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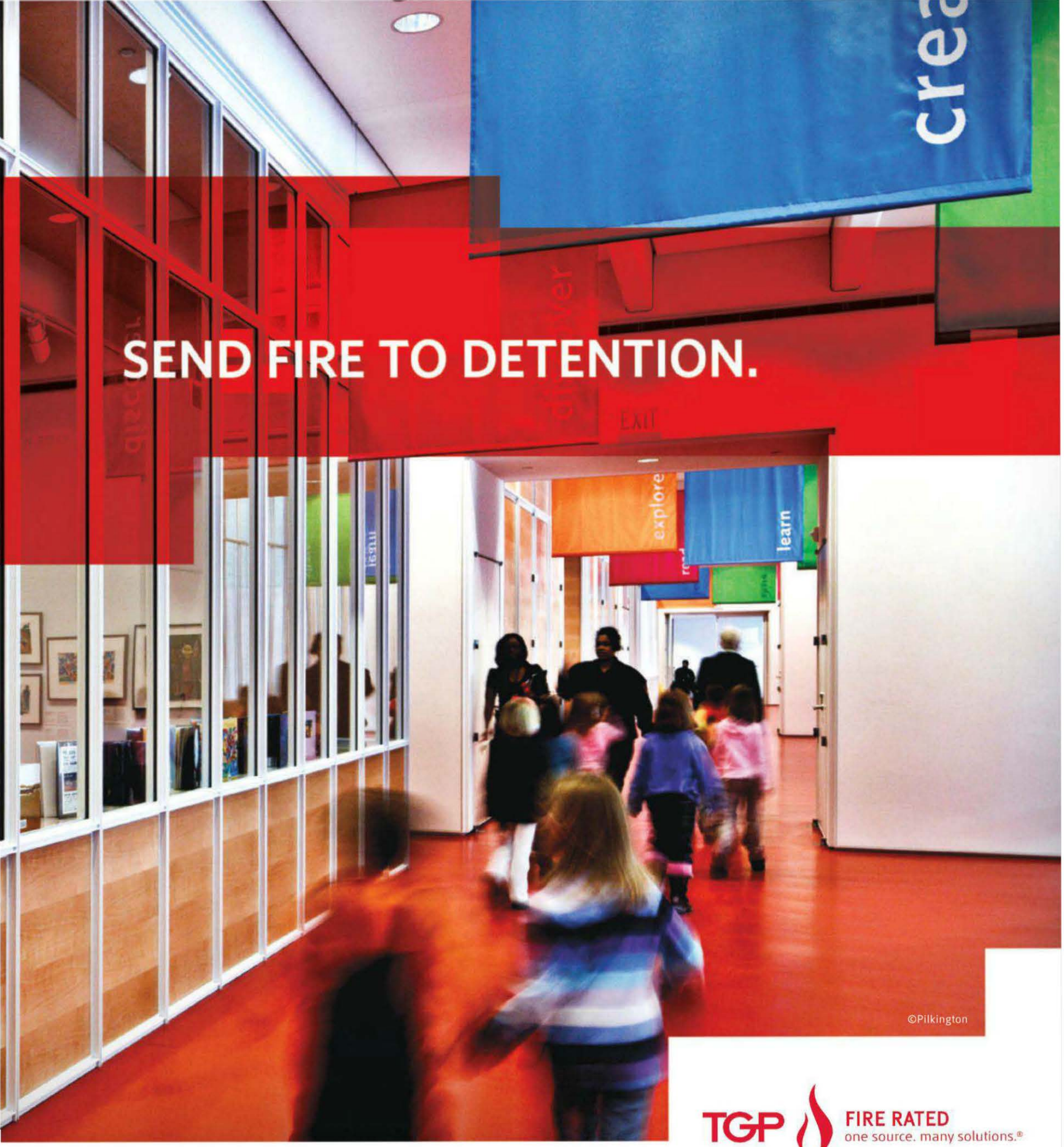

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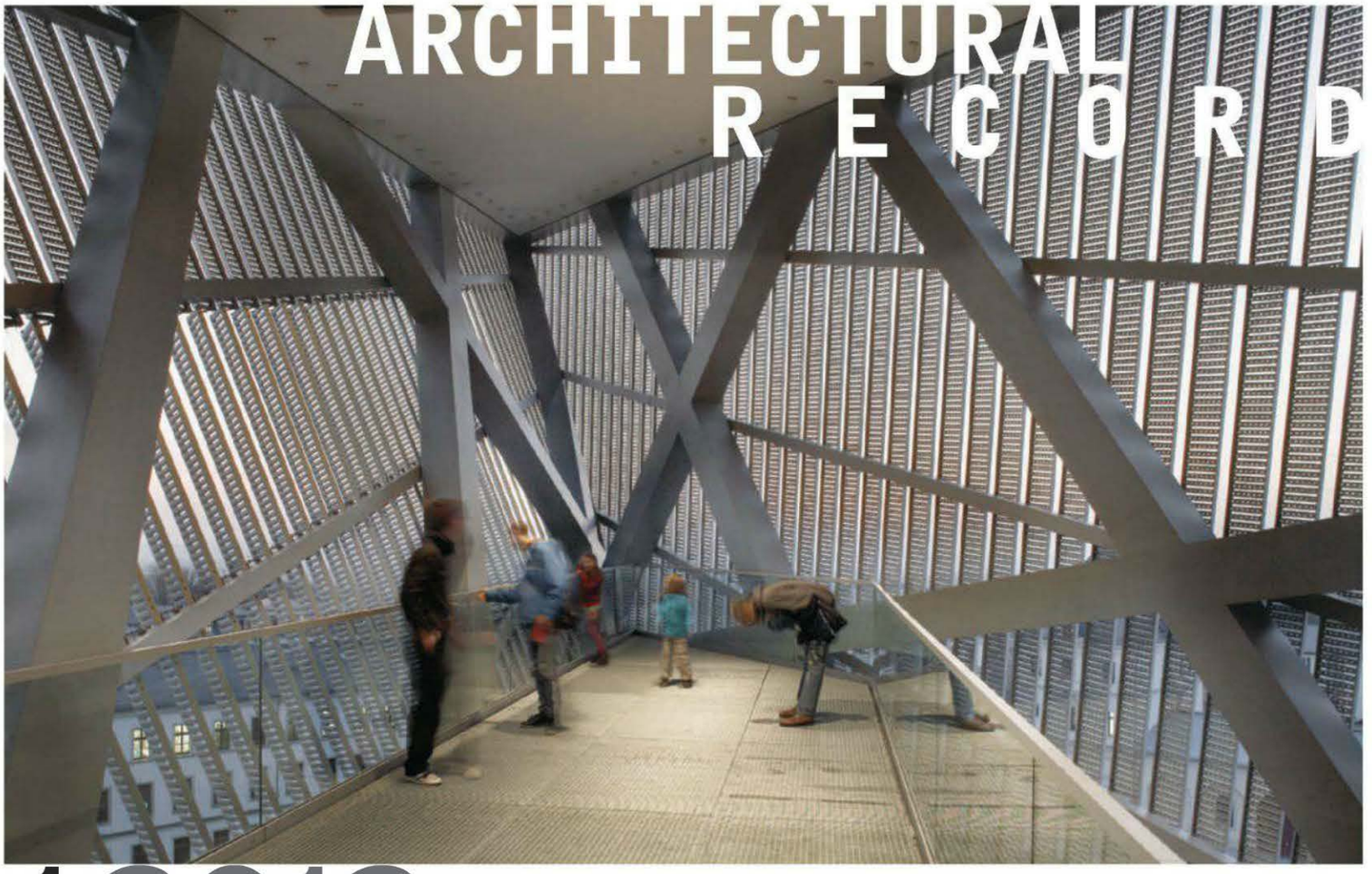

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ON THE COVER: EVELYN GRACE ACADEMY, LONDON, BY ZAHA HADID ARCHITECTS. PHOTO BY HUFTON + CROW.

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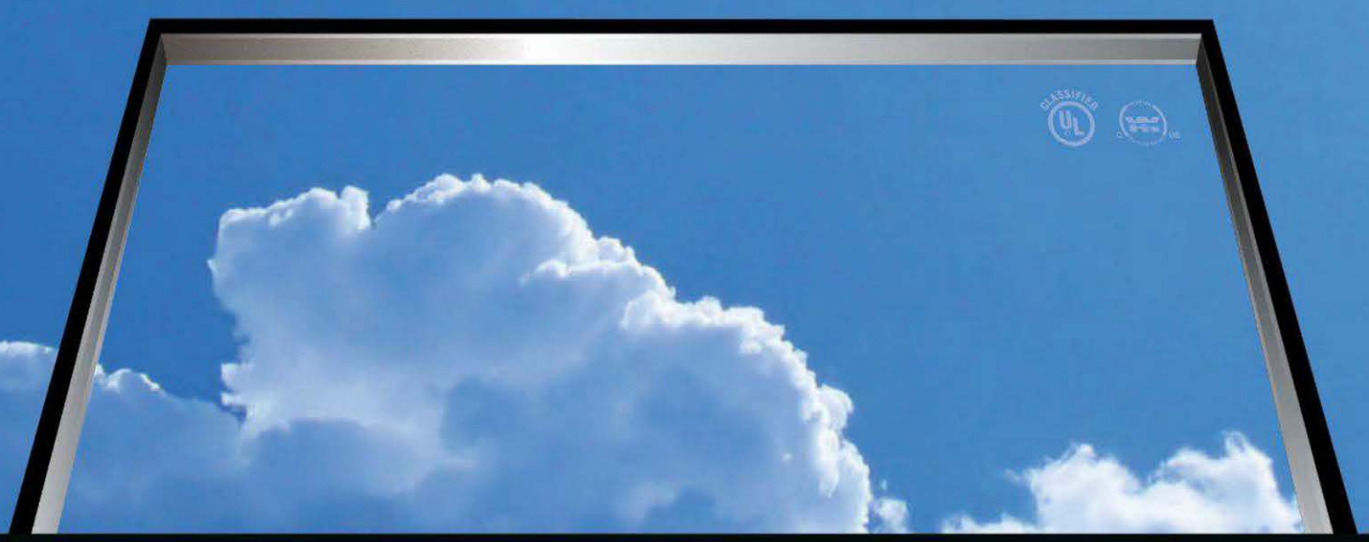

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[READER PHOTOS]

Every month we publish a list of Top Ten Reader Photos, highlighting the best submissions to our public galleries. We recently featured a residential project in South Korea by Chiasmus Partners (above) and Moshe Safdie's Kauffman Center for the Performing Arts in Kansas City, Missouri (below). Visit our site to submit your own work.

PHOTOGRAPHY: SUBMITTED BY "HLEE70" (TOP LEFT); "JAMES" (BOTTOM LEFT)
ILLUSTRATION: DAN PAGE

[CORRECTIONS]

In our December 2011 issue, the profile of 5468796 Architecture [pages 68-71] omitted a photo credit. The photography in the story is by Ian McCausland.

Many readers weighed in on "The Graduates Gripe," our story about the value of an architecture degree in a rough economy. Read selections from the comments here, and join the discussion on our website.

[COMMENTS AND LETTERS]

The rate-of-rise in tuition has been egregious and far outpaced salaries. Architecture will suffer from this as more people understand the unworkable economics and choose a different profession. But could this be a good thing? There will come a time when there is an increase in projects (it couldn't be soon enough), but a dearth of qualified designers. The supply-and-demand model will benefit designers, leading to competition for a smaller number of architects, which will drive up salaries.
—Anonymous

Let's separate architectural education from the work of architecture. There are too many graduates for the specifically architectural jobs available. A design degree should prepare students to work in any number of fields.
—Anonymous

A design degree should prepare students to work in any number of fields.

If traditional pathways through the profession have now failed, we should actively seek alternate routes, not look to professional organizations and multiple degrees. We need to shift the focus from rules and procedures, which only hold us back, to things that are useful for our communities and potential clients.
—Anonymous

Salary is the elephant in the room. It's time the schools and the profession come clean and start telling incoming students the truth. A carpenter makes more than an architect with a five-year B.Arch. degree.
—Anonymous

Without a doubt, students enter architecture with great expectations and a firm belief that they will fulfill their dreams. A few will do exactly that. Most will adjust their expectations to the realities of the business. Unfortunately, some will face disappointment. Such is life, and there is no way around it. You can't kill students' hope with predictions of doom.
—Anonymous

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CIRCLE 11

Picture Perfect

The changing world of architectural photography

'Beauty is truth, truth beauty.'
JOHN KEATS

HOLD ON a sec, Mr. Keats: When it comes to photography and architecture, truth is not that pure and simple. We all look at images of architecture every day, on the Internet and in magazines like this one. Architects depend on photography to document and market their work, and here at RECORD, photographs help us consider which projects to cover. When we lay out the magazine's pages, we think carefully about which pictures best convey the experience of a work of architecture.

But conveying the experience of architecture through images is subjective and problematic, to say the least. There's probably no more famous photograph in American Modernism than Julius Shulman's 1960 shot of a glassed-in living room overlooking the glittering Los Angeles basin at night. Yet that picture—of Pierre Koenig's Case Study House #22—tells us very little about the actual design. What Shulman did so well was capture a mood. His photo of the pool of Richard Neutra's Kaufmann House in Palm Springs is so evocative you can practically hear Sinatra wafting from the hi-fi and catch a whiff of Bain de Soleil.

A tipping point in romantic architectural photography may have been a beautiful image by Peter Aaron of an early Rem Koolhaas house on the outskirts of Paris, with a woman poised to dive into the rooftop pool for a nighttime dip, as the Eiffel Tower glimmered far in the distance. Koolhaas has said he didn't like the picture, and who can blame him? Though it landed on the cover of a big shelter magazine, it hardly showed the house at all.

Such giants of post-World War II architectural photography as Ezra Stoller and Balthazar Korab rarely stooped to that kind of theatrics. The drama in their pictures came from the brilliant use of light and shadow in images of sweeping grandeur or of minute details, from the epic curves of Saarinen's TWA terminal, say, to intense close-ups of richly textured concrete. Their photographs glorified majestic exteriors and serene interiors, unsullied by human use.

Yet in keeping with a shift in 21st-century architectural values, where buildings are seen not so much as idealized sculptural objects but as part of the fabric of places, photography, too, is changing. Documenting architecture is often less pristine these days, whether in the painterly photographs of Robert Polidori, who has shot decaying Havana villas and the ravages of post-Katrina New Orleans, or in the urbane images of Iwan Baan. The Amsterdam–based Baan, who spends so much time on airplanes he could be called the flying Dutchman, shoots houses, museums, office buildings, and city streets all over the globe, with passing traffic, telephone wires, and people running, schmoozing, skateboarding. His photographs are alive with the pulse of real places.

Which is not to say that even Baan's great pictures, or those of his talented peers, offer the "whole" truth. They record what a photographer chooses to show us—his or her framing and sense of scale. Documentary filmmaker Errol Morris, the author of the book

Believing is Seeing: Observations on the Mysteries of Photography, has said there's no such thing as a "true" photograph, but that the mission of photography is to try to pursue the truth.

But now that any fool with a laptop can mess around with Photoshop, some photographers seem to be pursuing the opposite direction, doctoring images of buildings to the level of airbrushed perfection demanded by aging movie stars. We've seen architectural photographs so thoroughly re-touched that they look as fake as computerized renderings. We've even received photos of buildings in false settings: One architect, apparently hoping to appear socially conscientious, Photoshopped his handsome project into a view of a slum instead of the middle-class neighborhood where it was actually built. And let's not even get started on the kind of distortion that makes a picture all about the artist, not the subject.

We know the limits of photography. We've all visited a place we knew from stunning images only to find it oddly underwhelming. And we know the corollary: It's impossible to do justice to the space of the Pantheon or the Hagia Sophia in two dimensions. Some quiet minimalist buildings, wonderful to linger in, go flat in front of the camera.

Yet with all the caveats, we do our best to bring you the most significant images we can in RECORD, those that contain the true essence of a project's design: the details, context, materials, a sense of the experience. But honestly—we're suckers for beauty, too. And often enough, it and truth are on the same side.

Cathleen McGuigan

Cathleen McGuigan, Editor in Chief

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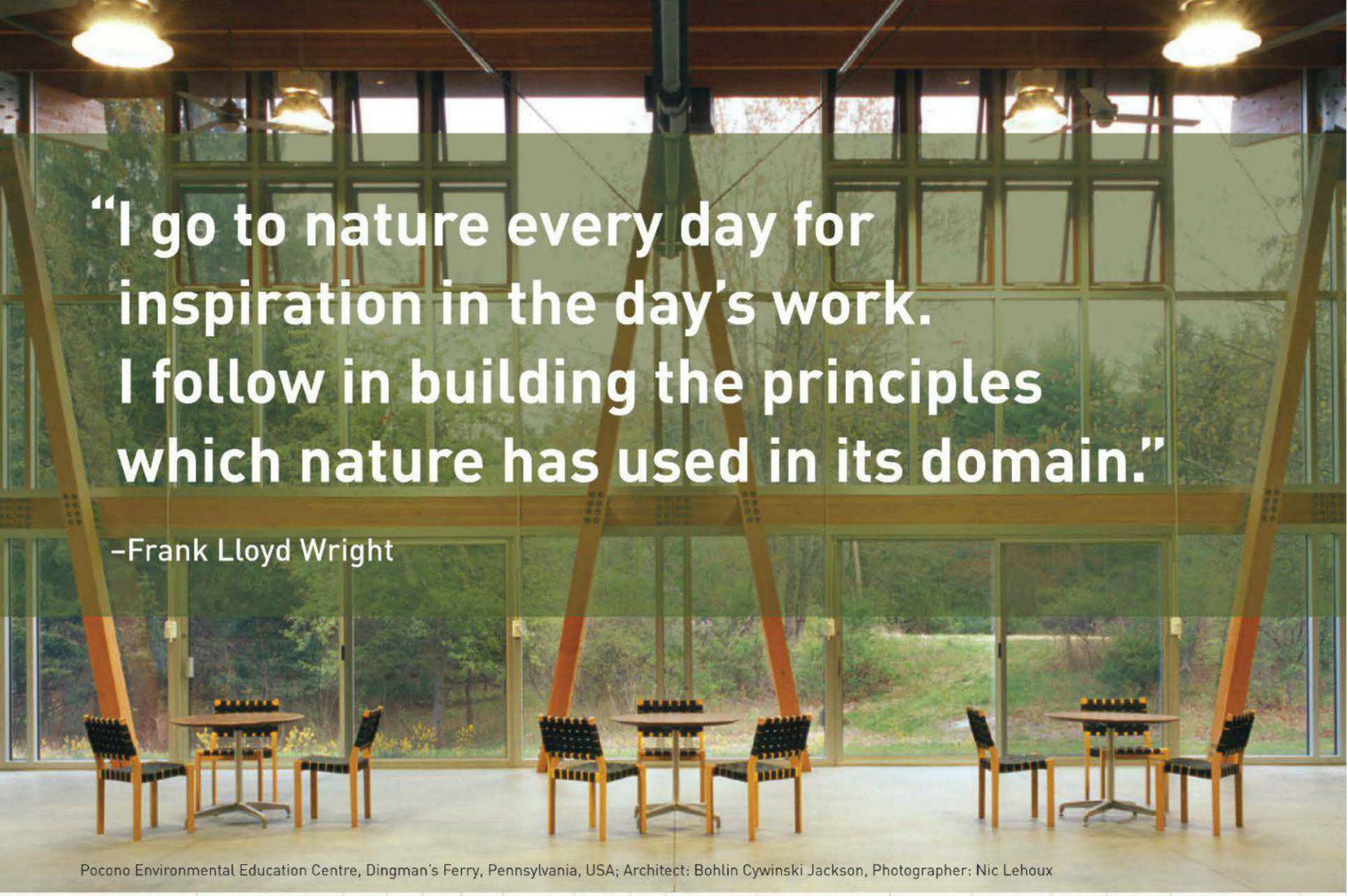

Pocono Environmental Education Centre, Dingman's Ferry, Pennsylvania, USA; Architect: Bohlin Cywinski Jackson, Photographer: Nic Lehoux

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Has Abu Dhabi Gone Bust?

EIGHTEEN MONTHS ago, Ross Ensor at Leo A Daly described the business climate in Abu Dhabi as "a bit like the California Gold Rush." Backed by oil prices at relatively high levels, the capital of the United Arab Emirates had embarked on an ambitious program of new developments, a rare bright spot as the rest of the world dealt with a crushing recession.

Today, however, with the global economy still weak and political unrest sweeping the Arab world, the mood here is subdued. "What a difference a year makes," says Ensor, a vice president with the Nebraska-based design firm, which has an office in the Persian Gulf emirate. "Things have certainly slowed down."

Most significantly, Abu Dhabi announced in October that the marquee projects in its $27 billion Saadiyat Island development, slated to be the emirate's cultural hub, were stalled. Three flagship museums—branches of the Louvre (by Jean Nouvel) and Guggenheim (by Frank Gehry), along with the Zayed National Museum (by Foster + Partners)—would no longer open between 2013 and 2014, and could be delayed up to five years. Gehry told a Bloomberg reporter in October that construction had come to a halt. "The Abu Dhabi building we've been working on in the last five to six years has been stopped, and that's painful," he stated.

A week after the setbacks were revealed, Aldar, the developer behind the Saadiyat projects, announced it was laying off 25 percent of its staff. (Earlier in 2011, the Abu Dhabi government had to bail out Aldar, upping its stake in the company from 38 to 60 percent.)

Stories of such retrenchment don't fit the profile of Abu Dhabi, the world's fourth-largest oil producer and holder of a sovereign-wealth fund estimated to be worth $500 billion. In recent years, Abu Dhabi—regarded as more judicious than its neighbor Dubai—has embarked on initiatives to diversify its economy, including boosting its tourism sector. In 2008, Abu Dhabi unveiled its sweeping Plan 2030, which outlined massive undertakings, such as Saadiyat Island and the zero-emissions mini city, Masdar Headquarters. Other big projects included Yas Island, with a Formula 1 racetrack and Ferrari World amusement park (both completed); and Sowwah Island, featuring a new central business district and full-service hospital. The building spree was expected to yield 3,000 hotel rooms, many of them housed in high-end resorts.

But the emirate is now reprioritizing its spending, and moves to scale back high-profile projects have forced design firms operating here to cope with construction setbacks and even delays in payment. "Times are tough," says Fares Kekhia, managing director of the multi-disciplinary design firm Otak, which opened its Abu Dhabi office in 2006 and is working on several master plans. "We've been awarded a number of projects whose contracts have not been executed, or which have been canceled. Most of our projects face delay." In turn, the firm has been forced to cut its headcount.

The slowdown has also hit Atkins's Middle Eastern division hard, which recently announced a 3.7-percent profit-drop for the first half of its fiscal year. Its Abu Dhabi projects include a waterpark on Yas Island and a new headquarters for the International Petroleum Investment Company, both under construction.

"A lot of this is a coming-back-down-to-reality," says Ahmad Alanani, a senior executive at the Dubai office of Exotix, an investment bank. Abu Dhabi was spending billions on development, he says, but the return on investment was looking increasingly shaky. With the Eurozone in distress and the American economy facing a double-dip recession, Abu Dhabi is pulling back the reins.

Plus, the emirate is competing for world-class status with Dubai, 140 miles to the northeast. "Abu Dhabi hasn't really captured the imagination of international tourists," says Alanani. "Changing conceptions takes a lot of time and a hell of a lot of money." The emirate's goals will be tough to achieve, unless it's willing to finance projects out of its own coffers.

That seems unlikely. Abu Dhabi's Tourism Development & Investment Company, the quasi-governmental entity heading up many big projects (including Saadiyat Island), had its budget slashed by 28 percent in 2011, to $3.6 billion. Architects say the Saadiyat delays will deal a major blow to the region. "Why Abu Dhabi has slowed down the museums is beyond me," says Steven Miller, the Middle East regional manager at Perkins Eastman. "It's what keeps them on the map." ■

Once speeding ahead with major projects, Abu Dhabi has slowed development in recent months.

BY ALANNA MALONE

[URBAN DEVELOPMENT]

A Stunning Revival for Hamburg's Old Port

WALKING THROUGH HafenCity, it's difficult to imagine the grungy shipbuilding yards and warehouses that once dominated the area. Today, the waterfront property stretching along the River Elbe is filled with offices, cafés, and condos, along with vibrant public spaces and tree-lined streets.

The $10 billion master plan for HafenCity—billed as Europe's largest inner-city development project—calls for transforming 388 acres into 10 distinct quarters. According to city officials, the district will increase Hamburg's urban core by 40 percent, create an estimated 45,000 jobs, and offer housing for 12,000 residents of varying income levels. The public-private project is being developed by HafenCity Hamburg.

With about 40 percent of the buildings finished or under construction, the harbor makeover is scheduled for completion by 2025, although financial woes have stalled several major projects.

"HafenCity is very multifaceted. It could be a good model for other inner-city developments," says the German architect Stefan Behnisch, whose firm has already completed two major projects there: the Unilever headquarters (2009) and the residential Marco Polo towers (2010). He notes that large-scale developments can be tough to pull off, but HafenCity "ensures quality" through design competitions, constraints for developers, and sustainability requirements.

"The city has fairly tight control over what's being done here," adds Bernhard Karpf, associate partner with Richard Meier & Partners, whose Coffee Plaza office building opened in HafenCity in 2010. "The combination of private development with a vision of public good is what's unique here."

Hamburg has been a vital industrial hub for centuries. Its historic port, where HafenCity is now taking shape, was rendered obsolete in the 1950s due to the introduction of large, modern container ships that couldn't maneuver through its narrow canals. Dormant for decades, the port was acquired in 1997 by the city-state of Hamburg, which set out to transform the area.

A collaboration between Dutch firm KCAP and German firm ASTOC, both founded by Kees Christiaanse, won a competition to master-plan the site. In 2000, the Hamburg Senate approved their scheme, which features varied building types and a series of neighborhoods. "The plan has a strong urban context, but enough flexibility to adapt to unforeseen circumstances," says Christiaanse, who is still actively involved. Last year, ASTOC updated the master plan to incorporate an additional 132 acres.

To foster innovation, design competitions are held for individual buildings, attracting local and international firms. Final decisions are made by a jury of developers, property owners, independent architects, and government officials. "HafenCity will be an ensemble of high-quality architecture," asserts Jürgen Bruns-Berentelg, chief executive officer of HafenCity Hamburg.

While generally well-received, this sweeping urban regeneration scheme is not without problems. Financing woes have plagued some key projects, including a dramatic, ring-shaped science center by OMA, which likely will not get built. Meanwhile, the completion date for Herzog & de Meuron's Elbphilharmonie Concert Hall has been pushed back to 2014. The high-profile project, which calls for adding an undulating glass structure atop a renovated brick warehouse, broke ground in 2007 and had been slated to wrap up by 2010. According to Björn Marzahn, city spokesman, cost overruns have plagued the project. The current price tag hovers around $630 million (double the original estimate). A recent weekday visit to the site revealed that tourists outnumbered construction workers.

While some projects are lagging, other architectural landmarks have been completed. These include the Coffee Plaza and adjacent Hamburg-America-Center (2010), by Richard Meier's office, and the Spiegel publishing house and neighboring Ericus Contor (2011), both designed by Copenhagen–based Henning Larsen. Moreover, HafenCity's first elementary school, Katharinenschule, designed by the local firm Spengler & Wiescholek, opened in 2009.

Overall, HafenCity is garnering international attention for Hamburg, helping elevate its status as a global city. For area residents, says Bruns-Berentelg, the transformation of this former industrial zone is a welcome surprise. "People saw this site as dead," says the developer, "and look at it now." ■

The 388-acre HafenCity master plan calls for transforming Hamburg's old port into a lively urban district.

PHOTOGRAPHY: © T. KRAUS/HAFENCITY HAMBURG GMBH

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Holl, VJAA Win AIA Top Honors

The AIA has announced that 64-year-old Steven Holl (pictured) will receive the 2012 Gold Medal. A tenured professor at Columbia University, Holl's eponymous New York City–based firm has designed a range of projects around the globe, including Linked Hybrid in Beijing (2009), the Bloch Building at the Nelson-Atkins Museum of Art (2007), and MIT's Simmons Hall (2004) in Cambridge, Massachusetts. The AIA has also named the winner of the 2012 Architecture Firm Award: VJAA (Vincent James Associates Architects), founded in 1995 in Minneapolis. Both winners will be honored in May at the AIA National Convention in Washington, D.C.

ON THE BOARDS

Project The Cloud
Location Seoul
Architect MVRDV

MVRDV incited outrage in December after unveiling its design for two residential towers connected by a "pixelated cloud" in an area master-planned by Studio Libeskind in Seoul's Yongsan Business district. Critics, including families of 9/11 victims, say the buildings resemble New York's collapsing Twin Towers. The Dutch firm apologized on its website; the developer says the scheme is not final.

Project Scotts Tower
Location Singapore
Architect UNStudio

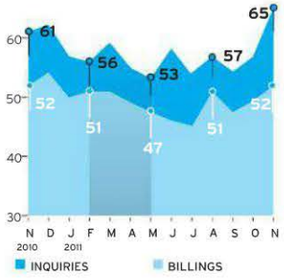
UNStudio, a Dutch firm with offices in Shanghai and Hong Kong, has released its design of a luxury residential tower in Singapore. Firm cofounder Ben van Berkel says the 31-story, 231-unit building will act as a "vertical city," housing distinct neighborhoods. Its upper portion will contain an open-air "sky garden" featuring pools, dining areas, and striking panoramic views.

Snøhetta Unveils SFMOMA Expansion Details

In late November, the Oslo– and New York–based firm Snøhetta presented its detailed plans for a 235,000-square-foot, $555 million addition to San Francisco's Museum of Modern Art. The design calls for a 10-story concrete building with a series of outdoor spaces that will help connect the museum to the surrounding Yerba Buena neighborhood. "It's about becoming more extroverted," says Snøhetta principal Craig Dykers of his design intent for the expansion. Groundbreaking is scheduled for summer 2013, with completion expected in 2016.

Designs Sought for AIDS Memorial Park

AIDS Memorial Park, a coalition of individuals and groups, has teamed up with RECORD and Architizer to host a design competition for a park, memorial, and small educational center in Manhattan's West Village, across from the now-shuttered St. Vincent's Hospital. Michael Arad, designer of the National September 11 Memorial, will serve as jury chair. Entries will be accepted through January 21, with winners being announced in February. Enter at architizer.com.



ABI on the Rise

The Architecture Billings Index climbed to 52.0 in November, marking the first time it has cleared 50 since August (a score above 50 denotes an increase in billings and below 50, a decrease). The inquiries score hit 65.0, up considerably from 57.3 in October. While a "heartening development," AIA chief economist Kermit Baker warns that we still need several months of positive readings to have confidence that the "U.S. construction recession is ending."

IMAGES: COURTESY STEVEN HOLL ARCHITECTS (TOP LEFT); MVRDV (TOP CENTER); UNSTUDIO (TOP RIGHT); SNØHETTA (BOTTOM LEFT); HELENE SILVERMAN (BOTTOM CENTER)

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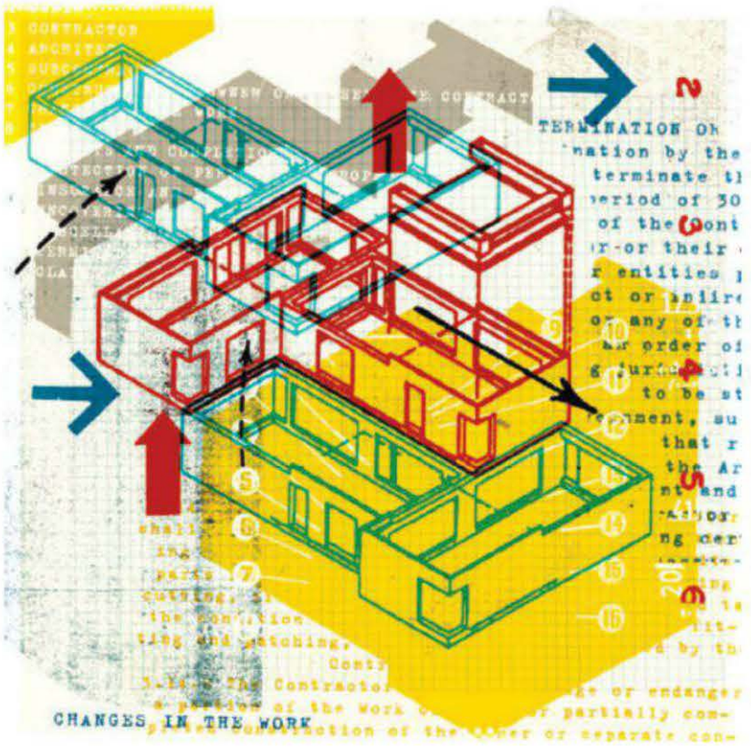
The Pitfalls of "Scope-creep"

When a small project grows, you may face compensatory and consequential damages.

LIKE POISON ivy on a job site in the summer, an architect's legal obligations to the owner can sometimes grow overnight. This phenomenon is well known as "scope-creep" to us lawyers who solve problems for design professionals. A classic example is the kitchen/bathroom renovation that grows and grows when the owner decides he or she wants to do a gut renovation of the entire house with you running the show. What a boost to the ego, (and one's bank account). But wait. You probably documented your scope of work at the outset in a fee proposal with a short work description. You didn't feel any need to worry about providing detail in that letter about construction administration services or about limiting your potential damages. After all, what could go wrong with such a small interior project? If things are moving along smoothly as the project expands, why get involved in the potentially unpleasant task of negotiating a revised agreement that reflects the realities of the increased scope of work? Besides if anything goes awry, it will all be sorted out amicably at the end. Right?

Wrong. Your letter of agreement needs to be changed or amended to reflect what is actually happening with the project. For example, suppose the scope-creep involves an excavation you hadn't previously provided for and leads to a question about buried utilities in an area that has been added to the scope of your responsibility. The excavation contractor proposes to look into the matter by checking filed plans from previous projects and by calling the local "one-call center"—one of the notification services that operators of buried pipelines, power lines, and other underground facilities have jointly established throughout the United States as clearinghouses for information about buried lines. You aren't even involved at this point.

But you are. You're the architect on the project. If one of the contractor's employees severs a buried electrical line and causes a fire or, worse, dies from electrocution, you are likely to find yourself caught up in a protracted, emotionally draining lawsuit. Your supposed lack of diligence in being sure that all buried lines have been identified will be subjected to scrutiny, and may even be assessed by a judge or jury with little feel for the practicalities of construction or for what an architect actually does. You, the architect, become more accountable than the contractor, who argues that he is just following your plans. And if your plans lack a warning later found to be necessary? It can mean trouble. Scope-creep requires you to think differently, and more intensely, about the greater detail and need for self-protection that goes with expansion of the size and complexity of the project.



Scope-creep requires you to think differently about the greater detail and need for self-protection that goes with an expansion in size and complexity of a project.

In the construction industry, the risk of consequential damages can amount to a kind of scope-creep. In addition to the compensatory damages you could face for loss or injury if you lose an arbitration or court case, you might also be hit with consequential damages—the term for payment ordered by a court or arbitrator for losses that result indirectly. This may include the loss of expected profits. In one well-known case, a contractor's delay in the partial renovation of a casino meant that a glass facade due in May wasn't substantially completed until August. The aggrieved owner terminated the agreement and brought an arbitration for lost profits. The arbitrator awarded $14,500,000 to the owner (on a contract for which the contractor's fee was $600,000), and the court upheld the arbitrator's award.

This kind of disaster can be avoided by the simple expedient of including a limitation on consequential damages in your contract with the owner. One architect came to me too late: His owner/client wanted a bigger residential renovation than originally planned, and on top of that was moving to another location while the work was underway. The potential for consequential damages proved to be a real and present danger. Delays in completing the project were attributed by the contractor to the architect. So the additional living expenses incurred by the owner while waiting impatiently in temporary quarters were among the consequential damages when the dispute ultimately became a legal fight.

In sum, scope-creep can mean that big risks go with the big benefits of an expanded job. Be sure to spell out warnings that may not have been applicable to the original job. The moment you hear your owner wants you to do more, much more, take a deep breath and retrieve your file with the engagement letter. See if it provides for an expansion of the project, if additional fees are clearly described, and how often you're expected to show up at the site. Also, determine the forum for addressing disputes—and if you have adequately limited your financial risks if something goes wrong. ■

Robert F. Herrmann is a lawyer and principal of the New York-based firm Menaker & Herrmann LLP.

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A SPRAWLING SHOW IN LONDON TRIES TO CAPTURE THE MANIC PACE AND SELF-CONSCIOUS WAYS OF REM'S FIRM. BY CHRISTOPHER HAWTHORNE

IN THE LATE SUMMER of 2010, the Belgian Pavilion was the talk of the Venice Architecture Biennale. Curated by Rotor, a young Brussels-based design collective, the pavilion was a beautifully sincere, irony-free study of the ways that architecture ages and is worn down by daily use. In the midst of the Biennale, which is often obsessed with new buildings and gymnastic forms, it was a subtly radical display.

The notoriety Rotor gained with that job helped it win its most prestigious commission to date: organizing a massive retrospective of the Office for Metropolitan Architecture that opened in October at London's Barbican Art Gallery and runs through February 19. Working on a project of this kind with Rem Koolhaas, who founded OMA in London in 1975 with Madelon Vriesendorp and Elia and Zoe Zenghelis, couldn't have been easy; though OMA picked Rotor to organize the show, Koolhaas seems constitutionally incapable of a hands-off approach.

Nearly all of the wall text in the exhibition *OMA/Progress* was written by Rotor, but it occasionally includes annotations in Koolhaas's handwriting. Considering the age difference between the curators and their subject—Rotor's members are mostly under 40, Koolhaas is 67—it's not difficult to read the result as something of an Oedipal production.

Readers may interject here that OMA is not simply Rem, and vice versa. (At the moment, the firm has seven partners, including Koolhaas.) From its earliest years, OMA, as its intentionally bland, collective name indicates, has been at pains to promote the idea that it is a collaborative office. As Koolhaas put it in a recent interview. "It's not purely my voice. It's more of an orchestration." One of the small pleasures of the exhibition is reading the fine-print credits on some of the projects and being reminded of all the talent OMA has cultivated and sent out into the architecture world over the years. (Those alumni include Winy Maas, Dan Wood and Amale Andraos, Bjarke Ingels, Farshid Moussavi and Alejandro Zaera-Polo, Minsuk Cho, and many more.) At the same time, of course, Koolhaas is among the brightest single stars in the architectural sky, with a blazing self-regard to match.

One of the exhibition's strengths is the sidelong, conscientiously indirect way it approaches

ABOVE: **Organized by the Belgian design collective Rotor, the exhibition includes stools made from the same blue foam that OMA uses for its study-models.**

FOLLOWING PAGE LEFT: **One of OMA's many projects scattered around the globe, the Casa de Música opened in Porto, Portugal, in 2005.**

FOLLOWING PAGE RIGHT: **OMA reimagined the skyscraper with its CCTV project in Beijing, bending the tower into a two-legged structure connected at the top.**

these themes. If it can be tough to parse the authorship of an OMA building, the same is true of the show. Rotor establishes its control over the proceedings not with top-down gestures of authority, but by means of a strategically messy, agglomerative strategy. Koolhaas gets to contribute to this museum-world version of a Wikipedia page on OMA's evolution—but he is one of many would-be historians tweaking the text.

The first two rooms feature densely arranged boards that OMA itself produced for many of its best-known projects. It's a way for Rotor to acknowledge that OMA, a famously self-critical office, has in essence been curating its own output for years. But as it turns out, that hall of mirrors is something of a false start. After making your way through it—and past a special OMA gift shop—you come to a piece of unadorned, beat-up drywall that officially announces the exhibition, with a guard stationed there to take your ticket.

The wall text at this second entry point begins with a surprisingly banal statement of curatorial purpose. "The problem with architecture shows is that they can't show what they promise: architecture," it reads, reviving a complaint about architecture exhibitions that has been endlessly rehashed in recent years. It continues: "This exhibition gives an outsider view of the insides of a particular architecture office. *OMA/Progress* is a portrait that consists mostly of found materials, materials that exist for reasons other than this exhibition."

Yet prominently displayed in the very next room is a note from Koolhaas to his architectural associates, which the curators point out was "found pinned on the kitchen wall of the OMA office in New York." Dated 1998, it includes the following admonition: "It is crucial that each of you take responsibility for the preservation, maintenance and, if necessary, repair of models, drawings and other evidence of architectural research."

There are certainly moments when this curatorial strategy—raise an idea only to immediately undermine it, as Koolhaas and OMA have done so often over the years—seems too clever by half. But in the galleries that follow, as the exhibition snakes across two floors of the Barbican, Rotor's approach manages to produce a deft, fitting portrait of contemporary architecture's most complex and influential firm, one that can seem self-satisfied and self-flagellating at the same time.

The show is exhaustingly thorough. (As Rowan Moore wrote in *The Observer*, "Don't expect to understand or even see it all. Nobody will, not even the people who made it.") There are rooms on OMA buildings that move (the famous house in Bordeaux); on projects that were put on ice by the economic crisis (a vertiginous condo tower for Twenty-second Street in Manhattan) or dramatically modified to save money (Cornell's Milstein Hall); and on designs dominated by the truss (CCTV in Beijing, the Wyly Theater in Dallas). There are inside jokes (squared-off stools made of the same blue foam that OMA uses for its intentionally crude models). There is a slideshow that shuffles through every digital image–3.5 million in all–stored on every one of the firm's servers.

There is also a small section the curators call the "secret room"; its walls are plastered with documents found in OMA's administrative files and its recycling bins. The most poignant is a written request by an anonymous young staffer, made nearly a year in advance, for two days of vacation. There is also an RFQ mailed by Harvard University on June 30, 2008, noting that proposals are due back in "July 2008."

That manic pace—and the complexity of contemporary architectural practice—is something that OMA has embraced from its earliest days and has incorporated into its work in direct, strategic fashion. As if to illustrate that idea, the exhibition includes the boards for an ill-fated OMA proposal for Universal Studios in Los Angeles, commissioned by Edgar Bronfman, Jr. The accompanying description of the scheme, written by the firm, compares the Universal job to other famous architecture for corporate America, including Mies van der Rohe's Seagram Building in New York, an earlier Bronfman-family commission: "It soon became apparent that the commission was less straightforward than it seemed. Where in '54 Seagram was a single entity with a clear identity that would be relatively stable during the five-year minimum that any architectural enterprise takes from beginning to end, that was no longer the case: by the mid-'90s, the substance and nature of any corporation was in constant flux, if not turmoil."

This is the culture for which OMA has always designed buildings, and the one Rotor has so energetically tried to recreate inside the Barbican. Forget the crystal-clear Modernist dictates that drove Mies; flux and turmoil are the muses for our age. I don't know if that counts as progress, but it seems to be just the way OMA likes it. ■

PHOTOGRAPHY: © LYNDON DOUGLAS (OPPOSITE); OMA/COURTESY BARBICAN ART GALLERY (LEFT); JIM GOURLEY/COURTESY BARBICAN ART GALLERY (RIGHT)

Christopher Hawthorne is the architecture critic of the Los Angeles Times *and the co-author, with Alanna Stang, of* The Green House: New Directions in Sustainable Architecture.

