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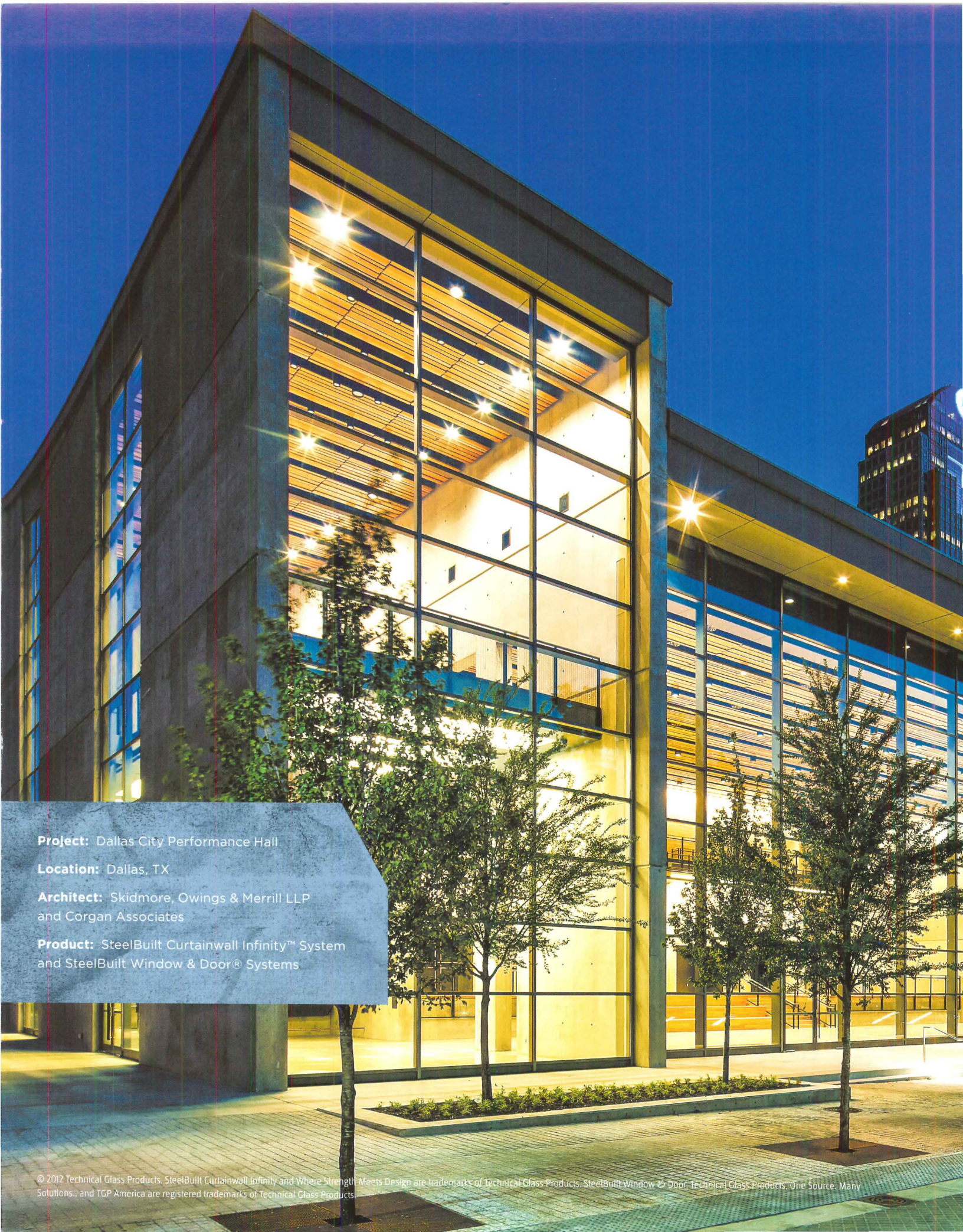
Record Houses 2013



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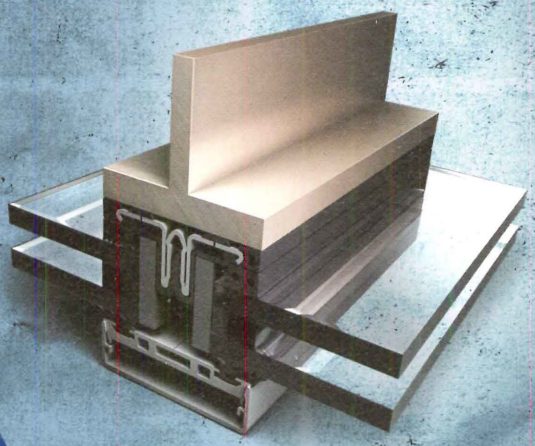

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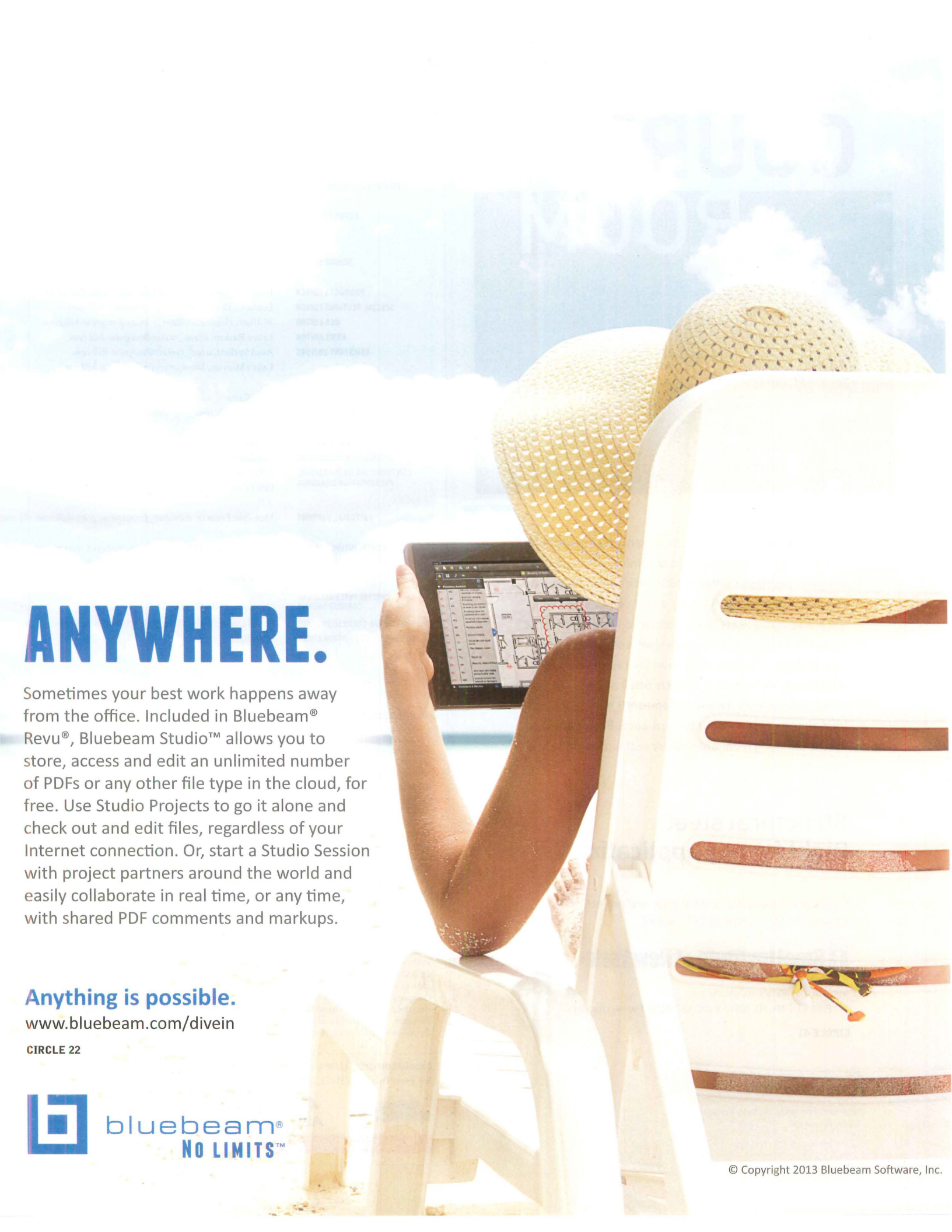

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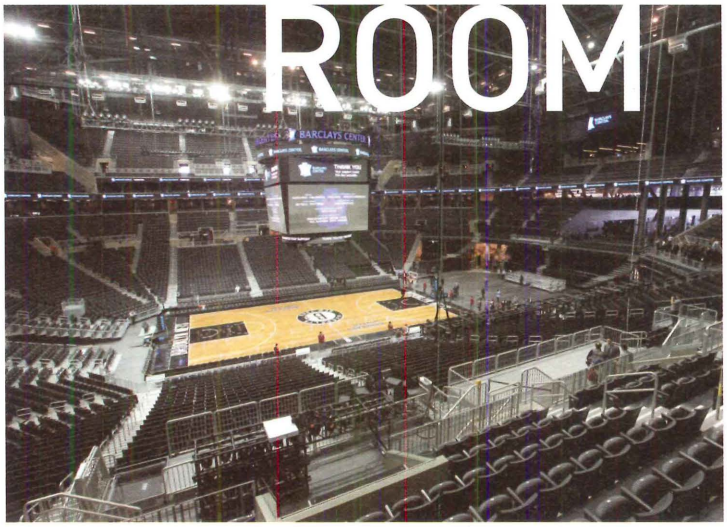

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Arena Design Architect: SHoP Architects
Arena Architect: AECOM
Design Builder: Hunt Construction Group
Structural Engineer: Thornton Tomasetti
Photo: Bess Adler

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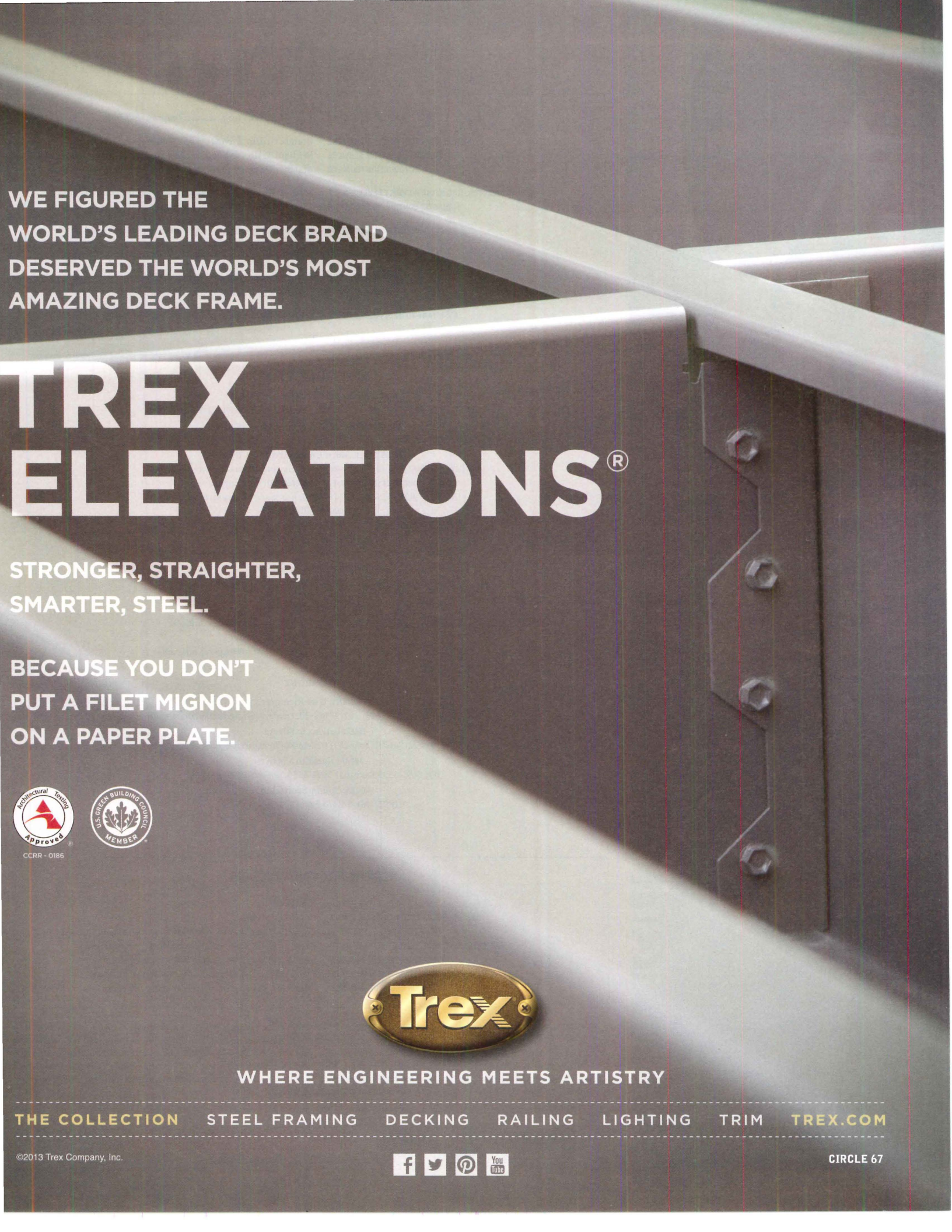
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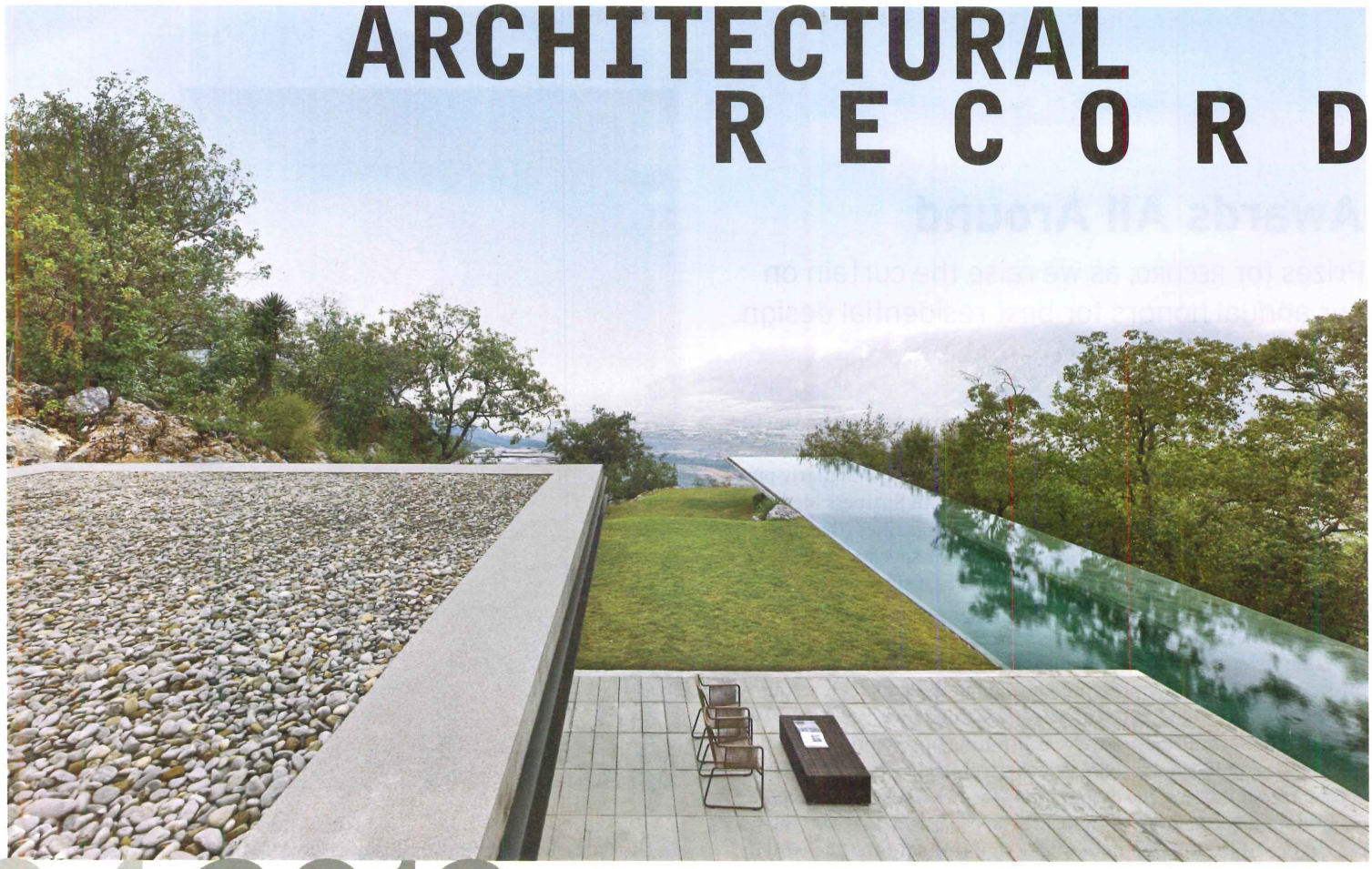

04 2013

NEWS

DEPARTMENTS

FEATURE

BUILDING TYPES STUDY 933
RECORD HOUSES 2013

ARCHITECTURAL TECHNOLOGY

ABOVE: HOUSE IN MONTERREY, BY TADAO ANDO ARCHITECT & ASSOCIATES. PHOTO BY JAMES SILVERMAN.

ON THE COVER: HOUSE K, BY SOU FUJIMOTO ARCHITECTS. PHOTO BY IWAN BAAN.

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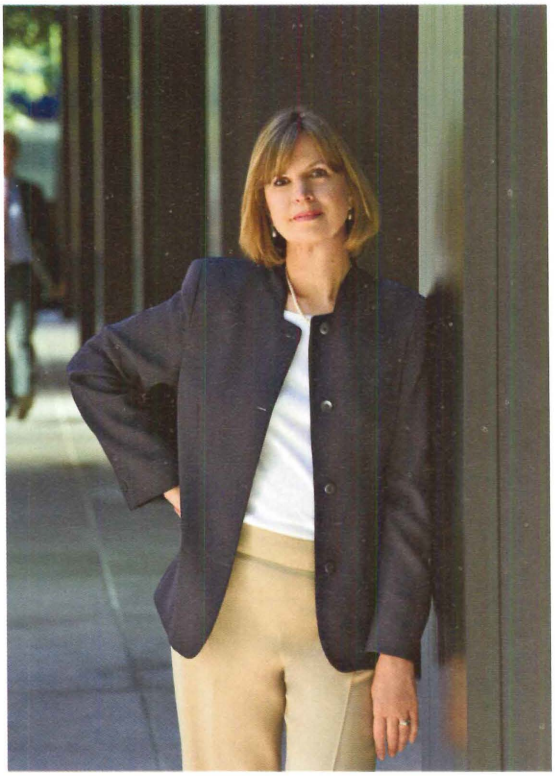
Awards All Around

Prizes for RECORD, as we raise the curtain on our annual honors for best residential design.



HERE AT ARCHITECTURAL RECORD, we work not only to bring you the best contemporary projects but also to report on the most critical issues confronting the profession today. That's why we're particularly proud of the recognition we've received from American Business Media's annual Jesse H. Neal awards—the Oscars for magazines like ours. RECORD won three of the big prizes: two for our special issue "Building for Social Change" (March 2012) and one for best single issue for "New Life for the American City" (October 2012). We were finalists for three other awards.

While covering such significant topics is a big part of our current mission—last month we presented new models for social housing—we also know how to have fun with the magazine's long traditions. With this issue of Record Houses, we're continuing our popular annual feature, first published in 1956. For the architects whose projects are chosen by our editors, the designation "Record House" has become a major honor. For readers, both inside the profession and out, the issue is a chance to see the best domestic design from around the world.

Recently, I sat on a jury for house of the year in New Zealand. Well, not sat, actually: we the judges of the awards (given each year by *Home NZ* magazine) flew, drove, and ferried all over that small country, visiting 11 short-listed projects in six days. What was most striking was how well the best-designed houses, though rooted in Western modernism, were tuned to the local climate and landscape. Site conditions would seem to be an obvious springboard for architecture everywhere, but we all know acclaimed designs that turn their back on where they're built.

This year's seven Record Houses all reflect a strong modernist sensibility, too (though the idiosyncratic house near Osaka, Japan, by Sou Fujimoto, whose quirky experiments defy categorization, is in a class by itself). Yet they are distinctive not only because of varying budgets and client demands but because, like those New Zealand houses, each design was strongly influenced by its setting.

Consider the stunning residence in Arizona by DUST architects, their first major project. Its open, boxlike pavilions, with rammed-earth walls (yes, the designers are disciples of Tucson architect Rick Joy) seem to grow out of the desert floor, while the roof terrace was created for nighttime communing with the stars (page 72). In the pine woods of a sleepy Argentine beach town, BAK Arquitectos built an austere and simple summer house (page 108) of poured-in-place concrete that retains the imprint of wood grain from the formwork made by a local carpenter. Tree trunks shoot up through holes in the outdoor wooden deck, too—though there are less obvious ways for a dwelling to engage a forest. Thomas Gluck's Tower House (page 90) in the Catskill Mountains in upstate New York is "a cross between a modernist skyscraper and a tree house," as RECORD editor Joann Gonchar describes the glass box elevated high up in the leafy canopy, with nothing rustic about its sleek look. The architect wanted, he said, "to make a building about the experience of being in the woods without having the materials be natural."

Of course, the American master of architecture inspired by nature was Frank Lloyd Wright. In this issue, we're exceptionally pleased to bring you Wright's Fir Tree House from 1948 (page 62). Haven't heard of it? The dramatic shingled wood lodge—with its monumental stone fireplace and a unique system of rafters in the soaring living room—is one of the architect's least-known structures, with interiors that have never before been published. Still owned by a descendant of the family who commissioned it, the house was recently refurbished but retains every aspect of its original design—including all the furniture, created by Wright.

Landing this elaborately rusticated summer house for these pages was something of a journalistic coup—and publishing great journalism is what we aspire to every day at RECORD. We're grateful and proud to be recognized by the Neal awards for our success in bringing you the best. ■

Cathleen McGuigan

Cathleen McGuigan, Editor in Chief

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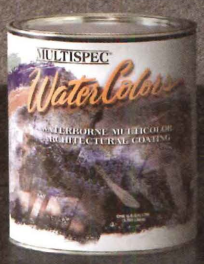

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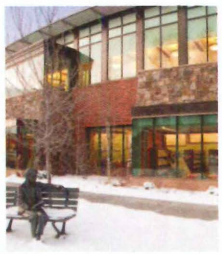

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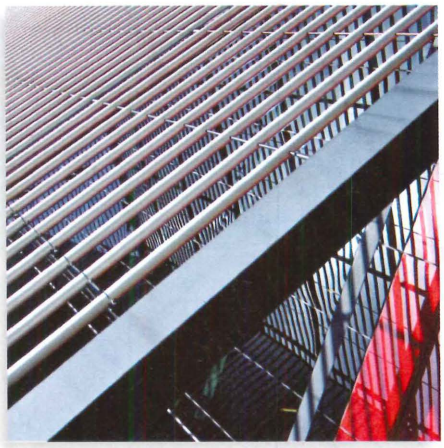

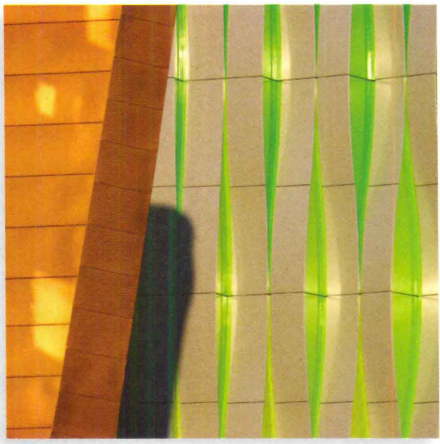

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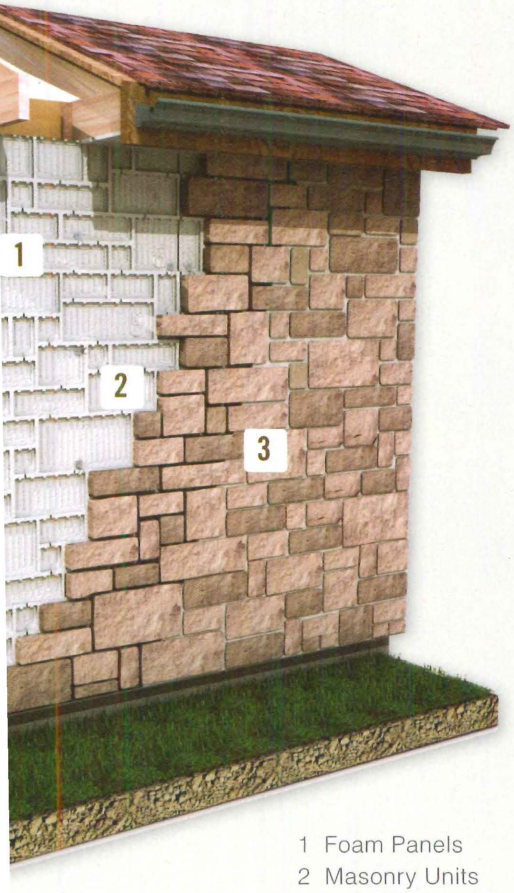

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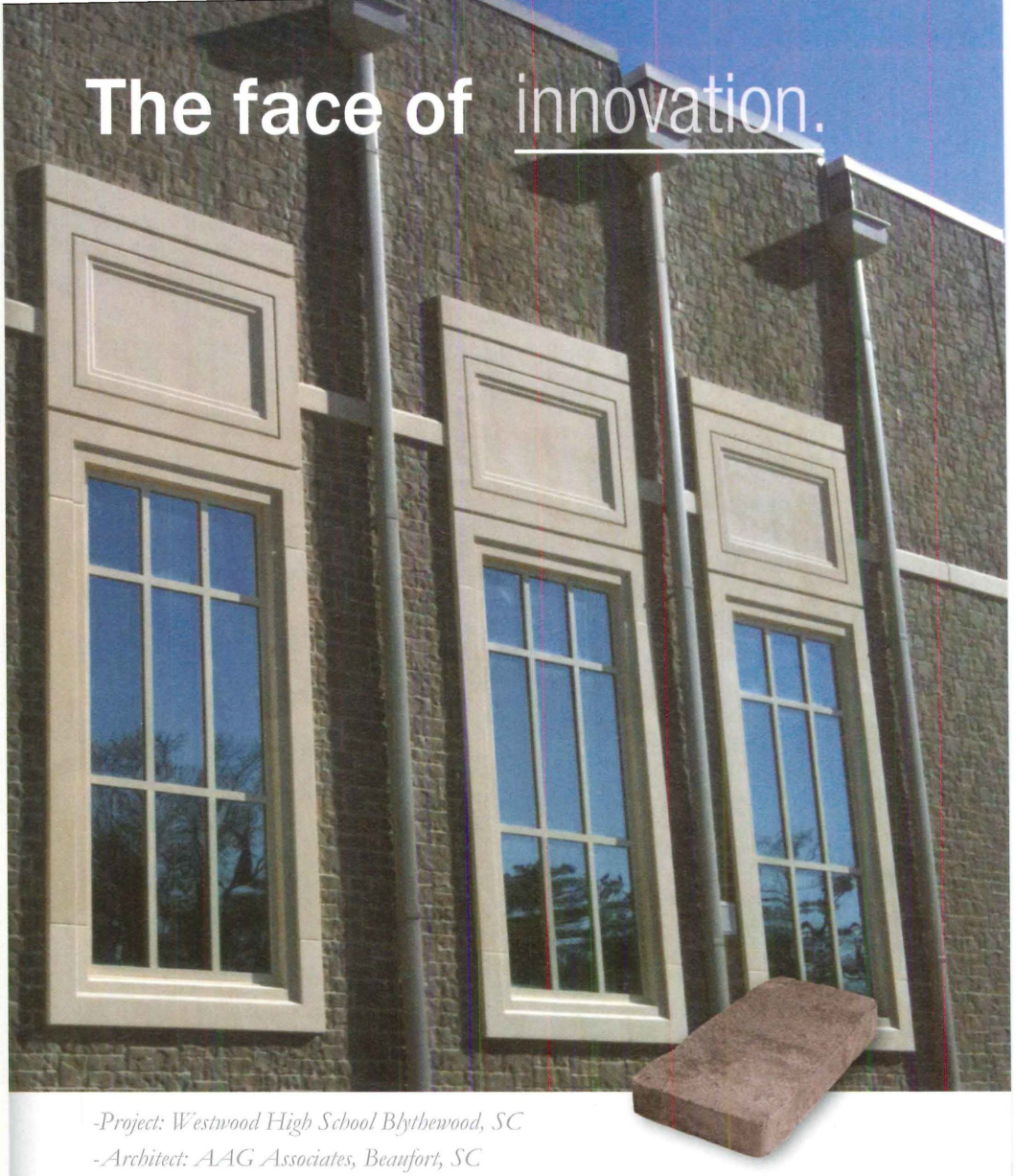

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perspective

It is easier for me in European countries than it is here. There is a different dynamic. In the U.K. they are very conservative. There is a skepticism and more misogynist behavior here. Although there [have also been] people here who were incredibly supportive. *–Zaha Hadid, speaking to the British newspaper the* Observer, *February 16, 2013*

New Mariinsky to Premiere After Years of Controversy

BY LINDA C. LENTZ

A promenade and glass bridge will link the existing Mariinsky Theater with Diamond Schmitt Architects' addition.

THE CURTAIN is about to rise on a Russian opus that's been a decade in the making—with as much Sturm und Drang as a Mussorgsky opera. After the selection (or near selection) of designs by three architects, two official competitions, and one false start, the Mariinsky II theater in St. Petersburg is scheduled to open to the public on May 2 with an evening of superstar performances led by general and artistic director Valery Gergiev.

Designed by Jack Diamond of the Toronto-based Diamond Schmitt Architects, the new 851,575-square-foot, seven-story building expands the institution's campus in the historic heart of the city: the original Mariinsky Theater (1860), home to the renowned opera and ballet companies, and a recently built concert hall (2006) by Xavier Fabre. Its size and scope may well fulfill Gergiev's goal to create a premier performing-arts complex capable of mounting demanding productions. But there is nothing excessive about Diamond's plan, which won the second of the competitions in 2009. An opera lover who caught Gergiev's attention with the superior technical performance of his Four Seasons Centre in Toronto, the architect emphasized program above all.

Respecting the context of the city's architecture and plan, Diamond devised a generously glazed, limestone-clad opera house with a wood-lined auditorium that accommodates nearly 2,000 seats. An enclosed bridge for people and props connects it to the existing 1,600-seat theater, a Rococo gem a third of its size, on the opposite side of the Kryukov Canal. Tests by theater consultant Fisher Dachs and acoustician Müller-BBM indicate excellent sightlines and acoustics, while state-of-the-art production facilities and daylit rehearsal studios for both houses aim to elevate the outdated venue to one of the world's best.

Yet despite reports of a first-rate interior, local residents have been sounding off about the building's exterior with petitions to have it razed before it's even completed. According to the city's English-language newspaper, the

(continued)

View additional images and watch a video at architecturalrecord.com/news.

Rising From the Rubble

The day before the second anniversary of the cataclysmic and fatal earthquake in Christchurch, New Zealand, on February 22, 2011, architect Shigeru Ban stood in the half-finished nave of the "cardboard cathedral" he designed, his largest temporary structure yet. Thirty-seven of the cardboard tubes that form the soaring A-shaped church roof were already installed, and will be covered in translucent corrugated-polycarbonate panels. Ban hopes that the space evokes the feeling of being in the destroyed 19th-century Christchurch Cathedral, which was the city's main landmark. Shipping containers anchor Ban's roof, which will be made up of 96 cardboard tubes when the building is completed in May. The $4.2 million "temporary" church is likely to stand for decades. *Cathleen McGuigan*

Shigeru Ban in front of his cardboard cathedral. The roof will rise up to 70 feet above the altar.

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

(Mariinsky continued)

St. Petersburg Times, preservationists say it conflicts with its traditional surroundings. At the same time, architects think it is too plain.

"Any contemporary building—any building, for that matter—introduced into historic St. Petersburg is subject to criticism, whether justified, informed, or not," said a Mariinsky representative in an e-mail. "Our expectations are more than being met. Once it is complete and people experience it, their impressions will change."

Ironically, the current protests follow a trail of similar reactions to previous schemes. The first to be considered, in 2002—a radical design by California architect Eric Owen Moss—was swiftly defeated for its imposing, crumpled-glass facade and programmatic limitations. One year later, the jury of an invited competition awarded the commission to French architect Dominique Perrault for a design that had the makings of an icon—a golden domelike structure enveloping a marble opera house. Plagued by client indecision, construction issues, and extreme budget overruns, this project was scrapped in 2007 despite the fact that the foundation was under way.

With an accumulated cost of approximately 21 billion rubles (about $700 million), funded by the Russian government, the Mariinsky II may be one of the most expensive cultural projects ever built—though the late Jørn Utzon's Sydney Opera House (1959–73) rivals its expense, duration, and stress.

A rooftop amphitheater and terrace will offer views of St. Petersburg.

Frustrated by the turmoil, Diamond defends his scheme, explaining, "We were pushed by the minister of culture at the beginning of the job to make a classical exterior with a modern interior, but I said, 'No, one should have a relationship to the other.'" He was also against overpowering the area's "independent jewels": the old Mariinsky, scheduled for future renovation, and the nearby St. Petersburg Conservatory of Music (c. 1890). Instead, the architect says he worked to frame them, using the principles of the past—maintaining the street continuity, the scale, and classic elements, such as a masonry base and metal roof.

"Every architect wants his shot at doing an extravagant building," says Diamond. "But it would be inappropriate here." ■

ABI Climbs, Firms Still Cautious

BY C.J. HUGHES

THE ANNOUNCEMENT that the Architecture Billings Index (ABI), a reliable measure of the industry's health, had clocked in at a post-recession high of 54.9 in February has many designers feeling that the worst of the downturn is behind them, even if they have made that claim before. The ABI has now surpassed 50 for seven straight months, its best performance since the official 2009 end of the recession. Still, hiring continues to be soft, as firms refocus their energies.

"We're still hunkered down, trying to be very efficient at everything we do," says Steve Ruth, a founding principal at Perkowitz+Ruth. The 34-year-old firm, based in Long Beach, California, focused on retail projects for longtime clients like Kroger and Walmart before the economy turned, forcing it to let go more than half its staff between 2008 and 2012, with much of that in the last year. It has 160 employees today and doesn't plan to start hiring anytime soon.

Overall, hiring gains have been incremental. In January, architecture firms employed 156,500 people, according to the U.S. Bureau of Labor Statistics, and that number has been steady for the past three years. In January 2012, there were 152,300; in January 2011, 154,200. By contrast, in January 2007, when the economy was in better shape, there were 210,900 employees, the agency says.

But hiring, which usually trails economic improvement, is imminent, notes Tom Ward, a principal of Resource Staffing Consultants, a recruiting firm, who says he's busier now than at any time in the last seven years: "Firms are starting to believe we're in a recovery, so they're investing in things they never thought they would invest in again."

"Firms are starting to believe we're in a recovery, so they're investing in things they never thought they would invest in again."

There have been hopeful signs before. Since plunging to a low of 34.4 in January 2009, the ABI, which is based on surveys of American Institute of Architects (AIA) members, has cracked the key 50 mark several times—a score above 50 indicates an increase in billings—before falling again. "We're cautiously optimistic," says Bill Wilson, the founding principal of Wilson Architects. In the past year his Boston firm has hired 15 people, boosting his staff to 55. The office, which focuses almost exclusively on college projects, says recent commissions at Boston University, Northeastern University, and Vanderbilt University fueled the expansion.

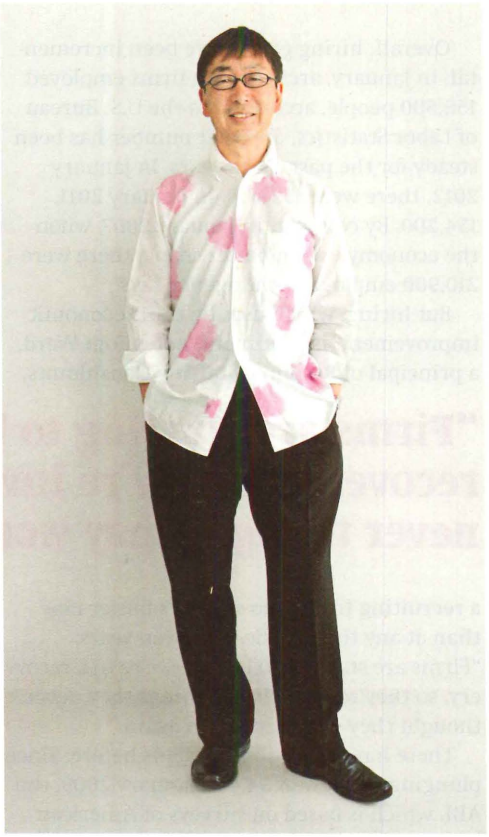
Even the behemoth firm Stantec faced leaner times. "When you come out of a trough, you want to highly utilize your employees, which we did for a long time," says Roger Swanson. He heads Stantec's West Coast design practice and says the Canadian firm, which has about 150 offices in the U.S., will also hire this year, after beginning to add people in 2012; as work picks up, the catch-22 is that firms can only run so lean for so long. ■

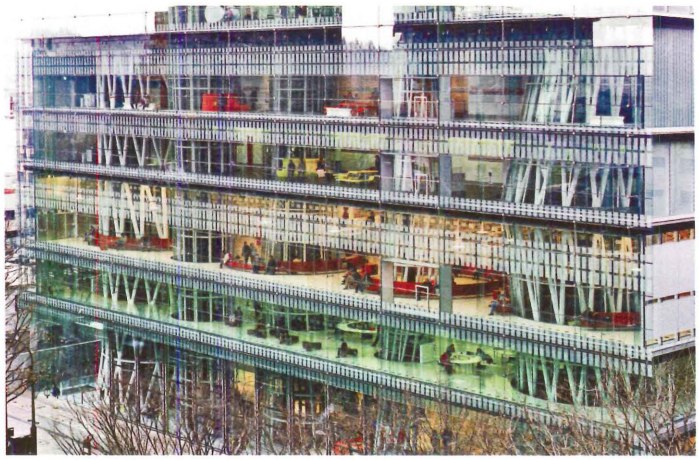
At Last, Toyo Ito Wins the Pritzker

BY NAOMI R. POLLOCK, AIA

TOYO ITO has been awarded the 2013 Pritzker Architecture Prize, announced by Thomas J. Pritzker, chairman of the Hyatt Foundation, which sponsors the program. The sixth Japanese architect to win the prize, Ito had been considered a leading candidate for years by outside observers. The 71-year-old designer has made it his mission to "overcome modernism" by freeing his buildings from that movement's geometric, structural, and spatial conventions. In the process, he has created an extraordinary array of libraries, houses, shops, theaters, and other buildings distinguished by their mazelike arches, wavy columns, and other elements that defy the norm. Yet his works are so logical that they seem comfortable in their settings, even as they startle us. Said Pritzker juror Yung Ho Chang, "Although Mr. Ito has built a great number of buildings in his career, in my view he has been working on one project all along—to push the boundaries of architecture."

Ito opened his studio in 1971 after working for Kiyonori Kikutake for six years. The project that catapulted him to international stardom and a steady stream of overseas commissions was Sendai Mediatheque, completed in 2001. As its ambiguous name suggests, the building combines various programmatic elements, such as library and gallery areas. But instead of dividing them with partitions, Ito modulated the interior loosely with 13 see-through columns that let functional zones connect fluidly. "This was a huge step away from modernism," explains the designer. It also changed the notion of public architecture in Japan.



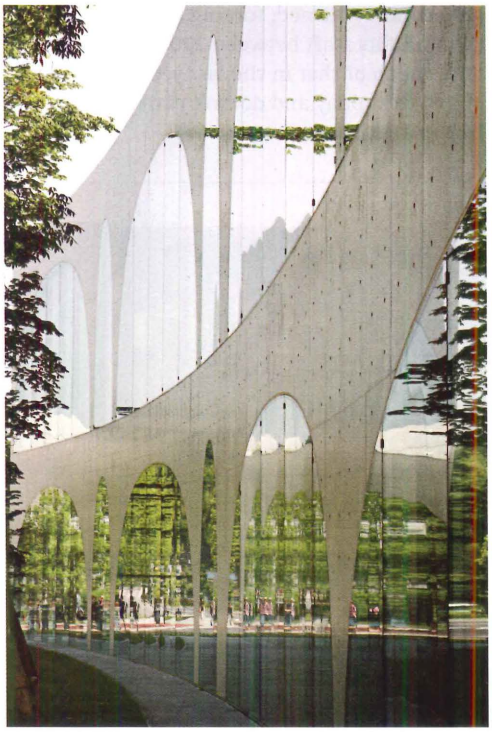


Toyo Ito (above) has challenged modernism's conventions with buildings such as the Sendai Mediatheque (below), completed in 2001, and the Tama Art University Library (right), from 2008. He has also helped train Tokyo architects such as Kazuyo Sejima, Ryue Nishizawa, Astrid Klein, and Mark Dytham.

Among the building's most distinctive features are the tubular columns themselves. Enclosing stairs and other usable spaces, they redefined the role of structure and its integration, a theme that emerged in many of Ito's subsequent projects, such as his building for the leather-goods company Tod's on Tokyo's Omotesando shopping street. Combining structure and skin, glass-and-concrete walls inspired by the leafy trees lining the boulevard enclose the building. As the walls ascend, their boughlike concrete elements bifurcate continually, yielding column-free space inside and a striking exterior.

While the expression of structure is rarely understated in Ito's newer work, the architect maintains that structural materials have not changed fundamentally. Rather, it is the way he uses steel and concrete that has evolved. "Over the past 10 years, structural analysis has progressed, resulting in much more flexibility and innovation," he explains. New fabrication methods have developed too: "The people working on-site have evolved alongside computer technology." And these changes are enabling him to realize such spectacular buildings as the Taichung Metropolitan Opera House. Under construction in Taiwan, it will be an enormous, cavelike edifice with multiple performance halls but nary a straight line anywhere (floor planes excepted) when it is completed in 2014. Until recently, even for Ito, buildings like this were strictly the stuff of fantasy.

Ito also has a strong sense of public responsibility. He speculates that one reason for this year's prize is his commitment to the revitalization of the earthquake- and tsunami-ravaged Tohoku region. Shortly after the 2011 disaster, Ito teamed up with colleagues to launch the Home-for-All projects, a series of modest buildings that provide communal space for people living in temporary housing



(RECORD, March 2013, page 196). For Ito, working with the survivors is not just a social-welfare exercise. "A disaster zone, where everything is lost, offers the opportunity for us to take a fresh look, from the ground up, at what architecture really is," he wrote in his book *Toyo Ito: Forces of Nature*.

Ito hopes to design more in Tohoku and is eager to work in the U.S., where he has yet to build. His project for the Berkeley Art Museum–Pacific Film Archive was canceled in 2009. He will receive his Pritzker in Boston on May 29. ■

View additional images at architecturalrecord.com/news.

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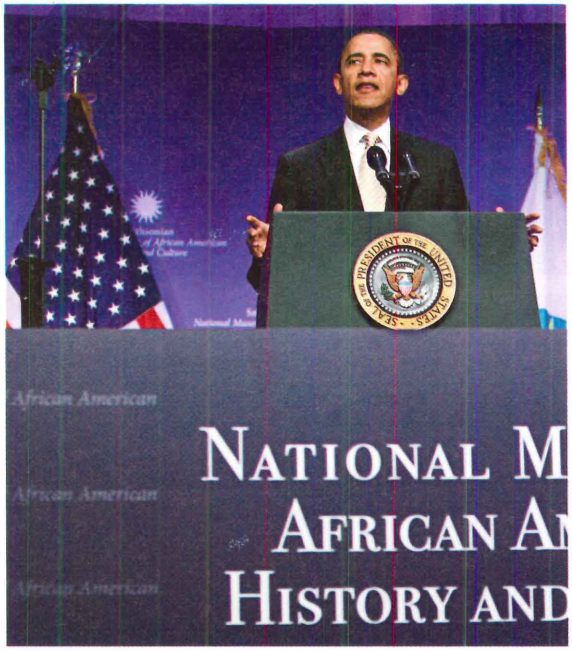
CIRCLE 16

Is Adjaye Obama's Pick?

BY FRED A. BERNSTEIN

WHEN PRESIDENT Barack Obama held a state dinner for British Prime Minister David Cameron last year, the luminaries at the head table included Warren Buffett, George Clooney, and David Adjaye. Not long after, the British press began referring to Adjaye as the president's favorite architect.

At the time, there was no talk of an Obama presidential library—the election was still months away, and the president had reportedly told friends he didn't want a library. But in January, the *New York Times*'s Jodi Kantor reported that Obama had changed his mind and that a former aide had been scouting locations. Since then, speculation has flourished about where the library will be built and who will be asked to design it.



President Obama addressed the crowd at the February 2012 groundbreaking ceremony for the David Adjaye–designed National Museum of African American History and Culture in Washington, D.C.

The "where" is still a question mark, with Chicago considered likely. But the "who" appears less of a mystery, because the only name being mentioned is Adjaye. The architect himself hardly denied rumors that he was the front-runner. Asked at a recent gallery opening whether he was going to design the presidential library, Adjaye responded, "I can't talk about that. I'll get in too much trouble."

Adjaye (who was born in Tanzania) shares more than African roots with the president. A few weeks before the state dinner, they shared the stage at the groundbreaking for the National Museum of African American History and Culture, which Adjaye designed (with Davis Brody Bond and Freelon Group). Obama is no doubt also aware of Adjaye's deep connection to libraries; his most prominent U.S. projects include two public libraries, both within a few miles of the White House.

Presidential libraries will be very much in the news when the George W. Bush Presidential Library and Museum, designed by Robert A.M. Stern, opens in Dallas on May 1. Undoubtedly, the press will criticize the cost to taxpayers of what many consider vanity projects. Though the libraries are built with private funds, they are maintained by the federal government.

The University of Chicago, where both the president and the first lady have worked, is lobbying hard to be the site of the Obama library. Susan Sher, a former chief of staff to the first lady, is now an executive vice president at the university's medical center and, according to the *Times*, the person charged with making the university's case. Asked for a comment, Sher e-mailed an official statement that concluded: "It is premature to discuss a presidential library." But it wasn't premature for University of Chicago political-science professor Charles Lipson to raise concerns about the problems of having a presidential library—which can have partisan elements—at a university. Or for the university to create a faculty committee, chaired by constitutional-law professor Geoffrey Stone, to "offer advice on how best to coordinate the possibility of such a library with the interests of the University," as Stone wrote in an e-mail. Among the possible sites, according to news reports, are the 37 acres that housed the Michael Reese Hospital, which was demolished between 2009 and 2012. One potential hiccup: the first family may return to their Hyde Park house in 2017 and may not want to draw tourists to a site so close to their actual home.

