frame materials without thermal breaks. The wood used in the manufacture of window units is selected for strength and a low coefficient of thermal expansion. But perhaps the most dominating advantage of wood is its aesthetic appeal particularly on interiors. Windows made entirely of wood may be preferred in regions where wood construction prevails and exposed wood finish materials are popular. However, this will require ongoing care and maintenance to protect the wood from environmental or insect damage. Hence, wood windows clad on the exterior with a low-maintenance material such as aluminum are more commonly specified, particularly on multifamily projects. This creates a virtually maintenance-free condition on the outside while retaining the appeal of wood on the inside. Clad wood windows are often used where design flexibility is desired, where the warmth of wood will complement other interior woodwork, where low-maintenance exteriors are important, or in older existing buildings that require an authentic look.

Vinyl Windows

Solid vinyl framed windows have gained in popularity in recent years since they are comparatively lightweight, have been shown to be as thermally efficient as wood, and are often the most economical option available. Typically, vinyl windows do not corrode or rust and the integral homogeneous color does not wear away, blister, crack, peel, or pit. Some manufacturers limit colors to lighter ones such as white or almond since their darker colors can promote heat buildup in hot climates that can warp or damage the vinyl. Others have developed the next generation of vinyl windows that offer darker colors along with deeper frames, more insulating air chambers, foam insulation in the frame, triple glazing, and other options. These enhancements provide greater structural performance, more design flexibility, and better energy efficiency. Some manufacturers also qualify for the AAMA Gold Label Certification Program or the WDMA Hallmark Certification Program. These programs represent air, water, and structural testing for windows and doors. AAMA also offers a silver certification which only requires thermal testing. High-quality vinyl windows are particularly well suited to situations where excellent energy efficiency and low maintenance is needed within a budget, thus offering an overall good value.

Fiberglass Windows

A fairly recent addition to the window market, fiberglass framed windows consist of glass fibers and a resin that binds those fibers together. The well-known tensile strength of fiberglass gives these windows high levels of durability and impact resistance. They are better suited than vinyl to handle a wide range of temperature extremes from -40 degrees F up to 200 degrees F. The frames tend to be very energy efficient and in some cases additional insulation can be added inside the frames. Durable finishes are available with good chalk resistance and fade performance and are suitable for use in harsh environments. Fiberglass framed windows are mostly used in multifamily buildings where price, durability, and low maintenance are important and where higher-performance aluminum windows may be too expensive.

Aluminum Windows

Aluminum has been a popular choice of window manufacturers for quite a while due to its light weight and excellent strength. It can readily be formed into complex extruded sections that are strong and can efficiently achieve desirable weathering and operating characteristics. These aluminum extrusions easily provide tracks, drips, baffles, and grooves for weather stripping. These pieces can then be cut and fabricated into window units of many different shapes and sizes. Further, the appearance of aluminum can be varied by selecting from a wide range of commonly available anodized and painted finishes. When complete, the final product can be decorative, strong enough to be used in large openings, and provide a low-maintenance solution.

Aluminum does have a higher coefficient of expansion compared to other materials so that needs to be allowed for in the detailing. Its high rate of conductivity also makes it prone to

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thermal bridging and unwanted heat transfer. However, the current focus on energy efficiency has prompted manufacturers to increase the energy enhancement of aluminum frames through enhanced thermal breaks and other measures to limit or reduce thermal bridging. Multifamily buildings that require added resistance to wind and rain, strength, durability, and design flexibility are the most suitable application for aluminum windows. They are also popular where low maintenance is desired in moderate environments and in buildings where function and performance are important. Aluminum storefront, curtain wall, and entrance systems may also be appropriate to consider.

Window Design Innovations

Window manufacturers continually seek to provide options and innovations in their products that can be considered in multifamily housing projects. Custom window sizes and window shapes are available for virtually any window type or style in addition to standard offerings. This is based on the use of a range of standard frame and sash profiles that can be custom cut and sized as needed to create a desired look and performance level. Specifying custom profiles will not likely be cost effective for a single project, but given the range of options already available, should not be needed. Glazing options run the full gamut and include a wide variety of coatings and glass treatment in double and triple glazed assemblies. Laminated and impact-resistant glass is also available as well as sound-deadening glass to address specific needs.

Manufacturers also have some specific options available to meet particular needs in multifamily housing units. For example, where safety is a concern in operable windows in upper stories, interior safety guards designed to match the window are available to help prevent children or adults from accidently falling out of the building. Similarly, from an aesthetic standpoint, most manufacturers offer choices in decorative grilles or even panels that are designed to work with their particular window system. Some are adhered directly to the glass or made to snap in and out but others are located between the glazing layers, keeping them free from dust and making it easier to clean the glazing.

A functional option in double or triple glazed window units is to place adjustable mini-blinds or fabric shades between the layers of glass. This has been done very successfully in multifamily housing projects where goals included energy efficiency, aesthetics, durability, and comfort. In these cases, the blinds or shades are protected between the layers of glass so they are not subject to being damaged the way exposed blinds or shades could be. From an indoor environmental quality standpoint, the enclosed blinds also don't accumulate dust the way exposed blinds do, making for a cleaner condition without allergens settling on the blinds. In products that use a sealed double glazing layer and a moveable third layer, it is easy to change or swap out shades or blinds for different fabrics, colors, etc. As an operable layer, the blinds or shades can close to block unwanted sunlight in warm seasons and open to allow passive heat gains on cold days. Currently, some of this operation is done manually, but electronic automation is also available. Automated blinds or shades in a multifamily building can be programmed to open and close on a schedule to help reduce energy use and provide occupant comfort.

Clearly there are many window choices and product options that architects can take advantage of. Part of the key to successful selection and design is to communicate directly with manufacturers to convey the specific design and performance requirements of a project. Then by asking the appropriate questions, architects can work with manufacturers to understand the particular choices, options, and variations available.

Photo courtesy of Space Plus, a division of The Sliding Door Company



Loft-style apartments can benefit from the flexibility and versatility of movable interior partitions that allow privacy when needed and openness when desired.

DESIGN INNOVATIONS FOR CREATIVE INTERIORS

The market trends calling for more multifamily housing are also calling for more creative interior layouts. This is particularly true for housing units (such as loft-style apartments) that are seeking to provide marketable options in less square footage or for buildings that are being adaptively re-used and renovated. One innovative design approach has taken the form of creating flexible spaces that optimize living arrangements through the use of movable or sliding partitions.

Commonly available, movable partitions can be a real design asset in that they allow rooms to open to up to each other for more spaciousness when desired or allow spaces to be closed off and private when required. This creates interior spaces and floor plans that are flexible in size, functional to accommodate different uses, and lockable when needed. Further, since most movable partitions of this type include glazing, then light is allowed to penetrate between spaces while still creating a separation with the ability to control the light by treating the glass. All of these design traits make them very beneficial for individual apartments as well as communal living environments such as senior living centers.

Most movable partition systems are based on using aluminum framed panels that slide along

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tracks either attached to other construction or secured as free-standing arrangements. Typically the weight of the panels is delivered to a roller on the panel bottom that glides along a track system on the floor while the top end of the panel is guided along an upper track. If a floor track cannot be accommodated, then top-hung suspended systems may be appropriate. Either way, the systems can be designed to be fully compliant with handicapped accessibility standards by keeping the floor flush or the track to a height of one half inch or less.

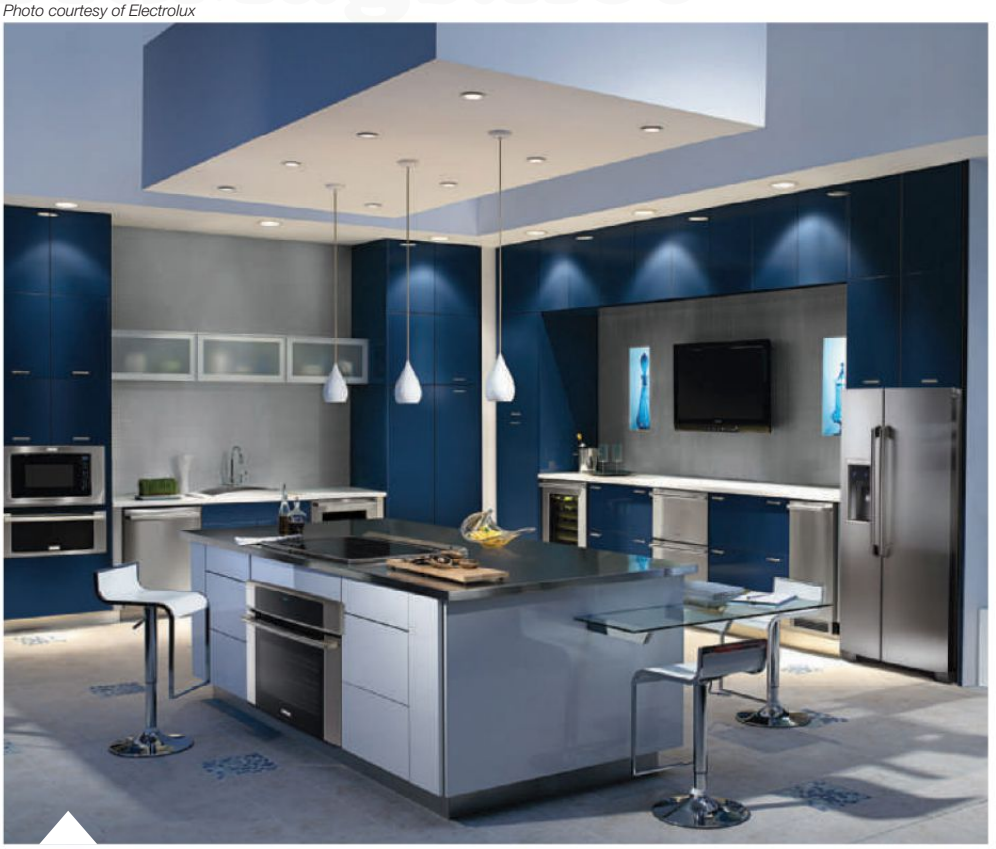
From a space required standpoint, most sliding partitions can be constructed independently from fixed walls without the need for opening up a field constructed wall to create a recessed pocket. Rather, they can be set up on a multi-line track that allows the sliding partitions to bypass one another and stack up tightly against a wall beside the opening. This sliding wall solution ultimately saves money, saves time, and perhaps most importantly to the design, saves space. From an access standpoint, sliding panels can be used as the means to enter and exit the enclosed area or, as an alternative, a swing door can be added to a panel and used for access.

When choosing to incorporate sliding, movable partitions into multifamily housing units, there are numerous options available that can be selected to create the best solutions for a particular space. In most cases, the size of the panels is completely customizable from small window-sized units up to full-height wall panels of 10 feet or so with the possibility for transoms above if needed. Most panels are square or rectangular, but intermediate mullions or muntins can be added to create a variety of geometric patterns within the border lines of the aluminum frames. This is both a safety feature and aesthetic benefit since the most common choice is to use glass of one type or another within the frame.

Selecting the final finished appearance of the movable panels involves several choices. The first is the frame finish. Most common aluminum finishes are available that create silver, white, black, or grey colored frames. Some manufacturers also use a high-pressure finish system to create a permanent stained wood grain appearance in the aluminum. Hardware needed to operate the sliding mechanism can be selected from common choices that are necessarily recessed or otherwise designed to allow the panels to slide uninterrupted. Handicapped-accessible hardware is available as well as fixed pulls, etc. in popular finishes compatible with the frames. Within the frame a number of glazing types are possible. Clear glass may be great for some situations and opaque colored glazing may be preferred in others. However, panels don't have to be uniform unless that is the design intent. Rather, panels can have portions that are clear, opaque, or even translucent within a range of geometric patterns. The coloring of translucent and opaque glazing can be variable within common ranges of white, gray, and black or other colors. In this manner, the degree of privacy and light transmittance can be controlled while contributing to the overall interior design scheme.

From a sustainability standpoint, the use of interior movable partitions as described can result in smaller, more efficient, but more desirable living units that require less energy and resources overall. As a product, they can be re-used and relocated within a building or moved to other buildings, forgoing the need for new materials. When they do reach the end of their useful life, the aluminum and glass can be salvaged and recycled. Overall, they offer a truly durable, long-lasting, sustainable solution that helps control construction costs.

Photo courtesy of Electrolux



Multifamily kitchens need to suit the lifestyles of the occupants including ways to save time and resources.

ADDRESSING LIFESTYLE WITH TIME-SAVING AMENITIES

The trends cited in multifamily housing indicate a diversity of users with a variety of lifestyles. Few rooms in a housing unit reflect that lifestyle more than the kitchen. Households that do a lot of cooking look for more kitchen workspace and higher-quality amenities. Those who choose to downsize to smaller living units may only cook for themselves and rely on local restaurants or bistros for entertaining guests. Anyone with a busy schedule will want high quality and plenty of time-saving features. Appliance manufacturers have recognized these needs that have played directly into the updated designs of several kitchen appliances as well.

Continues at ce.architecturalrecord.com

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Photo courtesy of NanaWall Systems, CenterCal Properties



An outdoor stage and additional seating areas were created by the installation of an opening glass wall at Settebello Restaurant, Station Park, Farmington, Utah.