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UNIDENTIFIED ACADEMIC OBJECT

In Russia, a business school flouts the traditional buildings-around-a-green campus organization in favor of a more winter-friendly megastructure.
By Asad Syrkett

ABOVE AND OPPOSITE: **The school sits in the vast and sparsely wooded village of Skolkovo, just outside Moscow's western boundary.**

FAR LEFT: **In the cafeteria, as in other interior spaces, walls are painted in punchy, saturated hues and lit from overhead by fluorescent tubes and amoebic skylights.**

LEFT: **The seven units within the disc-like main building are given the names of countries. "Russia," seen here, houses classrooms and meeting rooms.**

View additional images of this project at architecturalrecord.com.

PHOTOGRAPHY: © IWAN BAAN

IN THE ICY outskirts of Moscow lies a massive new complex: one part academic institution, one part alien mother ship. Designed by London- and Berlin-based Adjaye Associates, the Moscow School of Management, Skolkovo, is a 460,000-square-foot megastructure that contains all the usual facets of campus life—classrooms, lecture halls, a cafeteria, and a 660-seat auditorium, among others—in a series of interconnected buildings. In 2006, in conjunction with a state-led, Vladimir Putin–endorsed push to make Moscow a prominent center of world trade, a contingent of Russia's wealthiest businessmen—including magnate Roman Abramovich, the world's 53rd richest person—launched the initiative to establish Skolkovo. Four years and $250 million later, a new university had risen.

The central structure is a poured-in-place concrete disc 475 feet in diameter that houses academic and recreational facilities. Entrances and parking are tucked beneath the disc on the ground level, allowing visitors to avoid the cold by driving into a garage-like enclosure. The customary campus green, fine for more temperate climates, is replaced at Skolkovo by interstitial spaces between "teaching units" that are used for informal gathering and exhibiting student work. Four boxy volumes of varying sizes, clad in a mosaic of colored aluminum-composite panels, sit atop this base. These blocks are largely filled with residential spaces, including 123 dormitory-style student suites and a 126-room hotel for visitors. One of the four rectilinear structures, distinguished from its comrades by golden aluminum cladding, contains athletic facilities, including a gymnasium and fitness center.

Though the school was built with Russia's future in mind, the scheme of principal David Adjaye owes much of its form and shape to the country's past: The building recalls the outsized, geometric modernism of 1920s- and '30s- Constructivist architecture in the former Soviet Union. As in Vladimir Tatlin's seminal Monument to the Third International (1920), an unbuilt proposal for an iron-and-steel government office tower in St. Petersburg, each function in Adjaye's business school is given discrete real estate.

But Adjaye points to a different source of inspiration: the work of Russian Suprematist painter Kazimir Malevich. Malevich's radical paintings of the early twentieth century featured color-blocked squares, circles, and rectangles, arranged in a deceptively helter-skelter way that belied the artist's attention to detail. The disc and rectangular volumes at Skolkovo were composed in homage to his work.

By breaking up the mass, creating a dynamic, graphic facade, and designing spacious, light-filled interior spaces, Adjaye demonstrates that enormous structures need not be unwieldy. In his hands, this spacecraft of a school just might take flight. ■

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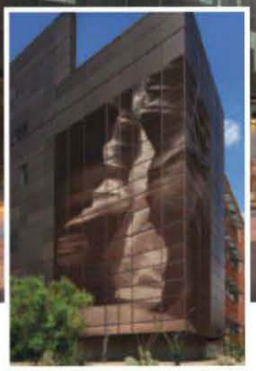

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CIRCLE 04

HOUSE OF THE MONTH INGRID SPENCER

A CONCRETE HOUSE IN TAIWAN BY BEHET BONDZIO LIN ARCHITEKTEN CONTAINS MANY SPATIAL SURPRISES WITHIN A NARROW STRUCTURE.

DESIGNING A house on a narrow lot in the bustling city of Taichung, Taiwan, called for a certain imagination—especially when it was intended for a family of three with an extensive art collection. The architects, a Münster, Germany–based firm, Behet Bondzio Lin Architekten, wanted to make sure the narrow (30 feet wide) and long (98 feet) house, known as Haus Flora, would be able to receive ample daylight, yet still afford privacy to its residents.

By building a four-story, poured-in-place concrete structure, organized around an internal open courtyard and fish pond, the architects were able to accommodate a range of functions while creating a spacious, livable home. The street elevation opens onto a garage and a passage leading to the courtyard and the gallery/living area at the rear. The lower floors of the house contain four galleries for sculpture, painting, crystal, and photography, while additional living spaces and bedrooms (office and master bedroom in the rear, and children's rooms at the front) are located on the upper levels. There are two below-grade parking levels.

Concrete columns and beams often subdivide the spaces in the 15,000-square-foot house, providing a sense of scale. "We thought about architecture as aperture," says principal-in-charge Yu-Han Michael Lin, adding that the concrete elements framed views that "arrest and release the stream of daily life."

Circulation, flow, and views all become salient elements in Haus Flora's design, since open spaces or gaps within the systematically stacked volumes suffuse light from one split-level to another.

RIGHT: **An unassuming street elevation disguises a courtyard within and an entrance to the garage underneath.**

BELOW: **At the rear of the house, concrete decks and sectional cuts allow natural light to permeate the sitting area and an elevated dining space.**

BOTTOM LEFT: **Parallel to the garden is a series of niches for displaying art, and large steps leading to a sitting area in the front.**

"We look on architecture as aperture," says architect Yu-Han Michael Lin.

The floors are clad in teak, except when they are treated as internal extensions of the garden terraces: The living room, dining room, and sculpture gallery, for example, are sheathed in ocean-gray marble. Bedroom doors slide open and disappear, while bathrooms are placed inside blocks clad in contrasting materials (teak when set inside areas with marble floors, white-painted wood inside spaces with teak floors). Adding to this play of volumes, planes, light, and space are custom-designed glass cubes that match the pattern of the courtyard walkway and display the crystal collection.

Lin's client, Flora Tseng, who spent many years in the United States living near the ocean, says the center courtyard's grass and water give her a sense of her erstwhile scenic environment. But about building this unusual house in central Taichung? "We're proud to have a unique home that pushes forward architecture in Taiwan," she says.

"To us, it's the perfect blend of design, comfort, and practicality." ■

PHOTOGRAPHY: © CHRISTIAN RICHTERS

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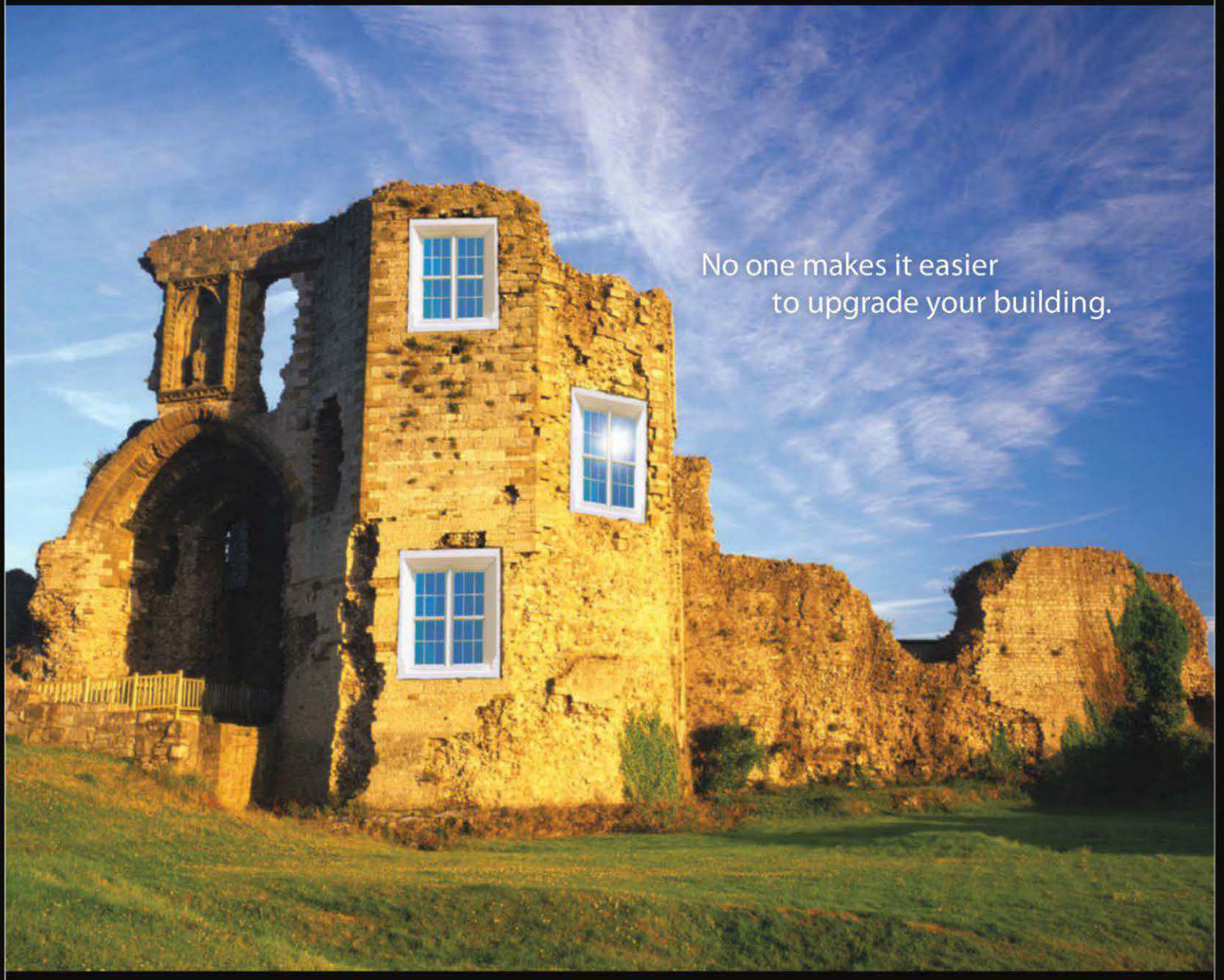

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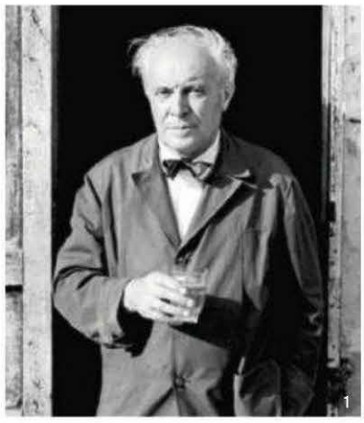
The Resurrection of a Classic '60s Tile Design

FOR THE Milan Triennale in 1960, Italian architects Gio Ponti and Alberto Rosselli designed the "4 times curved" ceramic wall tile, a Moorish shape with four curves made in various colors for the Modena, Italy-based Marazzi Group. Due to technical difficulties in producing the complex, puzzle-like form at the time, it never entered the company's line. Five decades later, with the help of state-of-the-art water-jet cutting technology, Marazzi has interpreted Ponti and Rosselli's original design with Progetto Triennale, a collection of porcelain stoneware, ceramic, and crystallized stoneware for both horizontal and vertical surfaces.

"Ponti and Rosselli wanted to study an untraditional and completely new design for tiles," says Dr. Maurizio Piglione, CEO of Marazzi Group. "The original design of Triennale was inspired by the curve shape that in those years was a very interesting theme." The new line comes in 13 colors and four sizes (24" x 37", 12" x 18", 4" x 6", and 6" x 9"); special trims are also available to complete the puzzle design.

Called the "Father of Modern Italian Design" for his decades of work in industrial design, architecture, and in journalism as the founder of *Domus*, Ponti first worked with ceramics early in his career when he developed intricate craft pieces decorated with Neoclassical detail for Richard Ginori, a ceramics manufacturer near Florence. "Like Ponti's exuberant early decorative ceramics—often at odds with the orthodox ideas of any given decade—he created this Triennale system as a hands-on, innovative kit of ceramic forms," says Jane Thompson, a principal with Boston's Thompson Design Group who met Ponti during a design jury in Italy in the early 1960s when she was editor of *I.D.* magazine.



1. **Gio Ponti, shown in Caracas, Venezuela, during the construction of Villa Planchart in 1954.**

2. **A wall feature with 12" x 18" Bianco, Nero, and Giallo colored tiles. 24" x 37" Bianco tiles cover the floor.**

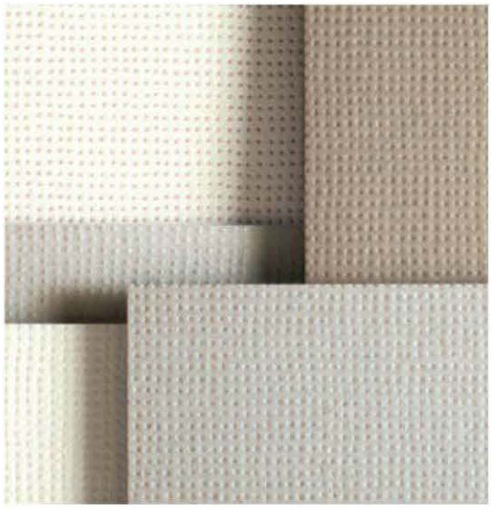
3. **4" x 6" wall tiles form a repeating pattern in Bianco and Turchese.**

4. **A wall installation displaying the 6" x 9" puzzlelike pieces in Lite Bianco, Lite Nero, and Lite Tortora. 12" x 18" Tortora tiles cover the floor.**

However, Ponti's product-design work extended far beyond ceramics. "Ponti is famous for the richness and variety of his work," says Salvatore Licitra, Ponti's grandson and curator of the Milan-based Gio Ponti Archives. "Even today, many of his pieces are in production," he says, naming designs like the Superleggera chair by Cassina, lamps by Fontana Arte and Venini, textiles by Maharam, and silverware and cutlery by Christofle.

Introduced in Europe last October, Progetto Triennale is planned to launch in the U.S. later this year. It may have taken over 50 years to arrive, but for fans of Mid-Century modern Italian design, this is one tile that was worth the wait. *American Marazzi Tile, Sunnyvale, Texas.* marazzitile.com CIRCLE 200

PHOTOGRAPHY: © G. PONTI ARCHIVES/S. LICITRA, MILAN



Reclaimed Hardwood Flooring

Viridian Wood Products viridianwood.com

Portland, Oregon-based Viridian Wood Products has introduced two new 100 percent reclaimed and FSC-certified, commercial-grade, exotic hardwood flooring products. Both the Jakarta Market Blend and Fishtail Oak flooring are milled from reclaimed shipping pallets and crates sourced from docks and harbors. They are extremely hard, and well-suited for high-traffic applications. CIRCLE 201

Pico Tile by Ronan & Erwan Boroullec

Mutina Ceramiche mutina.it

Designed for Mutina Ceramiche by brothers Ronan and Erwan Boroullec, Pico is inspired by the compressed sand and minerals that make up ceramic tiles. Intended for public or residential spaces, the tile collection comes in a white, gray, or sand base color. Pico's matte texture is the result of two relief surfaces: "Down," with sunken dots, and "Up," with elevated dots (both shown here). CIRCLE 202

Fireplace Surrounds Collection

Eldorado Stone eldoradostone.com

Eldorado's new collection is a series of hand-crafted, limestone-veneer fireplace surrounds that are a fraction of the cost of natural limestone surrounds. The collection includes nine profiles that frame the fireplace, ranging from modern-minimalist to majestic and ornate designs. The models range in width from 42" to 52" and are hand-finished in a labor-intensive, four-step process. CIRCLE 203

Ikat Collection

New Ravenna Mosaics newravenna.com

Designer Sara Baldwin has interpreted the classic patterns of Central Asian Ikat textiles in a striking line of jewel-glass mosaics. The three Ikat patterns—Loom, Weft, and Pamir (shown)—are presented in five colorways. The collection is handcrafted in Virginia in a seamless, repeat pattern for vertical interior surfaces. Made-to-measure for the installation, there is a minimum "module" size to depict the repeat pattern in its entirely. CIRCLE 204

Platinum Series

Silestone silestoneusa.com

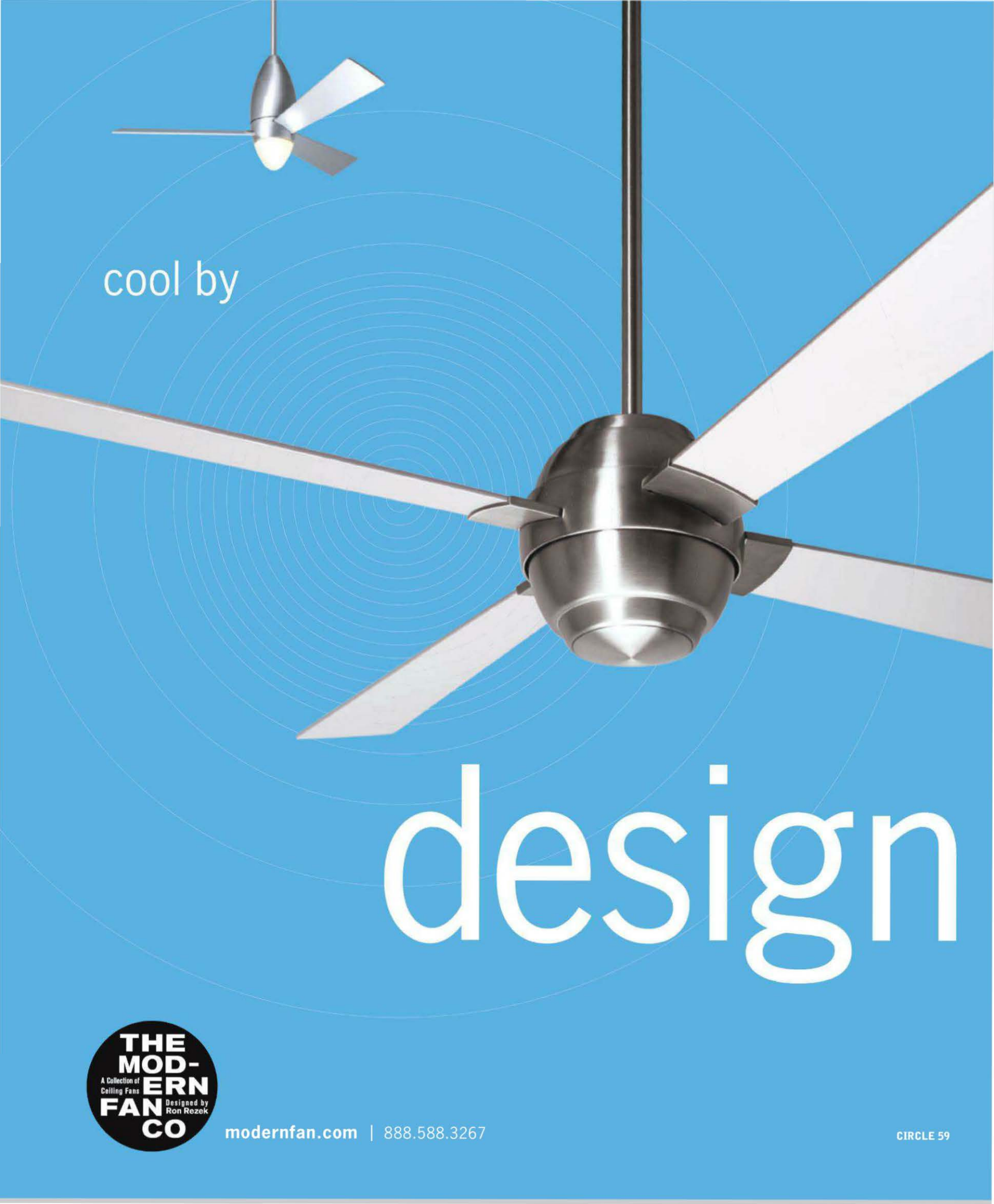
Silestone natural quartz has introduced White Platinum as the latest hue in the Platinum Series of surfacing for countertops, backsplashes, vanity tops, shower stalls, and fireplace surrounds for residential and hospitality spaces (shown here along with the Steel and Carbono shades). White Platinum features reflective, silver-toned specs created through a special heating process. CIRCLE 205

Eco-Terr Retro

CoveringsETC coveringsetc.com

A cheaper alternative to traditional terrazzo, Eco-Terr Retro is the latest addition to the Eco-Terr line of 70-percent recycled material derived from marble, granite, and stone-chip by-products of the manufacturing process. The new tile line offers highly pronounced, decorative geometric patterns that are available in a range of motifs including Mediterranean, Cuban, and Art Deco. Customizable patterns are also possible. CIRCLE 206

For more information, circle item numbers on Reader Service Card or go to architecturalrecord.com/products.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CIRCLE 60

Custom Designed Fascia is Engineered to be the Perfect Match

Photo courtesy of Craig A. Stough, AIA, Stough & Stough Architects

Building Type: Educational

Project: Sylvan Elementary School, Sylvania, OH

Architect: Stough and Stough Architects

Contractor: Advanced Roofing Inc., Westland, MI

Hickman Representative: Architectural Systems, LLC

Materials: Custom Design - Engineered Fascia

Sylvan Elementary went through a transformation with its recent addition and renovation. The addition needed to match the existing building and the design for the roof edge was an intricate cornice. The project required a high level of coordination between all parties involved so that the aesthetics of the existing building were achieved while still providing a strong roof edge system that would meet the region's wind requirements.

"The cornice was a unique challenge for our engineering team because of the large overall face dimension and the curves of the profile," says Adam Demchak, manager of engineering at Hickman. "We wanted to preserve the design intent and ensure that it met the International Building Code requirements." The engineered fascia was coupled with Hickman's standard Formed TerminEdge product, which is tested, certified and warranted in wind conditions up to 155 mph.

Accurate field measurements and templates were created so that the new metal would match up seamlessly with the design of the old. Intricate engineered drawings down to the smallest dimension were created. "Hickman's ability to duplicate a complex wood fascia profile in a single formed piece along with a standard TerminEdge at the roof edge allowed our crew to provide the owner with a great-looking installation and keep the project on schedule," says Rich Moeller, Advanced Roofing Inc. From the ground, the cornice looks almost as if it could have been made out of wood, but will not rot or warp over time.

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- Jason Gamache,
Sustainability Coordinator
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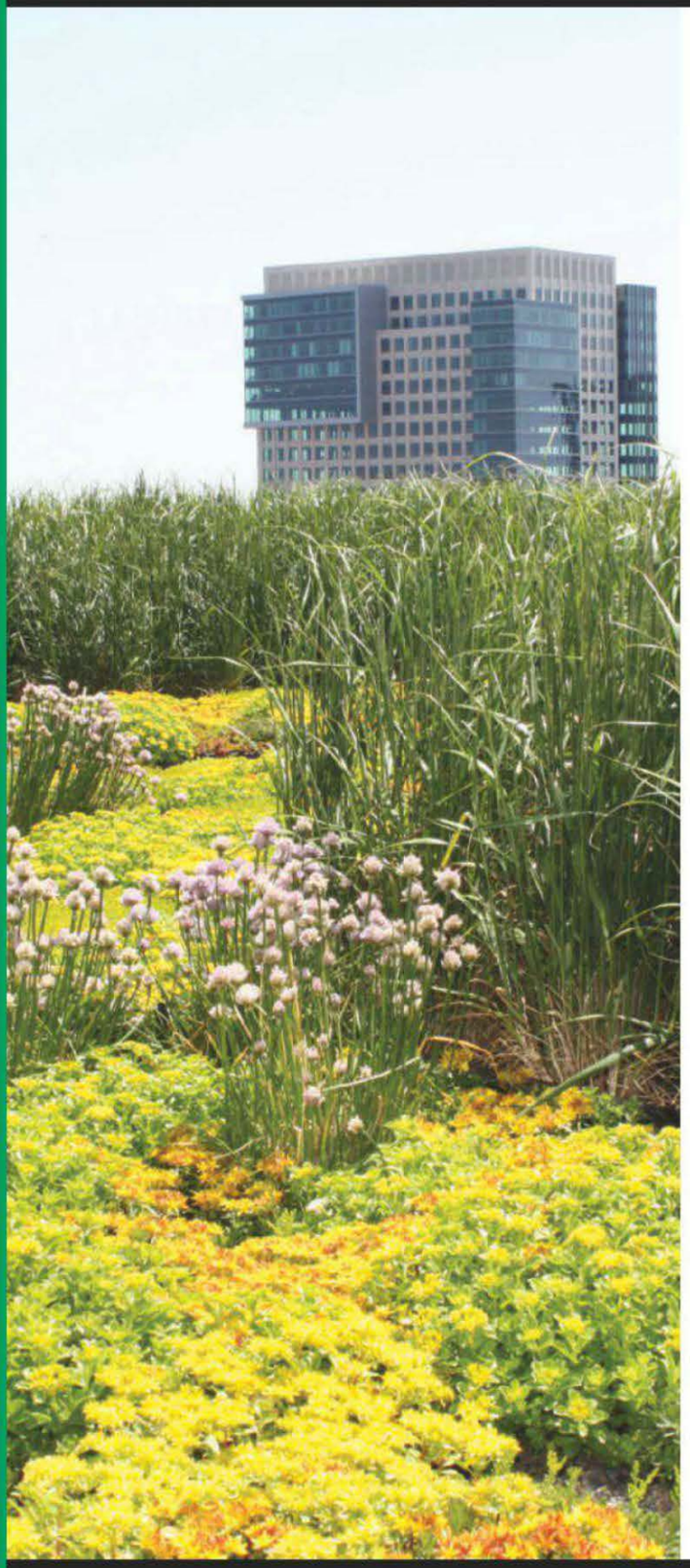

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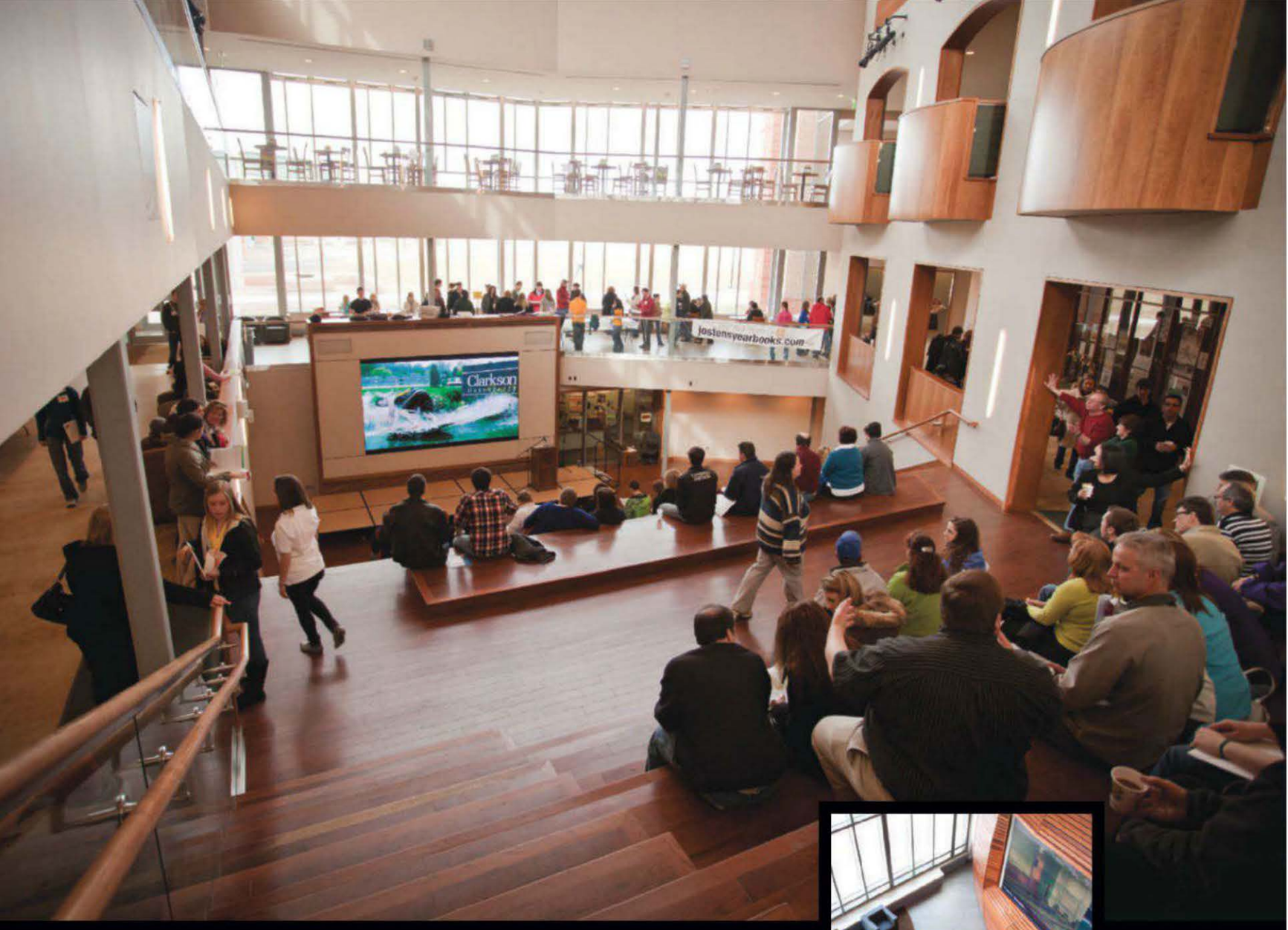

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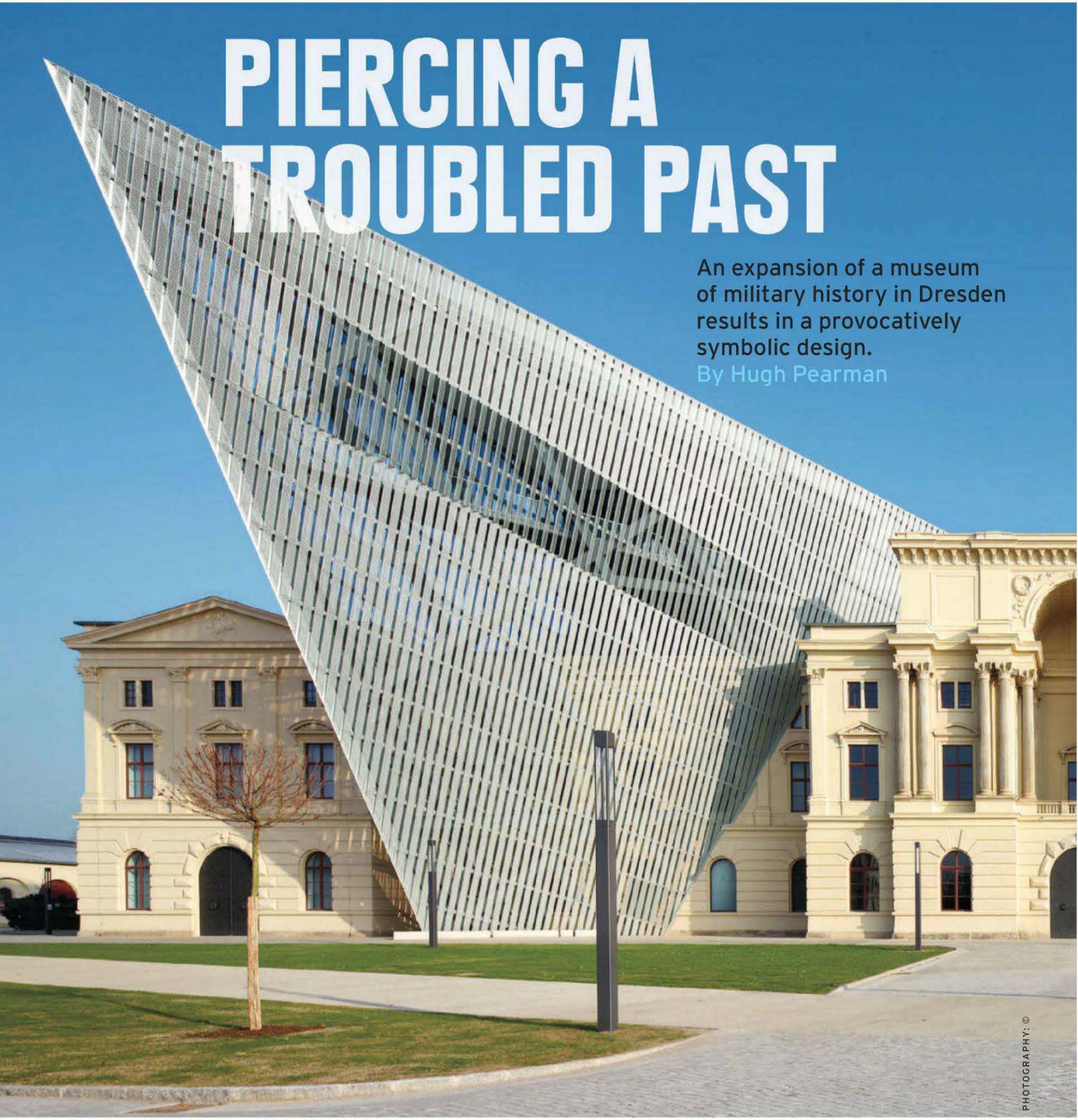
Military History Museum | Dresden, Germany | Studio Daniel Libeskind

PIERCING A TROUBLED PAST

An expansion of a museum of military history in Dresden results in a provocatively symbolic design.

By Hugh Pearman



PHOTOGRAPHY: ©

View additional images of this project at architecturalrecord.com.

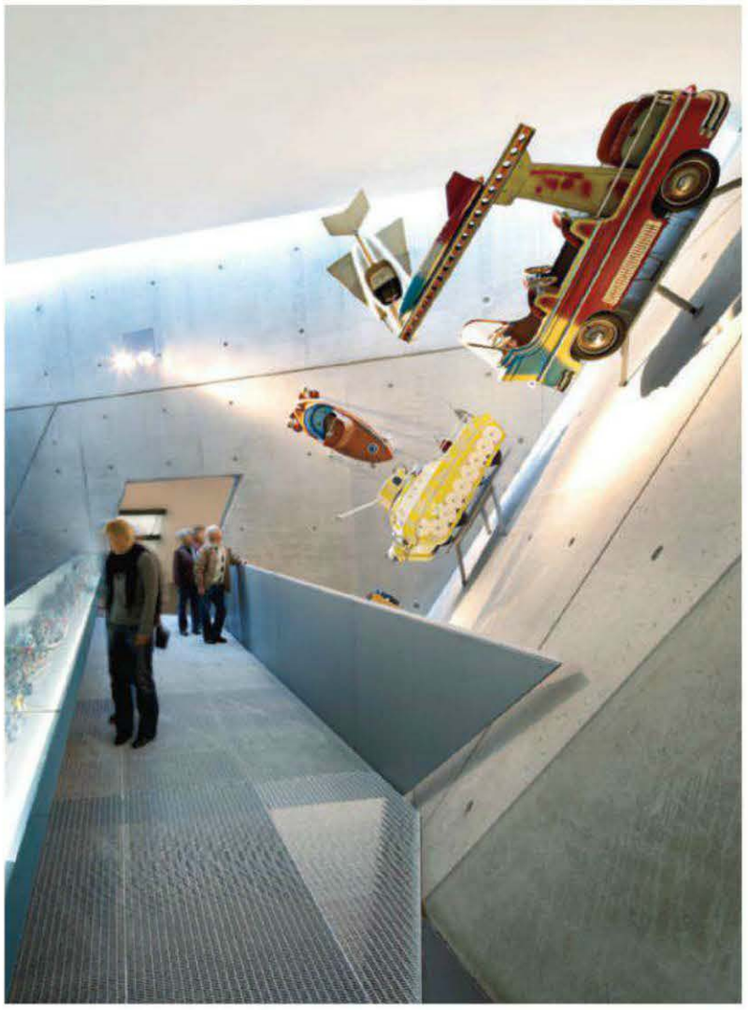
DRESDEN IS a place of ghosts and unease, the site of the most controversial and devastating series of Allied bombing raids of World War II. But today, the city is also a symbol of rebirth and reconciliation, epitomized by the painstaking reconstruction of its historic center—most notably the famous Baroque-style Lutheran church, Frauenkirche, (1726–43), designed with a virtuoso stone dome by George Bähr. A jagged heap of rubble during the Communist East German regime, the church was finally restored at a cost of $240 million in 2005, fifteen years after Germany's reunification. The city remains a supremely charged territory. And it is here that Daniel Libeskind has just expanded what had been a local East German museum into the largest museum in Germany, with 215,085 square feet of space. It is also now the official central museum of the German Armed Forces.

Seeing the place reminded me of my visit to Libeskind's very first completed project, the tiny Felix Nussbaum Haus art museum of 1998 in Osnabrück, another city largely flattened in the war and freighted with another charged context: Nussbaum, a Jewish artist, had perished at Auschwitz. As with that building and the larger Jewish Museum in Berlin (designed before the Nussbaum museum but completed later, in 2001), in Dresden, Libeskind once again adds to an existing building. Yet in this long-gestating project that he won in a competition in 2001, he has gone much further. Not content with merely extending an imposing 1876 former arsenal that was converted into a museum of military history in 1897, Libeskind has sliced through the structure. A new five-story concrete-and-steel wedge now forces its way at an angle from the back through to the front, bursting through the roofline and disrupting the serene symmetry of the original Neo-Renaissance building.

This simple concept—you could see it as an arrow, a missile, a crashed plane, a knife or sword, the prow of a warship—is an uncharacteristically direct choice of symbolism by Libeskind, who is sometimes inclined to overintellectualize in his search for form. Consider his 2001 Imperial War Museum in Manchester, England: Its three "shards" were conceived as simplified fragments of a shattered globe that the casual visitor is unlikely to pick up on at a glance. In Dresden, it's clear enough that the building is sundered by some huge weapon.

The Military History Museum, a former arsenal built in 1876, is pierced by a wedge that rises to a 98-foot height on the main facade.

PHOTOGRAPHY: ©



Libeskind has skillfully handled his angled incision, even to the extent of chopping through existing windows, which are neatly finished around the wedge's perforated aluminum skin.

The architectural sleight-of-hand is not quite a case of cutting a pie-shaped slice out of the old and then filling in the gap. Rather, the new section is grafted to the old, the steel structure lightly clasping the iron-and-sandstone mother ship with a certain amount of internal reconstruction providing wider-span spaces. The front section—the tip of the arrow—is empty, though it contains an 82-foot-high observation deck within it that looks out over the rebuilt city. The arrow points to the southwest, the direction from which the bombers came in 1945. The bombs destroyed the city in the shape of a wedge with a 40-degree angle at the tip—the same geometry as the Libeskind addition.