It would be unusual for a non-American to design a presidential library. But that probably wouldn't deter President Obama from choosing Adjaye, a British citizen who spends a large percentage of his time in New York and Washington, especially if the African American Museum is well received when it opens in 2015. The White House press office did not respond to an e-mail requesting comment on a possible site or architect for an Obama library. ■

noted

BIG to Draft New Smithsonian Campus Master Plan

The Smithsonian Institution has chosen a Bjarke Ingels Group–led design team to rethink its Washington, D.C., campus, which includes 19 museums, the National Zoo, and nine research facilities. BIG is charged with reengaging the buildings with their neighbors and public space.

NYC's Van Alen Names David van der Leer Its New Director

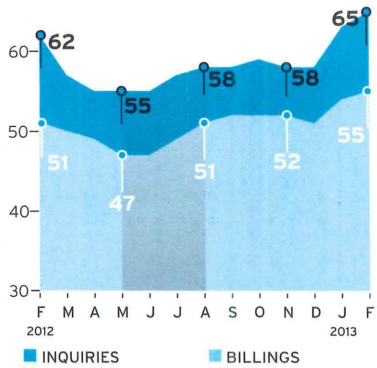
David van der Leer, a curator at the Solomon R. Guggenheim Museum since 2008, has been named the Van Alen Institute's executive director, effective May 6. Most recently, van der Leer served as curator of the BMW Guggenheim Lab and as associate curator of architecture and urban studies.

Competition Launched for Rio's World Cup Structure

Organizer [AC-CA] has launched an international architectural competition for a freestanding World Cup Structure in Lapa Square in the heart of Rio de Janeiro during the FIFA World Cup (June 12 through July 13, 2014). Registration ends June 30, 2013.

Laurie Olin Receives 2013 Jefferson Foundation Medal

Landscape architect Laurie Olin is one of the 2013 recipients of the Thomas Jefferson Foundation Medal, which recognizes achievement in areas that Jefferson excelled in. Olin is known for the Washington Monument grounds in Washington, D.C., and Bryant Park in New York City, among other projects.



ABI: Inquiries Score Highest Since 2007

In February, the Architecture Billings Index (ABI) score was 54.9, up slightly from a mark of 54.2 in January. The ABI has now surpassed 50 for seven months in a row (a score above 50 indicates an increase in billings). The new-projects-inquiries index was 64.8, higher than January's 63.2 reading, and its highest mark since January 2007.

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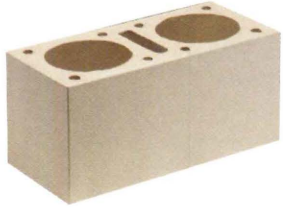
8" Double Thru-wall - 7-5/8" x 7-5/8" x 15-5/8"

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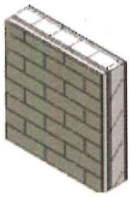

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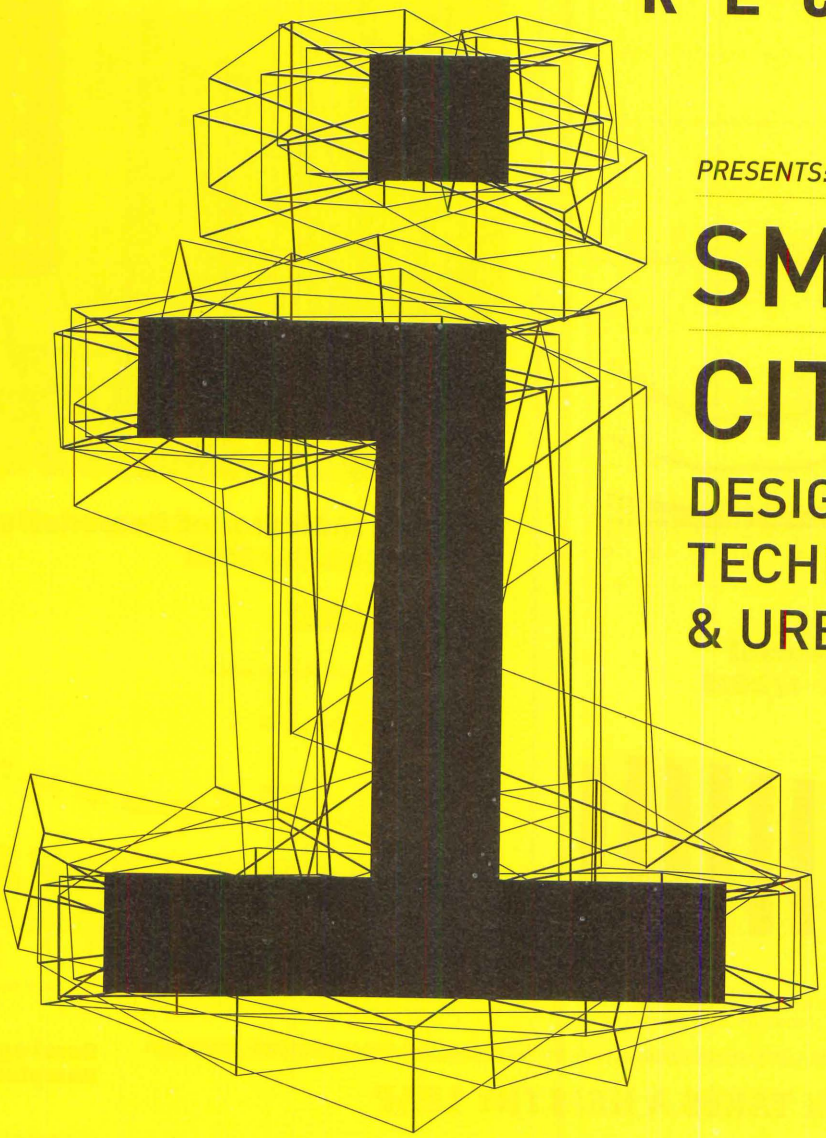

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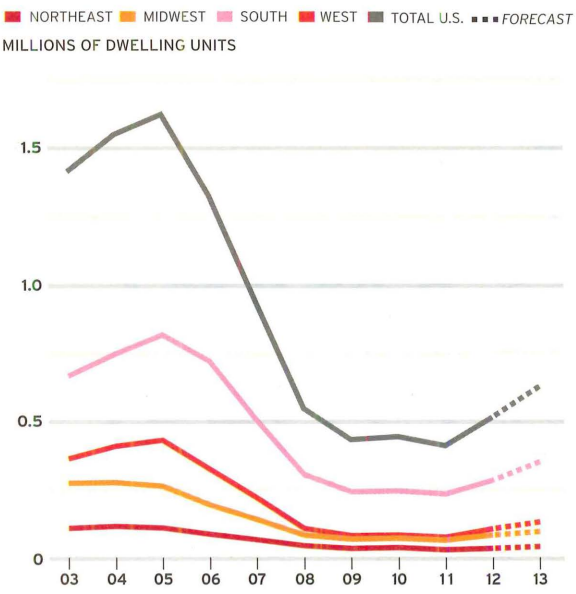
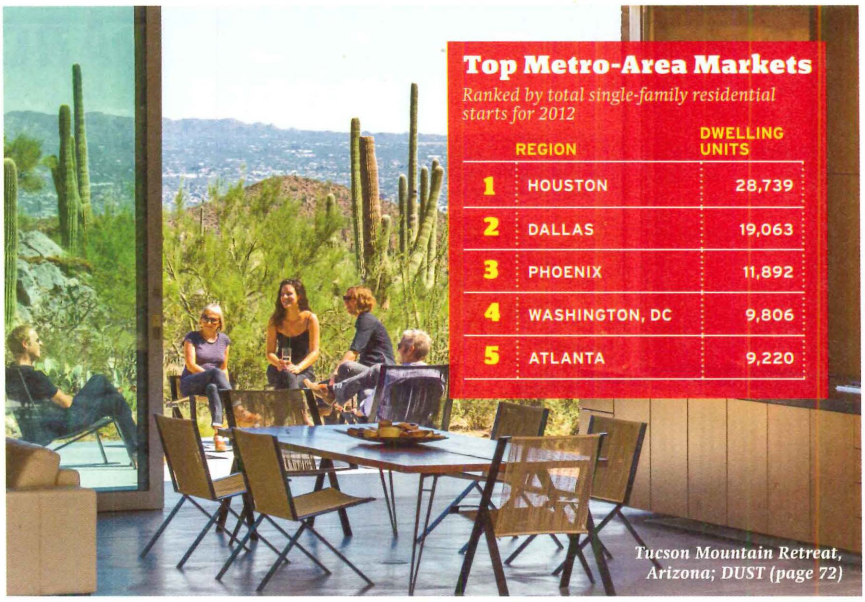
After years of instability and sharp declines, the housing market is finally on the rebound. Both new construction and home renovations have posted recent gains, a good sign for the entire U.S. economy.

Single-Family Starts by Region

In addition to U.S. total and 2013 forecast figures





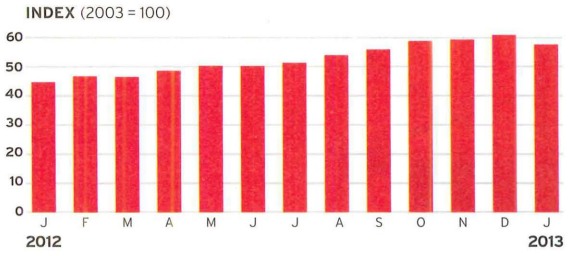
Top Metro-Area Markets

Ranked by total single-family residential starts for 2012

	REGION	DWELLING UNITS
1	HOUSTON	28,739
2	DALLAS	19,063
3	PHOENIX	11,892
4	WASHINGTON, DC	9,806
5	ATLANTA	9,220

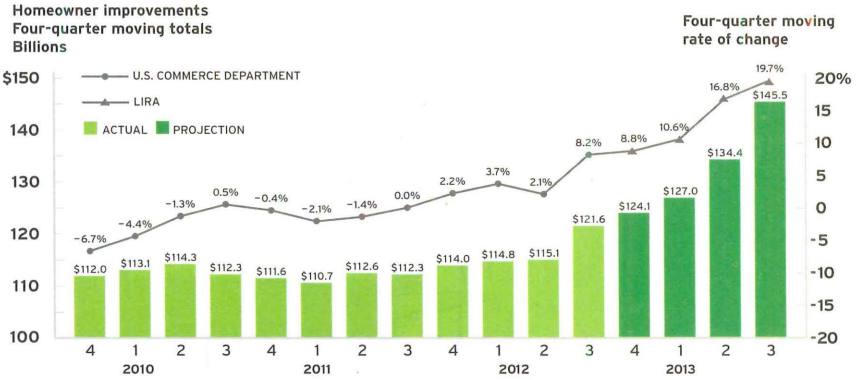
Tucson Mountain Retreat, Arizona; DUST (page 72)

The Dodge Index for Single-Family Residential Construction 1/2012–1/2013



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

Leading Indicator of Remodeling Activity (LIRA)
Fourth Quarter 2012

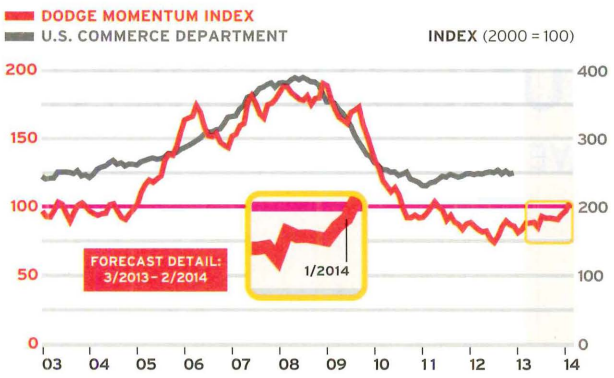


The fourth-quarter 2012 estimate is calculated using preliminary U.S. Commerce Department data and LIRA projections.
Source: Joint Center for Housing Studies of Harvard University

MOMENTUM INDEX TAKES A HEALTHY LEAP

In February, the Dodge Momentum Index rose 6.3% to 102.9, the highest level since April 2010. The strong increase, the third in a row, suggests that the recovery of the nonresidential building sector is finally gaining traction.

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



CoreLogic Measure of Completed Foreclosures

	COMPLETED FORECLOSURES
DECEMBER 2012	56,000
DECEMBER 2011	71,000
% change	-21%

S&P/Case-Shiller Home Price Index: Single-family

INDEX (JANUARY 2000 = 100)

	20-METRO AVERAGE
DECEMBER 2012	146.0
DECEMBER 2011	136.6
% change	+6.8%

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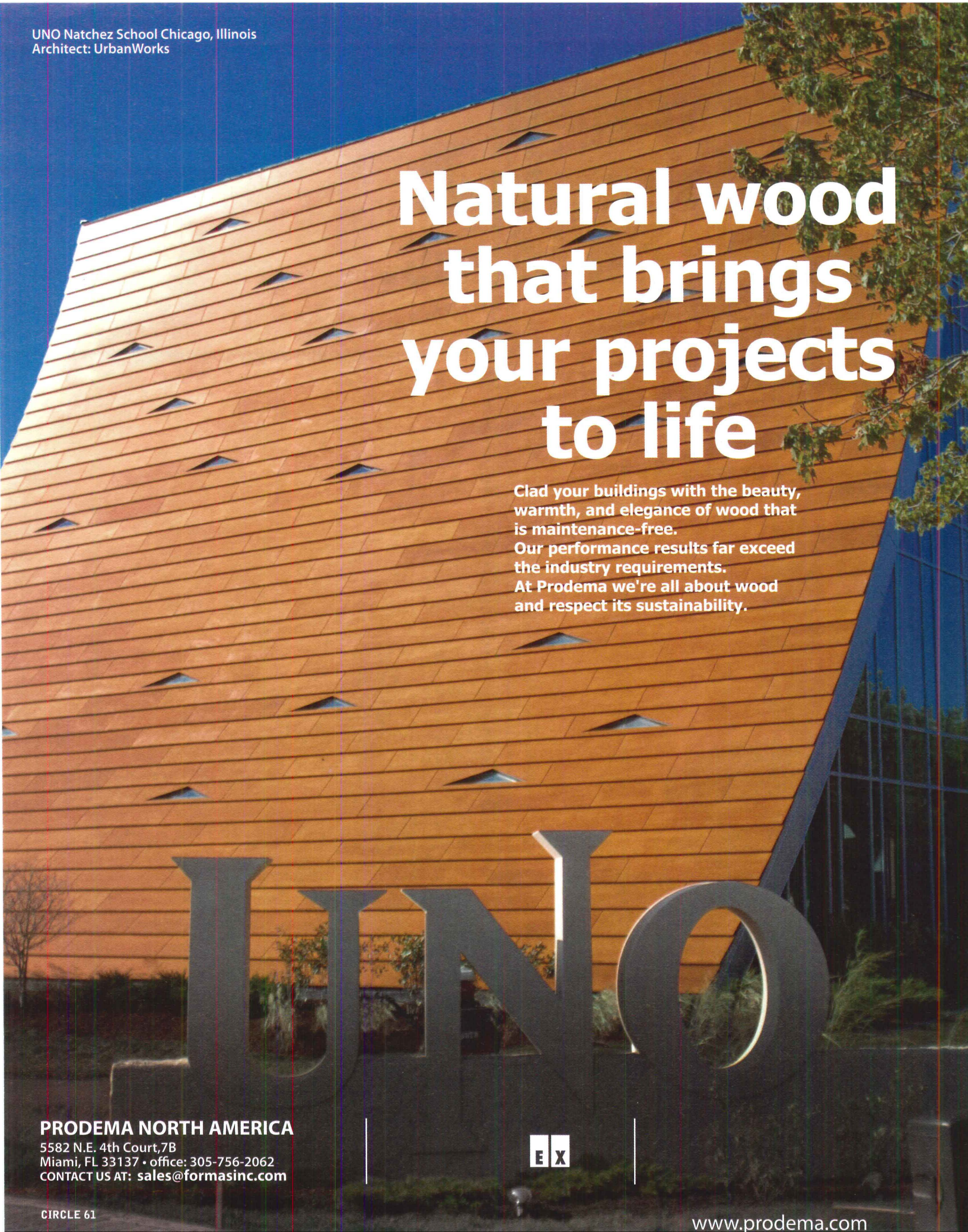
CIRCLE 58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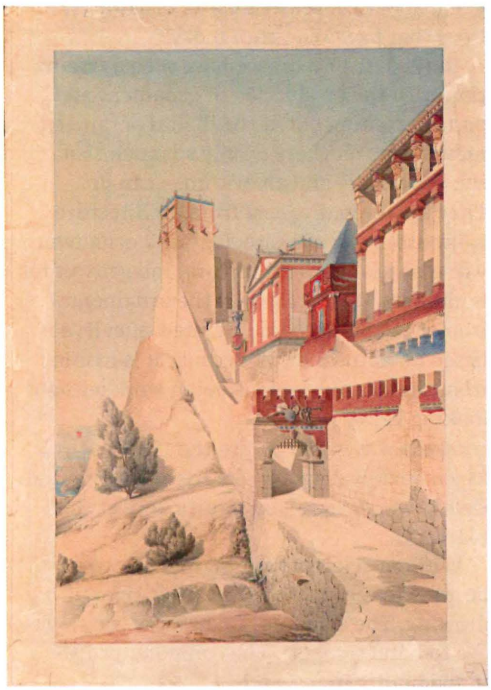
A Romantic Rationalist Examined

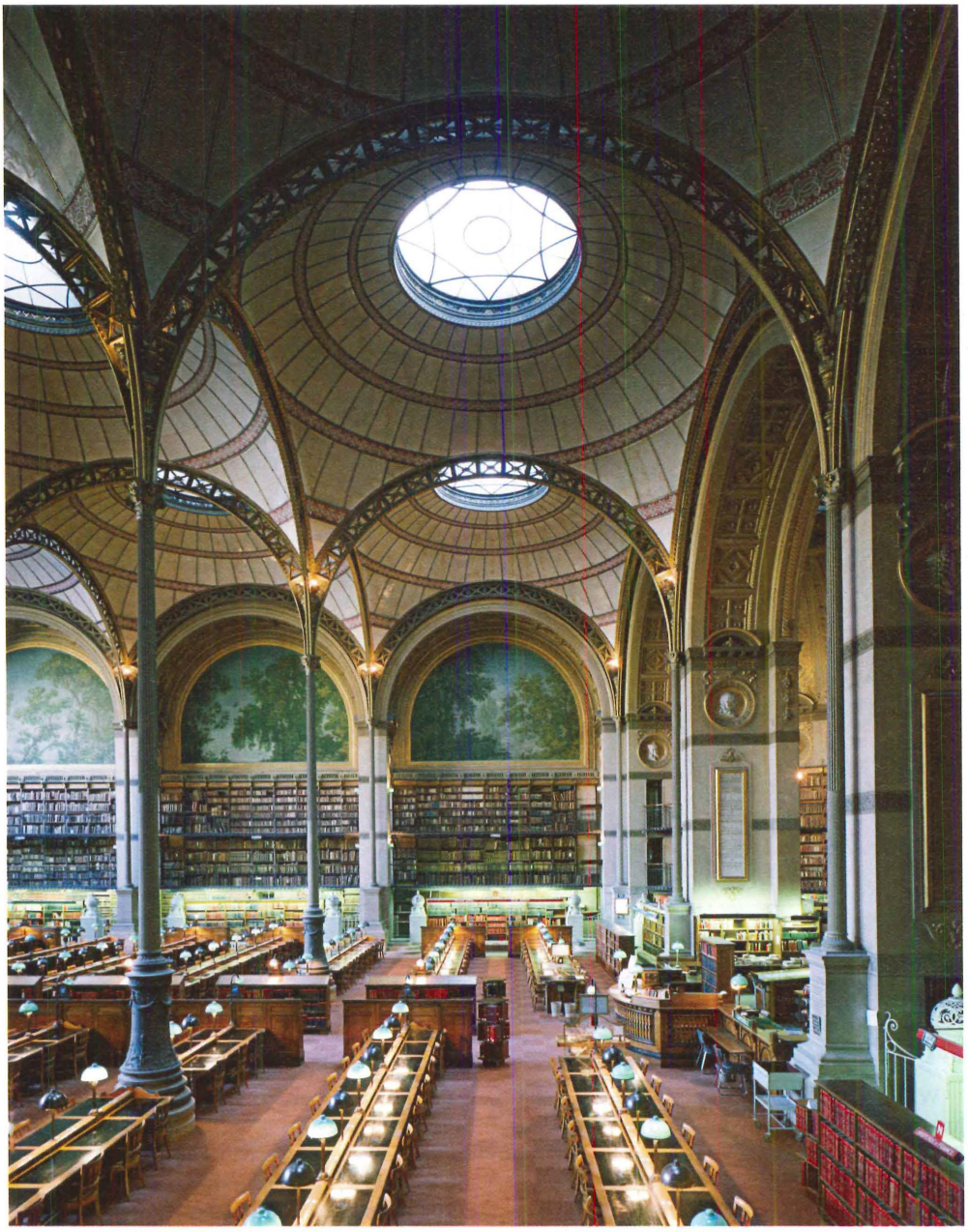
An exhibition highlights Henri Labrouste's modernization of the classical language.

BY SUZANNE STEPHENS

HENRI LABROUSTE: Structure Brought to Light, at New York's Museum of Modern Art (on view until June 24), highlights the pioneering legacy of the 19th-century architect. Labrouste (1801–75) gracefully transformed the classical language of masonry into an architecture suffused with space and light by exploiting the new structural possibilities of iron in his civic monuments.

In today's world, where new materials and techniques constantly challenge architects, Labrouste's ability to synthesize the traditional with the modern still serves as inspiration. The elegantly composed show, mounted by Barry Bergdoll, the museum's chief curator of architecture and design, focuses on this progenitor of Modernism and the two major works that vividly demonstrate his romantic rationalism—the Bibliothèque Sainte-Geneviève (1838–50) and the Bibliothèque Nationale de France (1859–75), both in Paris. In so doing, Bergdoll presents a substantive display of some 200 drawings, watercolors, architectural models, and vintage and modern photographs. The show begins with projects Labrouste executed as a Prix de Rome winner at the French Academy in Rome (1825–30), and ends with examples of architecture he influenced here and abroad.





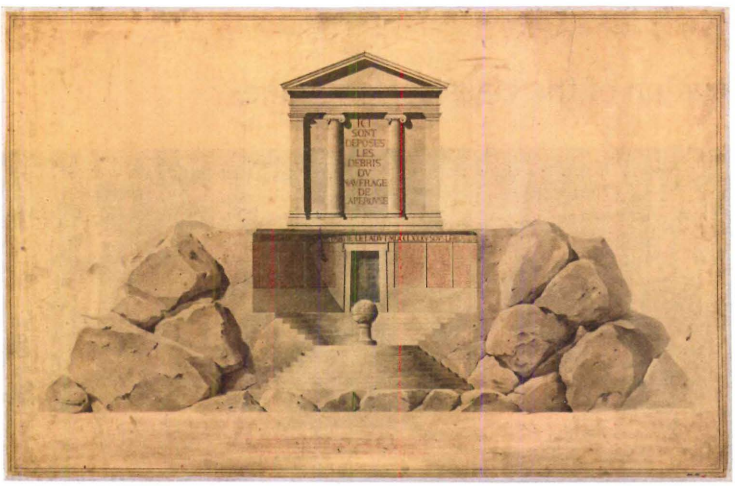
The reading room of Labrouste's Bibliothèque Nationale de France uses a classical vocabulary for ceramic vaults supported by iron columns. In his youth he drew a gateway to an antique city as a restoration project (1830, left).

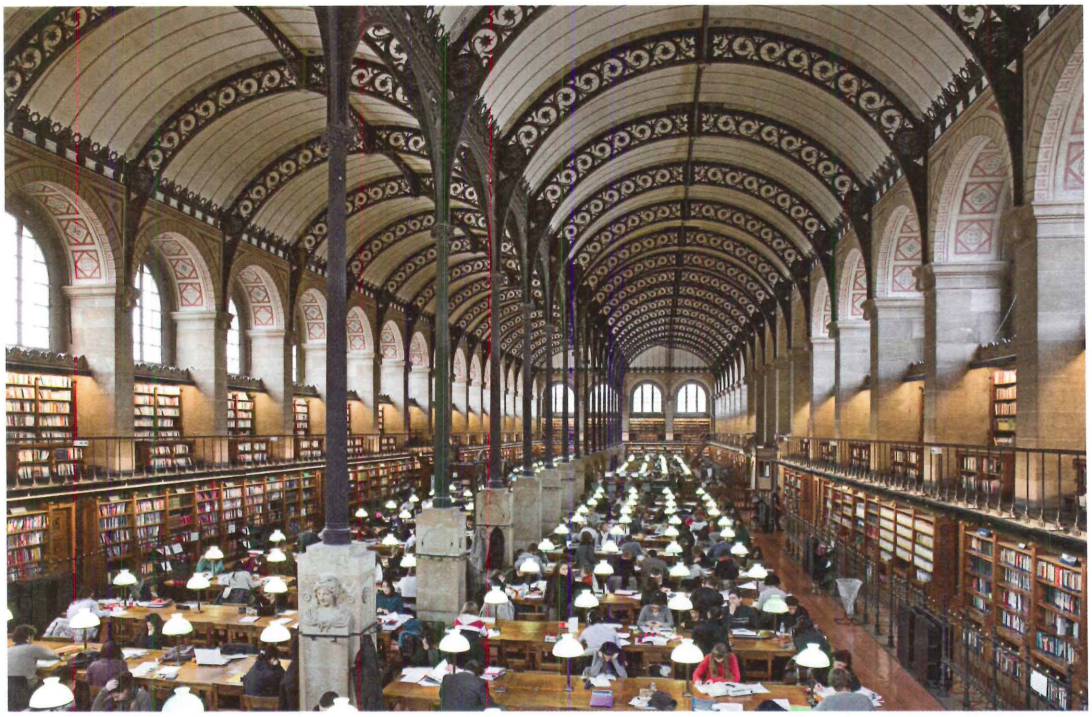
This is the first solo exhibition in the U.S. devoted to Labrouste; Bergdoll organized it with Corinne Bélier, chief curator of the Cité de l'Architecture et du Patrimoine in Paris (where it was shown last fall), and Marc Le Coeur, art historian at the Bibliothèque Nationale de France. It is accompanied by a catalogue that includes essays by historians Neil Levine, David Van Zanten, and Martin Bressani.

Just before the show's March opening, RECORD discussed Labrouste's revival with Bergdoll. For a fuller version of the interview, visit architecturalrecord.com/news.

Why is the Museum of Modern Art interested in an architectural exhibition devoted to Henri Labrouste now? Is it due in part to the reduced attention given by the media and museums to architectural history since the heyday of Postmodernism in the 1980s?

perspective**exhibitions**





In the reading room of the Bibliothèque Sainte-Geneviève in Paris (left), daylight dramatizes the twin-barrel-vaulted space; the reading desks inspired the display tables in the MoMA installation (above), which includes a drawing of a centotaph for the explorer La Pérouse (1829, above left).

While not every look at history needs to be justified by an argument related to the present, it's an interesting moment to reflect on Labrouste. He's an architect's architect. Early modern theorists such as Sigfried Giedion were interested in his rational use of iron structures; Postmodernist architects were drawn to his stone inscriptions and symbolic iconography. Now we see him as the forefather of assembling a building from discrete interlocking systems, as shown by the construction drawings in the exhibition.

The Museum of Modern Art created a stir when curator Arthur Drexler mounted the exhibition *The Architecture of the École des Beaux Arts* in 1975. Do you expect the same effect?

At the time Arthur was fighting a modernist orthodoxy. When he began research at the École des Beaux Arts in Paris, he was stunned by the drawings—as representations of architecture, they were more palpable than modernists' chipboard models. Yet he probably didn't mean the show to be interpreted by the new generation of classicists as a validation of its own efforts.

Now there is no orthodoxy to oppose or applaud. And history has been absorbed into the culture of architecture—you have Peter Eisenman teaching Palladio and Serlio at Yale. Bringing history to the Museum of Modern Art is not shocking. It is relevant. So why not Henri Labrouste? As his first solo exhibition in the U.S., it is valuable to see how an architect pushes experimentation but keeps control over it.

Labrouste's most famous buildings were two libraries—a seemingly outdated building type in the age of digital information. What should we value now in their design?

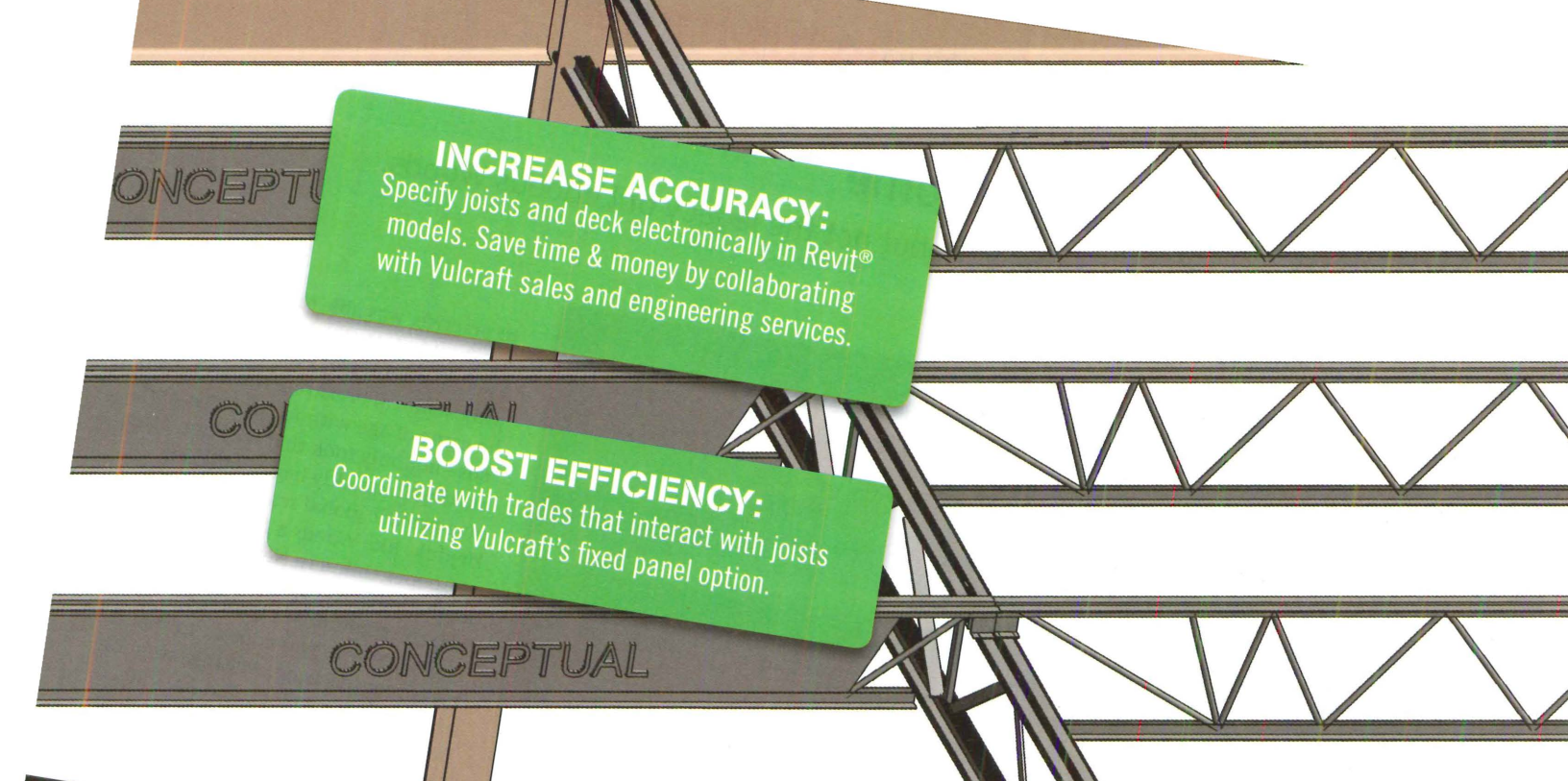
The Bibliothèque Sainte-Geneviève and the Bibliothèque Nationale de France represent two buildings concerned both about the public environment and the storing of information. Now we are confronting a tectonic shift in how knowledge is stored. Surprisingly, however, the emptying of libraries owing to the digital revolution hasn't taken place. Even though a new Bibliothèque Nationale opened in 1996 in eastern Paris, designed by Dominique Perrault, Labrouste's original structure is under restoration and is scheduled to open in 2015 as the national art-history library.

What about Labrouste's use of ornament? Does that have relevance today?

In the last 10 years we have seen a fascination with the production of ornament and pattern coming out of the digital parametric movement. Yet there is only so much that the computer—and algorithms—can do. They are often divorced from architecture. Labrouste's use of technology and ornament was essential to the structural integrity of his buildings—look at the way the ornamental iron of the Bibliothèque Sainte-Geneviève is based on natural form. Because it is cast in iron, the lacelike truss is doing work without looking heavy.

Drawing was important in the 19th century, as you vividly demonstrate in the installation. Does drawing have any significance at this moment?

Without rejecting digital tools, it would be good to recapture the analytic rigor of drawing. The computer takes away the slow eye-to-hand struggle. The computer erodes individuality in research. ■



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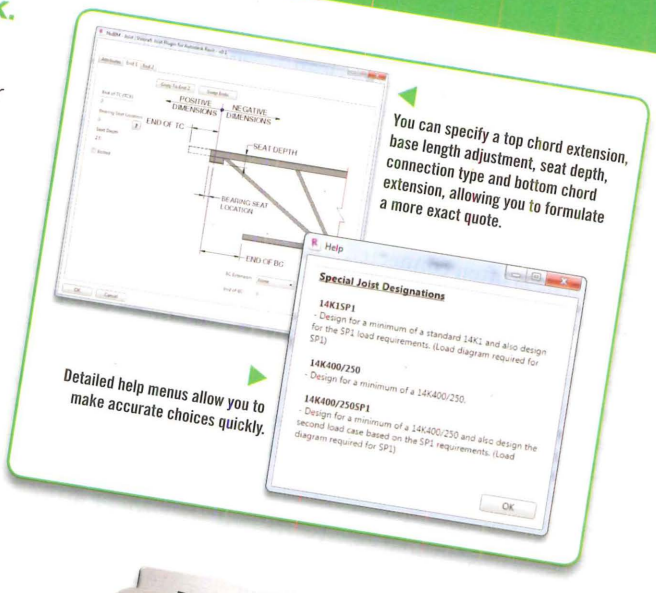

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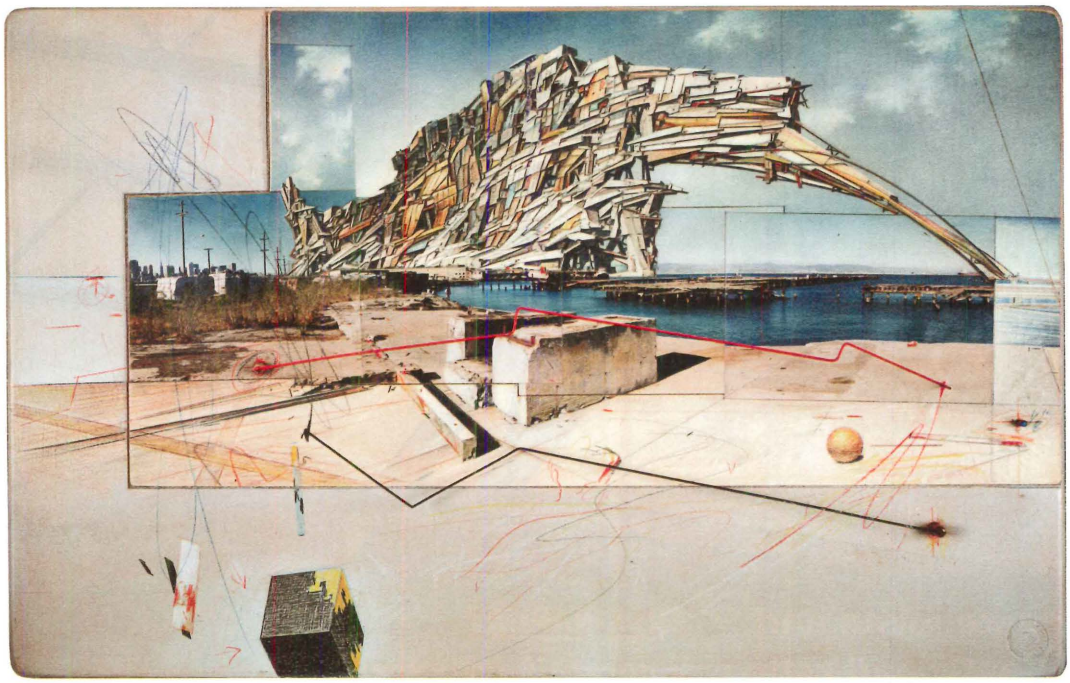
Build Nothing and They Will Come

An exhibition at SFMOMA examines the work but not the legacy of Lebbeus Woods.

BY CHRISTOPHER HAWTHORNE



Quake City, from the series *San Francisco Project: Inhabiting the Quake,* is a graphite and pastel drawing on paper from 1995.

LEBBEUS WOODS, who died last year at age 72, was among the most singularly gifted and stubbornly consistent architects in American history. His fantastically dense drawings in pencil and graphite imagined not just new kinds of buildings—some burrowed into the earth and others floating in the air or through space—but new cities and new worlds. Though he is often connected with the Deconstructivist movement and with architects like Zaha Hadid, Thom Mayne, and Daniel Libeskind, his work also directly recalls earlier figures and precedents in architecture, from Piranesi to Archigram.

If Woods's talent was plain to see, his legacy and what it means for practicing architects remain less so, as a stirring if incomplete new exhibition at the San Francisco Museum of Modern Art makes clear. Organized by Joseph Becker and Jennifer Dunlop Fletcher, assistant curators in the museum's architecture and design department, the show (which runs through June 2) was in the works well before Woods died last fall. It is packed full of examples of his often breathtaking talents as a draftsman and conjurer of alternative architectural universes.

A group of framed drawings from Woods's 1986–87 *Centricity* series lines one wall just outside the entrance to the exhibition, an appetizer before the visual riches to come. Inside are more framed drawings (dozens of them), models in glass cases, sketchbooks, and snippets of manifestos. Pride of place is given to a brilliant proposal, from 1980, for a monument to Albert Einstein designed to be sent into space, to drift eternally. In drawing equally from technology, philosophy, science fiction, and architectural history—in this case Boullée's cenotaph for Newton—it is typically dense with allusion. Some of the work on view responds to specific sites and political crises, as in a series of proposals for Sarajevo (1993–94) and Berlin (1990). Other items are more poetic, such as colored-pencil drawings from Woods's 1989 *Aerial Paris* project.

What the show fails to do—or even try to do, really—is address Woods's complicated relationship with, and tremendous influence on, his architectural peers. We've just emerged from a dizzying and arguably unprecedented period in Western architectural history in which nearly every skilled architect, no matter how adventurous or unorthodox, who wanted to make the jump from drawing to building, or from theory to practice, was able to do so.

Libeskind, Hadid, Mayne, Rem Koolhaas, Wolf Prix—all of Woods's philosophical brethren, the architects he came of age with in the 1970s and '80s—not only took that leap but, after making it, quickly began building on a prolific global scale. Even John Hejduk, like Woods a faculty member at Cooper Union in New York, became a practicing architect in something like the traditional manner.

Only Woods was content to spend his career teaching, writing (often on his own terrific blog), and drawing. Born in Michigan in 1940, he worked early on for Eero Saarinen's office. But by his mid-30s Woods had dedicated himself exclusively to experimental, theoretical projects. Near the end of his life his close friend Steven Holl gave him the chance to design a four-story-tall installation embedded in the facade of Holl's Sliced Porosity Block in Chengdu, China; part sculpture, part dystopian sky deck, Woods's contribution to the building was close in spirit to his sketchbooks (RECORD, January 2013, page 200).

Beyond that one project, Woods's talent stayed on the page. And this is what makes his career truly unusual. There have always been figures like him in architecture. But he may be the only one who had both the opportunity to build and the will, or maybe just the disposition, to ignore that opportunity with seeming ease over several decades.

The distance that opened up between Woods and his onetime comrades in paper architecture—a distance that only grew over time—is a fascinating chasm to contemplate, to peer into. The SFMOMA exhibition generally pretends it's not there (never mentioning other architects or really exploring Woods's decision not to build), as if the curators were worried that visitors might fall in. But that rabbit hole of a gap promises more revelations—about Woods, and about contemporary architecture—than even this beautiful and deeply rewarding show can provide. ■

Christopher Hawthorne is the architecture critic of the Los Angeles Times.

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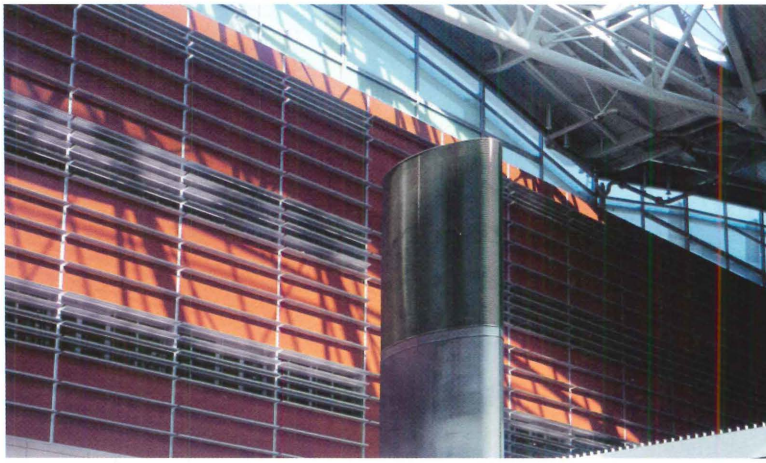

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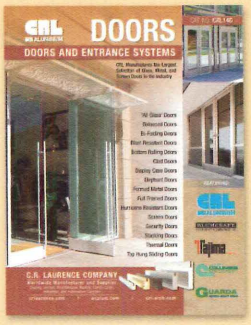

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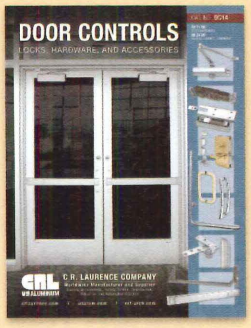

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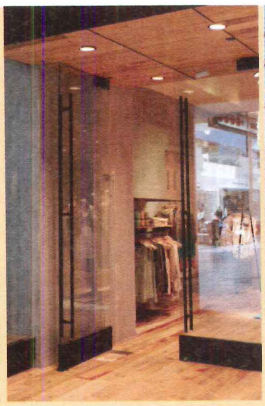

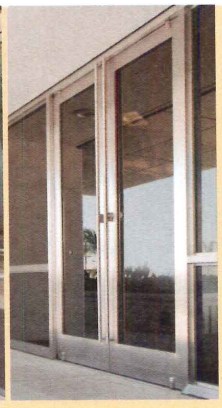

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Long Island Modernism: 1930–1980, *by Caroline Rob Zaleski. W.W. Norton, 2012, 336 pages, $80.*

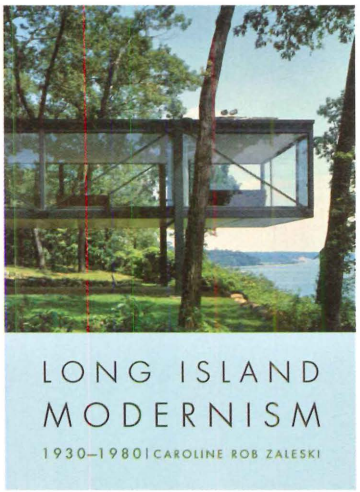
Reviewed by Alexander Gorlin

THIS FASCINATING book is as much a social history as a documentation of architects working on Long Island during the period of "high Modernism," when ideology was considered as important as space and form. Organized in chapters devoted to individual architects, rather than in a coherent thematic order, the book includes a surprising number of well-known architects who built on Long Island, such as Ludwig Mies van der Rohe, Antonin Raymond, Frank Lloyd Wright, Richard Neutra, Paul Rudolph, and Marcel Breuer.

Disappointing, although not entirely unexpected, is the almost total absence of women, with only one, Jane Yu, noted among the 25 chapters. This points to one of the unexpressed themes of the book—that Long Island architecture during this time, perhaps mirroring the contemporary culture, was an unrepentant old-boys network where backroom connections were the main means of procuring work. Wallace Harrison, a close friend of Governor Nelson Rockefeller and Robert Moses, looms large in this context. Virtually all the major commissions covered in the book—from the SUNY campus at Stony Brook to the one at Old Westbury—went to architects who had either worked for or were connected to Harrison. Mies, following in his habit of bedding female clients such as Edith Farnsworth, continued with the artist Mary Callery, doing a strangely Zen/Tudor barn renovation for her in Huntington in 1950. Quirky, wealthy women provided patronage to the arts in general; for example, Marian Willard opened her 300-acre estate in Locust Valley to Fernand Léger and others. She hired Josep Lluís Sert, then offered a property to the architect and his wife for their own Modernist house. Besides Richard Meier, Percival Goodman is the token Jewish architect, presented mainly for his 1950s Modernist synagogues that established the typology for this postwar-period structure. African-American architects seem to have been nonexistent at the time; if there were any on Long Island, they aren't mentioned here.

Unfortunately, the book lacks an informative introductory essay to provide context to the historical period. Neither the architectural issues nor the social currents are outlined, except in snippets in each chapter, making a more complete understanding of Long Island Modernism exceedingly difficult.