High-Performance Green Trends

New materials save energy, the environment, and promote collaboration in high-performance green buildings

Sponsored by ClimateMaster, Dow Corning, NanaWall Systems, and Tournesol Siteworks | *By Celeste Allen Novak, FAIA, LEED AP*

The green movement has led to growing changes in the materials and products that architects now specify for all buildings—not just those meeting green ratings. The American Institute of Architects has developed a brief history of green materials and is providing guidelines for choosing green products and materials. On their website, they are surveying architects to learn more about their choices. According to the AIA, "As architects, we specify materials every day. Our decisions affect the environment, our communities, and our health. Harnessing the evolving body of knowledge about the impact of materials is integral to improving the craft, science, and art of architecture."[1] This AIA initiative supports the growing trend to specify high-performance materials, systems, and products to increase energy efficiency, conserve water, provide more usable floor space, and reuse renewable resources for a sustainable future.

It has been almost 25 years since the American Institute of Architects published the Environmental Resource Guide or ERG, the USGBC posted LEED 1.0 for public review, and the National Institute of Standards and Technology published a new methodology for life-cycle analysis of building materials—Building for Environmental and Economic Sustainability (BEES). Since then, the commitment to developing green buildings and green building products has been exponential in growth.

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Photo courtesy of Tournesol Siteworks



Patagonia, Inc. of Ventura, California, specified these benches to be constructed from thermally modified ash that has properties similar to that of South American hardwoods.

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Learning Objectives

After reading this article, you should be able to:

1. Discuss high-performance thin insulation modules that contribute to meeting stringent green building rating systems for zero energy targets.
2. Describe innovative, energy-efficient, and space-saving water-source heat pumps that optimize controllability of systems by using thermostats controlled at central command centers or through mobile devices.
3. Identify new FSC-certified wood exterior decking produced from common domestic species and street furniture composed of lumber upcycled from urban forests.
4. Define sustainable components from thermal performance to human well-being of high-performance, flexible opening wall systems.

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

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Today, product manufacturers and engineers are pushing the boundaries of sustainability, with many focused on energy efficiency and water conservation. As Tony Landers, commercial marketing manager at ClimateMaster, comments, "If you look at America as a whole, the electric grid is antiquated, the energy grid is at its maximum, and there is a need to design products to reduce the demand for energy. Studies show that 40 percent of carbon emissions can be attributed to buildings' use of energy. When we analyze the impact of building systems on the longevity of the electric grid, attacking this 40 percent of the energy pie is the easiest adaptation we can make to our products." He continues, "In addition, conserving water by providing a more efficient water source is also important to the sustainability and health of the planet."

Manufacturers are achieving new gains while using common materials and methods from curtain walls to wood deck construction. Dow Corning's New Business Market Development Leader Paul Wisniewski comments, "By making the latest innovation and technology work within current construction techniques, manufacturers can help engineers, architects, and contractors deliver needed game-changing improvements in energy efficiency without requiring applicator retraining or specialized equipment. From eliminating traditionally overlooked thermal losses from thermal bridging and poorly constructed air barriers to delivering substantial improvements in curtain wall thermal performance, high-performance building solutions are necessary to help meet tomorrow's green building challenges today."

Chris Lyon at Tournesol Siteworks, a manufacturer of commercial landscape solutions, describes sustainability as a trend towards creating alternatives to vanishing materials such as wood from old-growth forests. He believes that this trend comes from a realization within the specifier communities. "While the owners are driving the use of products based on the performance, specifiers realize that using old-growth wood isn't sustainable. Thirty years ago, architects specified old-growth redwood, today it's South American Ipe. Product manufacturers have been focusing on developing domestic alternatives, and thinking about ways wood can be upcycled. An exciting new opportunity is the use of urban wood such as from the many trees that are being cut down due to the emerald ash borer."

The latest innovations are adding to the portfolios of designers specifying products that take advantage of new research and advanced engineering. Some of these imaginative and innovative new products include the following:

Smart HVAC systems. Architects can now specify smart systems that allow clients to adjust the temperature of their homes or condominiums from a cell phone.

Opening walls in offices and classrooms are removing boundaries and encouraging collaboration. Architects are also designing restaurants with opening walls which provide a seamless transition between the inside and outside. These opening walls have higher thermal performance values that can contribute rather than detract from green building rating systems.

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Water-source heat pumps. Historic properties are being renovated with small, water-conserving, water-source heat pumps located in ceiling cavities.

New exterior decking is available using thermally modified lumber from domestic and urban forests.

The use of thin insulation panels and blankets has made creating net-zero or highly efficient thermal envelopes easier.

TARGETING ZERO ENERGY

Many architects are committed to the reduction of energy consumption over the next few years, guided by numerous green rating systems. They know that they need to combine different strategies to achieve energy efficiency and sometimes meet net-zero goals for their buildings.

Addressing the building envelope requires an analysis of numerous factors. Focusing on the greater losses requires the architect to carefully specify materials that are highly efficient. David Posada, LEED AP, BD + C, CPHC, sustainability manager at GBD Architects, commented on his use of a new building insulation blanket in combination with sunshades at the Kiln Apartments in Portland, Oregon. "As energy codes have gotten more stringent, much of the 'low-hanging fruit' of energy efficiency has already been picked. Code now requires better insulation and higher-performing windows, and the market is making more efficient lighting and HVAC equipment more affordable."

THE KILN APARTMENTS: NEW EXTREMES IN THERMAL STANDARDS

The design of a small apartment project in Portland, Oregon, began with the concept that the building would wrap its clients in comfort and be the "kiln" that shapes the living environment. "The owner's goal was to build a small apartment project that pushed the limits on the building envelope's efficiency," says David Posada, sustainability manager at GBD Architects. "So we enthusiastically accepted the challenge and started working right away."

According to Posada, "Achieving the next incremental step of higher performance for buildings can be harder to do." Their firm has begun to use the Passive House standard, one of the most stringent energy standards in the world, for their residential projects. "The Passive House standard requires a building to use very little energy as measured per square foot of floor area. The energy use intensity, or EUI, of a residential or commercial building that meets the Passive House standard is often 60-80% lower than a conventional building. The Passive House Planning Package (PHPP) is an energy model that uses an Excel spreadsheet to analyze heat gains and losses from the envelope, glazing, ventilation, infiltration, equipment, and occupants to calculate annual energy consumption," he says. In the design of the Kiln Apartments, the design team consulted with manufacturers to solve some of the difficult problems when designing a tight envelope.

Their firm approached the challenge by starting with analyzing the loads and finding the most efficient systems. The architects designed custom window sunshade "eyebrows" to manage solar gain, but were stymied by the heat loss caused by these components through thermal bridging. Thermal bridging is caused when heat transfers through a conductive material from the outside to the inside of a building and vice versa and can affect both the heating and cooling systems. As Posada explains: "In the past, heat loss from thermal bridging might have only been a percent or two of the total heating load in winter, but after adding more insulation and upgrading the windows, thermal bridging from window frames or penetrations in the skin can make up a bigger fraction of your total heating load."



Photo courtesy of GBD Architects

Advanced building insulation blankets (hidden behind this narrow window sunshade eyebrow) are used to control thermal bridging at the Kiln Apartments in Portland, Oregon.

Posada recounts the challenge for this project: "For the Kiln Apartments project, we needed sunshades to reduce heat gains from high-angle summer sun and allow the lower wintertime sun to penetrate and provide some of the heating load. Structurally, the simplest solution was to attach these metal sunshades directly to the exterior wall sheathing right at the head of the window. But this created a cold bridge or thermal break that bypassed the 4 inches of exterior rigid insulation right at the window rough opening, the weakest link in the envelope. Most Passive House projects have only managed to meet their energy targets by providing continuous exterior insulation that wraps into the rough opening and overlaps the window frame. To reduce the thermal bridging of these shades, we needed a thin 'gasket' to keep the metal from touching the wall sheathing and conducting heat directly from the framing.

"We can't just insulate our way to higher-performing buildings; we have to be more conscious of how moisture moves through the wall or heat energy finds the weakest link in the envelope. Metal framing can create thermal bridges right through thick layers of insulation, so energy codes have started requiring continuous insulation outboard of the framing. It is common to support cladding, awnings, or sunshades with shelf angles or metal connections that can short-circuit that continuous exterior insulation. There will always be tricky conditions at window openings, material transitions, or penetrations where you need support for heavy items attached to your structure. You can't always fit the insulation you really need."

Working with the manufacturer, GBD Architects specified a thin-profile, flexible building insulation blanket with R-9.8 per inch insulation performance that could be cut to fit the sunshade attachment area. Using this material on the Kiln Apartments helped the architects not only meet Oregon building codes, which are more rigid than the national average, but also satisfy the even more stringent Passive House standards.

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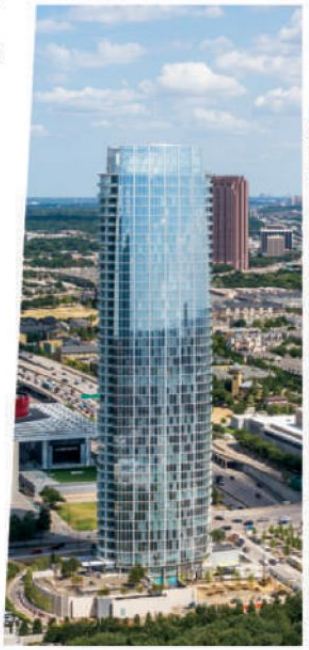
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Photo courtesy of Perkins+Will



The University of Alaska Fairbanks, in Fairbanks, Alaska, is monitoring the performance of new architectural vacuum insulation panels, shown between the working glass windows that incorporate new high-performance insulation.

The new dining hall at the University of Alaska Fairbanks is located in a climate where the temperatures can drop to -45 degrees F in the winter, which created a construction challenge for architect Perkins+Will. The architect was committed to the creation of a highly efficient thermal envelope that also allowed views to the night sky. According to Carsten Stinn, project manager and designer for Perkins+Will, "The building is intended to have an open and airy feeling and the amount of daylight and views to the outside was an important design factor. One of the main inspirations for this design was the beautiful, vast Alaskan sky; we wanted large windows to showcase the aurora borealis."

To address these challenges, the project team looked to a new solution—architectural insulation modules, which feature vacuum insulation panel (VIP) technology.

Vacuum insulation panels contain a pressed fumed-silica core contained within a multilayer, aluminized bag under vacuum that delivers initial performance of RSI 5.6 to RSI 6.2 per 25 mm (R-32 to R-35 per inch) at center of panel—substantially better than typical mineral wool insulation, which would need to be 8 to 10 times thicker to deliver an equivalent R-value. Available in pre-engineered sizes, VIP is often used in architectural insulation module form for panel protection and ease of installation.

Architectural insulation modules integrate VIP within a protective architectural finish. These modules combine the aesthetics and convenience of curtain wall construction with the added energy-saving benefit of high-performance insulation. These units can be installed using standard construction methods and techniques typical of those currently used for insulated glass in curtain wall structures—no special handling is required. Architectural insulation modules enable new design possibilities for zero-energy buildings, significantly increased thermal resistance in space-limited situations, and the creation of slim wall constructions with high R-value performance.

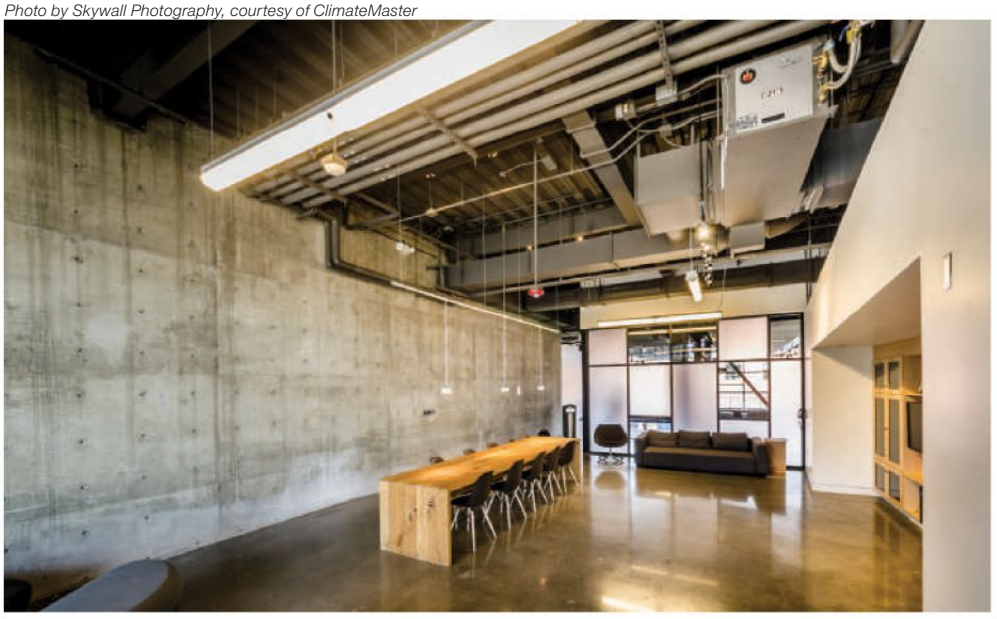
Using a 1-7/8-in.-thick architectural insulation module with an R-value of 49, the architect was able to minimize heat loss and use traditional spandrel glass configurations to keep a slim building profile. Committed to energy efficiency on the campus, the university is monitoring the energy use of this new building as part of research and teaching goals for their engineering program. "We work hard to display the best techniques for the arctic in a way that also delivers real-life educational experiences to our students," says Jenny Campbell, senior project manager in facility services, design, and construction for the university. "Here at the university, we are continually searching for ways to increase energy efficiency. We have our own heating and cooling plant on campus, so the more efficient our buildings are, the less it costs us."