At the rear of the building, the twin barbs of the arrowhead are solid beneath the lattice-work skin to contain gallery space. Inside, angled walls of concrete follow the thrust of the arrow's path. Within the resulting wedge,

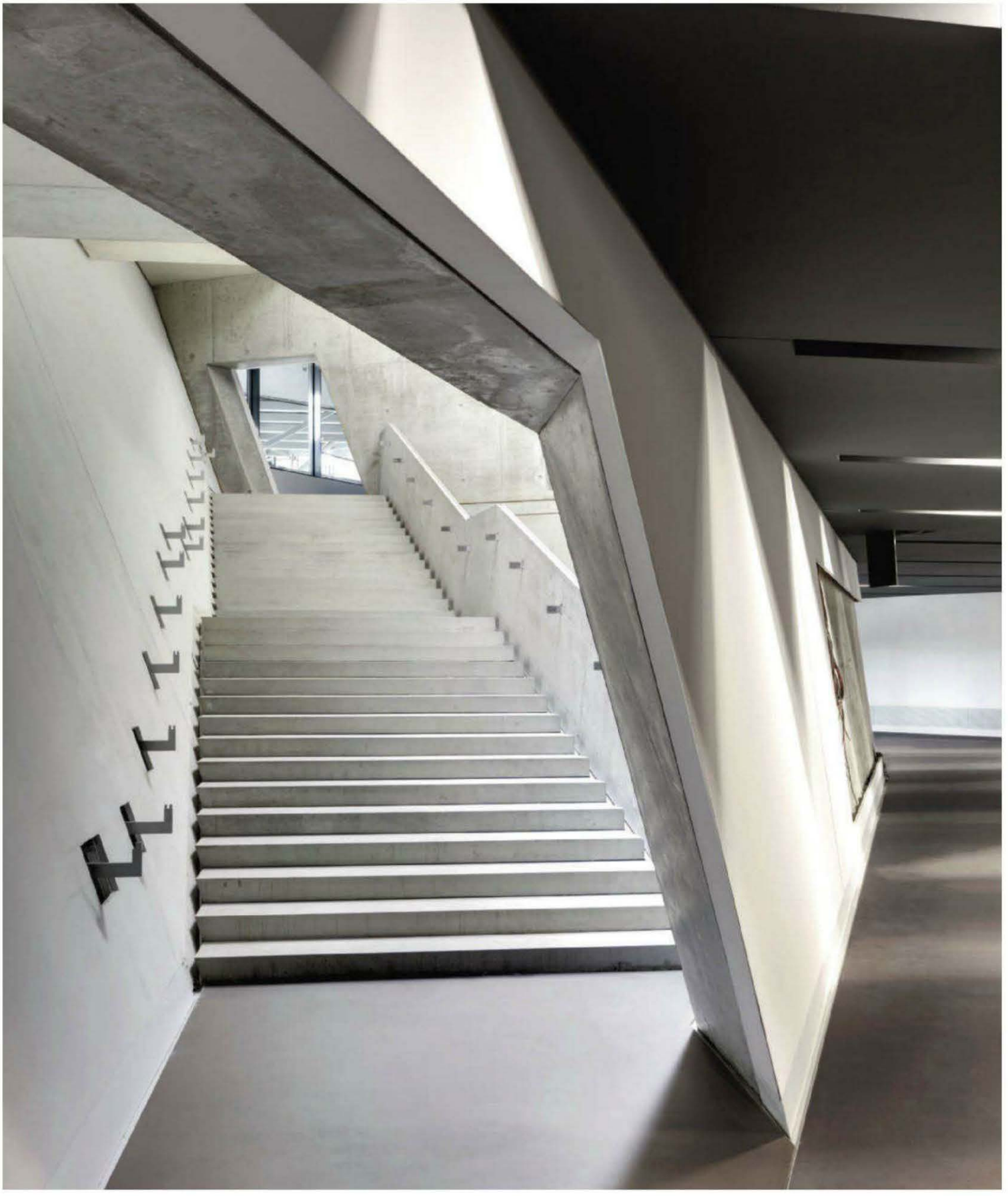
TOP LEFT: **The thematic exhibition installations, a collaboration between Holzer Kobler Architekturen and HG Merz Architekten of Zurich, emphasize the disorienting nature of the inclined planes within Libeskind's museum space. Military-inspired amusement-park cars are displayed on a concrete wall.**

TOP RIGHT: **Bombs rain down on a series of concrete shelters in a rear gallery of the new wedgelike exhibition space.**

LEFT: **The crevicelike spaces provide dramatic backgrounds for displays such as this military helicopter.**

OPPOSITE: **The narrowing of the angled stair contained within slanted concrete walls and floors (supported on steel beams) adds to a slightly disorienting perceptual experience.**

PHOTOGRAPHY: © HUFTON + CROW (PREVIOUS PAGE AND TOP LEFT); BITTER BREDT (TOP RIGHT AND BOTTOM)



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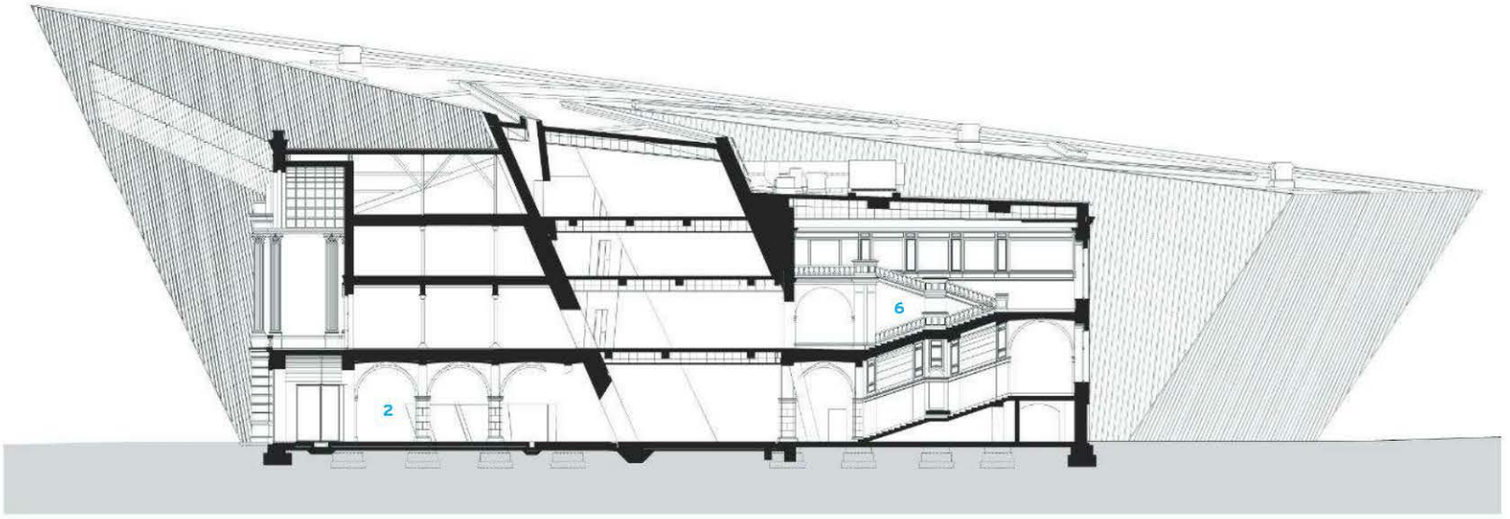

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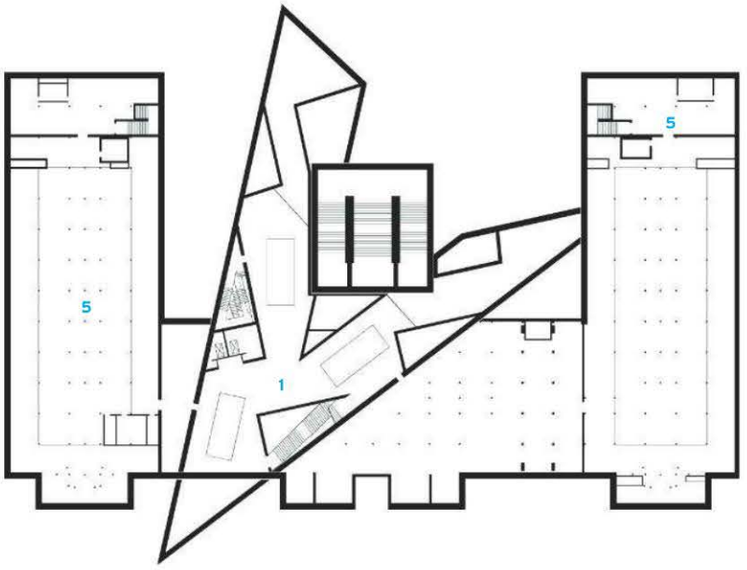
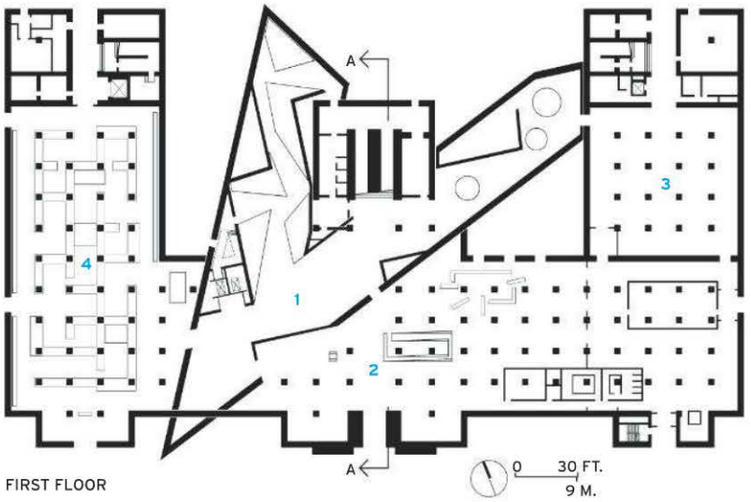


FOURTH FLOOR



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5 TECHNICAL ROOMS
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CREDITS

ARCHITECT: Studio Daniel Libeskind (Zurich) – Daniel Libeskind, principal in charge; Jochen Klein, project architect

COST AND SITE SUPERVISION: Reese Lubic Wöhrlin Gesellschaft von Architekten mbH

ENGINEERS: GSE Ingenieur-Gesellschaft mbH Saar Enseleit und Partner (structural); IPRO Dresden (technical facility equipment)

CONSULTANTS: Collaboration between Holzer Kobler Architects and HG Merz Architects

CLIENT: Federal Republic of Germany; German Armed Forces

SIZE: 215,085 square feet (gross)

COST: $86 million

COMPLETION DATE: October 2011

SOURCES

CONCRETE: Dykerhoff

METAL PANELS: ThyssenKrupp Hoesch Bausysteme

ALUMINUM SCREENS: Grepel

GLASS (4TH AND 5TH FLOORS): Saint-Gobain

EXHIBITION LIGHTING: Zumtobel

dark gray concrete floors and ceilings contrast with the lighter, restored old interior.

The separation of the wedge from the rectangular plan of the existing building is further reinforced by curatorial fiat. While the existing museum presents chronological displays—from 1300 to 1914, 1914 to 1945, and 1945 to today—the new wedge contains thematic exhibitions. They are arranged to include subjects such as military fashion, military toys, technology, and shelter. A freestanding structure at the front of the first floor becomes a mini-Libeskind building in itself and displays exhibits about the horrific effects of war on ordinary people.

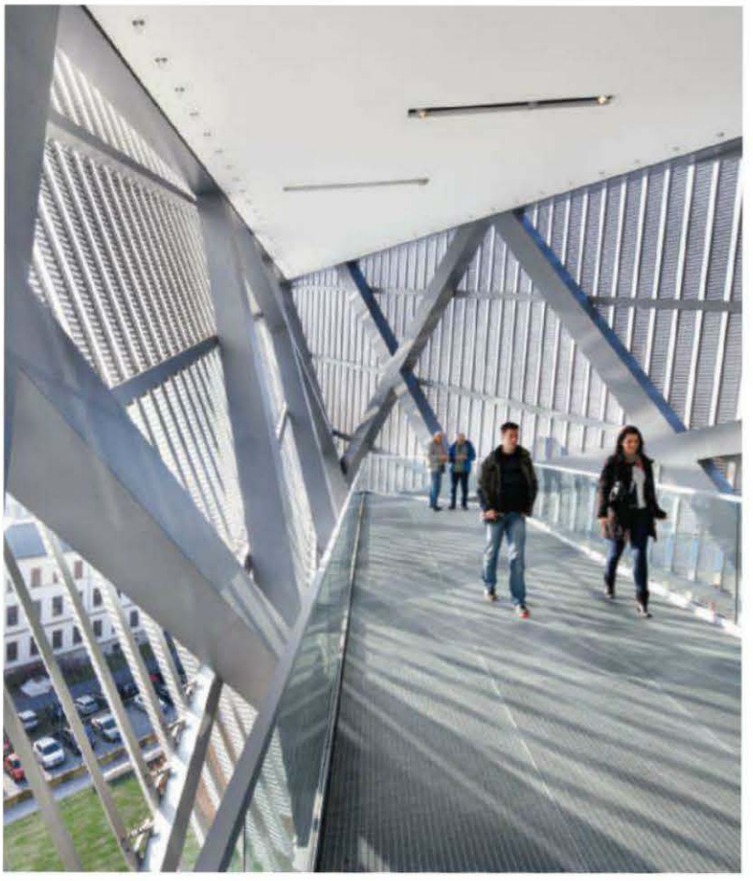
The Nazi era, represented in both chronological and thematic displays, is dealt with as dispassionately as the other periods—including the postwar Allied occupation and the emergence of rival armies for East and West Germany. This is far from being a museum that glorifies war or the instruments of death and destruction. The descriptions, presented in both German and English, make clear the cost of conflict.

Libeskind's design allows for some telling moments: For instance, one full-height space at the rear of the wedge contains a V-2 missile and above it, a Soviet-era Soyuz capsule. The one led to the other, as it did with America's space program. But in the other full-height rear gallery, rockets and bombs rain down on a series of massive concrete shelters.

The radical difference between the old and new spaces helps distinguish the chronological displays from the themed ones. Yet, as is often the case in Libeskind's architecture, the geometry leads to some strange leftover spaces that promote a sense of entrapment if you wander into them. Near the top of the museum, where the stairs climb into the bright new spaces, you feel the sense of journey toward... what? Here you arrive at the observation deck with a view over the city. In the gallery behind you is physical evidence of three cities destroyed in World War II: shattered pavements from Dresden and Wielun, Poland; a broken statue from an orphanage in Rotterdam.

This is architecture that is appropriate for its function, combining geometric rigor with clear commentary. While the museum is a streetcar's ride from the center, it shows a different Dresden apart from the revived, touristic old town. When Libeskind conceived the expansion a decade ago, he was at a creative peak. It shows. In this context, with this weight of history, this military museum is a force for good. ■

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



ABOVE: **The ribbed vaults and sandstone columns of the older museum establish a sharp contrast with the new incision.**

LEFT: **The steel-and-concrete observation deck in the wedge points toward the rebuilt city of Dresden, although the view is screened by aluminum mesh.**

PHOTOGRAPHY: © BITTER BREDT (TOP); HUFTON + CROW (BOTTOM)

Crystal Bridges Museum of American Art | Bentonville, Arkansas | Safdie Architects

BIG MUSEUM, SMALL POND

Walmart heiress Alice Walton's new institution, a series of pavilions in a forested ravine, links nature to a major collection of American works.

By James S. Russell, FAIA

View additional images of this project at architecturalrecord.com.

Visitors enter the chronological display sequence to the left of the dining-bridge (right), proceed across another bridge, and return through the modern-and-contemporary gallery-suite (foreground).

THE CENTERPIECE of the Crystal Bridges Museum of American Art, in Bentonville, Arkansas, is a vast room that rises in a graceful arc of laminated-wood roof beams and swells outward with canted walls of glass as it vaults a pond. An elaborate network of cables, pipes, and metal fittings suspends this spectacular copper-roofed contrivance from beefy anchors at either end, thanks to the engineers at Buro Happold. Sloping glass walls draw in the pond's reflections, while stripes of sunshine pour through skylights. This space is just the appetizer—it's a restaurant called Eleven—before the grand buffet of paintings and sculpture that fills up America's newest art museum.

The architect is Moshe Safdie, a maestro of spectacle, who seems to be everywhere in recent months. In Kansas City, Missouri, just 200 miles north of Bentonville, his Kauffman Center for the Performing Arts opened last fall. There, a vast lobby walled and roofed in glass and big enough to host a cotillion unites two performing-arts venues. In Washington, D.C., a cluster of overlapping, translucent quarter spheres flutters above the three-level atrium of the U.S. Institute of Peace. It opened in September (see RECORD, November 2011, page 24 and sidebar, page 69).

Safdie's work can be as hard to resist as a fattening dessert: You never get the anonymous mediocrity that has come to define our straitened times. In an era that's supposed to have set aside fanciful architectural spectacles for earnest social uplift, Safdie can seem to be a populist outlier. He recognizes that the theatrical gesture can ennoble public and institutional gathering places like the Peace Institute and the Kauffman Center. But he can also infuriate because too often, he's ham-handed.

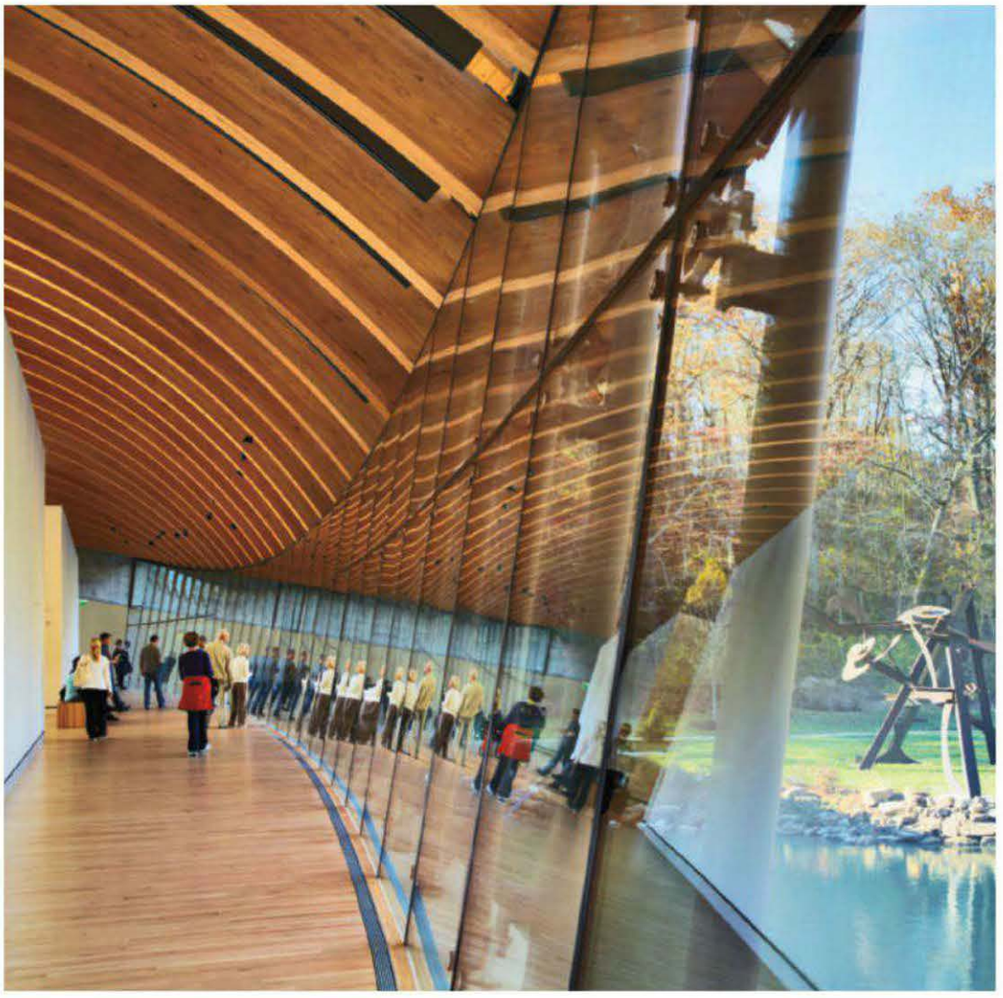
Of his new projects, Crystal Bridges is the most appealing because he attempts, if not entirely successfully, to let a lovely forested

BELOW: **Two vaulted, copper-and-glass bridges bookend concave-roofed gallery-suite pavilions. To enter, visitors descend via glass-faced elevators in the towers beyond. Education spaces open into the courtyard (visible at center of photo).**

OPPOSITE TOP: **A bridge devoted to dining and receptions opens from the entrance lobby of the museum. The outwardly-canted walls pick up daytime reflections from the pond, which are balanced by light from slit skylights between the Arkansas pine beams.**

OPPOSITE BOTTOM: **A bridge at the northern end of the museum houses white-walled galleries for early-20th-century art. Bolt-through glass fittings attach to external vertical pipe supports that frame into a suspended horizontal cable. The cable follows the swelling top of the glass wall and supports the roof beams.**

PHOTOGRAPHY: © TIMOTHY HURSLEY



ravine speak louder than his building.

Alice Walton, the Walmart heiress and second-richest woman in the United States, acquired an astonishing survey of four centuries of American art in just six years, with the help of veteran scholar John Wilmerding (see sidebar, page 67). The museum will not say how much the collection or Safdie's 93,000-square-foot structure cost, though the Walton Family Foundation has promised the museum $1.2 billion in additional funds. Clearly, the stakes were high—for Walton and for Bentonville, Walmart's hometown. Walton has said she wanted to build appreciation for America's artistic heritage in a region with little art on display. She sought out Safdie after she saw his 1994 Skirball Cultural Center in Los Angeles.

Inspired by the Louisiana Museum in Denmark, where a stunning natural setting is integral to viewing art, Walton and Safdie looked at a ridgetop site before deciding to set the museum in a ravine in the stream-laced woodland just north of Bentonville's central town square. Safdie dammed the stream to form the two-level pond and arranged the museum in eight pavilions that follow the ravine's contours. Yet the complex is too big for this setting—it doubled in size since his first design—and lacks the delicacy of, say, the late, great architect Fay Jones, who lived and worked in nearby Fayetteville and whose famous woodland chapels are as diaphanous as the forest. Safdie did not weave his pavilions into the landscape. He wedged them so tightly together that the forest becomes just a backdrop.

You could walk through Crystal Bridges thinking that architecture is the main event. Before you have set foot in a gallery, you have descended three levels in a glass-fronted elevator, crossed a circular courtyard, entered a high, daylit lobby, and gazed into the extraordinary restaurant-bridge. Safdie is canny enough to recognize that he had to create a destination, not just a museum—that, besides a great collection, visitors might need the lure of a fantastic architectural experience and a lush natural setting.

Safdie separates Crystal Bridges's large gallery-suites with glassy linking structures and daylit lounges that open onto views across the pond or into the landscape. He cuts in little balconies and courtyards. These vistas invite contemplation while echoing the museum's extraordinary landscape paintings by such masters as Asher B. Durand and Thomas Cole.

Safdie's work is full of references: to Louis Kahn in the cast concrete forms; to Mario Botta's way with striped walls; to traditional Japanese building in the laminated wood beams. But he only assembles these elements; there's no transformation of the whole that

Modern and contemporary art hangs in the largest of the gallery-suites. The suites were shaped to fit into the steep slopes of the ravine setting, which resulted in draping ceilings with laminated-beam supports and bowed walls.

ON THE RECORD

Buying American

***JOHN WILMERDING**, a Princeton professor and former deputy director of the National Gallery of Art, served as art advisor to Alice Walton as she acquired work for the Crystal Bridges Museum.* RECORD*'s William Hanley spoke with him about their six-year shopping spree to create the museum's extensive collection of colonial-through-contemporary American art.*

How did you start working with Walton?
We met in the fall of 2004. It's hard not to like her instantly. We were on the same wavelength and basically got to work in a five- or six-year frenzy. We would visit every dealer imaginable—mostly in New York, but also in the Southwest and on the West Coast. It was sort of kids at a candy counter.

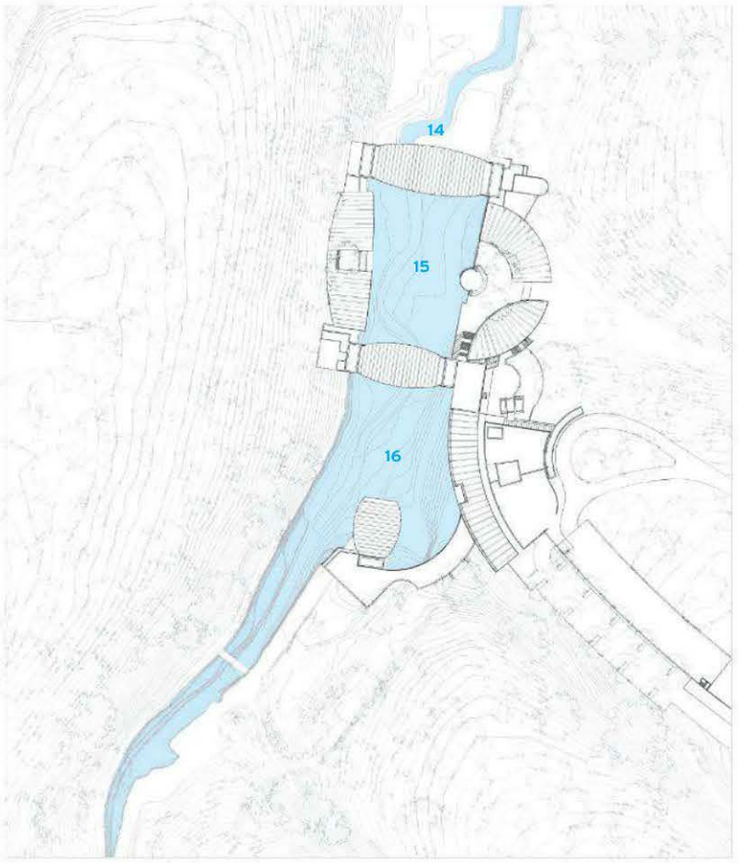
How did the scope and organization of the collection take shape?
Buying Asher B. Durand's painting, *Kindred Spirits* (1849), in 2005, triggered subsequent acquisitions over the next five years or so of landscape painting, which is a kind of subconscious thread that ties the collection together. Another unintentional theme was images of women. One of Alice's favorite acquisitions is an Alfred Maurer portrait of a woman. She's in a white dress—it's sort of a Whistlerian kind of picture—and she's smoking a cigarette. Later, through no particular consciousness, we acquired a large Tom Wesselmann cutout of a smoker's mouth. Alice is a reformed smoker, and she once said, "Wouldn't it be fun to hang the Wesselmann next to the Moore?" Well, they ended up in totally separate galleries.

Despite her fortune, Walton famously will not acquire work she thinks is overpriced. How did that affect your buying?
It drove me crazy. But she just won't do that. At auction, she was the underbidder on an Edward Hopper painting from Steve Martin's collection—and she had no Hopper oil. But she said, "It's an A-minus, not an A, and we're not going to spend the money." She takes the long view—she likes the idea of restraint, because it forces attention to quality and strategic planning.

How do you respond to critics who claim that you quietly tried to take advantage of institutions looking to unload important work, notably the Durand from the New York Public Library and the failed attempt to purchase the great Thomas Eakins's *The Gross Clinic* from Thomas Jefferson University in Philadelphia?
This is a particular bias of the Eastern press: that she's a raider going around saying, "You're weak and vulnerable, I want that." The fact is that virtually all of these acquisitions have been offered to her. The *Kindred Spirits* auction was a closed-bid, invitation-only sale. She won it and saved the work for the public domain—it could have disappeared into a private collection.

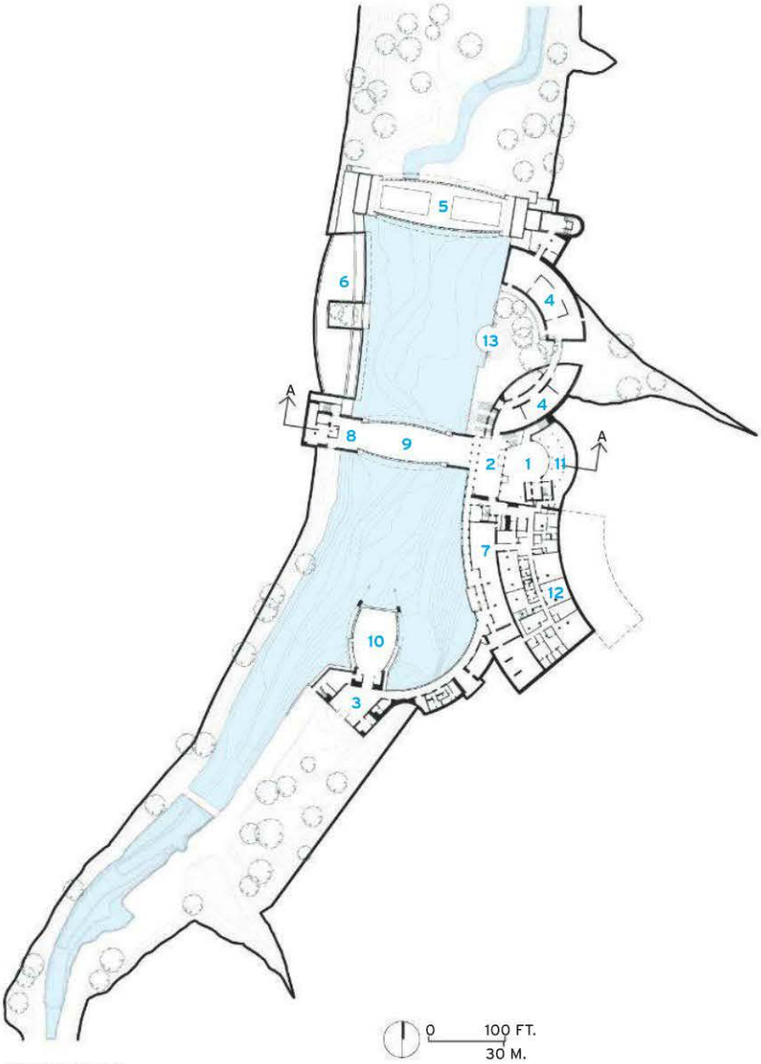
And what do you think of the museum building?
I think it's going to be transforming for its region—it's going to be our Bilbao.

According to Wilmerding, Walton was impressed by the narrative, technique, and "just the work's sheer presence" when they acquired Walton Ford's 2009 watercolor *The Island*. "This is not just going to be a museum that's a tomb. It's going to be fun, experimental, pushing boundaries."



SITE PLAN

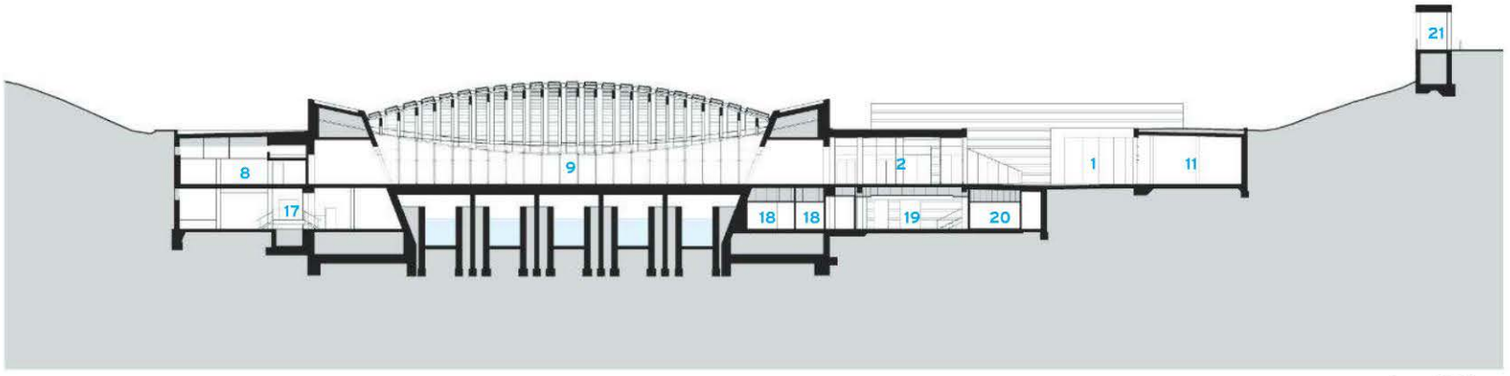
0 100 FT.
30 M.



GROUND FLOOR

0 100 FT.
30 M.

1 ENTRY COURT
2 LOBBY
3 SOUTH ENTRANCE/GREAT HALL LOBBY
4 EAST GALLERY
5 NORTH BRIDGE GALLERY
6 WEST GALLERY
7 TEMPORARY EXHIBITION GALLERY
8 KITCHEN
9 DINING BRIDGE
10 GREAT HALL
11 MUSEUM STORE
12 ADMINISTRATIVE OFFICES
13 PIAZZA/AMPHITHEATRE
14 OUTFALL POND
15 LOWER POND
16 UPPER POND
17 MECHANICAL
18 PUBLIC RESTROOMS
19 LOWER LOBBY
20 SUPPORT SPACE
21 ENTRY DROP-OFF ARCADE



SECTION A-A

0 20 FT.
6 M.

draws out deeper meanings. And the expressive exterior bravura at times overwhelms the art-viewing experience. As he shaped the pavilions around the pond and wedged them into the hillside, Safdie produced exhibition spaces with long, curved walls that unfurl a daunting array of paintings at once. A cavernous gallery devoted to Modern art dwarfs even the most monumental works.

But the real clunker comes along halfway through the chronological circuit, when you leave a series of windowless galleries to cross the pond on a glass bridge that is the twin to the restaurant bridge. The bridges are Safdie's most original contributions, but they are unsuited for art display. So Safdie had to build white boxes inside the glass bridge to provide walls to hang art on and ceiling scrims to control light (See page 85). It's a ridiculous feat, the architect ostentatiously solving a problem of his own making.

Visitors may well take away the sensuous memory of those "crystal bridges," the theatrical entrance sequence, and the pleasing alternation of galleries and views of the woods. But the art-viewing experience is merely serviceable. It's too bad that Safdie could not truly unite his collection of forms into an extraordinary, deeply realized whole. ■

James S. Russell is the architecture critic at Bloomberg News. *His book,* The Agile City: Building Well Being and Wealth in an Era of Climate Change, *was recently published by Island Press.*

CREDITS

ARCHITECT: Safdie Architects – Moshe Safdie, design principal; Hugh Phillips, principal in charge; Matthew Longo, project manager; Edward Stansea, project architect; Isaac Franco, Warren Mathison, Chris Mulvey, Howard Bloom, Rindala Awad, Andrea Morton, Jeff Brown, Jane Zimmerman, project team

ENGINEERS: Buro Happold (structural, m/e/p, f/p); CEI Engineering Associates (civil)

CONSULTANTS: Reed/Hildebrand Associates, Howell & Vancuren (landscape); Lam Partners (lighting); Ingersoll Rand (hardware)

CLIENT: Crystal Bridges Museum of American Art

SIZE: 93,000 square feet

COST: withheld

COMPLETION DATE: November 2011

SOURCES

EXTERIOR CLADDING: Cantera (architectural and structural concrete); Tremco (moisture barrier)

WIDNOWS/DOORS: Kawneer (aluminum curtain wall)

LIGHTING: Lutron (controls); Edison Price

ELEVATORS/ESCALATORS: Otis

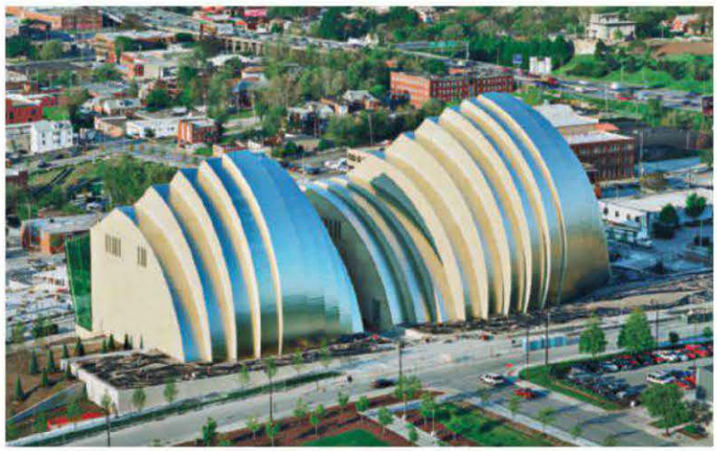
THE ARCHITECT'S PORTFOLIO

Glittering Tent, Fluttering Glass

Safdie's Kauffman Center and U.S. Institute of Peace

THE $304 MILLION, two-venue Kauffman Center for the Performing Arts has a dramatically split personality. Two majestic serrated half-spheres, clad in stainless steel, face downtown Kansas City, Missouri, evoking lonely grain elevators towering over a prairie. The spheres form the back, while the front of the 356,000-square-foot hilltop building faces away from downtown. The facade's 65-foot-high tilting glass wall, which runs the Kauffman's full width, encloses a spectacular lobby, with three concourse levels overlooking this tent of light. Safdie makes no attempt to reconcile front and back; he simply crashes them together into a glittering mega-object. Working with Theater Projects Consultants and Nagata Acoustics, Safdie shaped a 1,800-seat proscenium house for ballet and opera in a three-tiered horseshoe configuration. In the 1,600-seat concert hall next door, 11 curving, wood-fronted "vineyard-style" seating tiers surround the stage.

If you thought of doves' wings upon first seeing the $110 million United States Institute of Peace, you would not be the first, even though those roof-forms make an ill-fitting hat to the sober fortress they surmount. Still, the 150,000-square-foot building on the northwestern edge of the National Mall in Washington gives prominence to a little-known independent organization, created by Congress in 1984, that is devoted to conflict resolution. Two high, curving atria slice through the building's office spaces. The smaller one includes a light-filled staff café. The larger one features a stunning vista toward the Lincoln Memorial as it steps down two levels to unite teaching, conference spaces, an auditorium, and a planned public exhibition space. While much of the building is dedicated to research and training, the transparent and serene interiors are meant to convey a commitment to peacemaking to those who come to engage in resolving international disputes.



ABOVE: **The United States Institute of Peace, Washington, D.C.**

LEFT: **Kauffman Center for the Performing Arts, Kansas City, Missouri.**

Clyfford Still Museum | Denver | Allied Works Architecture

STILL LIFE

A muscular concrete structure provides a calm and fluid environment for appreciating the work of a maverick 20th-century artist.

By Clifford A. Pearson

View additional images of this project at architecturalrecord.com.

SURROUNDED BY a gaggle of noisy architectural neighbors, the new Clyfford Still Museum in Denver makes itself heard by speaking softly but clearly. Instead of the thunderbolt lines of Daniel Libeskind's addition to the Denver Art Museum next door, the quirky massing of Gio Ponti's 1971 North Building for that museum across the street, or the grandiose Postmodernism of Michael Graves's Public Library a block away, Brad Cloepfil's two-story Still museum is a calm haven for viewing the work of the pioneering Abstract Expressionist who died in 1980.

A poured-concrete box relieved by bands of glass and screens of vertical wood slats, the 28,500-square-foot museum sits behind a small grove of plane trees that are expected to grow to the same height as the building. The grove separates the museum from the hectic setting, providing a peaceful transition from sidewalk to entry. As the trees fill out, they will serve as a natural veil, conveying the idea that this piece of architecture isn't about iconic form-making or striking street presence. Cloepfil and his team at Allied Works Architecture had a different goal: to create a richly textured, well-lighted environment for showcasing the work of a talented but cranky artist who all but dropped out of the art scene during the last 30 years of his life (see page 75). According to Still's will, his collection of 2,400 of his artworks was to be given to an American city that agreed to keep it together and provide a permanent home dedicated to only his work. After his death, his widow spoke with a number of different cities, finally

BELOW: **The building sits behind a grove of plane trees with Libeskind's addition to the Denver Art Museum to the left.**

OPPOSITE PAGE: **Corduroy concrete with jagged ribs catches daylight on the front facade of the building. By changing the rhythm of the concrete formwork, the architect was able to vary the texture of the building envelope and break the elevations into smaller parts.**

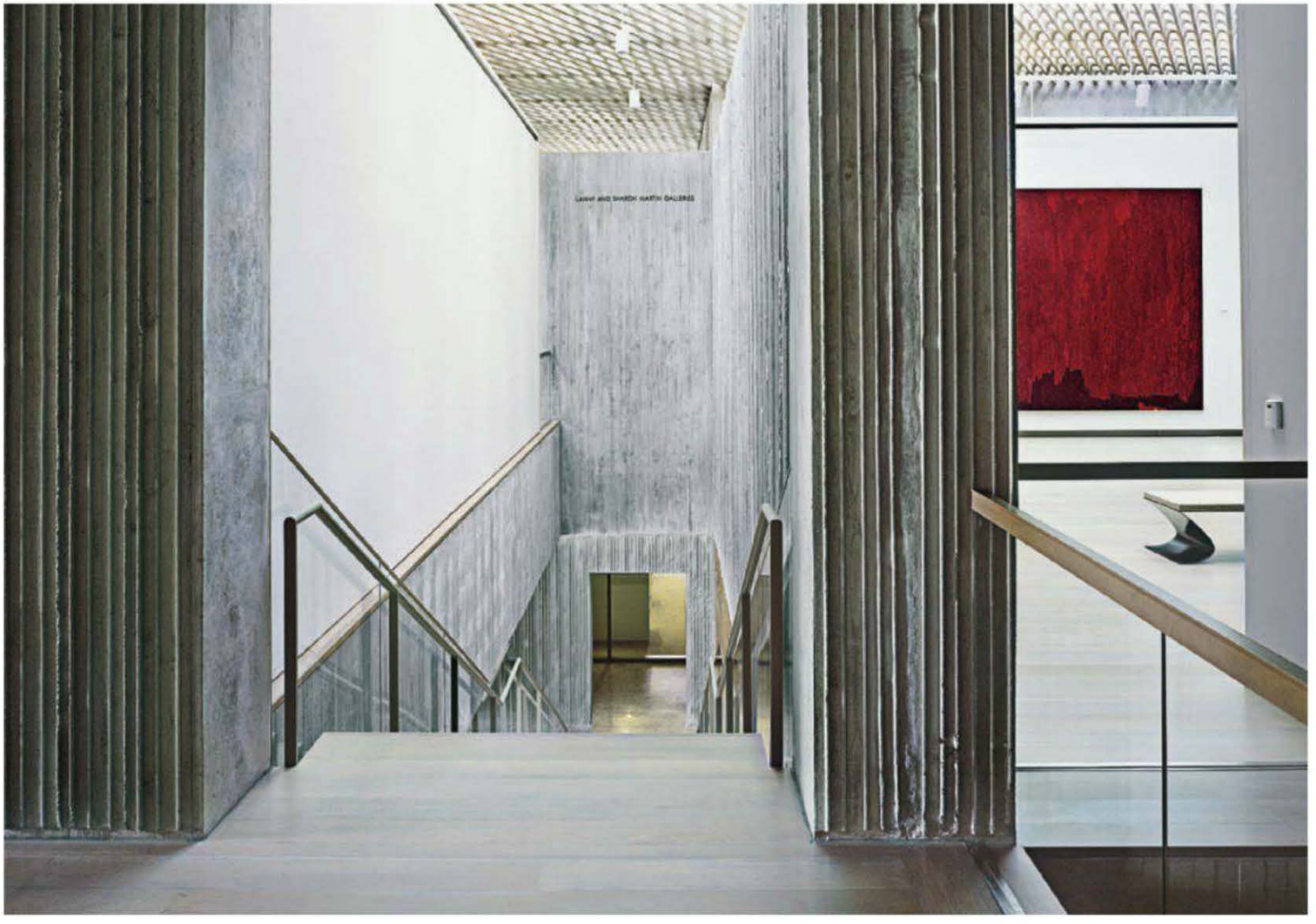
selecting Denver in 2004—though the North Dakota–born artist had no connection to the mile-high metropolis.

To connect the building to the earth, Cloepfil looked to geology. "I wanted the building to have a mineral quality," says Cloepfil. "The idea was to make one body with a simple form that opens up as you move inside it," he adds. At first, he imagined cladding the building with obsidian, and even used charcoal for his initial models. Eventually, he shifted to poured concrete, using wood formwork to create a range of effects—from a smooth finish touched with the wood's fine grain to a rough

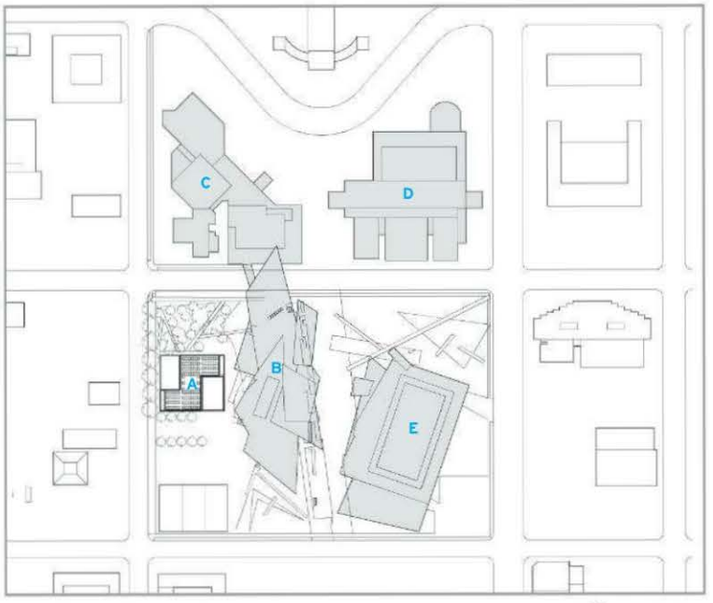
LEFT: **As he does in many of his projects, Cloepfil balanced heavy design elements like structural concrete walls with transparent ones such as the recessed, glazed entrance.**

BELOW: **The main stairwell is one of a series of double-height spaces that bring light and oblique views into the galleries.**

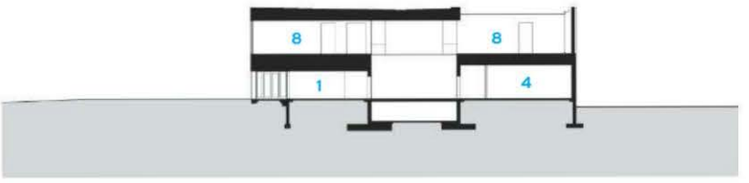
OPPOSITE PAGE: **A concrete ceiling screen filters daylight in a 17-foot-high gallery, where some concrete walls are flat, and others have vertical ribs.**



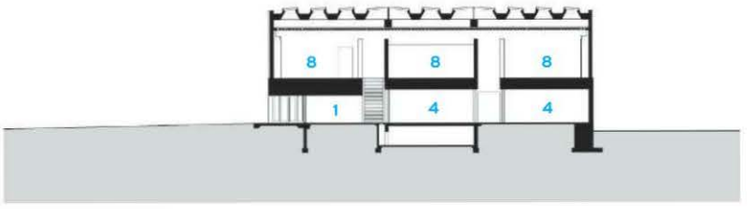
PHOTOGRAPHY: © JEREMY BITTERMANN, EXCEPT AS NOTED: RAUL J. GARCIA, COURTESY CLYFFORD STILL MUSEUM (TOP)



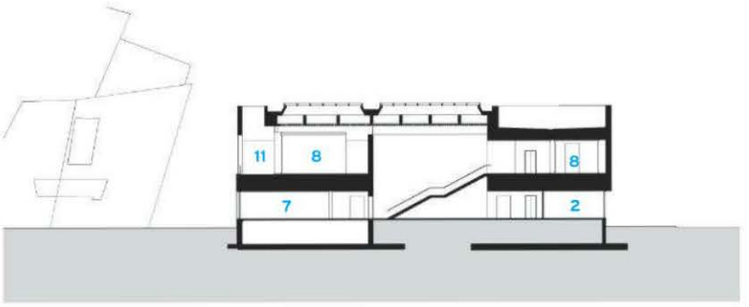
SITE PLAN



SECTION A-A



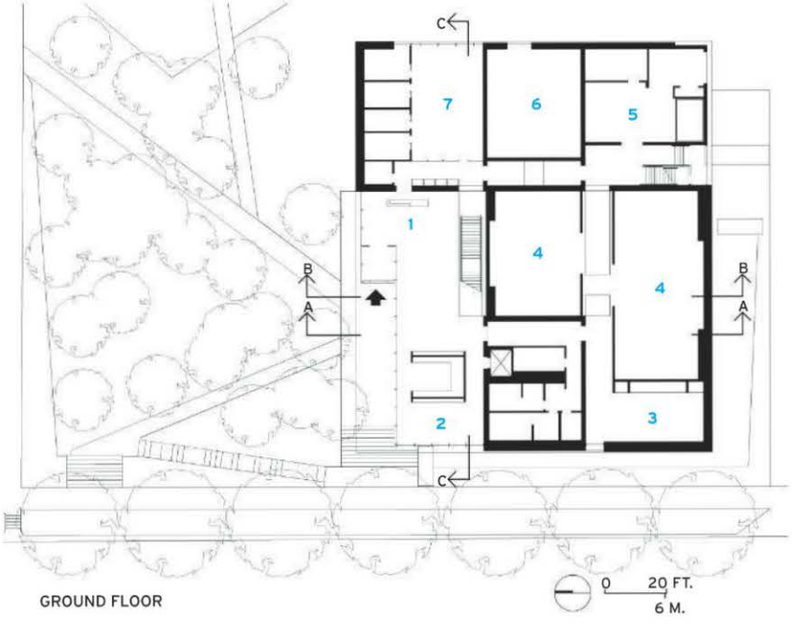
SECTION B-B



SECTION C-C

A CLYFFORD STILL MUSEUM
B DENVER ART MUSEUM ADDITION BY DANIEL LIBESKIND
C DENVER ART MUSEUM BY GIO PONTI
D PUBLIC LIBRARY BY MICHAEL GRAVES
E MUSEUM RESIDENCES BY DANIEL LIBESKIND

1 RECEPTION
2 RESEARCH LAB
3 CONSERVATION LAB
4 PAINTING STORAGE
5 SERVICE
6 MECHANICAL
7 ADMINISTRATION
8 GALLERY
9 EDUCATION GALLERY
10 CONFERENCE
11 TERRACE



GROUND FLOOR

UPPER FLOOR

"corduroy" surface with projecting fins. The contractor created the fins by beveling the sides of some of the formwork boards to leave gaps; when the boards were pulled off, parts of the fins' outside edges broke off to produce a jagged surface. The fins' irregularity is an essential part of their character. Cloepfil also varied the spacing between the boards to create varied visual rhythms and to change the texture of the large concrete planes.