Despite uncovering some interesting architectural nuggets and names in the region, none of the examples changed my perception of Long Island between New York City and the Hamptons as anything other than the Bermuda Triangle of design, the land of the sordid Joey Buttafuoco and Amy Fisher, the vulgar Howard Stern, and the Amityville Horror. In keeping with this cultural black



(continued from previous page)

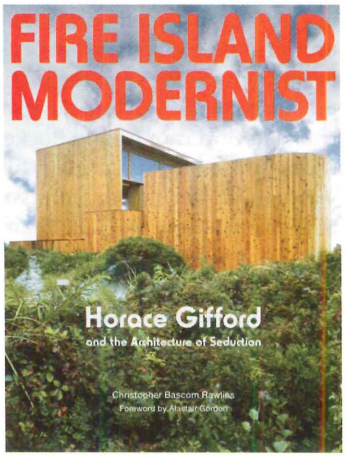
hole is the architecture of the campus of Old Westbury by John Johansen, Alexander Kouzmanoff, and Victor Christ-Janer and SUNY Stony Book by Damaz, Pokorny and Weigel with Gruen and Partners. So truly banal, insipid, and awful are these places that they exemplify the reasons the public soured on Modern architecture and planning, creating the groundswell of change that resulted in Postmodernism, which Zaleski decries for its pastiche of historical styles. But is that really so different from what pedigreed Modernists George Nelson and Gordon Chadwick did with their Spaeth House of 1955 in East Hampton—a Modern interpretation of McKim, Mead & White's William G. Low House? Perhaps not, but one would never know by the piecemeal manner in which architecture is presented here. Still, the book is worth its price for the juicy gossip and historical photographs, many of which have never been seen before. ■

Alexander Gorlin practices architecture in New York City and is the author of Tomorrow's Houses: New England Modernism, The New American Townhouse, *and other books.*

Fire Island Modernist: Horace Gifford and the Architecture of Seduction, *by Christopher Bascom Rawlins. Foreword by Alastair Gordon. Metropolis Books/Gordon de Vries Studio, 2013, 202 pages, $60.*

Reviewed by Clifford A. Pearson

Consider this book a handy time machine set to take you to a sun-soaked place in a hedonistic era. Bring your Speedo and Ray-Bans and let go of your hang-ups. Both a cultural history and an architectural meditation, *Fire Island Modernist* captures the look, feel, and sensation of gay society in the 1960s and '70s that flourished on the sandy shores and shifting dunes of the 31-mile-long barrier island of its title. Separated from the Hamptons by Great South Bay, Fire Island developed a free-spirited, car-free culture radically different from its more upscale neighbor to the northeast.



The book is also an ode to a mostly forgotten architect who designed 78 modern beach houses—mostly on Fire Island, but a few in the Hamptons—starting in 1961 and ending in the 1980s. Like so many of his clients, Horace Gifford fell victim to the AIDS epidemic, dying at age 60 in 1992.

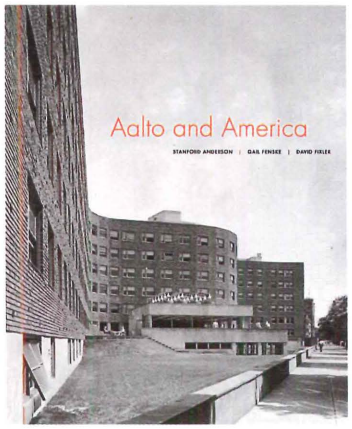
Christopher Bascom Rawlins, himself an architect and part-time resident of Fire Island, discovered Gifford's work piecemeal and, as his book's subtitle says, became seduced by it. Rawlins's clear, graceful prose has just the right tone and style for his subject, and his selection of photographs, drawings, and illustrations brings Gifford's times back to life. Chapter titles such as "Oasis of Free Love," "Boys in the Sand," and "Form Follows Foreplay" alert readers that this book is not some musty tome from the shelves of a university library. Photographs of handsome young men cavorting on the beach and striking fashionable poses by the pool add to the book's glamorous ambience. As Alastair Gordon states in his foreword, Gifford's houses "expressed the longings of a culture that had transformed Fire Island into a free-fire zone of social and sexual discovery."

Rawlins's goal, though, is also to raise Gifford's star in the architectural firmament. "Pairing this well of sensitivity [to the coast] with jazzy improvisations on modernist themes, he perfected a sustainable modernism in cedar and glass, as attuned to natural landscapes as our animal natures," states Rawlins of Gifford. As seductive as this book is, I'm not convinced that Gifford's houses—sometimes easygoing modern bungalows, sometimes awkward attempts at geometric innovation—truly rise to the highest level of architectural achievement. ■

Aalto and America, *edited by Stanford Anderson, Gail Fenske, and David Fixler. Yale University Press, 2012, 323 pages, $75.*

Reviewed by William Morgan

Alvar Aalto considered moving to the United States after World War II. The dapper, charming Finn loved America and, despite his mythic status in Finland now, felt unappreciated in his homeland (his boat, which he had designed and built, was named *Nemo Propheta in Patria*). He did, however, do two stints as a visiting professor at MIT in the 1940s. It was for that Cambridge campus that he created Baker House, one of his most important works and the protagonist of this handsome book.



Aalto and America is a collection of essays about the MIT dorm, the Finn's two other major buildings here—the Finnish Pavilion at the 1939 New York World's Fair and a library for Mount Angel Abbey in Oregon—and his relationship with the New World. The Woodberry Poetry Room at Harvard and a conference room at the United Nations are also covered. The 17 contributors include some well-known Aalto scholars, including Juhani Pallasmaa, Eeva-Liisa Pelkonen, and the late Colin St. John Wilson. This beautifully produced and handsomely illustrated volume addresses topics such as materials, rationalism, and housing traditions.

Still, the lion's share of the book is devoted to Baker House. Instead of the expected smooth, white International Style of the Paimio Sanatorium and Viipuri Library, Aalto surprised his American supporters by embracing the brick of Boston. Rather than social-democratic workers' housing, Aalto made reference to the mills of New England and brought the mystery of the Nordic forest to Cambridge. Forty-some years after its construction, the MIT dorm's sensuous running "S" still amazes with its daring. It was a masterpiece when new, and is an equally satisfying landmark today.

"The Intellectual Background of American Architecture," an article by Aalto published in the magazine *Arkkitehti* in 1945, is a perceptive take by a foreigner on our design aesthetic. In it, he showed that he knew more about our architectural history than most of our own architects did, and offered a cogent discussion of Jefferson, Sullivan, Wright, and Hood. "One of the reasons for the ease with which European designers have found their niche in America," wrote Aalto, "is that European architecture has for many years been subject to the influence of pioneering American architecture." ■

William Morgan is an architectural historian and author who has written extensively about Finnish architecture.

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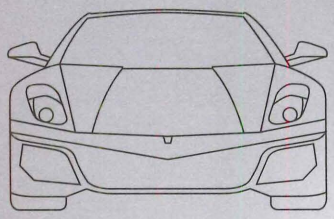

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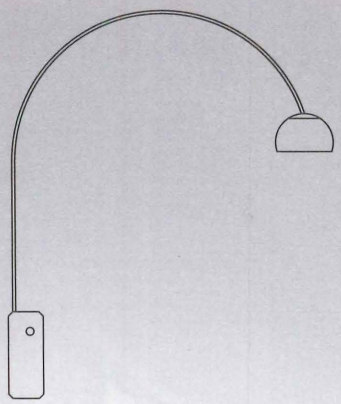

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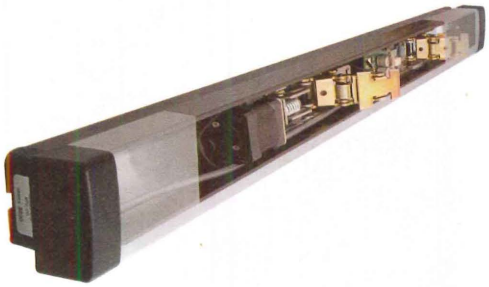

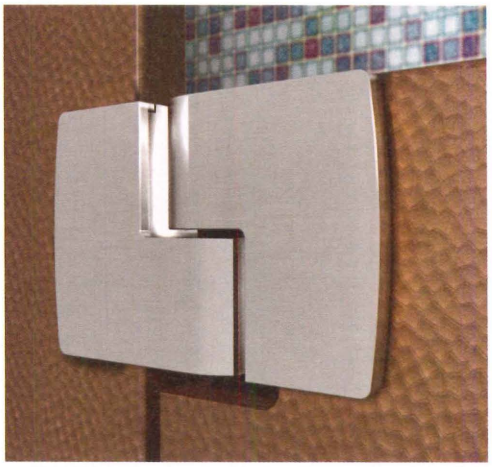

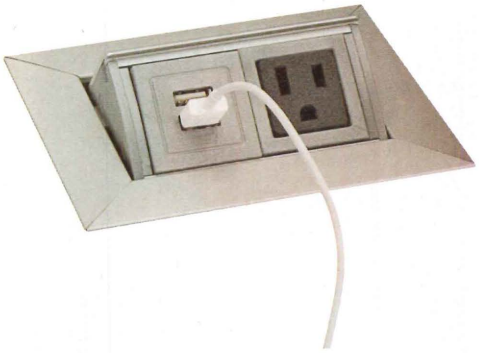

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Antimicrobial Copper Hardware

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Rocky Mountain Hardware has entered into a collaboration with Olin Brass, a developer of high-performance copper alloys, to provide antimicrobial copper-surface hardware. Starting this spring, hundreds of styles from the company will be available for casting in CuVerro, a copper that incorporates antimicrobial properties. Rocky Mountain will also produce a series in CuVerro alloy specifically suited to health-care facilities. CIRCLE 210

Partition Hinges

Scranton Products scrantonproducts.com

To complement its line of high-density-polyethylene bathroom partitions, Scranton Products has introduced two new contemporary aluminum-hinge collections offering the same strength and support as its standard lines. The first, Stealth, includes a line of modern chrome-finished hinges, while Regal includes a hinge design (shown) and a matching slider latch in three color options. CIRCLE 211

PCS36A Power Supply

Doug Mockett & Company mockett.com

This handy flip-up power-and-communication-system (PCS) device from Doug Mockett & Company lies flat when closed and pops open with a simple touch to the cover. A new configuration offers one electrical outlet rated 15A/125V and two powered USB ports for charging mobile devices and tablets. The PCS unit is UL-listed and comes in black and satin aluminum with a 6-foot electrical cord. CIRCLE 212

VeriLock Embedded Wireless Sensor

Andersen Corp. eaglewindow.com

The VeriLock sensor technology embeds Honeywell's widely used 5800 series of wireless sensors inside the locking mechanisms of a select group of Eagle brand windows and doors (an Andersen subsidiary). While similar technology can detect if a window or door is open or closed, VeriLock sensors are the first to signal that it is actually locked. CIRCLE 213

Real Living Key-Free Deadbolt

Yale Locks & Hardware yalerealliving.com

Yale Locks & Hardware's Real Living key-free touch-screen deadbolt eliminates the cylinder, resulting in a pick-free lock, faster installation, and a cleaner appearance. Should the battery die, terminals on the bottom of the lock accept a 9-volt battery. The lock comes with a durable acrylic touch screen and supports both Z-Wave and ZigBee standards. Users can control the lock from Web-enabled devices and create customized entry codes. CIRCLE 214

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

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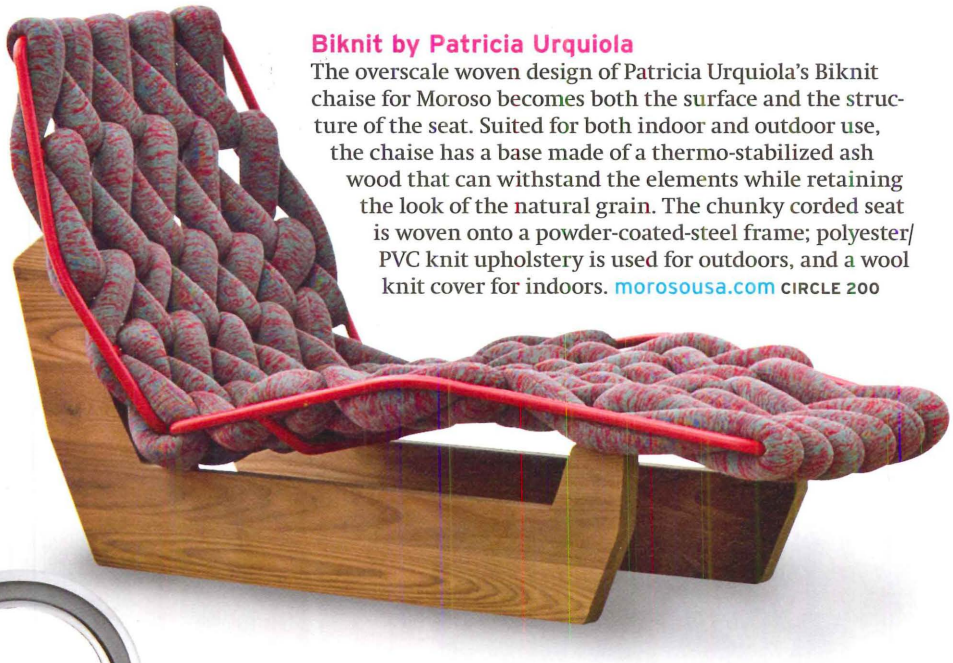
CIRCLE 54

Home Base

While not all strictly for residential use, these new furnishings, finishes, and technologies offer a personal touch that makes them particularly well suited for domestic life.

By Rita Catinella Orrell



Biknit by Patricia Urquiola

The overscale woven design of Patricia Urquiola's Biknit chaise for Moroso becomes both the surface and the structure of the seat. Suited for both indoor and outdoor use, the chaise has a base made of a thermo-stabilized ash wood that can withstand the elements while retaining the look of the natural grain. The chunky corded seat is woven onto a powder-coated-steel frame; polyester/PVC knit upholstery is used for outdoors, and a wool knit cover for indoors. morosousa.com CIRCLE 200

Sensate Faucet

Kohler's new touchless kitchen faucet uses a state-of-the-art sensor that responds in 20 milliseconds for consistent on/off operation. The technology does not require users to tap or wave in front of the sensor; they just need to place a hand or utensil through the activation area to start or halt water flow. Sensate's small handle allows users to tweak the water temperature and flow. A magnetic docking system in the faucet's spout securely locks the adjustable spray head into place. Optional manual operation ensures that the faucet works during power outages. kohler.com CIRCLE 202

ADA-Compliant Teak Shower Seat

Handcrafted and milled in the U.S. of durable teak and stainless steel, MTI's flip-up shower seat is also ADA-compliant (the ADA mounting height for the lowered seat is 17" to 19"). It can withstand a maximum weight of 500 pounds and is automatically held in position by a positive stop-friction spring guide bracket. MTI uses only 100% U.S.-certified, reclaimed, sustainable teak from reputable suppliers. All shower seats must be installed using suitable fasteners and sufficient in-wall backing materials. mtibaths.com CIRCLE 201

2013 DuPont Colors

DuPont worked with global trend experts along with architects and designers to bring the company's 2013 surfacing options to market. Nine new products in the Corian collection are joined by three new colors in DuPont's Zodiaq quartz surfacing material for residential and commercial applications. The new designs fall into three main color-trend stories—Raw, Interference, and Solidify—and feature mirrored and metallic mica flakes suspended in neutral gray, brown, or cream backgrounds. dupont.com CIRCLE 203

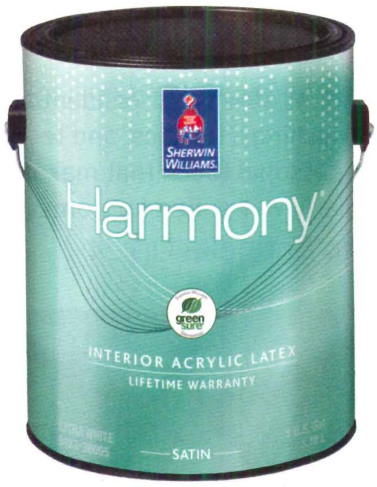
For more information, circle item numbers on Reader Service Card or go to architecturalrecord.com/products.

Steve Leung Collection

Known for his hospitality spaces, including the new Shangri-La Hotel at the Shard tower in London, Hong Kong–based interior designer and architect Steve Leung has launched his first wallpaper collection with Graham & Brown. The line includes seven new designs, from 3-D geometrics to classical stripes to climbing florals. Made in England, the line has been produced on a substrate that offers easier application and removal. The 3-D Ling pattern (shown below in beige/green) features an Eastern trellis motif embellished with metallic highlights. grahambrown.com CIRCLE 204

Canale Cover

The New Mexico–based architectural-metalwork firm Kason Group has introduced a new line of architectural canale covers as a cost-effective solution for retrofitting old wooden canales on Southwestern-style homes in Arizona, New Mexico, Colorado, and Texas. The cover is custom-designed to fit securely over an existing wooden canale without setting foot on the roof, and comes with a cascading brass rain-chain "waterfall." An eco-friendly powder-coat finish withstands rusting, fading, and harsh climate conditions. kasongroup.com CIRCLE 205



Harmony Paint

According to Sherwin-Williams, its latest interior paint features patented technologies that can reduce ambient odors to help rooms stay fresher for longer as well as reduce the levels of VOCs from potential sources such as insulation, carpets, cabinets, fabrics, and other building materials. The interior acrylic latex paint is ideal for new construction and renovation projects where elevated concentrations of formaldehyde may exist. Harmony is available this month in flat and eggshell finishes, with semigloss available in midsummer. sherwin-williams.com CIRCLE 206

Lazio Collection

Inspired by the authentic floors of the Lazio and Tuscany regions of Italy, the Lazio Collection from Ann Sacks features multihued terra cottas partnered with precisely cut marble or limestone to create patterns one would find on the floor of an ancient church. Each color comes from reclaimed bricks or clay found across Italy, and the assemblage is antiqued by hand using original techniques and oil and beeswax to re-create a soft, undulating Old World surface. Shown above is a 15¾"-square diamanté field in light and dark terra cotta. annsacks.com CIRCLE 208

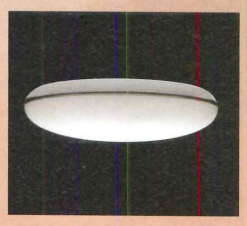
Gentle Chair

Sofia Lagerkvist, Charlotte von der Lancken, and Anna Lindgren, the three members of the Swedish design group Front, have collaborated on a striking new chair for the Italian manufacturer Porro that will be on display at this month's Salone del Mobile in Milan. Intended for residential use but also suited for restaurants, shops, and other commercial spaces, the Gentle chair features soft black "eco-leather" upholstery sewn onto its metallic back legs, flexible backrest, and padded seat, all of which contrast with the chair's natural ash-wood front arms and legs. porro.com CIRCLE 207

Silverback Wall/Ceiling LED

Photo: Jesper Ray

Design: KiBiSi. SILVERBACK emits diffused light. The opal curved diffuser provides a soft and comfortable spatial lighting, and the metallized rear half of the product produces a decorative halo-like illumination on the ceiling or wall surface. The metallized surface also creates a mirror effect, reflecting the texture, color or material of the installation surface.



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CIRCLE 52

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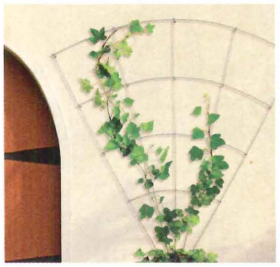

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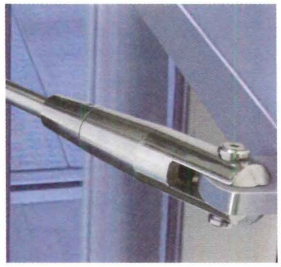

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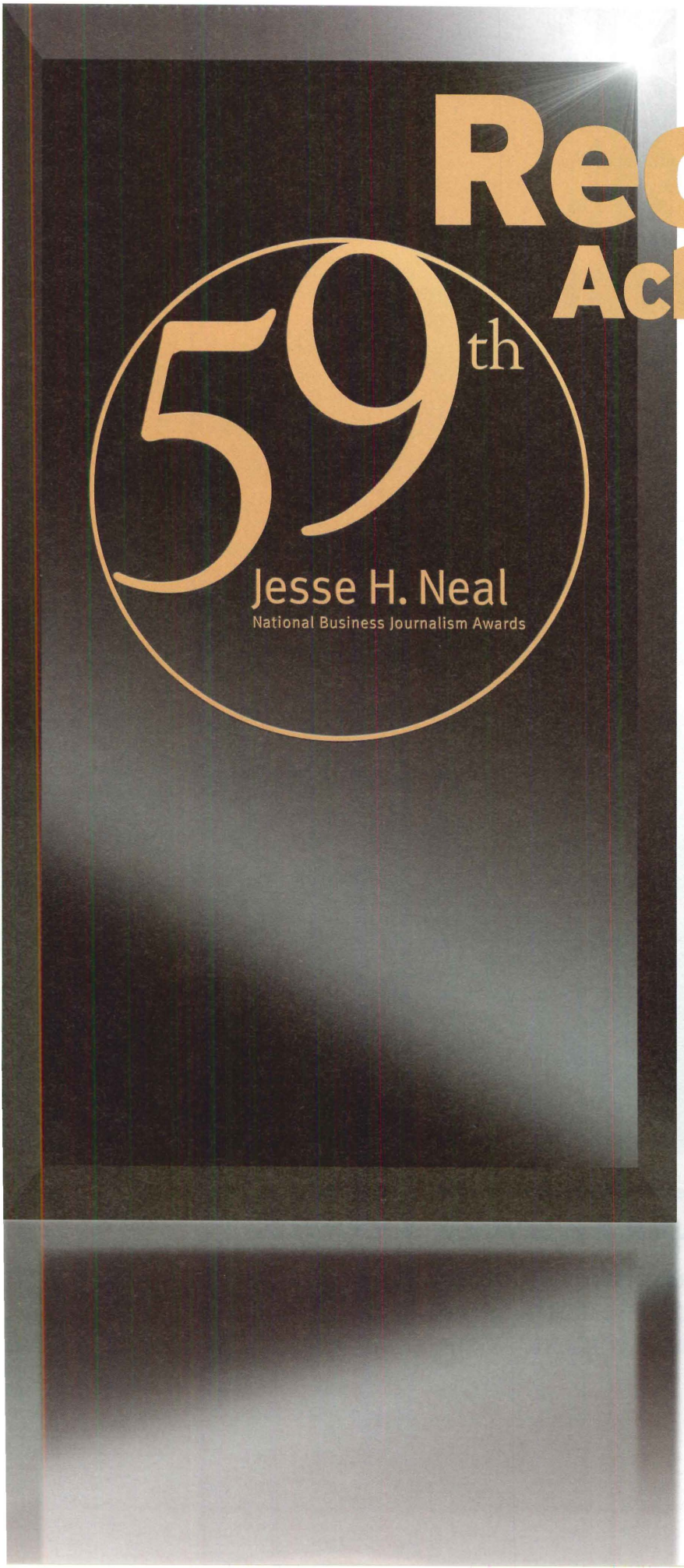

Record Achievements

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October 2012: New Life for the American City

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March 2012: Building for Social Change

BEST CROSS-PLATFORM PACKAGE
Building for Social Change

In addition, Architectural Record was a finalist for the following Neal Awards:

BEST THEME ISSUE:
"Into Africa" (August 2012)

BEST WEBSITE:
ArchRecord.com: Building a Community

BEST TECHNICAL CONTENT:
"Revival of an Icon" (September 2012)

ARCHITECTURAL RECORD

Found in Translation

With a house that zigzags down a lush hillside in Monterrey, Tadao Ando shows that his modern Japanese aesthetic can find new meaning in a contemporary Mexican context.

PHOTOGRAPHY BY JAMES SILVERMAN

TADAO ANDO'S first house in Mexico is a perfect blend of cool, Japanese elegance and sultry, sun-drenched space. Located within the Cumbres de Monterrey National Park, the home consists of two volumes. While a square ring containing the private zone is embedded in the hillside, a Z-shaped component for guests forms the top of the three-story building.

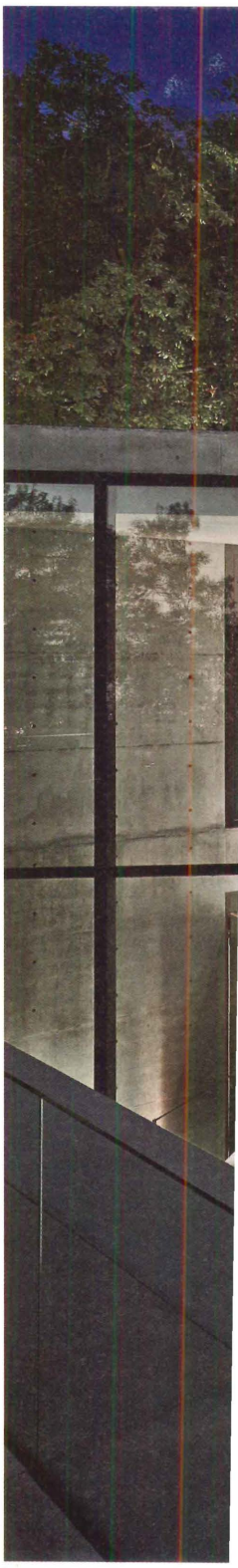
Commissioned as a primary residence by a couple with three children, the 16,350-square-foot house is only a 10-minute drive from the city. But it seems much farther, thanks to the site's lush greenery and spectacular view of the Sierra Las Mitras Mountains. Integrating terraces and outdoor spaces, Ando's scheme maximizes this scenery while preserving his clients' privacy.

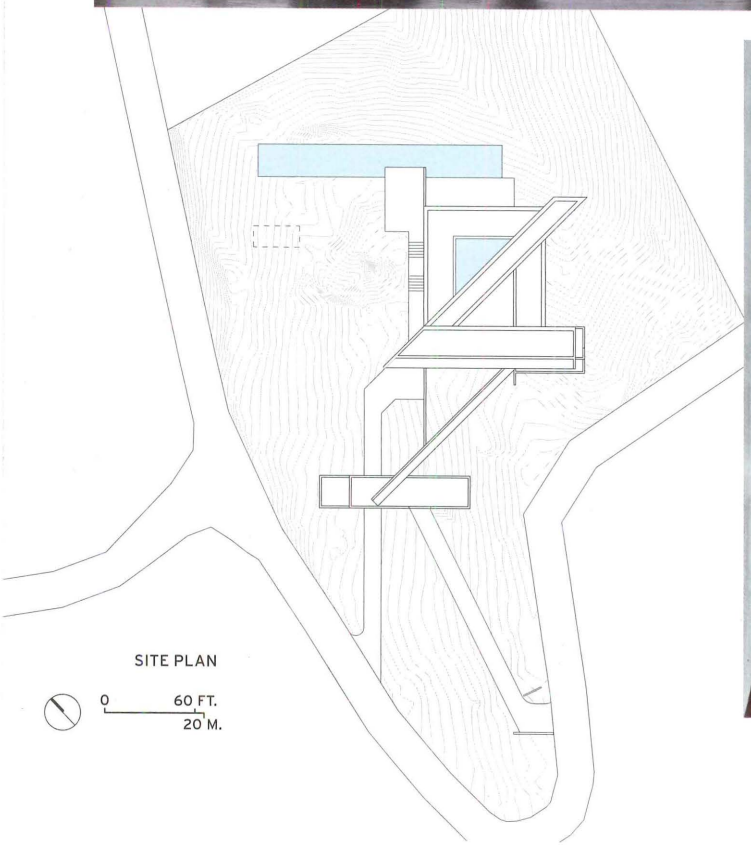
The house starts with an enclosed car park. An independent structure, it is tied to the main building by a service drive and an angled walkway leading to the primary entrance on the third floor. On entering, visitors take a set of stairs down to a gallery, which leads to a guest dining room slicing across the square ring at a 45-degree angle. From there, more stairs take them down to a library. Flanked by triangular courtyards, this book-lined retreat is the center of the family quarters, which also include a kitchen, dining room, wine cellar, gym, and children's bedrooms, plus a master suite that opens onto an expansive terrace featuring a dramatic "infinity pool." Measuring 157 by 20 feet, the pool reads as a rimless sheet of water that extends out seamlessly from the building's edge.

Undoubtedly, Ando's exquisite detailing and exposed concrete—the main material both inside and out—were not easy to replicate in Mexico. But that didn't stop the client. "He gathered skilled hands and created his own construction company," explains Ando. And as a result, he has a home that evokes Japan but is deeply wedded to its Mexican site. *Naomi R. Pollock, AIA*

A 157-foot-long infinity pool reaches out beyond the hillside to the valley below (right). A concrete arch frames the view of the Mexican city, while serving as a kind of modern *torii*, or Japanese gate. The master-bedroom suite opens onto the pool terrace (above).

View additional images at architecturalrecord.com.

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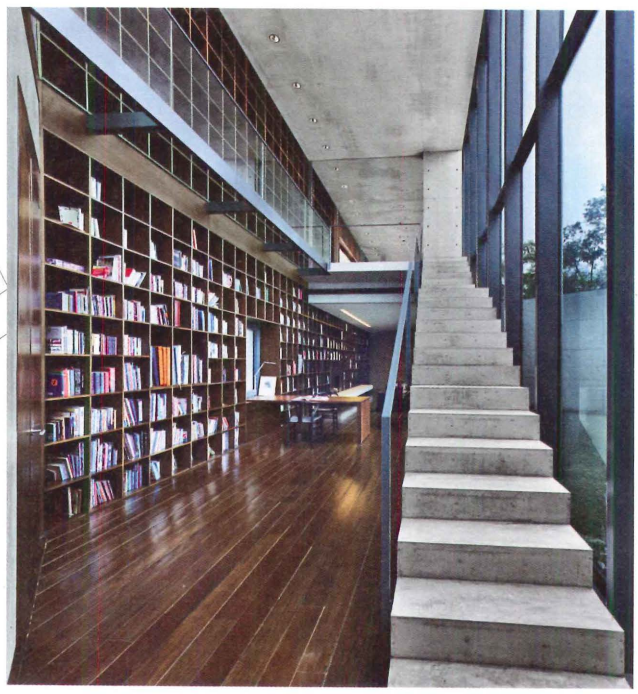

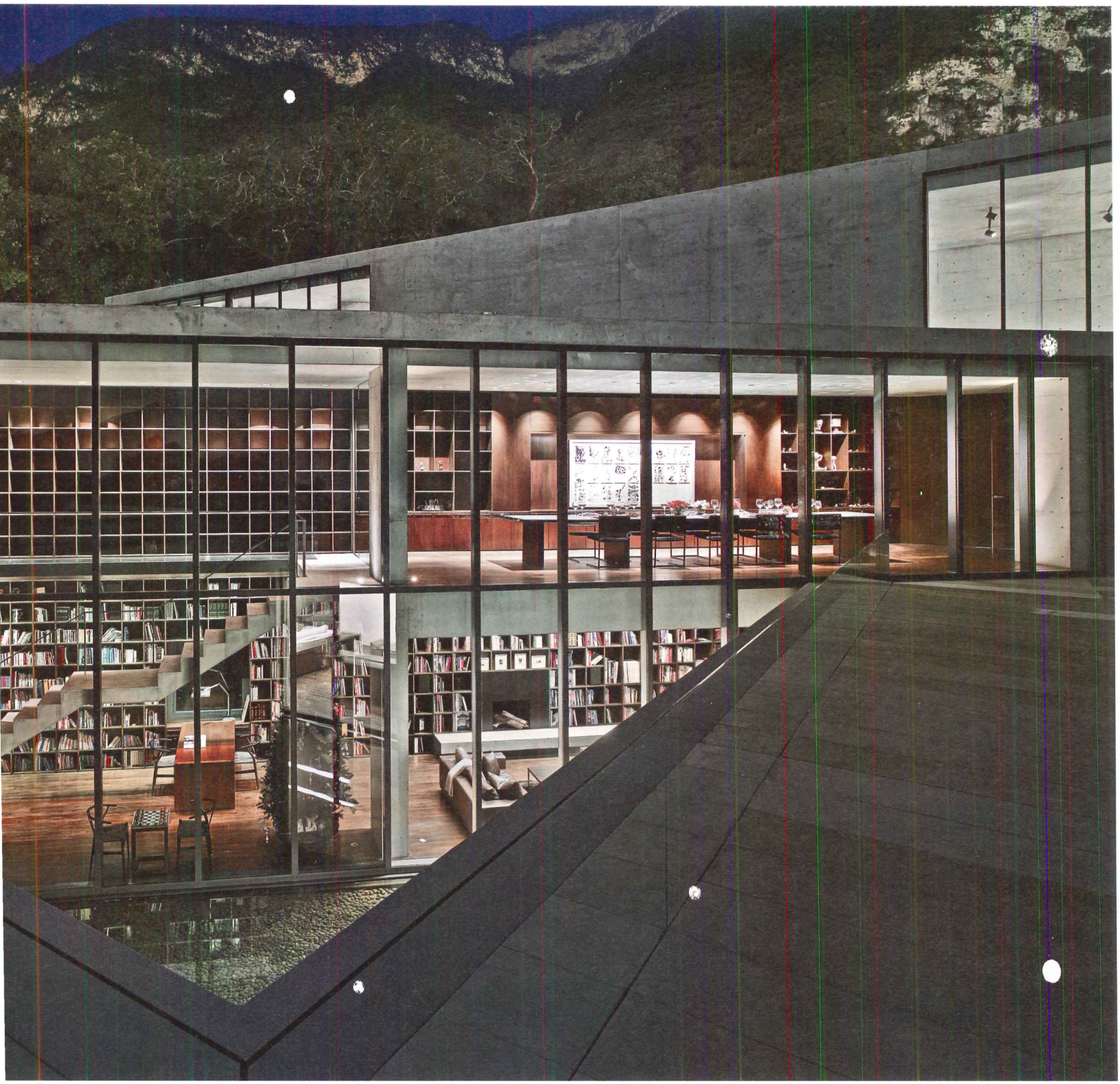

The house's Z-shaped plan (opposite, bottom left) helps negotiate the transition from public to private zones, with visitors arriving and spending most of their time on the top two floors and the clients being able to retreat to their bedrooms on the bottom level. A pair of triangular courtyards contained within the center of the plan help anchor the private areas while bringing in daylight and outdoor views (opposite, top).

The library (above and opposite, bottom right), which looks onto one of the courtyards, helps connect the public and private zones and is one of the most dramatic spaces in the house. The complex relationship between indoors and out has been a hallmark of Ando's work throughout his career but finds a rich new expression here in Mexico on a site that sits within a national park.

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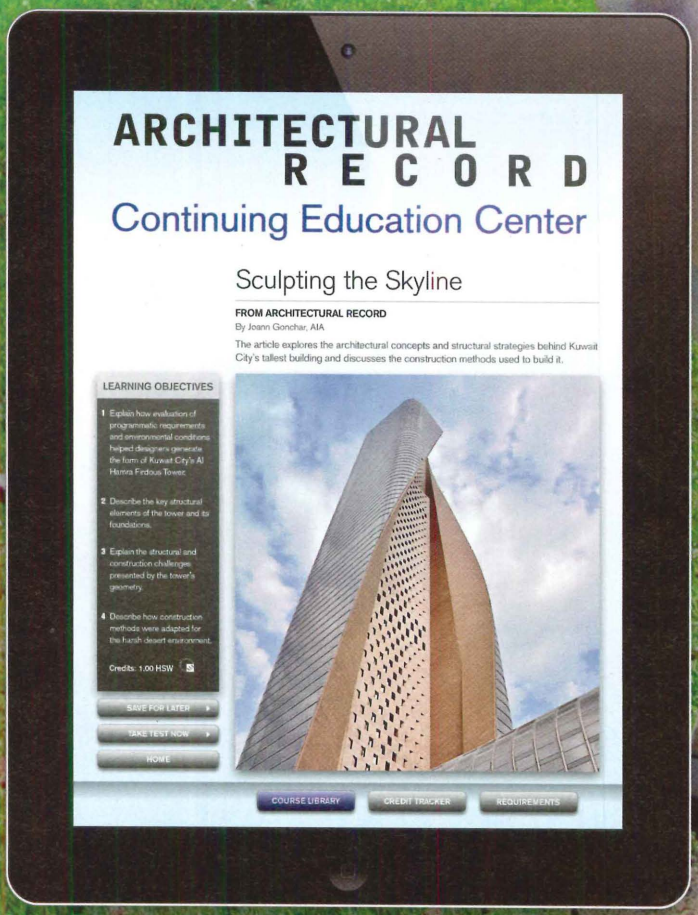

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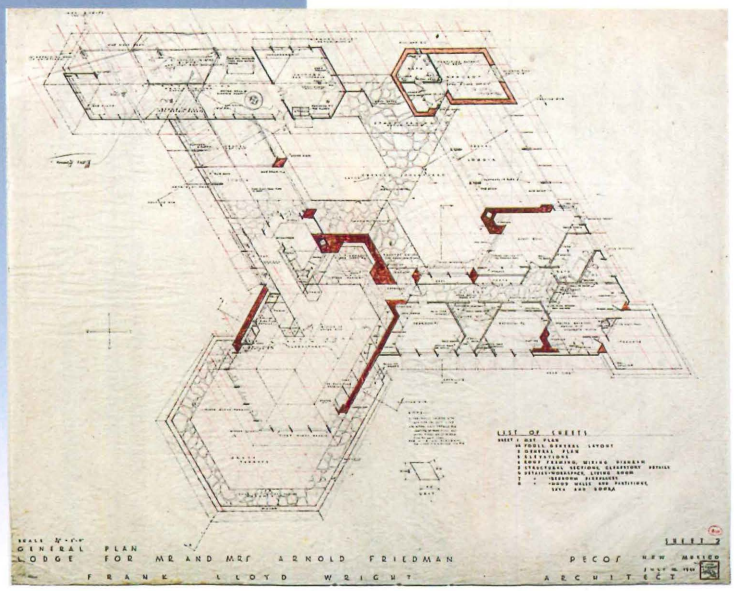
Wright Rediscovered

Exclusive: a tour inside a Frank Lloyd Wright house in the Southwest reveals the power of the original interiors, never before published.

BY BRUCE BROOKS PFEIFFER
PHOTOGRAPHY BY TREVOR TONDRO



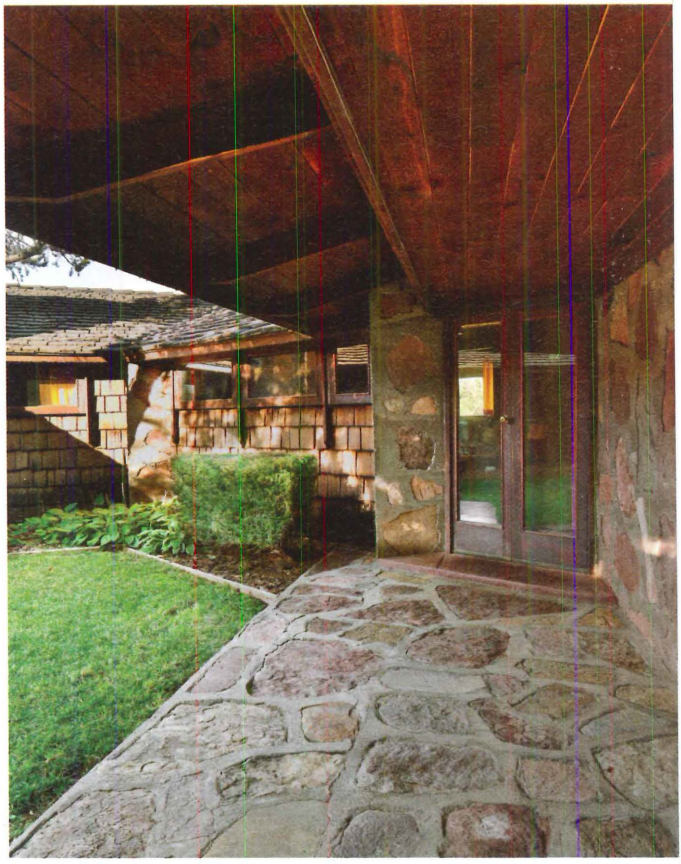
I visited the Fir Tree House only once, in 1950. An apprentice to Frank Lloyd Wright, I was on my way from Taliesin in Wisconsin to Taliesin West in Scottsdale, Arizona, with another apprentice, John deKoven Hill, who had supervised the stonework for the house. Wright had finished it in 1948 for a family who wanted a vacation home with four bedrooms, three baths, and a separate servant's room and bath in a remote valley in the Southwest. Also required was a service wing for the laundry, a water-pumping facility, and a stable—all for a budget of $10,000.

While the owners were very private, they welcomed us on that chilly October morning before they returned to their home in the Northeast. We were driving a sporty but elegant Lincoln Continental cabriolet—redesigned by Wright—and when we arrived we found a fire burning in the great living room's fireplace. The soaring space was phenomenal, the furniture specially designed by Wright was outstanding, and with the smell of smoke we felt we were in a great baronial hall looking out onto a wild, untainted landscape. The house sits on a gentle sloping meadow running down to a river, with a mountain, studded with fir trees, rising on the other side.

The mountains, the river, and abundant firs must have brought to Wright's mind his project conceived in 1923, the never-realized Lake Tahoe Summer Colony in Emerald Bay, California. Whereas the teepee roof of the hillside cabin for the earlier project rose over a square plan, in the Fir Tree House he elongated the roof for the living room. The owner also wanted the living room and master bedroom to face north to take in the splendid view of the mountain.

Wright's design called for combining stone walls with rough-sawn pine boards and cedar shakes. He had developed a construction technique for the walls at Taliesin West, which was built in 1938: although the Arizona desert was strewn with stones, they could not be dressed or cut in the manner of most normal stonework. So Wright placed the flat surfaces of the rocks in a wood form, poured the concrete around them, then removed the form to reveal a mosaic surface of stones in different sizes and colors. In the Fir Tree House, however, the stonework posed a problem, since the contractor was unfamiliar with this type of masonry. So Wright sent for John deKoven Hill, who worked on the project from the start. The result was very successful. With its grandly rustic architectural elegance, the Fir Tree House stands alone in Wright's oeuvre. ■

Bruce Brooks Pfeiffer is director of the Frank Lloyd Wright Archives and the author of numerous books on Wright.



NO RIGHT ANGLES The living room is topped by a teepee-shaped roof (left) covered with cedar shingles. Its large glass window walls meet at a 120-degree angle, and doors open onto a terrace bounded by low stone walls. The plan of the house takes the form of a large parallelogram (inset), with the courtyard entrance passing under the roof, which connects the servant's room on one side to the laundry on the other. From there a covered path edges an open courtyard to the front door (right), angled between the living room and a hallway for the bedroom wing.

View additional images at architecturalrecord.com.

CRAFTED INTERIORS The original owners and their heirs have kept the interior of the lodge intact, including Wright's specially designed furniture, such as the desk (right) in a corner of the living room. The hallway (opposite) leading to the bedroom wing branches to the left as you enter the house. Wright used rough-sawn pine, stained the color of cedar for the interiors. The owners recently had interior designer Pamela Duncan refurbish the house, replacing upholstery, bedspreads, and curtains in accordance with the original fabrics and colors.

STRUCTURAL DISPLAY The outstanding feature of the lodge is the living room, where the ceiling rises to a 28-foot height (opposite). At the perimeter, the roof drops to an 11-foot height, underscored by a flared rim that runs around the exterior of the entire lodge. A continuous band of narrow clerestory windows marks the point where the high roof joins the lower one and dematerializes this juncture with light. Inside, the rough-sawn rafters of the lower roof extend through the open space under the high ceiling, creating a spectacular kaleidoscope of geometric forms overhead. This innovative system of construction for the living-room ceiling remains unique in Wright's residential work—he never used it again.

Because the morning temperatures can be chilly, even in summer, Wright put fireplaces surrounded by stone walls in each bedroom (above). A child's room (left) in the caretaker's cottage lacks a fireplace but still seems cozy due to the extensive wood paneling. Designed by Wright in 1952, this cottage was not realized until 1972, when the son of the original owner had it built for his own family.

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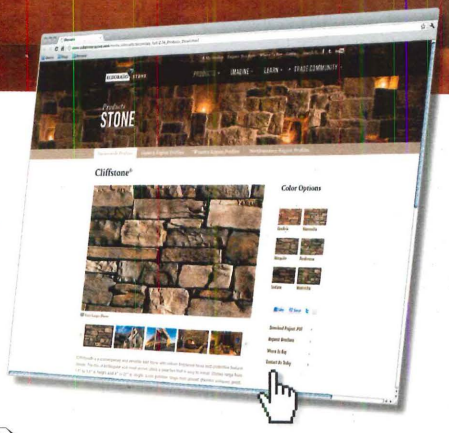

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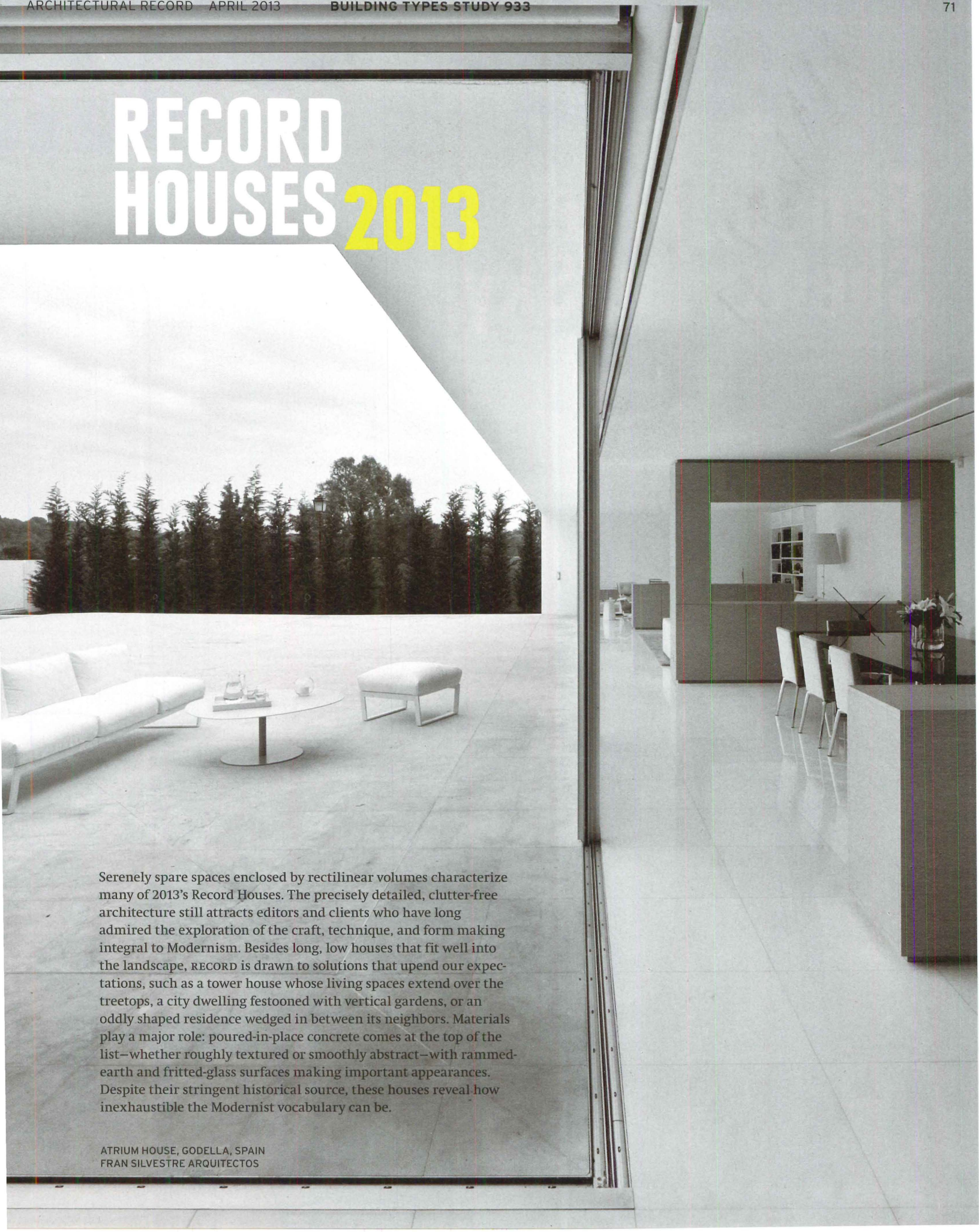
RECORD HOUSES 2013



Serenely spare spaces enclosed by rectilinear volumes characterize many of 2013's Record Houses. The precisely detailed, clutter-free architecture still attracts editors and clients who have long admired the exploration of the craft, technique, and form making integral to Modernism. Besides long, low houses that fit well into the landscape, RECORD is drawn to solutions that upend our expectations, such as a tower house whose living spaces extend over the treetops, a city dwelling festooned with vertical gardens, or an oddly shaped residence wedged in between its neighbors. Materials play a major role: poured-in-place concrete comes at the top of the list—whether roughly textured or smoothly abstract—with rammed-earth and fritted-glass surfaces making important appearances. Despite their stringent historical source, these houses reveal how inexhaustible the Modernist vocabulary can be.