SAVING ENERGY AND SAVING SPACE WITH SMART HVAC SYSTEMS

Small, efficient water-source heat pumps are being used in both renovations and new construction to save space while providing energy-efficient HVAC equipment. These units can be operated with traditional thermostats or smart controls from a central HVAC command station. Some products can be controlled from an application on a mobile device.

Vertical stack units operate quietly and can be placed in walls. Unobtrusive cabinets or small closets are constructed to contain units that provide individual client controls. Unit sizes can be as small as 24 inches by 24 inches and be sheet rocked into a wall. Other models

Photo by Skywall Photography, courtesy of ClimateMaster

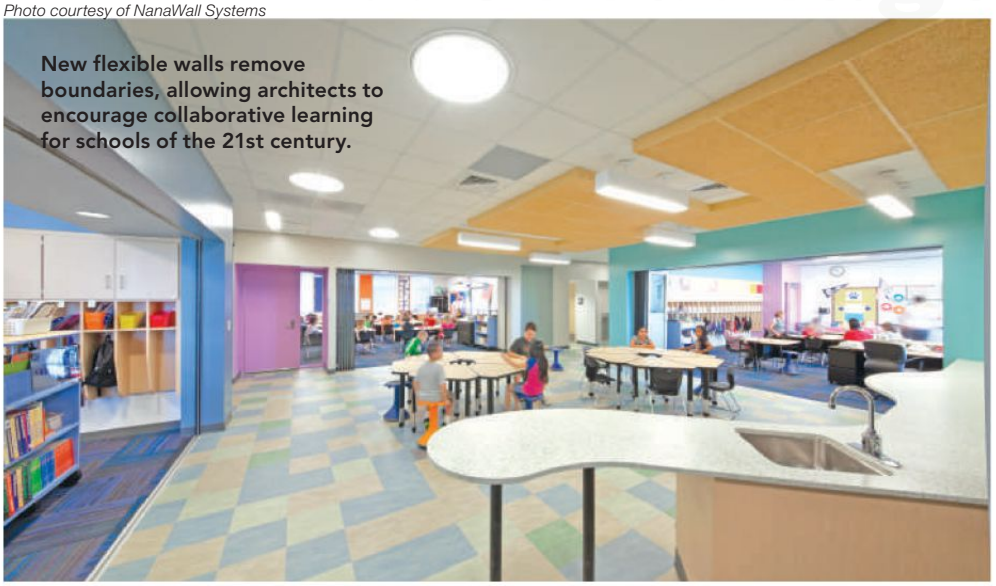


Guthrie Green is a renovated paper plant with a large geothermal borehole field, which ties into a hybrid system of geothermal heat pumps and a ground-mounted cooling tower. The combination of the geothermal field with the water-source heat pumps provides the capability of reducing heating and cooling costs by approximately 60 percent.

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Photo courtesy of NanaWall Systems



New flexible walls remove boundaries, allowing architects to encourage collaborative learning for schools of the 21st century.

can be mounted in a ceiling or in a small closet. Unlike earlier configurations for water-source heat pumps, they do not need direct access to an outdoor wall. Units can be controlled through a smart thermostat from a mobile device. Clients can warm or cool their units as needed. When used in hotel applications, these systems provide an "eco mode" that can sense if a room is occupied or when someone has left or entered the room to turn the unit on or off. They operate virtually undetected by a hotel guest.

For example, when considering a heating system for a new Kimpton Hotel, the hotel's engineering team and the architects were searching for a solution for an efficient, space-saving mechanical system that would maintain the modern appearance of the design which included floor-to-ceiling windows in all of the guest rooms. They also needed to meet the Chicago Energy Conservation Code (CECC) while maximizing occupant comfort.

"A heat pump-driven system was the only design that met all stipulations of the project," explains Gary Stern, vice president at Imbert International, a consultant on the project. "This included the energy goals and budget parameters, as well as the ability to separate the residential portion of the building from the hotel." The mechanical system design facilitates the independent operation of the private residences and hotel units when in heating mode. And when in cooling mode, both areas share only a cooling tower on the roof." Specifying a water-source heat pump requires the understanding of the Energy Efficiency Ratio or EER.

The American Heating and Refrigeration Institute rates the efficiency of HVAC equipment through a third-party certification system based on random audits. An EER is a measure of the Btu's per hour for each watt of power an air conditioner uses. According to the Department of Energy, higher EER ratings identify more efficient air conditioners. National appliance standards require room air conditioners to have an EER ranging from 8.0–9.8 or greater, depending on the type and capacity. ENERGY STAR®-qualified room air conditioners have even higher EER ratings. New water-source heat pumps can have EERs between 13-14 and when connected to a geothermal loop the EER can be as high as 45 for some high-performance units.

When the mechanical system for Tulsa's renovated paper company building was designed, inserting small HVAC units in the ceiling was a space-saving decision. Flynt & Kallenberger project manager Justin Roush shared that the "greenest" component of Guthrie Green's sustainable building plan actually lays below the grass, benches, and stage. This is where a field of 120 500-foot geothermal boreholes was drilled prior to the above-ground construction, which ties into a hybrid system of geothermal heat pumps and a ground-mounted cooling tower. This serves as the main mechanical system for the Tulsa Paper Company and Hardesty Arts Center buildings. The geothermal borehole field, organized into 15 operating circuits, provides 600 tons of heating and cooling to both buildings, with the capability of reducing heating and cooling costs by approximately 60 percent.

"The 600 tons from the geothermal field is supplemented with a 200-ton closed circuit fluid cooler, which was incorporated into the overall system design when taking the peak demands of all four end-users into account," says Roush. "Each of the tenants has a water-to-water heat exchanger that enables them to use the loop water on one side while keeping their individual systems separated. That way, if they wanted to create chilled water or put equipment on the roof and use glycol, these elements can't ultimately end up in the main loop water."

Units with vertical stacking can share cooling towers, plumbing runs, and electrical conduits. This means that construction sequencing, materials, and installation can be streamlined. The maintenance of these plug-and-play units is provided by removing the one unit and replacing it with another, allowing for virtually no "down time" to operations of the heating and cooling units.

Using this system that saved electricity and conserved water in the renovation of this existing building helped the architects meet their sustainable design goals.

OPENING UP BOUNDARIES

The Global Development Research Center (GDRC), a non-profit think tank that carries out initiatives in education, research, and practice, lists 44 benefits to collaborative learning. According to the GDRC, the first 10 reasons that collaborative learning[2] provides educational benefits are:

1. Develops higher level thinking skills
2. Promotes student-faculty interaction and familiarity
3. Increases student retention
4. Builds self esteem in students
5. Enhances student satisfaction with the learning experience
6. Promotes a positive attitude toward the subject matter
7. Develops oral communication skills
8. Develops social interaction skills
9. Promotes positive race relations
10. Creates an environment of active, involved, exploratory learning

See endnotes in the online version of this article.

Continues at ce.architecturalrecord.com

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PRODUCT REVIEW

High-Performance Green Trends

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Precast Concrete Life-Cycle Assessment and High-Performance Design

LCAs help architects design sustainable buildings

Sponsored by the Precast/Prestressed Concrete Institute

Photo © Sean Airhart/NBBJ



The life-cycle assessment is a fact-based approach to ensuring sustainability and guiding architects to specifying for high performance.

Building owners, designers, and users are demanding that structures look great, perform better, provide multi-hazard protection, and do so sustainably. Enter the world of high performance. High-performance design and structures challenge us to optimize all relevant attributes, on a life-cycle basis for a project, and do so while minimizing negative environmental impacts.

To accomplish this, we must better understand the environmental impact of the materials and systems we use. Many manufacturers tout the sustainability of their products, yet very often their claims are unproven by scientific data. Government agencies, professional organizations, and corporations alike are seeking fact-supported methods of gauging the environmental impact of their products. So as sustainable design has evolved, so has the ability to better quantify and understand environmental impacts.

One approach that is gaining wide acceptance in the architectural and building community is life-cycle assessment (LCA). This tool gives business and industry the ability to look holistically at the environmental consequences of their products and to strategically address the environmental soundness of their operations—all with important implications for architects interested in specifying high-quality, sustainable building materials.

This article will discuss the definition of high performance as it relates to the building industry and how it contains attributes of sustainability. It will also discuss the components of an International Organization for Standardization (ISO)-compliant LCA, considered by many to be the gold standard of measuring sustainability and pinpointing areas for improvement. Also presented are the highlights and findings of this third-party LCA on precast concrete, as well as what those conclusions mean for the precast concrete industry as a whole, and for design professionals.

HIGH-PERFORMANCE STRUCTURES DEFINED

"High performance" is not an arbitrary term given to a structure that may have positive environmental features, it is a term that implies specific parameters that have been explicitly defined by law. The Energy Independence and Security Act of 2007 - 401 PL 110-140 proclaimed that a high-performance structure is one that "*…integrates and optimizes on a life-cycle basis all major high-performance attributes including energy and water conservation, environment, safety, security, durability, accessibility, cost benefit, productivity, sustainability, functionality, and operational considerations.*"

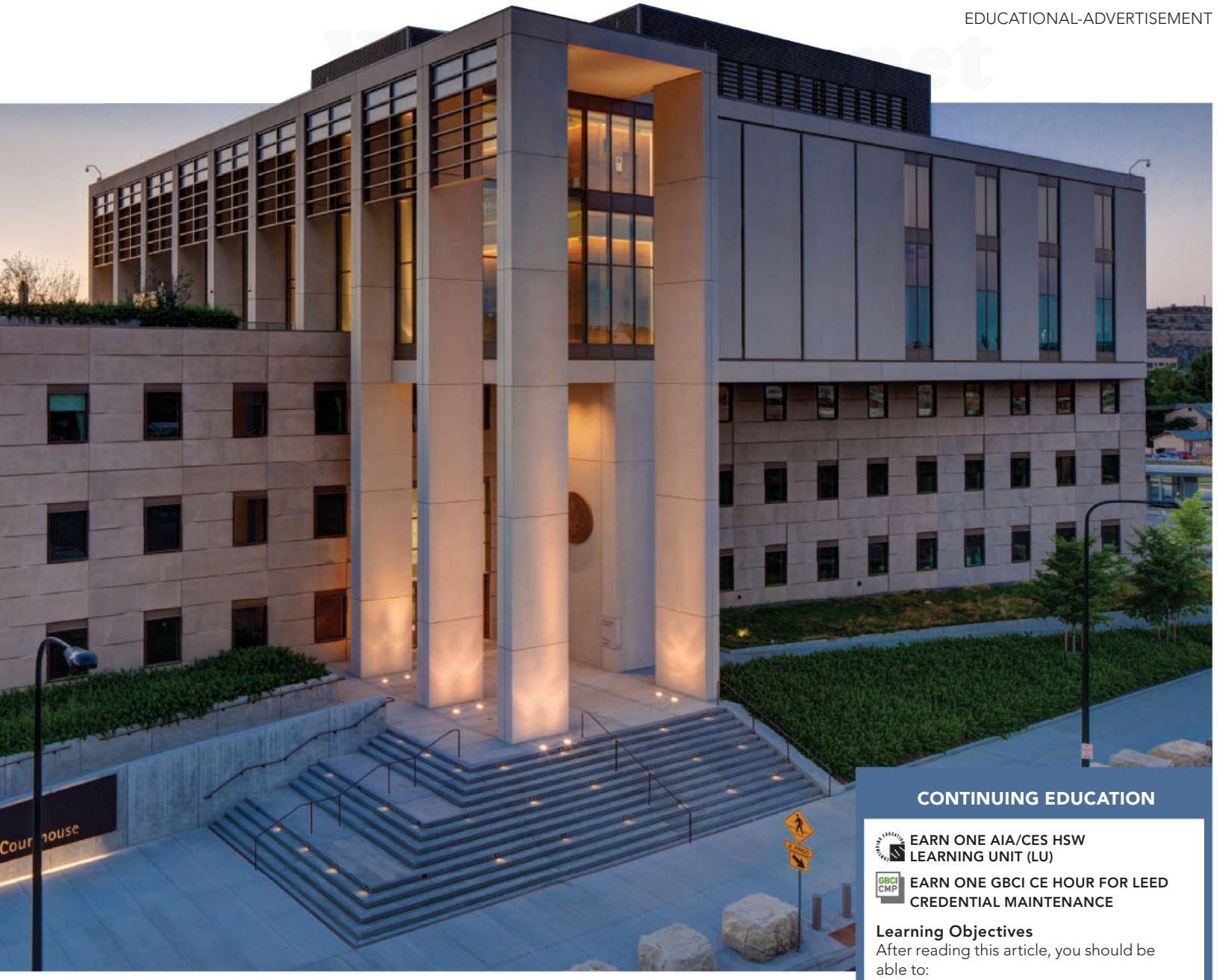
The 2007 law signaled a fundamental change in how green design is viewed. Sustainability, while a central aspect of high-performance buildings, was more specifically defined. No longer was sustainability merely a function of environmentally conscious design and construction, but performance on a life-cycle basis was a key and necessary component. While including the concepts and practices of sustainability, a high-performance building must demonstrate optimization of all relevant attributes of a project. Energy and water conservation, safety, security, and durability became requirements that must be integrated into a structure's overall design, construction, and performance.