Driving everything was the need to light the galleries to best show off the art. "My main concern was making the paintings look amazing," states Cloepfil. So he placed all the museum's nine galleries on the second floor and brought daylight into six of them from above. To diffuse the light, he suspended a perforated, cast-on-site, concrete screen four feet below skylights. A beautiful object in its

Concrete walls in galleries serve as the building's structure. Views from one gallery to another and down to the first floor create a fluid sense of space.

ARTIST PROFILE

Painting big with an ego to match

SPEAKING OF his own painting, Clyfford Still once warned, "Let no man under-value the implications of this work or its power for life—or death, if it is misused." He dismissed most art as "symbols of obeisance to—or illustration of—vested social structures, from antiquity through Cubism and Surrealism to my then immediate contemporaries, [which] were impaled and their sycophancy exposed on the blade of my identity." Wow. Such megalomania makes Julian Schnabel or Damien Hirst seem positively modest. But is it bragging if you can back it up? Because back it up is what Clyfford Still almost certainly did.

Still (1904–80) was part of the Abstract Expressionist school that made New York the capital of the art world in the late 1940s and '50s. But he wasn't particularly Expressionist. He didn't pour paint on canvases on the floor as did Jackson Pollock, nor tuck glimpses of human figures and landscapes into visceral skeins of paint like Willem de Kooning. Instead, Still carefully crafted large, ripped-edge, subtly undulating fields of contrasting, full-strength colors on vast areas of canvas. (Some measure more than 9-by-12 feet.) He fussed with the edges of his tapering forms in an epic struggle to have it both ways, compositionally (and existentially): shapes that never end versus shapes that must inevitably end. Critics considered Still—along with Mark Rothko and Barnett Newman—to be part of a style called the "Abstract Sublime."

Still formed his identity from his upbringing on farms in western Canada and Washington state. He never wanted to be anything other than an artist and began by depicting laborers. But over time, he abstracted those figures into more universal forms that finally melted into the paint of which they were made. By 1945, he'd gone totally abstract. Still lived for a time in New York where he occasionally found himself among the boozy Abstract Expressionists who hung out at the Cedar Tavern in Greenwich Village. But he hated what he called the "competitive atmosphere" of the New York art scene and moved to rural Maryland in 1961. There, he developed the odd habit of painting near-duplicates of many of his big canvases, which partly explains why he was able to hold on to an astonishing 94 percent of his output. These 800 paintings and 1,600 works on paper now constitute the collection of the new Clyfford Still Museum in Denver. Is the work of this sublimely cantankerous painter strong enough to justify a monographic museum that will never exhibit the work of anybody else? On the basis of having seen, repeatedly over the years, that selection of Still's work in the public domain, my answer is an emphatic yes.
Peter Plagens, painter and art critic

A self-portrait from 1940 shows the artist as a confident figure with a flair for the dramatic.

PHOTOGRAPHY: © PETER HARHOLDT (BOTTOM)

own right with oval perforations and sensuous lines, the screen dapples daylight and captures it in ever-changing ways while protecting the art from direct sunlight. (For more about the daylighting scheme, see page 85.) Corduroy-concrete walls on both the outside and inside of the building play a similar role: catching sunlight as it changes during the day. "I wanted the body of the building to feel like the source of light," explains the architect.

On the ground floor, Cloepfil arranged a pair of painting storage rooms and a conservation lab along a two-story-high corridor lined with exhibits on Still's career. Large glass doors allow visitors to see the paintings on storage racks and to peek into the lab. Still dictated in his will that the museum not include a café or bookstore, so the building is free of the usual commercial spaces that often distract attention from the art.

"What struck me about Brad's approach," recalls Dean Sobel, the museum's director, "was that he started by going to the places where Still grew up—Alberta and western Washington—not by looking at the paintings." The long, flat plains, river gorges, and low light informed Cloepfil's design, helping to shape the interplay of light and shadow and the balance between compressed spaces such as the low-ceilinged reception area and expansive ones like the 17-foot-high skylit galleries.

As he has in many of his other buildings—such as the Museum of Arts and Design in New York City and the Wieden + Kennedy headquarters in Portland, Oregon—Cloepfil set up an intriguing dialogue between solid and transparent, insinuating light into what at first appears to be a mostly opaque building. By inserting narrow, two-story spaces between some of the galleries, he provided views down to the first-floor corridor and across into other galleries. He also carved out a pair of second-floor, screened terraces where visitors can go for breaks from viewing art. As a result, light seeps into the building in many different ways, and what seems in plan to be a simple nine-room grid turns out to be much more complex as you move through it. "Inside, the building feels big, even though it isn't," says Sobel.

With Libeskind's building looming directly behind it, the Clyfford Still Museum stands its ground thanks to a muscular concrete structure and richly textured envelope. But what makes the building truly memorable is the way Cloepfil animated its squat volume with a series of fluid spaces dressed in filtered daylight and proportioned for viewing the iconoclastic artist's dramatic works. ■

ABOVE: **Formwork for the poured-concrete ceiling in the lobby runs at a 30-degree angle, the same as for the concrete ceiling screen in the galleries upstairs.**
RIGHT: **A small moss garden provides a green accent to one of the two second-floor terraces wrapped in cedar slats with metal louvers overhead.**

CREDITS

ARCHITECT: Allied Works Architecture – Brad Cloepfil, principal in charge; Chris Bixby, project lead; Dan Koch, project architect; Brent Linden, Susan Barnes, Robin Wilcox, Scott Miller, Chelsea Grassinger, Emily Kappes, project team

ENGINEERS: KPFF (structural); Arup (m/e/p)

CONSULTANTS: Reed Hilderbrand (landscape); Reginald D. Hough (architectural concrete); Simpson Gumpertz & Heger (building envelope)

GENERAL CONTRACTOR: Saunders Construction

SIZE: 28,500 square feet, total; 10,000 square feet, galleries

COST: $15.5 million

COMPLETION DATE: November 2011

SOURCES

RAIN SCREEN: Western Red Cedar

SKYLIGHT GLAZING: Oldcastle BuildingEnvelope

SKYLIGHT FRAMING SYSTEM: Skyline Sky-Lites

Natural History Museum of Utah | Salt Lake City | Ennead Architects

RUGGED AND HANDSOME

An elegantly powerful structure reflects its dramatic natural setting and the mission of the institution housed within.

By Joann Gonchar, AIA

PHOTOGRAPH

View additional images of this project at architecturalrecord.com.

The museum, which sits in the foothills of the Wasatch Mountains at the edge of the University of Utah campus, is clad in panels made of three different copper alloys. Each is patinating differently, creating an effect that resembles sedimentary rock.

FROM THE first glimpse of the $103 million Natural History Museum of Utah in Salt Lake City, the metaphor is unambiguous: The 163,000-square-foot building is both literally and figuratively rooted in the landscape. The terraced structure is anchored into its sloping site at the edge of the University of Utah campus, a few miles from downtown, while the folded and subtly canted exterior walls mimic the scrubby hillside rising behind it. But even though the references to its environment are readily recognizable, the museum holds its own as man-made object against the rugged backdrop. It is an interpretation and abstraction of nature rather than a facsimile, explains Todd Schliemann, partner at New York–based Ennead Achitects (formerly Polshek Partnership), which designed the building in association with local firm, GSBS.

The museum, which opened in November, moved from a decaying, Depression-era building in the heart of the campus to its current 17-acre site—one that appears to be the threshold of unspoiled wilderness. But although the land had never been developed for a building, it was not pristine. In the early 1900s, it had been marred when soldiers from nearby Fort Douglas used it as a firing range. More recently, major utility lines were routed through the property, along with a trailhead for a mountain-biking and hiking path.

The designers have integrated this infrastructure with the site by realigning and redefining the trailhead with gabion walls whose rock was uncovered during foundation excavation, and by camouflaging the utilities with sculptural landforms. They configured the new building as a three-bar form that steps up with the terrain. Its structure, which combines concrete shear walls and steel framing, is organized into two wings—one that supports the museum's "empirical" activities, including research, conservation, and administration; and an "interpretive" wing that houses the exhibits, says Schliemann.

The glue between the two programmatic halves, and the museum's centerpiece, is a 60-foot-tall lobby that doubles as a space for

PHOTOGRAPHY: © JEFF GOLDBERG/ESTO

OPPOSITE: **A 60-foot-tall, cathedral-like lobby dubbed the "canyon" is enclosed by faceted drywall planes, joining the museum's two wings—one for exhibitions and one for research facilities, collections storage, and administration.**

ABOVE: **A sculptural stair of board-formed concrete provides a vantage point for activity in the canyon—the museum's main social space.**

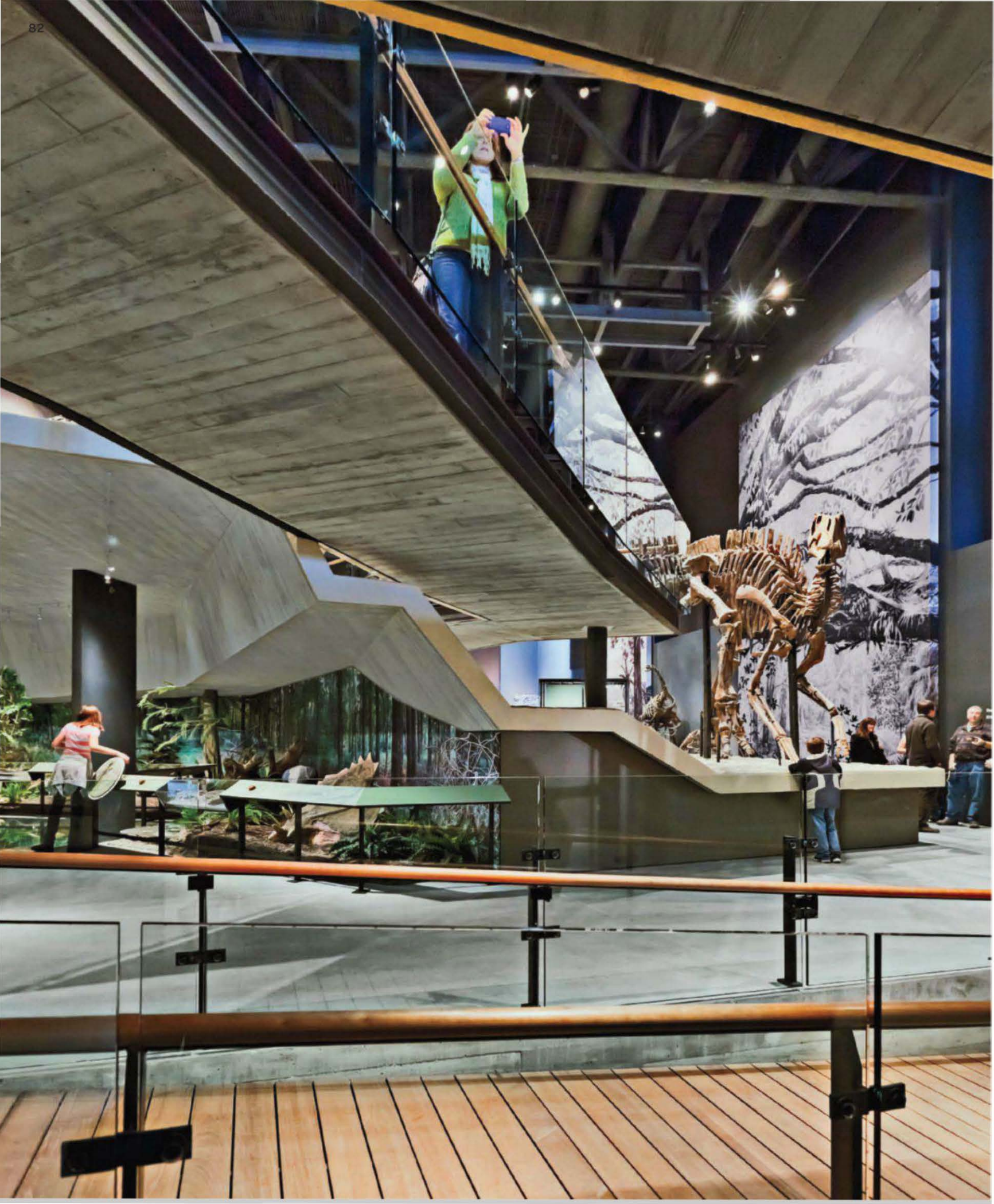
RIGHT: **The canyon includes one glazed wall that allows visitors to take in sweeping views of Salt Lake City and the Salt Lake Valley.**

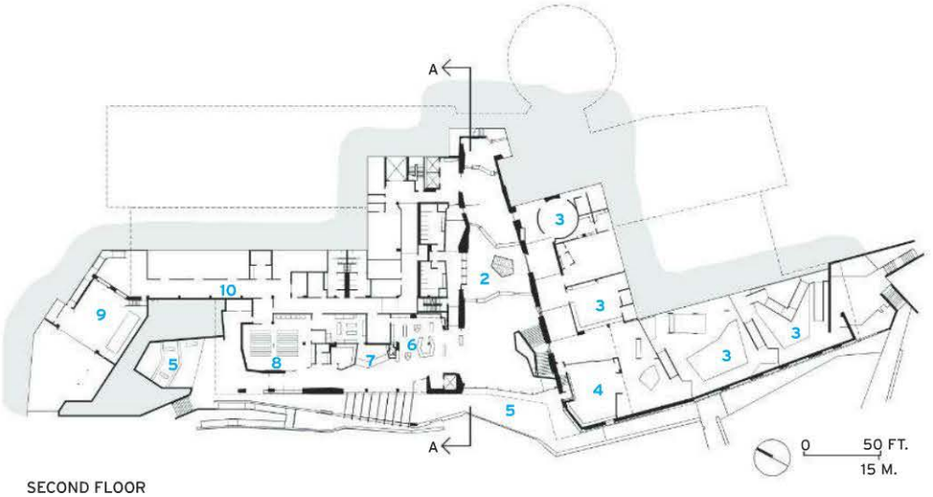
lectures and parties. It is enclosed by soft, gray board-formed concrete, warm, white-faceted drywall planes, and one glazed wall that offers sweeping views out over the city and across Salt Lake Valley. Even visitors who are unaware that this grand room has been dubbed the "canyon" will immediately understand that its form, like that of the building's exterior, has been inspired by the regional landscape. But the space can be appreciated without knowledge of its origins, since it elicits an immediate (and positive) emotional response. "We wanted an inspirational space that would be viscerally remembered," says Schliemann. "It's a cathedral with a view."

The simile of architecture-as-geological-formation extends to the building's exterior envelope, where horizontal standing-seam copper—mined on the opposite side of the valley and donated by the mine's parent company—covers the angular walls above the a poured-in-place concrete base. The cladding, made of three different alloys, takes on a varied patina, creating an effect similar to the striations of exposed rock cliffs. Although this skin is now different shades of brown with hints of green, its colors will continue to evolve, much like the landscape around the building where Gambel oaks, two types of maples, native sumac, and an understory of several varieties of brush, have been planted. In the autumn the foliage will turn nutty brown, vibrant orange, and red.

The route through the exhibits, which were designed by New York-based Ralph Appelbaum Associates, also takes its cues from the natural environment. Ramped walkways with ipé-plank decks and glass balustrades trace a gently ascending course that winds through the museum's 10 thematic galleries in the manner of a mountain traverse. The path leads from the lowest level displays, which showcase the region's plant and animal life over 225 million years, to the uppermost exhibition space, which focuses on the traditions of Utah's native peoples. Along the way, visitors can examine artifacts from the museum's collection of 1.2 million objects, including paleontological, archaeological, and mineralogical specimens. But museumgoers need not view the galleries in any particular order or follow a prescribed course, according to Sarah George, executive director. Instead, they can get off the elevator on any level, cross one of the bridges spanning the canyon, and explore just one section of the museum. "It was important to us that visitors be able to chose their own path," she says.

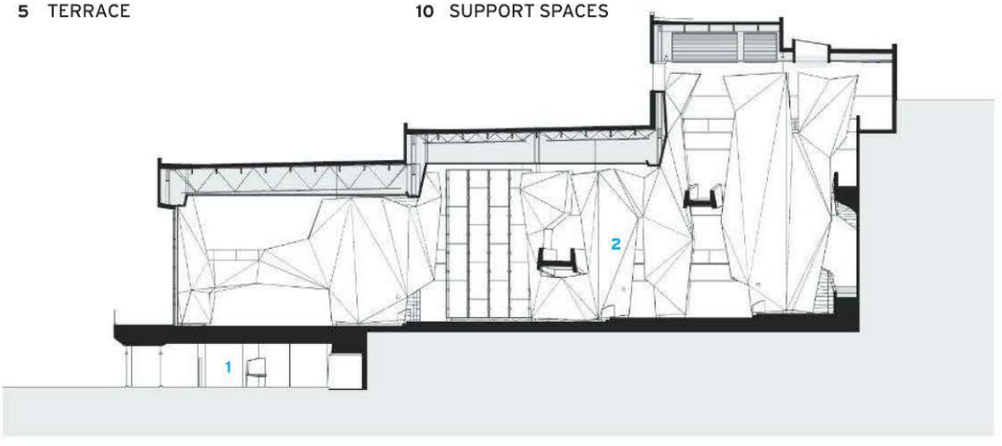
The galleries are primarily inwardly focused, with few windows in order to protect the collections from damaging ultraviolet light.





SECOND FLOOR

1 RECEPTION
2 CANYON
3 PERMANENT EXHIBITS
4 PALEONTOLOGY PREPARATION LAB
5 TERRACE
6 MUSEUM STORE
7 CAFE
8 COMMUNITY MEETING ROOM
9 LOADING DOCK
10 SUPPORT SPACES



SECTION A-A

However, in a select number of carefully orchestrated locations, windows are included so that museumgoers can make connections between the displays and the world outside. For example, an exhibit exploring the evolution of the Great Salt Lake is positioned next to a window that offers views of the actual body of water off in the distance.

The small number of windows—and the resulting low-window-to-wall ratio—helps improve the building's energy performance and is one of several strategies that have put the project on track for LEED Gold certification. (For more on the envelope, see page 85.) But because site constraints dictated that most of the openings face west—an undesirable orientation from both heat-gain and conservation perspectives—the high-performance glazing includes a frit and a low-e coating. Although the treatment somewhat obscures the view of the museum's interior from its outdoor terraces, the effect enhances the building: The glazing mirrors the sky and the museum's environs, providing another reminder that the mission of the institution beyond the glass and the copper-clad walls is to reflect and interpret the natural world. ■

OPPOSITE: **Ramped walkways with ipé-plank decks and glass balustrades trace a gently ascending route through the museum's 10 thematic galleries.**

ABOVE: **Although most of the galleries are inwardly focused, a few contain windows so that museumgoers can make connections between the objects on display and the building's surroundings.**

CREDITS

DESIGN ARCHITECT: Ennead Architects – Todd Schliemann, design partner; Don Weinreich, management partner; Thomas Wong, Alex O'Briant, project designers; John Majewski, Megan Miller, project architects

ARCHITECT OF RECORD: GSBS Architects

CONSULTANTS: Leslie E. Robertson Associates, Dunn Associates (structural); Colvin Engineering Associates (m/p/fp); Design Workshop (landscape); Brandston Partnership (lighting); Stantec (civil); Ralph Appelbaum Associates (exhibit design); Simpson Gumpertz & Heger (building envelope)

CONSTRUCTION MANAGER: Big-D Construction

CLIENT: Natural History Museum of Utah

SIZE: 163,000 square feet

PROJECT COST: $103 million

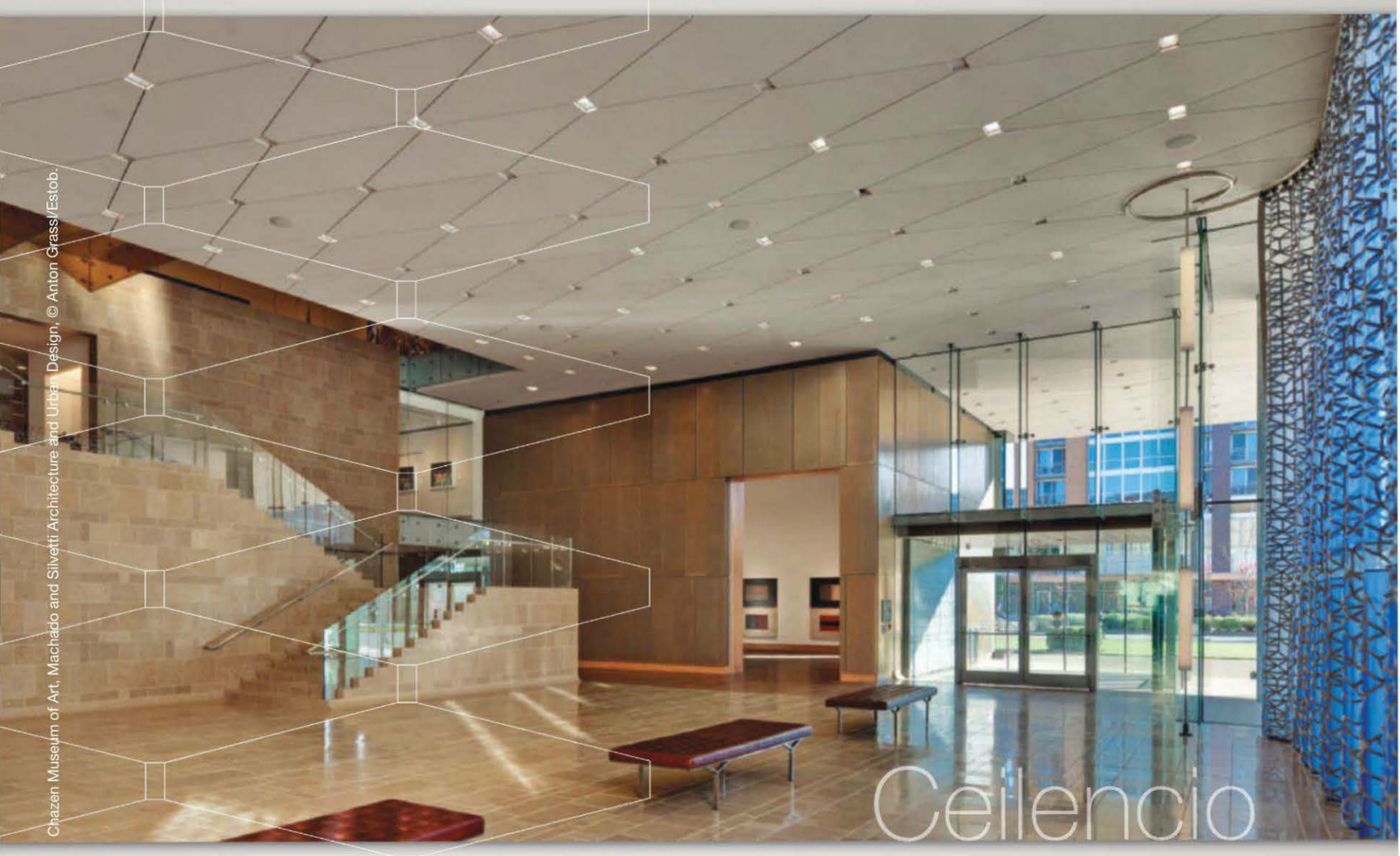
COMPLETION DATE: October 2011

SOURCES

METAL PANELS: Kennecott Utah Copper (copper cathode); Umicore (fabrication)

CURTAIN WALL: EFCO

GLAZING: Viracon



Chazen Museum of Art, Machado and Silvetti Architecture and Urban Design, © Anton Grassl/Estob.

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CIRCLE 52

Performance Puzzle

Museum design teams juggle the sometimes-competing demands for preservation of collections, human comfort, and energy conservation. By Joann Gonchar, AIA

LIGHTBOX: At the new Philadelphia home for the Barnes Collection, a court (bottom) covered with an etched-glass canopy is defined by a shoeboxlike gallery pavilion and an L-shaped wing (top). The configuration allows designers to take advantage of indirect daylight for gallery illumination.

RENDERINGS: COURTESY THE BARNES FOUNDATION

A MUSEUM is inherently an energy hog. Prolonging the life of artwork and cultural artifacts requires a consistent interior environment—generally one maintained at 70 degrees Fahrenheit with 50 percent relative humidity—regardless of the season or weather. These requirements result in large energy loads, especially for humidifying and dehumidifying outdoor air.

Designing a high-performing museum requires state-of-the-art HVAC equipment, to be sure, but passive strategies such as building orientation and a thermally efficient envelope, detailed and well-executed, are at least as important. "It isn't about configuring the right mechanical system, but about designing the right building," says Adam Trojanowski, principal at Altieri Sebor Wieber. Trojanowski's firm is mechanical engineer to Tod Williams Billie Tsien Architects for the Barnes Collection—the museum set to open in downtown Philadelphia in May that will house the highly regarded collection of Impressionist and early-Modern paintings amassed by the late Dr. Albert C. Barnes. Until last summer, the collection had been on display on the Barnes estate in Merion, a Philadelphia suburb.

The new 93,000-square-foot Barnes includes a shoebox-shaped permanent exhibition pavilion, as well as an L-shaped wing for conservation labs, offices, and visitor amenities like a gift shop and café. Together, the two volumes define an interior court, topped with an etched-glass canopy, or "lightbox," that allows controlled and diffuse daylight into adjacent spaces.

On track for LEED-Platinum certification, the museum is designed to exceed the performance of the 2007 version of the energy standard ASHRAE 90.1 by an impressive 43 percent. Some of the strategies that contribute to these savings include ventilation-air heat recovery, demand-control ventilation, and rooftop photovoltaic panels that are expected to supply more than 7 percent of the building's electricity. But more than half of the anticipated energy savings can be attributed to the thermal properties of the envelope, along with the inclusion of overhangs and other shading devices that help control heat gain, says Trojanowski. At the Barnes, the galleries' exterior walls have a limestone rainscreen-skin with bronze fins and stainless-steel reveals, rigid insulation with an adhered air-and-vapor barrier, and a grout-filled block wall. The whole assembly, including a plywood and sheetrock interior stud wall, is as thick as 40 inches in some locations. The windows are set back from the limestone skin—a detail that helps limit direct-sunlight penetration and emphasizes the facade's "beefiness" and "heft," giving the building a sense of permanence, says Williams/Tsien senior associate Philip Ryan. But the assembly's depth and composition also provide sound thermal performance, with an R-value, or thermal resistance, of 15.

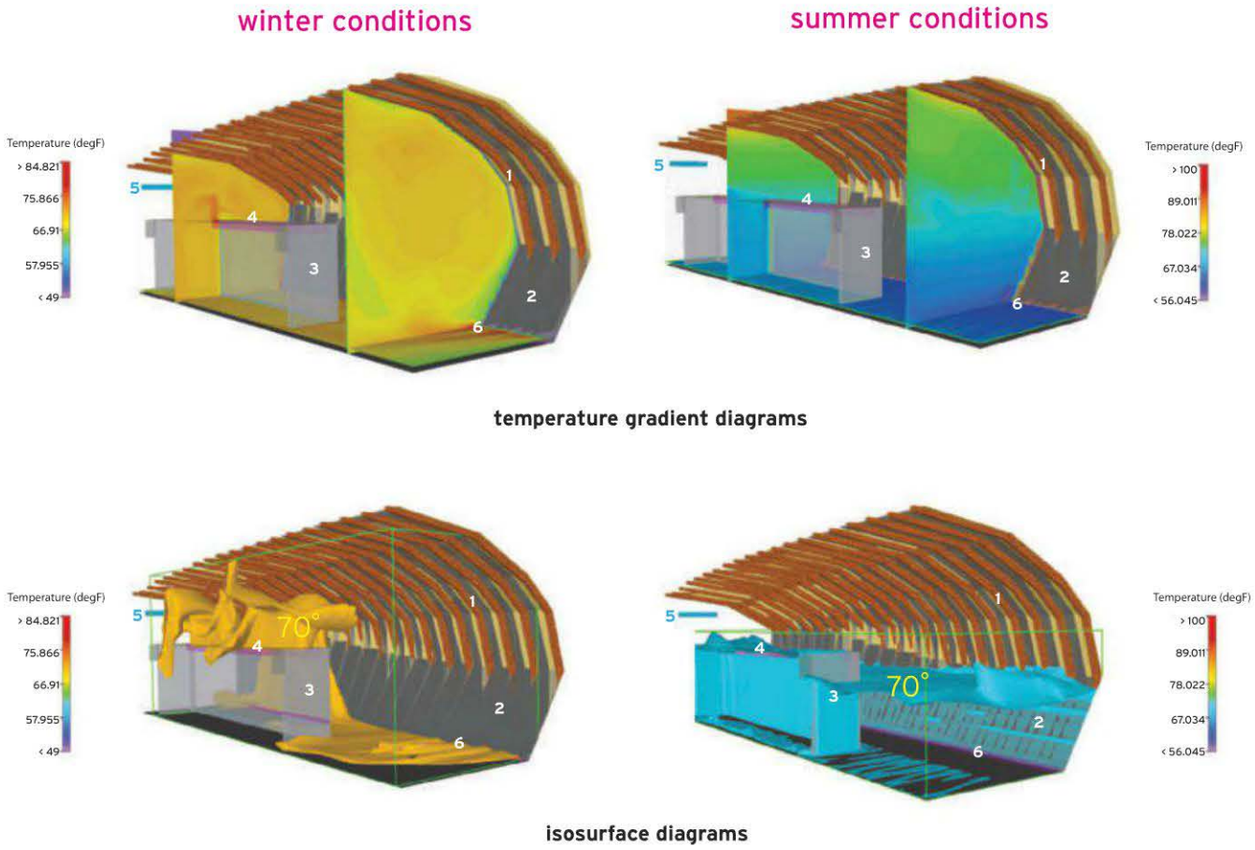
Thanks to the lightbox-covered court, Williams/Tsien is able to bring borrowed daylight into the galleries while limiting the amount of glass in their exterior walls. Those openings that do penetrate the building envelope include very high-performing glazing. The architects have also taken special care to detail the connection between the window and the wall—typically a thermal weak point due to the potential for air infiltration and exfiltration.

A lack of air-tightness can have energy-use

SUSPENDED SPAN: **Crystal Bridges Museum of American Art includes a primarily glass-enclosed bridge pavilion that serves as an exhibition space (background, bottom). Its interior includes drywall boxes for art display. Using computational tools, engineers studied the potential for temperature-stratification and the flow of air around the boxes under worst-case winter and summer conditions. Because the bridge is symmetrical, they modeled only one quadrant, saving calculation time.**

1 LAMINATED WOOD BEAMS
2 GLAZING
3 GALLERY ENCLOSURE
4 CEILING SCRIM
5 AIR SUPPLY
6 AIR RETURN

CRYSTAL BRIDGES CFD ANALYSIS

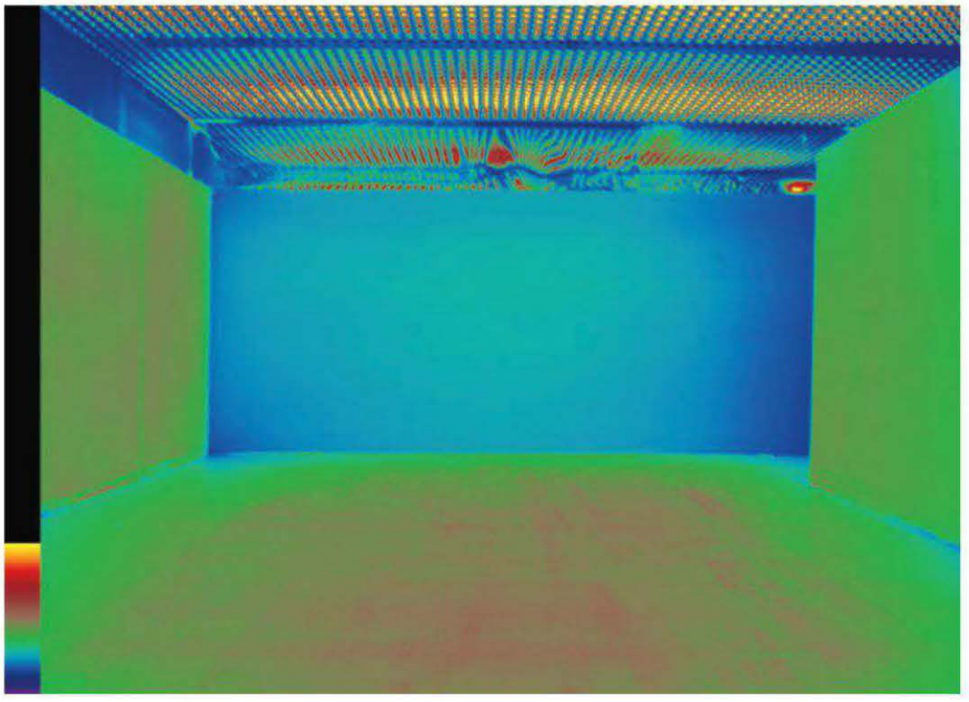


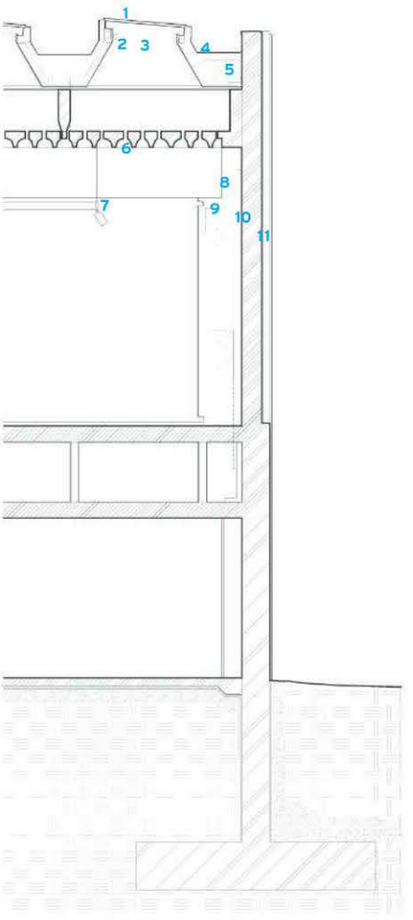
consequences for any type of building, but for a facility like a museum with a highly humidified interior environment, a leaky facade has other associated risks. Especially during heating season, a sievelike envelope increases the chances that condensation will form. The moisture can lodge itself within the enclosure's layers, causing deterioration over time. But for conservators and curators, the critical concern is an inability to maintain the required relative-humidity levels. Fluctuations can cause damage to collections and can also jeopardize a museum's ability to borrow objects from other institutions, points out Sean O'Brien, associate principal at Simpson Gumpertz & Heger. The firm was facade consultant on the Natural History Museum of Utah (see page 78) designed by Ennead Architects and recently opened in Salt Lake City. One of the project's challenges was ensuring air-tightness among a diversity of cladding types, including standing-seam copper, aluminum panels, and cast-in-place concrete, and at the junctions of those materials with windows and curtain walls.

Along with the preservation of cultural artifacts, the role of a museum is to make its collection accessible to the public and to dis-

PHOTOGRAPHY: © TIMOTHY HURSLEY; DIAGRAMS: COURTESY BURO HAPPOLD

SCULPTURAL AND TEXTURED: **The painting galleries at the Clyfford Still Museum (right) have concrete ceilings perforated with oval-shaped apertures. Suspended from the beam structure supporting the roof, the ceiling diffuses the daylight that penetrates a system of linear skylights. The designers optimized the ceiling-and-skylight assembly with simulation and physical models and used tools like high-dynamic range-imaging (below) to better understand how to uniformly illuminate the wall surfaces.**





CLYFFORD STILL WALL SECTION DETAIL

1 SKYLIGHT
2 RADIANT HEATER
3 ROLLER SHADE SYSTEM
4 ROOF MEMBRANE
5 RIGID INSULATION OVER AIR/VAPOR BARRIER
6 PERFORATED ARCHITECTURAL CONCRETE CEILING
7 GALLERY LIGHTING SYSTEM
8 PRECAST ARCHITECTURAL CONCRETE WALL PANEL
9 SUPPLY AIR
10 RIGID INSULATION AND AIR/VAPOR BARRIER
11 ARCHITECTURAL CONCRETE WALL

TIGHT AS A DRUM: **To prevent air infiltration and exfiltration, which can cause condensation and fluctuations in relative humidity levels, the design team for the Natural History Museum of Utah paid special attention to the air-tightness of the building envelope, especially where multiple building materials, such as standing-seam copper, poured-in-place concrete, and glazing meet.**

play it in a way that it can be best appreciated. For many institutions, including the Clyfford Still Museum, which opened in Denver in November (see page 70), this means a heavy reliance on daylight for exhibition-illumination, since sunlight renders color perfectly. Designed by architect Brad Cloepfil and his firm Allied Works, the 28,500-square-foot, two-story poured-in-place concrete structure showcases the work of Still, an Abstract Expressionist who died three decades ago.

The museum's galleries are on the second floor, allowing them to be daylit from above through a "light loft"—a series of linear skylights that run from east to west about 7 feet above a perforated concrete screen. The skylight includes a polyvinyl butyral (PVB) interlayer in its glazing to filter out damaging ultraviolet light, and small heaters to prevent condensation from forming in extreme winter conditions. The system also includes blackout shades which facility managers can extend during certain seasons, or when the museum is closed to limit the paintings cumulative exposure to light.

To perfect the configuration of the sculptural "light loft," lighting designers from Arup relied on both physical models and simulation tools. Among other factors, they analyzed luminance, or the amount of light leaving the walls where Still's paintings would hang. The goal, according to Arup lighting leader Brian Stacy, was to understand how uniformly illuminated these surface would appear.

In addition to making Still's paintings appear to pop off the walls, the daylighting should also save energy. According to Stacy, the galleries' electric illumination has a lighting power density of just over 1 watt per square foot, and that is without taking into account the savings provided by a photo-responsive dimming system. A more typical gallery allowance is 5 to 7 watts per square foot, he says.

Reconciling a project's architectural aims with its conservation requirements often involves imaginative solutions and thorough analysis. Such was the case at the just-completed Crystal Bridges Museum of American Art in Bentonville, Arkansas, which houses the collection of Walmart heiress Alice Walton (see page 62). Designed by Moshe Safdie, the 200,000-square-foot assemblage of linked pavilions sits in a wooded ravine alongside a dammed stream. Two of the pavilions, which have inclined glass walls and cable-supported, glass-and-copper roofs framed by glue-laminated arches, span the stream. Safdie has designated one as a restaurant and the other as an exhibition space, despite the quantity of glazing. Within this gallery-bridge, he inserted two drywall boxes with fabric-scrim ceilings. The arrangement provides wall surfaces for display and helps limit the artworks' exposure to sunlight. It also, says Safdie, allows museumgoers to take in the natural setting as they move from gallery to gallery.