ATRIUM HOUSE, GODELLA, SPAIN
FRAN SILVESTRE ARQUITECTOS

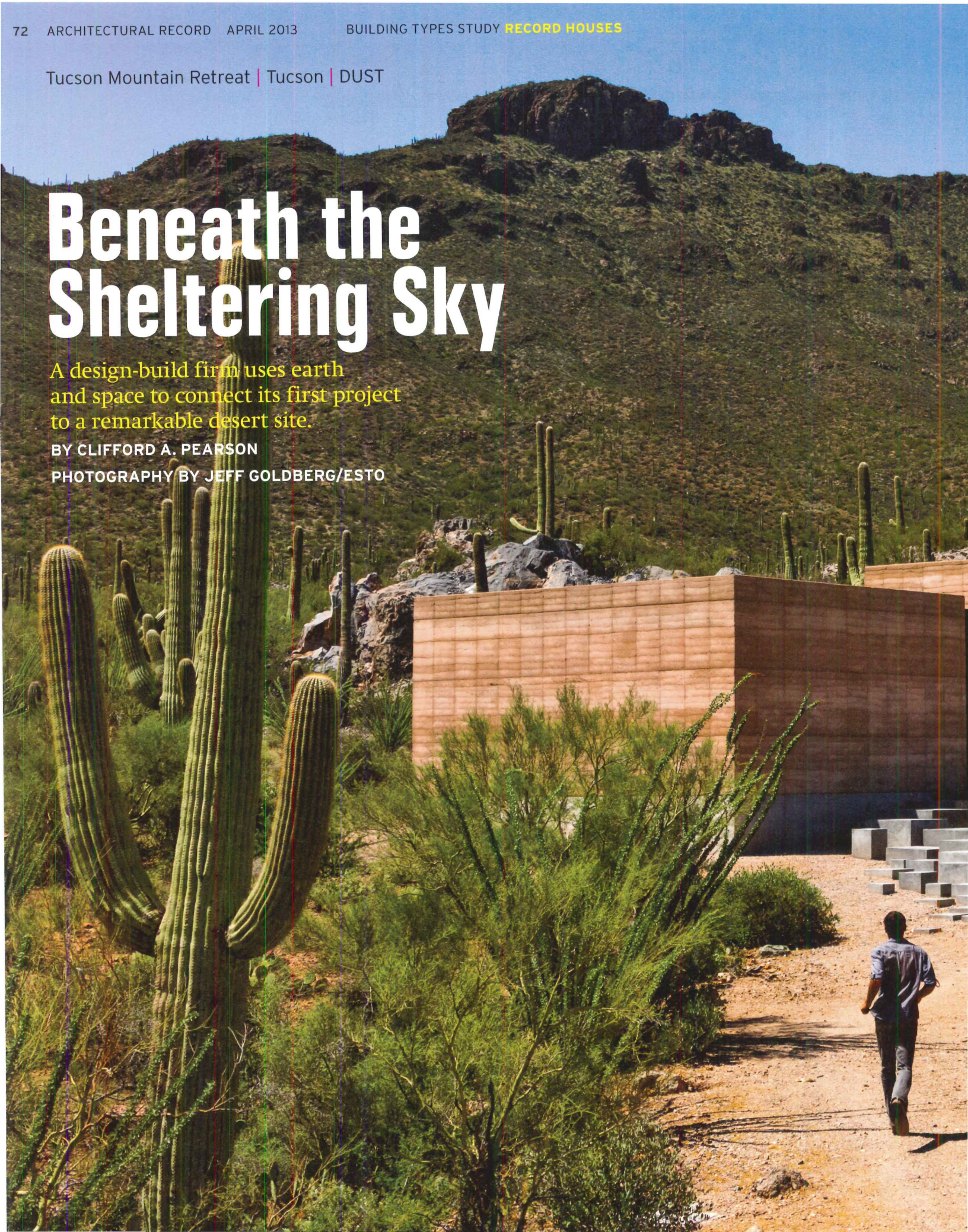
Tucson Mountain Retreat | Tucson | DUST

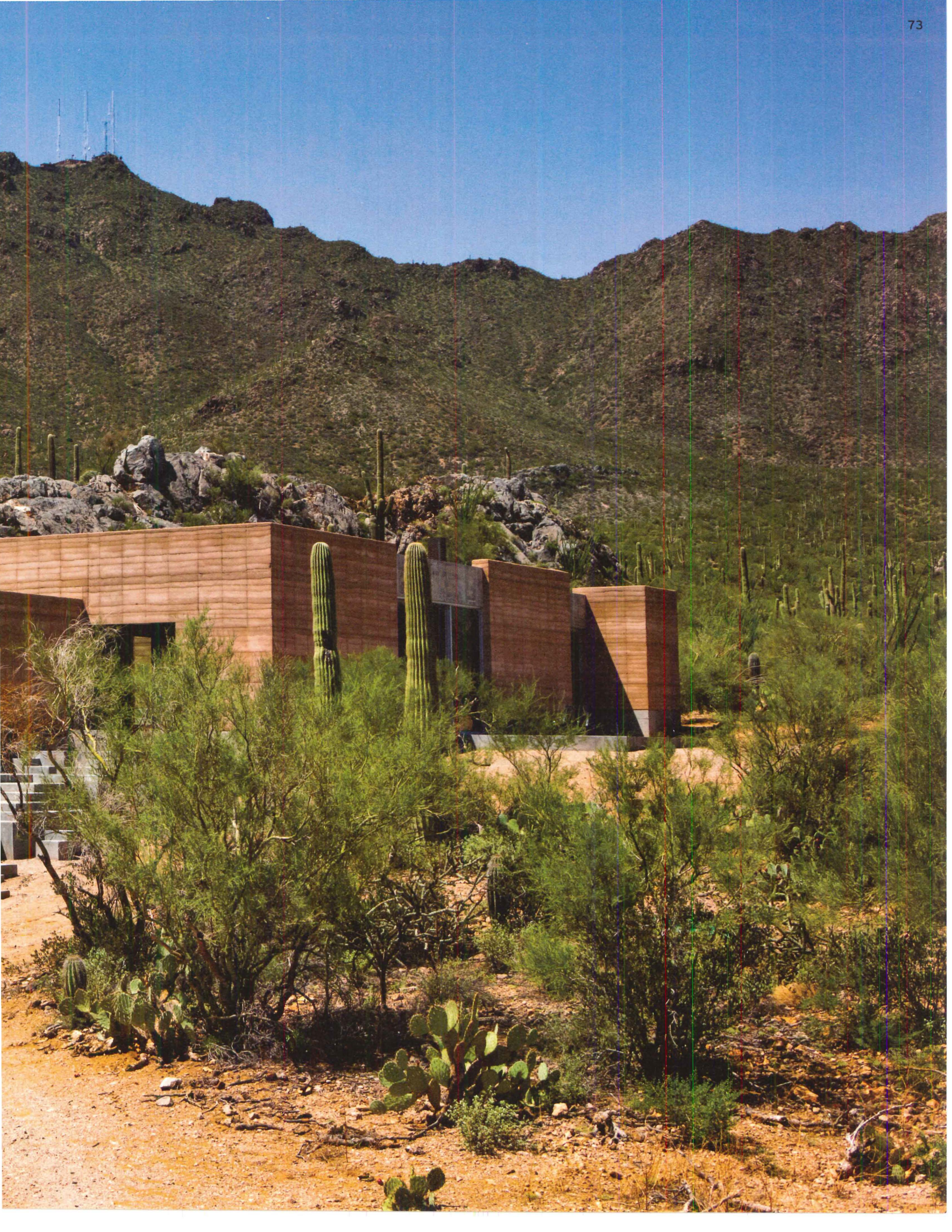
Beneath the Sheltering Sky

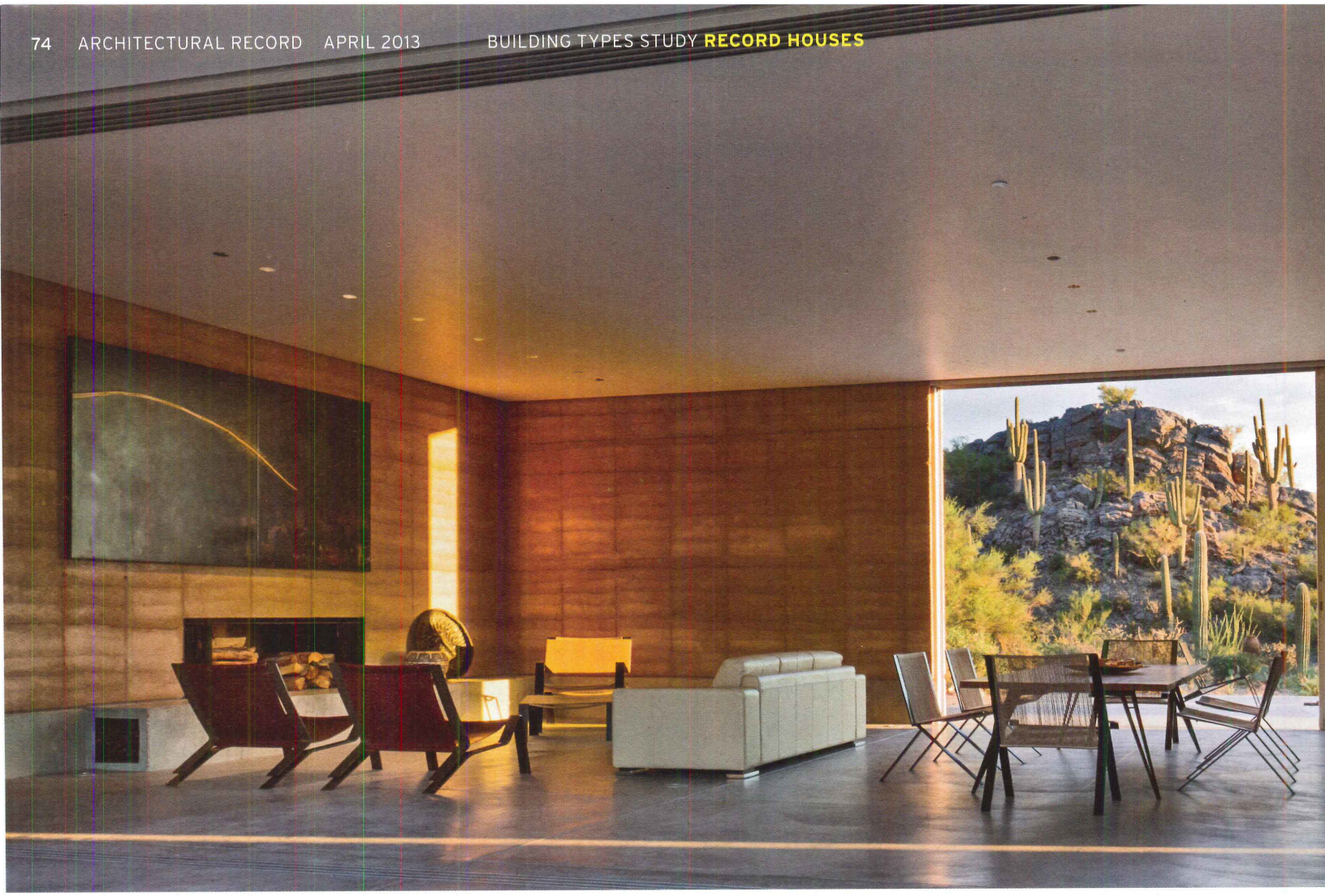
A design-build firm uses earth and space to connect its first project to a remarkable desert site.

BY CLIFFORD A. PEARSON

PHOTOGRAPHY BY JEFF GOLDBERG/ESTO







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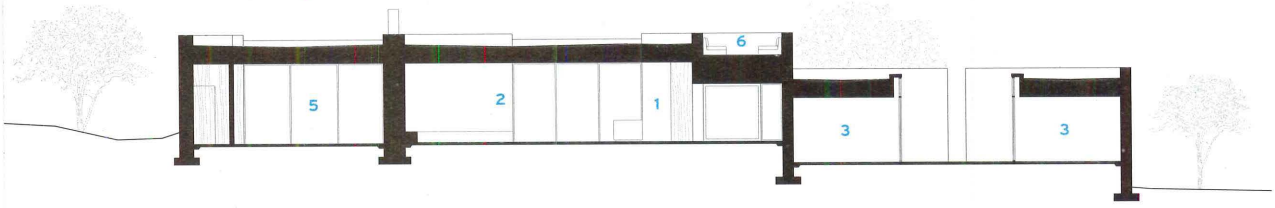


SECTION A - A

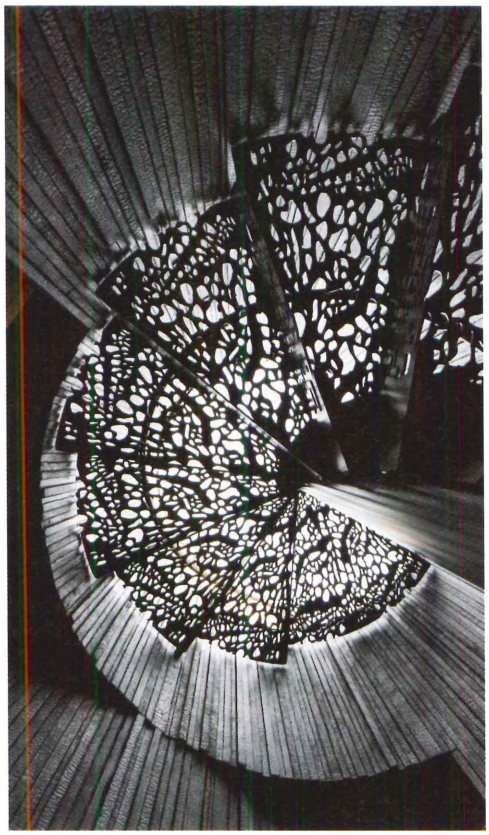
MATERIAL WORLD
Sliding glass panels on two sides open the living pavilion (above) to views and patios. The rammed-earth walls, which took four months to build, combine earth, cement, and dye. The music room (opposite, far right) was acoustically engineered to work as a professional recording studio and has a Murphy bed in the wall opposite the fireplace so it can also serve as a guest suite. The clients hope it will be used by guest musicians for performances and short residencies. A perforated-steel stair (opposite, left) leads to a roof deck.

CADE HAYES admits he was nervous when he started work on the Tucson Mountain Retreat, a 3,650-square-foot house on the edge of Saguaro National Park. Having grown up in New Mexico, he had developed a love of the desert. "It was our first project and we didn't want to scar the land," says Hayes, who runs DUST, a Tucson-based design-build firm, along with Jesus Robles. Both Hayes and Robles studied architecture at Texas Tech, and Hayes had worked for architect Rick Joy for five years, so they had the skills for the job. But their respect for the area's rugged yet fragile terrain kept them humble in the face of building on it.

Luckily, their clients—David and Karen Francis, who live in San Diego, and their daughter Nina, who is at college studying music—shared their kinship with the land. David Francis grew up in Tucson and wanted a house there for weekends and vacations, a place where he could reconnect with the desert and indulge his love of music. He had visited a friend who owns a rammed-earth house designed by Joy and told him, "You'll have to call 911 to get me out of here." But instead of commandeering his friend's residence, he bought a 6½-acre site nearby in the Tucson Mountains and built his own house. "I wanted a low-maintenance place, since we would be there only part time," says Francis, explaining why he picked rammed earth. "And it just seems like the right material for this area."

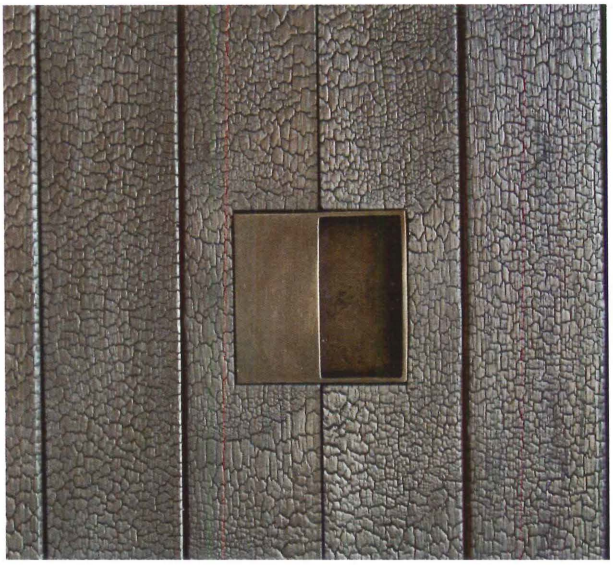
The decision to use rammed earth informed the entire design process, starting with the orientation of the house and its placement on the site. To exploit the material's effectiveness in absorbing heat from the sun during the day and releasing it in the evening when outdoor temperatures drop significantly, Hayes and Robles aligned the rectilinear structure along an east-west axis so the main elevations faced north and south. Only one small window interrupts the thick walls on the west, and none on the east. The architects and clients wanted the house to embrace the desert—not hunker down in it—so they opened all its main rooms to big views and shaded patios on the north and south. Floor-to-ceiling sliding glass panels can turn interior spaces into covered extensions of the outdoors. "The clients wanted each room to be just one step away from the land," says Hayes.

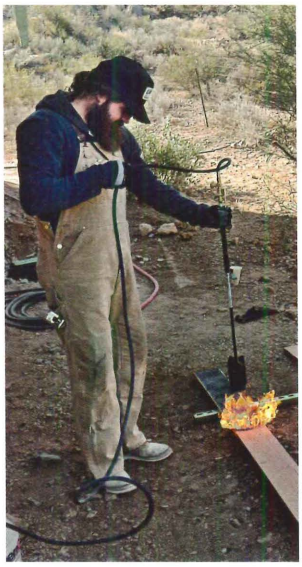
The earth walls, which range from 18 inches to 3 feet thick, snake through the house, protecting rooms on two or three sides and imprinting both interiors and exteriors with their warm, textured presence. But the architects wanted to be



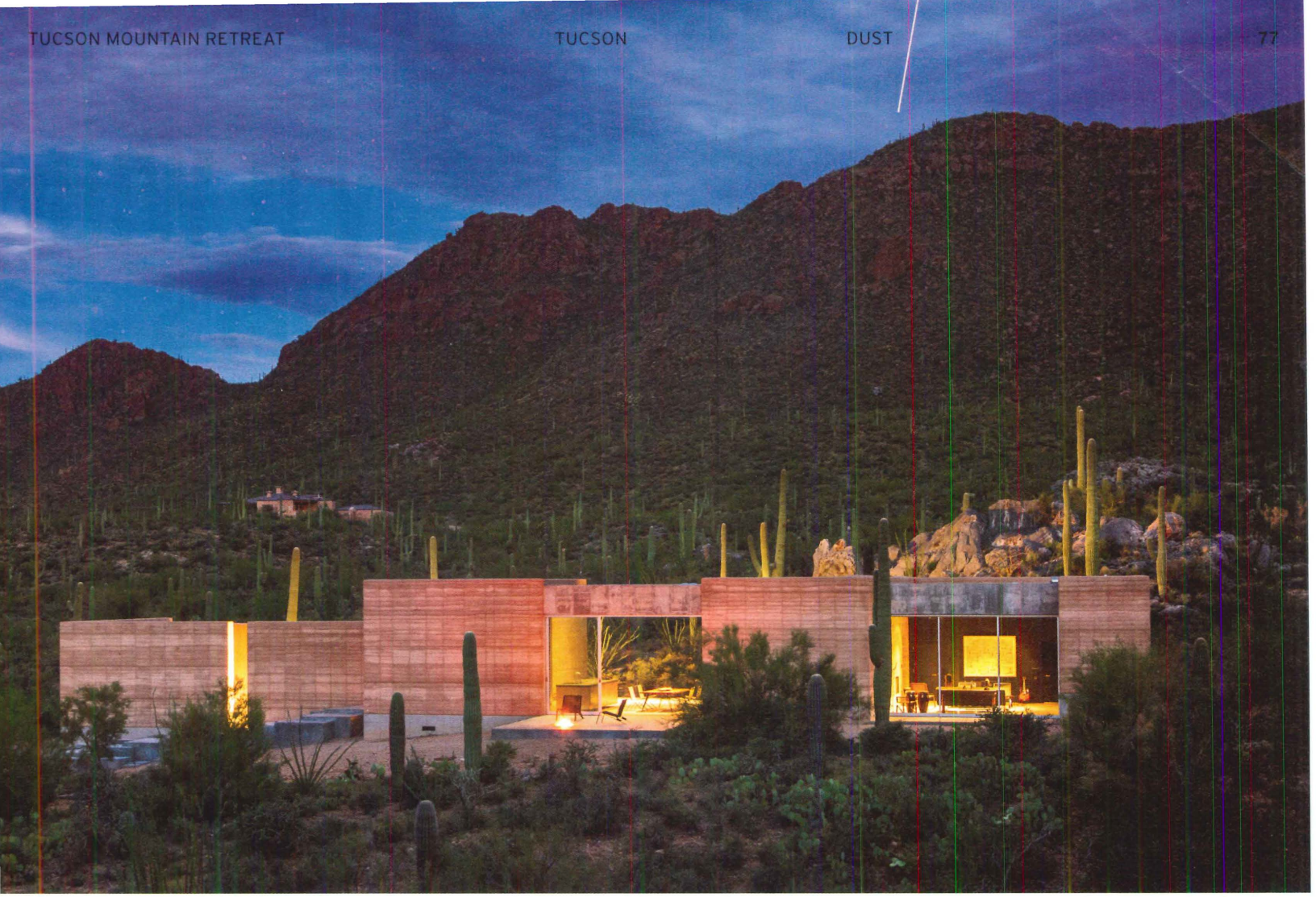
CLOSE-UP: SHOU SUGI BAN

A traditional Japanese way of preserving wood by charring its exterior, *shou sugi ban* creates a crackled black surface that is both elegant and rugged. Hayes and Robles had learned of the technique when reading about the work of Terunobu Fujimori, an architect and author who applies old construction methods and handcraft to quirky new teahouses and other buildings. Although the clients at first worried that the black wood wouldn't fit in with the rest of the house, the architects had a hunch it would work well with rammed earth, since both materials feature irregularities created during fabrication. "Burn master" Caleb Coy charred Spanish cedar, which was installed in a few places such as the bedrooms and the outdoor foyer between the bedrooms. The clients now say they love it.





BURN THIS A door has a custom pull that works for both lefties and righties; Caleb Coy chars Spanish cedar.



LIGHT TOUCH The Tucson Mountains and the desert look tough, but DUST understood how fragile they really are. So the firm limited the house's footprint and moved only five small saguaro cacti. This spring, landscaping will bring native plants to the edge of the house and between the concrete steps leading to the main entry (above). In a bedroom (opposite, bottom) and other rooms, the architects devised a system of hanging art from wires attached to a reveal between walls and the ceiling, as a way of preserving the rammed earth.

efficient with materials. "Wherever we could take away a wall, we did," says Hayes. Likewise, the clients pushed for efficiency in layout and asked for no hallways. So the architects devised a plan that works as a trio of attached boxes—one for a bedroom wing, one for the living/dining/cooking space, and one for a music room that can double as a guest suite. Each box is entered only from the outside: a narrow slit in a rammed-earth wall for the bedrooms, a deep porch for the living pavilion, and a simple door off a patio for the music room. This means people have to go outside to get to another part of the house, but Francis says, "It hardly ever rains here. And it reminds you that you're in this wonderful desert."

Concrete beams that are 3 feet 3 inches deep extend 40 feet in the living pavilion and 46 feet in the bedroom wing to tie the boxes together and support the roof, which has a 450-square-foot deck for stargazing and margarita sipping. A winding steel stair tucked away in a small office leads to the roof, while a dumbwaiter delivers the margaritas. The clients plan to move in this spring, and Francis is looking forward to testing out the music room, which could serve as a professional recording studio.

This being Tucson, water is a critical issue. Small pumice stones on the roof filter rainwater, which goes to a 30,000-gallon cistern buried in the ground. Landscaping, which will begin soon, involves bringing the desert right to the house and will include native plants growing between the concrete steps that cascade down the slope from the front door. Right now those variously sized concrete blocks stick out against the dry terrain, but they will eventually look as if the desert is enveloping them. Connecting to the land is what this house is all about—whether you're in the living room appreciating the views, on a patio breathing the desert air, or on the roof lost under a starlit sky. ■

credits

ARCHITECT: DUST – Cade Hayes, Jesus Robles, principals; Dale Rush, project team

ENGINEERS: Harris Engineering Services (structural); Otterbein Engineering (plumbing/mechanical); Matthews Consulting & Design (electrical)

LIGHTING DESIGNER: Claudia Kappl

CLIENTS: David and Karen Francis

RAMMED-EARTH CONTRACTOR: Pure Build

GENERAL CONTRACTOR: DUST

SIZE: 3,650 square feet (indoors); 965 square feet (covered outdoors); 450 square feet (roof deck); 700 square feet (carport/pump house)

COST: withheld

COMPLETION DATE: June 2012

SOURCES

WINDOWS AND DOORS: Fleetwood

DOOR HARDWARE: Valli & Valli

KITCHEN APPLIANCES: Sub-Zero; Thermador

CHAIRS AND DINING TABLE: Custom by DUST

Patrocínio House | Lisbon | RA\\Architecture and Design Studio

Say It With Flowers

House and garden become one in a Lisbon dwelling designed by Luís Rebelo de Andrade.

BY SUZANNE STEPHENS

VISITORS TO the hilltop neighborhood of Travessa do Patrocínio in Lisbon come screeching to a halt (even if on foot) when they first glimpse a three-story house whose walls pulsate with lush vegetation. The vertical gardens of the Patrocínio House bring a new meaning to "picturesque," the adjective often used to describe this city of low-rise, white- or pastel-stuccoed buildings with red-tiled roofs. In this single-family residence, two living exterior walls, angled slightly outward and supporting 4,500 plants, cause the narrow structure to look more like a tree than a townhouse. "That's what I wanted—a tree!" exclaims the architect Luís Rebelo de Andrade of RA\\Architecture and Design Studio in Lisbon, who completed the house with his son Tiago in 2012.

Lavender, rosemary, and saffron are only some of the fragrant flora sprouting from the effulgent walls installed by ADN Garden Design. The client, BWA—Building With Art, a developer specializing in custom residential projects, had acquired a worse-for-wear

LITERALLY ORGANIC The three-story townhouse is a larky, welcoming presence on its corner site in Lisbon. Poured-in-place-concrete walls are festooned with 1,240 square feet of plants above a base for the garage (left) and a study screened by louvers. The entrance (right) opens into a hall with a glazed interior stair.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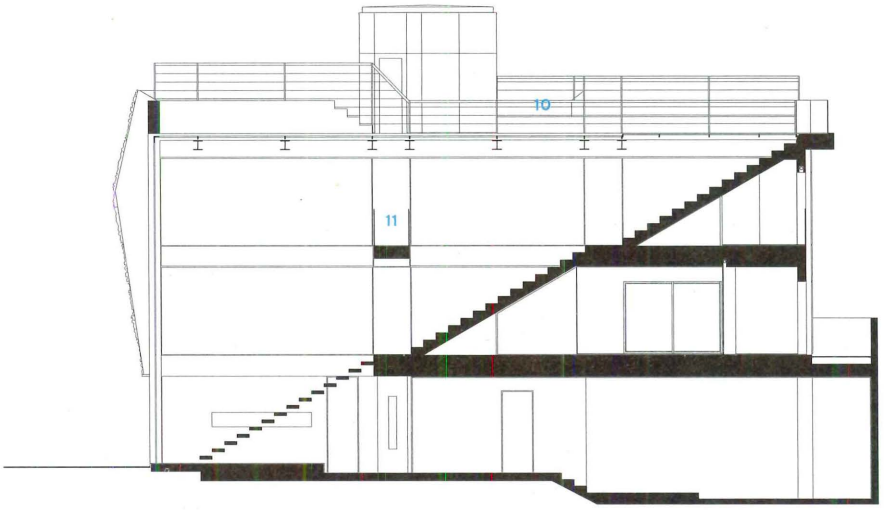

SECTION A - A

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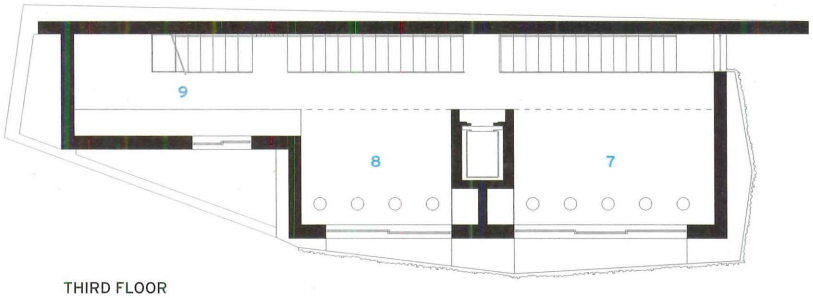
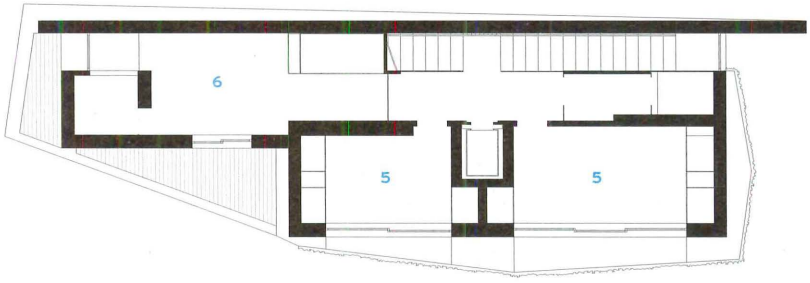
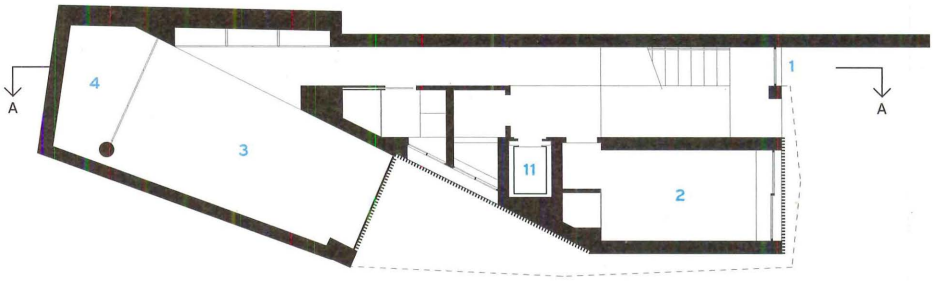
3 M.



THIRD FLOOR



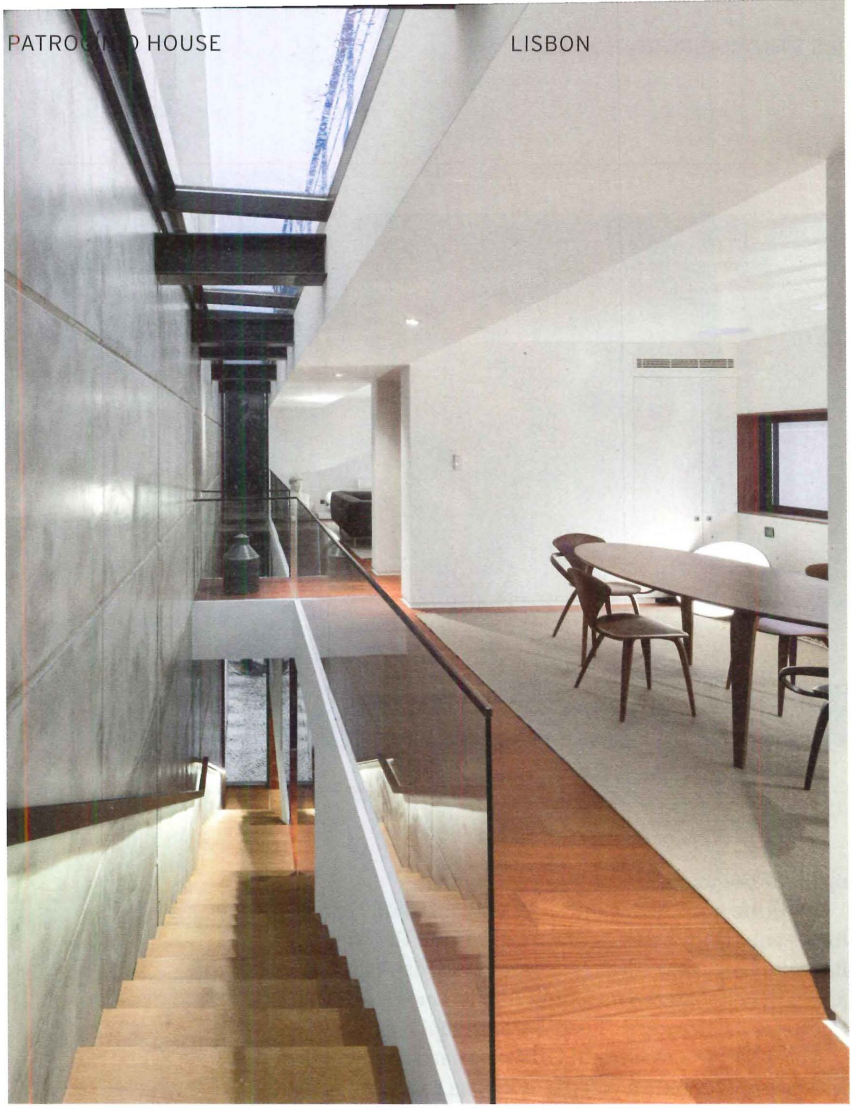
SECOND FLOOR

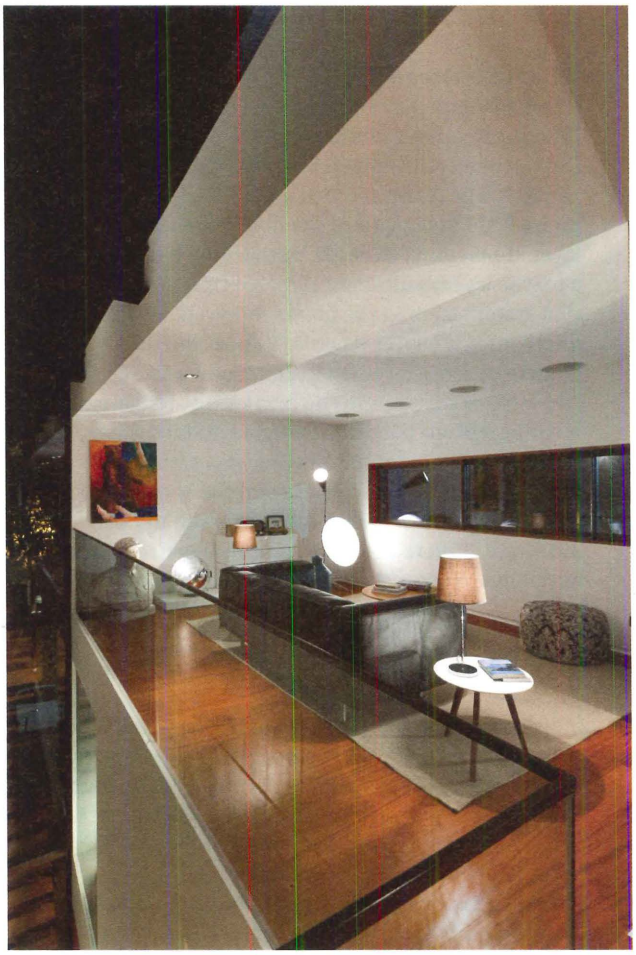


STREET FLOOR

0 10 FT.
3 M.

1 ENTRANCE HALL
2 STUDY
3 GARAGE
4 STORAGE
5 BEDROOM
6 MASTER BEDROOM
7 LIVING ROOM
8 DINING AREA
9 KITCHEN
10 ROOF POOL
11 ELEVATOR





BORROWED SPACE Glazing atop the three flights of stairs (opposite) introduces daylight to the narrow house. A steel beam between the concrete wall and the elevator core supports a viewing platform (above). The architects designed the living room (above right) and the dining area (right) to open directly onto the stair landing to enhance the sense of space within the elongated structure.

View video at architecturalrecord.com.

CLOSE-UP: LIVING WALL

With the Patrocínio House, the architects and ADN Garden Design partner João Salgueiro opted to follow a technique similar to one developed by Patrick Blanc, the French botanist, for his vertical gardens. The team attached a metal scaffold to the poured-concrete walls of the house, then added a layer of polyvinyl chloride, onto which it mounted a textile layer made from recycled fiber. The irrigation system feeding the plants followed, along with another textile layer. Then ADN inserted the plants—which are rooted in small amounts of soil—into holes cut into the blanketing. Irrigation is calibrated so that different quantities of water hydrate various sections of the wall according to the amount of solar exposure and the species of the plant. The exterior living walls fare well in the moderate climate of Lisbon, notes Salgueiro, who nevertheless suggests relying on local plants.

building on the tiny, 1,075-square-foot corner site. In discussing its replacement with BWA, the senior Andrade argued that the new spec house should look completely different—without being too unsettling—to attract a buyer. "Architects have a responsibility to add to the views of others," he explains. "We need to be guardians of that."

Andrade had incorporated a living wall as part of the elegant Aquapura Douro Valley hotel he designed in northern Portugal in 2008. But here was a chance to do it in a tightly knit city neighborhood. The parti for the Modernist, poured-in-place-concrete structure reflects its close abutment to a taller building next door. A skylit, three-flight stair on the west party wall skims past a study and a garage on the ground floor, ascending to second-level sleeping quarters, then to the third-level living and dining spaces. The stair ends at the roof, where the skylight opens like a hatch to allow the future residents and visitors to clamber onto the wood deck and take a swim in the 4-foot-wide, 40-foot-long pool. A projecting canopy for the rooftop elevator cabin supports photovoltaic panels that capture solar energy for hot water. There may not be room for a backyard garden and pool in this diminutive site, but that's OK. Both features come as an integral part of an energy-efficient house where the thick, leafy walls retain warmth in the winter and help cool the house in the summer.

Since the rooms in this shiplike dwelling are compact, the architects deftly contrived to suffuse the interiors with daylight and a sense of borrowed space. The living and dining areas open off the stair landing like alcoves, and glazed bands carved out of the planted wall facing east introduce daylight to both the living and the bedroom floors. Portholes in the bottom of the rooftop pool also admit light into the living areas, while glass balustrades add to the interior's sense of transparency and reflectivity. The architects even enhanced daylight in the master bedroom by enclosing the shower in translucent glass on three sides, and increased outdoor space with small rear balconies that open off the master bedroom and kitchen.

Working with ADN Garden Design, a Lisbon firm known for its aquariums, the architects emulated the work of Patrick Blanc, who developed vertical gardens for Ateliers Jean Nouvel's Musée du Quai Branly in Paris (2006) and Herzog & de Meuron's CaixaForum in Madrid (2008).

The effect is a rich floral quilt emanating seasonal scents, which requires only a full day with the gardener two or three times a year. Fortunately, Lisbon's mild climate lends itself well to living walls, although the architects and consultants say it's best to stick to local plants. "So far we only had to replace 5 percent of them," says Tiago Rebelo de Andrade. "We were told to expect 20 percent."

The 2,650-square-foot house, which cost $780,000 to build, including the 1,240 square feet of planting, has become something of a living landmark since its completion last August—the first time a house has been designed with an exterior vertical garden in Lisbon, the team notes. While the downturn in the Portuguese economy "created a challenge," says BWA's head, Louis Soares Franco, he says that prospective buyers from abroad have been showing interest. Luís and Tiago Rebelo de Andrade, gratified by the reaction, hope to do it again.

Fragrant living walls offer a romantic counterpoint to the sleekly designed Modernist architecture of the house.

On a recent sunny winter day, the architects, the client, and the living-wall consultants sat with a journalist in the ground-floor study, peering unseen through the wood louvers as passersby came up to the house, pointed, and started to smile. Did we hear "adorável"? That would be Portuguese for "adorable." ■

COOL POOL A rooftop pool about 4 feet wide by 40 feet long runs along the east garden wall, edged by a teak-wood deck and a mirror-paneled elevator cabin. Glass portholes in the floor of the pool help bring daylight into the living and dining areas below.

credits

ARCHITECT: RA\\Architecture and Design Studio – Luís Rebelo de Andrade, principal; Tiago Rebelo de Andrade, Manuel Cachão Tojal, architects; Madalena Rebelo de Andrade, Raquel Jorge, team

LANDSCAPE (LIVING WALL): ADN Garden Design

CLIENT: BWA–Building With Art

SIZE: 2,650 square feet

COST: $780,000

COMPLETION DATE: August 2012

SOURCES

GLASS AND METAL FRAMING: Reynaers Aluminium

DOORS: Dierre; VitroChaves (glass upswinging door)

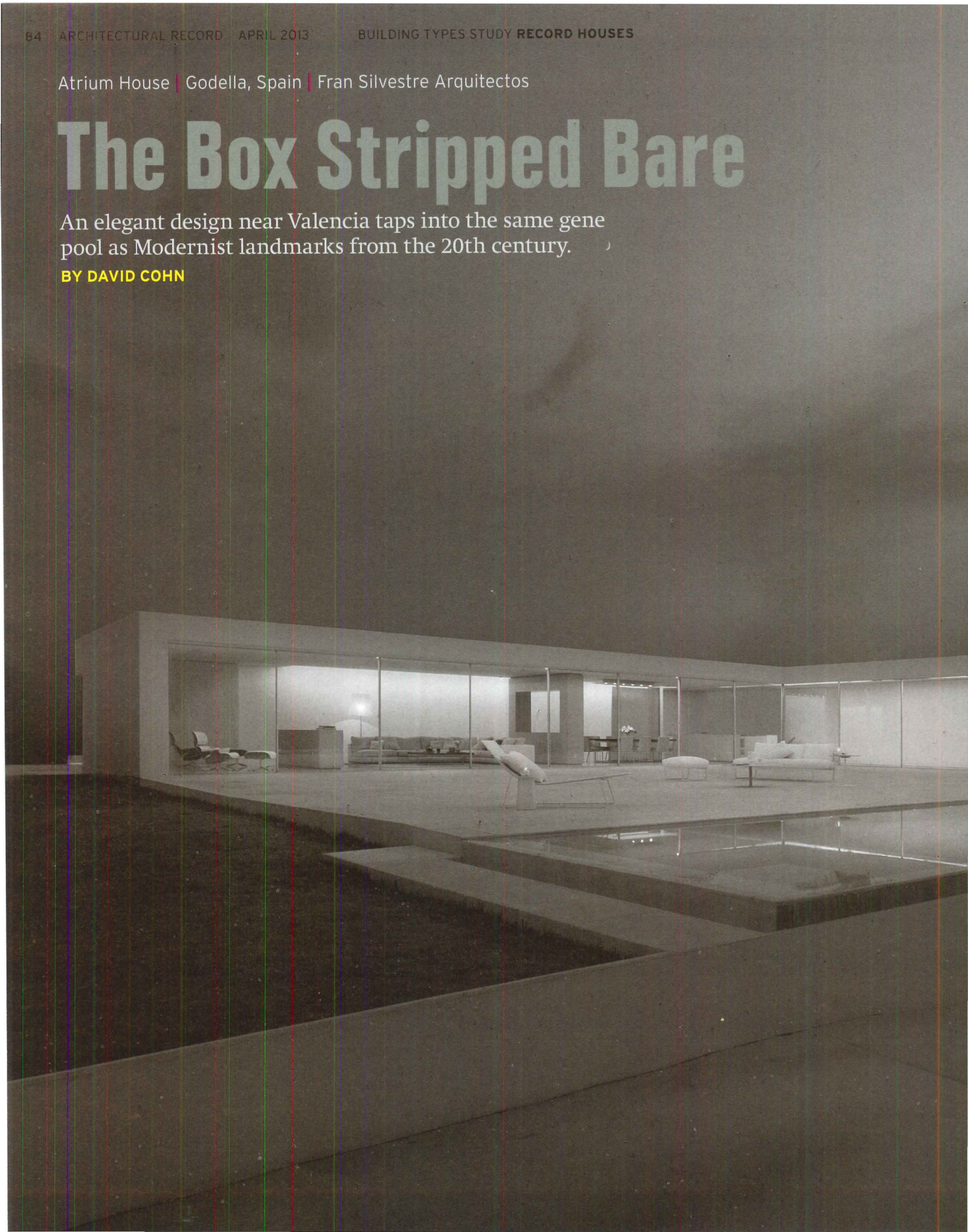
PHOTOVOLTAIC SYSTEM: Vulcano

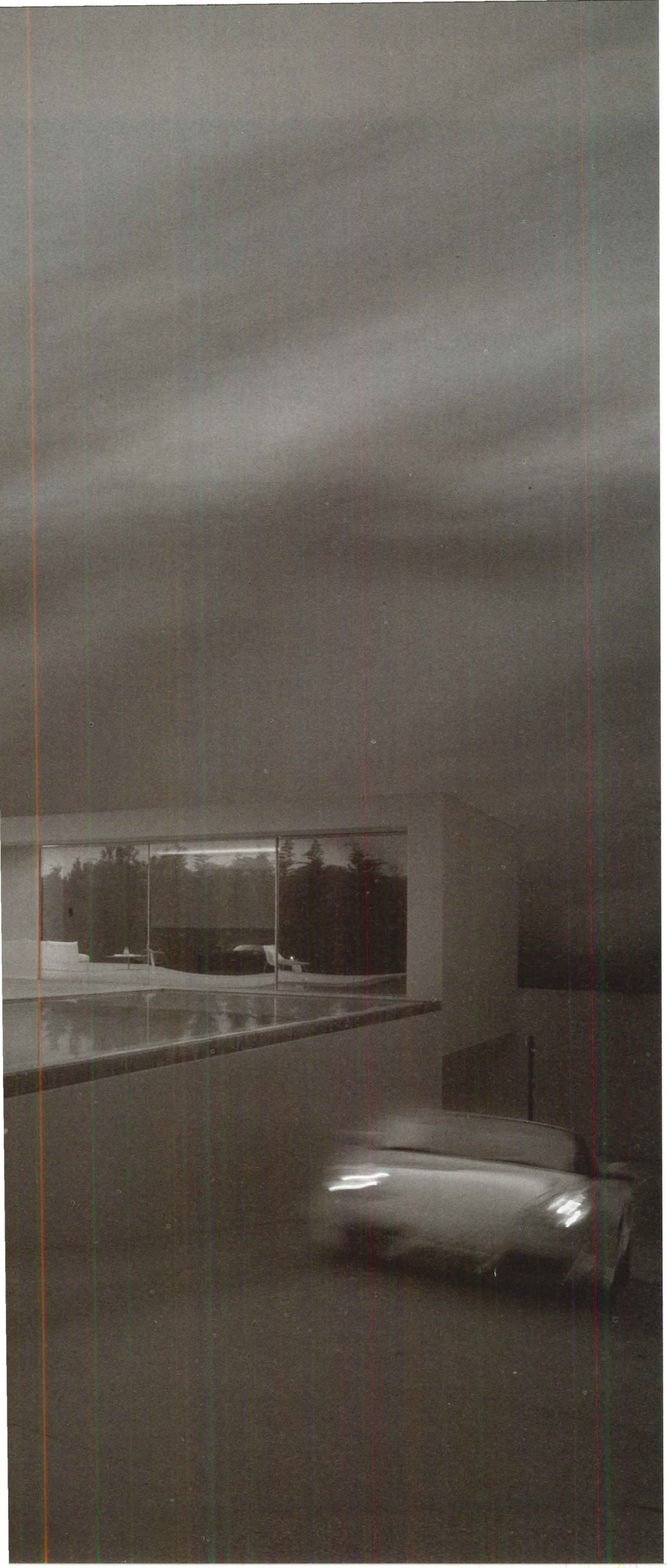
Atrium House | Godella, Spain | Fran Silvestre Arquitectos

The Box Stripped Bare

An elegant design near Valencia taps into the same gene pool as Modernist landmarks from the 20th century.