For example, a parking structure will not have a huge energy component relative to a conditioned space building such as an office. However, both have energy requirements. The goal in high-performance design is to not forget, ignore, or otherwise overlook any of the relevant attributes in the optimization of the project. An important component to accomplishing this is to look at the interaction between systems and materials. For example, when you replace brick veneer with insulated precast concrete, how does this change affect the HVAC system, the construction schedule, or the indoor environmental quality, etc.?

The meaning of high performance thus became to design and build structures that optimize all relevant attributes on a life-cycle basis rather than a solely first-cost basis. With this criteria, high performance essentially became synonymous with life-cycle design—design for the long term. Critical to achieving this designation were high-performance materials and systems—integrated systems that allow for design versatility and are efficient, resilient, and can be optimized to meet the multi-hazard requirements and long-term demands of high-performance structures.

High-performance criteria have not only become important to building owners, but essential in meeting the standards of funding agencies and green codes, notably the new International Green Construction Code, LEED

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(v.4), ASHRAE 189.1, and the mandate by the U.S. Federal Government Executive Order 13514, which requires government buildings to achieve net-zero energy use by 2030.

LIFE-CYCLE ASSESSMENT: A SCIENTIFIC APPROACH TO SUSTAINABILITY

Life-cycle assessment is widely accepted as an objective and scientifically based determination of a product's environmental impact, based on examining a broad range of environmental impacts over its life cycle. All phases of a product's life, from cradle to grave, have an impact on the environment. These impacts can be quantified and compared through an LCA, which assesses those impacts from the time materials are extracted through manufacture, storage, use, recovery, reuse, and disposal, including all transportation required during a product's existence. All inputs and outputs (materials and energy used, and emissions to air, land, and water) of a specific material are assessed with respect to their impact on the environment. This information is used to improve processes, support policy, and provide a sound basis for informed design decisions.

There are several variations in the scope of an LCA. One of the most commonly used versions of the LCA is cradle-to-gate, which is an assessment of a partial product life cycle from resource extraction, or cradle, to the factory gate, or before it is transported to the consumer. The use phase and disposal phase of the product are omitted in this case. Often, cradle-to-gate assessments are the basis for environmental product declarations (EPDs), defined as "quantified environmental data for a product with pre-set categories of parameters based on the ISO 14040 series of standards, but not excluding additional environmental information." EPDs have often been likened to a nutrition label for a product, but providing

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Learning Objectives

After reading this article, you should be able to:

1. Define the term high performance as it relates to sustainable solutions in the built environment.
2. Discuss the contribution a life-cycle assessment (LCA) can make in understanding a material's environmental impact and continued improvement in its manufacturing and use phases .
3. Identify where the precast concrete industry is making improvements in the manufacturing process to reduce adverse environmental impacts.
4. Cite the key findings of a third-party LCA on precast concrete that are relevant to sustainable design decisions.

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

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PRECAST CONCRETE HELPS ACHIEVE HIGH-PERFORMANCE GOALS AT UNIVERSITY OF KENTUCKY'S HOSPITAL

1 For its Albert B. Chandler Pavilion, the University of Kentucky Hospital used insulated precast concrete panels for a high-performance envelope offering energy efficiency, striking aesthetics, and faster construction. To achieve these goals, the precaster worked on a design-assist basis for more than a year before construction began. The structure consists of a seven-story steel frame atop a five-story, cast-in-place concrete frame sitting on concrete piers, and is clad with insulated precast concrete panels embedded with thin brick, which was selected to complement the surrounding campus. "Scheduling was a key challenge and a primary reason that precast concrete panels were chosen," says Bill Sparks, chief engineer at Gate Precast Company, noting that precast panels probably allowed the building to be enclosed up to three times faster than if constructed with hand-laid brick.

Photo by Pease Photography



High-performance precast concrete combined a continuous air and vapor barrier, as well as continuous insulation, efficiently into one system. This provided a calculated performance R-value of R-26.

2 Architects had envisioned continuous insulation throughout, even before it was a code requirement. So connections would not interfere with the insulation layer, panels were specified that consist of a 3-inch front wythe of concrete, which features another 5/8-inch layer of embedded thin brick, a middle 2 inches of polyisocyanurate insulation with ship-lapped edges, and an interior 4-inch structural wythe. Nonconductive fiber-composite connectors penetrate the insulation, securing the wythes. These essentially eliminate thermal bridging. Prestressing strengthened the panels to provide for the handling stresses caused by the large, heavy panels. "The insulated system provided a very efficient wall system," Thomas Gormley, principal at GBBN Architects, says. "To not have to post-apply insulation in the interior wall assembly saved significant time and provided more uniform coverage." The panelized system

environmental instead of health information. Third-party verified reports published by manufacturers regarding the environmental performance of their products, EPDs can now contribute to a project's earning of LEED credits. While many architectural firms already require transparency from their product vendors, LEED v4 will accelerate this trend by awarding points for projects that use a certain number of products with EPDs.

Although cradle-to-gate EPDs are an incomplete sustainability assessment, in many cases they are the best assessment that product manufacturers can provide at this time. However, for many building materials and products, the overwhelming majority of adverse environmental impacts occurs during the use phase, but the use of a product isn't always known at the time it leaves the manufacturing facility. Thus, the use phase can be difficult to include in an EPD without making several assumptions about how the product may be used. Encouraging product manufacturers to provide EPDs can still provide some value, however, because oftentimes the product manufacturers identify environmental hotspots in their processes just from going through the exercise of performing an LCA and creating an EPD.

To get a true sustainability picture, some experts maintain that only the LCA of a building over its full life cycle can provide estimates of the full range of environmental burdens, such as embodied energy use and related fossil fuel depletion; other resource use; greenhouse gas emissions; and toxic releases to air, water, and land. This is important to better understand the overall net effect of our design decisions on the environment. When applied to buildings, an LCA includes the following phases: resource extraction; manufacturing and transportation of materials and prefabricated components; on-site construction; building operations, including energy consumption and maintenance; and end-of-life reuse, recycling, or disposal.

LIFE-CYCLE ASSESSMENT OF PRECAST CONCRETE

The Precast/Prestressed Concrete Institute (PCI) initiated a life-cycle assessment with Morrison Hershfield and the Athena Institute to investigate the environmental impact of precast concrete. In 2013 a "cradle-to-grave" LCA study relating to commercial buildings was completed. In broadest terms, a cradle-to-grave LCA evaluates the environmental performance of a building over its entire life cycle, which the study divides into manufacturing, construction, maintenance, operating energy, and end-of-life stages. This was a comparative study, examining the performance of precast concrete relative to alternative structural and envelope systems. The methodology employed in this study complied with international standards ISO 14040:2006 and ISO 14044:2006, considered to be the most rigorous for conducting life-cycle assessments.

The basis of comparison chosen for the study was a five-story commercial office building that provides space for 130 people and meets minimum building and energy code requirements. The service life of the building was assumed to be 73 years, the standard median life for large commercial buildings according to published literature. In conformance with international standards for comparative studies, the same fundamental design parameters, such as dimensions, column spacing, etc., were applied for all cases; the design of the comparison structure was not optimized for any of the structural and envelope systems evaluated. In all, the study evaluated 15 design cases consisting of five different building envelope systems combined with three different structural systems, as can be seen in the accompanying table (see the online version of this course). To allow for different climate conditions, the 15 cases were modeled in four U.S. locations—Denver, Memphis, Miami, and Phoenix. The case using precast concrete

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Photo courtesy of Gate Precast Company



Precast panels consist of a 3-inch exterior wythe of concrete, with a 5/8-inch layer of embedded thin brick, a middle 2 inches of insulation with ship-lapped edges, and an interior 4-inch structural wythe. Thin brick can also be returned for edges and corners if desired as seen in this photo.

is a rain barrier system and also provided mold, mildew, and fire resistance; minimal maintenance due to fewer joints; and good indoor air and acoustic quality with noise dampening as a result of its massing and elimination of air penetration.

3 In terms of aesthetics, the brick inlaid panels had to achieve the look of hand-set brick and stone used on surrounding buildings—an aesthetic that the precaster had to demonstrate prior to specification. The façade is composed of a mix of five brick colors, requiring more than 1 million thin brick pieces in all. There are accenting panels in three finishes, two in buff limestone and one resembling field-applied granite. "The design team's decision to integrate embedded thin-brick and insulation helped achieve the design objectives," says Gormley. "It seamlessly matched adjacent campus structures, formed a better thermally performing exterior skin, and was produced in an environment where quality of the construction could be better controlled and still take a significant amount of time off the project schedule."

Photo courtesy of Gate Precast Company



The precast included several different finishes with five colors of thin brick, producing a range of color that is common to the handset-brick and stone used on adjoining buildings.

for both the envelope and structural systems (designated "P-P") was defined as the baseline for comparison.

In addition to the comparative study, a sensitivity analysis was conducted to determine the extent to which environmental impacts would be affected by using double tees instead of hollow-core planks for floors .

STUDY RESULTS

The study yielded three important results that have far-reaching implications for design professionals and the industry as a whole:

Building Environmental Performance Is Dominated by the Operating Energy Stage

Operating the building over its lifetime—that is, the use phase—was shown to have the greatest overall impact on the environmental performance of a building. In fact, more than 90 percent of the impacts relating to global warming, acidification, respiratory effect, eutrophication, photochemical smog, and total primary energy occur in the use phase. While the numbers vary somewhat among the four cities studied, in all cases at least 97 percent of the total primary energy (TPE) and 96 percent of the global warming potential attributed to the building over its lifetime occur in the use phase. This is a primary reason why environmental impacts should be evaluated over the full life cycle of a building.

Environmental Performance of Precast Concrete Buildings Is Competitive

The peer-reviewed study also confirmed a basic conclusion of most balanced LCA studies of commercial buildings, namely that there is presently not a significant difference in life-cycle impacts between steel, cast-in-place concrete, and precast concrete building systems. Although concrete is sometimes perceived to have a higher environmental impact due to energy use and carbon dioxide emissions associated with manufacturing portland cement, the fact is, as shown by this research, precast concrete does not impose additional environmental burden than other materials over the full building life cycle.

The following 10 environmental impacts were evaluated for each of the 15 building cases, in each of the four cities. To provide a simplified characterization, the following discussion focuses on the coefficient of variation (COV) of the results for the 15 building cases for each environmental impact. For detailed life-cycle impact assessment results, architects can refer to the full LCA report.[1]

- **Global warming potential, total primary energy, acidification, respiratory effects, eutrophication, photochemical smog, and solid waste impacts.** Within a given city, the COV of results for the 15 building cases relating to global warming potential, total primary energy, acidification, respiratory effects, eutrophication, photochemical smog, and solid waste was 2 percent or less. This means that for a given climate, there is little difference among the building cases for these seven environmental impact categories.

See endnote in the online version of this article.

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PCI develops, maintains, and disseminates the body of knowledge for the precast/prestressed concrete structures industry. PCI provides technical resources, certification, and education, as well as conducts industry events, research and development, and more. **www.pci.org**

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Looking Good: New Paper Towel Dispenser Systems Score in Appearance, Sustainability, and User Preference

Specification decisions help users have the ideal hand-drying experience

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It's not often that a product can rest squarely on the three pillars of sustainability—environmental, economic, and social. While drying one's hands in a restroom may seem a simple act, it is one with far-reaching implications. With the wrong system, hand drying may be incomplete. It may be a way to transmit germs, causing illness that results in millions of dollars of downtime for employers, lost days for students, and inconvenience to the general public. Further, the wrong system can degrade the environment and generate unnecessary noise pollution, increased maintenance costs, and even safety concerns.

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

1. Detail the ways in which next-generation paper towel systems contribute to green building goals and affect public health considerations.
2. Describe effective approaches to curtailing the spread of germs in order to create safe, healthy public facilities.
3. Compare the effectiveness of various hand-drying methods in terms of personal hygiene and cleanliness of the public restroom facility.
4. Specify paper towel dispensing systems according to universal design and ADA standards.

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Ideally, modern facilities feature a clean, crisp look and support public health goals.

*All photos courtesy of KIMBERLY-CLARK PROFESSIONAL**

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There are several germ "hot spots" throughout a typical office space.



Recent studies have reaffirmed that paper towels are the most hygienic and user-preferred method of hand drying in a public restroom[1]—and architects interested in creating fully sustainable spaces are well advised to closely examine this issue. The following article will present the urgent need to take steps to create healthy and safe public spaces, focusing on a key element of those spaces: restrooms. Existing hand-drying systems will be compared in terms of hygiene, environmental, and aesthetic characteristics. Also presented will be a short primer on specification considerations and best practices in next-generation paper towel systems.

DESIGNING FOR FUNCTION, HEALTH, AND WASTE REDUCTION

Today's green buildings demand solutions that promote the safety, health, and well-being of occupants, while enabling minimum possible energy usage and responsible sourcing of materials. Providing solutions that foster occupant health and hygiene can have a significant impact on a building's environmental performance, and offer the potential to earn credits in the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) rating system, the preeminent green rating program in the U.S.