Engineers made the most of the resulting circulation area between the boxes and the bridge's sloped glass walls, putting it to use as a climatic buffer zone. Here, temperature and humidity levels could vary beyond the narrow range permitted in the galleries, explains Niall Cooper, associate principal at Buro Happold, the project's structural and mechanical consultants. To coordinate the systems in the circulation zone with those of the gallery boxes, and to ensure the right conditions for both people and art, the engineers used several types of tools, including computational fluid dynamics (CFD)—an analysis of fluid-flow, heat-transfer, and other phenomena by means of computer-based simulation. The studies identified several potential vulnerabilities, including winter downdraft conditions that could lead to the formation of condensation. For the final design, engineers were then able to tune the temperature, direction, and velocity of air supplied to both the galleries and circulation space to avoid such problems. The methodology allowed Safdie to maintain the desired connection to the landscape while keeping energy use in check. Or, as Cooper explains: "It facilitated the architectural vision." ■

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Learning Objectives

1 Outline the environmental conditions considered optimum for conservation of museum collections.

2 Describe architectural and mechanical strategies for achieving these conditions.

3 Identify energy-saving strategies appropriate for museums.

4 Describe simulation methods that consultants use to optimize climate-control, energy-performance, and daylighting.

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CIRCLE 56

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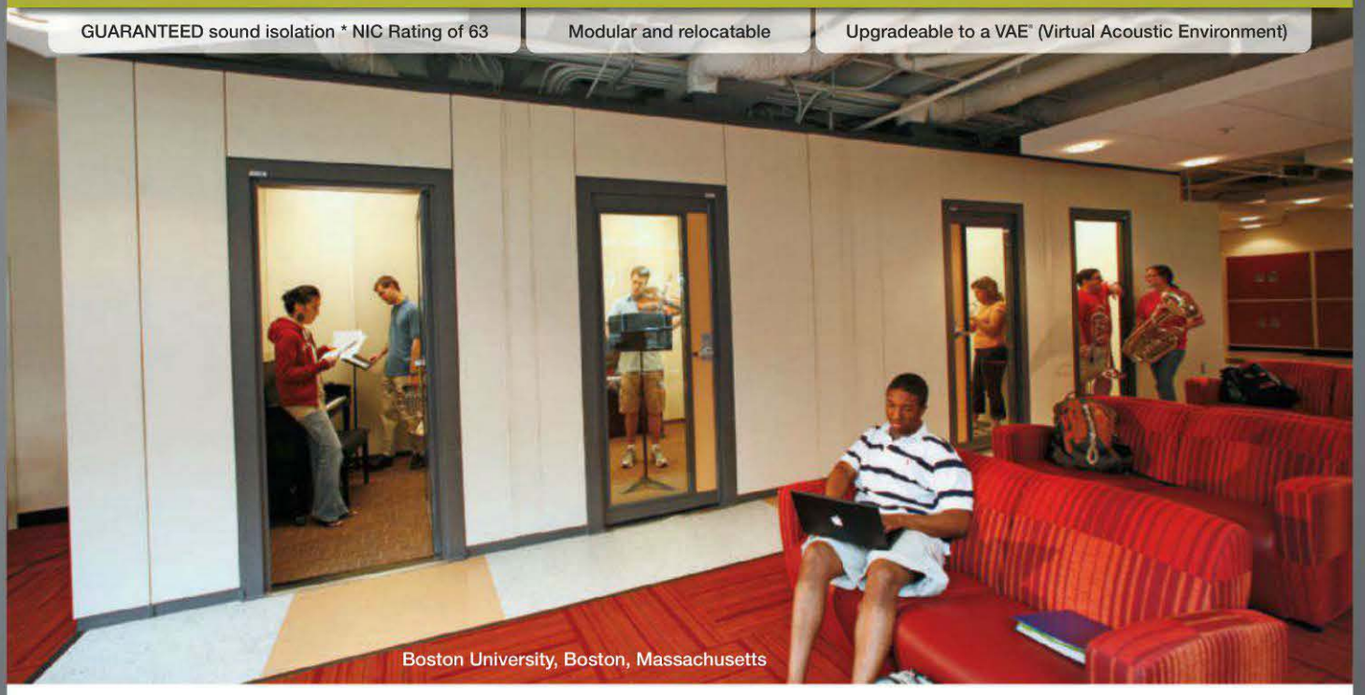

Boston University, Boston, Massachusetts

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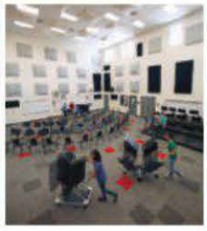

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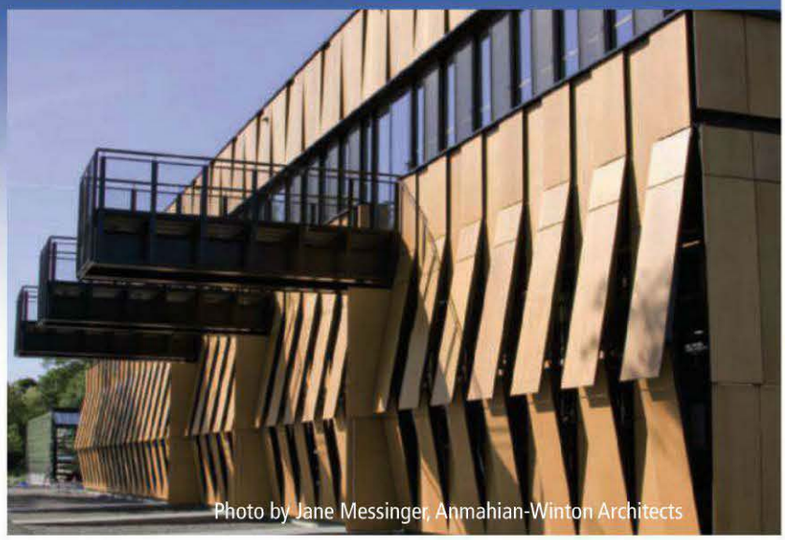

Photo by Jane Messinger, Anmahian-Winton Architects

"Without the ingenuity and technical skills of EXTECH, our aspirations for the project could not have been achieved," said Alex Anmahian, a principal at Anmahian-Winton Architects in Cambridge, MA. "While quality...was very important, it was the diversity of their engineering and manufacturing capabilities, and their overt willingness to work with us in developing, prototyping and testing...that won us over."

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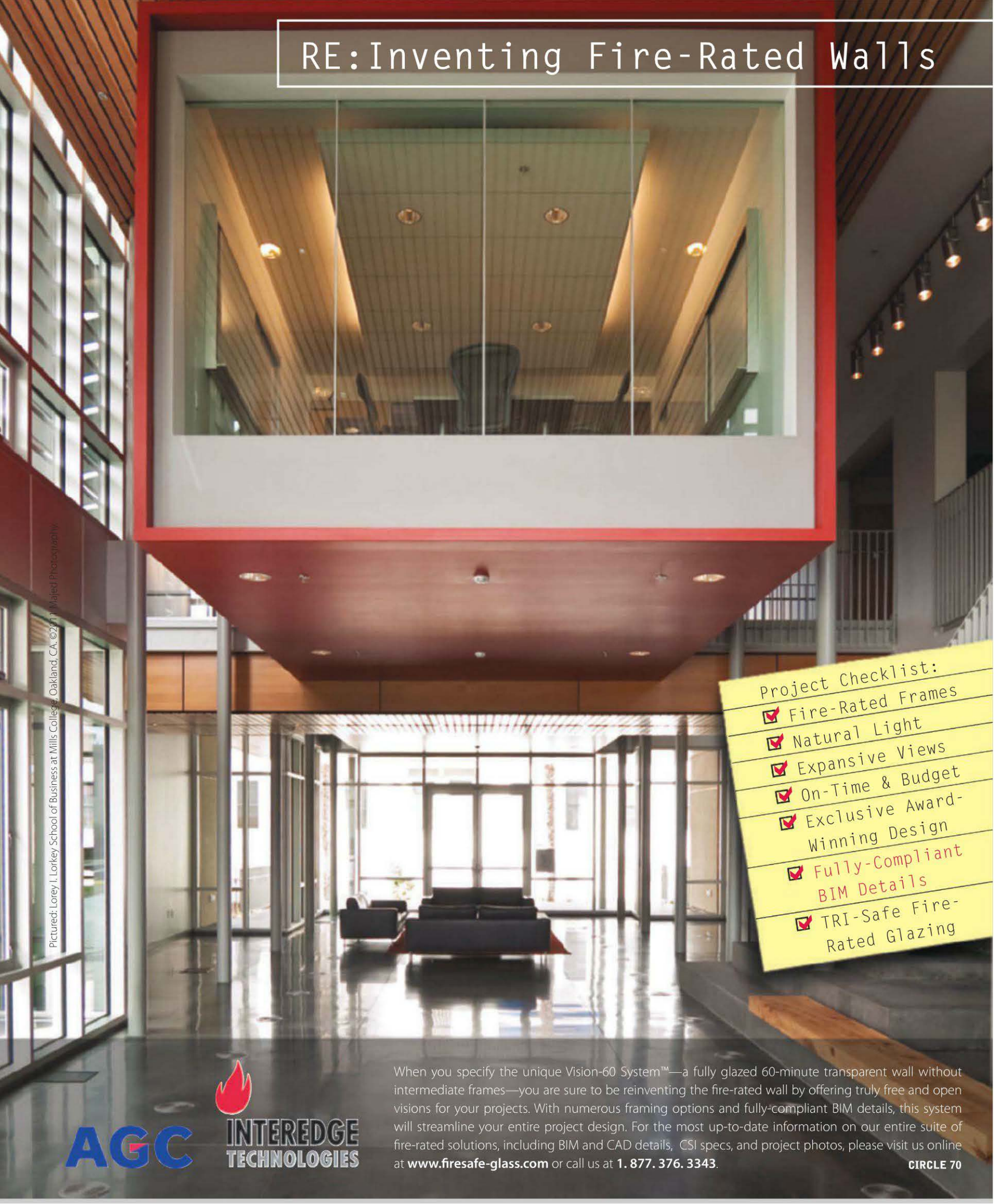
CIRCLE 82

RE:Inventing Fire-Rated Walls



Pictured: Lorey I. Lorkey School of Business at Mills College, Oakland, CA. ©2011 Majed Photography

Project Checklist:

- Fire-Rated Frames
- Natural Light
- Expansive Views
- On-Time & Budget
- Exclusive Award-Winning Design
- Fully-Compliant BIM Details
- TRI-Safe Fire-Rated Glazing

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CIRCLE 70

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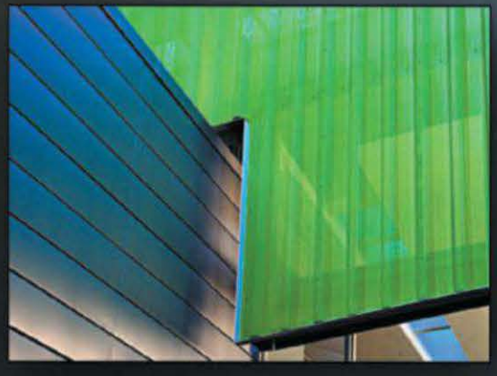

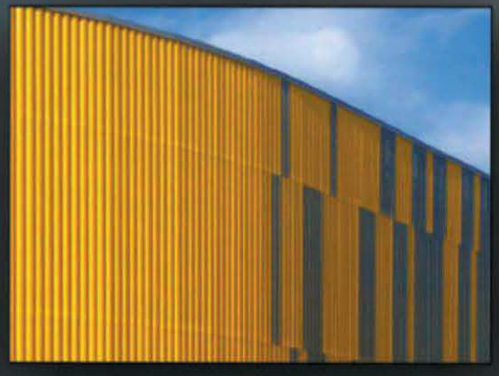

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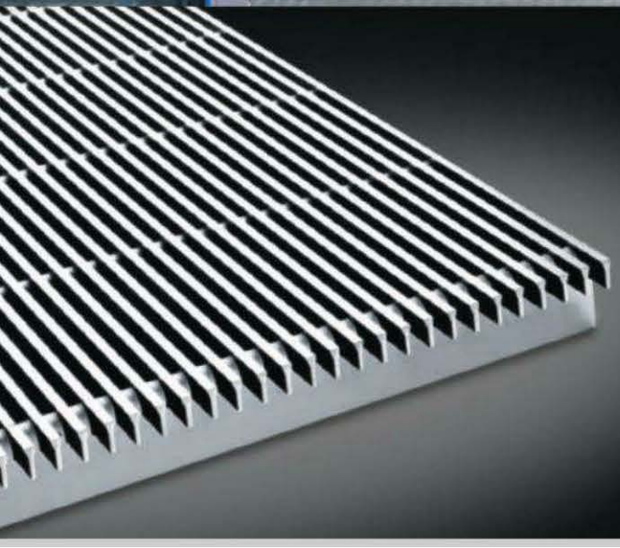

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CIRCLE 57

Schools of the 21st Century

WHAT DEFINES A MODEL SCHOOL? If such a paradigm exists, design would number among the prime factors. Striving for realistic solutions to existing problems such as dated facilities, overcrowding, rising costs, and stringent budgets, many public and private institutions are embracing proactive, holistic reforms that integrate innovative teaching methods with more effective learning environments. Increasingly, insightful teams of administrators, educators, and parents are collaborating with architects to reimagine the schoolhouse. The goal: to create buildings that will engage students, welcome the community, and adapt to the inevitable shifts in population and pedagogy.

The planning committees of the schools that follow all aim to exemplify change through design, in each case inviting the architect to weigh in early during the project-development process. Good buildings, they believe, do matter. While the report card is still out, this commitment to an idea, and to architecture as a means to achieve it, signifies a valuable investment in the future of our children. *Linda C. Lentz*

PHOTOGRAPHY: © NIKLAUS SPOERRI

EVELYN GRACE ACADEMY
LONDON
ZAHA HADID ARCHITECTS

PHOTOGRAPHY: © LUKE HAYES, EXCEPT AS NOTED

Raising the Bar in Brixton

Winner of the 2011 Stirling Prize, this daring charter school aims to bridge architectural and social divides in a regenerating historic neighborhood. **BY CHRISTOPHER TURNER**

SET BACK from the road, Zaha Hadid's Evelyn Grace Academy in South London zigzags across its small site with jagged angles of bare concrete, glass, and silver-spray-painted aluminum. The newly founded secondary school—for pupils ranging in age from 11 to 19—is state-funded, but owned and operated by ARK (Absolute Return for Kids), an educational charity organization that contributes additional financial support.

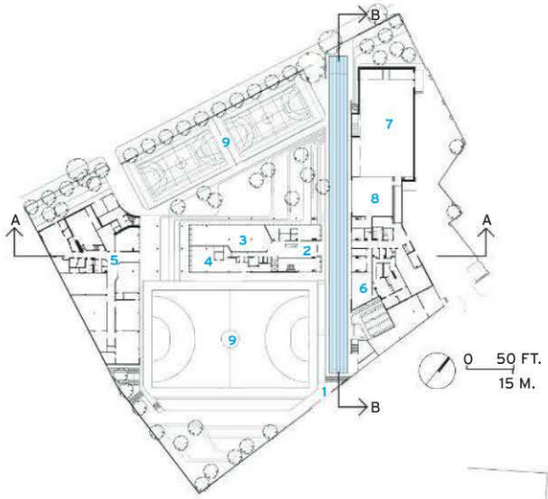
"ARK wanted a grown-up building," project director Lars Teichmann says of the brief. "Neutral and functional rather than playful and childish." The energetic, striking result recently won Hadid the Stirling Prize for the second year in a row (last year she won for the MAXXI museum in Rome, RECORD October 2010, page 82), beating stiff competition, including David Chipperfield's Folkwang Museum in Essen, Germany, and Hopkins' Velodrome for next summer's London Olympics.

The 3½-acre site, jammed between a maintenance depot for garbage trucks and a building that stores data from the city's surveillance cameras, is one-quarter the size of an average secondary school site in London. The institution specializes in math and sports, and Hadid's design cleverly maximizes the grounds. The building meanders between a synthetic-turf soccer field and two basketball courts, and a bright red 100-meter running track cuts under and through the building, bisecting the site and linking its two entrances. Pupils literally run to school.

This disadvantaged area of Brixton is, says headmaster Peter Walker, "the highest violent-crime ward in Western Europe." Gang culture is a

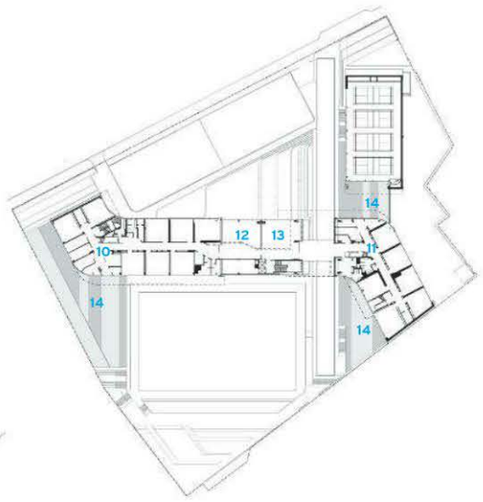
LEFT: **A 100-meter running track bisects the campus and links its two entrances.**

ABOVE: **Students in uniform gather on the terrace adjacent to the entrance of the Evelyn Middle School.**

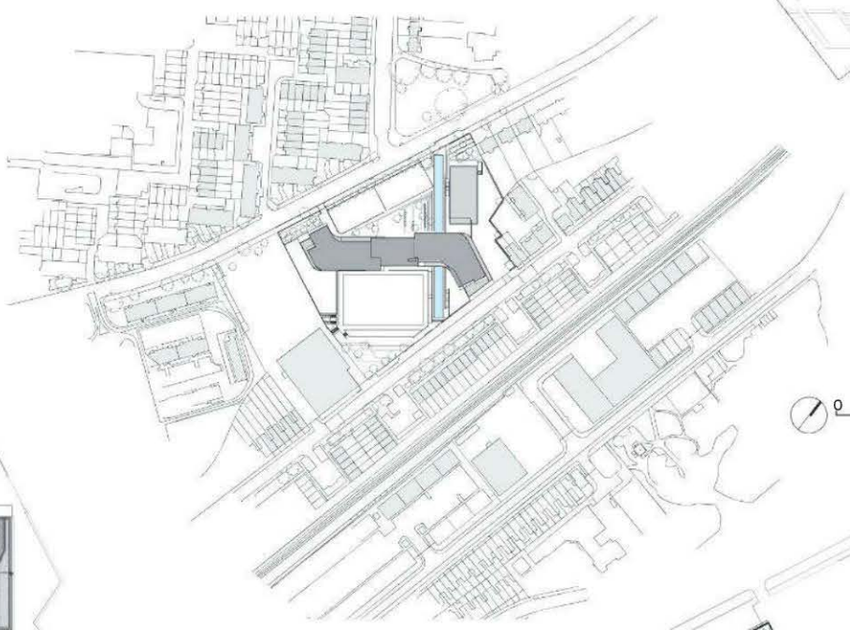


GROUND FLOOR

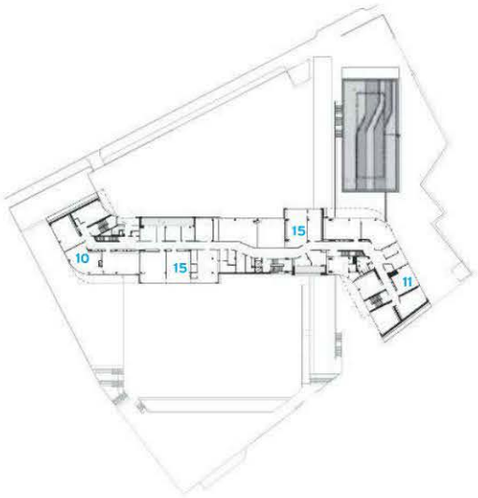
1 PEDESTRIAN ENTRANCE
2 MAIN ENTRANCE/RECEPTION
3 LIBRARY
4 KITCHEN
5 ART & TECHNOLOGY BLOCK
6 SPORTS & FITNESS BLOCK
7 GYM
8 DANCE STUDIO
9 SPORTS FIELD
10 EVELYN MIDDLE SCHOOL
11 GRACE MIDDLE SCHOOL



FIRST FLOOR

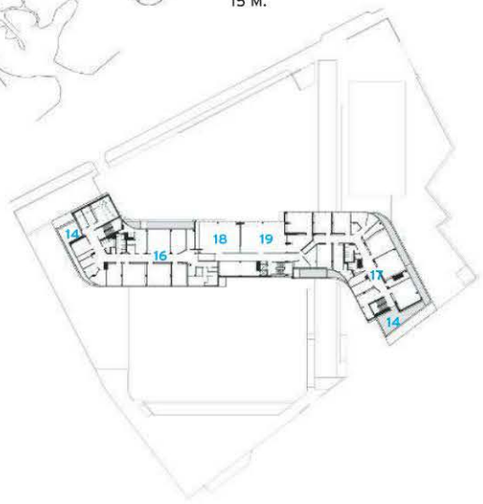


SITE PLAN

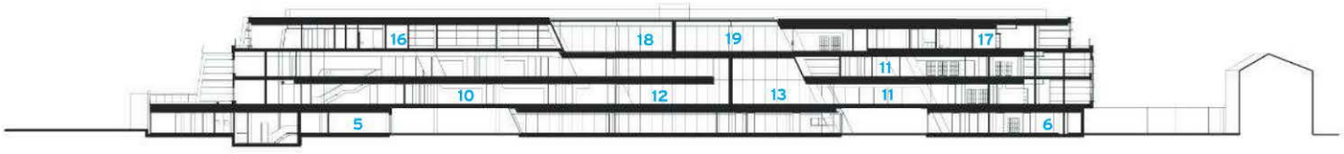


SECOND FLOOR

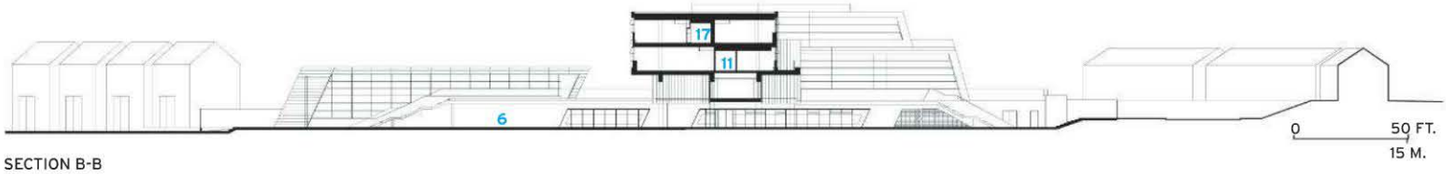
12 EVELYN MIDDLE COMMON HALL
13 GRACE MIDDLE COMMON HALL
14 TERRACE
15 SHARED CLASSROOM
16 EVELYN UPPER SCHOOL
17 GRACE UPPER SCHOOL
18 EVELYN UPPER COMMON HALL
19 GRACE UPPER COMMON HALL



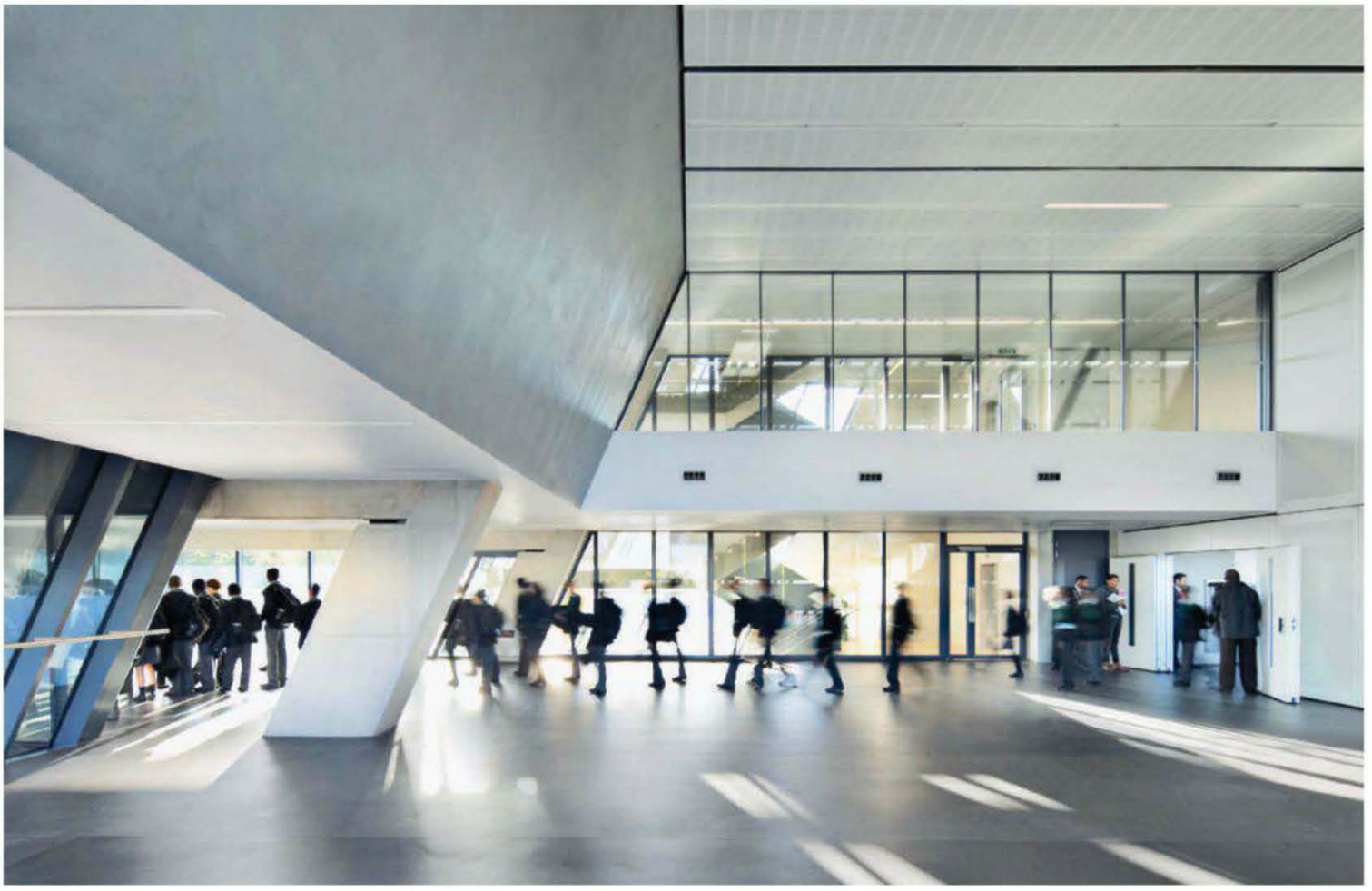
THIRD FLOOR



SECTION A-A



SECTION B-B



The Common Hall, shared by the Grace Middle and Upper Schools, is where the students of these two academies gather for events and meals.

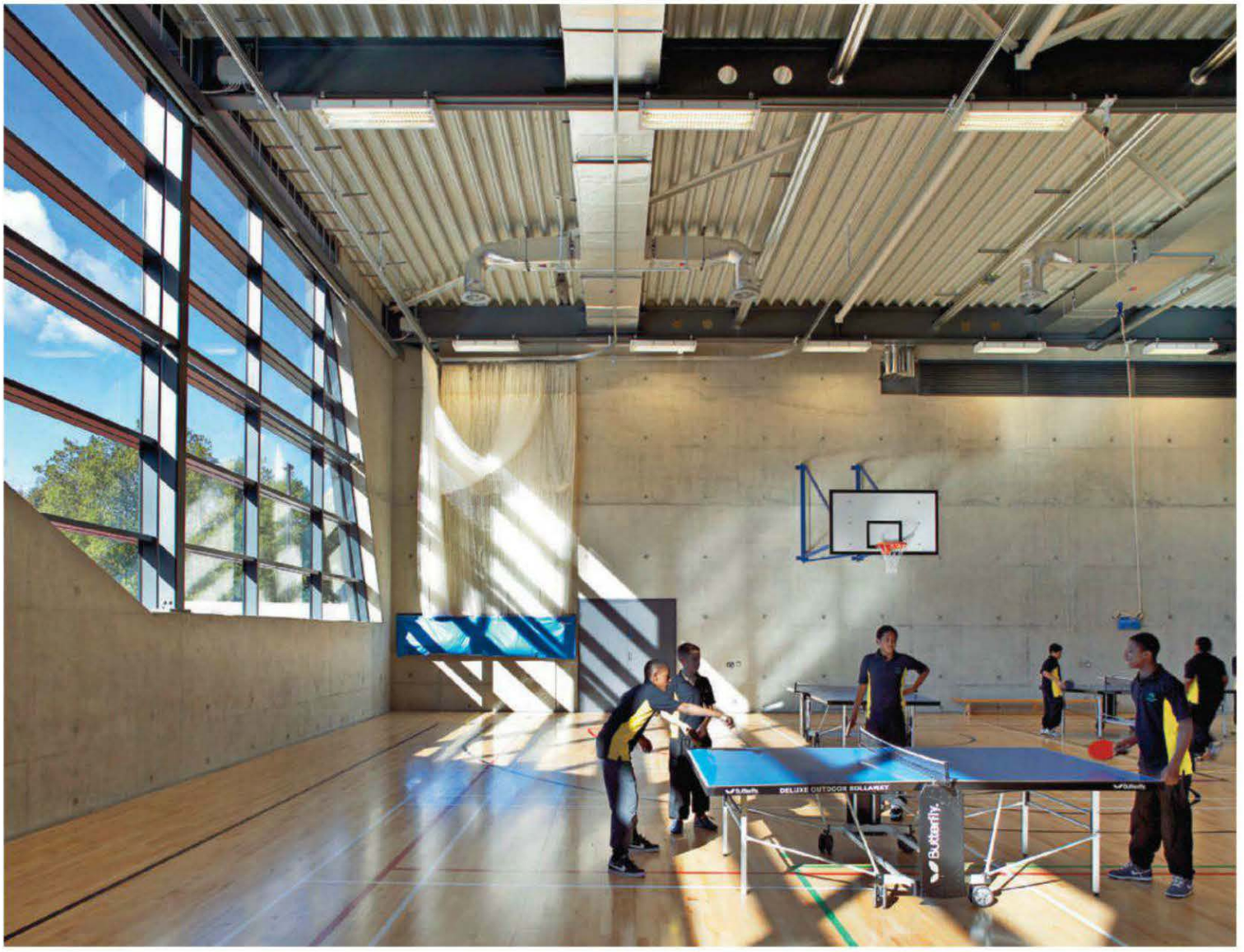
serious problem in the nearby housing projects from where the school's 1,200 pupils are drawn. 80 percent are African-Caribbean; 55 percent qualify for free school meals (three times the national average); and 60 percent are on the "special needs register," with emotional and behavioral difficulties. Walker thinks that secondary schools, especially in the inner city, are too large and, following an American model, has broken Evelyn Grace Academy into four smaller, more manageable units that he refers to as "schools within a school." (Jay Altman, who founded several charter schools in New Orleans, served as educational advisor.)

The school is divided into two middle and two upper academies, each with a head teacher and some dedicated staff, learning, and play spaces. These are easily visualized within the sculptural articulations of the facade. "We tried to express those four elements of the school in the massing of the building," Teichmann explains. A middle and upper school are stacked atop one another in the wings of the building, where they jigsaw dynamically between floors. Each school also has its own entrance and staircase, as well as a sheltered terrace where pupils can congregate during breaks, so that older and younger students can choose whether or not to mix in the larger playground. Students share communal spaces in the middle of the structure, two large multi-purpose halls with floor-to-ceiling glazing where they meet for assemblies, meals, and indoor games.

Hadid didn't want the building to loom over the area, as some of the surrounding 1970s-era housing does. Instead, says Teichmann, the school aims to "stitch up" the discordant urban fabric in which it is set. To reduce the building's mass, it is built on a podium, partially concealing shared, daylight-filled facilities for sports, music, and art, as well as a library and reception area. These concrete buttresses serve to ramp up the building, making it look as if it only has three floors, and to insulate the school from the street. "We tried to soften the blow of the volume by hiding one floor," Teichmann says, "making it look more slender and less high." Walker concurs: "The architects created something that is both startling yet somehow settles into the neighborhood. Unobtrusive is the wrong word, but it doesn't dominate."

"The kids say the building gives a sense that someone cares about them . . . Buildings do matter."
—Peter Walker, headmaster

In contrast to the arresting exterior, the interior is fairly basic, a victim of last-minute cost-cutting. There is the traditional arrangement of spines of wide corridors with classrooms branching off them. "These always



lead to a room that is glazed or lit, so there are always views offered," Teichmann says, "Bullying happens in dark corners and staircases, so we tried to avoid those." Lockers are built into walls that sit in the corridors like furniture pieces, with clerestory windows above, so that the ceilings of the corridors continue seamlessly into the classrooms. The doors are full-height, and a vertical strip of glass alongside them allows for what Teichmann refers to as "passive supervision."

ARK, a philanthropic enterprise founded by Swiss financier Arpad Busson, contributed 90 percent of the school's $55.5 million construction costs. The building is one of the last to be completed under the Labour Party's Building Schools for the Future program, which was scrapped by the incoming coalition government. Michael Gove, the U.K.'s new Conservative Education Secretary, is unsympathetic to such an architecturally ambitious enterprise. "We won't be getting Richard Rogers to design your school," he told a recent education conference, "We won't be getting any 'award-winning architects' to design it, because no one … is here to make architects richer."

Rogers protested in an open letter to the press, pointing out that only the previous day, Gove had praised Mossbourne Academy, which used to be one of Hackney's failing schools but had been transformed, partly thanks to a new building, that happened to be designed by Rogers. Many critics thought that Hadid's winning of the Stirling Prize for the second year running was the bruised architectural establishment's rejoinder to Gove, and there was some grumbling about her victory in the local architectural press. Evelyn Grace Academy is the only school ever to win the prize.

Hadid and Rogers have built just one school

CREDITS

ARCHITECT: Zaha Hadid Architects – Zaha Hadid, Patrik Schumacher, design architects; Lars Teichmann, project director; Matthew Hardcastle, project architect

ENGINEER: Arup

CONSULTANTS: Gross.Max (landscape); Steve Wells Assoc. (sports); LCE Architects (Education)

CLIENT: Absolute Return for Kids (ARK); U.K. Department for Education

SIZE: 115,658 square feet

COST: $56 million

COMPLETION DATE: October 2010

SOURCES

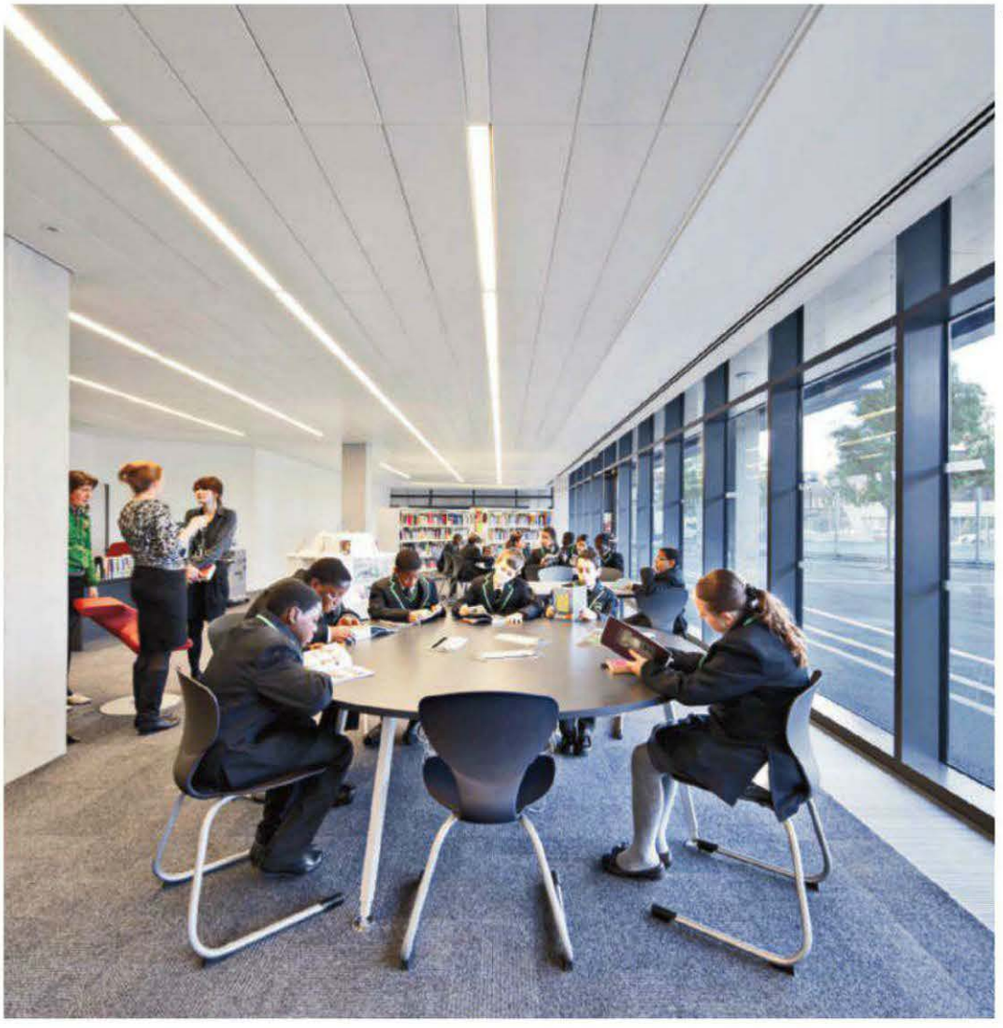
CURTAIN WALL SYSTEM: Schuco (aluminum/glass)

SKYLIGHTS: Pilkington

OPPOSITE: **Large windows bring ample daylight into the school's industrial-style Sports Hall.**

RIGHT: **Colorful, furniture-like lockers are built into the walls, some with clerestory windows above.**

BELOW: **Facing the school's horticulture garden and multi-use sports field, the Evelyn Grace library provides a peaceful sanctuary of reading and research for the students of all four schools.**



"It's a one-off. But, as a society we should be investing in significant buildings for our young people."
—Walker

each in the U.K. "While we had a lot to absorb working on a publicly funded, educational project," reflects Teichmann, "we in turn had the advantage of coming to the project with a fresh look, which meant we were able to challenge the standard reactions to school design." Hadid brings to the project some of the trademark flash of her BMW factory in Leipzig, which also has vaults over its entrance, or her soon-to-be-completed Pierres Vives building in Marseille, which has a recessed glass and concrete facade that drops and swoops between floors (Hadid compares the form to a "tree of knowledge").

"This building makes a statement about our education," says Walker of Evelyn Grace. "What impact will coming to a school like this have subliminally on these kids?" ■

London-based author Christopher Turner is Editor of Icon *magazine and an editor at* Cabinet *magazine.*

PHOTOGRAPHY: © HUFTON + CROW (OPPOSITE AND BOTTOM)

MARYSVILLE GETCHELL HIGH SCHOOL CAMPUS
MARYSVILLE, WASHINGTON
DLR GROUP

For a video tour of the project, see our website or iPad edition.

Divide and Conquer

In a district plagued by years of bond failures and overcrowding, a high school initiates a fresh start with collegiate learning tracks and a complementary campus. **BY LAURA RASKIN**

LEFT: **DLR Group worked with a student in a wheelchair to develop raised boardwalks and ramps with integrated LEDs. All students take the same paths between buildings.**

TOP: **From above, Marysville Getchell's five buildings mimic the surrounding suburban neighborhood. Faculty and students agreed to allot less space to parking, allowing more of the second-growth forest on the site to be preserved.**

PHOTOGRAPHY

ON A MISTY Pacific Northwest morning, teenagers quickly shuffle along raised boardwalks among five school buildings with hovering roofs vaguely evocative of the bungalows common to the West Coast. Adjacent to a suburban development, the campus, tucked into the tall firs and hemlocks of a second growth forest, makes Marysville Getchell High School in Marysville, Washington, feel more like a college than a high school. Sixteen-year-old senior Louie Vital says, "It makes me feel mature in a setting like this."

To walk around the campus, about an hour's drive north of Seattle, you wouldn't guess that during the last decade the district suffered a 49-day teachers' strike, dismal graduation rates, and overcrowding.

Before Marysville Getchell opened in the fall of 2010, the 11,000-student district had four high schools, including Marysville Pilchuck High School. Pilchuck was built in 1971 for 1,850 students, and by the mid-2000s it was bursting with 3,000. "It's hard for a principal to focus on instruction while managing a small city," says superintendent Larry Nyland. In 2006, the school board voted to create Small Learning Communities (SLCs) to organize the overcrowded Pilchuck. These offer

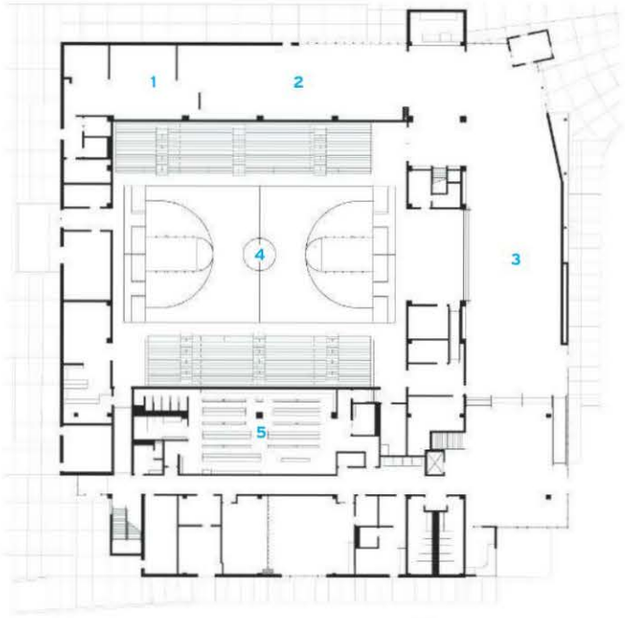
academic tracks based on specific interests like science or languages. But the small academies struggled to find coherence. Happily, the district passed a bond in 2006 to build a new high school. The Seattle office of DLR Group designed a campus that would accommodate the SLCs and 1,600 pupils in grades 9–12. There are four SLCs at Marysville Getchell, each with its own building: School for the Entrepreneur, Bio-Med Academy, Academy of Construction and Engineering, and International School of Communications. The Campus Commons contains a gym, dining room, and fitness room that puts most health clubs to shame.

The buildings' identities are transmitted through bright-colored accents and subtle graphics. Structures rise from masonry bases, while exposed steel beams and abundant windows create levity. The expansive windows also mean that students and teachers have constant views—of the woods and of one another. Exteriors are clad in aluminum, fiber cement, and high-efficiency glass. Forest shade and operable windows replace a mechanical cooling system.