BY DAVID COHN





WITH HIS design for the Atrium House, 36-year-old architect Fran Silvestre takes a fresh look at 20th-century Modernist formulas, from the courtyard houses of Mies van der Rohe of the 1920s and '30s to the Case Study Houses in Los Angeles of the 1950s and '60s. In the process, he offers nods to Álvaro Siza, for whom he worked for two years (2001–03), and Eduardo Souto de Moura, who spent five years in Siza's office. The house—located outside Valencia, Spain—wraps around two sides of a sprawling white Ibiza-marble terrace (the "atrium" of its name), with Leylandii-cypress hedges serving as a contrasting natural enclosure on its other two sides and completing the courtyard.

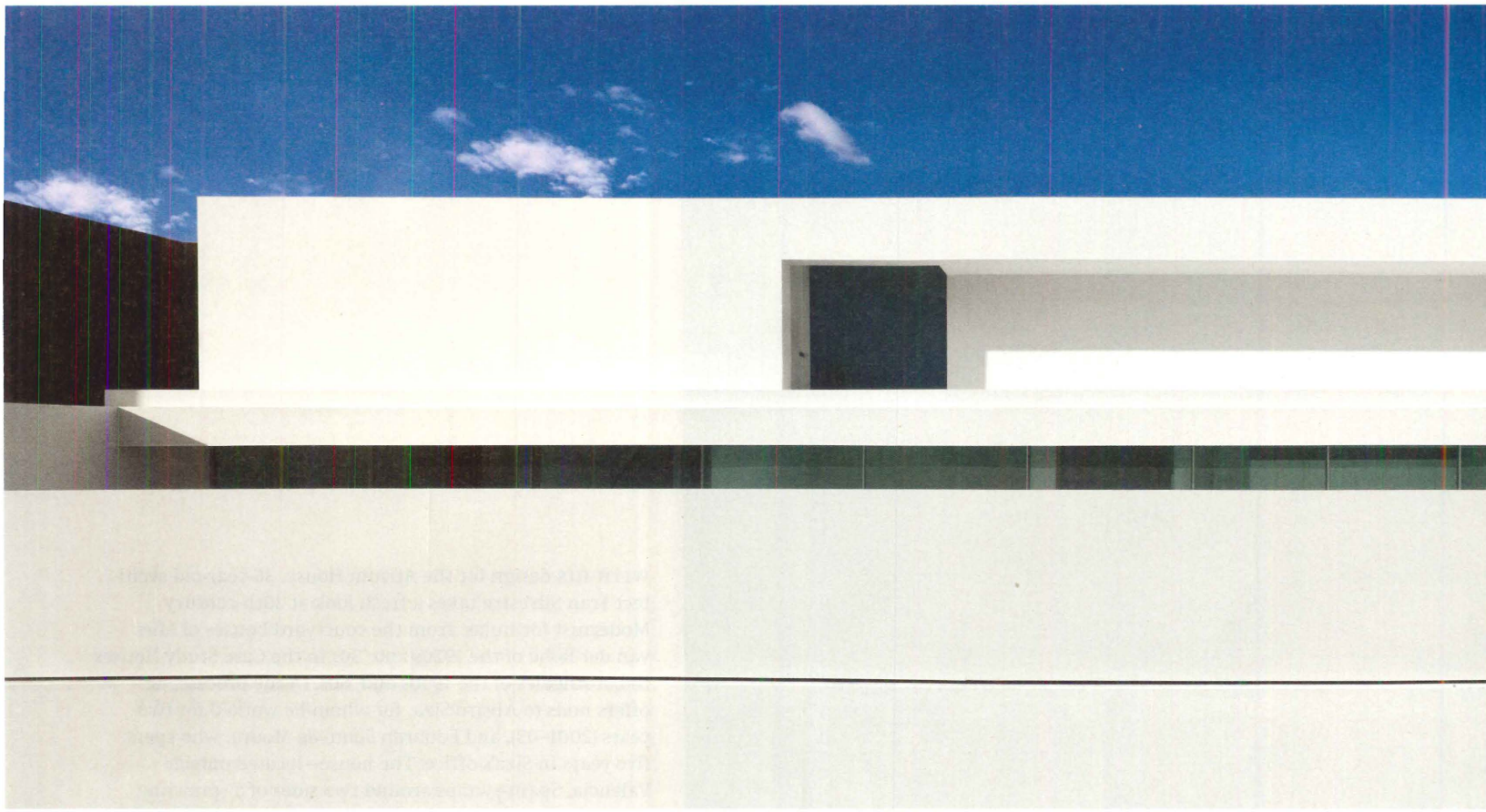
The layout of the house can be taken in at a glance: a continuous wall of floor-to-ceiling glass reveals a 57-foot-long wing for the living area on one side and a bedroom wing on the other. "My strategy was to free the largest possible area for the pleasure of a private outdoor space with limitless height and volume," Silvestre explains. "I see the house and its site as a continuum."

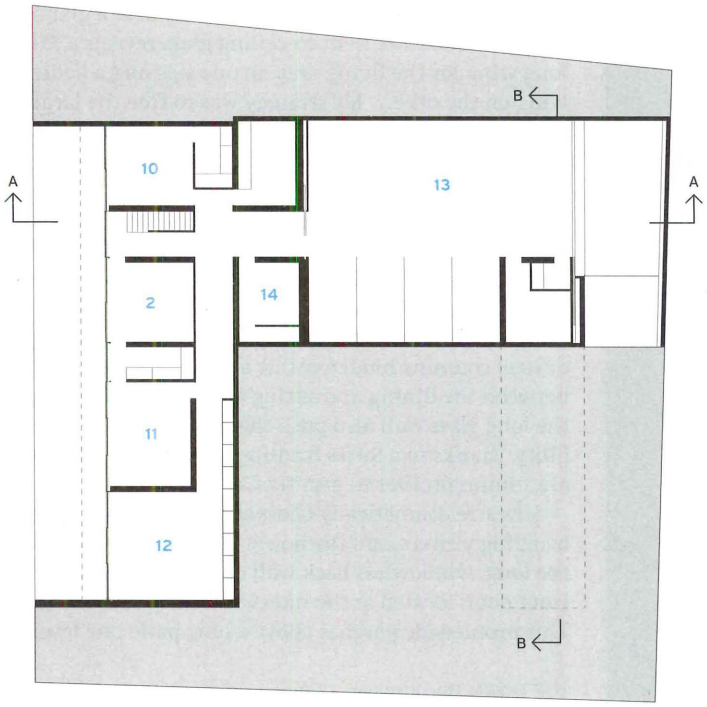
The uninterrupted sweep of glass is made possible by a structure of high-strength concrete walls and slabs. The entire roof of the living area, with the glass wall on one side and a trench skylight running along the ceiling on the other, is supported at only three points, including a pair of steel columns hidden inside a built-in maple cabinet between the dining and sitting areas. The sliding panels of the long glass wall also push the limits of structural feasibility, thanks to a Swiss framing system that reduces their aluminum profiles to just ¾ of an inch.

Silvestre dramatically choreographs the entry sequence, bringing visitors into the house on the upper level, along the long, windowless back wall of the living area to the front door, located at the intersection of the two wings. This promenade perches above a long patio one level below

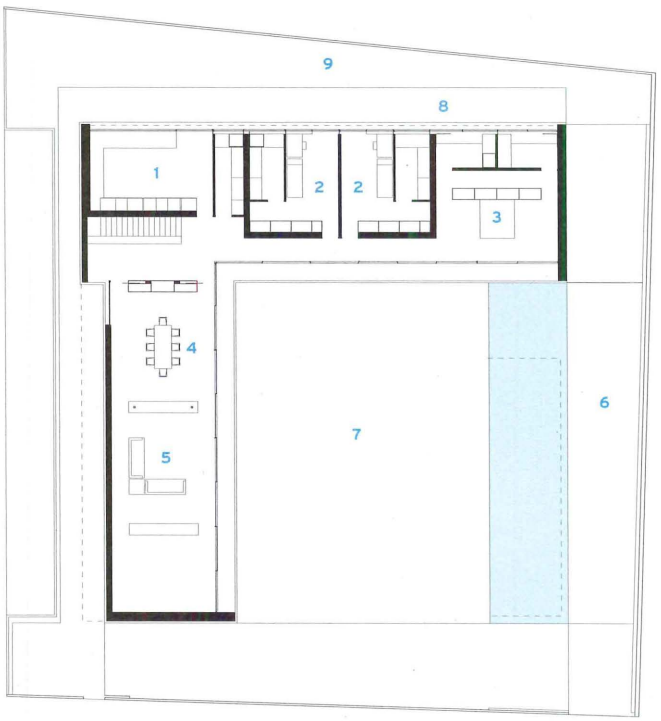
TOP DOWN The main floor of the house sits above a lower level containing a four-car garage, a guest room, a gym, and a study. The central terrace or "atrium" serves as the focus for the living spaces and master bedroom, creating a visual continuum between indoor and outdoor living.

View additional images at architecturalrecord.com.





LOWER FLOOR



UPPER FLOOR

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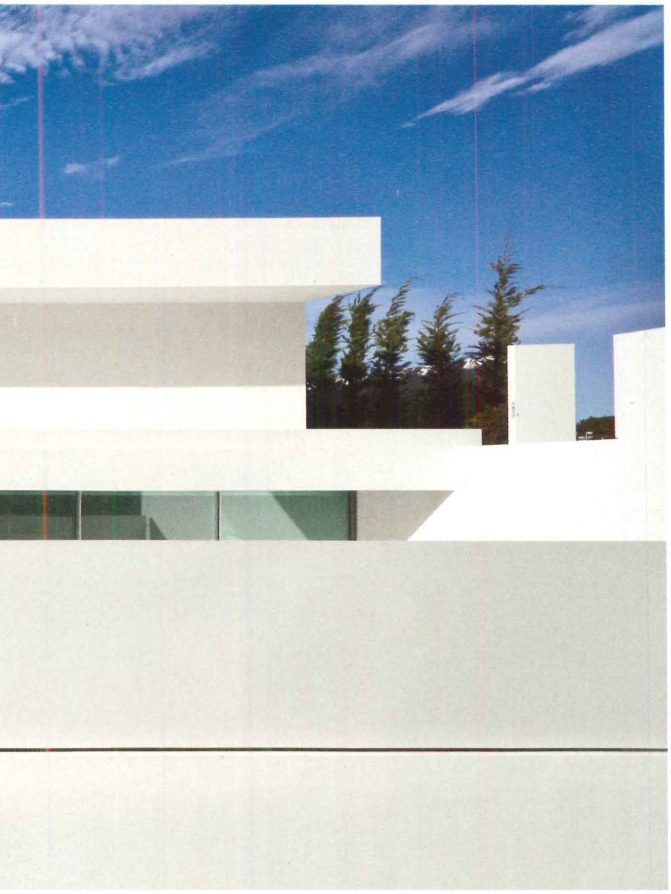
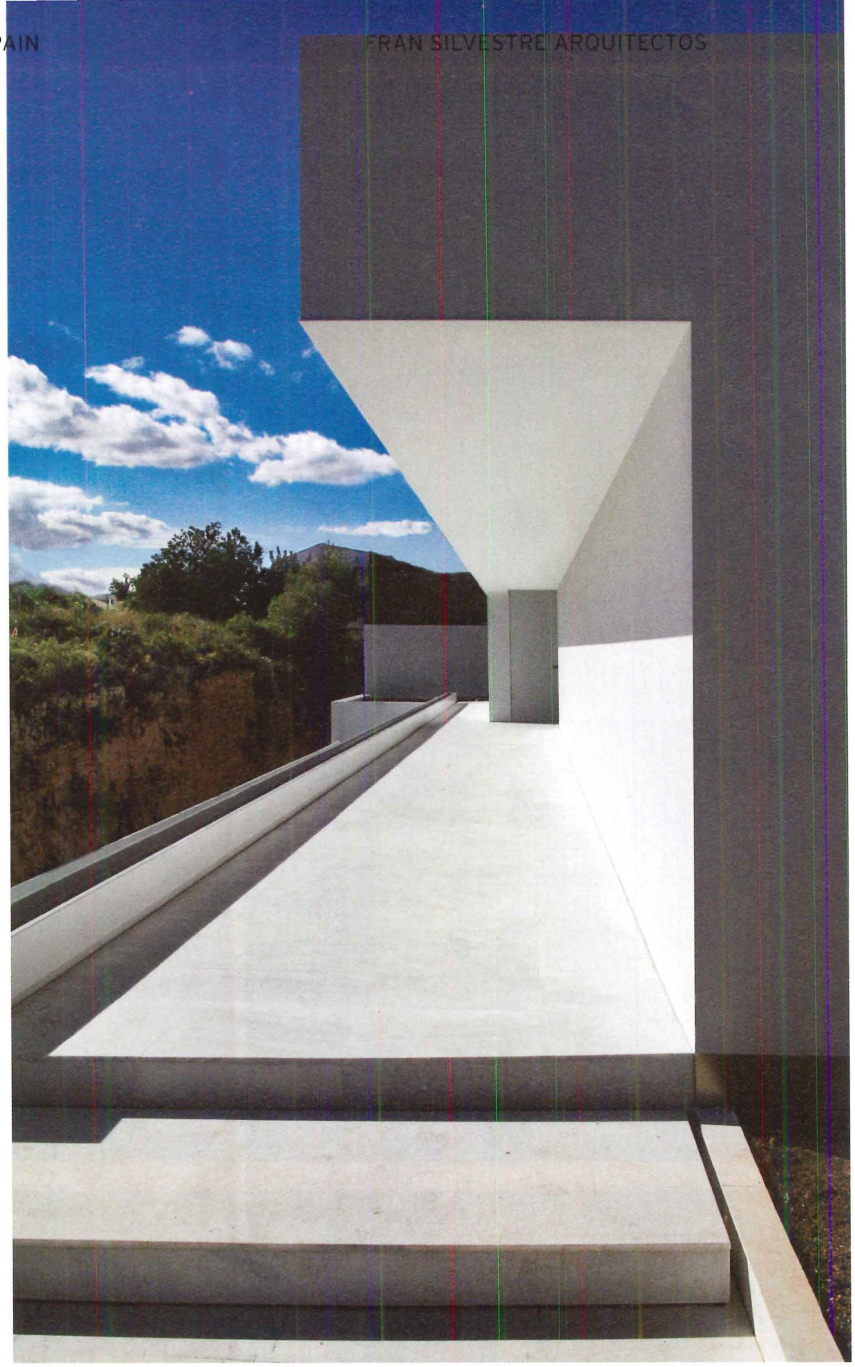
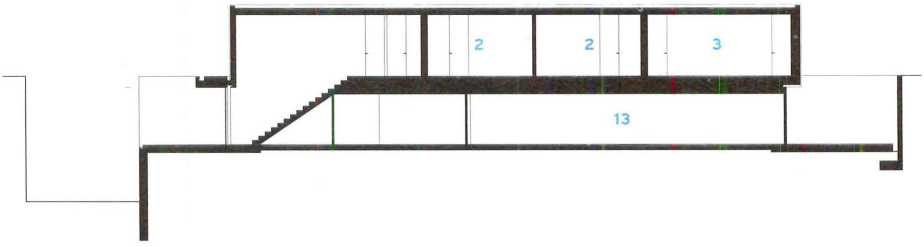
5 M.



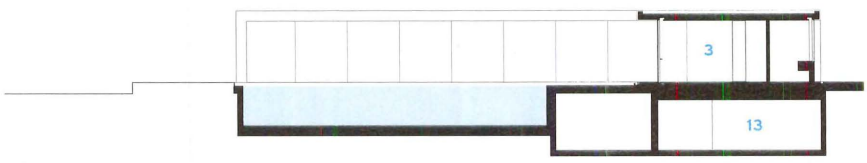


LONG MARCH While much of the house reveals itself from the central courtyard, the entry sequence on the upper level takes visitors on an extended promenade around two mostly windowless facades. Shaded from above, the promenade (right and above) leads past a triangular-shaped garden behind the bedroom wing and then a sunken patio running along one side of the guest/gym/study level. Silvestre choreographed the sequence to create a sense of anticipation and mystery and to show off the site around the house.

1 KITCHEN
2 BEDROOM
3 MASTER BEDROOM
4 DINING AREA
5 LIVING AREA
6 DRIVEWAY/RAMP
7 TERRACE/ATRIUM
8 PATIO
9 GARDEN
10 LAUNDRY
11 GYM
12 STUDY
13 GARAGE
14 WINE CELLAR



SECTION A - A



SECTION B - B

0 16 FT.
5 M.

credits

ARCHITECT: Fran Silvestre Arquitectos – Fran Silvestre, Maria José Sáez, principals in charge; José V. Miguel, José Ángel Ruiz, Jordi Martínez, Ángel Fito, Adrián Mora, María Masiá, Fran Ayala, project team

INTERIOR DESIGNER: Andrés Alfaro Hofmann

ENGINEERS: David Gallardo/UPV (structural); Carlos García (building)

LIGHTING DESIGNER: Studio2

CLIENT: withheld

GENERAL CONTRACTOR: Coarco

SIZE: 12,375 square feet (gross)

COST: $1.75 million

COMPLETION DATE: March 2010

SOURCES

GLAZING AND WINDOWS: Vitrocsa

INSULATED-CONCRETE WALLS: Sate Vipal/Parex

LIGHT FITTINGS: Jung

LINEAR FLUORESCENT LIGHTS: Studio2

BARE ESSENTIALS Just as Mies van der Rohe extolled the virtue of *beinahe nichts* (almost nothing), Silvestre stripped away distracting elements such as doorframes and hid electrical outlets, kitchen appliances, and even the water source for an outdoor shower. A high-strength concrete frame frees the atrium elevations to almost disappear as uninterrupted, floor-to-ceiling glass walls (above). The bedrooms look onto a rear terrace and garden (opposite, bottom).

that provides natural light to spaces such as a study and guest room. On the rear, northern exposure of the upper level, the bedrooms and kitchen look through a continuous curtain wall into a small enclosed garden. Concrete walls in this wing, along with the floor and ceiling, form a three-dimensional truss that spans a four-car garage below. Designed for a couple currently without children, the three-bedroom program includes room for the family to grow.

Inside the house, an austere formality reigns, as Silvestre wrestled with every detail to eliminate any extraneous element. In the process, he devised frameless floor-to-ceiling doors; electrical outlets that drop down from kitchen cabinets to keep them out of view; a mechanism that hides the microwave oven in a cabinet when not in use; and fold-away mirrors in the master bathrooms that open out over the back window wall only when needed. Even outside, he avoided visible plumbing by devising a trick shower on the terrace by the pool that shoots water upward from the ground when bathers step on its plate. While these details are fun, other design decisions could be accused of sacrificing livability. In the bedroom wing, the master bedroom lacks privacy and bathrooms occupy a disproportionate amount of space. And all the glaring white marble and glass has prompted the owners to add extra shading elements to protect the house from Valencia's fierce summer climate.

The overall effect of the house's uninterrupted surfaces is to focus attention on people, furnishings, and outdoor views. The owners' collection of large, colorful paintings by local artist Juan Ripollés helps anchor the living spaces and adds warmth, as does the Italian furniture selected by interior designer Andrés Alfaro Hofmann.

Following his graduation from the Polytechnic University of Valencia, Silvestre collaborated on a number of private houses with Alfaro Hofmann, the son of Andreu Alfaro, a renowned local sculptor. The sculptural impulse evident in Silvestre's work and his drive to overcome the limits of materiality in favor of formal expression reflect the influence of the elder Alfaro. Traces of Siza's formal vocabulary are evident too in the white surfaces, overhanging planes, and elongated horizontal lines of the house. But in Siza's work, a door is always a door and a window a window; he never treats them as obstacles to overcome.

In this respect, Silvestre's approach may be closer to that of Siza's disciple Souto de Moura in his early court houses in Porto, Portugal. Silvestre, though, replaces the solid, walled enclosures of Souto de Moura's courtyards with glass, vegetation, and floating horizontal planes. His Atrium House is a work at ease in nature and the outdoors. With its 50-foot-long lap pool and elegant white marble, it's the incarnation of an enduring Mediterranean ideal. ■

Tower House | Ulster County, New York | Gluck+

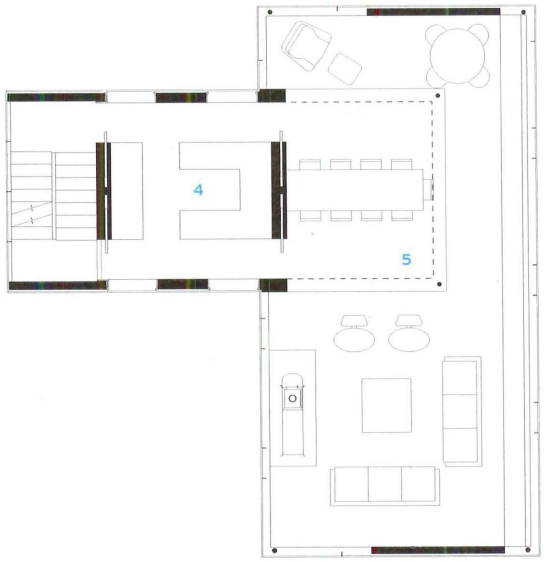
A Stairway to the Treetops

A chameleonlike house—which changes with the seasons and throughout the day—provides a perch for total immersion in the surrounding woods.

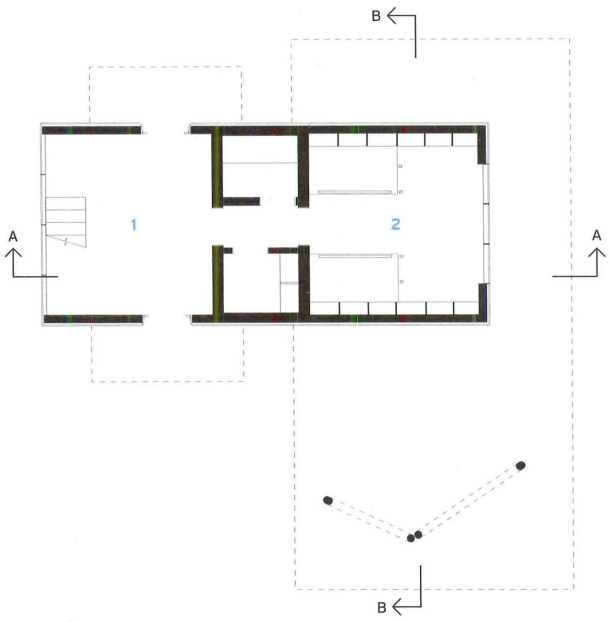
BY JOANN GONCHAR, AIA

PHOTOGRAPHY BY PAUL WARCHOL

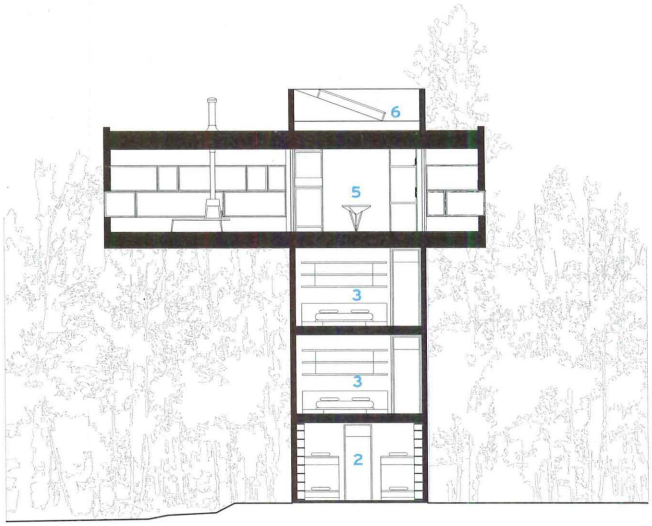
ARCHITECTURAL HYBRID The Tower House resembles the offspring of a Modernist skyscraper and a tree house. The entirely glass-clad structure comprises a four-story tower containing a stair, bedrooms, bathrooms, and a kitchen, and a primary living space cantilevered 30 feet off the ground.



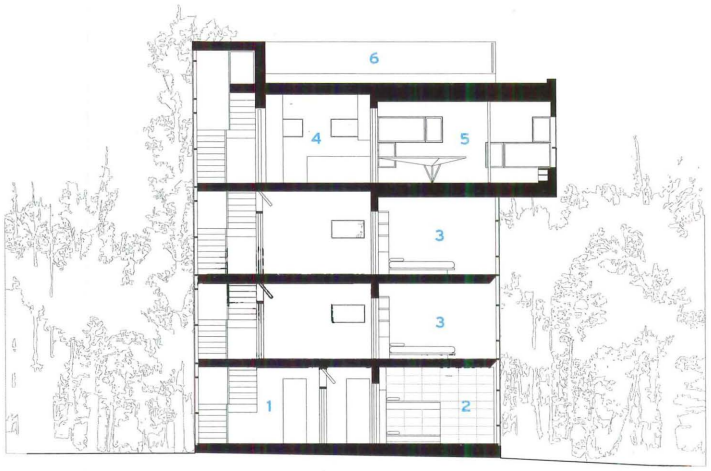
FOURTH FLOOR



GROUND FLOOR



SECTION B - B



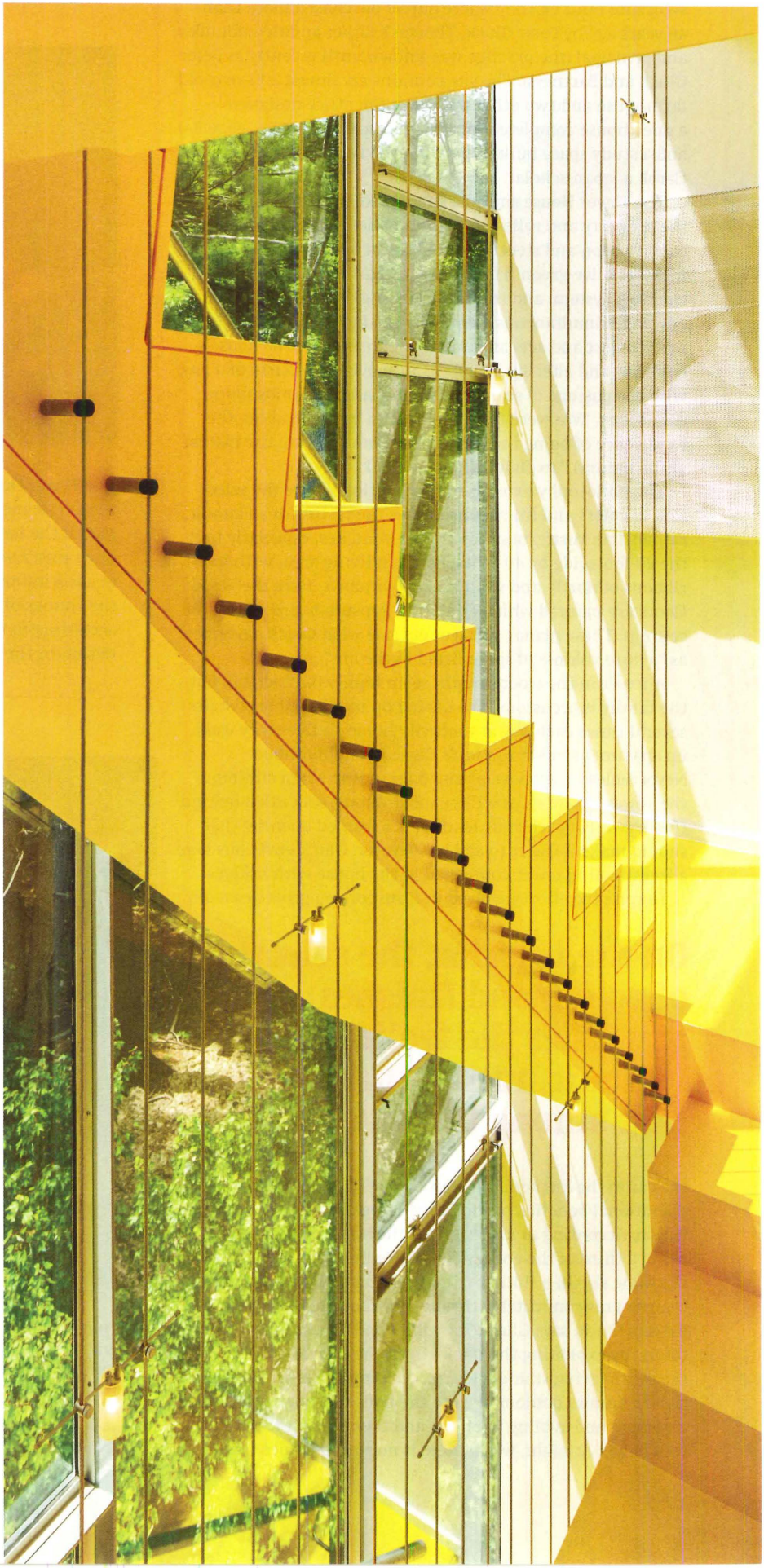
SECTION A - A

1 ENTRY/MUDROOM
2 CHILDREN'S BEDROOM
3 BEDROOM
4 KITCHEN
5 LIVING/DINING AREA
6 ROOF DECK

ARCHITECTURE NEED not always be serious. And nowhere is lightheartedness more fitting than in a vacation house. One such playful example is the Tower House—a 2,500-square-foot structure on a sloping, wooded site in Ulster County, New York, about 100 miles north of Manhattan. Designed by New York City–based Gluck+ as the mountain retreat for one of the firm's principals, Thomas Gluck; his wife, Anne Langston; and their two children, the house resembles a cross between a Modernist skyscraper and a tree house. It is completely glass-clad and has three bedrooms and adjoining baths stacked one on top of the other to support a living and dining room cantilevered 30 feet from the ground. A switch-back stair, with bright-yellow treads and risers, connects all four levels and leads to a rooftop deck. The goal, says Gluck, was to create an aerie within the trees and take advantage of views of nearby Catskill Park, a vast state forest preserve.

Completed last summer, the house is the most recent

TIGHT AND BRIGHT Although the kitchen (below) is only about 175 square feet, it is open at each of its corners to the main living area or the stair (right), with its yellow risers and treads. Since the kitchen is part of the thermal core—the only portion of the building heated during cold periods when the house is unoccupied—it includes insulated pocket doors that the owners close before leaving at the end of winter weekends.



Take a video tour of this project at architecturalrecord.com.

structure built on the 19-acre parcel purchased more than 40 years ago by Peter Gluck, Thomas's father and firm founder and principal (the practice was known until recently as Peter Gluck and Partners). The site contains an almost 200-year-old farmhouse and two other buildings the office designed—a guesthouse completed in 1995 (RECORD, April 1996, page 84) and a study space built in 2003 for the senior Gluck's wife, Carol, a Japan scholar.

The Tower House sits on a small plateau above the rest of the property and relies on a combination of wood platform construction and steel. Covering the armature is a skin that includes olive-green fritted glass, as part of a rainscreen cladding system, and insulated vision glass. This slick envelope simultaneously emphasizes the structure as a man-made object and acts as camouflage, reflecting the house's environs and altering its appearance over the course of a day, with the passage of seasons, and in changing atmospheric conditions. "We were trying to make a building about the experience of being in the woods without having the materials be natural," explains Thomas Gluck.

The philosophy extends to the interior, where the selection of colors and finishes amplifies the feeling of a Platonic, rather than rustic, nest among the branches, especially in the 20-foot-wide by 40-foot-long main living area, with its ribbons of north- and south-facing windows. Here the wood floors are painted white, as are the gypsum-board walls and ceilings. These planar surfaces enclose what Gluck describes as "a pure volume of space lifted in the air."

A tower in the woods might seem highly impractical, but the family is accustomed to hiking up many flights of stairs several times each day at their city home—a five-story walk-up apartment in Manhattan's Harlem neighborhood. Nevertheless, they have planned for a time when climbing the Tower House steps will be too arduous: concealed behind the drywall at each stair landing is a framed opening that should make it easier to add an elevator. Gluck envisions it as a freestanding tower connected to the house with bridges.

Despite the effort involved in transporting groceries from the car to the kitchen, the house's configuration offers operational benefits, particularly in regard to energy conservation. According to its designers, the building uses only about a third of the energy consumed by a typical house of the same size in a similar climate. It has no air-conditioning but remains comfortable throughout the summer except in extreme heat, says Gluck. Tolerable conditions are maintained by exploiting the stack effect: the sun heats the air in the south-facing stair enclosure, creating a pressure differential that draws outdoor air into the house through gill-like casement and awning windows and then vents it through a roof hatch. At night, when there is no sun to induce this

On the interior, the selection of colors and finishes amplifies the feeling of a Platonic, rather than rustic, nest among the branches.

CLOSE-UP:
GLAZED RAINSCREEN FACADE

The Tower House has an all-glass envelope that reflects the trees and the sky. It includes spandrel panels with an olive-green frit intended to match the hue of lichen growing on nearby branches. The panels, part of a rainscreen cladding system, are structurally glazed with silicone to aluminum Ts and angles. These extrusions are barely visible, as are the frames of operable windows inserted within the skin. The goal, according to the designers, was to enhance the building's geometry and maintain the continuity of reflections between panels.

FLOATING BOX In order to enhance the sensation that the main living area (opposite) is a volume lifted into the trees, the wood floor and gypsum-board walls have been painted white, except for the floor in the part of the space directly below the roof deck, which is light gray (above). Through its ribbonlike windows, which include both fixed and operable insulated units, the room offers views of the Tower House's immediate environs and of the Catskill Mountains.

phenomenon, a fan at the top of the stairs assists ventilation.

The most significant savings, however, are realized by making it unnecessary to heat the entire house during the winter periods when the building is unoccupied. To prevent water pipes from freezing, a highly insulated 14-foot-by-13-foot core encloses the baths and the kitchen and includes substantial pocket doors. Before leaving at the end of a winter weekend, the owners slide the doors closed, set the temperature for the core to 50 degrees, and turn off the heat everywhere else.

This kind of careful consideration of energy use demonstrates that the Tower House is more than a mere folly—plenty of substance lies behind its whimsical exterior. ■

credits

ARCHITECT: Gluck+ – A.B. Morburg-Davis, Peter L. Gluck, Thomas Gluck, Davis Hecht, Marisa Kolodny, project team (in alphabetical order)

CONSULTANTS: Robert Silman Associates (structural); IBC Engineering Services (m/e/p, environmental); Forst Consulting (facade); Hoerr Schaudt Landscape Architects (landscape); Lux Populi (lighting)

CLIENTS: Thomas Gluck and Anne Langston

GENERAL CONTRACTOR: Gluck+ Construction

SIZE: 2,545 square feet

COST: withheld

COMPLETION DATE: June 2012

SOURCES

SPANDREL GLASS: Oldcastle BuildingEnvelope

OPERABLE WINDOWS: Arcadia

DOOR HARDWARE: Omnia Industries

PAINTS AND STAINS: Benjamin Moore

2 Verandas | Zurich | Gus Wüstemann Architects

Discreet in Concrete

On a built-up hillside overlooking Lake Zurich, a quietly monumental house asserts its powerful presence on the interior.

BY LAURA RASKIN

PHOTOGRAPHY BY BRUNO HELBLING

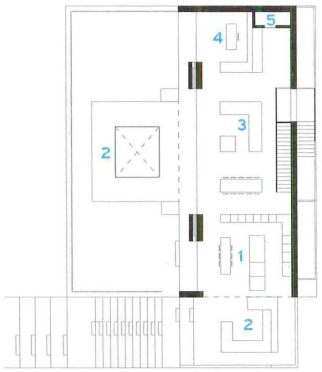
GOOD NEIGHBOR
The entrance to the house along the northeast facade is enclosed with wood panels, which emphasize the horizontal concrete volume (opposite). Much of the house, which is embedded in a sloping site and spills down the hill, is concealed from the street. Clerestory windows slice a concrete, barrel-vaulted roof (above).

WHILE MOST of its eurozone neighbors were whacked by financial crises, Switzerland managed to avoid a recession, and its economy grew by 1 percent in 2012. This relative robustness is evident in Zurich, where no vista seems clear of construction cranes. In the last several years the gritty, industrial west side of the city, across the Limmat River, has experienced the beginnings of a transformation into a residential and business district. The Zurich firm EM2N turned an old viaduct into a High Line–esque walking path, filling its arches with pricey stores and a food market. A glass mixed-use tower by Gigon/Guyer—the tallest in Zurich—was completed in 2011, and its 35th-floor bar overlooks a tapestry of train tracks.

Building is also booming in the already densely packed suburban hills on either side of Lake Zurich, where one of architect Gus Wüstemann's newest houses almost disappears among traditional Swiss structures and slapdash condominiums. The lake's south-facing bank, called Erlenbach, remains a desired place to live for its views of the water and the Alps beyond. Wüstemann's clients, a South African family with two young children, approached the Zurich-born architect to help them make the best use of their sloping site. He conceived two rectangular volumes—one for the house at the top of the hill; the second, a pool pavilion at the bottom. An exterior stair connects the two.

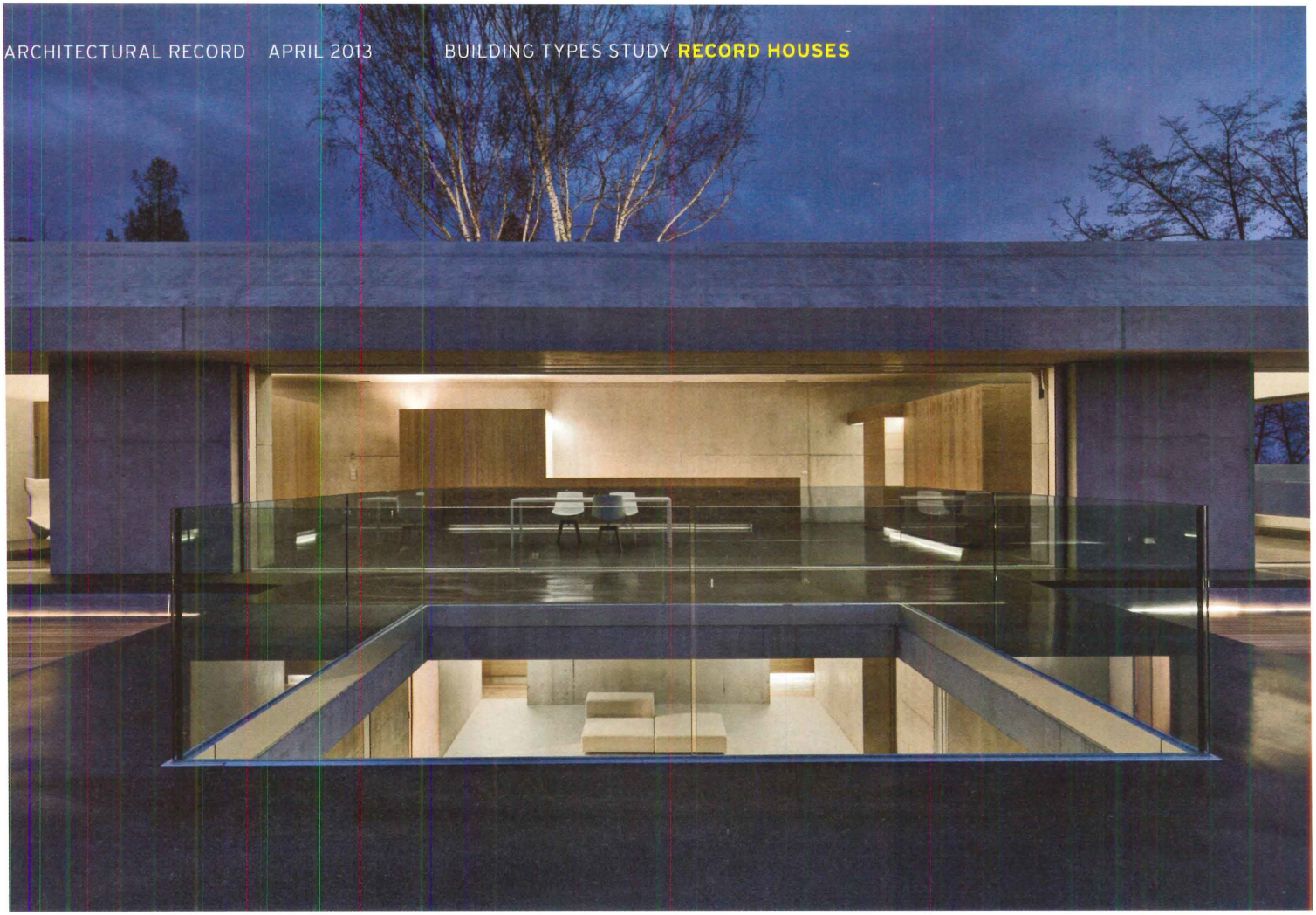
Wüstemann founded his firm in 1997 and received his M.Arch. from ETH (the Swiss Federal Institute of Technology) in Zurich. He loves concrete for its Brutalist, "it is what it is" attitude, and his goal was to design a house that was not a house—"a strong figure that has a presence, atmosphere, patina," free from the conventions of the program. A sense of monumentality is most evident on the interior. Here

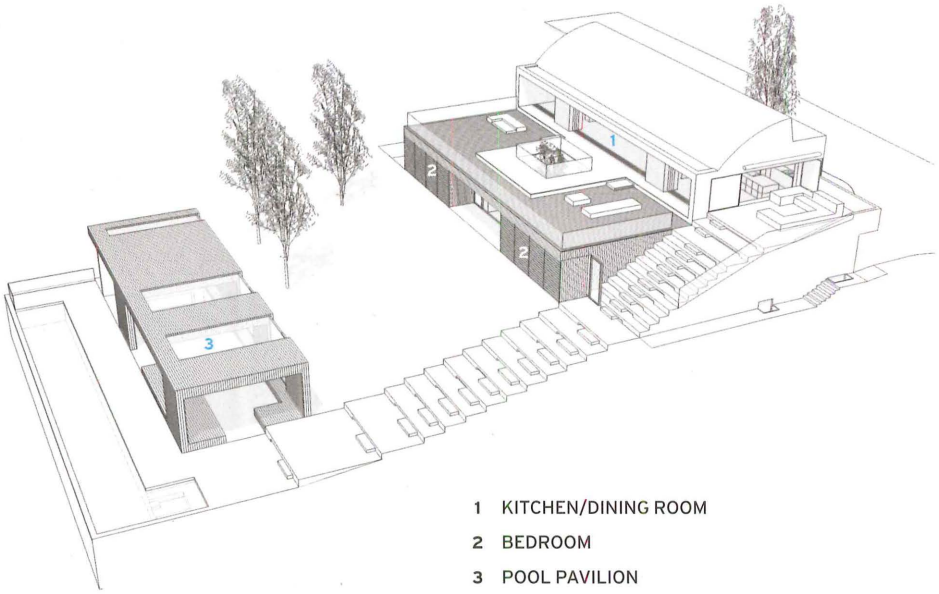
1 KITCHEN
2 TERRACE
3 DINING ROOM
4 OFFICE
5 BATHROOM
6 GARAGE
7 STORAGE
8 MASTER BEDROOM
9 LIVING ROOM
10 PATIO
11 BEDROOM
12 POOL HOUSE
13 POOL



UPPER FLOOR

GROUND FLOOR





1 KITCHEN/DINING ROOM
2 BEDROOM
3 POOL PAVILION

PICTURE FRAME
The kitchen and dining areas on the top floor look out to a terrace—the first veranda (opposite, top). A cutout in the terrace brings daylight to an open-air room on the ground floor (opposite, bottom). This space connects to the main living area by a sliding glass wall and features concrete benches and a square void for plants. The bedrooms on the ground floor (above) have views through trees and houses to Lake Zurich (right). An oak-and-sipo-mahogany-clad pool pavilion sits at the bottom of the hill, opening onto the second veranda.

board-formed concrete planks create the foot-and-a-half-thick walls of the house. "The sensation is not separation but presence," says Wüstemann. "They have the dimension of mass, like an Egyptian temple."