The importance of solutions that foster occupant health is underscored by research that shows that 98 percent of workers are affected by minor illness each year[2] and 80 percent of minor illnesses are preventable.[3] One contributing factor could be highly concentrated work environments often have high levels of germs. Viruses can live from 20 minutes to 2 hours on surfaces, including chairs, tables, and vending machines.[4] Common areas are perfect sanctuaries for unwanted germs—water coolers, ATMs, door handles, conference tables, reception areas. Adults touch their faces an average of 15.7 times every hour,[5] transmitting germs to the surfaces they subsequently touch. Handshakes can transmit viruses far beyond the hands of the person being greeted, including people outside the actual office.

Naturally, it is no surprise that a public restroom is another hot spot for germs. Florida researchers cultured four commercial aircraft and 18 restrooms,[6] including those in a mall, hospital, offices, lecture hall, conference center, department stores, restaurants, airport, and resort. According to the study, "Faucets, soap and paper dispenser operating levers, and the exit door handle of restaurants and aircraft restrooms were more likely to have concentrations of microorganisms too numerous to count compared with other locations." The study further found that "Cultures of high-touch sites in three restrooms located in different areas of a tertiary care hospital yielded six microorganisms that are responsible for two-thirds of healthcare-associated infections."[7]

Personal hygiene habits have a direct correlation with contracting minor illnesses, particularly during flu season, and some companies have adopted the three-step approach of hand washing, wiping, and sanitizing as a way to keep workplace illnesses at bay. As has been published widely in the medical literature, proper hand washing is still the best way to reduce the spread of germs. Using disinfectant wipes kills germs on some of the dirtiest hot spots, such as doorknobs, keyboards, and phones. The third line of defense is to use hand sanitizer—it kills 99.9 percent of germs, and can reduce sick days by 21 percent in office environments.

While personal hygiene habits do reduce minor illness, architects and owners are concerned with building for high-traffic areas and controlling potential public health issues. Of prime importance are solutions that combine functional design with health and waste reduction goals.

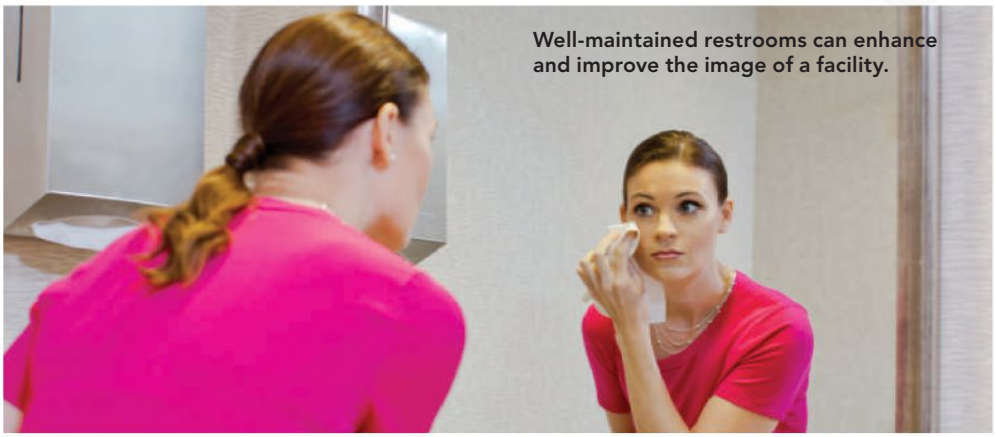
RESTROOMS—A KEY COMPONENT OF HEALTHY PUBLIC SPACES

While in times past, public restrooms were not a major focus of attention, today the concern with curtailing the spread of germs and disease has made having safe and sanitary restrooms a must for any establishment. An unsightly appearance of the restrooms in a restaurant,

*Instant hand sanitizer kills 99.9% of germs in as little as 15 seconds.

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Well-maintained restrooms can enhance and improve the image of a facility.

hospital, school, office building can create the perception of uncleanliness throughout the rest of the facility. Patrons may be enthusiastic about the food in a restaurant or visitors may be impressed with a hotel's ambience, for example, but if they see wet floors or unclean conditions in the restroom, they may question the sanitary standards of the entire operation. Faced with these conditions, users may not wipe their hands adequately, or forego hand washing altogether. On the other hand, modern and clean restrooms are an opportunity to enhance and improve the image of a facility. For example, an opera house might have nice cloth towels and exceptional features and a contemporary university student center restroom would have clean modern lines and the same high-end look as the rest of the facility.

One key way that facility managers are upgrading their restrooms for minimal to no incremental investment is through touchless operation technologies. Consumers do not want to touch surfaces, buttons, or knobs that have been repeatedly handled by others, and have been shown to harbor germs for hours. Manufacturers have responded with faucets, sinks, dryers, and toilets that operate automatically, and facility managers seeking improved hygiene, better image of the restroom, and reduced consumption of natural resources have increasingly invested in their products. Accordingly, automatic touchless operation has virtually become the norm in today's high-traffic public restrooms.[8] Earlier models had limited battery life which frustrated maintenance teams and users alike, but newer technologies offer AC power or innovative dispensing technology capable of two to four times the traditional battery life span. Newer models have a more stylish look, too, creating a more upscale restroom while advancing the environmental agenda as toilets, sinks, and hand-drying mechanisms reduce consumption and save resources by allowing patrons to use only what is necessary.

New towel and skincare systems are more hygienic by eliminating touch points and controlling the dispenser to minimize waste. Foam skincare products reduce product usage and provide the same benefits of liquid. Further, recyclable plastic cartridges are more hygienic than their "refillable" counterparts since the refill systems are prone to bacteria growth.

Widely regarded as the most hygienic approach, touchless products when installed properly have also been recognized as Americans with Disability Act (ADA) compliant and consistent with universal design standards, now a LEED-sanctioned feature. It is important to note, however, that appropriate maintenance protocols remain a key part of keeping restrooms, touchless or otherwise, up to desired criteria.

NEXT-GENERATION PAPER TOWEL SYSTEMS

Compared to their predecessors, today's dispensing systems have a sleek, contemporary design that is suitable for Class A office facilities and other upscale locations. Stainless steel or black and white finish options in a compact design that is nearly half the size of more traditional dispensers give a sophisticated look to a facility's restroom that can enhance user satisfaction, and thus have a bearing on a facility's ability to keep existing patrons and attract new ones.

Next-generation paper towel systems combine touchless technology with innovative dispensing technology that enables towels to be delivered to users precut. These features can be customized by the facility, all while enjoying hands-free, portion-controlled dispensing, which in turn reduces usage and potentially the spread of germs. The next-generation dispenser also has a setting that helps extend battery life by turning on and off depending on the user traffic.

Dispenser settings can be customized to allow for faster dispensing based on the restroom traffic needs. Towel delay settings are also available to control usage and ensure that users don't take more paper towels than are needed. Lastly, touchless dispensers come in both extended battery and no-battery versions that can cater to a variety of facility needs.

Manufacturers offer both high-capacity hard roll and folded towel dispenser options in their product lines, with the latter providing one-at-a-time dispensing that is designed to reduce tabbing, tearing, and multiple dispensing for reduced waste. Overfill prevention features can be specified on the folded towel modules to improve the user experience. Some next-generation models also feature innovative internal dispensing modules that plug and play to give owners the flexibility to build a dispenser customized to meet specific requirements. The stainless steel recessed dispenser housing can be combined with one of a variety of dispensing modules. If a unit needs to be repaired rather than replaced, selecting one that can be easily serviced could make a difference not only in terms of operations, but in terms of overall sustainability and longevity.



Next-generation paper towel dispensers offer architects a sleek fixture for today's upscale public restrooms.

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EXISTING HAND- AND FACE-DRYING SYSTEMS—PROMOTING HYGIENE

In a restroom, one of the most important functions in promoting good hygiene is hand sanitizing. The U.S. Centers for Disease Control and Prevention (CDC) has proclaimed that "hand washing is like a 'do-it-yourself' vaccine," and can reduce the spread of diarrheal and respiratory illness. Countless other organizations have echoed the CDC's message about the value of keeping hands clean. However, to effectively complete the process and receive the full benefits of hand washing, it is imperative that hands be dried effectively, too. As experts maintain that transmitting bacteria is more likely to occur from wet skin than from dry skin, the most effective approach to hand drying can have far-reaching implications for public health.[9] Substantial research has been conducted to determine the most sustainable and hygienic options. Following is a comparative discussion on hand drying via paper towels and air dryers in terms of both hygiene and efficacy.

PAPER TOWEL SYSTEMS

Drying hands with paper towels can reduce germs substantially, and several studies have concluded that hand drying with paper towels is the best option in terms of hygiene and user preference. In 2011, the Mayo Clinic conducted *The Hygienic Efficacy of Different Hand-Drying Methods: A Review of the Evidence*, a study that examined the research on the hygienic efficacy of different hand-drying methods. The highlights of that study are as follows:

- Hand washing is the most important measure to reduce the burden of health care-associated infection.
- Because the transmission of bacteria is more likely to occur from wet skin than from dry skin, the proper drying of hands after washing should be an essential component of hand hygiene procedures.
- The hygienic efficacy of hand drying includes drying efficiency, the effective removal of bacteria, and the prevention of cross-contamination.
- From a hygiene viewpoint, paper towels are superior to electric air dryers.
- Drying hands thoroughly with single-use, disposable paper towels is the preferred method of hand drying in health care.
- The provision of paper towels should be considered as a means of improving hand hygiene adherence among health care workers.



Incorporating natural, non-tree fibers, such as bamboo and wheat straw, is another option that has been deployed to achieve sustainable paper products.

In other conclusions, residual water was found to be more efficiently removed from the hands by cloth or paper towels. With just 10 seconds of drying with a single-serve towel, the residual water on the hands was minimal. Warm air dryers were much slower and required 45 seconds to reduce the residual water.[10] The study also revealed that users have a strong preference for using paper towels and that "hand hygiene adherence would possibly decrease if paper towels are not available in washrooms."

While alternative methods of hand dryers perform only one function, namely drying hands, paper towels multi task. They can be used to wipe the face, spot clean clothes, and tidy up children. Many restroom users favor the two paper-towel approach, one for drying hands and another for grasping the door handle upon exiting. Paper towels score well on other counts as well, far outstripping hand dryers. According to a comparative study of different hand-drying methods undertaken at the University of Westminster in November 2008, paper towels can do a satisfactory job in hand drying in only 10 seconds,[11] and they actually show a decrease in germ counts on fingertips after use up to 77 percent.[12] A study found hand dryers blow bacteria on people and throughout the restroom—up to 2 meters. Only a clean towel is touched, instead of being blown into the air as is the case with hand dryers; any germs that may gather on the towel during wiping are disposed of in the trash basket.

An effective paper towel system is predicated on a comprehensive maintenance system, in which staff are trained to remove the trash basket and replenish supplies of towels in a timely manner to keep restrooms comfortable and sanitary.

See endnotes in the online version of this article.

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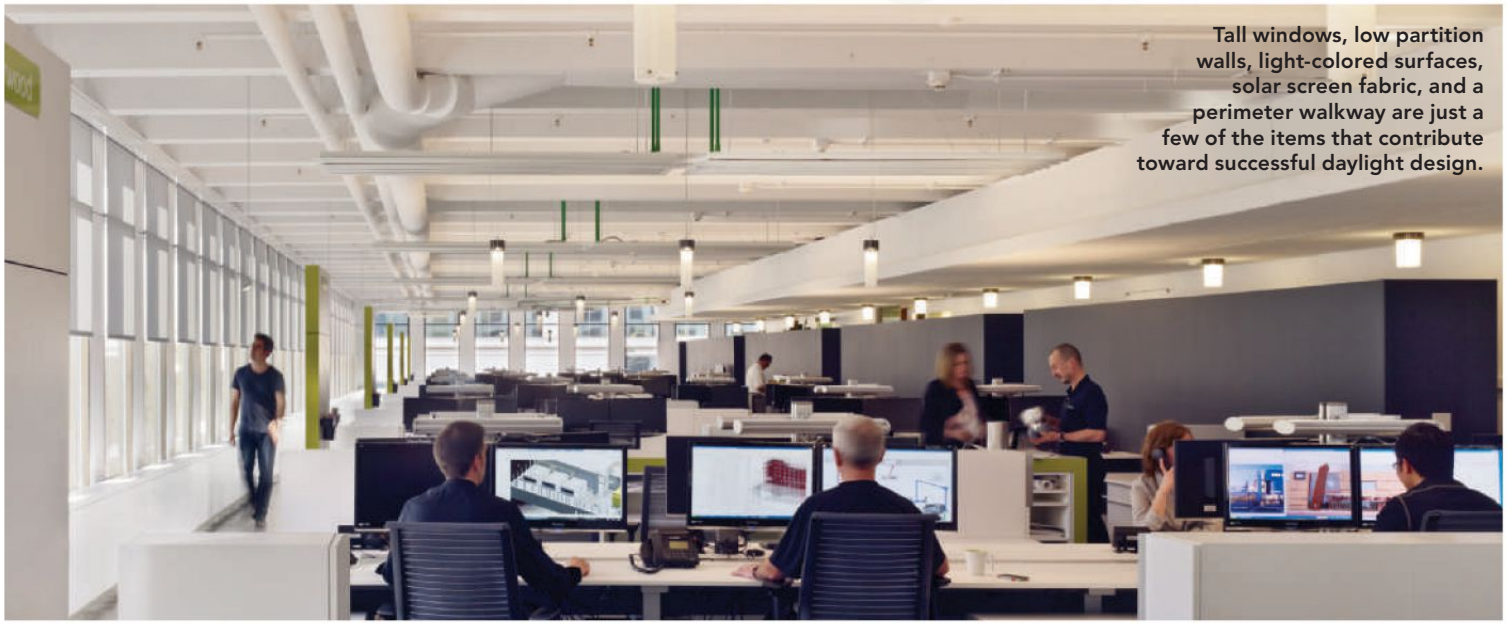
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CIRCLE 11

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Photo by Bruce Damonte



Tall windows, low partition walls, light-colored surfaces, solar screen fabric, and a perimeter walkway are just a few of the items that contribute toward successful daylight design.