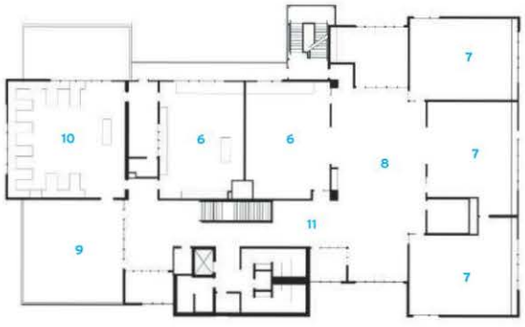
Craig Mason, DLR's principal in charge of design, has been designing schools for 20 years. Working with the community and a design committee made up of school and district administrators, teachers, and parents, he and his team developed flexible learning spaces that don't respond to a particular curriculum, but instead support the district's five guiding principles, including "relationships at the center," "community," and "accountability." Classrooms with moveable walls are set around common areas for research, projects, interdisciplinary work, and interaction. There are no hallways. Some classrooms remain empty, and outdoor patios can be enclosed if necessary; there's room to grow. Says Mason, "Almost every school we work with is looking at how you change classroom instruction," which informs classroom design. "It's not a stand-and-deliver anymore." On the ground floor of each SLC, a social commons abuts a specialized learning area. At the International School of Communications, students produce a daily newscast that airs on a local television

"This school is one of the best things that ever happened to me. I know that sounds far-fetched, but in all honesty, it's true." –*Louie Vital, student*

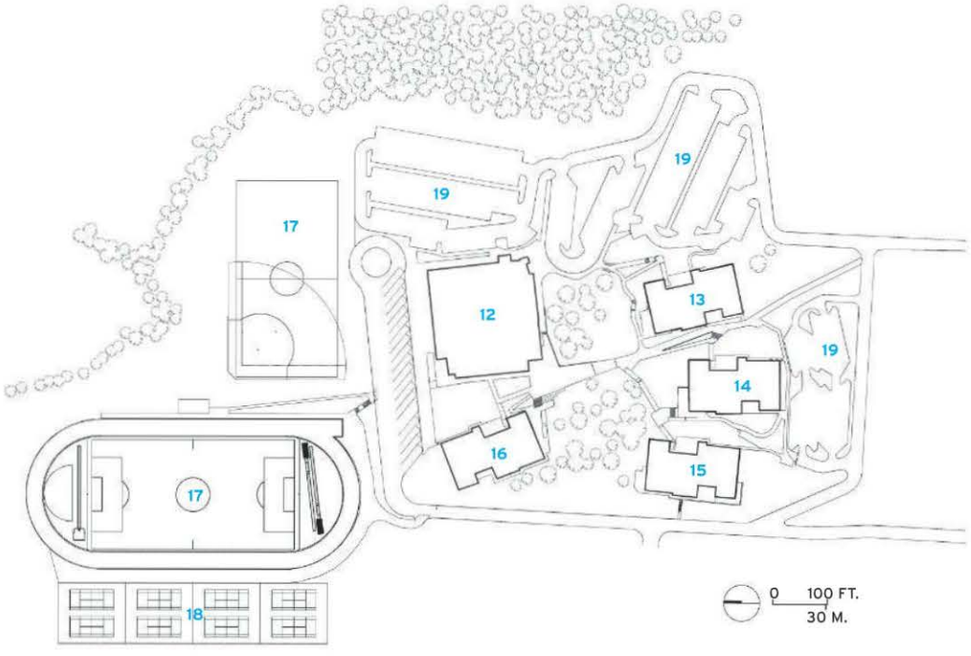
1 KITCHEN
2 SERVERY
3 DINING AREA
4 GYMNASIUM
5 LOCKER ROOMS
6 SCIENCE CLASSROOM
7 CORE LEARNING AREA
8 PROJECT COMMONS
9 OUTDOOR TERRACE
10 SCIENCE LAB
11 INFORMATION RESOURCES
12 CAMPUS COMMONS
13 INTERNATIONAL SCHOOL OF COMMUNICATIONS
14 ACADEMY OF CONSTRUCTION AND ENGINEERING
15 BIO-MED ACADEMY
16 SCHOOL FOR THE ENTREPRENEUR
17 PLAYING FIELD
18 TENNIS COURTS
19 PARKING



CAMPUS COMMONS MAIN LEVEL



LEARNING COMMUNITY TYPICAL UPPER LEVEL



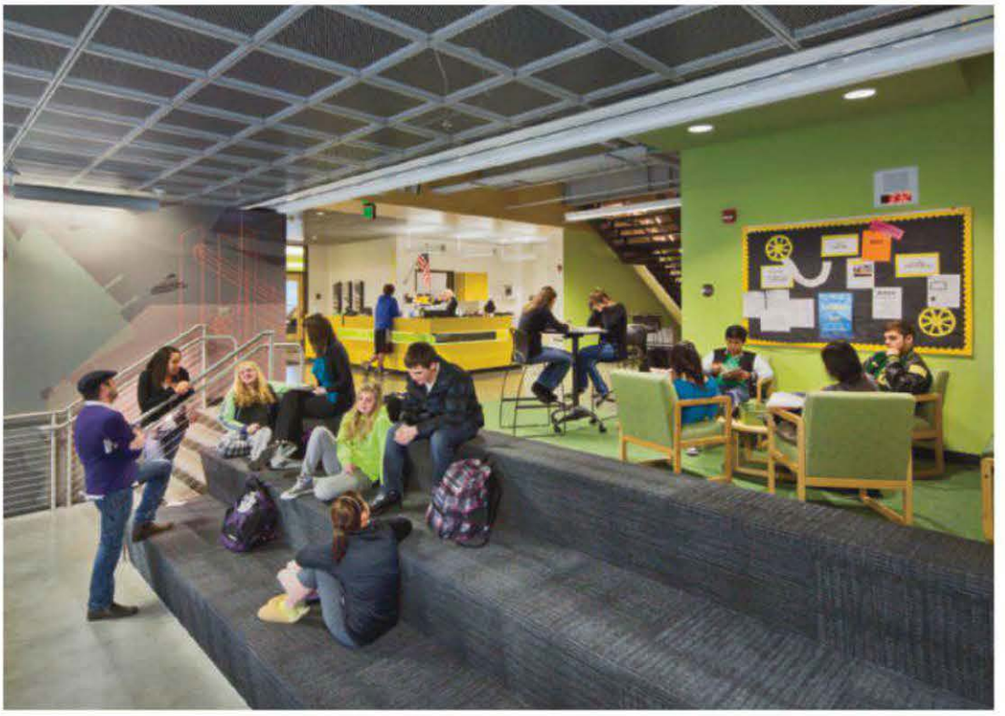
SITE PLAN

channel. In the Academy of Construction and Engineering, the woodshop is on display.

While students played ping-pong during lunch in the Academy of Construction and Engineering, social studies teacher Frank Monkman discussed the transformation of the community after its move from Pilchuck, which is still in use but benefits from a smaller student body. "There are some tougher kids here [in Construction and Engineering], kids who would have dropped out of high school. They were marginalized in a larger school, and now they have accomplishments on their résumé they wouldn't have had," he says.

Eighth graders who choose an SLC at Marysville Getchell and are unhappy after their freshman year can often switch to a different SLC for their second. "We don't get a lot of changes," says Nyland, even when students aren't thrilled with their choices. When asked why not, Nyland says that the students report, "The teachers know who I am."

So far, the school has been met with excitement. Graduation rates district-wide have improved, from 50 percent in 2007 to a projected 89 percent in 2011. Still, some challenges remain. Vital pointed out the difficulty in creating a sense of school-wide community when students are physically segregated. But for the most part, says Nyland, "The comments from the community truly reflect what we wanted to build"—a family atmosphere. "Now principals can put time and attention into building relationships and instruction. The buildings didn't make that happen…" He corrects himself: "But, they did." ■



TOP: **The fitness center on the third floor of the Campus Commons projects through the curtain wall.**

TOP RIGHT: **A mezzanine-level gathering space overlooks a social commons in each Small Learning Community.**

ABOVE: **Students meet in the Construction and Engineering lobby.**

CREDITS

ARCHITECT: DLR Group – Craig Mason, principal in charge, design; Dan Munn, principal in charge, engineering; Todd Ferking, project manager

ENGINEERS: SCE (civil); DLR Group (structural, mechanical); Coffman Engineers (electrical)

CONSULTANTS: Cascade Design Collaborative (landscape); BRC (acoustics)

CLIENT: Marysville School District

SIZE: 195,000 square feet

COST: $68 million

COMPLETION DATE: August 2010

SOURCES

CURTAIN WALL: EFCO

CLADDING: James Hardie Matrix System

GLAZING: PPG

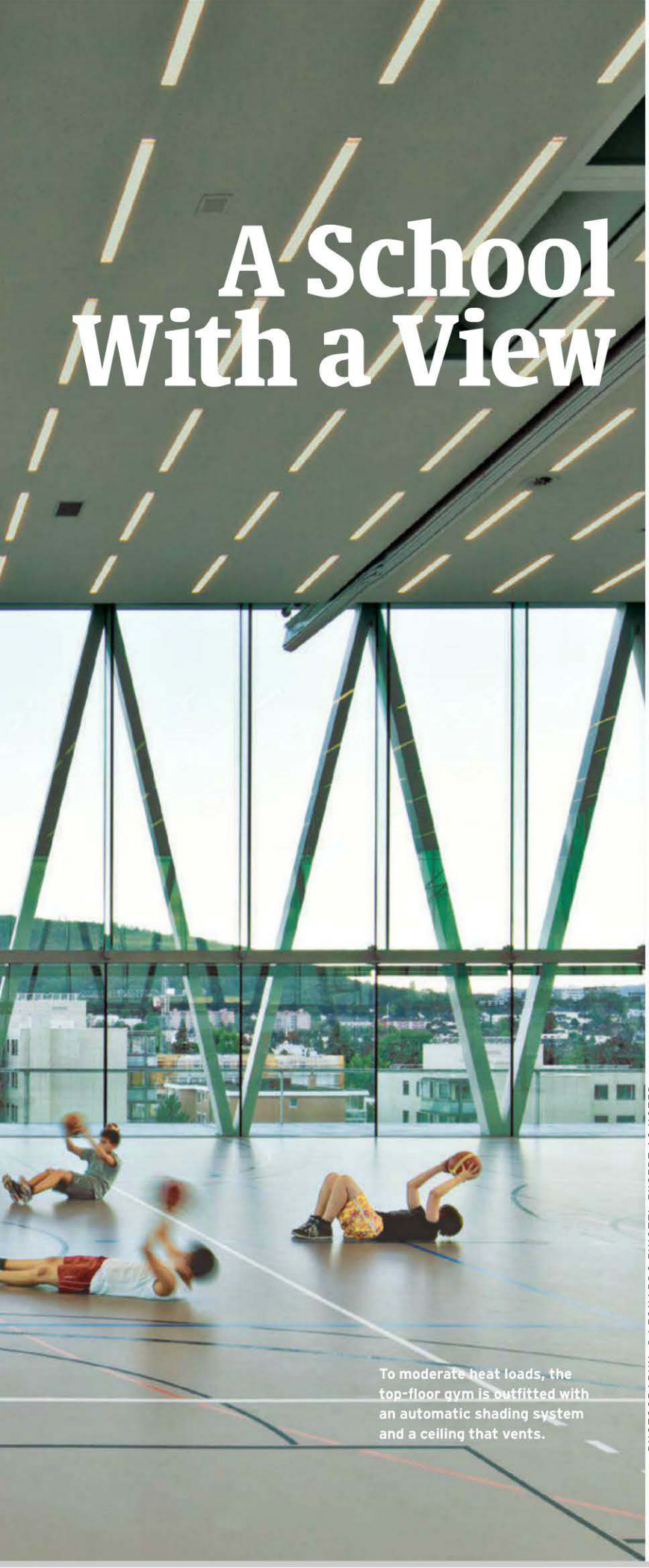
LIGHTING: Cooper Lighting

PHOTOGRAPHY: © KELLEY TANNER (FIRST PAGE SPREAD); AERIAL IMAGE COURTESY MARYSVILLE SCHOOL DISTRICT; ALL OTHER PHOTOGRAPHY © CHRIS J. ROBERTS

LEUTSCHENBACH SCHOOL
ZURICH
CHRISTIAN KEREZ

A School With a View

A Swiss city in transition employs bold architecture as a functional and symbolic catalyst for change in a traditional education system. **BY LINDA C. LENTZ**



To moderate heat loads, the top-floor gym is outfitted with an automatic shading system and a ceiling that vents.

PHOTOGRAPHY: © LEONARDO FINOTTI, EXCEPT AS NOTED

THE SCHOOLHOUSE as we know it has been upended in Leutschenbach, Switzerland, a quiet suburban corner north of metropolitan Zurich, where the city is transforming a former industrial site into a mixed-use, middle-class neighborhood infused with green spaces. Rising six stories above the trees, housing developments, and remaining factories, a crystalline new school designed by Christian Kerez not only treats students to sweeping views from the top-floor gym, it represents a clear vision for the future of a community and its children.

The initiative for change began in the mid-1990s. At that time education reforms prompted new guidelines for school construction emphasizing the need for more flexible, sustainable spaces that accommodate current instructional needs like group learning, team teaching, computer workspaces, and early childhood centers. More importantly, since pedagogical concepts are subject to change, a building must be adaptable for subsequent trends. Four schools have been built and 15 more renovated or expanded since 1998. In each case, a project-planning committee made up of school and building authorities, invited programmatic design proposals from architects through an open competition.

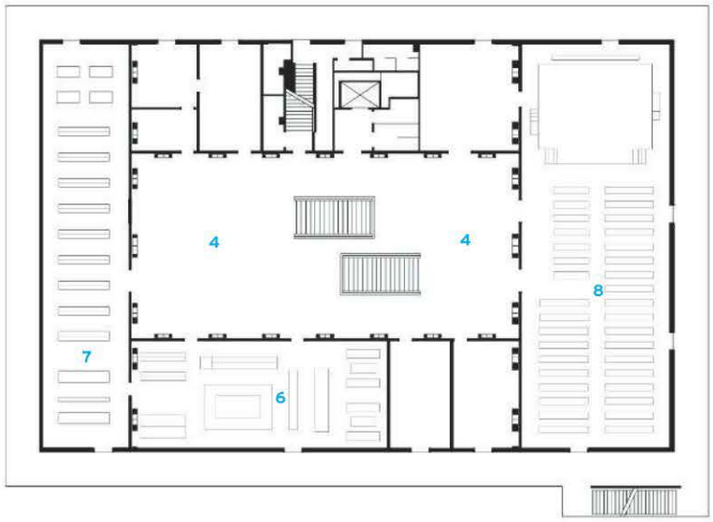
"They didn't only give a brief with square meters and functional definitions," says Kerez about the Leutschenbach call for bids. "They also asked us to envision how a child would experience the school in the future." Recalling how he enjoyed the large public spaces of his own school and how free he felt running around the grounds, the Zurich-based architect elected to "make this a very public building with large halls and staircases." Additionally, he chose to retain as much of the 177,600-square-foot lot as possible by reducing the building's footprint.

"This was crucial for the quality of the school," says Kerez. While the land allotment was generous, the site was under the flight path of the nearby international airport and adjacent to a high-speed rail line and factory incinerator. Maintaining an open field with a compact, stacked structure at its center—instead of with a typical two-level building spread over it—would enable the architect to create a park around the school, insulating its occupants from grit and noise while enhancing the developing community.

Once this decision was made, Kerez's solution began to take shape. He developed a scheme for a mid-rise box that fits neatly within a 95- by 148-foot footprint, the dimensions of the school's largest component—the gym. Collaborating closely with structural engineer Joseph Schwartz, the architect devised a bridgelike, steel-frame structure supported by six tripods at grade. An alternating sequence of trusses, internal and external, distributes and bears the building's weight, freeing the design team to cantilever slabs of lightweight, recycled concrete beyond the structural, triple-glazed facade. The resulting balconies provide sunshade and necessary fire-egress, and extend the sense of

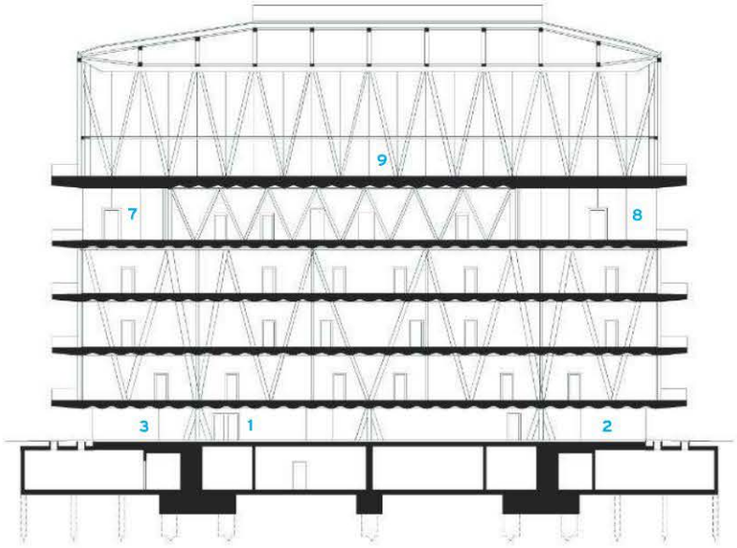
GROUND FLOOR

FIRST FLOOR

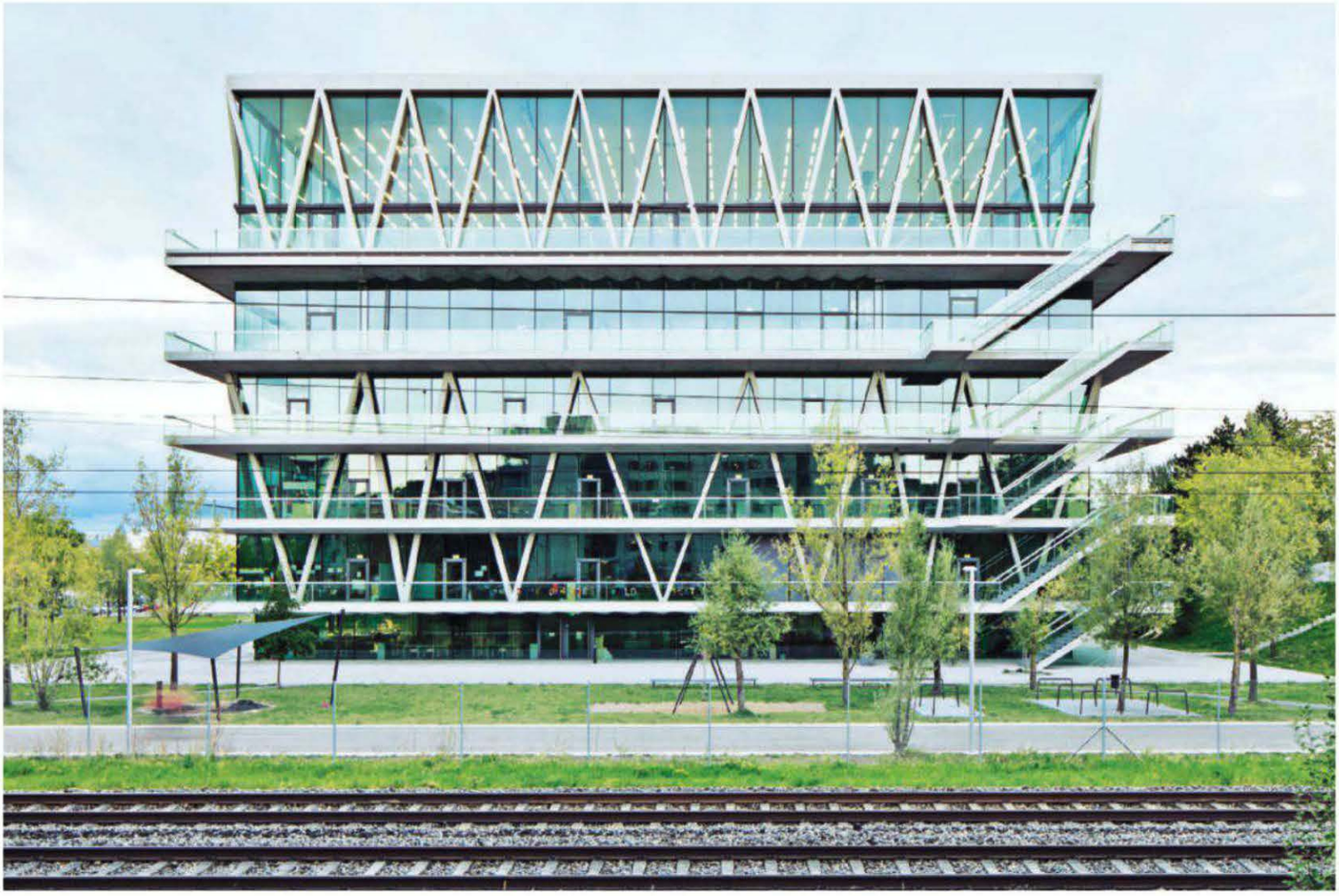


FOURTH FLOOR

1 ENTRANCE
2 KITCHEN/CAFETERIA
3 MEETING/WORK/PLAY AREA
4 COMMON HALLWAY
5 CLASSROOM
6 STAFF ROOM
7 LIBRARY
8 MULTIFUNCTION ROOM
9 GYM



LONGITUDINAL SECTION A-A



LEFT: **Kerez stacked the required building components to create a parklike setting for the children and community.**

TOP: **The school's lightweight concrete slabs extend beyond the glazing to form balconies with fire escape stairs.**

RIGHT: **Generous common areas replace typical corridors and receive plenty of daylight through the translucent channel-glass walls.**

interior space. The pleated ceilings on the undersides reduce the structure's visual weight, and allow for room heights up to 12½ feet.

The column-free construction also gave Kerez the ability to satisfy the client's request for open-ended, versatile floor plans. As Leutschenbach serves 500 kindergarten-through-secondary-school children, the teachers requested the ability to separate different age groups as needed. Kerez arranged the interior into four logical sections, one above the other, organized by general function, and unified by a simple palette of materials. Double-glazed, translucent channel-glass walls maximize transparency and light, and creamy terrazzo floors distribute radiant heat fueled by the nearby incinerator. (Indeed, the certified low-energy building is vented naturally through outlets in the roof.)

The children enter on either side of the ground level, which is basically a core with a wide, open area around it. This is where they eat and hang out after class—completely surrounded by unobstructed spans of glass, as if outdoors.

Kerez created a vertical trajectory that directs circulation up two central stairways to the second-, third-, and fourth-floor classroom clusters, nine classrooms lining the sides of each floor. Rather than the typical corridor though, he carved a generous communal area between them for group activities and lessons. Then, he carried this plan up to the fifth floor, tweaking it to fit the shared auditorium, library, and administrative offices around a courtyardlike common.

Saving his most spirited—and daring—move for last, Kerez set the double-height gym directly on top of this volume, as if resting a final layer on a tiered cake. Accessible by elevator or secondary stair, the gym spans the entire upper level, acoustically isolated from the floor below, so races can be run and games played without disturbing the activities beneath them. Not surprisingly, says Kerez, when he asks pupils what they like most about the school, nearly all say the gym.

The unconventional layout is still a challenge for some teachers accustomed to more defined, private spaces. But there is an overall commitment to the concept, says the architect. This was apparent during a recent visit on a blustery Friday afternoon, when the staff seemed to have things well under control as kids of varying ages snacked and played within the vast ground floor.

"I'm glad the students and many of the teachers appreciate the building," says Kerez. "We did it for them—they spend so much time in the building. We also wanted to pay respect to the site and the people who live here." ■

CREDITS

ARCHITECT: Christian Kerez Architect – Christian Kerez, design principal; Christian Scheidegger, Lukas Camponovo, Andrea Casiraghi, design team

ENGINEERS: Schwartz Consulting (structural); dsp Ingenieure & Planer (steel); Meili Tanner (electrical); GKP Fassadentechnik (facade)

CONSULTANTS: Beta Project Management (project management); 4d (landscape); Amstein & Waltert (lighting); Martin Lienhard (acoustics)

CLIENT: Municipality of Zurich

SIZE: 106,000 square feet

COST: $51 million

COMPLETION DATE: August 2009

SOURCES

GLAZING: Fahrni (facade system)

CONCRETE: Liapor, Eberhard Bau

STEEL: Zwahlen & Mayr

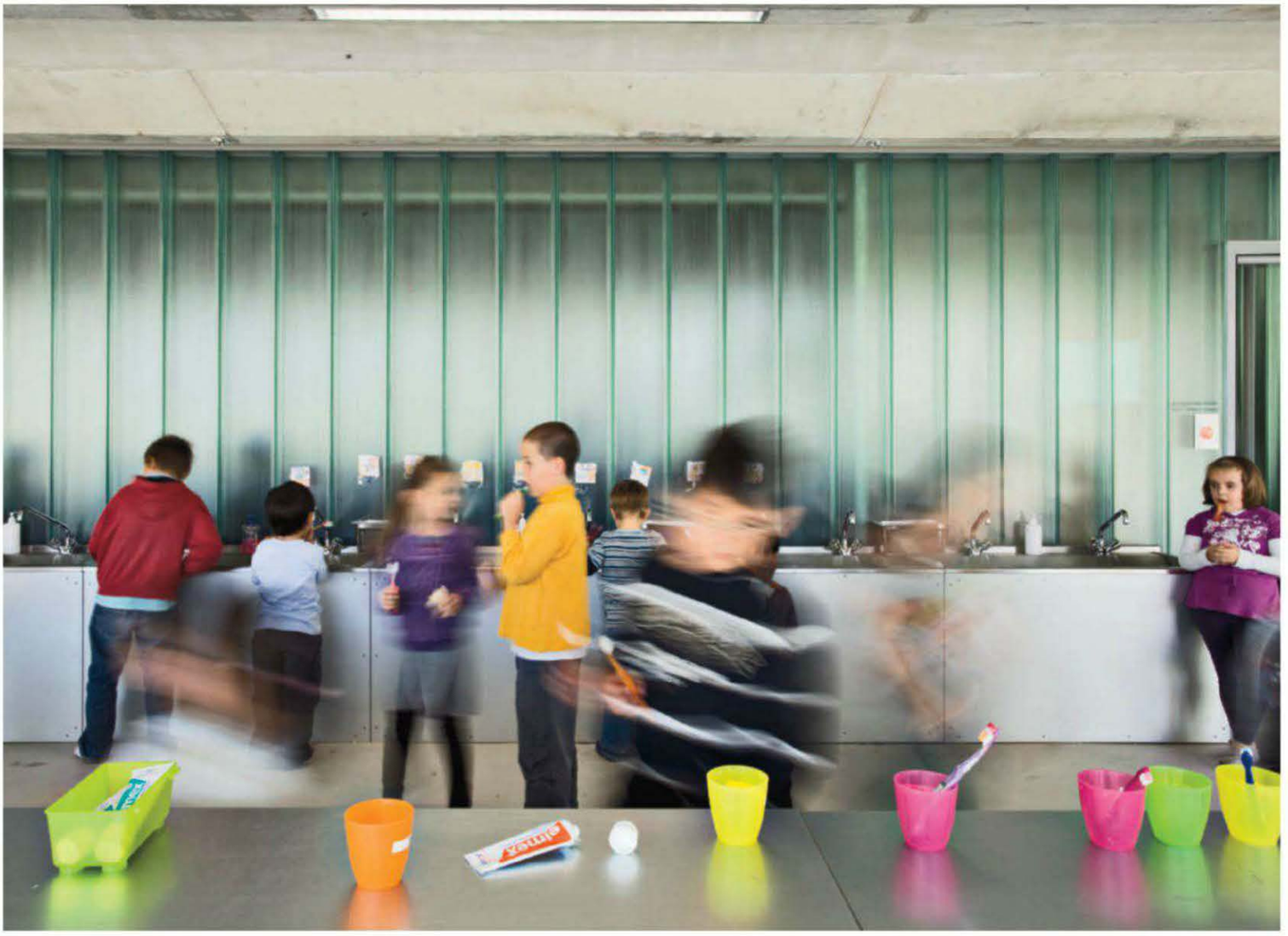
CHANNEL GLASS: Pilkington

TOP: **Versatile classrooms allow teachers to arrange the school's standard-issue furnishings to best suit their agenda.**

ABOVE: **Frameless triple-glazing around the ground floor provides a sound- and weather-insulating barrier for students inside and visually brings the outdoors in.**

OPPOSITE TOP: **A row of stainless-steel lavs fits into the materials palette and keeps young pupils organized after meals.**

OPPOSITE BOTTOM: **A pair of glass-lined stairs at the building's core direct vertical circulation.**



"The school building is a challenge, but it is a rewarding environment if you are willing to adapt."
—intermediate school teacher
(from Leutschenbach: Architecture as a Habitat, Niggli, 2011)

PHOTOGRAPHY: © NIKLAUS SPOERRI (OPPOSITE, TOP, BOTTOM)

SOUTH SHORE INTERNATIONAL COLLEGE PREP HIGH SCHOOL
CHICAGO
JOHN RONAN ARCHITECTS

The high school's main entrance at the northeast corner is elevated on a plinth, which is intended to give the school a sense of importance as well as to provide sitting areas on the steps.

PHOTOGRAPHY: © STEVE HALL/HEDRICH BLESSING

Mining Modernism for Students and the Community

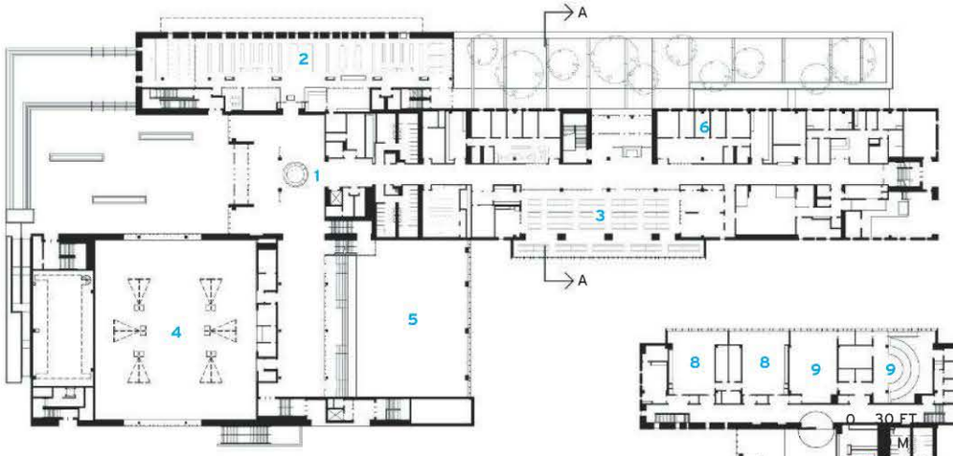
A high school with an academic program exploits early-Modernist vocabulary.

BY SUZANNE STEPHENS

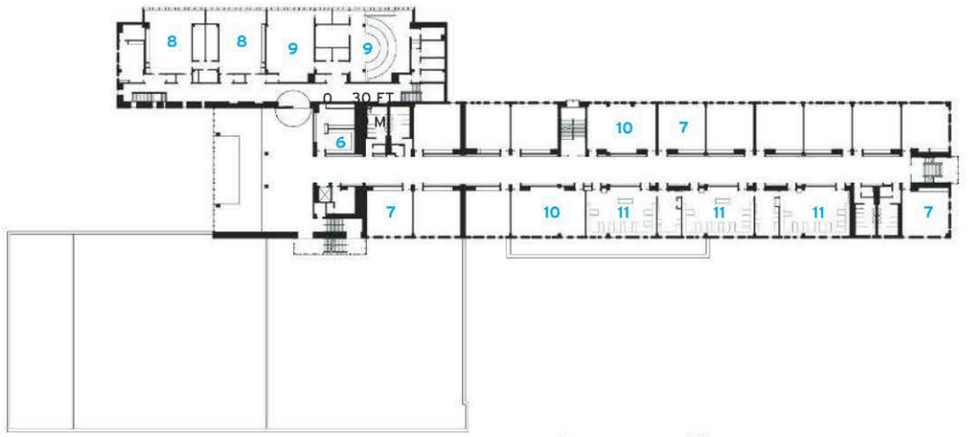
AS MANY American architects know too well, public schools in the U.S. lose out big-time on the scale of invention compared to their European and Asian counterparts. With the tight budgets and detailed restrictions handed down by school authorities, it is the rare architect who can be both ingenious and pragmatic. Yet John Ronan Architects (with DeStefano + Partners as architect of record) show it is possible with the South Shore International College Prep High School in Chicago.

This is not a normal public high school: The Chicago Public Schools agency has made it part of a program that prepares students for college. A school administrator says half the students are admitted city-wide, while the other half are students from the neighborhood south of Jackson Park who meet minimum academic requirements. Role models from the past loom: Financial advisor Suze Orman, Oracle founder Larry Ellison, and Nobel Prize–winner James D. Watson all went to the old South Shore High.

In designing the 213,000-square-foot structure, Ronan worked with the Public Building Commission (PBC), in charge of planning, design, and construction of city facilities. Since the 1,200-student high school was included within an "urban model" prototype program to speed the building process and lower costs, he had to act fast. "We had nine months from the start of the design to the completion of the construction documents," Ronan says. And the architecture had a tight budget of $70 million—or about $300 per square foot. The new high school was to express its role as an instrument of change by replacing a 1969 Brutalist concrete structure (designed by Fridstein & Fitch). While the older building had

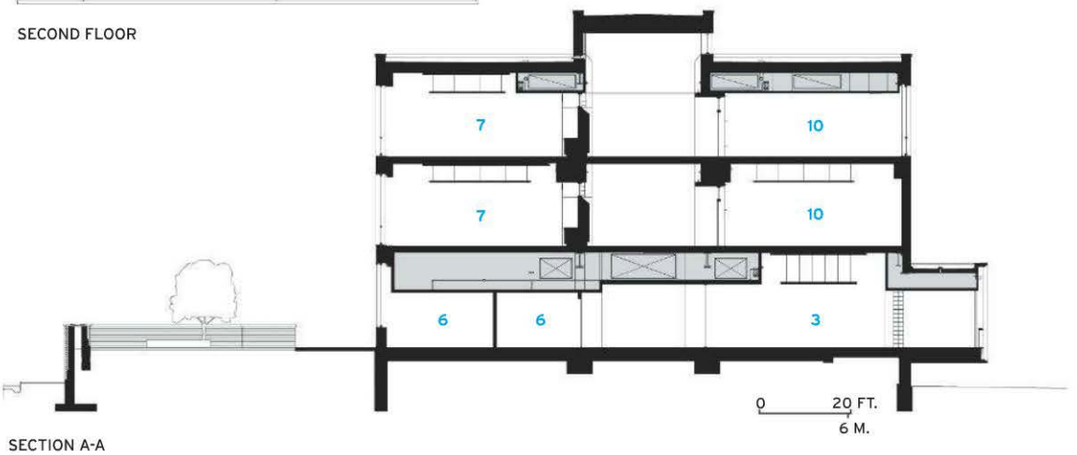


GROUND FLOOR



SECOND FLOOR

1 LOBBY
2 LIBRARY
3 DINING
4 OPEN TO GYM BELOW
5 OPEN TO POOL BELOW
6 OFFICES
7 CLASSROOM
8 ART ROOM
9 MUSIC ROOM
10 COMPUTER LAB
11 SCIENCE LAB



SECTION A-A

OPPOSITE TOP: **On the west elevation, the light masonry, band of windows, and red tile indicate the location of the gym; behind it, the lunchroom is contained in a dark rectilinear bar.**

OPPOSITE CENTER: **The main-entrance lobby is backed by rust and brown tile walls. The floor is a terrazzo mixed with a local aggregate.**

OPPOSITE BOTTOM: **The subterranean gym, which is 32 feet from floor to ceiling, can be turned into an auditorium to seat 1,200.**

been regarded as innovative in its time, it had not aged well. (Interestingly, a 1940 Moderne brick building housing four specialized high schools next door remains in use.)

"The new building should instill a sense of pride in the students, yet be accessible to the community," explains Ronan, who has already designed four other schools in the Chicago area—not to mention the elegantly rendered Poetry Foundation (RECORD, November 2011, page 84). His award-winning projects mine the early Modernist vocabulary of taut planes and clean lines which exploit space, light, and transparency. And like his Modernist forebears, Ronan creates spaces that serve multiple needs: the gym, for example, can be converted into a 1,200-seat auditorium; the library, pool, and gymnasium can be entered directly from the outside, so that the community can use the facilities when school is not in session.

For the three-story structure, Ronan developed a parti where he grouped spaces within three rectilinear volumes according to function: athletic activities in one; academic in another; and the library, arts, and music spaces in a third. These distinct volumes shift past each other on the 168,000-square-foot site to create semi-enclosed outdoor areas for the main entrance, an athletic space, and a reading garden. In addition, Ronan submerged the gym/auditorium and the swimming pool 10 feet below grade, where they still receive daylight from clerestories.

In response to the PBC's arresting mandate that the building be designed to last 100 years and rely heavily on masonry, Ronan clad the exterior walls of the steel-frame-and-concrete deck structure in a ground-face limestone block. (Red glazed clay tile covers the entry walls of the gym, blue tile designates the pool, and yellow tile the library.) Dark gray masonry alternates with lighter gray for major expanses, and the darker block acts as a thermal mass to store heat on sunny, cold days, slowly releasing it at night. Other green strategies meet the PBC's desire for a LEED-Silver building: Sedum roofs over the gym, pool, and library reduce the urban heat-island effect. Inside the build-

CREDITS

ARCHITECT: John Ronan Architects – John Ronan, principal in charge.

ARCHITECT OF RECORD: DeStefano + Partners

ENGINEERS: Rubinos & Mesia Engineers (structural); Environmental Systems Design (mep/fp)

CONSULTANTS: Terry Guen Design Associates (landscape); Charter Sills (lighting)

CLIENT: Chicago Public Schools/Public Building Commission of Chicago

SIZE: 213,000 square feet

COST: $70 million

COMPLETION DATE: January 2011

SOURCES

METAL PANELS: Centria

GLASS: Viracon, PPG

"One student favors the pool and the central hallway ('the best') for their spaciousness. He thinks the design has a 'nice look,' but would prefer school colors for tiles."

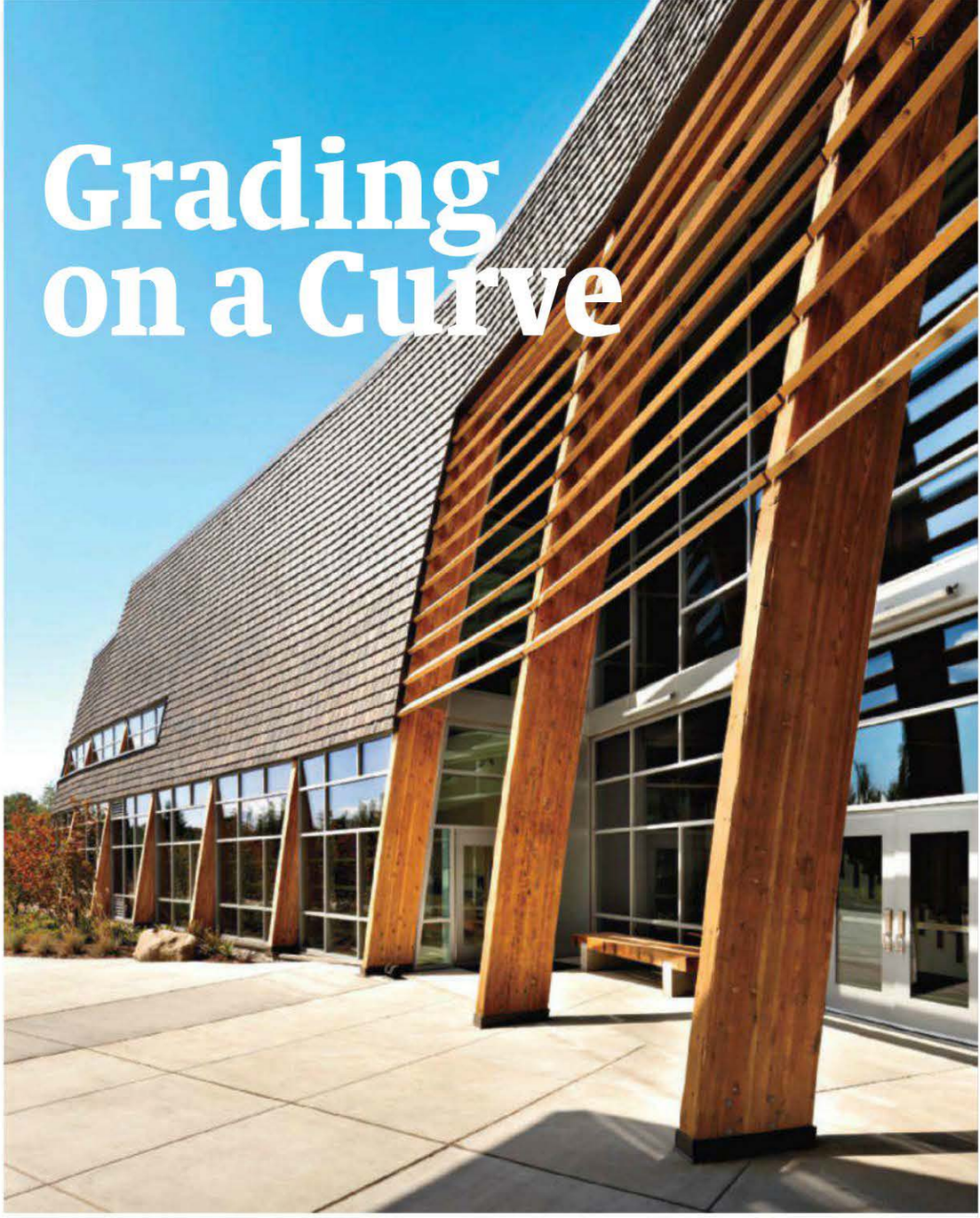
ing, a displacement system for the HVAC causes conditioned air to rise to returns at the top of the ceiling—a healthier and more efficient alternative to forced air.

Because occupancy is being phased in over four years, only ninth-graders (about 320 of them) currently attend the school. Still, interviews with two students reveal that they are worried about eventual overcrowding. One student says the gym is her favorite area because "it is so spacious," adding, "the classrooms can be claustrophobic." The classrooms, which are generally 30 feet by 30 feet, accommodate 30 pupils, which this student found to be a problem "when noisy students deprive you of focus." Another student agrees, favoring the pool and the central hallway ("the best") for their ample sizes. He also commends the design for its "nice look," with the exception of the brown tile coating some interior walls. "It needs to be more cheerful," he maintains. The young critic adds he would have preferred the tile to be blue and green—the school colors—"like these," he says, proudly pointing to the vibrantly hued stripes of his school tie. ■

PHOTOGRAPHY: © STEVE HALL/HEDRICH BLESSING

MACHIAS ELEMENTARY SCHOOL
SNOHOMISH, WASHINGTON
NAC ARCHITECTURE

Grading on a Curve



A rural elementary school pays homage to its surroundings with a sinuous form nestled in the landscape. **BY LAURA RASKIN**

"WHO ARE YOU?" asked a Machias Elementary School first grader as she ran out of her classroom on the way to recess and spotted out-of-place adults. "We're the architects who designed your school," said Matt Rumbaugh, the project manager and design principal with NAC Architecture's Seattle office. The girl stopped. Her eyes widened. "Oooooh." She seemed impressed. Then, after a pause: "Why did you guys have to change the playground?"

This was the only complaint heard on a recent tour of the K–6 school in Snohomish, Washington. "Visiting our beautiful school?" was the more common phrase from teachers. Most students showed, rather than voiced, their appreciation: cavorting on the playground in T-shirts despite the rain, or curling up with books on beanbag chairs that threatened to swallow the smallest of them. Like the new Marysville

LEFT: **The library is a sky-lit space, perfect for curling up with a book. Repurposed columns and a sculptural-wood ceiling are on display.**

TOP: **The architects salvaged beams from two razed elementary schools and reused them as arching columns.**

"We were able to take that memory of the old school and keep it around." *–Matt Rumbaugh, architect*

Getchell High School [page 106], Machias is about an hour north of Seattle—the two are a 15-minute drive from one another, but in different districts. And like Marysville's predecessor, the previous 1970 Machias building was at capacity and out of date. Instead of renovating, the district built a new school on the same property, which opened a year ago. (Riverview, another elementary school nearby, was also demolished and rebuilt on its site with a design by NAC.)