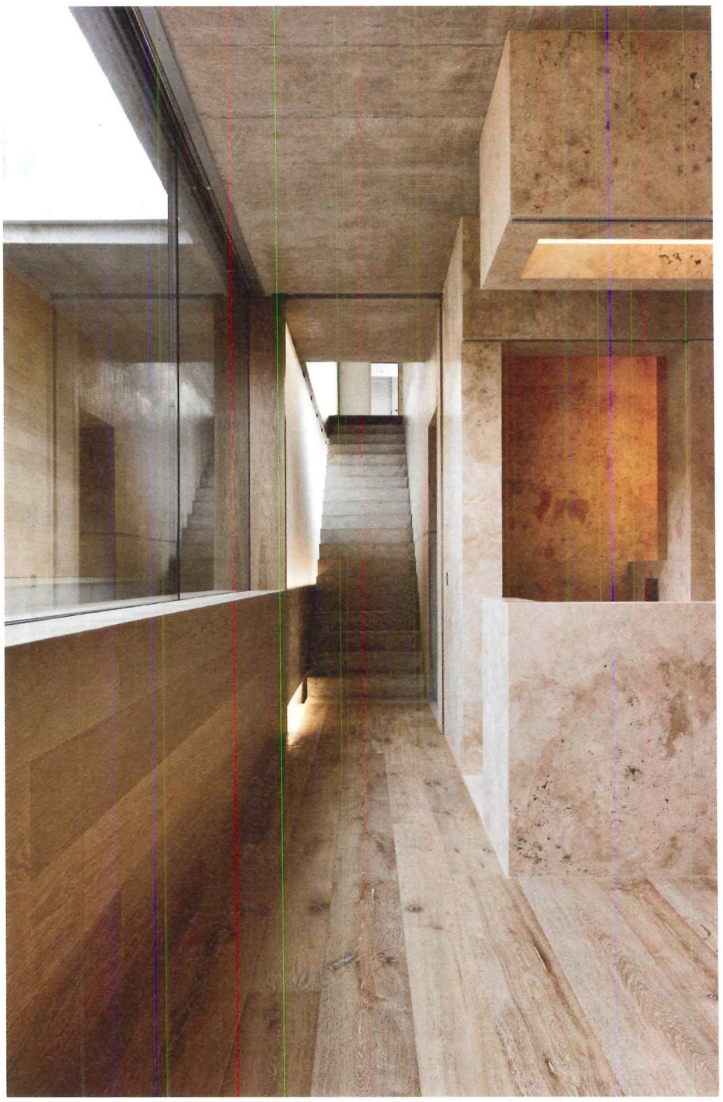
On the top floor, a concrete barrel vault sliced with clerestory windows arcs over the kitchen and dining areas. This space also connects seamlessly to a terrace with sliding glass walls. The roof, a bit more than 2 feet thick, was the most technically difficult feat Wüstemann has attempted. "The profile is like a shark fin," he says.

The living space one floor below connects by another sliding glass door to an open-air room with built-in concrete benches, which receives daylight from a large square opening in the floor of the upper terrace. "It's nice to shape more than just walls—to make it topographical," says Wüstemann. When standing at this level, one has glimpses of the lake through the trees and houses, framed by voids in the oak-and-sipo-mahogany-clad pool pavilion down the hill.

The architect's sculptural touch is most evident in the moody basement buried in the hill beneath the main level with the living space and bedrooms. Here, a family and entertainment area makes the most of the lack of daylight. On a snowy February day, Wüstemann swiveled and pointed to the concrete furniture and strong, horizontal bands of cove lighting that punctuate strategic areas of the walls and floor. The "shelves" of a glass-enclosed wine room, also illuminated with bars of LED and fluorescent lights, are made of blocks of wood. "The light gives you a horizon," said the architect, who manipulates lighting at the periphery and corners of the rooms to help direct movement through the space. In doing so, Wüstemann has made every attempt to disguise the pedestrian necessities of the house; even the mechanical room is hidden behind a backlit, hand-sanded glass door.

Wüstemann shuttles weekly between his small offices in Zurich and his home in Barcelona, where he converted a loft for his wife and children (RECORD, September 2010, page 102). During the recent visit to the house in Erlenbach, he laughed as he slid open the facade of the top floor to demonstrate the sensation of indoor-outdoor living, only to welcome a cold blast of air. "I only build summer houses," he joked. "It tranquilizes me to see the material," he continued, patting the concrete. "I grew up in a lovely traditional house with a lot of stairs and rooms and never felt I lived in the space." ■

MIXED MATERIALS During the day, clerestory windows in a barrel vault reflect daylight into the dining room and kitchen (above). The architect concealed a bathroom behind hand-sanded glass (opposite, top left). Travertine marble in the guest bathroom on the ground level blends seamlessly with oak floorboards (opposite, top right). Cove lighting in the basement, a family and party space, adds drama to the board-formed concrete volumes (opposite, bottom).



credits

ARCHITECT: Gus Wüstemann Architects – Gus Wüstemann, architect in charge; Jan Kubasiewicz, Marta B. Goni, design team

ENGINEERS: Born Partner (construction); Frei + Partner Haustechnikplanung (m/e/p)

CONSTRUCTION MANAGER: Jaeger Baumanagement

GENERAL CONTRACTOR: Corti

CONSULTANTS: Schreinerei Schönmann (joiner); Cremer Bruhin (carpenter); 1 Sound & Vision (acoustical)

SIZE: 10,500 square feet

COST: withheld

COMPLETION DATE: February 2012

SOURCES

WINDOWS: Sky-Frame; R&G Metallbau

FLOORING: Texolit; Terrazzolit; Fiechter + Fuchs

NATURAL STONE: Stone Group

LIGHTING: Elektro Stählin

House K | Nishinomiya, Japan | Sou Fujimoto Architects

A Slice of Life for a Modern Family

In sharp contrast to the client's previous Western-style dwelling, this open, loftlike house encourages togetherness—a quality of life still prized by the Japanese.

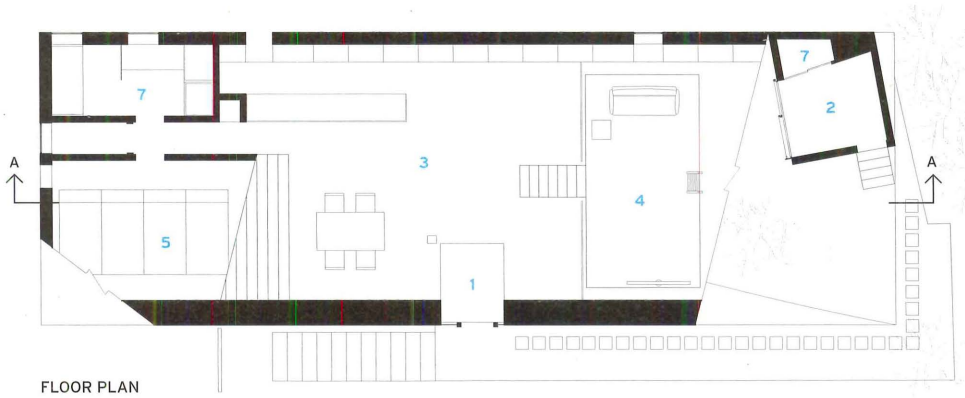
BY NAOMI R. POLLOCK, AIA
PHOTOGRAPHY BY IWAN BAAN

CONCEPTUALLY, THE quirky house on an L-shaped lot in the affluent outskirts of Osaka has a lot in common with a traditional Japanese dwelling. Fixed, internal walls are conspicuously absent, furnishings delineate functional zones, and the roof is the defining architectural element. It even has a hanare, or freestanding room separated from the main house. But any likeness between old and new comes to a screeching halt there. Called House K after the first letter of the client's last name, the latest home from Sou Fujimoto—a Tokyo architect known to push residential design to extremes—is a single, swooping volume that emerges gently from the ground and then rapidly surges upward before tapering to a blunt point at the site's east end. Studded with trees in giant steel planters, the sloped wedge of a house looks more like a man-made landform than a place to call home.

While the notion of blending architecture and landscape fascinates Fujimoto, it wasn't exactly what his clients, a couple with two school-age kids, initially had in mind. Though they had few specific requests, their first hope was to create a facsimile of Fujimoto's House N (RECORD, April 2009, page 100). But try as he might, the architect could not fit that building's nesting-box scheme on the 3,340-square-foot property, hemmed in by houses on three sides, open to a grove of trees on the fourth, and tethered to the street by a 98-foot-long path.

These constraints inspired Fujimoto to design the hill-like scheme

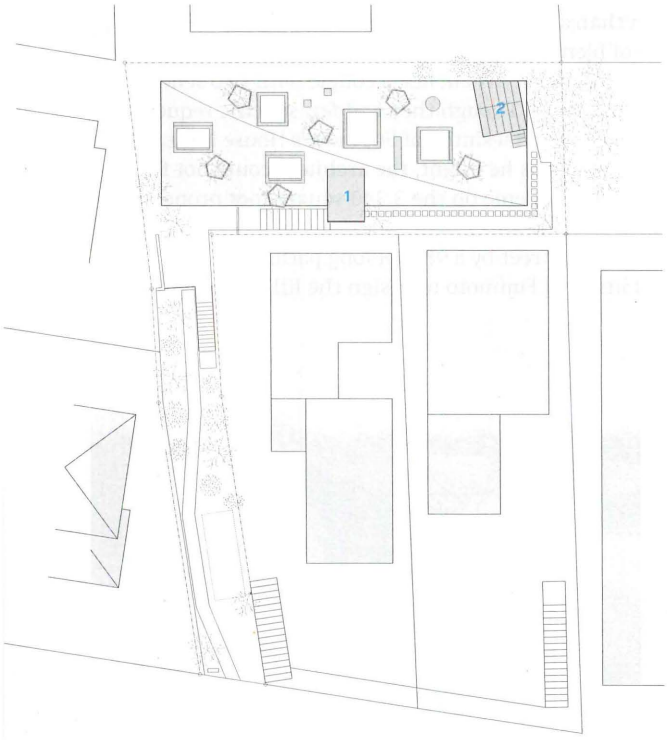
WEDGED IN House K's rooftop garden is dotted with an assortment of trees and outdoor furniture configured to align with the sloping ground plane (this photo). Like an engawa porch, the edge of the hanare is the ideal spot to look out and enjoy the greenery (opposite).



FLOOR PLAN

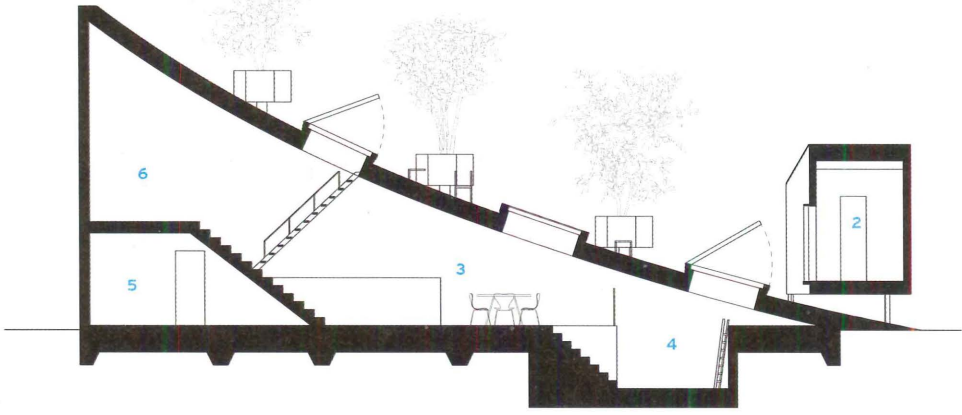
0 10 FT.
3 M.

1 ENTRANCE
2 HANARE (ANNEX)
3 DINING/KITCHEN
4 LIVING ROOM
5 BEDROOM/STUDY
6 SLEEPING LOFT
7 BATHROOM



SITE PLAN

0 20 FT.
5 M.



SECTION A - A

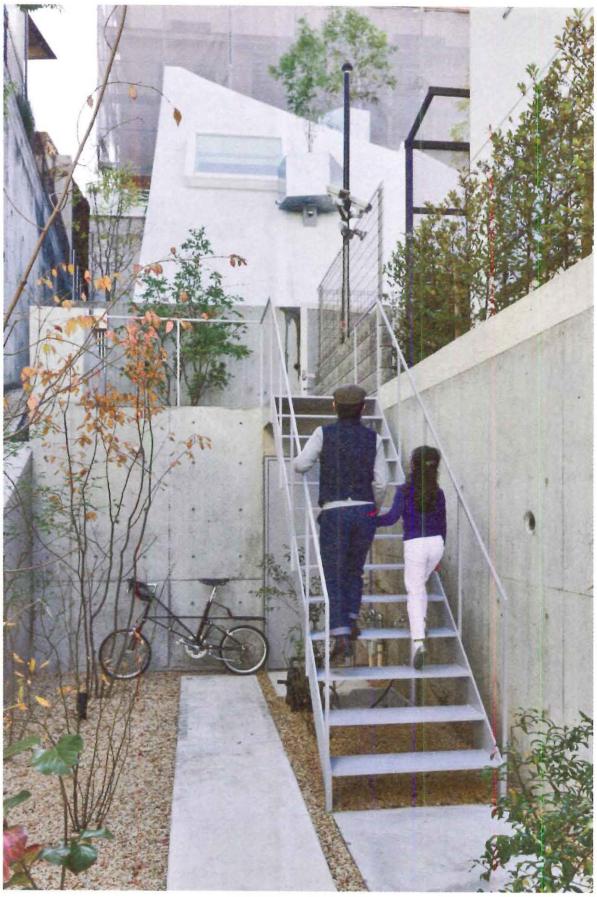
0 10 FT.
3 M.

with a folded roof, softly creased like origami paper to form two angled surfaces. As it ascends from the grove, the west-facing plane inclines from 10 degrees to 35 degrees along its length. The result is a striking exterior and spacious interior. Acting as both wall and roof, the north-facing elevation rises abruptly from the ground at 45 degrees but nears 53 degrees toward the top. Tilted sharply away from the house to the north, this angled surface yields much-needed breathing room from neighboring houses and creates a logical place for the glass-encased entrance foyer.

The house sits 18 feet above the end of a 10-foot-wide lane and is accessed by two flights of stairs. Protected by a canopy, the main entrance opens onto a vestibule with a tile floor that segues into the dining area and kitchen—a kind of command center with unimpeded sightlines in multiple directions. As with all Fujimoto-designed dwellings, House K contains a sequence of spaces with ambiguous borders and many possible functions. Where the ceiling rises, broad steps that double as auxiliary seating lead up to a loftlike sleeping area used by the parents. Tucked beneath are the bathroom and children's bedroom—the only spaces with bona fide walls and doors. On the opposite side of the house, a stair leads to a sunken living area beneath the descending ceiling. The hanare, perched at the roof's lowest part, provides a private getaway, with a sitting area and powder room.

An antidote to the communal lifestyle prescribed by Fujimoto's architecture, the hanare also establishes visual balance. "If the roof was completely naked, it would be too strong," the architect explains. "And from the start I wanted to make it a field for activity." The roof garden supplies the clients with precious outdoor space where the kids can play and the family can enjoy ice cream on hot summer evenings.

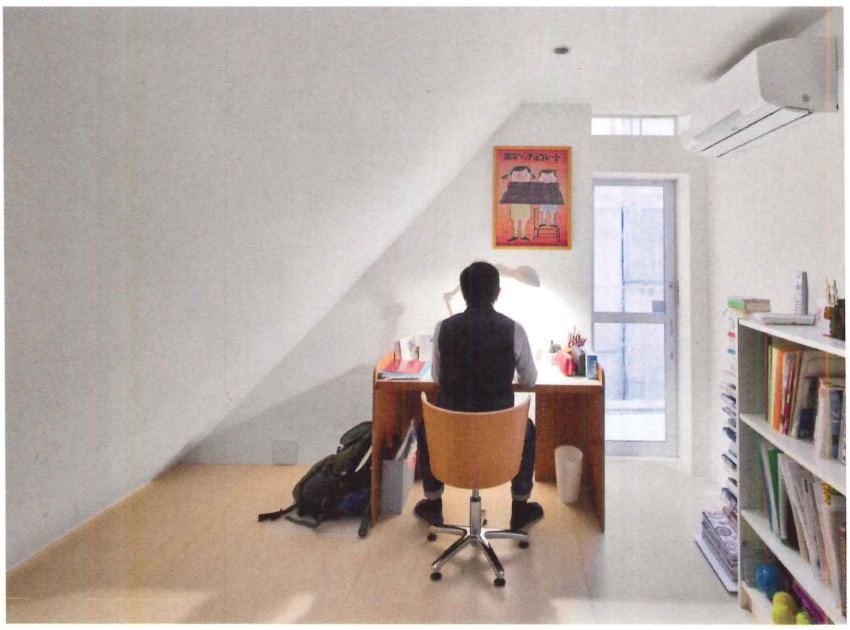
Not surprisingly, the roof was the most difficult part of the house to construct. To keep costs down, Fujimoto opted



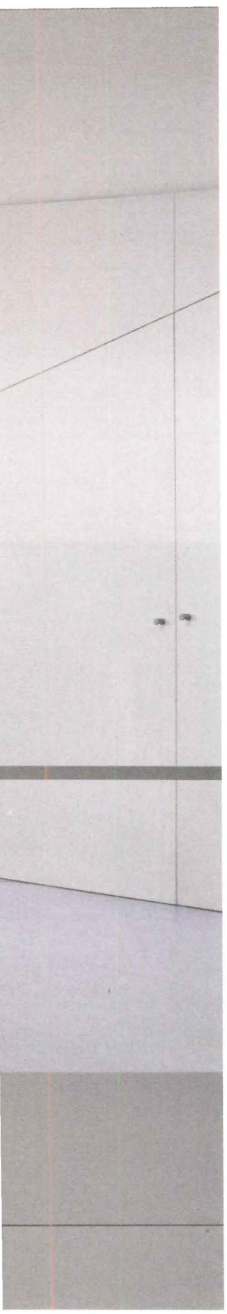
STREET SMART
Direct street access wide enough for emergency vehicles is required of all residential properties in Japan. Turning the long approach to House K into a pleasant transitional space, Fujimoto covered it with gravel, dotted the perimeter with trees, and threaded a meandering path along the middle, leaving space for the legally mandated off-street parking on one side (far left). The path leads to both the exterior storage vault that holds bicycles, fishing rods, and other large items and the first run of stairs leading up to the house (left). Planted with a colorful Japanese maple tree selected by Fujimoto, the main entrance is protected by a canopy and encased with glass (below). As with the skylights, rolling screens behind the transparent front door provide much-needed privacy from the neighbors.

for a steel-frame system made of 4-by-4-inch H-beams spaced 3 feet apart. Joined with rigid welded or bolted connections, the frames are linked by connecting beams at the roof's edges. They support a 3-inch-thick concrete skin that was applied by hand and then finished with waterproofing and paint. Inside, painted plasterboard walls and ceiling contrast softly with white-tinted birch floors. Custom furniture and the potted trees, anchored to the structure, dot the roofscape, along with six large skylights—two of them operable, enabling indoor-outdoor circulation via ladders from the sunken living room and loft stairs.

With its curving trajectory, House K marks a dynamic new direction for Fujimoto. Not everyone would feel at home with its unusual geometry, especially where safety is concerned. While the loft's broad stairs and the low railings rimming the living area were configured to prevent falls, the roof is devoid of parapets and guardrails. The trade-off for watching one's step, however, is a chance to live in a place that expands the very notion of what a home and garden can be, elevating it to new heights and possibilities. ■



The main entrance opens onto a vestibule that segues into the dining area and kitchen—a kind of command center with unimpeded sightlines.



FLOOR-THROUGH
Inside, level changes and furnishings divide the space, enabling family members to remain in each other's presence even when engaged in different activities (opposite, top). Bleacherlike stairs lead up to a sleeping loft and conceal the children's bedroom and study behind (opposite, top and bottom). Built-in storage units line the house's south wall; full-height closets surround the sunken living room (above right). Operable skylights enliven the entire interior (right).

credits

ARCHITECT: Sou Fujimoto Architects – Sou Fujimoto, principal in charge; Yoshihiro Nakazono, Naganobu Matsumara, Ryota Okada, Naoki Tamura, project team

ENGINEER: Jun Sato Structural Engineers

CONSULTANTS: Furukawateijuen (landscape); Sirius Lighting Office (lighting)

CLIENT: withheld

GENERAL CONTRACTOR: Tokuoka Koumuten

SIZE: 1,275 square feet

COST: withheld

COMPLETION DATE: July 2012

SOURCES

GLASS: Sankyo Tateyama; SankyoAlumi-Company; Bettetsu Sash Kogyo

LIGHTING: MAXRAY; Yamagiwa; Endo Lighting

Casa BB | Mar Azul, Argentina | BAK Arquitectos

Rustic Roots

With a minimalist design and material palette, a summer retreat creates a dialogue with its natural setting.

BY EMILY SCHMALL

PHOTOGRAPHY BY GUSTAVO SOSA PINILLA

TWO WORLDS The natural and the man-made converge as fragrant pines shoot through Casa BB's front deck. A broad overhang creates a shaded spot for an afternoon nap following a morning at the beach, while still allowing daylight to pour into the living room and kitchen through generous glazing beneath.

NO HOTEL tower or gritty boardwalk impedes the dramatic sunset over the wide, windswept beach of Mar Azul, a remote and laid-back vacation town a few hours from Buenos Aires on Argentina's South Atlantic coast. "Blue Sea" may be something of a misnomer, as the water is brown and turbid, but the rugged landscape is no less lovely for it.

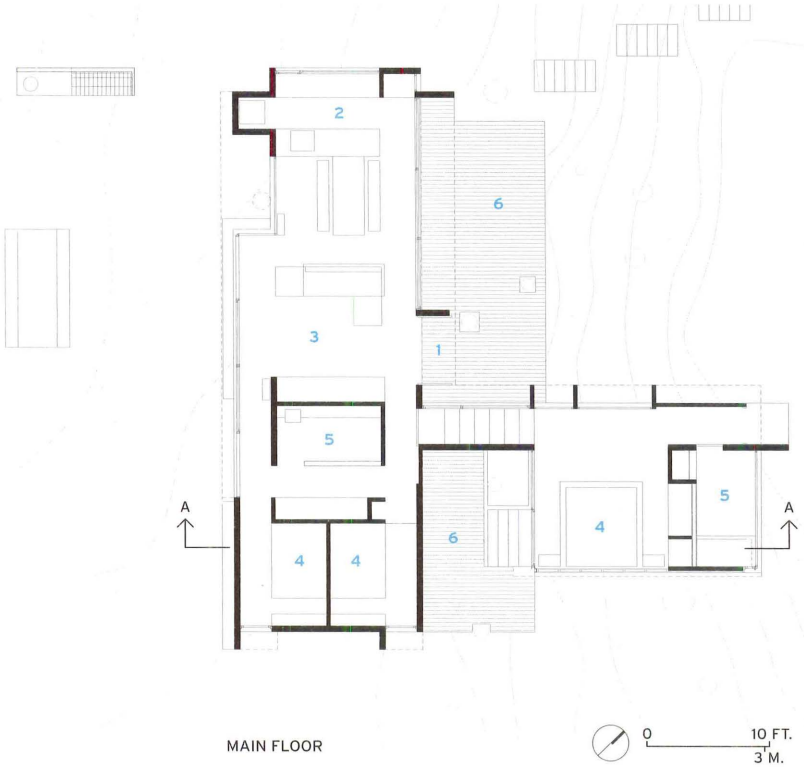
A few blocks from the shore, calmness prevails in the densely wooded terrain that surrounds Casa BB (named after its owners, Karina Blumencwejg, an industrial designer, and her husband, Cristian Bianchini, a furniture-store owner who trained as an architect). Tall, fragrant pines, black poplars, and sprawling acacia act as a shield from the blazing summer heat, shading the sandy, unpaved roads where horses and ATVs are more common than cars. The vegetation, introduced to the dunes when the town was founded in the 1940s, also protects against the polar winds that whip the beach when the sun goes down. With a resemblance to a rustic campground, Mar Azul is a refuge for artists seeking an escape from city life and contrasts sharply with some of the trendier nearby beach communities.

Even in a town so low-key and peaceful, the simple, exposed-concrete-and-wood Casa BB stands out for its graceful subtlety. Unlike neighboring Alpine-style chalets or retro structures with faux-rock walls and bright-colored paint, the house, with its clean, Modernist lines, submits almost solemnly to the natural environment.

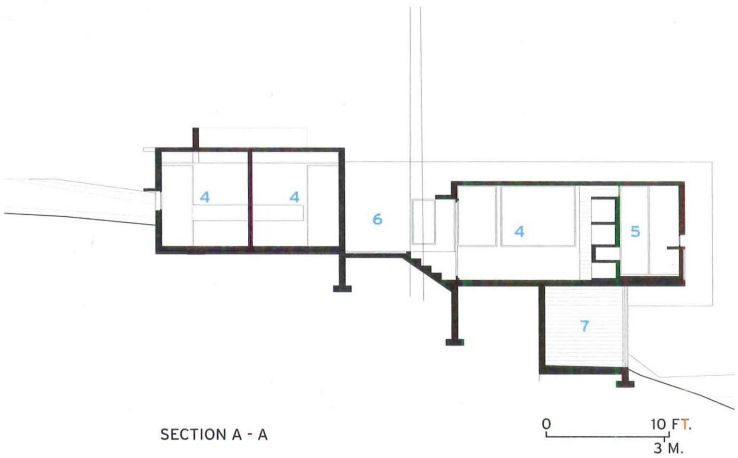
"I wanted the house to take up the least amount of space possible," says Blumencwejg, who hired Buenos Aires–based BAK Arquitectos after spending several summers with her daughters in two nearby rental properties designed by the firm. "Nothing here is superfluous or random." Indeed, the 21 houses designed by BAK in the neighborhood—including that of firm principal María Victoria Besonías, who in 2004 built the first as a summer retreat for her own family—evoke the understated force of Le Corbusier, as well as the work of Mies van der Rohe and Louis Kahn. "What interested us was how well austere architecture fits into the landscape," says Besonías, "as a reflection of a less cluttered life that is more harmonious with its surroundings."

When Blumencwejg first saw her completed house, bare of any furniture, it reminded her of the sculpture of Basque artist Jorge Oteiza. "It was so beautiful, I almost wanted to leave it empty," she says. In fact, with the poured-in-place-concrete kitchen counter and dining-room table, there was little to add: glazing for the windows, shelving, a brick wall to hold bathroom plumbing, and spare furnishings. Light and breezes stream through the house's sliding doors at its front, creating an airy serenity.

Blumencwejg was drawn to BAK's use of concrete as well as the architects' simple designs and pragmatic approach. Very few materials withstand Mar Azul's



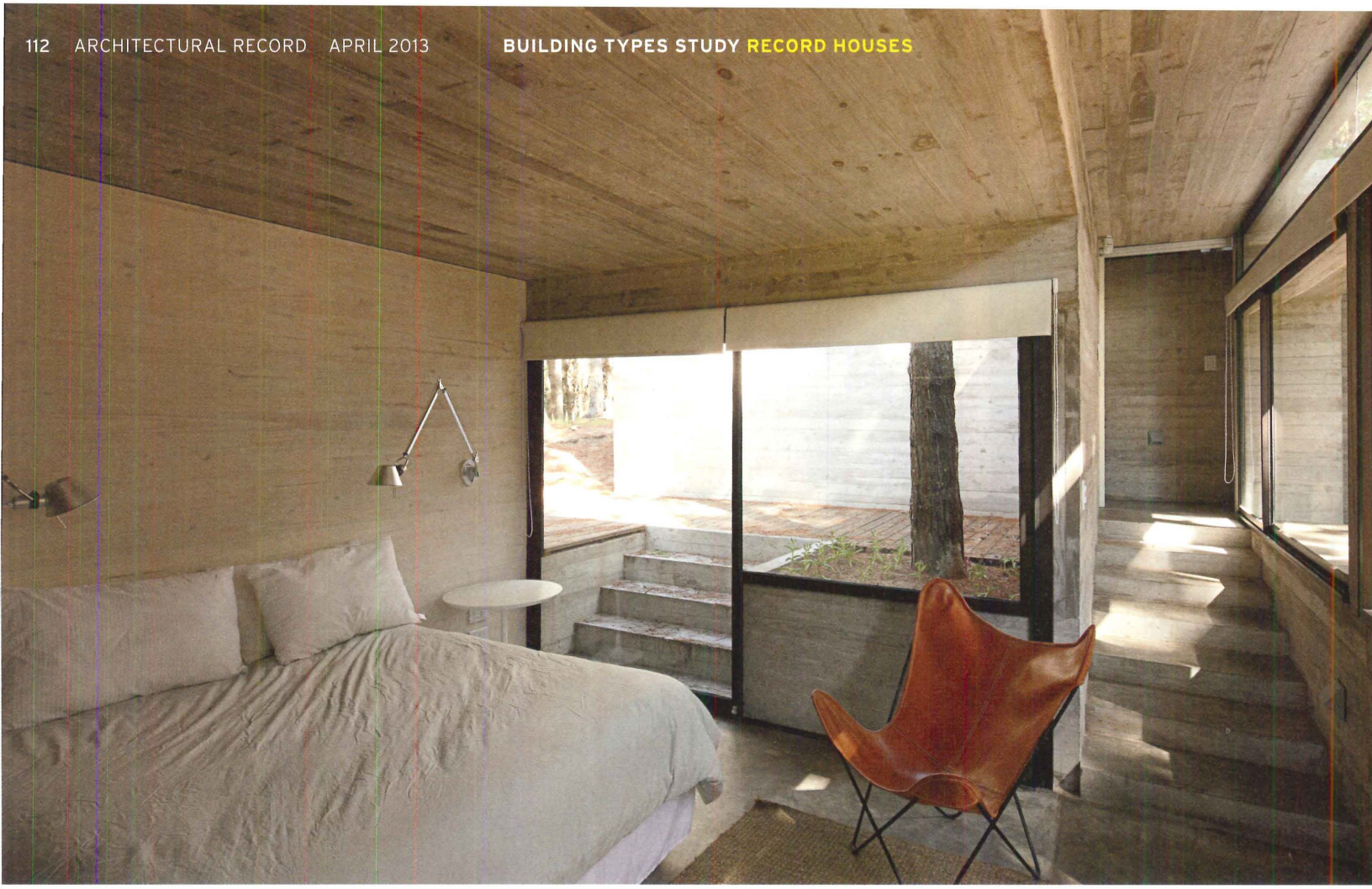
MAIN FLOOR



SECTION A - A

1 MAIN ENTRY
2 KITCHEN
3 LIVING ROOM
4 BEDROOM
5 BATHROOM
6 DECK
7 STORAGE

SOFT TOUCH
Direct lighting (visible in the living area and master bedroom above) underscores the architects' commitment to efficiency and subtlety. A ribbon window in the master bath (top right) frames views into the woods, while a glass door connects the bedroom to the outside. Many furnishings, such as the dining table and kitchen counters (right), are made from board-formed concrete, the surfaces smoothed with burnt oil.



credits

ARCHITECT: BAK Arquitectos – María Victoria Besonías, Luciano Kruk, principals; Diorella Fortunati, project team

ASSOCIATE ARCHITECT: Nuria Jover

CLIENT: Karina Blumencwejg

SIZE: 1,075 square feet

COST: $100,000

COMPLETION DATE: November 2011

SOURCES

CONCRETE: Pasalto

ALUMINUM AND GLASS: Aberturas Vidal

PLUMBING FIXTURES: Deca Piazza

FAUCETS: FV

hostile climate: the unforgiving winds, salty air, and temperature swings from 23 to 100 degrees Fahrenheit. And as a beach getaway that is occupied only four months a year but is constantly trafficked by sandy feet during that time, the house had to be low-maintenance.

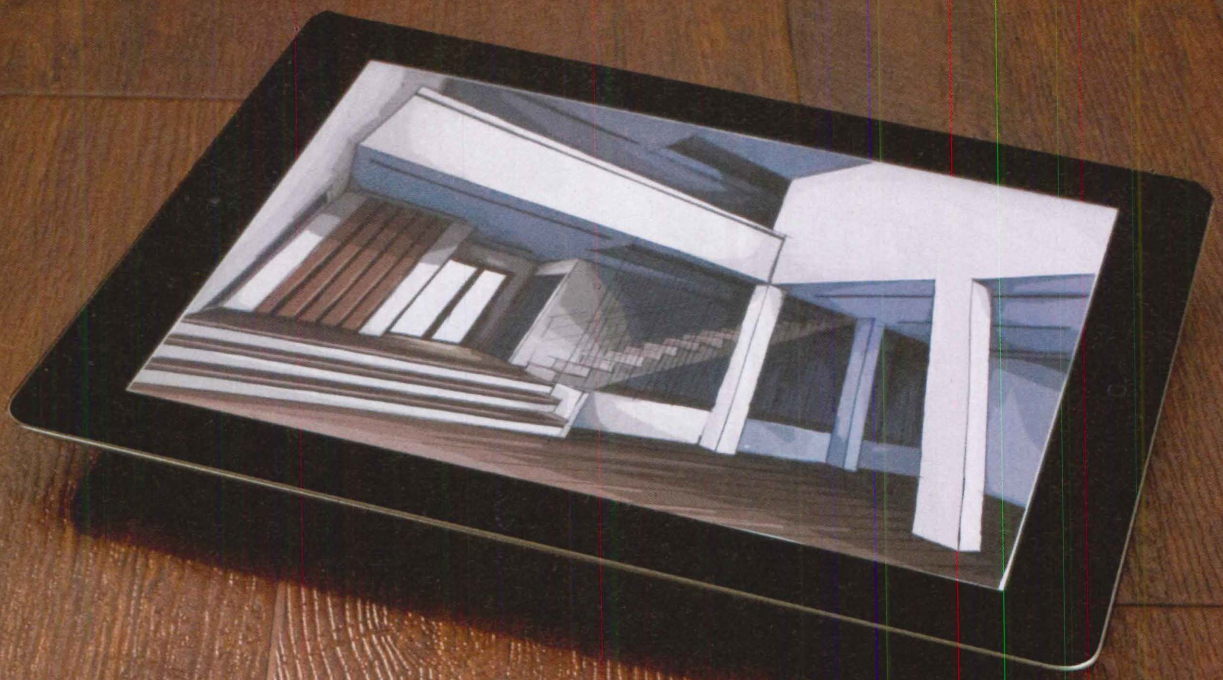
For BAK's Luciano Kruk, who oversaw the construction (and who now has his own firm), a limited material palette also made sense in this relatively remote location. To ensure a high level of quality, the architects hired a local carpenter with proficiency in building wood-plank formwork and Kruk trained a five-person team on the artisanal process of pouring the mix into the mold. But the architect was also enthralled with the aesthetic qualities of concrete. "The beauty has to do with contrast. We sought an equilibrium between the rustic and the perfect that wouldn't diminish the expressive potential of the material," he says.

The architects took advantage of the sloping site to comply with Blumencwejg's request to set the master bedroom apart from the rest of the L-shaped house. That room and an adjacent bathroom and terrace were constructed at the foot of the incline, so they float over the forest floor, while the windows at the back of the house—in the living room, kitchen, and one of the two nearly identical guest rooms—are almost level with the ground, creating the sensation of being in a tent.

Casa BB's clean horizontal lines playfully interact with the verticality of the woods, creating a dialogue between the natural and the man-made. At times these worlds literally converge, as when pine trees pass through holes cut in the deck. Although concrete evokes a certain roughness, the formwork's wood-grain impression expressed on the surfaces softens the rationalist design, and the muted monochrome of the walls delicately offsets the brown, green, and beige of the surrounding forest. ■

Emily Schmall, who writes for the New York Times, *is based in Buenos Aires.*

HUNKERING DOWN
The master bedroom (above) retains a degree of independence from the rest of the house, with its own bathroom and terrace and a wood-burning fireplace for colder weather. "If my daughters want to entertain," says owner Karina Blumencwejg, "I don't have to be a part of it if I don't want to."



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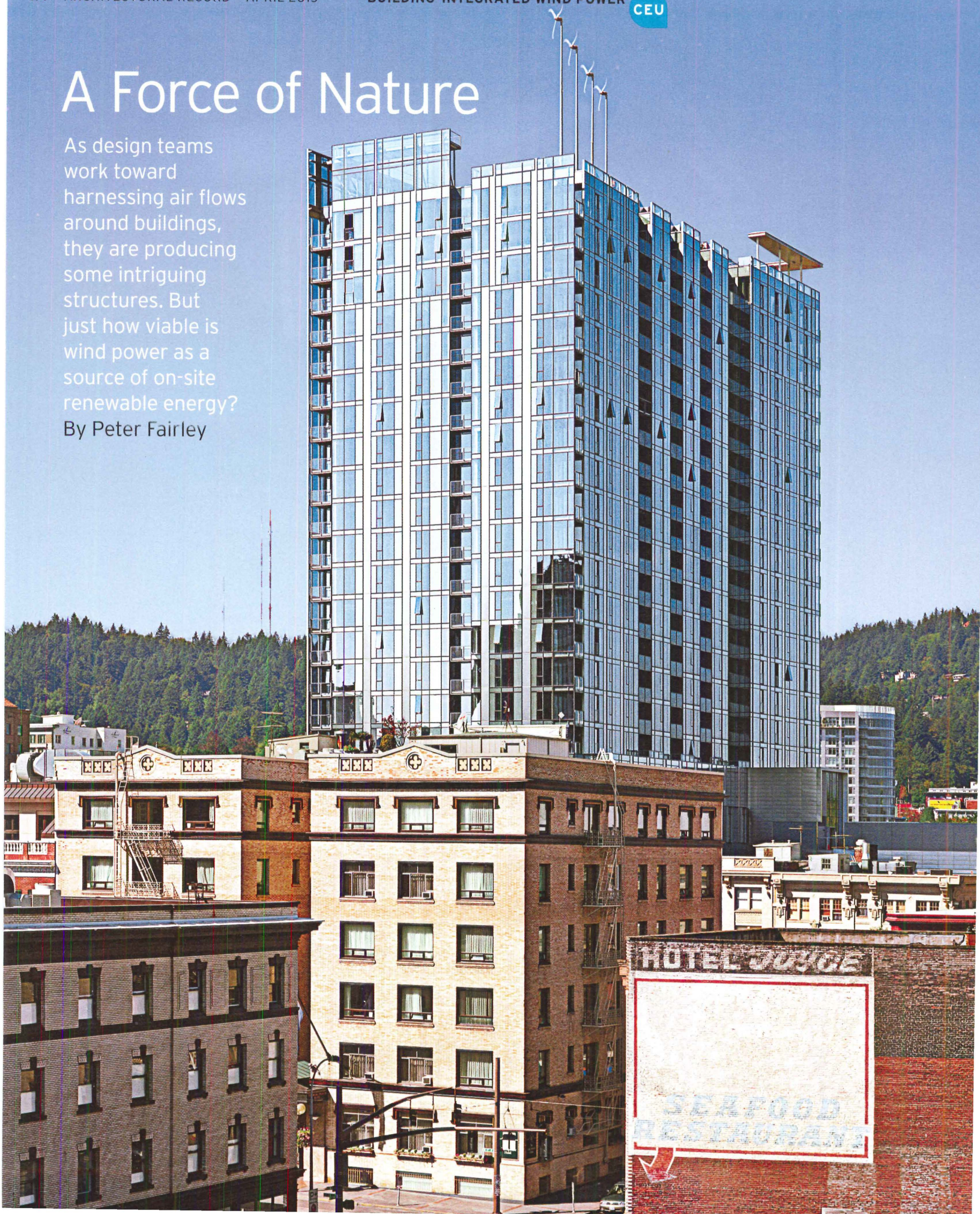
CIRCLE 46

A Force of Nature

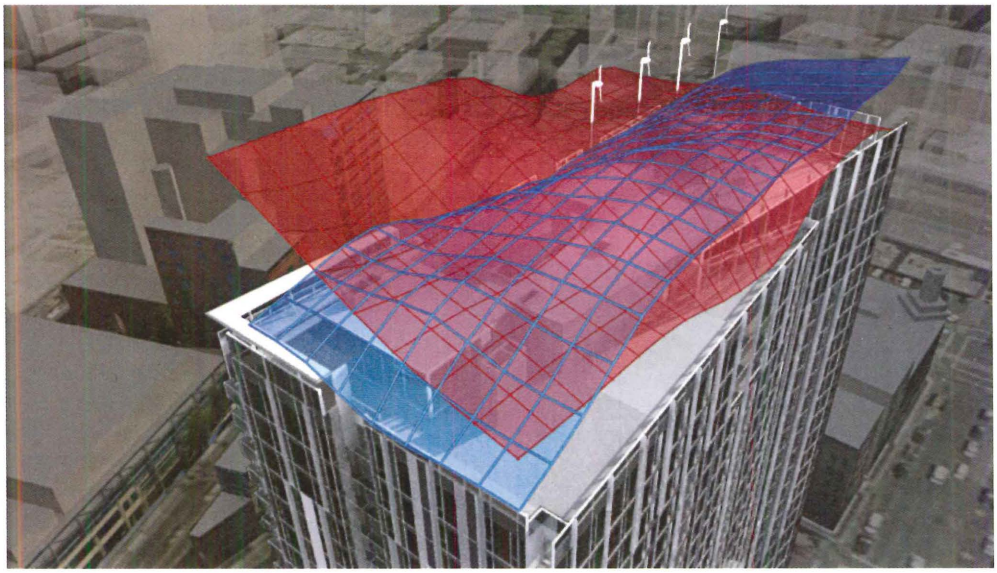
As design teams work toward harnessing air flows around buildings, they are producing some intriguing structures. But just how viable is wind power as a source of on-site renewable energy?

By Peter Fairley



WIND POWER is the fastest-growing source of megawatts thanks to the jumbo-jet-sized turbines sprouting en masse worldwide. But it also has a significant presence in the city, where gusts regularly send umbrellas to landfills. Rather than considering it a nuisance, architects increasingly view urban wind as a renewable resource for on-building power generation.

Building-integrated wind power (BIWP)—wind turbines mounted on or incorporated within an occupied structure—may lack wind farms' economies of scale. But like the leading source of on-building renewables—photovoltaics (PVs)—wind turbines offer some advantages in architectural applications. No roads get cut through wilderness to erect towers, and they deliver electricity without power lines and transmission losses. Wind turbines are also attractive to designers and clients looking to express a commitment to sustainability.



TWELVE WEST By combining CFD analyses and wind-tunnel tests, designers from ZGF determined the optimal configuration for turbines to be mounted on the roof of this mixed-use high-rise (opposite and above) in Portland, Oregon. The four horizontal-axis turbines are mounted atop 45-foot-tall masts and positioned so that they are at the intersection of two shear planes and above turbulent and eddying air.

Such benefits provide potential for dramatic growth, says mechanical engineer Roger Frechette, principal in the Washington, D.C., office of Interface Engineering. "If there's data showing that BIWP works and testimony that it's a good thing to do, there will be an explosion," he predicts.

So far, however, data is thin, and testimonials show that BIWP is tough to implement. While PV panels are svelte, solid-state devices, turbines are weighty machines that vibrate, make noise, and place stresses on buildings. And those drawbacks vary depending on site factors such as weather, as well as on the turbine selected.

Propeller-style turbines, akin to those used at utility scale, must always face the wind for their airfoil blades to generate lift and spin their horizontal shafts. In contrast, vertical-axis wind turbines (VAWTs), whose upright blades spin a vertical shaft, are agnostic to wind direction. And some eschew airfoils for blades that simply catch wind drag. These drag-based VAWTs are less efficient, but they tolerate turbulent air and produce less noise.

The wind resource itself is harder to assess than the rays harvested with PVs. Speed, direction, and turbulence are affected by local landscape, surrounding structures, and the building they are part of. "Wind in an urban setting is complex and irrational and very difficult to predict," says John Breshears, president of Architectural Applications, a Portland, Oregon–based engineering and design firm.

Urban wind complexity puts a premium on local wind and weather data and aerodynamic analysis. Tools for the latter are improving, says Gordon Gill, partner at Adrian Smith + Gordon Gill Architecture in Chicago. Desktop computational-fluid-dynamics (CFD) software provides an "almost real-time" simulation of wind behavior. Gill's firm routinely applies CFD tools from the earliest design stages for a variety of tasks, such as evaluating opportunities for natural ventilation and assessing the impact of downdrafts at street level.

DOCUMENTED IN DETAIL

Portland's Twelve West, a LEED Platinum, mixed-use high-rise by ZGF Architects completed in 2009, exemplifies BIWP's challenges and opportunities. Fortunately for all who follow, the turbine-system design process was documented in detail by its designers at ZGF: engineer Craig Briscoe, now director of integrated design for the m/e/p firm Glumac, and Breshears.

The pair got started in early 2007 when the client-developer suggested BIWP as a means of helping the project achieve its lofty sustainability goals. Sketches of rooftop turbines—the only option left, since building design was nearly complete—clinched the developer's interest. Since BIWP was uncharted territory and Portland's winds are mediocre, ZGF proposed to pursue it as an experiment. "To our surprise they went for it," says Briscoe.

First step: predicting what would be blowing over the 22-story building. Briscoe and Breshears brought in Dutch aerodynamicist Sander Mertens, founder of Delft-based consulting firm Ingreenious. He generated a CFD model of wind regimes around the building, relying on data from Portland's airport and a NASA database. He projected an average wind speed at roof level of 4.9 meters per second.

AeroVironment, a Monrovia, California–based engineering firm then selling small propeller-style turbines for low-rise buildings, helped ZGF decide where to put turbines. Thomas Zambrano, AeroVironment senior scientist, spent several days with Breshears and Briscoe at a wind-tunnel facility observing air flows around a scale model of Twelve West using bits of thread, cassette tape, and toy airplane propellers. They mapped turbulence above the roof and determined that turbines on its north side, atop 45-foot-tall masts, would "see" an optimally smooth airstream.

From a field of 45 manufacturers, few of which had performance data or certifications for their turbines, ZGF fixed on the Skystream 3.7 horizontal-axis turbine produced by Flagstaff, Arizona–based Southwest Windpower. Its reliability record and certifications for the 12-foot-diameter machine put it way ahead of the pack. Southwest agreed to warranty the product for ZGF's BIWP application—something that turbine makers (including Southwest) typically shy away from, fearing that turbulence will cause premature wear.