Designing Daylight Fixtures

Best practices for optimizing the presence of useful daylight in a space

Sponsored by Lutron Electronics | *By Jeanette Fitzgerald Pitts*

The demand to have access to daylight in a commercial space has never been greater. New building codes and green building initiatives continue to incentivize, and are starting to require, that a certain level of glare-free daylight be available to building occupants and that the building be equipped to realize returns in energy savings when daylight is present. Design research and the resulting new technologies now enable windows to be specified so that they will put the right amount of daylight in the right spaces, be energy efficient, aesthetically pleasing, and within budget. Windows are not just windows anymore. Windows can become daylight fixtures.

This article will provide best practices on how to specify a window into a more sophisticated, better-performing daylight fixture and explore the impact that environmental design decisions can have in determining the type of daylight available at the project site in the first place.

INTRODUCING DAYLIGHT FIXTURES

It could be argued that the sun is the premier light source currently available. It is more energy efficient than an LED with a longer lamp life too. Add unmatched reliability, unparalleled color rendering, and documented health benefits and it is easy to see why a little daylight is such a desirable solution for the built environment. The most common way to get this coveted daylight into the interior is through a window. In architecture, a window is a source of daylight and, as such, a window could be considered a daylight fixture.

But a lighting fixture does more than simply transmit the light emitted from the light source into the space. Fixtures are designed to manage and distribute light, placing certain amounts of light into specific locations. A spotlight focuses the light emitted by the lamp onto a specific target. High-quality recessed troffer fixtures found in commercial environments are designed to keep higher-intensity light out of certain viewing areas to minimize the likelihood that the fixture will create a distracting glare on a computer screen.

A standard commercial window lacks the ability to provide much management to the daylight streaming through it. In that sense, it may be more accurate to say that a bare window performs more similarly to a bare bulb or naked lamp than a lighting fixture. Available daylight streams through the bare window and into the interior space in whatever intensity and angle it exists. On a sunny day, the intensity of daylight may reach up to, or over, 8,000 foot-candles (fc), making bare windows potentially very bright bulbs.

Adding a solar screen fabric and an automated control system to a bare window gives the window the best ability to manage available daylight. The solar screen fabric reduces the total number of foot-candles allowed into the interior and diffuses direct sunlight. This helps to mitigate glare, preserve views to the outdoors, and improve the overall aesthetic of the window wall. The automated system actively controls the position of the fabric in relation to the position of the sun and sky conditions: lowering the fabric to protect the interior from direct sunlight or overly bright skies and raising the fabric whenever more agreeable conditions exist to maximize the amount of usable daylight allowed into the building. It is the ability to better manage the daylight entering the interior that turns a bare window into a daylight fixture.

Just as bare bulbs and naked lamps are never specified, bare windows, too, may soon become a design anomaly. Designers can specify a solar screen fabric and automation system to satisfy certain performance criteria and turn a regular window into an effective, efficient, and aesthetically pleasing daylight fixture.

DESIGN GOALS FOR DAYLIGHT FIXTURES

Design objectives for incorporating daylight into a space can range from basic daylight management to saving energy with daylighting and achieving daylight autonomy.

Basic Daylight Management

Preventing glare and excessive brightness from destroying the visual environment and

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Left: Solar screen fabric helps to prevent glare and preserve views to the outdoors, while the automated shading system controls the position of the fabric on the window. Right: Siting and façade orientation each play a large role in determining what type of daylight is available at a window.

preserving views to the outdoors are two of the key considerations in achieving basic daylight management.

Preventing glare and excessive brightness. In an office setting, the range of useful daylight levels is considered to be between 10 fc and 200 fc at the work plane. As previously mentioned, on a sunny day, daylight levels can reach or exceed 8,000 fc. The solar screen fabric must be capable of significantly reducing the number of foot-candles transmitted into the interior, so that employees can continue productively without distraction or discomfort, even when the sun is at its most intense. The automation system ensures that the fabric is, in fact, deployed to protect the interior when these excessively bright, glare-causing conditions exist.

Preserving views. When it is too bright to look comfortably at a window, it is also too bright to enjoy the view beyond the window. A barrier must be placed between the window and the interior to block or filter the intense daylight before it reaches the interior. A vertical or horizontal blind can disrupt the view of the outdoors or eliminate it entirely, while deployed to block the sun. A solar screen fabric has been designed to filter and diffuse intense sunlight and enhance the view of the outdoors, simultaneously. Even when the fabric is lowered, building occupants can see the undistorted landscape or cityscape on the other side.

Daylighting

Daylighting, also referred to as daylight harvesting, is the practice of reducing electric light levels when daylight is present. Not only does daylighting reduce electrical lighting use, but it can offer significant savings as it is able to reduce the electrical lighting use during peak demand of a building. Daylighting is becoming much more commonplace and is now required by ANSI/ASHRAE/IESNA Standard 90.1-2010 and the California Building Efficiency Standards. Solar screen fabrics and automated systems create opportunities to light more of the floor plate with daylight, without exposing the interior to excessive brightness or glare.

Daylight Autonomy

In some instances, the goal is not to provide partial illumination of a space with daylight, but for daylight to be the exclusive light source for the space. This lofty design objective is referred to as daylight autonomy (DA). The 10th edition of *The Lighting Handbook,* published by the IES, defines daylight autonomy as "the percentage of the operating period (or number of hours) that a particular daylight level is exceeded throughout the year." The DA value represents the percentage of the workday that a space could be exclusively illuminated with daylight.

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Learning Objectives

After reading this article, you should be able to:

1. Explain how environmental factors such as siting, façade orientation, window-to-wall ratio, and interior space planning affect the availability of useful daylight and the building's ability to bring useful daylight deep into the interior space.
2. Apply best practices to select solar screen fabrics that provide the glare control, preservation of views, and energy savings demanded by the space.
3. Describe how an automated shading system saves energy by maximizing the amount of usable and glare-free daylight into a space.
4. Incorporate best practices into a design that will help maximize the presence of usable daylight, protect the interior from glare, and preserve views to the outdoors.

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

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CIRCLE 10

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Photo by Tony Frederick, Muncie, Indiana; courtesy of Draper, Inc.



Indiana University-Purdue University Campus Center, Indianapolis, Indiana

Managing Daylight with Automated Solar Control

Motorized shades lead to sustainable solutions

Sponsored by Draper, Inc.

In today's world of rising energy costs, it is important to keep a handle on a building's energy consumption. One of the easiest ways to do this is by using the sun's natural light. The sun provides a building with free light and keeps it warm, and many studies have found that the sun's natural light produces beneficial effects on building occupants. At the same time, however, sunlight can overrun a facility, causing problems such as high energy costs for constant air conditioning, eyestrain from glare on computers, hot spots in the building, and lethargy in employees. To keep out heat and glare while still maintaining a view for people inside the building, window shades are a first line of defense.

But there are shades, and there are shades. With the large amounts of glazing in today's buildings, the solar shading industry has increased its offerings to effectively control daylight and reduce solar heat gain. Some of the most efficient solar control options are motorized window shades, which can automatically adjust to compensate for the changing shade requirements throughout the day, adding to occupant comfort as well as building energy performance. Automated shades react silently to the ever-changing nature of daylight, without the need for manual operation, to prevent glare and allow maximum usable daylight.

This article will provide an overview of the benefits of designing a space with ample views and daylight, the challenges this presents, and how motorized shading can help solve these issues. Under discussion will be the benefits of natural light, the importance of shade fabric selection, and the different motorization options, as well as the right time in the design process to discuss these issues.

DAYLIGHTING: THE ABCs

The proper definition of daylighting—the harvesting of natural light—and its benefits

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Learning Objectives

After reading this article, you should be able to:

1. Discuss the benefits of natural light and how it can be maximized and controlled to enhance the personal comfort of the building occupants.
2. Explain how energy can be conserved through the proper specification of automated shades in order to raise the sustainability profile of the building.
3. Describe how a shade is motorized, and identify the different motorization options along with the controls and building integration possibilities that create an environmentally friendly solution.
4. Discuss the importance of fabric in specifying shades that maximize daylight, minimize glare, and are green building solutions with particular reference to openness and color.

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

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PC-based control of all shades was enabled from individual offices in this one-story office space.

are well known. Many studies, including groundbreaking research from the Hershong Mahone Group, have been conducted and the results are all very similar: Natural light and connection to the outdoors via window views improve people's mood and their general well-being; they boost recovery rates in hospital patients and the test scores of students; and perhaps most important to building and company owners, they increase productivity and reduce the number of employee sick days. Operational performance increases, too, with often significant reductions in artificial light and HVAC usage. With commercial buildings representing just under one-fifth of U.S. energy consumption, and office space, retail space, and educational facilities constituting half of commercial sector energy consumption, reductions in building energy usage can add up to some pretty significant savings both in dollar amounts and greenhouse gas emissions. Owners and architects in virtually every building sector have joined the push to maximize natural daylight. A recent article titled "Best and Brightest" in United Airlines *Hemispheres* Magazine stated that some companies including major aerospace engineering firms maintain they have won billions of dollars in additional contracts by incorporating more natural light into their workspaces.

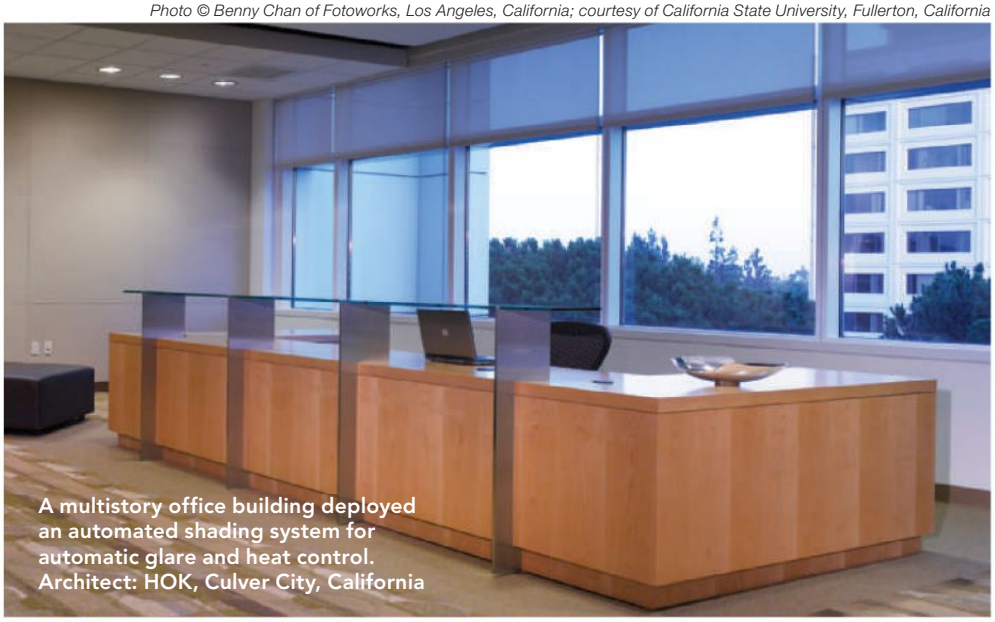
Shades play a crucial role in helping a facility reach daylighting autonomy, that is, the minimum use of artificial light, and the maximum use of natural light without being overcome by glare. When a person experiences glare coming in from a window directly in their face or on their computer screen, work performance can be adversely affected. Glare control, defined as improving visual comfort by blocking direct sun views while reducing brightness and contrast to manageable levels, in fact, can be a significant factor in daylighting strategies. If not controlled properly, glare can also affect interior lighting quality. The U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Reference Guide notes in IEQ for Daylight, there are "acceptable and unacceptable forms of glare control devices. The major attribute all acceptable forms have is operability." Absent a properly designed glare control strategy, a daylighting program is doomed to failure.

For reference in terms of designing for daylighting, architects should consult the Illuminating Engineering Society of North America (IESNA), which has been the reigning authority and has published *Recommended Practice for Daylighting Buildings*. This document serves to guide professionals through different design options and includes the latest data and technological solutions for meeting the challenges of daylighting while maximizing its benefits. Included is detailed information on design techniques, delivery methods, glazing systems, shading techniques, control strategies, and daylight performance simulation tools.