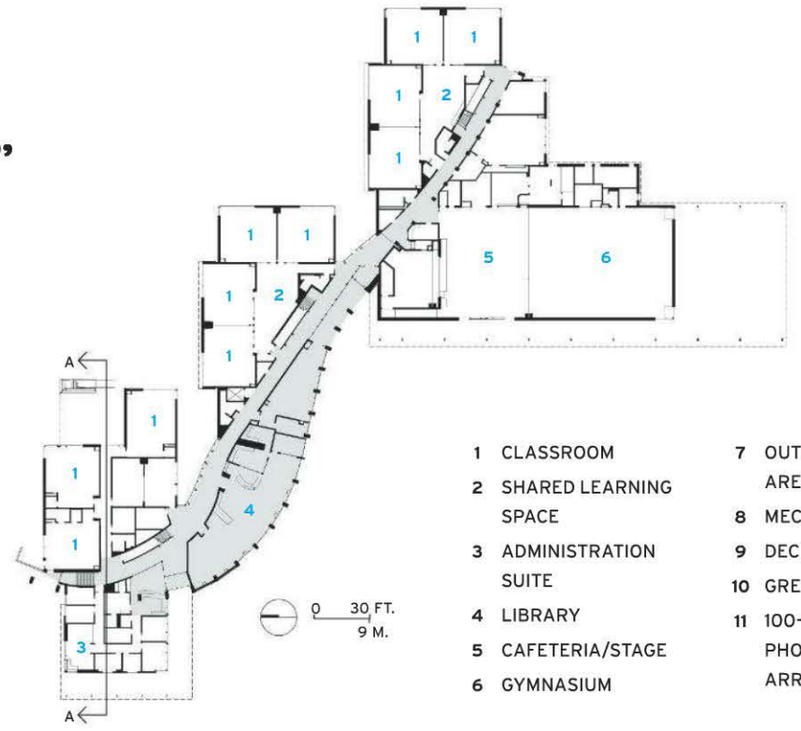
Snohomish is rural, and the community wanted the new Machias to reflect its roots. The resulting two-story structure curves like a stretched-out "S" at the back of a tree-lined field. The front of the school follows an arc formed by canted wood columns that were salvaged from the former Machias and Riverview. "We were able to take that memory of the old school and keep it around in a way that we haven't had the opportunity to do before," says Rumbaugh.

Inside, the "curve creates a feeling of exploration," says Rumbaugh, in addition to nestling the school in the site. "I've had teachers tell me that they just like to walk down the hall during breaks to enjoy the experience." A sculptural ash-wood ceiling can be seen from communal spaces and follows the curve. Its conceals mechanical components, and absorbs sound.

Clusters of four classrooms around a common space create "neighborhoods"—one for each grade—and face north. Teachers and administrators desired more transparency and stronger connections between spaces, and they received both. The library, in particular, is serene and light-filled, as is a joint science and art lab with multipurpose stainless steel tables and project shelves lining the windows.

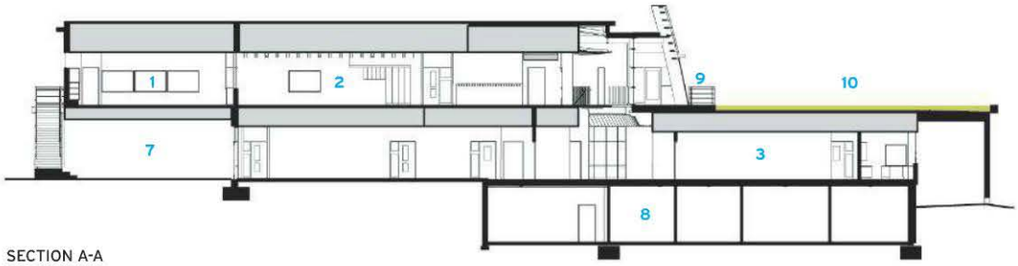
The old Machias was close to the street, but Rumbaugh and his team buffered the new one with a playing field. "We really felt like it was important to have a rural approach, not to be on the street," he says. Contemporizing the school to comply with current educational standards while maintaining a connection to the rural environs was the balance that NAC sought to maintain. "I think we did a good job of getting the connection to the land that we wanted," says Rumbaugh.

Steve Moore, a consultant who oversees the

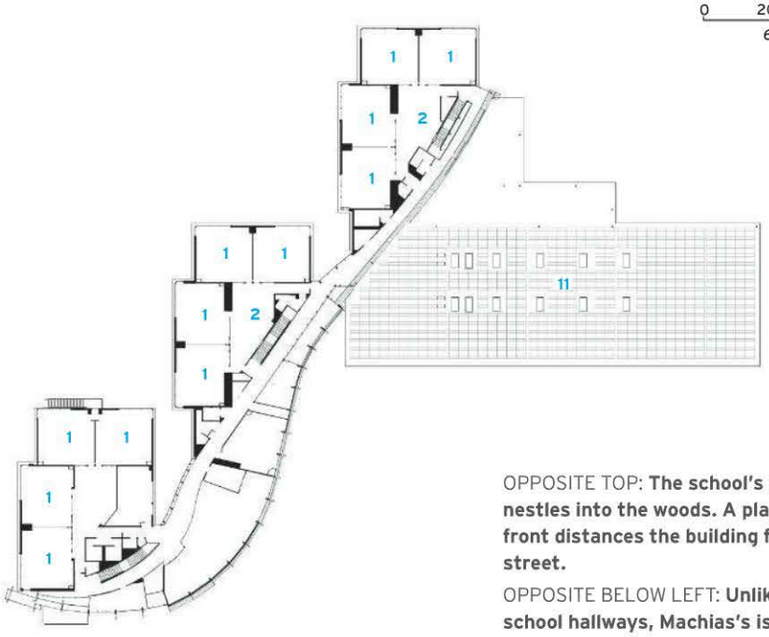


1 CLASSROOM
2 SHARED LEARNING SPACE
3 ADMINISTRATION SUITE
4 LIBRARY
5 CAFETERIA/STAGE
6 GYMNASIUM
7 OUTDOOR PLAY AREA
8 MECHANICAL
9 DECK
10 GREEN ROOF
11 100-KW PHOTOVOLTAIC ARRAY

FIRST FLOOR



SECTION A-A



SECOND FLOOR

OPPOSITE TOP: **The school's curving form nestles into the woods. A playing field in front distances the building from the street.**

OPPOSITE BELOW LEFT: **Unlike many school hallways, Machias's is inviting and filled with light.**

OPPOSITE BELOW RIGHT: **Concrete shingles are more durable than cedar and still manage to evoke old barns.**

school district's capital projects, says Snohomish is unusual for its dedication to sustainability. "The board has a vision for the district to be pushing the edge of sustainability and bringing it into the classroom," he says. Rumbaugh agrees: "This school has things that very few do." Almost everywhere you turn at Machias, there is a subtle environmental lesson. In the bathrooms, confetti-frosting-like partitions are made from recycled plastic milk jugs, and plaques describe their fabrication process. Along the curving hallway, the wall suddenly gives way to a transparent strip, offering a peek into the guts of the building and an explanation of what is there and why. A touch screen at the school's entrance allows students to check up on the building's energy performance—a 100-kilowatt photovoltaic array on the roof of the gym is currently one of the largest operating PV arrays on any building in the state.

On a less didactic level, sustainable strategies are apparent throughout the school. A watercolor swirl of green, red, purple, yellow, and orange sedum covers a green roof outside of the teachers' lounge. The roof helps slow water runoff, all of which is channeled to rain gardens.

"We spent a lot of time figuring out what we wanted learning to look like, not attempting to replicate what we had," says Riverview principal Tammy Jones, who sat on the joint design committee for both Riverview and Machias. "We looked at how we could ensure that curiosity was a central part of learning. We didn't see learning having to happen at a desk, in a chair." The results have exceeded her expectations. "A lot of people say a building doesn't matter. It matters." ■

CREDITS

ARCHITECT: NAC Architecture – Kevin Flanagan, principal in charge; Matt Rumbaugh, project manager, design principal; Philip Riedel, project architect; Marcia Wall, interior designer

ENGINEERS: Coughlin Porter Lundeen (civil, structural); Hargis Engineers (m/e/p); Associated Earth Sciences (geotechnical)

LANDSCAPING: Weisman Design Group

CLIENT: Snohomish School District

SIZE: 79,778 square feet

COST: $21 million

COMPLETION DATE: December 2010

SOURCES

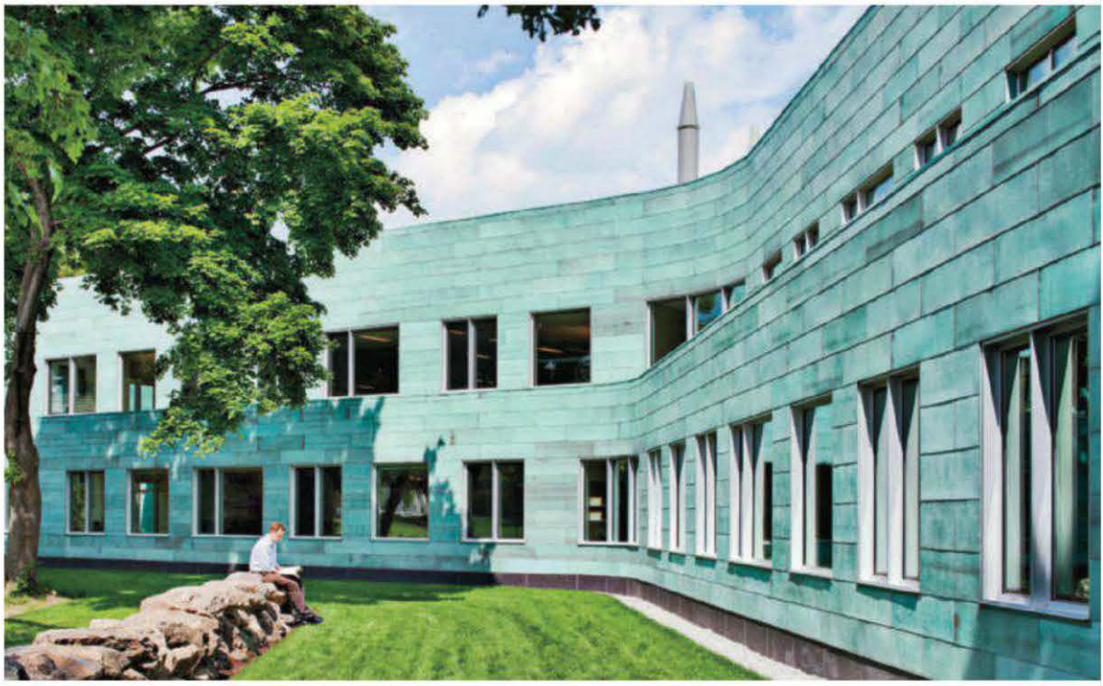
PRECAST CONCRETE: Puget Sound Precast

CONCRETE SHINGLES: MonierLifetile

View additional images of this project at architecturalrecord.com.

PHOTOGRAPHS

In the Name of Science



An architecture office and prep school underscore community and the excitement of science with a new building that puts the discipline on display. **BY BETH BROOME**

"TRUE SCIENCE thrives best in glass houses, where everyone can look in," wrote Nobel Prize–winning molecular biologist Max Perutz. Boston-based William Rawn Associates, Architects (WRA) took this sentiment to heart in the design of their Pritzker Science Center at Milton Academy, which puts visibility, in every sense of the word, front and center. The new building is evidence that the elite prep school, founded in 1798 and located in the bucolic Boston suburb of Milton, while steeped in tradition, is not stuck behind cloistered walls.

For many years Milton's science department operated out of a concrete Brutalist building. Recognizing that the outdated "bunker" might constrain the program's future, the school worked with a consultant to formally define the department's needs. The art department moved into the former science building and science moved into a temporary cluster of trailers. Meanwhile, venture capitalist and Milton alum J. B. Pritzker (of the famed Chicago family) provided a lead gift for a new building, and the project started in earnest.

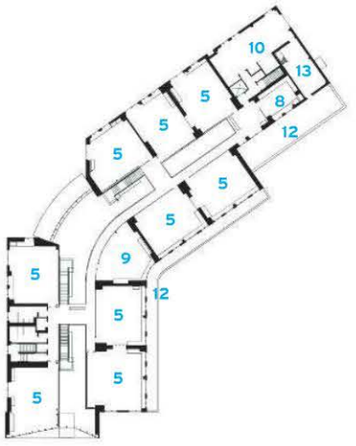
LEFT: **A glass facade calls out the front door and connects to the campus green. The curtain wall is angled to greet visitors arriving from different directions.**

TOP: **The copper-clad west side's second story steps back to accommodate bands of green roof. Fieldstone was reclaimed from a preexisting wall.**

The overarching mandate to make science visible was coupled with the demands to provide flexible space, foster a sense of community, and capture the energy of science. "When I was a kid," says WRA principal William Rawn, "there was no fun to science. It was all about work. The idea of changing the paradigm was really important here—that struck a chord with me." So the building also aimed to model the open and interconnected spaces in which professional science is practiced today, as well as to promote active learning, a hallmark of Milton.

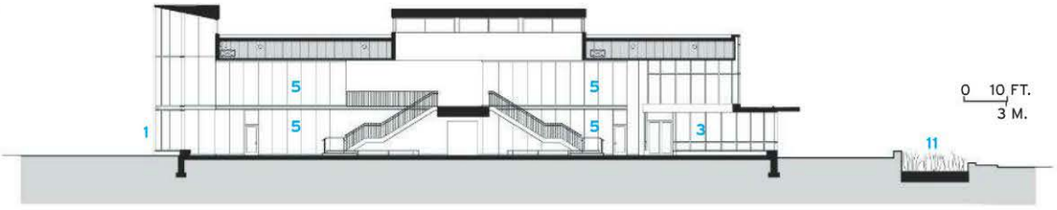
To proclaim the new center's significance, the team selected a site along the Green, near the center of the historic, Georgian-style campus. While the architects hoped to downplay the scale of the 40,000-square-foot building by orienting its narrow end to face Centre Street, they also wanted a prominent front door, like the other street-fronting Upper School academic buildings. This feature is called out with a 35-foot-high curtain wall, animated by the activity in the public spaces and classrooms behind it. The building bends to the south, expressed as a bar, clad on the west facade with pre-patinated copper panels. The administration says the surrounding community embraced the new neighbor, acknowledging that WRA's 2003 glass-and-wood student center likely warmed the neighbors to modern design at Milton. The architects also used brick on the exterior to both break down the steel-framed building's relatively large mass as well as integrate it into the campus. If the north and west facades are the department's calling cards, the building's bowed, brick east side is

FIRST FLOOR



SECOND FLOOR

1 MAIN ENTRANCE
2 CENTRAL GATHERING ENTRY
3 STUDENT LOUNGE
4 INQUIRY LAB
5 CLASSROOM LAB
6 FACULTY LOUNGE
7 LAB PREP SUITE
8 FABRICATION ROOM
9 PROJECT ROOM
10 MECHANICAL
11 RAINWATER GARDEN
12 ROOF GARDEN
13 OUTDOOR CHILLER WELL



SECTION A-A

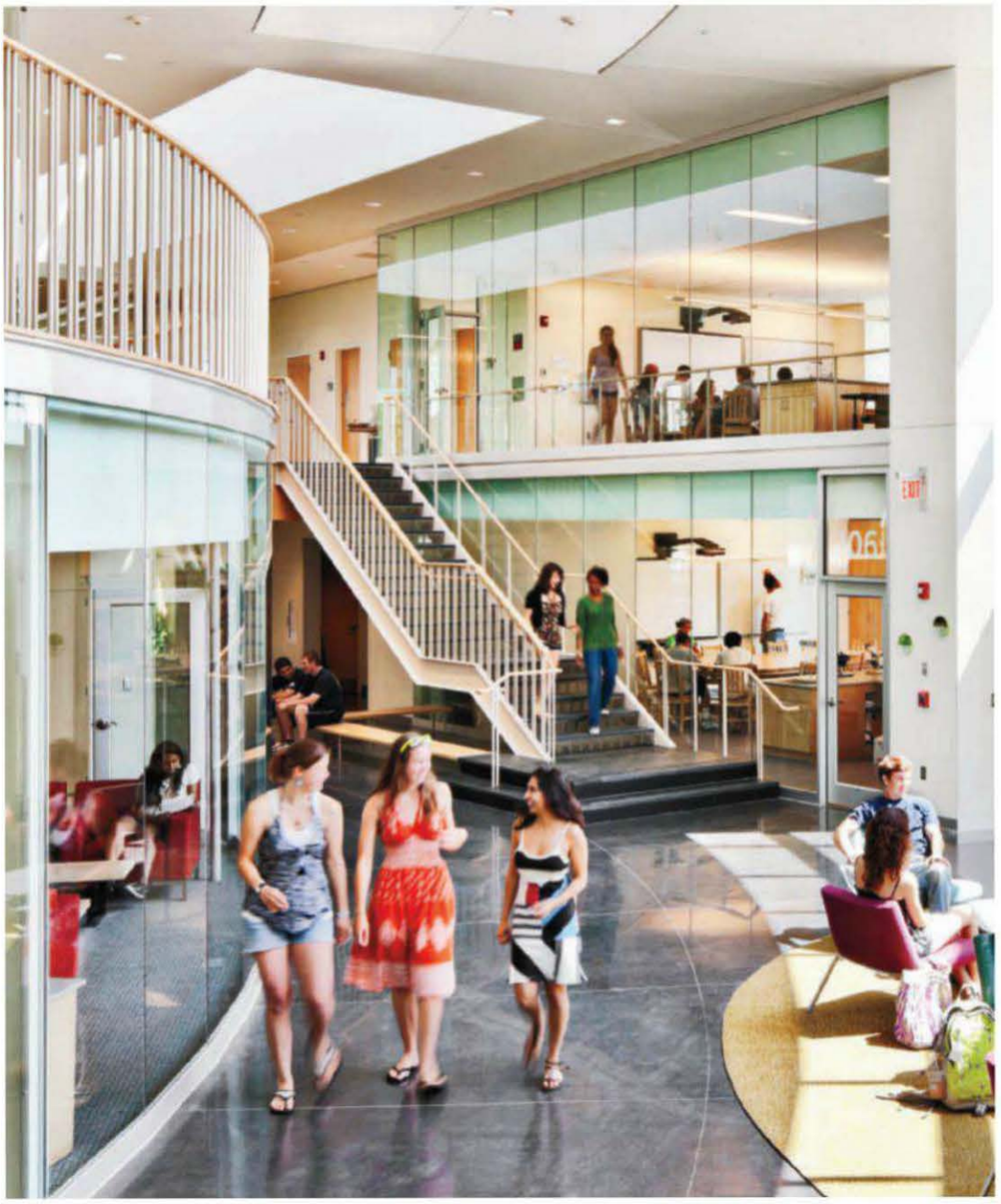
its bashful cousin—a prosaic, institutional sea of red masonry and punched windows that knows its place in the backyard.

The building's form responds to its double-height, double-loaded central corridor that is flanked by classroom-labs: They combine seminar tables and group lab benches in a single room to promote hands-on learning. The plan gets a twist as the spine kinks in the middle, cleverly creating the heart of the building, which comprises student and faculty lounges. Teachers do not have private offices, so the keystone-shaped faculty lounge functions as a central gathering place, which connects, through floor-to-ceiling, butt-glazed glass walls, to the student lounge, as well as to the neighboring Inquiry Labs, where children pursue independent study. "The faculty wanted to be in the center of it all," points out Rawn, "in the interest of fostering this scientific community."

Visually and physically connecting the two stories largely drove the design, say the architects. By moving all mechanicals above the second level, the team lowered the ground floor's ceiling height down from the typical 14 feet to 11-foot-4, creating—along with three open stairways—an intimacy between levels. Abundant floor-to-ceiling glass brings classroom activity out to the hall and carries light into the core, as do clerestories and skylights. "Designing the interior was this progressive unveiling to the point that it became wide open," notes associate principal Samuel Lasky. These moves are not lost on the students: "The building has a good community feel to it," says senior Bright Osajie, over a cow heart he is dissecting. "The classes are more connected, and there is a lot of science immersed in this building—you can see science everywhere."

Milton also wanted their building to teach sustainable practice by example. The Pritzker Center employs an impressive range of strategies, from native plantings, a green roof, 100 percent on-site infiltration of rainwater, reclaimed and locally sourced materials, daylight harvesting, and construction-waste recycling and reuse. A touch screen building dashboard in the front lounge provides real-time information on energy and resource consumption and solar electricity generation.

"I love the vitality of the building," says department chair Michael Edgar, as students stream into the Pritzker Center for second period. "One of our aims as a department and as a school is to ignite interest and passion in our kids. Being able to see what's going on in all the classes and experience not only what you are doing, but what everyone is doing, is an excellent catalyst for getting kids excited about science." ■



OPPOSITE: **Garage doors connect classroom-labs, which feature "Harkness" seminar tables next to lab benches, underscoring the school's commitment to active learning.**

ABOVE: **Open stairways in the double-height corridor, and floor-to-ceiling glass walls between classrooms and public spaces, create an airy yet intimate environment.**

PHOTOGRAPHY: © ROBERT BENSON

CREDITS

ARCHITECT: William Rawn Associates, Architects – William L. Rawn, Douglas C. Johnston, principals for design; Samuel M. Lasky, associate principal for design; Andrew Jonic, project architect; Mark Scott, Carla Ceruzzi, Rachel Gealy, Stephanie Ulrich (project team)

ENGINEERS: LeMessurier (structural); Rist-Frost-Shumway Engineering (civil, m/e/p, f/p); McPhail Associates (geotechnical)

CONSULTANTS: Stephen Stimson Associates (landscape)

SIZE: 40,000 square feet

COST: $19.3 million

COMPLETION DATE: August 2010

SOURCES

EXTERIOR CLADDING: Morin Brick, Polycor (masonry); Revere Copper (metal panels)

ROOFING: Firestone (elastomeric); Liveroof Planting System (green roof)

WINDOWS/DOORS, CURTAIN WALL: Kawneer

GLAZING: PPG; Oldcastle BuildingEnvelope

ACOUSTICAL CEILING: Armstrong

OFFICE FURNITURE: Steelcase

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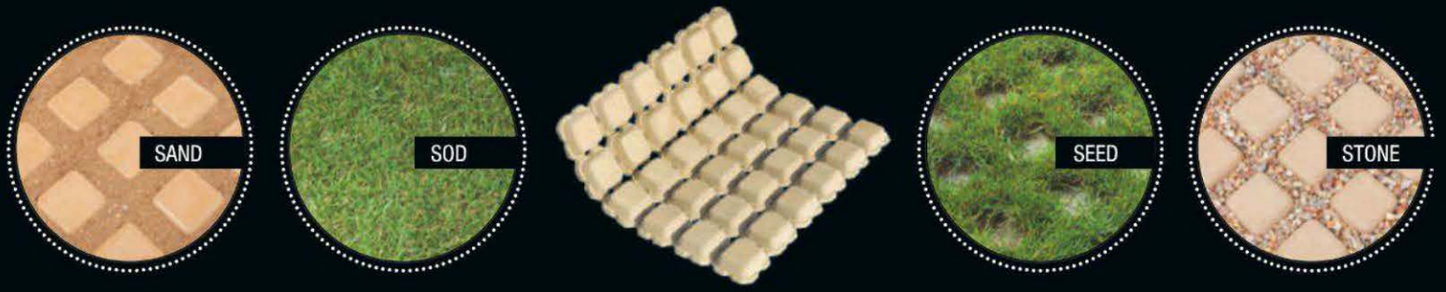

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CIRCLE 88

Sustainable Solutions

At a time when many districts are tightening their belts, the green schools movement is gaining steam. We check in with administrators and architects, along with nonprofit groups that are stepping up to help. **BY JENNA M. MCKNIGHT**

PHOTOGRAPHY: © KIMBERLY MOA (LEFT); © JENNA M. MCKNIGHT (RIGHT)

Phoebe Beierle, a USGBC Green Schools Fellow, works to boost sustainability initiatives in Boston's public school system. Her day-to-day tasks vary, such as describing an edible garden to students (left) and encouraging recycling efforts (right).

ON AN unseasonably warm December day, Phoebe Beierle is making the rounds at various facilities in the Boston public school system. The assiduous 29-year-old sustainability advocate has a mile-long list of aspirations, and today she's on a mission to spur recycling efforts. She meets with school administrators, peppering them with questions: What materials do they recycle? Do they use Styrofoam trays in the cafeteria? How much garbage do they generate each week?

"My role as sustainability director for the district is my dream job," says Beierle, who holds a degree in environmental studies and worked on green building and renewable energy projects before joining the Boston school district. "Every day, I'm excited to have the opportunity to work toward improving schools and the education we provide for children."

Beierle is on loan to the district through the U.S. Green Building Council's (USGBC) new Green Schools Fellowship program, which places sustainability gurus in cash-strapped public school systems for three-year terms. The fellows are charged with boosting or creating green initiatives—from energy audits to edible gardens—depending on the district's needs and resources. In addition to Beierle, the center has hired a fellow to work in Sacramento, with hopes of expanding the program in the coming years. United Technologies Corporation is helping to fund the endeavor.

The fellowships are just one facet of the USGBC's burgeoning Center for Green Schools. Established in the fall of 2010, the center is an outgrowth of the organization's National Green Schools Campaign, which was launched in 2007 in conjunction with the LEED for Schools rating system. At its core, the center's raison d'être is to promote sustainability in the educational sector at all levels, from building design to facility management to classroom curriculum. The 12-member staff, bolstered by an army of volunteers, not only advises school districts, but also provides support to policymakers, USGBC chapters, student groups, and nonprofit organizations.

"We're like a campaign organizer," says center director Rachel Gutter, who spends much of her time zipping around the country to spread the green schools gospel. "We're getting people the materials they need, linking them up with sponsors, providing training, offering a communication platform. We kind of function as a center of gravity for the movement." The center also coordinates events; last fall, it teamed up with Robert Redford to host a green schools summit at his Sundance Resort in Utah, where dozens of civic and educational leaders converged to exchange ideas.

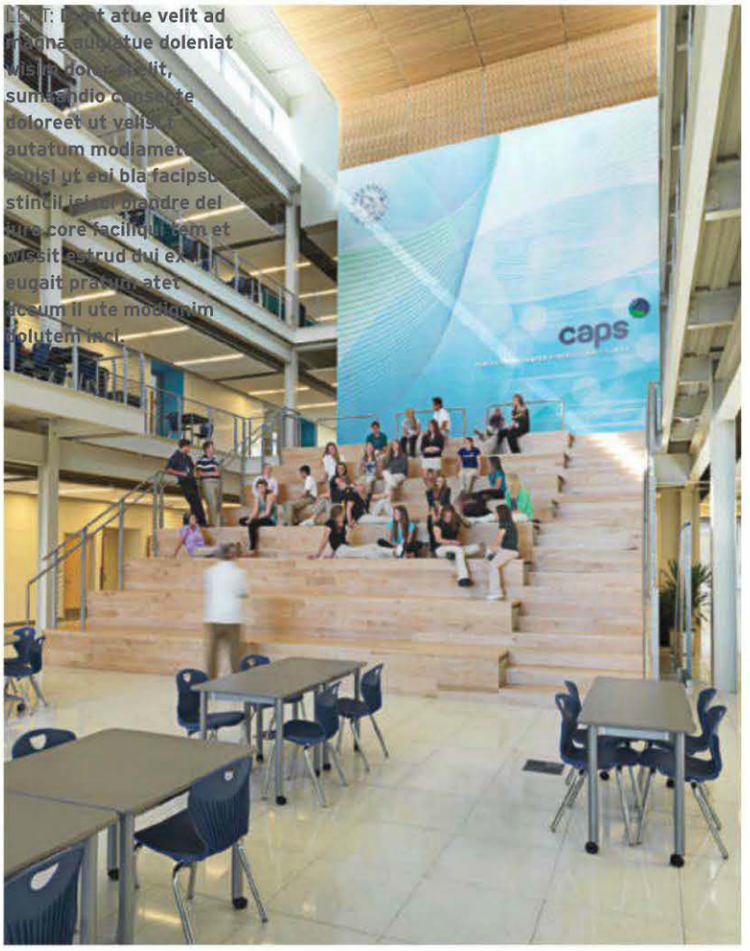
The center has arrived at an optimal moment. A bevy of advocacy groups, from local parent associations to national environmental organizations, are pushing for healthier, more eco-friendly learning spaces. In turn, 12 states, plus the District of Columbia, have enacted legislation requiring that public-school construction projects incorporate sustainable

View a video interview with Rachel Gutter online.

features. Then, last September, the U.S. Department of Education officially kicked off its Green Ribbon Schools awards program, which honors schools that reduce their carbon footprint while also promoting "environmental literacy" among students. The first winners will be announced on Earth Day in 2012.

The demand for building green schools is on the rise, according to studies conducted by McGraw-Hill Construction (MHC). [MHC is the publisher of RECORD.] The 165 architecture and engineering firms that responded to a green buildings survey reported $508 million in school-design revenue in 2008; that amount grew to $641 million the following year (with 162 firms reporting), and to $690 million in 2010 (with 172 firms reporting). "Despite the education-construction market flattening out, there continues to be interest and growth in this market," notes Gary Tulacz, MHC's manager of surveys.

Architects confirm that the slumped economy doesn't seem to be slowing the movement. "I haven't seen a decreased interest in green schools. If anything, it's going in the other direction," says Steven Turckes, who leads Perkins+Will's K–12 practice, which has completed more than 2,500 school projects in the past seven decades. When Turckes began working in this sector in the mid-1990s, sustainability "just wasn't part of the lexicon," he says. "Now, when clients are looking for architects to design schools, they want us to demonstrate that we know our way around sustainable design. Schools understand the benefits to them, both in terms of operational savings and the potential benefit to student performance."



In the United States, Perkins+Will is a leader in the green educational sector. Recent K–12 public-school projects by the firm include the LEED Gold–Certified Springdale Park Elementary School in Atlanta (below), and the Blue Valley School District's Center for Advanced Professional Studies in Overland Park, Kansas (right), which aims for LEED Gold.

Still, misgivings persist about the price of going green. "We've come a long way as an industry in being able to address those concerns and do it with a straight face," Turckes says. He generally tells clients that he can deliver a LEED-Silver facility with "very little, if any, additional costs." While specific elements might come at a premium, savings are recouped in other areas. "Spend a little bit more on an exterior wall, and perhaps you don't need to spend as much on mechanical systems," he says. Plus, eco-friendly features pay off over time, as schools are typically designed to last for 50 to 75 years.

Financial motivation is one reason Charles "Chuck" Saylors, vice president of South Carolina–based M.B. Kahn Construction, championed green schools while serving as president of the National PTA (his two-year volunteer term ended in June). His company, ranked among the top-50 Southeast green contractors by *Engineering News-Record* [*ENR* is a sister publication of RECORD], has built more than 2,000 K–12 schools in the last four decades, and Saylors has seen firsthand the advantages of sustainable strategies. His local district, where Saylors is a school-board member, has trimmed about $2 million from its annual electric bill due largely to the installation of energy-efficient lighting and HVAC systems. "In the long-term," he says, "these kinds of decisions help save taxpayer dollars."

Still, investments of any kind are out of the question for many budget-crunched districts. In 2005, the Washington state legislature

PHOTOGRAPHY: © JAMES STEINKAMP (TOP); JONATHAN HILLYER (BOTTOM)

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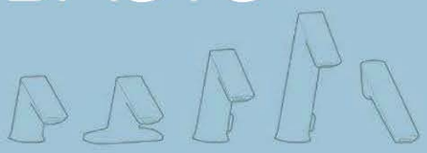

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CIRCLE 76

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Designed by NAC Architecture, the new Riverview Elementary School in Snohomish, Washington, has a host of sustainable features, including on-site photovoltaic panels and a ground-source heating and cooling system. The project was funded through a bond passed by voters in 2008.

passed a law mandating that major school construction projects receiving state funds be designed to achieve LEED Silver Certification or an equivalent. Even in the progressive-leaning Evergreen State, the requirement has stirred resistance. "The cost issue really causes dissention—the cost to design, build, and maintain," explains Gordon Beck, the state's director of school facilities. While there's no reliable data, the general perception is that green schools cost 2 percent more to build, he says. "People are frustrated; they think it's just an added expense," Beck explains. He suspects, however, that the opposition will fade over time, similarly to how concerns in the 1990s about retrofitting facilities for ADA compliancy eventually dissolved. "It was a really big deal. Now, we don't even talk about it. It's a given," he says. "With green schools, I think it will just become a part of doing business."

In the meantime, select companies and nonprofits are jumping in to help. Four years ago, Cause and Effect Evolutions, a California-based marketing firm, started an initiative to build green facilities at no cost to underserved districts. Construction projects would be funded entirely through donations. "We're the puzzlemaster," says Jeff Zotara, a cofounder of Cause and Effect. "We work with architects, engineers, general contractors, building-product manufacturers, and consumer-corporate clients to fund these schools."

The impetus for the program, branded the Green Schoolhouse Series, was to curb the proliferation of portable classrooms—cheap structures that often have poor air quality, noisy mechanical systems, and no windows. The "puzzlemaster" broke ground on its first project in December: a 6,000-square-foot, $2.4 million facility at Roadrunner Elementary School in Phoenix that will double as a community center during nights and weekends. Designed pro bono by Stantec, the building, made of insulated concrete forms and a steel moment frame, will replace up to eight portables. Green features include bio-based flooring, low-flow toilets, and solar panels. "In a lot of cases, we have to say no to potential donors because they're not sustainable enough," says Zotara.

"Most districts in the country right now don't have enough money to repair a leaky roof," says Rachel Gutter, director of the USGBC Center for Green Schools.

In the next 18 months, the Green Schoolhouse Series aims to start work on two more projects in Arizona, plus two in California. The ultimate goal is to construct facilities nationwide. "We're focused on getting schools built in these tough economic times," says Zotara.

Indeed, addressing funding issues is a priority for the Center for Green Schools, particularly when it comes to retrofitting existing buildings. "Most districts in the country right now don't have enough money to repair a leaky roof," says director Gutter. She argues that greening a school doesn't require big bucks. Schools can immediately start conserving the environment—and money—through simple actions, such as judiciously monitoring thermostats and powering down computers when they're not in use. Having an energy management plan can help: Since instituting such a scheme in 2003, the Warren County School District in Kentucky has reportedly saved $6 million in energy costs. It also has a full-time "energy educator" on staff.

To effectively infuse a green ethos into a school district, it "has to be someone's job," says Gutter. That's why her center established its fellowship program; it recognizes that many public districts, such as Boston Public Schools (BPS), can't afford to have an employee dedicated to carrying the green torch. "We've lost a lot of staff lately," says Khadijah Brown, director of facilities management at BPS. Comprising 132 schools, her district has several successful environmental initiatives in place, but slashed budgets could put these at risk. Other programs, such as ones for the collection of recyclable paper, are struggling.

Enter Beierle. "I have a flyer here that explains how you can qualify for free recycling bins," she says as she hands a brochure to Amy Sprott, the principal at Philbrick Elementary School. Situated in the ethnically diverse neighborhood of Roslindale, the small school provides free or reduced lunches to 69 percent of its students. Thanks to the longtime support of the nearby Boston Nature Center, Philbrick already boasts edible gardens and a modest composting program. "We wouldn't be able to do these things without the help," says Sprott. Now, it has the USGBC lending an extra hand. "My goal is to establish the Boston school district as a leader in sustainability," Beierle says. "A lot has already been accomplished, but there are so many more opportunities." ■

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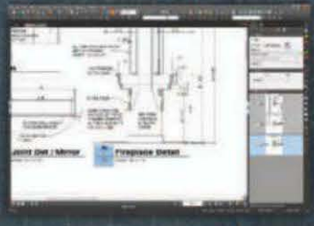

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Learning Tools

Products that help K–12 grade students see, hear, create, and make the most of their learning environments. **BY RITA CATINELLA ORRELL**

Tools at Schools

Tools at Schools, a partnership between Bernhardt Design, creative consultancy Aruliden, and The School at Columbia University, introduced design into the school's eighth-grade curriculum by challenging 45 students to create the classroom of the future. While not yet available, there is discussion about bringing the line, including chairs, desks, and lockers, into production.
bernhardtdesign.com

Kalwall Translucent Curtain Wall

DLR Group extensively used Kalwall's translucent panels in the Metea Valley High School in Aurora, Illinois, to bring glare-free lighting into the stairwells, gymnasium, lunchroom, natatorium, media center (above), and other spaces. In addition to the regular rectangular panel, DLR Group chose Verti-Kal, a design variation of the system's standard shoji or square grid layouts. kalwall.com CIRCLE 207

SoundSoak Baffles

The installation of Armstrong's SoundSoak Baffles in reverberant spaces such as auditoriums, gymnasiums, music rooms, and other areas, can significantly reduce background noise and reverberation time. Ideal for new construction or retrofits, the baffles provide greater sound absorption than a continuous ceiling of the same surface area because sound is absorbed into both the front and back surfaces.
armstrong.com/baffles CIRCLE 209

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Metal Sales provided custom T16-L horizontal and curved horizontal siding panels to the 98,000-square-foot William R. Anton Elementary School in Los Angeles. Built on 3.2 acres of uneven land, the site's severely sloped topography required that the campus be designed vertically. 1,260 square feet of 20-gauge ribbed panels (in Kynar 500 Champagne Gold) were used on the facade, and 10,240 square feet of matching panels cover the external stair enclosure.
metalsales.us.com CIRCLE 210

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Photo by David Lena; Courtesy of HMC Architects

Wood Scores A+ in School Construction

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Natural building material takes top honors for cost, aesthetics, and performance. This course details the many benefits of wood in school construction, including material cost advantages, speed of construction, design versatility, and the ability to meet green building goals — all while creating positive learning environments.

Credit: 1.00 HSW/SD **page 137**

Photo courtesy of Excel Dryer, Inc.

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Credit: 1.00 HSW/SD, 1.00 GBCI CE Hour **page 143**

Photo courtesy of Guardian Industries

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Credit: 1.00 HSW/SD **page 149**

Wood Scores A+ in School Construction

Natural Building Material Takes Top Honors for Cost, Aesthetics, and Performance

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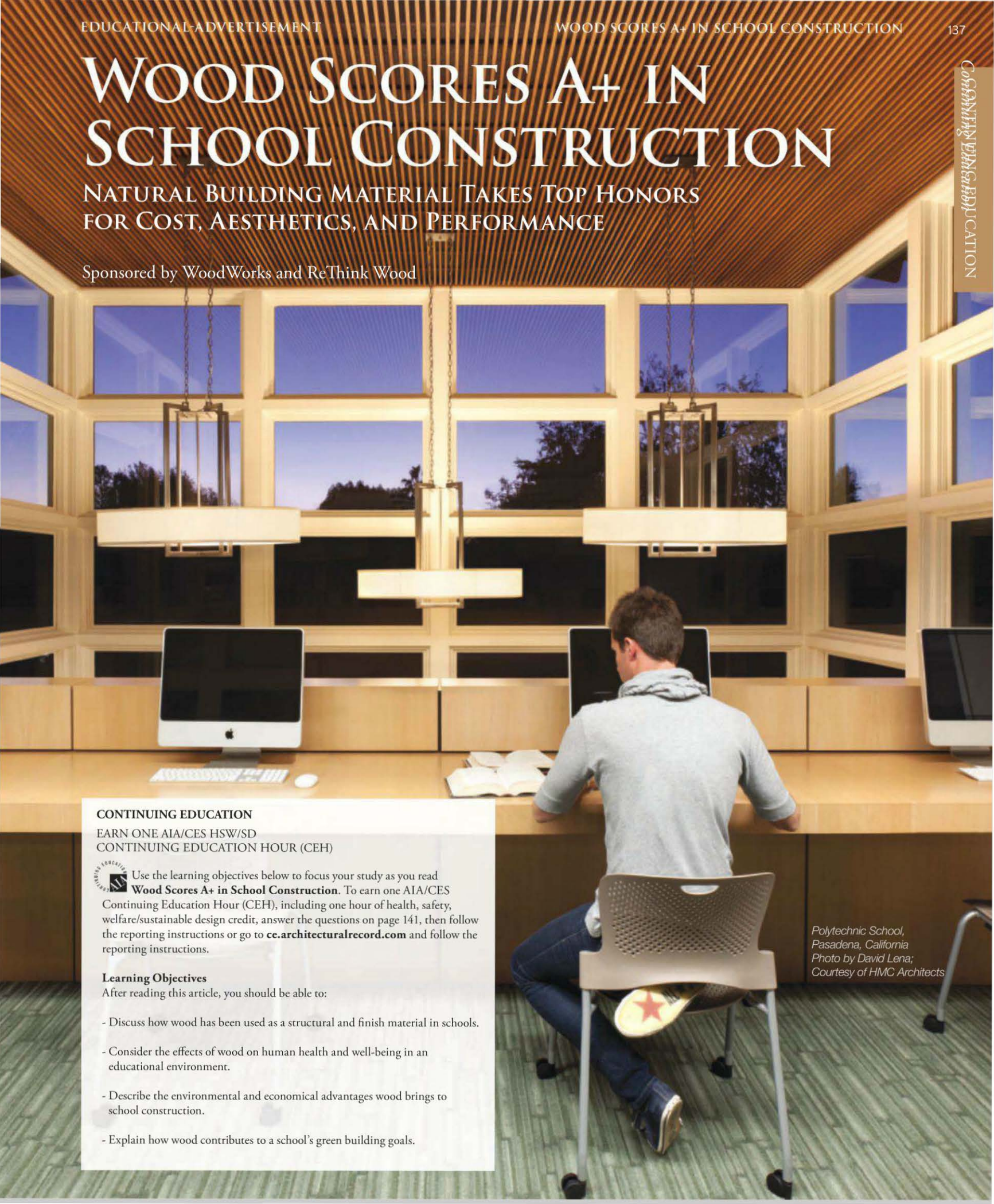

Polytechnic School, Pasadena, California Photo by David Lena; Courtesy of HMC Architects

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Use the learning objectives below to focus your study as you read **Wood Scores A+ in School Construction**. To earn one AIA/CES Continuing Education Hour (CEH), including one hour of health, safety, welfare/sustainable design credit, answer the questions on page 141, then follow the reporting instructions or go to **ce.architecturalrecord.com** and follow the reporting instructions.

Learning Objectives

After reading this article, you should be able to:

- Discuss how wood has been used as a structural and finish material in schools.
- Consider the effects of wood on human health and well-being in an educational environment.
- Describe the environmental and economical advantages wood brings to school construction.
- Explain how wood contributes to a school's green building goals.

The grades have been posted: Schools are finding that wood ranks at the top of the class when it comes to cost-effectiveness, with one Arkansas school district saving as much as $2.7 million by changing from structural steel to wood-frame construction. The educational community is taking note, not only of wood's material cost advantages, but its other attributes as well, such as speed of construction, design versatility and the ability to meet green building goals — while creating positive learning environments and meeting all code and safety requirements. "We often use wood in school designs — it's affordable, strong and durable," says Wendy Rogers, AIA, LEED AP, principal at LPA, Inc. in Sacramento, California. "Because it can function as a structural member and finished product, wood is a popular choice in school design." Gordon Whirry, of Gordon Whirry Architecture in Great Falls, Montana, also finds wood to be a good fit in an educational setting. "Many schools, particularly in higher education, are moving toward a more environmentally responsible approach to design and construction. Wood can complement this effort."

Photos courtesy of W.I. Bell (under construction); Dennis Ivy

At El Dorado High School in Arkansas, switching to wood framing from the original design saved $2.7 million.