A final step was minimizing vibration and sound. This was doubly important for Twelve West, where the turbines would rise above penthouse apartments. To date there have been no complaints, according to Breshears and Briscoe. But in terms of power generation—BIWP's raison d'être—it's only a partial win. The four turbines deliver about 65 percent of the expected 10,000 to 12,000 kilowatt-hours per year. The shortfall comes in winter, when turbulence causes

STRATA SE1 The BIWP turbines at this 485-foot-tall residential tower in London are housed within three cowls punched through its crown. As the result of an intensive design assessment, the project team selected BIWP to fulfill renewable-energy mandates. However, it is not clear if the turbines are operating.

one turbine to pivot away from the rest.

Breshears and Briscoe say Twelve West shows the value of considering BIWP early in design. Masts 10 to 15 feet taller would have done the trick, but maintenance crews would not have been able to lay them flat within the already determined roof design.

While output is limited—about enough to run the elevators—the ZGF team bets that BIWP is making Twelve West's occupants more aware of the relationship between their behavior and energy demand. For example, people who see the turbines may decide to take the stairs, especially if they know that the supply of clean energy pales in comparison to consumption. As Briscoe puts it, BIWP sends a message about "the importance of using a lot less energy in general."

SHAPED AND SCULPTED

Architects, meanwhile, are looking beyond rooftops toward building designs that enhance their BIWP potential. Such buildings are sculpted to accelerate wind and maximize BIWP output. They are exciting visual statements, though a dearth of performance data makes their success hard to assess.

The first high-profile accelerator design was the Bahrain World Trade Center (WTC), completed in 2008 with three 95-foot-diameter horizontal-axis turbines mounted on bridgeways between twin 50-story towers. Danish turbine manufacturer Norwin provided the 225-kilowatt (kW) turbines, which architect Atkins Global predicted would generate up to 1,300 megawatt-hours (mWh) per year. That would be 200 times greater than Twelve West's BIWP output and would satisfy 11 to 15 percent of the building's consumption.

Real output, however, remains an open question. An Atkins press representative confirms that the turbines are running but says the firm is not free to release operational data. Furthermore, BIWP experts have low expectations. One cause for doubt is the turbines' fixed orientation. Unlike those at Twelve West, the WTC turbines cannot turn with the wind.

Data is also unavailable for a more recent BIWP icon: London's Strata SE1, a 485-foot-tall residential tower completed in 2010. In this case it is unclear whether BIWP is generating any electricity.

Strata's designers at London-based BFLS turned to BIWP to meet renewable-energy mandates, according to the firm's associate director Robbie Turner, who led the Strata team from planning consent through completion. BIWP got the nod through an intensive design assessment that deemed other options, such as geothermal and solar energy, to be infeasible given Strata's footprint, its "rights of light" envelope, and its residential program.

BFLS opted to place three 19-kW Norwin turbines within three cowls punched through the top, facing the London summer's southwesterly winds. A series of inertia-damping pads below the turbines mitigate vibration, and five-bladed rotors were used to reduce noise-generating vortices from the blade tips. The design team anticipated that the turbines could generate 50 mWh per year—up to 8 percent of consumption.

Today the website maintained by Strata's rental managers presents the turbines as a feature that "translates directly into electricity bill savings for every [sic] of the 408 apartments." Unfortunately, there is no evidence they are operating. Norwin CEO Ole Sangill says he cannot confirm that Strata's turbines are running because Norwin's monitoring system is disconnected.

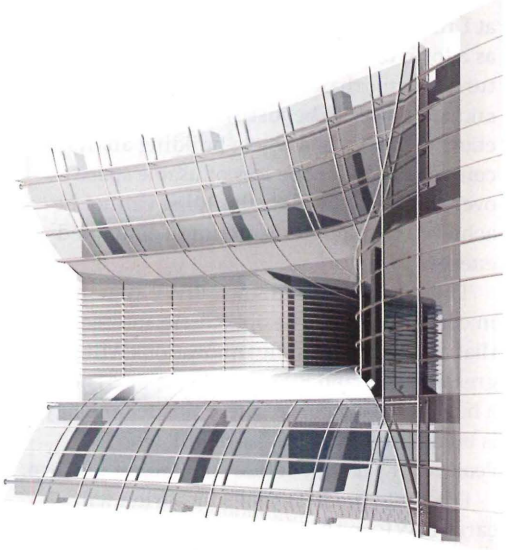
BAHRAIN WORLD TRADE CENTER The first high-profile building shaped to accelerate wind and maximize BIWP output was completed in 2008. It has three 95-foot-diameter horizontal-axis wind turbines mounted between a pair of 50-story towers. The designers predicted that the system would generate 1,300 mWh per year, but they have not released operational data.

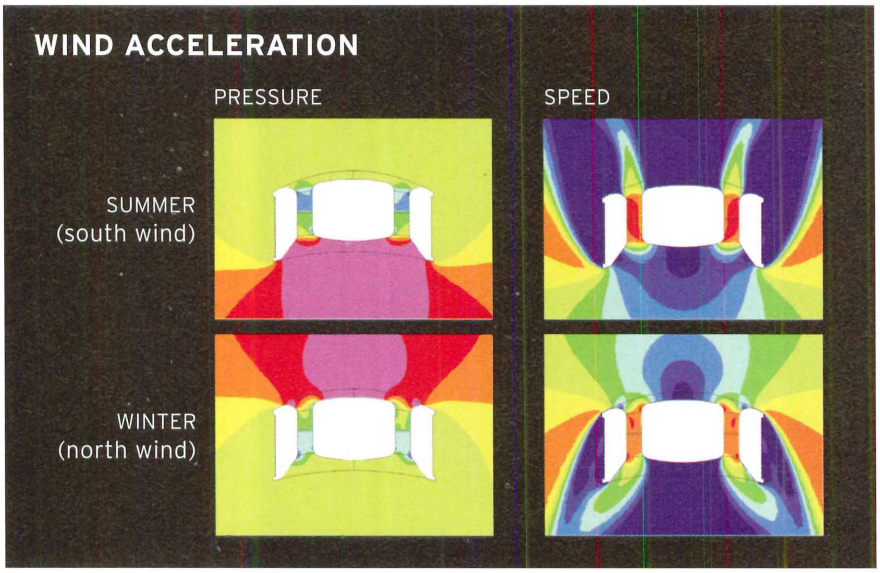
What is known is that Strata's BIWP hit technical snags during building commissioning. Sangill cites interference from a system designed to protect maintenance crews that prevented the turbines from operating. Turner says voltage fluctuations on the local grid similarly prompted the BIWP control panel to turn off the turbines.

While these glitches are the sort of "teething troubles" often seen during building commissioning and may be no fault of Strata's BIWP system, Turner says there were also sporadic noise complaints. Not from tower residents but from neighbors who, in rare weather conditions, perceive a fluttering—something acoustic modeling did not pick up.

CHINA CATCHES WIND

Following Strata, towers in China have seized the BIWP spotlight. The 1,014-foot-tall Pearl River Tower nearing completion in Guangzhou





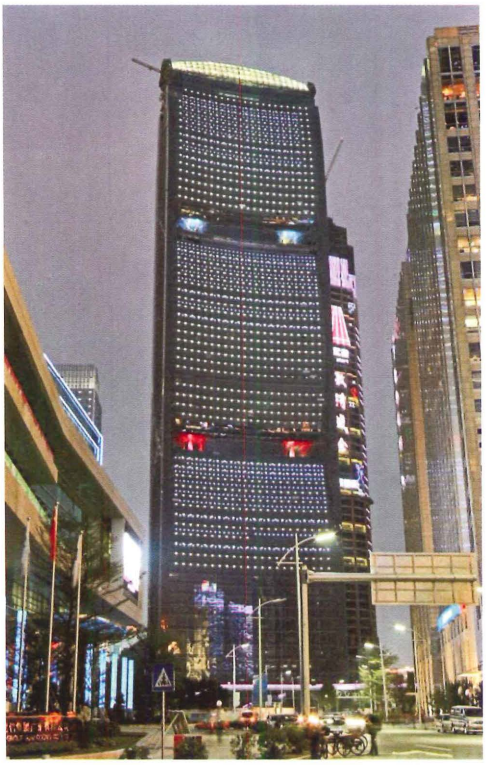
offers an intriguing response to shifting wind direction. As with Strata, its turbines spin within tunnels punched through the building. Pearl River, however, employs VAWTs to capture wind blowing through from either direction.

Pearl River's designers in the Chicago office of Skidmore, Owings & Merrill (SOM) oriented the rectangular tower to face north-south, positioning the VAWTs for prevailing southerly winds, as well as winter northerlies. The drag-based VAWTs, produced by Finnish firm Windside, minimize vibration and noise.

Frechette, who was engineering lead for Pearl River before leaving SOM, says its envelope was crafted from the outset to exploit the immense force with which wind slams large buildings. "Wind forces almost always trump seismic needs," he says, adding, "That's tremendous force."

Introducing ducts—two each one-third and two-thirds up the face—provided a means of both concentrating and utilizing that force. Frechette says wind accelerates as it's "sucked through the holes" by the differential pressure on the windward and leeward faces. The ducts also act as pressure-relief valves, permitting a reduction in structural steel and concrete and a corresponding reduction in embodied carbon (the amount of carbon dioxide emitted during materials production and in construction).

SOM projected a payback of at least 15 years for the turbines, which was longer than most of the tower's other sustainability features. The client, the China National Tobacco Company, kept them anyway to enhance awareness and complement less visible measures, such as radiant ceiling cooling. While only occupants in neighboring towers will see the turbines spinning in their tunnels,



PEARL RIVER TOWER The envelope of SOM's 1,014-foot-tall tower in Guangzhou, China, includes ducts (above, far left) shaped to accelerate prevailing winds. Two pairs of inlets exploit a pressure differential across the tower, causing a 6-meter-per-second wind to rush through them at 7 to 9 meters per second. CFD modeling (above) helped designers sculpt the ducts to minimize drag and thus maximize acceleration of the vertical-axis wind turbines housed within them. The modeling also demonstrated that the ducts would reduce wind stress on the structure. Exterior lighting (left) acts as a real-time indicator of wind-power output.

dynamic red and blue lighting will indicate turbine activity for all observers.

The BIWP will deliver 297 mWh per year, displacing about $47,000 of power, according to a recent projection. PVs on the roof and on exterior light shelves should add another 250 mWh per year.

Frechette says BIWP cost-effectiveness has improved since Pearl River's design. Growing interest is driving down costs, he says, and grid prices are up: "What made marginal sense in 2006 makes a lot more sense in 2013."

Faster paybacks are affirmed by SOM's latest BIWP project, a 1,073-foot-tall mixed-use tower in the early stages of construction in Qingdao, on China's northeast coast. In late February the developer, Hangzhou-based Greentown China Holdings, affirmed its intention to include four ducted Windside VAWTs in the building's angular crown.

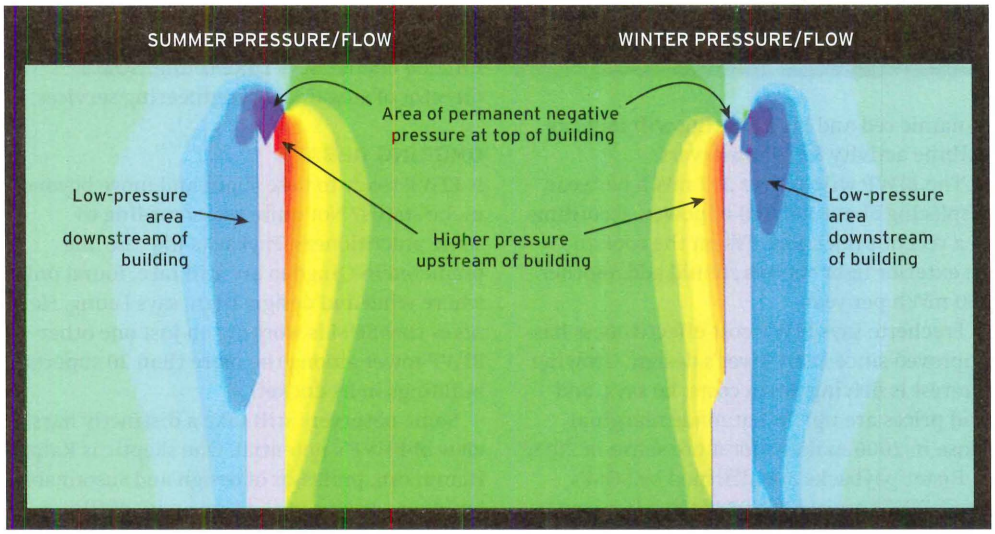
The tower faces the ocean and should have a strong pressure differential from onshore and offshore winds. SOM predicts that will suck a 25-meter-per-second wind through the ducts, yielding 322 mWh per year from the turbines. The projected 10-year payback is within the range sought by sustainability-minded clients, says Luke Leung, SOM's director of sustainable engineering services.

ONGOING DEBATE

Is BIWP ready to take flight and move beyond niche status? Not quite yet, according to some practitioners. Paybacks like the one predicted in Qingdao are still rare, found only where wind and design align, says Leung. He notes that SOM is working on just one other BIWP tower among the more than 20 supertall buildings in its docket.

Some observers still take a distinctly harsh view of BIWP's potential. One skeptic is Ralph Hammann, professor of design and sustainable building systems at the University of Illinois

QINGDAO TOWER
Some of China's strongest wind will set up a potent pressure differential atop an SOM-designed 1,073-foot-tall tower (left) in Qingdao, according to CFD analysis (below) of prevailing winter wind from the northwest and summer wind from the southeast. The firm predicts that the four vertical-axis turbines to be installed in ducts in the crown will pay off in 10 years—a relatively quick return for BIWP.



at Urbana-Champaign, who sees most BIWP as a form of greenwashing. He doubts that turbines in urban settings will ever deliver enough power to be justified on a "rational energy" basis. "In a whole-building analysis, compensation for the loss of usable space over the life span of the building cannot be achieved through the amount of generated energy," he says.

Those who have designed BIWP systems, in contrast, tend to be optimistic, foreseeing that design and turbine innovations will progressively expand BIWP's sweet spot. "There is a huge learning curve where this technology is being implemented," says Gill, who led Pearl River's design before cofounding his firm.

Frechette predicts that innovation will carry BIWP up the same curve that PV has traveled. He recalls two decades ago examining a PV system with a 100-year payback and thinking, "This is never going to catch on." Now, he notes, it's on the way to becoming an automatic building feature. ■

Peter Fairley is a journalist based in Paris and British Columbia who covers energy and the environment for Technology Review *and* Nature.

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Learning Objectives

1 Outline different types of building-integrated wind turbines and explain the applications most appropriate for each one.

2 Explain the advantage of building-integrated wind power (BIWP) when compared with grid-supplied power and discuss impediments to realizing a successful BIWP project.

3 Describe some of the necessary studies, analyses, and simulations required for realizing a BIWP project.

4 Discuss the structural considerations for BIWP and describe ways of incorporating turbines that can help reduce a building's embodied carbon.

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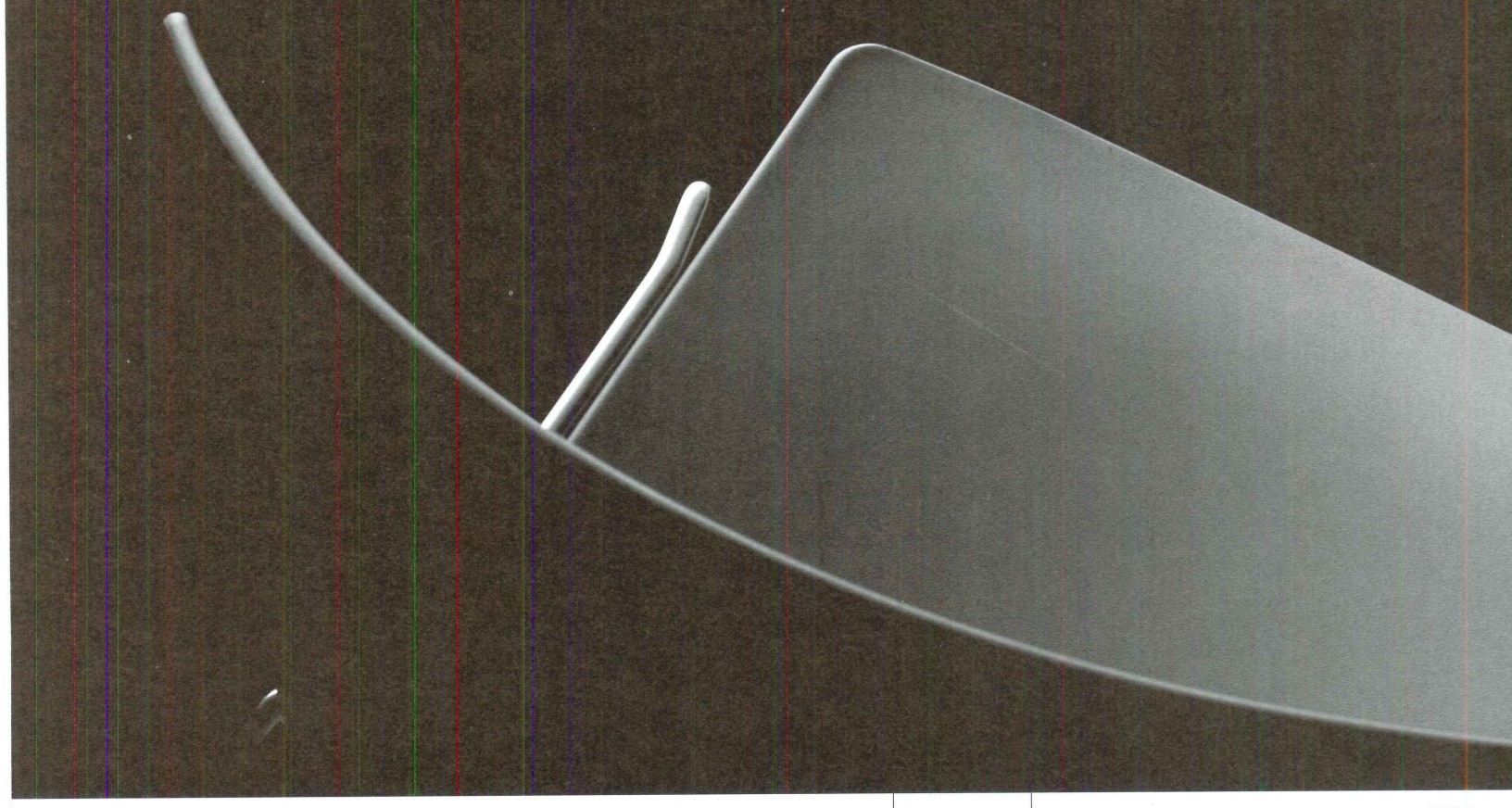

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Indoor environments are increasingly recognized as being an influencing factor on people's health. Airborne transfer of germs and bacteria has received a lot of attention in recent times suggesting solutions focused on air ventilation and filtration. However, there has also been increasing attention paid to the role that the things we touch with our hands can play on our health. Specifically, it has been shown that just touching a surface that has been recently touched by someone who is sick, can mean that we can get the same sickness, even if the sick person touched it many hours or even days earlier. Finding ways to control or eliminate the spread of disease like this is becoming increasingly important in hospital settings as we might expect. But it is also emerging as a significant concern anywhere there is an unwanted risk of people becoming sick such as retirement communities, assisted living facilities, spa/wellness centers, schools, public buildings, and even in private residences.

THE PROBLEM: ENVIRONMENTALLY ACQUIRED INFECTIONS

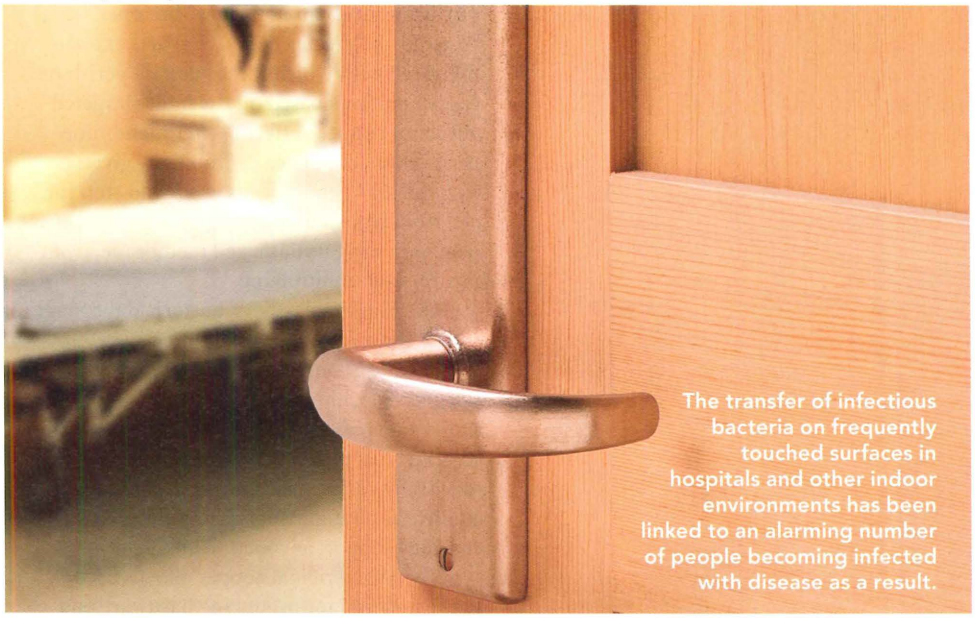
The means of transferring illness from one person to another in an indoor setting is contained in infectious bacteria. It is these bacteria that are deposited on surfaces typically from the hands of an already infected person. When an uninfected person touches that same surface (such as a door handle, furniture, equipment, etc.), they are prone to pick up that infectious bacteria onto their hands. If that bacteria then gets transferred to something they are eating or drinking, or enters their body when they rub their eyes or nose, then they can become infected as well. Or they could shake hands or otherwise touch another person and transfer it to them. Frequent hand-washing is offered as a way to protect against becoming infected, but while that may interrupt the process, it doesn't eliminate the core problem. It also requires constant diligence on the part of those who want to be protected.

This topic of the spread of infectious bacteria in indoor environments garnered some global attention recently. In July 2011, the World Health Organization (WHO) convened the First International Conference on Prevention and

Bactericidal hardware offers a unique bactericidal touch surface solution to kill 99.9% of bacteria* that is linked to hospital-acquired infections.

Photo courtesy of Rocky Mountain Hardware

Photo courtesy of Rocky Mountain Hardware



The transfer of infectious bacteria on frequently touched surfaces in hospitals and other indoor environments has been linked to an alarming number of people becoming infected with disease as a result.

Infection Control in Geneva, Switzerland. Of particular concern was a growing realization that hospital patients were being infected with diseases while they were still in the hospital. Among the possible reasons for the rise in these hospital-acquired infections (HAIs) was the indoor environment. During the proceedings, Dr. Michael G. Schmidt of the Medical University of South Carolina gave a presentation where he declared, "The built environment in hospitals [furnishings, equipment, hardware, and more] likely accounts for at least 50 percent of the HAIs seen in the medical intensive care units."[1] Attributing half or more of these infections to the built environment is a clear wake-up call for those of us involved in the design, construction, and operation of such spaces. If we are truly protecting the health, safety, and welfare of the public, particularly those vulnerable already by being hospitalized, then these findings cannot be ignored.

There are plenty of other reasons that hospital administrators and healthcare professionals are paying attention to this phenomenon. Most disturbing is that each year in the U.S. alone, HAIs have been documented to claim on the order of 100,000 lives.[2] That makes HAI-related deaths more prevalent than diabetes, influenza, pneumonia, AIDS, breast cancer, or Alzheimer's disease. To make matters worse, it is costing a tremendous amount of money to treat those infections, upwards of $45 billion nationally.[3] A part of that cost is the common medical treatment of using antibiotics to counteract the infections. But many antibiotics have made news lately because they are becoming less effective while new antibiotics aren't being developed fast enough to be effective and save lives.

The trend isn't improving. Some sources currently estimate that up to 80 percent of infectious diseases are transmitted by touch.[4] What are hospitals doing? For one thing, they are promoting hand-washing campaigns for all staff and visitors. They are also increasing the use of alcohol gels and gloves wherever possible. And of course they are also mandating increased diligence with surface cleaning and disinfection by maintenance staff. But despite these aggressive approaches by hospitals to combat the issue, infection rates continue to rise. Clearly, alternative solutions are needed.

A NEW APPROACH: BACTERICIDAL HARDWARE SURFACES

Product manufacturers have heard the problem loud and clear from hospital administrators and facility managers and have begun to respond with alternative proposals to improve the situation. The most promising approach is to create commonly touched surfaces out of materials that have the ability to kill infectious bacteria* while it is on that surface. Thus the problem bacteria* are prevented from growing and the risk of being spread to other people is reduced. Such materials with bacteria*-killing capability are referred to as *bactericidal* which is a term we may be familiar with from hand soap and disinfectants. Essentially, a bactericidal product is one that attacks and kills the bacterial microorganisms but without harming people.

As with most new offerings, though, product claims need to be carefully reviewed and verified. Of note, there have emerged a number of purported antimicrobial products that use a chemical coating and silver coatings, over a base product such as a work surface or a piece of hardware. There are some inherent problems with these coatings, however. The most obvious is that coatings of any type wear off over time from repeated touching or use by people; hence they don't provide a long-term solution. Of course, as they wear off, the question also arises as to where they go. If they are leaching into the surrounding environment, the various chemicals that make up the coating can become a concern.

The biggest issue with coatings, however, is their real effectiveness as an antimicrobial agent. The U.S. Environmental Protection Agency (EPA) is the de-facto watchdog agency when it comes to human health claims. Products that can prove and demonstrate their effectiveness can be recognized and registered as truly bactericidal. Such recognized products can then make specific health benefit claims based only on what they have been able to demonstrate and prove through Good Laboratory Practice (GLP) testing and peer-reviewed scientific analysis. In the case of coatings, they have predominantly been found not to actually kill bacteria but rather they just limit or inhibit its growth. By virtue of limiting growth, a claim of some limited antimicrobial properties can be made, but since they do not actually kill bacteria, then no bactericidal claim can be made.

Coatings aside, there is one very successful material that has been recognized and registered with the EPA based on GLP as well as documented in over 40 peer-reviewed and professionally published papers. That material is a metal alloy that may take several forms but is

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Learning Objectives

After reading this article, you should be able to:

1. Identify and recognize the health issues related to the transmission of infectious bacteria in indoor environments.
2. Investigate the potential for healthier environments using hardware made from inherently bactericidal materials.
3. Assess the effectiveness of EPA-registered copper-based materials in continuously killing bacteria (based on laboratory and clinical tests) and compare these materials to the relative efficacy of stainless steel or coatings.
4. Specify hardware and accessories made from bactericidal copper alloys for inclusion in a variety of building settings.

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Photo courtesy of Rocky Mountain Hardware

Door handles are an example of a typical frequently touched surface where bactericidal copper can be used to break down and kill infectious bacteria*.

copper based, such as different types of bronze or brass. These copper-based metal alloys have been shown to be the only class of solid material with the inherent ability to kill bacteria* harmful to human health. While copper alloys kill a wide range of bacteria, bactericidal copper alloy is registered to kill six specific bacteria* based on tested effectiveness against the following:

- E. coli O157: H7, a food-borne pathogen that has been associated with large-scale food recalls
- MRSA (Methicillin-Resistant Staphylococcus aureus), one of the most virulent strains of antibiotic-resistant bacteria and a common culprit of hospital- and community-acquired infections
- Staphylococcus aureus, the most common of all bacterial staphylococcus (i.e. staph) infections that can cause life-threatening diseases, including pneumonia and meningitis
- VRE (Vancomycin-Resistant Enterococcus faecalis), an antibiotic-resistant organism responsible for 4 percent of all healthcare-associated infections
- Enterobacter aerogenes, a pathogenic bacterium commonly found in hospitals that cause opportunistic skin infections and impacts other body tissues
- Pseudomonas aeruginosa, a bacterium that infects the pulmonary tracts, urinary tracts, blood, and skin of immunocompromised individuals

The science behind these results suggests that copper surfaces affect these bacteria in two sequential steps: The first step is a direct interaction between the surface and the bacterial outer membrane, causing the membrane to rupture. The second is related to these rupture holes in the outer membrane, through which the cell loses vital nutrients and water, causing a general weakening of the cell. How are those rupture holes created? Every cell's outer membrane, including that of a single-cell organism like a bacterium, is characterized by a stable electrical micro-current. This is often called *transmembrane potential*, and is, literally, a voltage difference between the inside and the outside of a cell. It is strongly suspected that when a bacterium comes in contact with a copper surface, a short circuiting of the current in the cell membrane can occur. This weakens the membrane and creates holes. Another way to make a hole in a membrane is by localized oxidation or "rusting." This happens when a single copper molecule, or copper ion, is released from the copper surface and hits a building block of the cell membrane (either a protein or a fatty acid). If the "hit" occurs in the presence of oxygen, then "oxidative damage" or "rust" occurs. An analogy is rust weakening and making holes in a piece of metal.

Once the cell's main defense (i.e., its outer membrane) has been breached, there is an unopposed stream of copper ions entering the cell. This puts several vital processes inside the cell in danger. Copper literally overwhelms the inside of the cell and obstructs cell metabolism (i.e., the biochemical reactions needed for life). These reactions are accomplished and catalyzed by enzymes. When excess copper binds to these enzymes, their activity grinds to a halt. The bacterium can no longer "breathe," "eat," "digest," or "create energy." Experts explain the speed with which these bacteria perish on copper surfaces based on the multi-targeted nature of copper's effects. After membrane perforation, copper can inhibit any given enzyme that "stands in its way," and stop the cell from transporting or digesting nutrients, from repairing its damaged membrane, from breathing or multiplying.

Based on these results, bactericidal copper alloy is the only class of solid surfaces (i.e., not a liquid or gas that EPA has recognized) that is registered with the U.S. EPA and capable of supporting public health claims of killing harmful bacteria* that pose a risk to human health. No other solid surface material, no coating, nor any additive has this kind of registration and can currently support any such claims.

When bactericidal copper alloy is used as the material for producing hardware and accessories, then those products carry the same ability to kill the tested bacteria. The installed hardware is used in a conventional manner meaning that door handles, pulls, door plates, etc. that people need to touch on a regular basis to operate doors still function in the usual manner. Similarly, cabinetry can be equipped with hardware made from bactericidal copper for pulls and handles. And just as significantly, accessories such as hooks, shelves, switch plates, grab bars, and towel bars can be made of bactericidal copper alloy to help in those heavy-use locations as well.

Other applications are possible too including sink faucets and handles, handicapped door activation switches, or even custom-fabricated elements for particular needs in specific building designs. The bactericidal properties of the copper alloy used in any of these products will then help achieve healthier environments that can reduce the risk of transmitting environmentally acquired infections. And this is true whether it is used in hospitals, schools, living facilities, or anywhere else healthy indoor environments are a concern. By reducing contamination on these surfaces, it will lower the risk of transferring infectious bacteria* within buildings.

COMPARING MATERIALS

The most common traditional materials used in healthcare and other high-use settings include stainless steel, plastics, and composites. In particular, stainless steel has been a material of choice of hospitals for years because of its "clean look" and ability to be used for a variety of products and uses. However, tests have determined that it has no inherent abilities to kill bacteria.

Specifically, three tests were performed under GLP conditions following EPA protocols

Examples of the range of bactericidal copper alloy hardware and accessories that can be produced for buildings of all types

Images courtesy of Rocky Mountain Hardware

where stainless steel was used as the "control" surface to compare the differences between it and bactericidal copper alloy surfaces. These tests are described below with supporting graphs summarizing the results (see the online version of this article).

EPA Test 1: Efficacy as a Sanitizer

This test measures how many bacteria are still viable (living/growing) on a surface over time after the initial deposit on that surface. The graph shown (see online version of this article) is for one test of this type that started with an initial concentration of approximately 14 million Colony Forming Units (CFUs) of the antibiotic-resistant bacteria MRSA placed on a bactericidal copper surface. After only 2 hours of exposure, the tests revealed that virtually all of these bacteria (99.99 percent) were not viable meaning that they were in fact killed. By contrast, over the same 2-hour time period, over 70 percent of the MRSA exposed to the stainless steel control material remained viable or alive. At 6 hours of exposure the amount dropped slightly to approximately two thirds still viable—more than 8 million CFU compared to a starting sample of 13.2 million CFU still on this stainless steel surface. This is a dramatic display of the initial difference between bactericidal copper and stainless steel in terms of their inherent sanitizing capabilities.

EPA Test 2: Efficacy Will Not Wear Away

The EPA has developed a Residual Self-Sanitizing Activity Test to measure what the effects are of wear on a bactericidal surface. This test specifically measures bacterial count before and after a series of six wet and dry wear abrasion cycles during which bacteria are added in a standard wear apparatus. The process starts with the initial efficacy of bactericidal properties of a surface being measured after 2 hours as in the test above. Then the surface is exposed to a dry abrasive procedure to simulate wear. After 15 minutes, the surface is re-inoculated with bacteria. After 30 minutes the surface is then exposed to a wet abrasive/wear procedure. Another 15 minutes and the surface is again re-inoculated and 30 minutes later the same dry/wet cycle continues five more times for a total of six test cycles. A final 2-hour efficacy test is conducted at least 24 hours after the initial inoculation to show the final results of all of this wear and re-inoculation on a surface. The results showed that bactericidal copper alloy again performed with exemplary results with 99.99 percent of MRSA being killed. By comparison, stainless steel did not perform so well with a substantial amount (more than 1.3 million CFUs in this case) of bacteria remaining. The EPA uses this test to find out if the effective bactericidal agent will wear away or not. Based on this, the inherent bactericidal effectiveness of bactericidal copper alloy is expected to last the life of the product while a silver-based coating over a material may wear away over time and not be able to make the same claim.

EPA Test 3: Continued Effectiveness After Repeated Contamination

The question of repeated contamination is certainly legitimate, particularly in a setting with many people using a facility. Therefore, the EPA has developed a test procedure based on measuring bacteria counts after inoculating an alloy surface not just once, but eight times in a 24-hour period without any intermediate cleaning or wiping. In this test, 640,000 CFU of MRSA were inoculated on copper alloys, and within 2 hours, all were killed. Then without any surface cleaning performed, seven additional inoculations were performed (totaling 5.1 million CFU) on the same surface. After each time, the copper-alloy surfaces killed virtually all of the bacteria within a matter of hours. At the end of the 24-hour period only a very small amount of the initial CFU were found to still be viable showing that there was no cumulative build-up of any type from the repeated inoculations. This test showed the EPA that even after repeated contamination, and without cleaning the surfaces in between, bactericidal copper alloy surfaces are continually effective in killing MRSA bacteria over the course of a 24-hour day.

See endnotes in the online version of this article.

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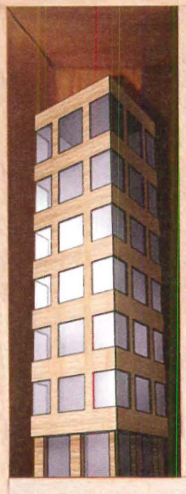

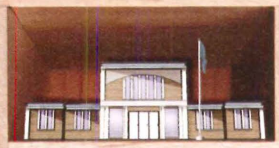

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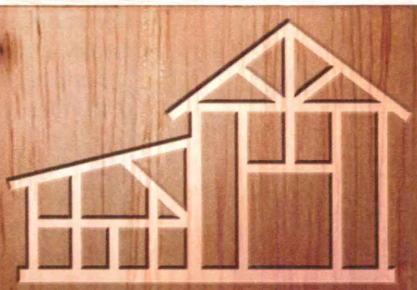

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Photo by Benjamin Benschneider/Mahlum, courtesy of WoodWorks

The University of Washington's new West Campus Student Housing by Mahlum Architects comprises five upper floors of Type V-A wood construction over a podium of Type I-A concrete, clad with manganese flashed brick.

Is the multifamily market ready for true innovation? The answer lately has been a resounding yes. In the face of a burgeoning market for downtown rentals, luxury condominiums, and assisted living, architects around the country are experimenting with a variety of new apartment layouts and building technologies that help differentiate today's new and renovated properties. From indoor-outdoor spaces and panelized structures to geothermal systems and weather-resistant assemblies, the very fabric of today's residential construction systems would be unrecognizable to an architect working just a decade ago.

The reinvention of today's multifamily offerings may be the most important macro trend. The underlying market dynamic is driven by retrenching, according to Freddie Mac, including the increased demand for apartment rentals "related to economic stress and high foreclosures in single-family housing."

New multifamily designs reflect that: Starting in San Francisco over the last two years—and now upending the local markets as far away as Charlotte, Boston, and New York—are new ideas in *micro-housing*, for example, with some apartments as small as 450 square feet. In addition to offering less expensive homes for emerging professionals and seniors alike, micro-units create a need for varied building products that offer the illusion of greater volume—wall-to-wall mirrors, anyone?—as well as shared amenities in common areas and more access to the outdoors.

"In many urban markets, developers and architects are working to maximize outdoor living spaces," says Lisa von Gunten, general manager of Bison Innovative Products, Denver, which makes pedestal-mounted deck systems that are used on rooftops, as well as other zones in multifamily housing. "Recently this has included access to green roofs, pool areas,

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Learning Objectives

After reading this article, you should be able to:

1. Describe how overall trends in U.S. multifamily housing are affecting design and building product selection for recent new construction and renovation projects.
2. List recent trends in fire safety, occupant health, and green building that are leading to the adoption of specific products and materials.
3. Explain selection criteria for energy efficiency and sustainability that affect the design of multifamily building structures, enclosure systems, fenestration, and HVAC systems.
4. Discuss recent case studies of multifamily housing that respond to both market trends as well as owner/occupant needs for durability and life-cycle performance.

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walkways to decks, outdoor movie theaters, and even a dog park on an upper floor of one Denver apartment mid-rise."

Indoor-outdoor design statements are another way to mitigate the enclosed and sometimes claustrophobic feel of more efficient housing layouts, leading to more use of terrace doors, balconies, and sliding glass doors. Architects are also working with larger window openings with fewer mullions and cross members to boost that open feel. In many cases, renters also expect that unit doors or windows will open to exterior zones including balconies and rooftops. "Even for entire façades or selective renovations of existing residences, project teams are using large openings as not just a selling point but also as a lifestyle feature," notes Matt Thomas, marketing director with NanaWall Systems, which makes operable glass walls.

These trends are shaking up enclosure design for the entire multifamily market, a bellwether business for many architects, contractors, and suppliers. "Fenestration in multifamily typologies is evolving to include more walls with operable windows and sliders or terraces doors. Utilizing insulated slab covers, window wall systems provide versatility and aesthetic options when compared to a conventional all-glass curtain wall," says Dave Hewitt, vice president of sales and marketing with the window producer EFCO, a Pella Company. "The market is robust in several key metropolitan areas, including for tall buildings. Right now, for example, we're supplying three new high-rise projects in Minneapolis with high-performance window walls and terrace doors."

Across the country, growth tends to be concentrated in mid-rise multi-housing projects, from college campuses to retirement locations. Wood-framed projects dominate construction in projects up to five or six stories, for condominiums, townhouses, and supportive housing types, such as assisted-living facilities (ALFs). Yet traditional building approaches are rapidly giving way to prefabricated, panelized timber assemblies and meticulously detailed enclosures with air barriers, continuous insulation (CI), and techniques for draining and blocking moisture.

"Investors are more interested in life-cycle cost and overall profitability, and many buyers say they value durability and sustainability, so that makes multifamily a target for better protection against moisture and air infiltration," says Peter Barrett, product manager for Cosella-Dörken, which makes building enclosure materials including water-resistive barriers (WRBs) and drainage sheets. "Air tightness is critical to energy management, and moisture is acknowledged as the leading cause of building degradation."

Improvements to the enclosure extend to fenestration as well, with novel windows that have triple glazing and gas fill or blinds or shades between the glass lites. High-performance vinyl windows are increasingly specified for multifamily projects, too. "These newer products also improve energy efficiency by controlling heat while helping to bring more daylight into the apartment interiors," says Terry Zeimetz, AIA, CSI, CCPR, commercial marketing manager with manufacturer Pella Commercial Solutions. "The between-glass blinds also mitigate the issue of allergens that can get trapped in room-side blinds."

For structural systems, modular and prefabricated timber systems are adding new options alongside traditional, stick-built framing that dominates one- to three-family, detached dwellings. "Modular, prefabricated walls and floor systems are the most important innovation in the wood multifamily and residential market in years," says Lisa Podesto, MS, P.E., a structural engineer and senior technical director in Building Systems for WoodWorks, an education and technical resource provider. "Assembled offsite, these systems are efficient and fast to build, with components like studs, plates, and openings already included. For large repetitive structure, these help work out lots of issues in the field and save money."

On the operational side of the multifamily business are a number of techniques to reduce energy costs, maintenance needs, and also simplify building systems. Among the most rapidly growing are proven renewable energy systems such as geothermal heating and cooling.

"The energy extracted from the earth provides an immediate and free efficiency boost, and water-source geothermal systems can serve diverse needs, such as moving heat from the south-facing units and moving it to other units that need heat," says Tony Landers, director of marketing with ClimateMaster, a geothermal system provider. "Other than energy needed to pump the loop, that is free conditioning by moving heat from one point to the next."

Photo courtesy of NanaWall Systems

Many new multifamily projects include larger window openings, including operable walls, for access to balconies and rooftops.

MICRO-HOUSING GETS BIGGER

Efficiency is important—but it's not just energy efficiency in today's market. "Space efficiency is the name of the game for growing segments of the multifamily market, including very small apartments that range from 250 to 450 square feet," says Andrew Franz, AIA, principal of Andrew Franz Architect, New York City. "These new typologies are meant to accommodate a growing urban demographic: one- and two-person households, often of young professionals, who need to live more economically in the city."

In fact, in New York, longstanding zoning regulations were recently waived to allow a city-owned property with 55 micro-units as part of a local pilot. Designed by the architecture firms Monadnock and nARCHITECTS, the project uses prefabricated, modular construction techniques

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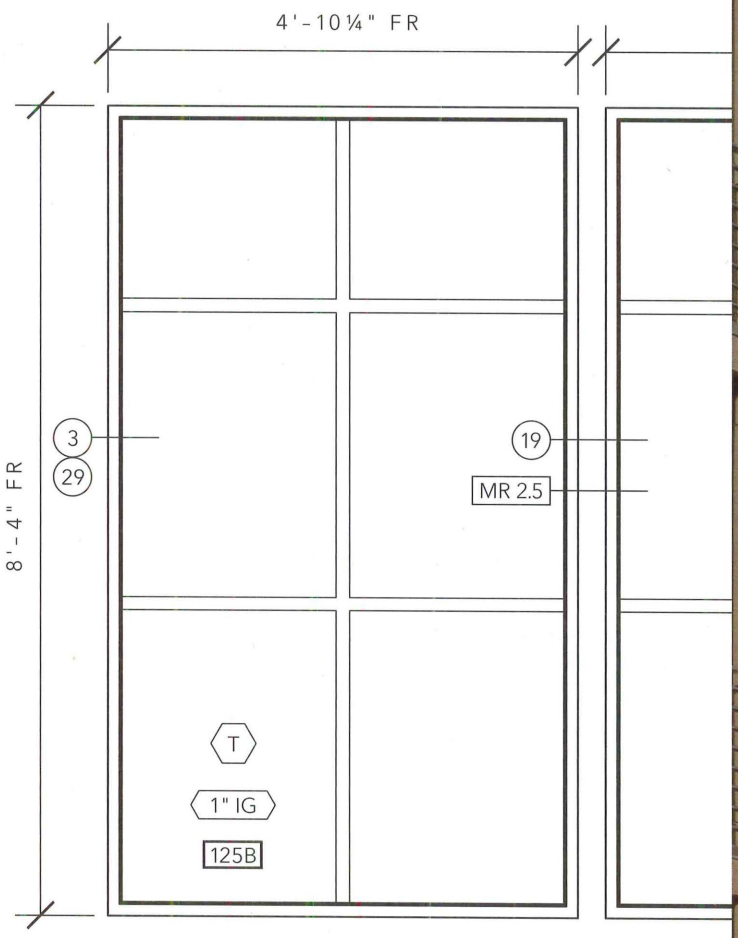

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This project has high-performance aluminum projected windows with sliding glass doors, providing energy efficiency and comfort for occupants with balcony access.

and will rent at $950 to $1,900 per apartment.

In Boston, market-rate developments of similar sizes are planned for the fast-growing Seaport District, including the $100-million Boston Wharf Tower, designed by ADD Inc. (The city allows floor plans as small as a tidy 300 square feet.) Others, such as the luxury high-rise The Kensington, designed by The Architectural Team, include efficient "open one-bedrooms" of about 550 square feet. In San Francisco, the smallest pads ever include 220-square-foot units starting at about $975 per month.[1]

In fact, micro-units are a new riff on an old and much-maligned idea: single-room occupancy or SRO buildings, many with shared kitchens or bathrooms, which were opposed by building departments in these same cities just a few years ago. Today, leaders including Boston Mayor Thomas M. Menino and San Francisco's Edwin M. Lee are eager to entice young professionals with more affordable downtown housing options to stabilize neighborhoods.

Unlike SROs, today's market-rate micro-pads are hardly cheap: A 450-square-foot unit might go for $2,200 per month. With pull-out sofas or Murphy beds, small bathrooms, and open or galley-style kitchens, the apartments often come with shared amenities in common zones to allow residents to escape from their confines and socialize with likeminded tenants.

"In these ways, micro-units are starting to resemble assisted-living facilities, an ironic parallel between young professionals and seniors with a certain degree of acuity," says Michael E. Liu, AIA, NCARB, vice president with The Architectural Team in Chelsea, Mass. "Some developers see an opportunity to convert their micro-unit projects to housing for older, more frail populations as demographics shift." While the net-to-gross ratio, which compares living unit area against common space, tends to be higher for ALFs, so too are the rents—typically about three times what the apartments command.

LOW-COST MID-RISE, HIGH-VALUE AMENITIES

With these economic realities in mind, multifamily developers and their architects are focused on efficient layouts, maximizing unit density, and low-cost building solutions. "Many of these new urban infill, mid-rise developments are gravitating to wood mid-rise solutions, including wood frame over a one- or two-story concrete podium, which help maximize how many units you can fit on the site," says WoodWorks' Podesto. "There are also major cost savings, period. Savings of 30 percent would not be out of the question, though of course it depends on the project design and the system it's being costed against."

Examples include the first phase of the University of Washington's West Campus housing in Seattle, which added 1,700 new beds in three residential halls and two apartment buildings designed by Mahlum Architects. The 668,800-square-foot complex uses five stories of light-frame wood over two stories of concrete structure, which cost about $177 per square foot to build in 2012. "Currently we're seeing a majority of our projects leveraging this 'five over one' typology, mainly due to budget constraints," says Anne Schopf, FAIA, design partner with Mahlum. "This is a common construction type here in Seattle."