DAYLIGHTING WITH SHADES

Shading systems are very useful as daylight management solutions that can mitigate both glare and heat gain while maximizing usable daylight in a building. Controllability of those shades is a key issue and can influence the achievable level of daylight autonomy. Shades can be either manual or automated and while they can both be fashioned from the same fabric, and similarly positioned, the manually operated shade will always be moved at the discretion of the building occupants. Industry studies have shown that, frequently, manual shades are only moved once or twice a day, if at all. Occupants have been known to be quick to lower a shade in the face of bright glare, but are not always as fast to raise it again when the glare situation has given way to more diffuse light. In some cases the shade is left drawn for extended periods, thus depriving the space of the human and operational benefits of subsequent daylight cycles.

Photo © Benny Chan of Fotoworks, Los Angeles, California; courtesy of California State University, Fullerton, California



A multistory office building deployed an automated shading system for automatic glare and heat control. Architect: HOK, Culver City, California

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Originally published in June 2014 on ce.architecturalrecord.com

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CIRCLE 9

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EDUCATIONAL-ADVERTISEMENT



Study areas engender equilibrium, balance, and stillness and should be quiet in design and allow for concentration.

Functional Color and Design In Education Environments

Smart choices in color and design facilitate the learning process | Sponsored by PPG Paints

Color is a powerful communicator. It impacts us on many psychological and physiological levels. Color can enhance or impair learning, morale, and behaviors. Studies have shown that color affects a student's attention span and perception of time and can reduce absenteeism and vandalism. In addition to color, incorporating nature and the five senses into design scenarios for schools can have a positive impact on the learning process. While no one color or design scheme is infallible—and are heavily influenced by a host of factors—certain principles apply. This article will discuss the findings of extensive research and explore the role of the color palette, light, nature, and the five senses in the process of designing for preschool, elementary, middle, and high school. Optimum color and design scenarios for each room of the school will be highlighted.

COLOR RESEARCH—WHAT THE EXPERTS SAY

There is extensive research regarding design initiatives and their importance in the school environment. Study after study concludes that there is an explicit relationship between the physical characteristics of school buildings and educational outcomes. Four studies that evaluated the relationship between school buildings and student achievement reported higher test scores for students learning in better buildings and lower scores for students learning in substandard buildings. One of these studies showed a difference in student test scores ranging from 5 to 17 percent. Another report evaluating school facilities in Milwaukee, completed by the Council of Educational Facility Planners International, found that facility condition may have a stronger effect on student performance than the combined influences of family background, socioeconomic status, school attendance, and behavior. In his article "'Effects of School Lighting on Physical Development and School Performance," Warren E. Hathaway clearly shows that the visual environment is one of the most important factors in learning, affecting mental attitude, class attendance, and performance.[1]

See endnote in the online version of this article.

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CONTINUING EDUCATION

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Learning Objectives

After reading this article, you should be able to:

1. Explain the color and design choices that benefit the developmental stages of children in the school environment from grades K through 12.
2. Describe the philosophy of educational professionals, design authorities, and education researchers on the basic principles of school design and structure that promotes the health, safety, and well-being of students.
3. Discuss each color palette combined with an understanding of light reflectance values in the design process to create effective school environments.
4. Identify appropriate color and design choices for major areas and rooms within the education environment.

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

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Originally published in the June 2013 issue of Architectural Record; updated August 2014.

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CIRCLE 8

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Cathedral of Christ The Light, Oakland, California. Design architect: Skidmore, Owings & Merrill.

Photo by Timothy Hursley

Rethinking Wood as a Material of Choice

Costs less, delivers more

Sponsored by reThink Wood | *By Layne Evans*

Designers today are finding new possibilities in one of the oldest building materials on earth. Wood has always been valued for its beauty, abundance and practicality, but many of wood's inherent characteristics are rising to very current challenges. Wood's traditional values and newest technologies meet in the projects presented in this course, illustrating the advantages of wood in four areas: cost-effectiveness in a wide range of projects; adaptability for use in challenging, visionary new designs; lower environmental costs throughout its life cycle, from its source in renewable, carefully managed forests, through an energy-efficient service life, and often on to a new, recycled and reimagined use; and a unique human-nature connection that has always been intuitive, but is now being documented in research.

COST CONSCIOUS

As a material grown throughout North America, wood can be locally sourced and is usually less expensive than alternative building materials. Wood building systems also typically cost less to install when construction is viewed as a whole, for a number of reasons. Wood is readily available and tends to be delivered quickly, and most communities have a large pool of qualified tradespeople with wood framing experience, which minimizes construction delays and keeps labor costs competitive. Wood's adaptability and ease of use also translate into faster construction schedules, while a smaller foundation may be needed because of its light weight.

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Learning Objectives

After reading this article, you should be able to:

1. Compare the material, project and environmental costs of wood to other building materials.
2. Explain innovative wood technologies and how they are contributing to a wide range of sustainable designs.
3. Discuss the environmental impact of wood throughout its life cycle, including its renewability, certification options, impacts on energy efficiency, low carbon footprint, and end-of-life recycling and reuse.
4. Examine research and examples demonstrating the positive impact of exposed wood on a building's occupants.

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reTHINK WOOD

The reThink Wood initiative is a coalition of interests representing North America's wood products industry and related stakeholders. The coalition shares a passion for wood products and the forests they come from. Innovative new technologies and building systems have enabled longer wood spans, taller walls and higher buildings, and continue to expand the possibilities for wood use in construction. **www.rethinkwood.com**

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- Maintenance-free slide bearings for doors up to 300 kg/660 lbs - designed for high-frequency use (not limited to low-frequency applications)

www.simonswerk-usa.com
262.472.9500 | **Contact:** info@simonswerk.com

Circle 150

DOORS, WINDOWS

ONE-PIECE HYDRAULIC DESIGNER DOORS

Schweiss Doors



Schweiss Doors, Moving Walls. Schweiss Doors manufactures custom designer doors like this one-piece hydraulic door for Under Armour in Maryland.

Product Application:
- Moving doors and walls
- Custom-designed storefronts and more

Performance Data:
- One-piece hydraulic doors
- Faster, safer operation
- Zero lost headroom
- Superior design that keeps working

www.schweissdoors.com
800.746.8273 | **Contact:** Schweiss Doors

Circle 151

MATERIALS

DRIVABLE GRASS

G | WR

Soil Retention Products, Inc.



Drivable Grass is a permeable, flexible, and plantable concrete pavement system that can be used for a wide variety of applications ranging from pathways to fire lanes.

Product Application:
- Legoland Hotel, Carlsbad, CA
- Kaiser Permanente, Anaheim, CA
- Red Bull Headquarters, Santa Monica, CA

Performance Data:
- Hydraulic performance testing
- Live load testing

www.soilretention.com
800.346.7995 | **Contact:** Danny Reynaga

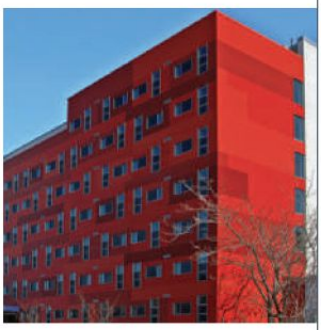
Circle 152

MATERIALS

UNIQUE METAL WALL SYSTEMS

$

ATAS International, Inc.



ATAS offers a variety of horizontal and vertical wall panels; mix and match colors for visual impact with interesting patterns and design.

Product Application:
- Corrugated Panel is a traditional, economical wall or roof panel
- Available in multiple metals and gauges
- Navy Green in Brooklyn, NY

Performance Data:
- Installed horizontally or vertically with exposed fasteners

www.atas.com
800.468.1441 | **Contact:** Liz Valori

Greenbuild Booth #1412

Circle 153

MECHANICAL SYSTEMS, HVAC, PLUMBING

LOW-PROFILE LINEAR DRAIN SYSTEMS

WR

Infinity Drain



Versatile linear drain system works for showers, pools, patios, balconies, and storm drainage, providing an architectural aesthetic and limitless possibilities.

Product Application:
- Offering the only site adjustable linear drain
- The most decorative top grate options
- Up to 5 finish options available

Performance Data:
- Custom fabrication available
- Made in USA

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

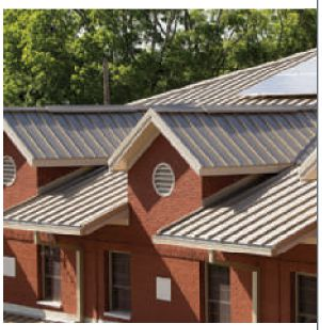
Circle 154

ROOFING, SIDING, THERMAL & MOISTURE PROTECTION

METAL ROOFING

$$ | G

Petersen Aluminum Corporation



SNAP-CLAD Metal Roofing Panels feature architectural aesthetics and structural performance. They are corrective leveled for superior flatness.

Product Application:
- Madiaon, TN fire station
- LEED Gold certification

Performance Data:
- Available in 38 colors on steel and 37 on aluminum
- 20-year non-prorated finish warranty
- Labor-saving one-piece design

www.PAC-CLAD.com
800.722.2523

Circle 155

SPECIALTY PRODUCTS

ARCHITECTURAL WIRE MESH

WR | G

The Gage Corporation, Int.



GageWoven® is an innovative collection of 23 designs suitable for elevator lobbies and cab interiors, plus other architectural fabrication.

Product Application:
- Atlantic Station, Atlanta, GA
- Calgary Zoo, Calgary, Canada
- State Street Bank, Quincy, IL

Performance Data:
- Wide variety of metals available including stainless steel, aluminum, copper, and commercial bronze
- Powdercoat finish available

www.gagecorp.net
800.786.4243, 608.269.7447

Circle 156

SPECIALTY PRODUCTS

METAL FABRIC

Cambridge Architectural



Build-A-Pattern metal fabric from Cambridge Architectural allows architects to mix and match multiple mesh patterns on a facade. Ideal for variable sun shading or just for a more interesting aesthetic design. Available in stainless steel for exterior use and anodized aluminum for interiors. Offered with a wide range of attachment options.

CambridgeArchitectural.com
866.806.2385

Circle 157

All products in this section are accessible on sweets.com. **$$$**= Premium cost | **$$**= Mid-range cost | **$**= Value-oriented cost
WR = Wide range of price points | **NC**= No charge | **G** = Product marketed as green | **NEW** = Released in the past 12 months

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New and Upcoming Exhibitions

Cybernetic Serendipity
London
October 14—November 30, 2014
Cybernetic Serendipity, the landmark exhibition curated by Jasia Reichardt in 1968, will be celebrated in the Fox Reading Room at the Institute of Contemporary Arts through a new presentation of rare installation photographs, press reviews, invitation cards, and printed material, such as the catalogue. Garnering the attention of the national and international press at the time, *Cybernetic Serendipity* was the first international exhibition in the UK devoted to the relationship between the creative arts and new technology. For more information, visit ica.org.uk.

Assembled Realities: Jeff Chien-Hsing Liao's New York
New York City
October 15, 2014—February 15, 2015
A portrait of New York as seen through more than 40 large-scale panoramic photographs of the city's urban landscape, *Assembled Realities* will feature work by Taiwanese artist Jeff Chien-Hsing Liao, who came to New York at age 18 to study photography. Pushing the boundaries of traditional documentary photography, Liao (born in 1977) creates large-scale panoramas by combining multiple exposures of the same location taken over the course of several hours. At the Museum of the City of New York. For more information, visit mcny.org.

IDEA Office: Thinking the Future of Auschwitz
Los Angeles
October 24—November 30, 2014
Thinking the Future of Auschwitz, at the SCI-Arc Gallery, is an architectural proposal for the future of the Nazi concentration camp in Poland. While the original concentration camp and Polish State Museum at Auschwitz continues to present a narrated, didactic experience, the proposal transforms the extermination camp at Auschwitz-Birkenau into a Biblical black hole. While the project is unique to Auschwitz, it tests architecture's own particular agency in the 21st century and contributes significantly to an expanded discourse on the conventions of catastrophe. For more information, visit sciarc.edu.

"Make a Joyful Noise": Renaissance Art and Music at Florence Cathedral
Atlanta
October 25, 2014—January 11, 2015
Three marble panels from Italian sculptor Luca della Robbia's famed organ loft created for Florence Cathedral will travel to the High Museum of Art, their first time in the U.S. The High's exhibition will place these panels in an environment like that for which they were originally created by displaying them with other musical objects, including hand-decorated choir books from the cathedral and a lectern designed to hold them. For more information, visit high.org.

Uneven Growth: Tactical Urbanisms for Expanding Megacities
New York City
November 22, 2014–May 10, 2015
As the world's population approaches 8 billion, city authorities, urban planners and designers, and many others will have to join forces to ensure expanding megacities remain habitable. To engage this international debate, *Uneven Growth* at the Museum of Modern Art will present the work of six interdisciplinary teams examining new architectural possibilities for six global metropolises. The resulting proposals will show how emergent forms of tactical urbanism can respond to alterations in the nature of public space, housing, mobility, and other issues in near-future urban contexts. For more information, visit moma.org.



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Ongoing Exhibitions

Louis Kahn: The Power of Architecture
London
Through October 12, 2014
Louis Kahn (1901–74) was a visionary architect, an expert manipulator of form and light, a creator of uniquely dramatic buildings, and a highly complex individual. This new exhibition at the Design Museum explores Kahn's work and legacy through architectural models, original drawings, travel sketches, photographs, and films, bringing to life his singular career and diverse output. *The Power of Architecture* explores such broad themes as ruins and archetypes, the world as structure, and community. For more information, visit designmuseum.org.