For the West Campus, each building has upper floors of Type V-A construction over two lower floors of a Type I-A concrete, clad with manganese flashed brick and topped with roofs of engineered wood trusses and plywood sheathing. The podium and upper floors are separated by a three-hour-rated floor assembly, and the wood-frame floors use 2x4 and 2x6 wood studs and plywood sheathing in both exterior and interior load-bearing walls and partitions. Schopf specified engineered wood I-joists and plywood sheathing for the floors and stair treads, with landings of glued laminated beams and engineered laminated strand lumber (LSL) for the rim board stringers. Heavy timber blocking throughout affords fire protection, though all floors are fully sprinklered.

Similar techniques are validated at Morgan Park Place in Nashville, a 72-unit, mixed-use residential and retail development located parkside in the historic Germantown neighborhood and designed by Dryden Abernathy Architecture Design. After winning a competition for this project, the architects put into action their eco-friendly, "urban village" concept for a live-work-play hub of townhouses, carriage houses, single-family houses, and upstairs flats in mixed-use buildings. The units, in compact sizes ranging from 750 to 2,200 square feet, were priced at $150,000 to $550,000.

The hybrid structures combine precast insulated concrete form (ICF) walls and light-frame wood using advanced framing techniques, such as ladder corners, which allow for better insulation. Various cladding materials "ensure a timeless, modern landscape," say the architects. The tightly sealed enclosures are heavily insulated with open-cell spray foam for larger surface areas and closed-cell foam for enclosure joints. Between the studs, blown-in cellulose from recycled blue jeans provides ample R-value. Interior materials include sustainable bamboo flooring, Energy Star-rated appliances, on-demand water heaters, recycled rubber, and highly efficient heating and cooling equipment.

The enclosures also benefit from windows and doors with low-emissivity (low-E) triple-pane glazing, according to Pella's Zeimetz. Between-the-glass window treatments increase each opening's energy efficiency, helping to

substantially reduce heating and cooling costs. Convenient for users and flexible in terms of design, the integral window treatments snap in and out, so homeowners can change them as desired, choosing from blinds, shades, grilles, or decorative panels.

Earning an EarthCraft House certification, the new complex offers living spaces that are 50 percent more energy-efficient overall than conventionally built homes—and with less square footage. "When you have a premium product on the marketplace, you have to offer advantages—especially when it is a small space," says Darrell Crawford, director of New Urban Construction LLC, one of the developers. "Our customers want personalization, and the windows help meet that need."

In other situations, especially where energy efficiency is critical, so-called "premium vinyl" windows are useful in not only meeting aesthetic needs but also providing high levels of insulation. Some of these units, which can look like traditional double-hung and picture windows, are specified for admitting plenty of sunlight while helping to ensure good thermal performance.

At the Prestwick Chase mid-rise senior development in Saratoga Springs, New York, for example, architect Ethan Hall of Rucinski Hall Architecture specified about 1,500 high-end vinyl windows with low-E glass and an argon gas fill. The thermal control helps reduce unwanted heating in the building's sunlit atriums and window-wrapped common areas.

SOPHISTICATED HIGH-RISE HOMES

While mid-rise projects account for the lion's share of U.S. multifamily market activity, an increase in high-rise buildings is animating many central business districts, from Houston to Chicago. Behind the growth are low debt financing rates, and annual rent increases of 7 to 8 percent for Class A units, according to real estate services company CBRE.[2] The towers "resemble resorts" in terms of amenities and aesthetics, and typical renters are young professionals, typically 25- to 45-year-old singles or couples, and some empty-nesters of retirement age.

Concrete and steel structures vie for dominance in the urban skyscraper markets, as exemplified by Chicago's 82-story Aqua, designed by the local firm Studio Gang for Magellan Development Group. The 1.9-million-square-foot structure near Millennium Park is instantly recognizable, with its curving concrete floor slabs extending beyond the rectangular footprint to offer solar shading and thermal mass. Its three-story podium is planted with a large garden, further cooling the site. High-performance glazing allows ample views—a major driver for the high-rise market—while cutting solar load with low-E coatings and reflective glass on portions of the south- and east-facing façades.

The project used a variety of projected, casement, and fixed thermal aluminum windows and curtain wall, as well as matched sliding glass doors for the balconies. The unique design of the extended balconies required a window system that could easily accommodate the unusual deflection with custom head receptors. Another key feature of the window system was the ability to easily change mullion spacing to match the desired aesthetics for the award-winning design.

Whether in the Windy City or elsewhere, high-rise buildings need "the added strength, durability, and design flexibility of aluminum windows," says EFCO's Hewitt, who explains that American Architectural Manufacturers Association (AAMA) guidelines[3] classify window product performance. The AAMA rating AW class is commonly used in high-rise applications to meet increased loading requirements and limits on deflection, including where pressures of at least 40 psf are expected. (By contrast, LC-class products for low- to mid-rise multifamily dwellings resist pressures up to 25 psf. See window ratings sidebar in the online version of this article.)

The challenge of floor-to-ceiling, operable glazing systems is well worth the effort, say developers like Magellan's James Loewenberg —also an architect—noting that the resulting designs bring more tenants and higher rents. This dynamic is true for both high-rise and mid-rise developments, adds NanaWall's Thomas, though he sees fully opening glass walls as a way to differentiate offerings in many markets, including detached condominiums and townhouses, among others.

Examples include the live-work-play Justison Landing in Wilmington, Delaware, a 150,000-square-foot building set on a former brownfield adjacent to the Christina River. Designed by the firm Burt Hill, the project fills out six new city blocks with housing, retail, offices, and a hotel, with an overall goal of "maintaining continuity along the streets, and drawing people in from other areas to visit the shops and access the riverfront walk," according to the architects. Residential options include four seven-story blocks of two-story townhomes topped by luxury loft condominiums. To enhance the loft feel, the firm added fully opening glass walls with a series of collapsible screen panels that stack onto each other using a single track.

Depending on the climate and the proposed height of the operable glass walls, the key to specification is determining needs for weather resistance, impact resistance, and other durability considerations. In general, thermally broken aluminum folding-type glass walls tend to be favored for multifamily projects over single-track, sliding systems.

SHARED OUTDOOR SPACES

With these large openings available for even mid-rise and high-rise apartments, the indoor-outdoor craze that swept the custom home industry over

Gravity-based, modular pedestal deck systems are used on flat rooftop terraces as pool surrounds, green roofs, water features, and even lawn bowling courts.

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Photos courtesy of Cosella-Dörken Products Inc.

A ventilated rainscreen over a polymeric, water-resistive barrier protects the enclosure for Bellingrath Town Residences in Atlanta's Buckhead.

the last decade has had a pronounced effect on multifamily environments. Many of the outdoor settings are private, but the increased expectations for shared amenities and common spaces—especially for so-called lifestyle residences where community and socializing are part of the sell—have led to more programming of communal zones. Rooftop clubrooms, open terraces, and pools as well as shared balconies and courtyards are now common features highlighted by realtors.

Whether for new buildings or renovations, the key challenges include activating roof areas and beautifying the surroundings while also protecting the roof membrane and drainage elements, such as soft metal flashings. Pedestal decking, which are gravity-based modular systems, have in recent years been applied to flat rooftop terraces as pool surrounds, green roofs, water features, and even as upper-floor dog parks and bocce lawn bowling courts. The systems use deck point supports topped by varied flat surfaces such as wood and stone tiles and concrete pavers.

"The pedestal systems do not penetrate or attach through waterproofing or roofing membranes, and they also eliminate the need to connect to parapet walls or use joists," says Bison Innovative Products' von Gunten. Building systems are accommodated below the pedestals, such as roof drains, piping, irrigation for roof gardens, and even low-voltage lighting. The modular elements are fitted to a 2-foot grid, and they are lightweight and relatively small enough to ease transport to upper floors, she adds. Typical materials include Ipé and other weather-resistant deck tiles. Used with water features, the pedestals sit within pools and fountains.

Keeping these outdoor, shared spaces safe is critical to project owners, and some pedestal systems have been developed to meet seismic criteria and ASTM standards for fire resistance. One of the challenges for high-rise developments and locations with potential for severe weather has been wind uplift, says von Gunten, and the air-permeable pedestal decks help equalize uplift forces, restraining the decks and tiles from movement. Although there is no specific standard for testing the decks, engineers have applied the Florida Building Code's Testing Application Standard (TAS) 108, *Test Procedure for Wind Tunnel Testing of Air Permeable, Rigid, Discontinuous Roof Systems.*

The rooftop systems also have a positive effect on enclosure performance, both protecting the underlying roof membrane and helping to reduce solar heat gain on large, flat roof expanses. This performance benefit dovetails neatly with the overall trajectory of today's designs for multifamily building enclosures, where better thermal control, air barriers, and moisture management are driving new construction techniques.

OPAQUE WALLS AND PUNCHED WINDOWS

In spite of the allure of the glass-box look and large windows expanses, many developers are using punched-out windows and more opaque wall surfaces in order to reduce operating costs and—where submetering is used—to reduce utility bills for tenants. "Many of these techniques are geared toward wood construction, which is very common for multifamily developments," says Cosella-Dörken's Barrett. "They also address cladding materials that can cause moisture issues, such as manufactured stone and conventional stucco."

According to Barrett, the issue of solar-driven moisture and inward vapor drive has been poorly understood, presenting a common cause of wetting and rot in sheathing behind masonry veneer. Essentially, the sun heating the outside of a wet stucco or manufactured-stone wall forms high vapor pressure that impels moisture further into the wall assembly and prevents it from drying to the outside. "It tends to move from high pressure to areas of low pressure, so the moisture is moving deeper into the wall," he says.

One solution to the issue has been applying a dimensional, two-sided drainage sheet behind the cladding but exterior to the weather-resistive barrier (WRB). The drainage layer installs easily with standard roofing nails and helps drain more than the requisite 80 percent of moisture entering the wall.

Other enclosure systems are designed to provide drying and drainage, and have been adopted by many architects and their multifamily clients. Ventilated rainscreens, for example, have open-joint claddings designed for drainage and natural ventilation, helping to keep wall assemblies dry. Behind the rainscreen, the insulation and air barriers are protected from weather and solar degradation.

Novel technologies are improving air tightness and moisture control, including self-adhering, vapor-permeable air barrier and WRB materials used over exterior-grade drywall sheathing or concrete masonry. Eliminating leaks at staples, nails, and other fasteners, the self-adhered barriers exceed the relevant requirements of the Air Barrier Association of America (ABAA) and building codes referencing ASTM E2357, *Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.* Yet the vapor permeable construction also allows moisture within the building enclosure to escape through the membrane via diffusion.

An example of the application of a simple ventilated rainscreen to multifamily developments is seen in projects like the new Bellingrath Town Residences in Atlanta, a grouping of eight unique, luxury town residences on Peachtree in the trendy Buckhead district. Designed by Harrison Design Associates, the linear townhome block is "true to classical forms, [to] make a statement that

creates a timeless and lasting impression," as the architects have stated. Yet the enclosure system uses high-end, modern technologies. About 25,000 square feet of ventilated rainscreen was installed over a polymeric, water-resistive barrier and OSB sheathing behind the limestone and brick façade. The result manages moisture flow in the wall assembly.

"Air tightness is critical to energy management," says Barrett, noting that air leakage is responsible for up to one-third of lost heating and cooling energy in some older residential structures. "And moisture is the leading cause of building degradation, so these simple details are shown to make multifamily projects into much better investments."

The focus on energy costs is reshaping how buildings are designed, leading to more use of high-efficiency design approaches that often exceed the U.S. Green Building Council's LEED requirements. For Museum Tower in the downtown Dallas arts district, for example, the developer's vision was of a classic, modern glass box with a feeling of immediacy and sweeping views of the city. Yet the 42-story, 115-unit luxury high-rise designed by architect Scott Johnson of Johnson Fain Partners, is designed to LEED Gold and uses surprisingly little energy considering its transparent envelope.

IMPROVED HVAC SYSTEMS

One of the reasons is the use of a geothermal cooling and heating system, which comprises 335 water-source heat pump systems in individual packaged units for each condominium, which transfer heat via a single- or two-pipe water loops. Each unit can be used in either heating or cooling mode year-round, and loop temperature is maintained via the building's boilers and cooling towers. "Each zone within the tower has complete control of its heating or cooling mode and each unit is independent from the others," says ClimateMaster's Landers. "High-rise applications in downtown areas have been among the largest markets for these systems, and they are coming back, thanks in part to aggressive energy plans like the one for Museum Tower."

For the multifamily building operator, using a renewable energy technology like geothermal affords several benefits. "The main goal was two-fold—to be able to submeter the electrical usage of each condo unit, and also to achieve an ultra-high level of efficiency with the HVAC system's operation," says Jake Musick, P.E., project manager at Blum Consulting Engineers. "A heat pump-driven system helped us to achieve both aims, while also providing the quiet operation expected in a residence of such luxury caliber."

Photo courtesy of ClimateMaster

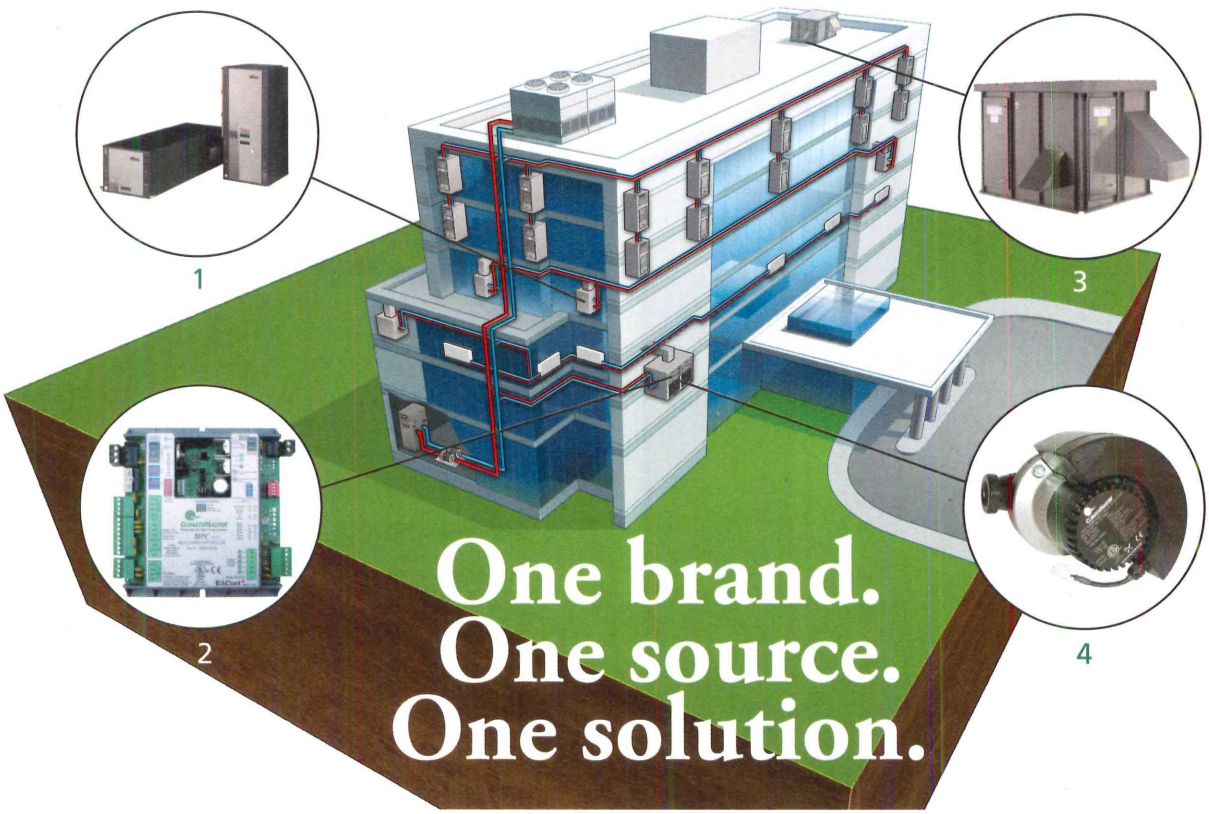
For the 234-unit Millennium Tower in New York City's Battery Park, unitized water-to-air heat pumps are used for geothermal heating and cooling.

Recent applications of geothermal for multifamily projects like Museum Tower and the 234-unit Millennium Tower in New York City's Battery Park rely on the unitized, small-footprint units that can fit inside individual living areas.

See endnotes in the online version of this article.

Continues at ce.architecturalrecord.com

Chris Sullivan is principal of C.C. Sullivan, *a communications consulting and marketing agency focused on architecture and building products.*



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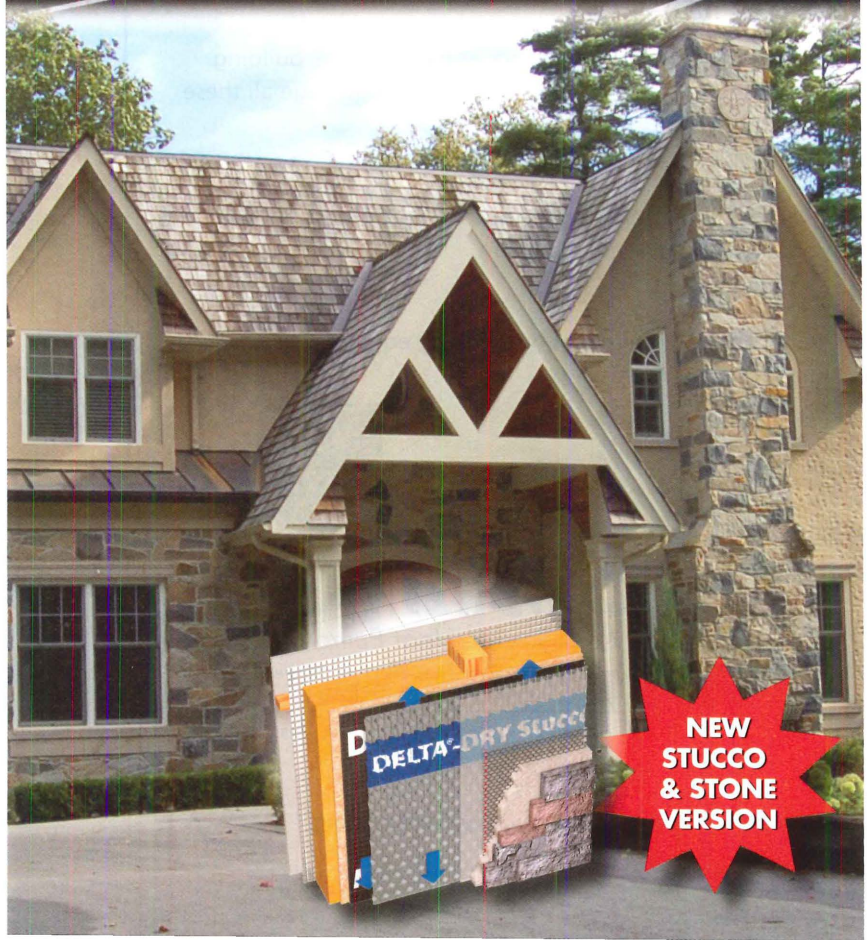

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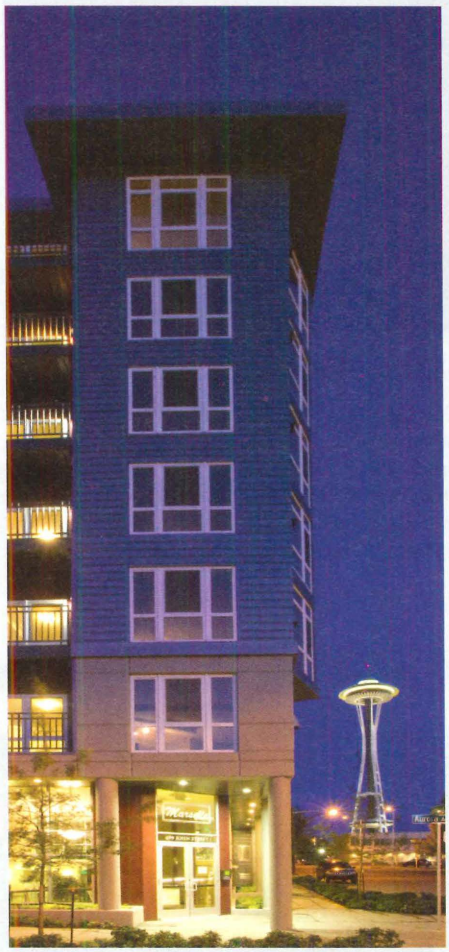

Marselle Condominium, Seattle, WA. PB Architects. Matt Todd Photography, courtesy of WoodWorks.

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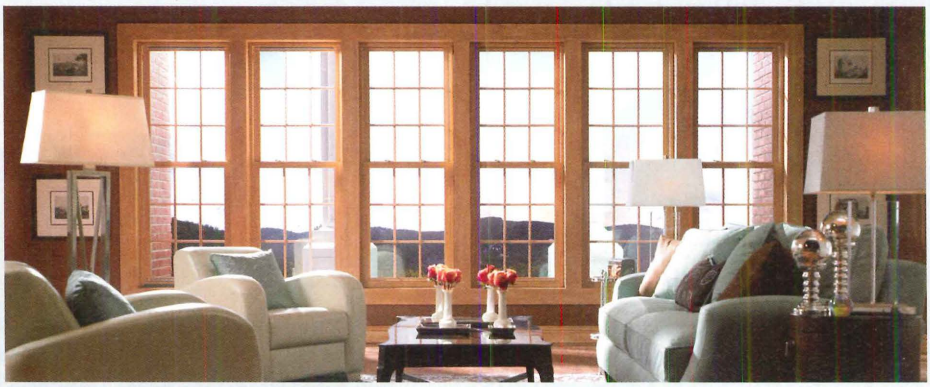

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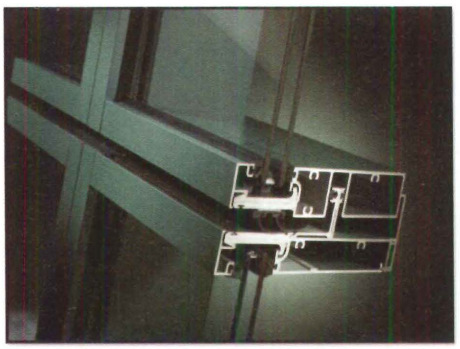

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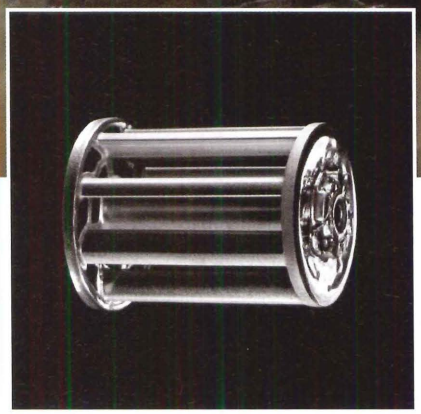

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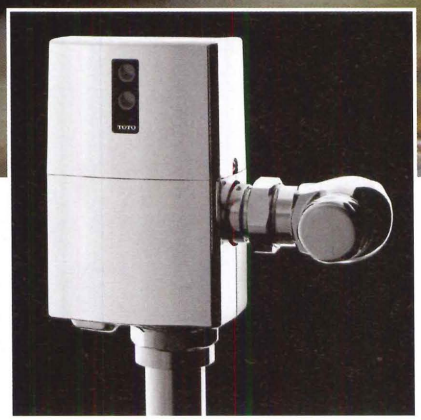

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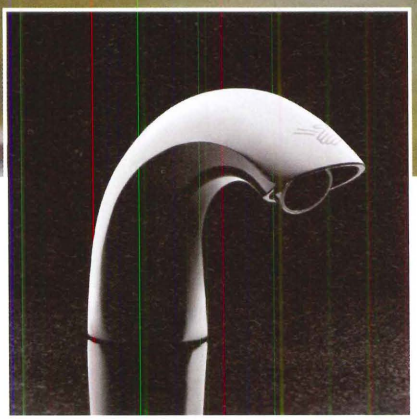

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		ENR Global Construction Summit *construction.com/events/2012/globalsummit/*	142-143
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58		HP *hp.com/go/newdesignjet*	33
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15		Johnsonite A Tarkett Company *johnsonite.com*	10
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19	S	Milgard *milgard.com*	121
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49		Multispec *multispec.com*	13
69	S	NanaWall Systems *NanaWallSystems.com*	129
		NeoCon *neocon.com*	120
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42		Rocky Mountain Hardware *rockymountainhardware.com*	20
12		Rocky Mountain Hardware *rockymountainhardware.com*	122-125
16	S	SAFTI*FIRST* Fire Rated Glazing Solutions *safti.com/ar*	25
70	S	Simonton Windows® *simonton.com*	134
38		Simpson Strong-Tie Company Inc. *strongtie.com/strongframe*	29
		Skyscraper Museum, The *skyscraper.org*	151
71	S	Sloan Valve Company *sloanvalve.com*	43
41		Steel Institute of New York/ Ornamental Metals *ominy.org*	6
34		SubZero and Wolf, Inc. *subzero-wolf.com*	cv3
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		Sweets.com *sweets.com*	121
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27		Technical Glass Products *tgpamerica.com*	148
55	S	ThyssenKrupp Elevator Corporation *thyssenkruppelevator.com*	16
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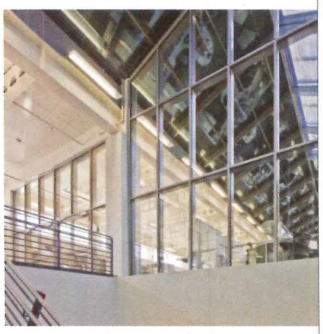

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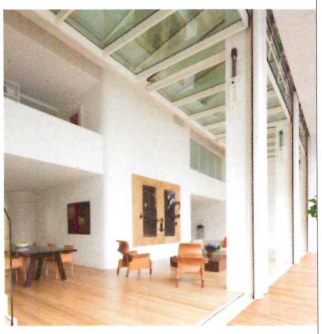

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- Faster, safer operation, zero lost headroom, superior design that keeps working

www.schweissdoors.com
800.746.8273 **Circle 151**

LANDSCAPING, SITEWORK

INVISIBLE PAVING

WR | G

Invisible Structures

Grasspave2 Grass Porous Pavement.

Product Application:
- Grass fire lanes
- Turf parking lots
- Grass access roads

Performance Data:
- 5,721 PSI compressive strength
- 100% grass coverage

www.invisiblestructures.com
800.233.1510 | **Contact:** Dustin Glist **Circle 152**

MATERIALS

STEEL DECK FRAMING

WR | G | NEW

Trex

Trex Elevations® Steel Deck Framing—stronger, straighter, smarter. Because a world-leading deck brand deserves one of the world's most amazing deck frames.

Performance Data:
- Stronger, safer than pressure-treated lumber; low-maintenance like Trex decking products; non-combustible and rust-resistant; spans longer distances, so fewer posts; 25-year limited residential warranty

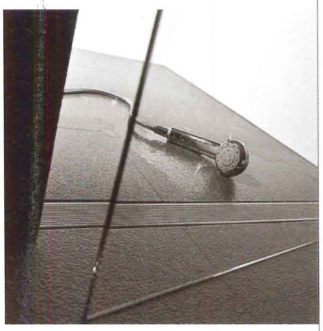
www.Trex.com
800.BUY.TREX | **Contact:** Leslie Adkins **Circle 153**

MECHANICAL SYSTEMS, HVAC, PLUMBING

LINEAR DRAIN SYSTEMS

WR

Infinity Drain



Infinity Drain's Site Sizeable linear drain systems are ideal for zero-threshold showers.

Product Application:
- Adjust the length and outlet placement on-site for a perfect wall-to-wall installation
- Works with any type of waterproofing
- Suited for both residential and hospitality and healthcare

Performance Data:
- Add outlets on-site to increase drain capacity
- Made in USA

www.InfinityDrain.com
516.767.6786 | **Contact:** info@InfinityDrain.com **Circle 154**

ROOFING, SIDING, THERMAL & MOISTURE PROTECTION

ARCHITECTURAL CONCRETE CLADDING

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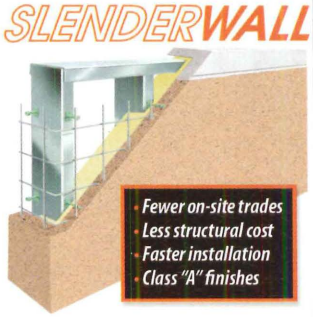
Easi-Set Worldwide



Slenderwall is a 30 lb./sf award-winning architectural precast concrete and steel-stud exterior panel system that can contribute to LEED and Net Zero projects.

Product Application:
- BioInnovation Center, New Orleans, LA
- Westin Luxury Hotel, Virginia Beach, VA
- Hilton Gardens, Montreal, Quebec, Canada

Performance Data:
- Optional factory-installed closed-cell foam insulation and windows, no infiltration—guaranteed

www.slenderwall.com
800.547.4045 | **Contact:** Moffette Tharpe **Circle 155**

ROOFING, SIDING, THERMAL & MOISTURE PROTECTION

RAINSCREEN & VENTILATION MATS

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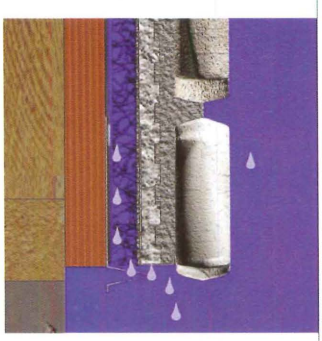
Stuc-O-Flex International, Inc.



Consider the benefits of moisture protection and space that drains water 50 times faster than normal claddings while ventilating your walls.

Product Application:
- Bing Concert Hall, Stanford University
- Hilton, New Orleans, Katrina retrofit
- Stucco, stone, EIFS, siding, metal

Performance Data:
- Create space between your building and the elements; filter fabric functions like additional layer of WRB

www.stucoflex.com
800.305.1045 | **Contact:** Dan Johnson **Circle 156**

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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

Ongoing Exhibitions

The Way We Live: Iwan Baan
Los Angeles
Through April 13, 2013
Architecture photographer Iwan Baan's aerial image of a post-hurricane Manhattan became a viral sensation following its publication on the cover of *New York* magazine. This work is a centerpiece in Baan's first exhibition with the Perry Rubenstein Gallery in Los Angeles. Baan's artistic practice examines how we live and interact with architecture, focusing on the human element, which brings buildings, intersections, and public gathering places to life. For more information, visit perryrubenstein.com.

Never Say the Eye Is Rigid: Architectural Drawings of Daniel Libeskind
Rome
Through April 30, 2013
This exhibition brings together 52 original architectural drawings by architect Daniel Libeskind. Eight projects will be on display, including Libeskind's signature work, the Jewish Museum Berlin (2001), and Memory Foundations, Ground Zero (2003), the master plan for the World Trade Center site. For more information, visit daniel-libeskind.com.

White Cube, Green Maze: New Art Landscapes
New Haven, Connecticut
Through May 4, 2013
By examining emerging trends in museum design, this exhibition at Yale presents six new art sites that share the common thread of moving beyond the traditional "white cube" gallery space and juxtaposing the experience of culture, art, architecture, and landscape. The architects range from such established masters as Tadao Ando and Álvaro Siza Vieira to such emerging practitioners as Tatiana Bilbao and Johnston Marklee. For more information, visit architecture.yale.edu.

Seismic Shifts: 10 Visionaries in Contemporary Art and Architecture
New York City
Through May 5, 2013
Artists and architects whose work challenges disciplinary boundaries and raises critical social, environmental, and political issues are recognized in this special exhibition at the National Academy. *Seismic Shifts* showcases seminal work by Nick Cave, Thornton Dial, Tom Friedman, Vik Muniz, Wangechi Mutu, Betye Saar, and Bill Viola, as well as recent projects by architects Greg Lynn, Kate Orff, and Moshe Safdie. For more information, visit nationalacademy.org.

Lead Pencil Studio: Diffuse Reflection Lab
Austin, Texas
Through May 11, 2013
Lead Pencil Studio creates projects that traverse the territories of architecture and art. Adopting the term "spatial inquiry" to describe their in-between practice, Annie Han and Daniel Mihalyo create environments and structures that serve as places of inquiry to understand the influences of architecture and art on the behavior, emotions, and politics of people. At the Visual Arts Center. For more information, visit utvac.org.

Voices of Design: 25 Years of Architalx
Portland, Maine
Through May 19, 2013
This interactive exhibition at the Portland Museum of Art celebrates the 25th anniversary of Architalx, a nonprofit organization that hosts talks and other educational programming

for architects and designers in Maine. Visitors can browse Architalx's archive of voice, text, and images from lectures by many of the leading architects and designers of the last quarter-century. For more information, visit architalx.org.

Lebbeus Woods, Architect
San Francisco
Through June 2, 2013
This exhibition at the San Francisco Museum of Modern Art brings together 75 works from the past 35 years by one of the most influential architects working in the field. Recognized beyond architecture, Woods (1940–2012) has been hailed by leading designers, filmmakers, writers, and artists alike as a significant voice in recent decades. His works resonate across many disciplines for their conceptual potency, imaginative breadth, jarring poetry, and ethical depth. For more information, visit sfmoma.org.

The Woolworth Building @ 100
New York City
Through July 14, 2013
A masterpiece of early-20th-century art and technology, the Woolworth Building celebrates its centennial year in the process of conversion, with office space remaining below and luxury residences planned for the upper tower. Still radiant on the Lower Manhattan skyline, the landmark heralds both the past and future of New York. For more information, visit skyscraper.org.

Green Schools
Washington, D.C.
Through January 5, 2014
The National Building Museum is hosting the first-ever museum exhibition dedicated to the greening of American schools. Featuring more than 40 exemplary projects, from new construction to rehabs to modular classrooms, the exhibition will survey the breadth of green school design in the United States through sample building materials, photographs, video, and green products. For more information, visit nbm.org.

Lectures, Conferences, and Symposia

Sharjah Biennial 11
Sharjah, United Arab Emirates
Through May 13, 2013
For Sharjah Biennial 11, curator Yuko Hasegawa has solicited a selection of artworks that reassess the Western-centrism of knowledge in modern times. A selection of architects

and cultural practitioners from Lebanon, India, Belgium, Japan, Spain, and elsewhere have been asked to create temporary architectural interventions that connect Sharjah's historic area and its courtyard typology with the larger city. For more information, visit sharjahart.org.

Modular Construction Summit
Brooklyn
May 16, 2013
Do modular structures last as long as stick-built buildings? Are they environmentally sustainable? Can they be as attractive as their traditionally built counterparts? The answer to all of these questions is yes. This conference, cohosted by the Modular Building Institute and the Pratt Institute, will distinguish fact from fiction in the burgeoning field of modular design. For more information, visit modular.org.

International Design Festival
Washington, D.C.
Through May 19, 2013
What makes an object useful, engaging, and beautiful? What is it about a distinct design that conveys calm, wonder, and excitement in the user and helps us recall a moment in time? This free, three-month-long multidisciplinary celebration of design at Artisphere features *The Next Wave: Industrial Design Innovation in the 21st Century*, a 4,000-square-foot exhibition exploring innovation in product design from Spain, Italy, Belgium, the U.K., Scandinavia, and the United States over the last 13 years. For more information, visit artisphere.com.

Competitions

ASID Foundation Scholarship and Awards
Submission Deadline: April 15, 2013
The American Society of Interior Designers Foundation invites interior-design students and professionals to apply for five awards and scholarships totaling $23,000. Open to both ASID members and nonmembers, the scholarships and awards range from scholarships for undergraduate and graduate students to monetary awards for contributions to the profession. For more information, visit www.asidfoundation.org.

In Pursuit of Architecture
Submission Deadline: April 15, 2013
"In Pursuit of Architecture," a special 10th-anniversary issue of the magazine *Log*, will feature 10 buildings that have contributed to architectural discourse between 2003 and 2013. Architects age 59 and younger are each invited to submit one building project completed or started between 2003 and 2013 for publication in this celebratory issue. For more information, visit www.anycorp.com.

Brick in Architecture Awards
Submission Deadline: April 30, 2013
The Brick Industry Association calls for architectural and design firms in the United States to enter any work of architecture completed since January 1, 2008, in which clay-brick products make up the predominant exterior building or paving material (over 50 percent). These include face or hollow brick, building brick, thin brick, paving brick, glazed brick, structural glazed facing tile, clay-brick products in special shapes, and/or a combination of any of these. For more information, visit gobrick.com.

Public Space for Urban Art and Sound
Registration Deadline: April 30, 2013
This competition organized by Opengap seeks innovative, cutting-edge proposals for a new kind of public space to house street art. Applicants may choose the site of their project, but they must address the issue of artistic expression in an urban context. Submissions can be made individually or in teams of up to five people, and the competition is open to all architects, designers, architecture students, and others interested in the topic. For more information, visit opengap.net.

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

2013 CALL FOR ENTRIES
Record Interiors

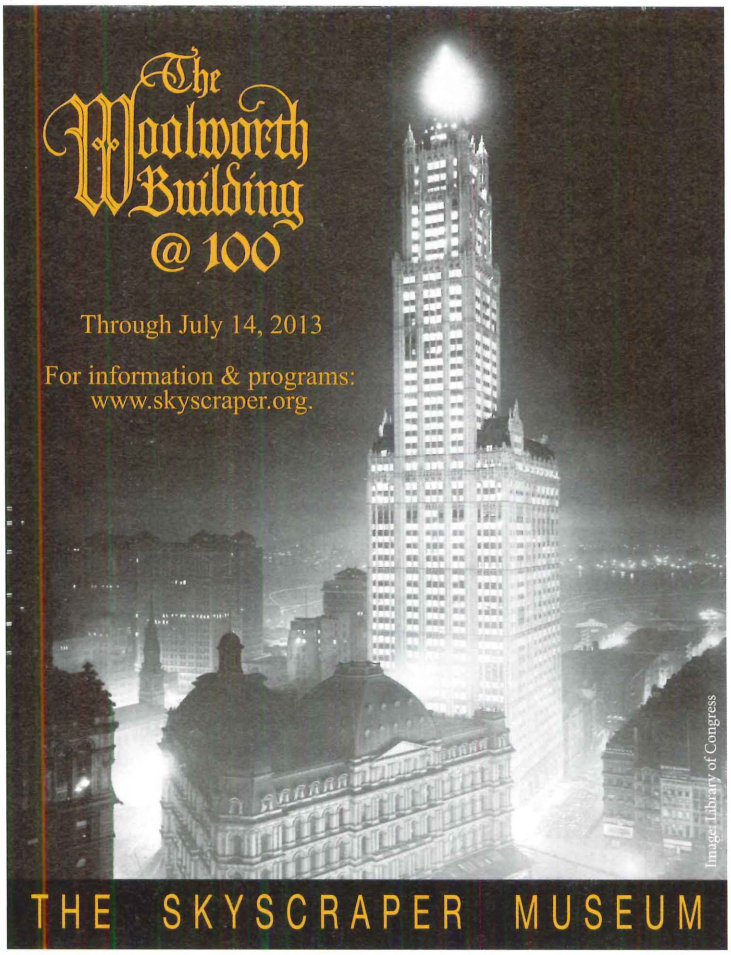
The editors of ARCHITECTURAL RECORD are currently inviting submissions for the **2013 Record Interiors** issue. All architects registered in the United States or abroad, as well as interior designers working in collaboration with architects, are welcome to submit interiors-only projects that have been completed in the last year. The projects may be new construction, renovation, or adaptive reuse; commercial or residential; domestic or international. Special consideration will be paid to works that incorporate innovation in design, program, building technology, sustainability, and/or materials. The winning projects will be featured in the September 2013 issue.

The fee is US$75 per entry. Download the official entry form with submission and payment instructions at architecturalrecord.com/call4entries. E-mail questions and submissions to ARCallForEntries@mcgraw-hill.com. (Please indicate **Record Interiors** as the subject of the e-mail.) **Submissions are due May 31, 2013.**

2013 CALL FOR ENTRIES
Record Kitchen & Bath

The editors of ARCHITECTURAL RECORD are currently accepting submissions for the **2013 Record Kitchen & Bath** competition. Entry is open to any registered architect who has completed an innovative residential and/or commercial kitchen or bath project in the last year. We are looking for projects that feature unexpected materials, address unique client needs, or are designed in a manner that allows these utilitarian spaces to be functional, sustainable, and beautiful. Winning projects will be featured in the September 2013 issue.

The fee is US$50 per entry. Download the official entry form with submission and payment instructions at architecturalrecord.com/call4entries. E-mail questions and submissions to ARCallForEntries@mcgraw-hill.com. (Please indicate **Record Kitchen & Bath** as the subject of the e-mail.) **Submissions are due May 31, 2013.**



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snapshot

PROJECT DARTMOOR TREEHOUSE
LOCATION DREWSTEIGNTON, ENGLAND
DESIGNER JERRY TATE ARCHITECTS

THE ICONIC gable-roofed tree house got an update last August as part of Dartmoor Arts Week, an arts-education program in Drewsteignton, England. With carpenter and instructor Henry Russell, a team of university students, and a budget of $900, London-based Jerry Tate Architects crafted a bird's-nest-inspired arboreal perch. The 107-square-foot tree house is composed of larch, spruce, and western red cedar harvested on the farm that plays host to the arts program. "We adults have to crouch on the way up to the nest, but the kids get to go all the way up standing," says Tate about traversing the bridge (seen here), which leads to a podlike sitting area built for the farm owners' grandchildren. "There's a bit of an Alice in Wonderland effect." *Asad Syrkett*

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Walk out with definitely

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CIRCLE 34

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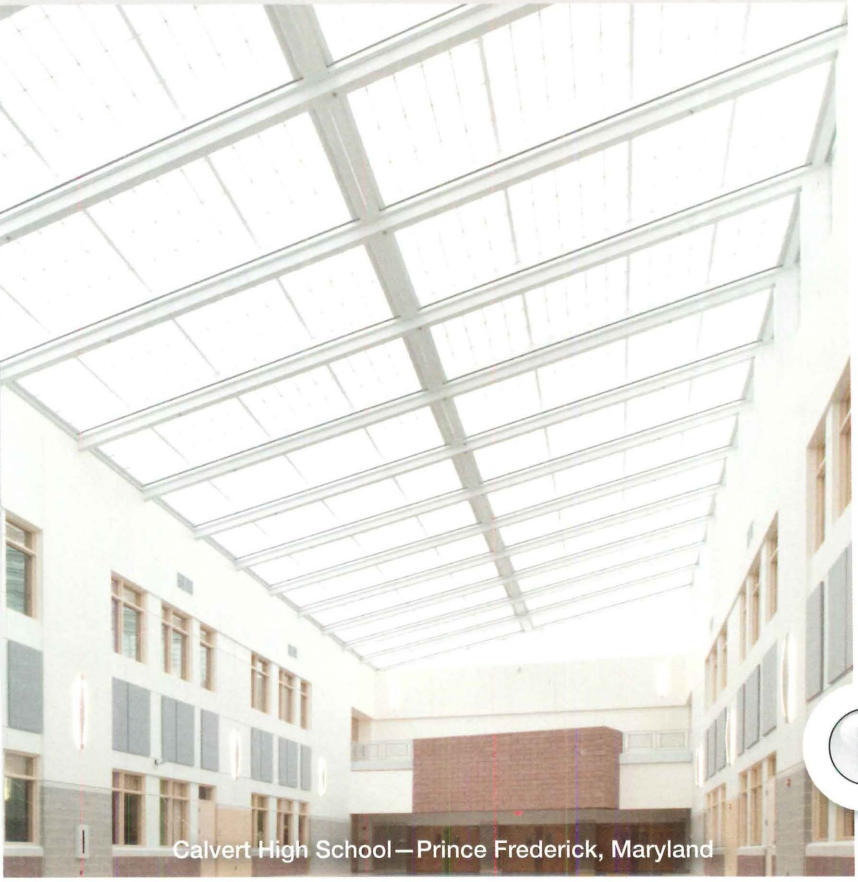
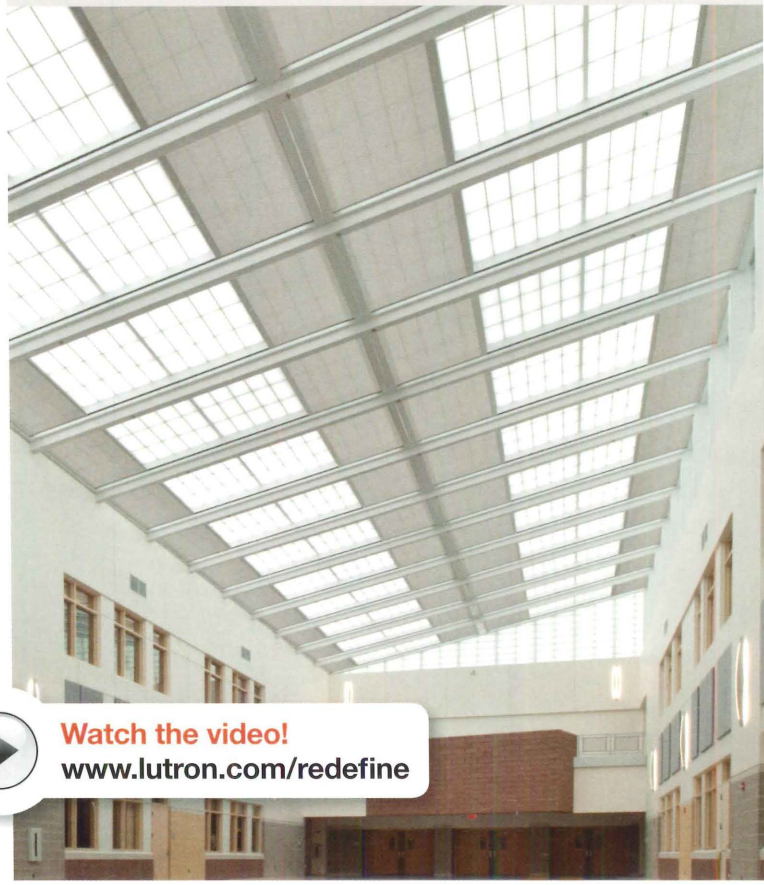


Calvert High School—Prince Frederick, Maryland

Solution
Lutron shades transform this atrium into a comfortable, dynamic space.



Watch the video!
www.lutron.com/redefine

To meet the needs of this unique space:

- Lutron worked closely with the architect to tailor its skylight shading solution.
- 108 skylight shades and 26 roller shades operate in unison at the touch of a single button.

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"It's awe-inspiring. When the shades move, you completely change the experience of the space."

Ran Ilkovitch, NCARB, AIA
Principal, Smolen Emr Ilkovitch Architects

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