NYC Makers: The MAD Biennial
New York City
Through October 12, 2014
This exhibition spotlights the creative communities thriving across the five boroughs of New York. It showcases the work of approximately 100 makers who have been nominated by a pool of more than 300 New York–based cultural leaders, with final participants selected by a jury. From world-renowned cultural leaders to emergent enfants terribles, every maker selected demonstrates the highest level of skill in his or her respective field, whether architecture, furniture design, fashion, or film. At the Museum of Arts and Design (MAD). For more information, visit madmuseum.org.

Encounters
Dallas
Through October 31, 2014
Held at the Dallas Center for Architecture, *Encounters* is an interactive retrospective of the work of luis vidal + architects about the 10 years leading to their plan's realization as the new Terminal 2: The Queen's Terminal at Heathrow Airport, which just opened its doors this June and is the world's first airport terminal to be awarded BREEAM EXCELLENT rating for its sustainable building design. Featuring 80 projects, and 18 cities, *Encounters* takes the viewer through a conceptual map of Luis Vidal and his collaborators' work. For more information, visit dallascfa.com.

Hudson Yards: New York's Future is Rising
New York City
Through November, 2014
New York's future is rising in the heart of Manhattan, where the High Line ends and midtown begins. Hudson Yards, the largest private real-estate development in U.S. history, will redefine the New York skyline. While more than 24 million people will visit Hudson Yards every year when it is completed, this interactive exhibition offers viewers a unique opportunity to learn about New York's newest neighborhood today. At the Time Warner Center. For more information, visit hudsonyardsnewyork.com.

Fujiko Nakaya: Veil
New Canaan, Connecticut
Through November 30, 2014
The first site-specific work of art to engage the iconic Glass House itself, *Fujiko Nakaya: Veil* features the work of Nakaya, a Japanese artist who has produced fog sculptures and environments internationally. The exhibition wraps the Glass House in a veil of dense mist that

comes and goes. For approximately 10 to 15 minutes each hour, the Glass House seems to vanish, only to return as the fog dissipates. Inside the structure, the sense of being outdoors is temporarily suspended during the misty spells. For more information, visit theglasshouse.org.

Infra Eco Logi Urbanism
New Haven, Connecticut
Through November 30, 2014
Opening at the Yale School of Architecture, this exhibition brings together research and design work by the experimental Canadian architecture practice RVTR to explore possible urban and architectural futures in a post-metropolitan world. Infra Eco Logi Urbanisim looks at the Great Lakes Megaregion of North America (GLM) to envision the kinds of systems that could best serve a cluster of cities in an age of renewable energy, new mobility, and urban growth. For more information, visit architecture.yale.edu.

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

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

Millennium tiles
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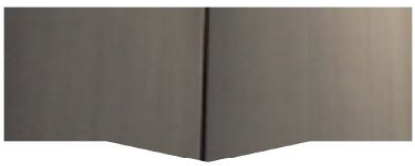
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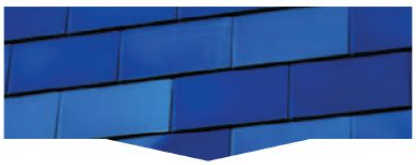
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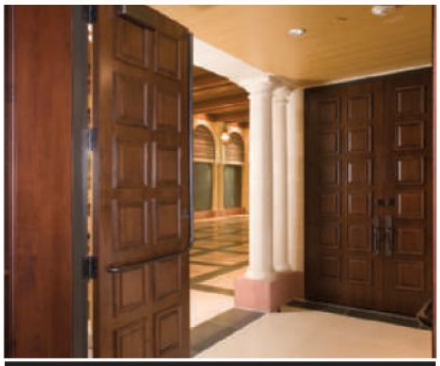
ARCHITECTURAL RECORD Innovation Conference
New York City
October 9, 2014
Influential designers will address topics ranging from the integration of art, technology, and design to the creative process behind experimental architecture and the evolution of a new American modernism. Keynote speakers include Doriana and Massimiliano Fuksas and Odile Decq. Architects will have the opportunity to earn seven AIA learning units. For more information, visit construction.com/events/2014/innovation-ny.

Worktech
San Francisco
October 9, 2014
Worktech will bring together renowned international and local thought leaders to focus on the alignment of business strategy and the workplace. It will welcome more than 200 senior professionals from real estate, technology, executive management, architecture, design, and professional advisors to further knowledge and share expertise. Event themes will include the blurring of physical and virtual space, UX and magnet workplaces, and the city as a platform for innovation. For more information, visit unwired.eu.com.

Women in Architecture Forum and Awards
New York City
October 10, 2014
The awards program will acknowledge the increasingly visible role of women in the profession; will encourage firms to promote female architects and their work; and will provide an opportunity for those in the field—honorees, firm leaders, and other practitioners—to come together to celebrate women's design achievements at an event hosted by ARCHITECTURAL RECORD. For more information, visit archrecord.construction.com.

City by Numbers: Big Data and the Urban Future
New York City
October 11, 2014
Big Data—the exponential growth and availability of information—is one of the defining phenomena of our time. It affects us all on different levels—with far-reaching social,

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STC 50 rated pairs of doors with wood molding.



Oversized door 188 in. by 158 in. with STC 55 rating.

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environmental, and governmental significance. To help make sense of Big Data as it relates to our built environment, and to provide insights into how we understand, experience, and create cities, Pratt Institute and *Places Journal* present a symposium titled City by Numbers: Big Data and the Urban Future. The event, to be held at Pratt, will be accompanied by an exhibition of print, digital, and video projects and associated apps produced using Big Data. For more information, visit pratt.edu.

Architecture and Design Film Festival
New York City
October 15–19, 2014
Now in its sixth season, the Architecture & Design Film Festival, the nation's largest film festival devoted to the subject of architecture and design, returns to Tribeca Cinemas with a special lineup of more than 25 films curated from around the world. Film subjects include artist Eileen Gray, Polish neon design, the maker movement, urban farming, Michael Graves, and women in architecture. This year's festival also boasts an impressive panel of distinguished speakers, lively Q&A's and, as always, great parties. For more information, visit adfilmfest.com.

Competitions

Breaking New Ground
Registration opens October 2014
Breaking New Ground is an international design and ideas competition that addresses the urgent affordable-housing needs of farmworker and service-worker families in the Coachella Valley in southeastern California. Efforts to improve living conditions suffer from a lack of funding and coordination. The competition seeks to address this by harnessing the power of design to envision new precedents, mechanisms, and policies for affordable-housing implementation and development, with implications for California and the nation. For more information, visit breaknewground.org.

Museum of Science Fiction Exhibit Design Competition
Registration deadline: October 31, 2014
The Museum of Science Fiction is proud to announce an exhibit-design competition for its 2015 Preview Museum, which is to be located in the Washington, D.C., metro area. The competition is open to students, architects, and designers from around the world. The museum plans to construct a 4,000-square-foot preview space in 2015 as an intermediary step in its efforts toward establishing a permanent museum dedicated to science fiction's history across the arts. The gallery must accommodate at least seven exhibits, which will rotate. Designs should emphasize the multiuse aspect of the space and incorporate creative ways to reconfigure the exhibits to provide open space for events, ideas for interactive environments, and ways to incorporate technology. For more information, visit museumofsciencefiction.org.

Ceramics of Italy Tile Competition
Submission deadline: February 3, 2015
Now in its 22nd year, this contest is open to North American architects and designers who use Italian ceramic tiles in their institutional, residential, and commercial/hospitality spaces. From corporate headquarters with ventilated porcelain facades and hospitals utilizing antibacterial ceramic floors to summer homes using decorative ceramics, Ceramics of Italy is looking for all types of inspiring projects featuring Italian ceramics. For more information, visit tilecompetition.com.

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

Good Design Is Good Business

CALL FOR ENTRIES

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

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



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snapshot

PROJECT **ÅKRAFJORDEN**
LOCATION **ETNE, NORWAY**
DESIGNERS **SNØHETTA**



IN THE VAST expanses surrounding a fjord in western Norway, a tiny cabin dissolves into the rocky, heather-shrouded terrain. The shelter, built for a prominent businessman to use during hunting excursions, was a unique undertaking for Oslo-based firm Snøhetta: there are no roads nearby; one can only reach the site on foot, on horseback, or by air. The latter means of transport is how the hut came to rest there: it was constructed in the lowlands, taken apart, and then flown piecemeal by helicopter to the site to be assembled again. "We wanted a building that blends with the scale and the shape of the hills around it," explains senior architect Margrethe Lund. Two teardrop-shaped steel beams make up the frame and are connected by hand-hewn timber planks. The designers planted the roof with native grasses and made an exterior wall from local stones, camouflaging the hut. Extraordinarily, in spite of its 375-square-foot size, the architect says the cabin can accommodate 21 guests. Once inside, looking out through a glazed facade, it is possible to feel both embraced by the landscape and at the edge of the world. *Anna Fixsen*

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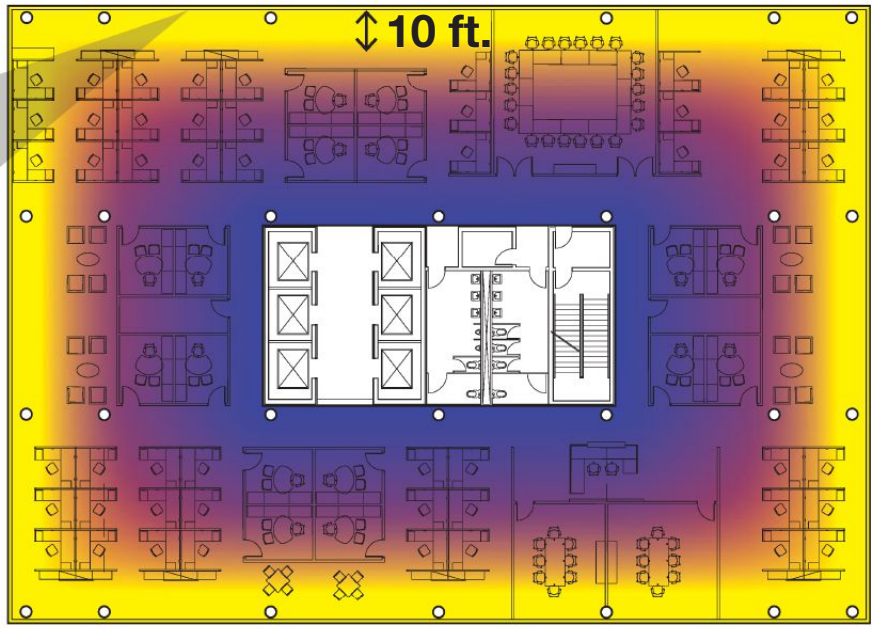
Daylight autonomy made possible by Lutron

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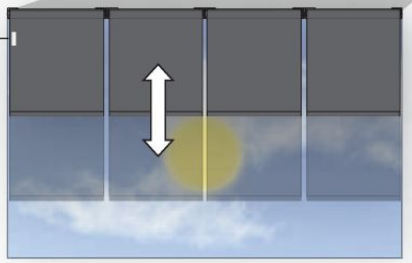
Manual shades provide a useful daylight zone up to only **10 ft.**



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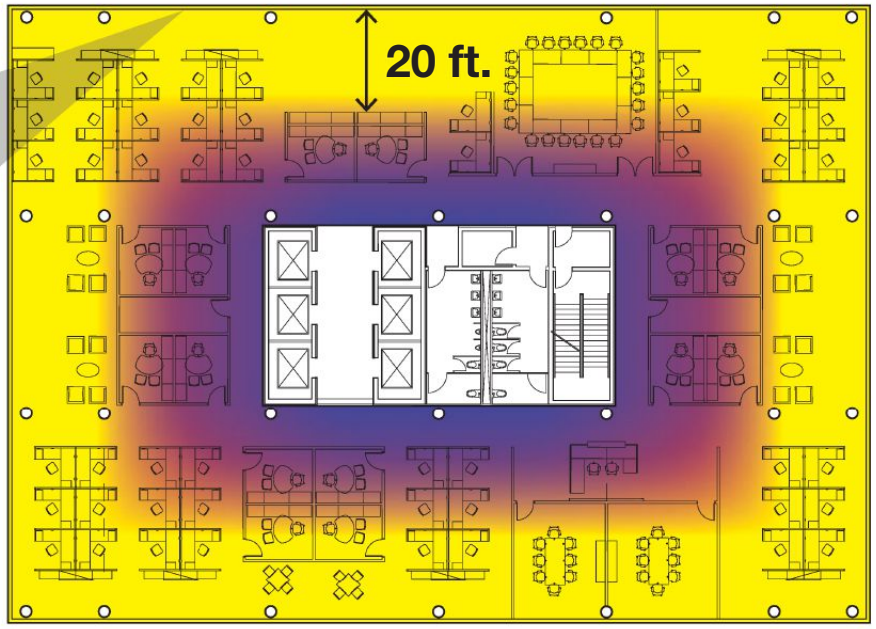


Sensor adjusts automated shades according to daylight conditions.

Maximizes useful daylight entering a space, reducing electric light usage.



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