WOOD SAVES MONEY

When specifying wood in schools, architects say cost-effectiveness is a major reason — and wood helps the bottom line in several ways. In addition to lower material costs, wood building systems typically cost less to install than other materials, while meeting all of the same safety and performance requirements. Whether comprised of traditional wood framing, panelized products, or prefabricated assemblies, wood construction is fast, expediting project completion. "Schools are always working toward a fixed start date, and wood is a good choice when the construction schedule is compressed," says Scott Lockyear, senior technical director, school construction, at WoodWorks, an initiative of the Wood Products Council established to provide free project support and other resources related to the use of wood in non-residential and multi-family wood buildings. "There's no need to wait for shop drawings or steel fabrication. Deliveries and frame assembly tend to move rapidly, and most communities have a large pool of skilled tradespeople with wood framing experience, which minimizes construction delays and keeps labor costs competitive."

LPA's Rogers notes that speed of construction was important in the firm's work for the cash-strapped Lake Tahoe Unified School District in building the South Tahoe High School. Rogers says both time and money were saved by using wood-frame construction. "Specifically, we benefitted from rapid erection and minimized labor required for assembling wall-to-roof connections."

Also from a cost-saving perspective, wood's relative light weight reduces the need for foundation capacity and associated costs. "Wood-frame walls can be used as load-bearing walls, eliminating the need for additional beams," says Lockyear, who also reports growing interest from architects in wood roofs. "Utilizing a sloped wooden roof system which can house mechanical systems in a conditioned space can also reduce HVAC requirements as compared to flat roof systems with mechanical units exposed on the roof. In terms of aesthetics, cost and design flexibility, the use of wood in school construction offers significant value."

In Arkansas, wood framing proved the most cost-effective structural system for the El Dorado High School. "Originally, the project was designed in steel and masonry, which is common for a building of this size," says J. Richard Brown, P.E., principal engineer with Engineering Consultants, Inc. in Little Rock. "But the budget was

Calculating Costs

A recently launched cost calculator shows that, in November 2011, the shell of an average one-story, 45,000-square-foot wood school in the U.S. costs 16 percent less to construct than the shell of a non-wood school. The calculator features information on a range of building types based on cost data that is updated quarterly.[1]

Source: woodworks.org

too high. So our response was to look at other framing types. That's where we found considerable savings." During the early pre-construction stages, structural steel, pre-cast concrete and wood were evaluated against steel framing. "Ultimately we made the decision to maximize the use of wood framing throughout the project. By just changing the framing, we were able to save about $2.7 million."

SCHOOL SAFETY

Regardless of whether they're built in wood, steel or concrete, schools must be safe. Protection from fire, seismic and wind events are a concern in schools around the country.

Fire Protection. While no building is completely fireproof, construction materials and systems can make a building fire safe. Fire-resistive construction allows time to discover a fire, suppress it before it spreads and evacuate if necessary. Ordinary wood-frame construction with plywood or oriented strand board (OSB) sheathing provides ample fire safety and easily meets requirements of the International Building Code (IBC). For larger wood frame schools, protected construction, heavy timber construction, and fire-retardant-treated construction on exterior walls may be required. Per IBC 903.2.3, sprinklers are required in areas larger than 12,000 square feet in Occupancy Group E building types. Most schools fall into this category. In addition, local building code amendments typically require sprinkler systems and other fire control measures in school construction, regardless of size or material used.

Another advantage of wood, and particularly heavy timber, is its unique charring properties. When exposed to fire, surface char insulates the member so it can continue to support its load, increasing the amount of time before the member fails.

"At South Tahoe High School, there were only a few areas that required additional fire protection and they were met using fire-treated dimensional wood," says Rogers. "Where portions of a glue-laminated (glulam) member needed to be protected, the member itself met the criteria of heavy timber."

Seismic Performance. In some parts of the country, seismic safety is particularly important. In California, for example, one of the most highly regulated states in the U.S. in terms of seismic requirements, wood-frame schools are common. "Wood has historically performed well during an earthquake," says Lockyear. "Wood is lightweight relative to other construction materials, and light weight correlates directly to lower seismic forces and better performance during seismic events." In addition, wood-frame structures, which have numerous nailed joints, are inherently more ductile than those with rigid connections, making them more flexible and allowing them to dissipate energy when subjected to the sudden loads of an earthquake. The fact that wood structures have numerous load paths also helps to avoid collapse should some connections fail.

Performance in High Winds. Wood has a number of inherent characteristics that make it ideal for schools in areas prone to high wind. When designing a wood-frame building to resist high winds and other lateral loads, design engineers use sheathing products such as wood structural panels, structural fiberboard, particleboard and board sheathing to create diaphragms and shear walls that transfer the loads into the foundation. When structural wood panels such as plywood and OSB are properly attached to lumber framing members, they form some of the most solid and stable roof, floor, and wall systems available. These materials are also used to form the diaphragms and shear walls necessary to resist high wind loads. Alternatively, designers can use rigid frame construction to transfer the lateral loads. Wood is able to resist higher stresses when the load is applied for a short time, a feature that enhances its performance in high wind events, which are typically of short duration.

In designing a K-12 school as a podium structure with two stories of wood-frame construction over a concrete parking garage, Kyle Peterson, LEED AP BD+C of HMC Architects in Los Angeles, took an ingenious approach to meeting California's seismic criteria. "We have a fairly high floor-to-floor dimension, thus the design team needed to be creative in order to get the required shear values and maintain the large window openings that were desired," he says. As part of the project, two relocated historic wood-frame buildings were also upgraded to meet shear and seismic requirements. "Since there were no requirements for shear in the early 20th century, there was very little available space to add shear walls. The use of prefabricated shear panels was the best solution in order to maintain the beautiful, large window openings and provide the required shear values. The buildings were gutted, and the interior framing was upgraded to achieve all these requirements."

Faced with a high floor-to-floor dimension at the Polytechnic School in California, designers needed to be creative in order to get the required shear values and still maintain the large windows they desired.

School Construction and the IBC

Wood is approved by the International Building Code (IBC) for use in school construction.

- Type V is the most common type of wood construction, and is allowed for school design. Type V is typically a cost-effective type of construction, particularly when load-bearing walls are wood. The IBC allows use of untreated wood throughout a Type V structure. Under the IBC, one-story Type V schools can be up to 87,875 square feet and two-story schools may be as large as 138,750 square feet. If additional square footage is required, two-hour rated fire walls can be used.
- Type IV, also known as heavy timber construction, allows use of solid or laminated wood members such as glulam, wood decking and structural sheathing when there are no concealed spaces. Fire-retardant-treated (FRT) wood can be used to frame exterior walls.
- Type III construction allows wood roof and floor systems as well as interior wood-frame walls. FRT wood is required to frame exterior wood-frame walls.
- Building Types I and II allow the use of heavy timber construction in roof construction and for secondary members. FRT wood can also be used in certain applications. *Designing Schools with Wood* from APA—The Engineered Wood Association details the approved use of wood in school construction by IBC building type.[2]

HUMAN HEALTH AND WELL-BEING

Green building objectives are broader than just environmental effects and have come to embrace human health and well-being issues, which involve both physical health and the psychological aspects of human performance — an area especially relevant to schools. The stress-reducing effects of nature are well documented, and intuition tells us that a connection to nature improves our sense of well-being while indoors. In fact, studies surrounding biophilia, the innate attraction that humans have to living organisms and life-like processes, support the use of wood and natural building products in a learning environment. Many building designers cite the warm and natural attributes of wood as a reason for its use, and are finding that users respond well to a visual or tactile connection with exposed wood products. "Wood is immensely popular and inviting, making it a perfect material to be used in learning environments," says LPA's Rogers.

Photo by Costea Photography; Courtesy of LPA Inc.

Wood has a strong presence at the South Tahoe High School in California. It was used for the school's main structural system as well as exposed elements.

A recent study at the University of British Columbia and FPInnovations established a link between wood and human health. In the study, the presence of visual wood surfaces in a room lowered activation of the sympathetic nervous system (SNS). The SNS is responsible for physiological stress responses in humans such as increased blood pressure and heart rate while inhibiting the parasympathetic system responsible for digestion, recovery and repair functions in the body. The study immersed 119 university students in one of four different office environments, some with wood surfaces and others without. Stress as measured by SNS activation was lower in the wood rooms in all periods of the study. The study concluded that wood is one way to create a healthier built environment. Study author David Fell says that while research on wood and schools is underway in British Columbia, the results of the office study apply to any interior environment. "The stress-reducing effects we found for wood in office environments are in theory transferable to any building type as these are innate reactions to natural materials. By extension, we would expect the application of wood in schools to contribute to lower stress activation in students and teachers," says Fell. "Any built environment activates our sympathetic nervous system to some degree. From a biological/evolutionary perspective we are adapted to functioning in nature. By adding natural elements back into the built environment these stress reactions can be reduced."

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Program title: **"Wood Scores A+ in School Construction " (01/12, page 137)**. AIA/CES Credit: This article will earn you one AIA/CES Continuing Education Hour (CEH) of health, safety, welfare/sustainable design (HSW/SD) credit. (Valid for credit through January 2013). **Directions:** Refer to the Learning Objectives for this program. Select one answer for each question in the exam and fill in the box by the appropriate letter. A minimum score of 80% is required to earn credit. **To take this test online and avoid handling charge, go to ce.architecturalrecord.com**

1. What characteristic of wood reduces the need for foundation capacity and associated costs?
- ❑ **a.** Ease of construction
- ❑ **b.** Tensile strength
- ❑ **c.** Light weight
- ❑ **d.** Minimal labor requirements

2. According to a recently launched cost calculator, what was the cost to construct the shell of an average one-story, 45,000-square-foot wood school in the U.S. vs. the shell of a non-wood school?
- ❑ **a.** 10 percent more
- ❑ **b.** 24 percent more
- ❑ **c.** 6 percent less
- ❑ **d.** 16 percent less

3. When structural wood panels such as plywood and oriented strand board (OSB) are properly attached to lumber framing members, they form some of the most solid and stable roof, floor and wall systems available.
- ❑ **a.** True
- ❑ **b.** False

4. Compared to structures with rigid connections, wood-frame structures, which have numerous nailed joints, are inherently:
- ❑ **a.** more ductile.
- ❑ **b.** less ductile.
- ❑ **c.** stronger.
- ❑ **d.** weaker.

5. What is biophilia?
- ❑ **a.** The study of wood cells
- ❑ **b.** The science of wood construction
- ❑ **c.** The innate attraction that humans have to living organisms and life-like processes
- ❑ **d.** New research into biodegradable substances

6. In a research study the presence of visual wood surfaces in a room:
- ❑ **a.** lowered activation of the sympathetic nervous system (SNS).
- ❑ **b.** increased heart rate.
- ❑ **c.** decreased activation of brain waves.
- ❑ **d.** had no effect on blood pressure.

7. Steel is less resistant to heat flow than wood.
- ❑ **a.** True
- ❑ **b.** False

8. Life cycle assessment studies consistently show that wood outperforms other materials in terms of:
- ❑ **a.** embodied energy.
- ❑ **b.** air and water pollution.
- ❑ **c.** greenhouse gas emissions.
- ❑ **d.** all of the above

9. What is the drawback of painted masonry in schools?
- ❑ **a.** Durability
- ❑ **b.** Cost
- ❑ **c.** An institutional look
- ❑ **d.** High maintenance

10. A survey of buildings torn down between 2000 and 2003 in the Minneapolis/St. Paul area demonstrated that buildings in North America often fail to make the 50-year mark because of:
- ❑ **a.** changing needs.
- ❑ **b.** increasing land values.
- ❑ **c.** building code changes.
- ❑ **d.** both a. and b.

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Material resources used: This article addresses issues concerning health, safety, welfare and sustainable design.

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Endnotes in Print (addtional endnotes can be found in the online version of this article):
1. For more information on the WoodWorks calculator, see woodworks.org;
2. For additional details refer to the WoodWorks information sheet, Wood and Building Codes, *available at woodworks.org*

WoodWorks is an initiative of the Wood Products Council established to provide free one-on-one project support, education and resources related to the design of non-residential and multi-family wood buildings — including schools. This includes online training and events, CAD/REVIT drawings, cost and carbon calculators, case studies, span tables and more.
www.woodworks.org

The reThink Wood initiative is a coalition of interests representing North America's wood products industry and related stakeholders. We share a passion in wood and the forests they come from. Innovative new technologies and building systems have enabled longer wood spans, taller walls and higher buildings, and continue to expand the possibilities for wood use in construction.
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CIRCLE 49

THROW IN THE TOWEL

HIGH-SPEED, ENERGY-EFFICIENT HAND DRYERS WIN HANDS DOWN

SPONSORED BY EXCEL DRYER, INC.

By Roger C. Brady, AIA, LEED AP

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This course was approved by the **Green Building Certification Institute** for one GBCI CE hour for LEED Credential Maintenance.

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Use the learning objectives below to focus your study as you read **Throw in the Towel: High-Speed, Energy-Efficient Hand Dryers Win Hands Down.** To earn credit, answer the questions on page 147, then follow the reporting instructions or go to **ce.architecturalrecord.com** and follow the reporting instructions.

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

- List the primary benefits of high-speed, energy-efficient hand dryers for K-12 school applications.
- Distinguish between the two main categories of HSEE hand dryers.
- Identify the major stages or phases in an environmental Life Cycle Assessment.
- Describe how the midpoint and endpoint categories figure into the LCA methodology.
- Discuss the concepts of Scenario Evaluations and Sensitivity Tests and their impact on an LCA.
- Recognize the environmental Life Cycle Assessment benefits and impacts for various hand-drying approaches.

High-speed, energy-efficient (HSEE) hand dryers have been developed by several manufacturers over the past 10 years and are now the most sustainable solution for drying your hands in public restrooms. This class of dryers is better for the environment than conventional (electric) dryers and old-fashioned paper towels.

This course will first look at the key benefits of high-speed, energy-efficient (HSEE) hand dryers for K-12 and higher education facilities. Then it will shift gears for the remainder of the article and examine how a manufacturer goes about proving the sustainability of its product; namely by commissioning a peer reviewed, Life Cycle Assessment (LCA), which is the current "gold standard" in proving the case of a product's (relative) sustainability.

Many architects are familiar with some level of life cycle cost calculations, payback periods for one selection vs. another, or ROI (Return on Investment) on the initial cost of an investment. But few of us have delved into the details of an LCA sufficiently to articulate the major stages, describe midpoint and endpoint impact categories, the rigor & conscientiousness of scenario evaluations and sensitivity tests, and why a peer reviewed LCA is the only internationally accepted method of comparative environmental assessment of products.

WHY HIGH-SPEED ENERGY-EFFICIENT (HSEE) HAND DRYERS ARE RIGHT FOR K-12 SCHOOLS

Like most businesses, households, and public entities in the United States, school districts are looking for ways to live within their means, reduce costs, and spend their money wisely. Something as small as drying your hands can have a big impact, especially when you have 10s or 100s, or 1,000s of restrooms throughout your facilities. Paper towels are still commonly used. But new evidence suggests this is no longer the cost effective or best choice environmentally. Since 2000, smart organizations have dispensed with paper towels and now use the latest in hand drying technology. What benefits do these so-called, high-speed, energy-efficient ww(HSEE) hand dryers have in common?

Energy-efficient. To be considered in this class, they need to provide a 3-4 fold energy savings over conventional air dryers. There are various mechanical and electrical innovations (and patents) to improve the low horsepower motors for hand dryers to spin from 20,000 up to 40,000 RPMs.

High-speed. To save energy, you not only need a more efficient motor, but you need to move the air at a much faster velocity – even up to 16,000 LFM. Airflow is measured in lineal feet per minute (LFM) for new dryers vs. cubic feet per minute (CFM) with old-technology dryers.

> Some manufacturers are offering product enhancements to address concerns for sound-sensitive areas. Examples include an air speed controller that adjusts the speed and sound level of the dryer and noise reduction nozzles — both options are retrofittable and can help significantly reduce the dryer's decibel level.

Hot air. The introduction of heat — at 135 degrees at the air outlet — is necessary to speed the drying process from 30-45 seconds down to typically 10-15 seconds. Heat is a vital element to the drying process for HSEE hand dryers, since it evaporates the "residual boundary layer of moisture" on skin.

Faster drying times. To be in this class of dryer, at least a 3-fold improvement in drying time vs. conventional dryer times (of 30-45 seconds) is required. Furthermore, "completely dry" is now defined to mean .02 grams of residual water. New HSEE dryers 'penetrate the boundary layer' of moisture on the skin and the broken down water molecules are then easily evaporated by the heated airstream. (It should be noted that rubbing your hands actually slows down the drying process with the new technology.)

Motion sensitive. Virtually all dryers in this new classification are also motion sensitive so you don't have to grab a handle or push a button to activate the drying process, making them more hygienic than conventional dryers or paper towel dispensers.

Cleaner restrooms. Hand dryers — HSEE or conventional — eliminate the paper clutter of a school restroom with towels on the floor, in the toilet fixtures, and overflowing waste receptacles. Less time is spent cleaning a K-12 restroom with hand dryers and you will have fewer calls to your plumber.

Cost effective. First, initial costs of HSEE hand dryers can vary greatly depending on the manufacturer. The payback period for some manufacturer's hand dryers versus paper towel systems — with their low initial costs but high operating costs to purchase and dispose of the towels — is less than a year.

Easy to retrofit. For schools transitioning from paper towel dispensers to high-speed, energy-efficient hand dryers, paper towel retrofit kits can help make the process a simple and cost effective. Some high-speed hand dryer manufacturers now offer ADA compliant stainless steel paper towel dispenser retrofit kits that provide a simple, cost-effective solution for replacing built-in paper towel dispensers with high-speed, energy-efficient hand dryers. An

HSEE hand dryers have a more modern look, much different from conventional dryers.

adjustable stainless steel panel allows the dryers to mount over the existing footprint of the paper dispensers, allowing schools to easily transition from paper towels to high-speed hand dryers with minimal cost and labor.

Of special note, a number of public and private programs have emerged in pursuit of a common mission: providing every child in America with a green school. The USGBC's Center for Green Schools, The Coalition for Green Schools, The Green Schoolhouse Series, and The Better Buildings Challenge are all examples of a shared vision to create green schools that reduce waste, conserve resources, and help lower utility costs — while providing a safer, cleaner environment for our nation's children.

According to the USGBC's Center for Green Schools website, "As the economy forces school districts to slow or even halt capital improvement plans, many are focusing on what can be done to improve the efficiency and environmental quality of existing facilities. As with new green construction, implementing green strategies into existing school buildings can be cost effective. Setting policies that reduce waste, increase use of public transportation, and encourage the purchase of environmentally-preferable products are a few simple ways that schools are greening their everyday operations. Schools can also develop a plan to introduce and upgrade new building systems, technologies and policies over time, focusing first on high-impact strategies that yield immediate savings or have significant impact on student health and wellness."

The installation of high-speed, energy-efficient hand dryers represents a simple, cost-effective way for K-12 schools to reduce waste and maintenance while creating a more hygienic restroom environment.

Even with all these compelling benefits, not all HSEE dryers are created equal. It is important for design professionals or owners to do their homework and ask the right questions to get a fair comparison among the various new and old options.

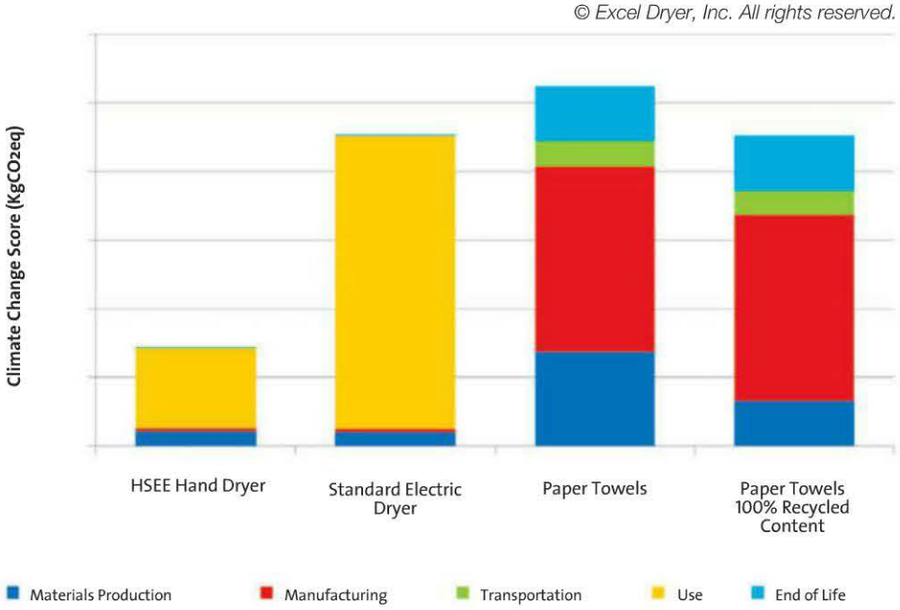
School District Saves Time and Money

The Niles Township School District 219, just north of Chicago, has over 4,800 students and like most school districts; it is asking hard questions about every dollar of operating expense.

Joe Tomaselli, Aramark Director of Operations for the District, said "Restrooms had always been an area where we faced a lot of extra work. Our student restrooms had both paper towels and traditional hand dryers, but we were constantly dealing with vandalism, blocked toilets and more, which translated into an extra four hours of clean-up every night. This was costing us an extra $16,500 per year in restroom maintenance!"

And the District was spending over $35,000 each year on paper towels alone, plus the additional cost of running the inefficient, conventional hand dryers for 30 seconds per use.

Bottom Line: The District removed virtually all of their towel dispensers and replaced all their existing, inefficient, conventional hand dryers with high-speed, energy-efficient hand dryers in the restrooms, based on Tomaselli's research and recommendation. By eliminating $35,000 each year in paper towel expense and reducing the extra $16,500 previously spent on extra clean up in the restroom maintenance, the District realized a one year payback on the new dryers. "In terms of energy savings, the new HSEE hand dryers drew an average of 1500 watts, compared to the traditional 2300 watts. Annually, this translated into an electrical consumption savings of $52 per unit, or for 80 units, an additional $4,160 per year in savings. The dryers delivered a return on investment in just one year. "Once we did the math, the cost savings were clear."



Carbon Footprint: Total life cycle climate change score for each system for the 5-endpoint or damage categories

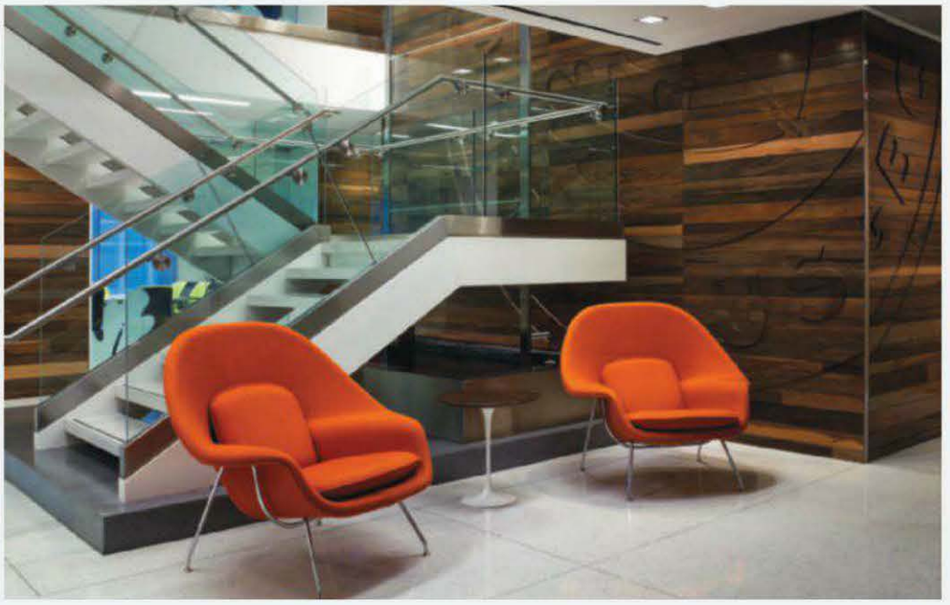
PAYING ATTENTION TO DETAILS

How a manufacturer balances the energy use, motor speed, and amount of heat not only makes for a more or less successful drying experience, but it also impacts what may seem to be unrelated issues such as maintenance, hygiene, useful life, and suitability for a particular application. There are significant differences among the products in this 21st century-class of dryers, including:

Conventional or trough-style design. Each manu-facturer chooses between either the 'traditional' design approach — with the hands positioned under the air outlet or the "trough-style" approach — where the user puts his/her hands into a trough or enclosure of some sort.

Hygiene and vandalism. These fundamental design decisions, in turn, can lead to hygiene and vandalism issues, both

USGBC Decided to 'Throw in the Towel' at Its HQ



USGBC's headquarters building is LEED Gold and its 22,000-sq. ft. interior is LEED Platinum. By using new HSEE hand dryers in each restroom, USGBC saves energy, which contributed to its Earth and Atmosphere Credit 1 — Optimizing Energy Performance. A spokesman for USGBC said, "We wanted dryers that would limit paper towel use and minimize energy consumption; but we also wanted them to work quickly and thoroughly. Not many hand dryers can make that claim."

The USGBC recently launched a new virtual tour of its Washington, D.C. headquarters. The tour includes an interactive look at the facility's Next Generation Green Restroom and a CE course that outlines how architects and interior designers can achieve similar water, energy and waste reduction results by following the specifications provided in the course.

Additional information includes information on the practical, economic and environmental benefits of high-speed energy-efficient hand dryers, water use and trends, how to choose water-saving products and an explanation of how these products apply the new, best-practice green building.

In addition, HSEE dryers may help K-12 facilities qualify for the following credits in the LEED for Schools rating system:

- EA Credit 1: Optimize Energy Performance (1-19 points)
- MR Credit 5: Regional Materials* (1-2 points)
- ID Credit 1: Innovation In Design - Path 1 (1 point)
- ID Credit 3: The School as a Teaching Tool (1 point)

*For projects within 500 miles of East Longmeadow, MA

critical to K-12 schools and other public facilities. Trough-style designs can collect excess water from the user's hands in the trough creating a cool damp environment which bacteria needs to grow and a hygiene issue can result. The trough area can also provide a vandalism opportunity for a prankster to use his/her creativity to introduce another type of liquid that might require maintenance staff to remove and clean or could even necessitate a repair. Even though some 'trough-style' units filter the air that blows out of it, unless the trough area is free of all excess used water and debris, it is just filtered air blowing into unfiltered, perhaps contaminated air, which then swirls around the hands as they dry, making it less sanitary than a conventional design.

Additionally, the design of the motion sensor can prevent or create an opportunity for damage from moisture or vandalism. A completely sealed sensor and control assembly defends against both.

Useful life. Each manufacturer has its own unique approach, to the design and speed of the motor and the necessary heat required to achieve a fast and a "completely dry" experience. The balance of these factors the manufacturers chose affect the useful life as well as scheduled maintenance, and likelihood of repair of a unit. An RPM rate that is too high can lead to burn outs and a short lifespan, while an RPM rate that is too low can lead to an inefficient or ineffective drying experience.

Maintenance, service, or repair. Each manufacturer creates a complete system that is more or less maintenance free. A unit's design, components, and assembly determine the level of expertise and how much effort is required to get inside the unit to maintain, service, or repair it, or replace a part. What's required to get inside the machine? Is it serviceable on the wall or must it be removed? Can you do (some) repairs with your staff or must it be sent to a service center?

Drying position. The 'trough-style' design used by some manufacturers requires the user to place her hands into the dryer. This may be an issue for disabled persons, school children of various heights, of individuals who may be leery of putting their hands into a dryer.

Noise. With high-speed air comes a greater amount of sound. HSEE hand dryers will add some decibels to the environment, but with flushing toilets, running faucets, and the chance to talk in a normal tone with others, this is not usually a concern for most schools or other public restrooms. Some manufacturers are offering product enhancements to address concerns for sound-sensitive areas. Enhancements include an air speed controller that allows you to adjust the speed and sound level of the dryer or a noise reduction nozzle that are retrofittable and can help significantly reduce the dryer's decibel level.

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Program title: **"Throw in the Towel: High-Speed, Energy-Efficient Hand Dryers Win Hands Down" (01/12, page 143).** AIA/CES Credit: This article will earn you one AIA/CES hour of health, safety, welfare/sustainable design (HSW/SD) credit. (Valid for credit through January 2014). **Directions:** Refer to the Learning Objectives for this program. Select one answer for each question in the exam and fill in the box by the appropriate letter. A minimum score of 80% is required to earn credit. **To take this test online and avoid handling charge, go to ce.architecturalrecord.com**

1. Which of these attribute groupings do all high-speed, energy-efficient (HSEE) hand dryers have in common?
- ❑ **a.** Hot air, fast drying time, motion sensor, cleaner restrooms
- ❑ **b.** Simple elegant design, quiet operation, 20-year warranty
- ❑ **c.** Pricing similar to conventional dryers, maintenance contracts, life time parts replacement at no charge
- ❑ **d.** Numerous model designs, motor speeds of 10-15,000 RPMs, air temperatures of 70-90 degrees

2. What issues should design professionals and K-12 Schools consider before selecting an HSEE hand dryer?
- ❑ **a.** Conventional or trough-style design and hygiene and vandalism
- ❑ **b.** Useful life and maintenance, service, or repair
- ❑ **c.** Drying position and cost and savings
- ❑ **d.** All of the above

3. Which element below is not a requirement for a top quality environmental Life Cycle Assessment of a product or process?
- ❑ **a.** Peer-review
- ❑ **b.** Follow ISO 14040 and 14044 standards
- ❑ **c.** A Life Cycle Cost Analysis
- ❑ **d.** Perform Sensitivity Tests, Scenario Evaluations, and Uncertainty Assessments

4. Which of the following is the correct order and names of the major phases of a Life Cycle Assessment?
- ❑ **a.** Assessment, Life Cycle Analysis, Recommendations, Implementation
- ❑ **b.** Needs Assessment, Boundary Definitions, Environmental Impact Report, Implementation
- ❑ **c.** Goal & Scope Definition, Inventory Analysis, Impact Assessment, Interpretation
- ❑ **d.** Uncertainty Assessment, Scenario Development, Sensitivity Testing, Damage Category Diagnostics

5. The life cycles of the three systems under study were divided into these principal life cycle stages:
- ❑ **a.** Climate Change, Resources, Human Health, Ecosystem Quality, Freshwater Use
- ❑ **b.** Material Production, Transportation, Manufacturing, Use, End of Life
- ❑ **c.** Ionized Radiation, Ozone Layer Depletion, Terrestrial Ecotoxicity, Mineral Extraction, Land Occupation
- ❑ **d.** Definition of Environmental Impacts, Comparison of Impacts, Influence of Key Variables

6. New features and accessories are now available with some high-speed hand dryers that include air speed control, sound level adjustment and ADA-compliant paper towel retrofit kits.
- ❑ **a.** True
- ❑ **b.** False

7. According to this peer-reviewed LCA, the sensitivity tests on "producing recycled pulp suggests that there may be very little, if any, benefit from using recycled content in paper towels."
- ❑ **a.** True
- ❑ **b.** False

8. On which of these issues was a Sensitivity Test performed in the hand drying LCA?
- ❑ **a.** The temperature of the water on the washer's hands
- ❑ **b.** Distance from the floor of the electric hand dryer or paper towel dispenser
- ❑ **c.** Intensity of use (of the subject hand drying system) by the user
- ❑ **d.** Various price points of the system to see which one sells best

9. All told, the paper towels themselves are responsible for ___% of the life cycle impacts of the paper towel dispenser system.
- ❑ **a.** <50%
- ❑ **b.** 70%
- ❑ **c.** 80-85%
- ❑ **d.** >90%

10. High-speed, energy-efficient hand dryers reduce the environmental impact of hand drying _____ when compared with conventional electric hand dryers or a paper towel dispenser.
- ❑ **a.** >90%
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Material resources used: This article addresses issues concerning health, safety, welfare and sustainable design.

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Use the learning objectives below to focus your study as you read **Innovations for Educational Facility Design.** To earn one AIA/CES Continuing Education Hour (CEH), including one hour of health, safety, welfare/sustainable design credit, answer the questions on page 161, then follow the reporting instructions or go to **ce.architecturalrecord.com** and follow the reporting instructions.

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

- Discuss the main issues affecting high-performance school design, as indicated by the CHPS and LEED for Schools certification programs.

- Describe strategies for enhancing learning environments using retrofit or renovation strategies to improve daylighting, flexibility of use, or energy efficiency.

- Explain how new curricular and organizational approaches by educators are affecting the programming and planning of educational facilities.

- List examples of building techniques and technologies specifically designed to improve student health or the life cycle and durability of educational buildings.

Linden Grove Middle School, Kalamazoo, Mich.
Architect: TowerPinkster; photo courtesy of Guardian Industries

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CIRCLE 18

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Innovations for Educational Facility Design

By C.C. Sullivan

Working alongside educators around the country, savvy architects are bringing curriculum-responsive designs and technical innovations to today's K-12 and higher-education environments. On the one hand, this movement stems from the ongoing evolution of building systems, materials, finishes and furnishings specified for cost-effective, sustainable education end-uses. On the other, national and regional programs have helped codify design excellence for learning places, such as EduTopia, Architects of Achievement, and the American Institute of Architects Committee on Architecture for Education (CAE). Two key sustainability certification programs – the U.S. Green Building Council's LEED for Schools and the Collaborative for High Performance Schools (CHPS) – have been adopted by localities, owner groups and a wide range of individual school districts across the country.


Photo courtesy of Petersen Aluminum Corp.

At Bells Mill Elementary School in Potomac, Md., the unique look of the colorful roof cladding belies the strength and durability of the system. Architect: Walton, Madden, Cooper, Robinson, Poness, Inc.

The challenges facing U.S. educators today range from social and technology pressures to issues of budgeting and political reform. After almost a decade of focus on new building, facility owners nationwide are turning their attention to adaptive renovations and tactical expansions, with a focus on energy and operational costs. Across campuses and within classrooms, the projects echo new ways to teach and learn – and a changing conception of how schools work.

"Educators are moving away from the factory models of the 19th and 20th centuries," says Mark Quattrocchi, AIA, principal of Santa Rosa, Calif.-based Quattrocchi Kwok Architects. "Instead of lecture-style learning in self-contained classrooms, there's more project-based, student-centered learning. So we're grouping classrooms together and opening up spaces."


Photo courtesy of NanaWall Systems

Operable glass walls can increase the transparency and flexibility of the educational setting. At the LEED Gold STEM Academy in Champaign, Ill., the architects Cannon Design and Bailey Edward Design used glass partitions to improve visual links and create larger class spaces.

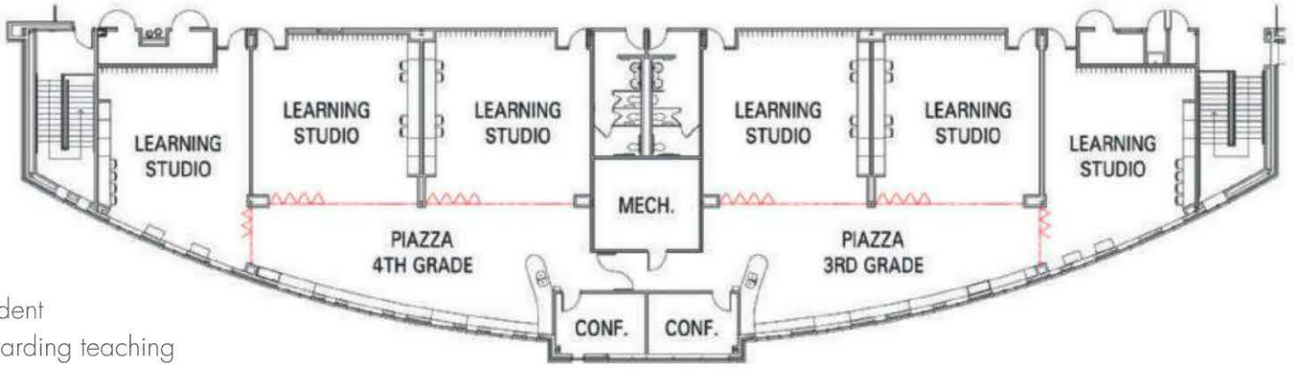
The workplace consultant DEGW, a division of Los Angeles-based AECOM, advocates the term "learning landscapes" to describe sweeping changes in how educational interiors are organized. Another macro-trend is revived interest in regional influences and local context. "Creating and reviving this sense of place for a campus strengthens the school's identity and presence," says Daniel Kelley, FAIA, senior partner with MGA Partners Architects in Philadelphia. "The best classroom buildings and places of learning respond to and revive the context of the campus. Through craft – and a modern sensibility – we connect students and the community back to the legacy of earlier campus designs, and forward to a progressive vision."

Taken together, these core ideas have accelerated the adoption of novel concepts intended to facilitate learning. "Increased transparency of the educational setting is one outgrowth of this confluence of needs, meaning reduced barriers and more glass and moveable or operable separations," says Matt Thomas of NanaWall Systems in Mill Valley, Calif., a maker of operable glass wall systems. "Educators value those visual links, and the improved communication allows teachers and students to relate better." Classrooms can also be converted into shared spaces or other uses, and growing interest in outdoor learning venues has also increased the need for convertible walls.

"Part of acknowledging the varied ways students learn is the recognition that not all learning happens behind the walls of a classroom," says Quattrocchi. "Outdoor learning can provide superior education opportunities including individual contemplative work, group student projects or entire classroom work."

NanaWall Enhances Schools

Booker T. Washington STEM Academy, Champaign, IL NanaWall SL45 Architect: Cannon Design



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STUART BRODSKY, AIA, LEED AP
Associate Principal, Cannon Design

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CIRCLE 33

The University of Michigan Law School blended a historical restoration with a contemporary addition including a glazed space-frame canopy, designed by Huntman-Cox and Integrated Design Solutions. Stained glass windows in the 1933 limestone walls were mated with 2-hour rated fire-resistive glass panels to preserve the original look.

Increased transparency also translates into improved observation and security. "Fire-rated glass separations are being used more in school environments – as opposed to opaque surfaces or traditional wire glass – and not just to improve fire protection," says Diana San Diego, director of marketing for San Francisco-based SAFTI *FIRST*, which produces fire-rated glass and framing systems in the United States. "Fire-rated glass multitasks, bringing in daylight and reducing electrical lighting loads while improving safety and helping educators observe student activity in challenging areas such as egress stairwells."

The benefits of daylight on student performance and teaching efficacy are well established. The seminal "Daylighting in Schools" study in 1999 by Heschong Mahone Group of Fair Oaks, Calif., demonstrated that natural lighting markedly boosts math and reading test scores. Another study by the California Energy Commission showed how outdoor views can boost mental function and memory recall by up to 25 percent. These findings inform new educational practices as well as certifications like CHPS and LEED for Schools.

ENERGY USE AND EFFICIENCY

Used properly, daylighting also reduces building energy loads by replacing electrical lighting, adding controlled thermal gain, and feeding solar-powered systems. Energy efficiency is a central tenet of the certifications. In California, facilities meeting CHPS must meet or exceed the 2008 version of the state's Title 24, Section 6 energy code. In Massachusetts, the state's "Stretch Energy Code," defined as 20% more efficient than a national baseline, serves as the model. LEED for Schools calls for either whole-building energy simulations per ANSI/ASHRAE/IESNA Standard 90.1-2007, or prescriptive paths based on ASHRAE's *Advanced Energy Design Guides* or the Vancouver, Wash.-based New Buildings Institute's *Advanced Buildings Core Performance Guide*.

Increasingly, architects focus on enclosure design to meet these benchmarks, says Rick Brow, director of marketing for CENTRIA, a Moon Township, Pa.-based producer of metal panels that analyzed various cladding and enclosure systems. "Many project teams are using thermal modeling to understand the performance of window-wall interfaces, panel attachments or other attributes," he explains. "A break in the enclosure's air/vapor barrier or a thermal bridge can cause moisture intrusion, condensation or thermal conductivity. It's better to test that performance in the lab, not in the field."

Another impetus has been the growing use of air barriers and continuous insulation (ci), which are increasingly called for by local jurisdictions as well as model building codes such as IBC and IECC. "Continuous insulation is in the codes now, so new and renovated facilities need to have it installed exterior to the building structure or framing," says Cary Robertson, a civil engineer and envelope specifications expert who is U.S. national sales manager for Roxul, the Milton, Ontario-based stone wool insulation manufacturer. "It's accompanied by new questions, such as the fire ratings of these wall assemblies or the need for vapor permeability to maximize the drying potential of walls prone to condensation or moisture migration. Another key issue is that some insulation materials may dissipate in R-value over the long-term."

Within the walls of educational facilities, according to the U.S. Environmental Protection Agency (EPA), energy consumption is driven largely by mechanical systems. In addition to optimized HVAC design, institutional owners are looking for more use of renewable power to offset these costs. "Based on the requirements of LEED for Schools – especially the Gold or Platinum certifications – there's a strong incentive to incorporate nonpolluting and renewable

Designed by architect SRG Partnership, the Chemeketa Community College's 74,000-square-foot project revamped the facilities that house space and equipment for nursing, dental hygiene and pharmacy technology students, with a durable metal-panel cladding system incorporating an insulated composite back-up panel.

Energy Efficiency Credit

CHPS:
Energy Efficiency (EE)

Comply with or exceed state energy codes or other performance criteria
— EE1.0: Minimum Performance
— EE1.1: Superior Performance

LEED for Schools:
Energy & Atmosphere (EA)

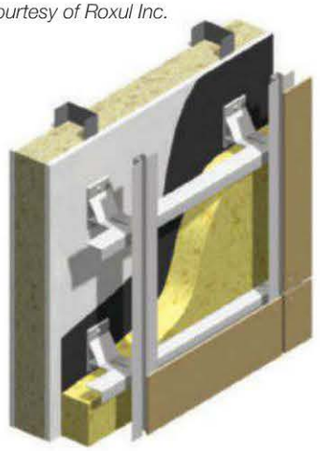
Exceed ASHRAE 90.1 by 10% (new buildings) or 5% (renovation)
— EA-P2 MinimumPerformance
— EA-1 Optimize Energy Performance

A high school for at-risk students, Metro Career Academy – the first LEED Gold of its kind in Oklahoma – uses underground thermal sources to reduce HVAC operating costs.

energy sources such as geothermal," says Tony Landers, a former HVAC systems designer who is now director of marketing for Oklahoma City's ClimateMaster, which specializes in water-source heat pumps. Landers points to a nearby high school, Metro Career Academy – the first LEED Gold of its kind in Oklahoma – as an example using underground thermal sources.

Another factor is the increased heat and energy draw from plug loads, which account for up to 25 percent of the total electricity consumed by schools, according to the National Energy Education Development (NEED) Project, Manassas, Va. This may increase, even as architects see wireless communications and tablet technology revolutionizing how students collaborate and present their work, says Joshua Zinder, AIA, LEED AP, principal of Princeton, N.J.-based Joshua Zinder Architecture + Design. "Yet while the technology is new, their operational and pedagogical characteristics date back to the one-room school house, where tablets and lap boards were standard. Yes, you can do more with today's tablets, but in terms of the effect on organizing classroom space, there are important similarities."

Image courtesy of Roxul Inc.



Building envelope insulation, including continuous exterior insulation, is more important than ever for educational facilities, as shown in this cladding schematic.

MATERIALS AND RESOURCE CONSERVATION

For these learning tools as much as for novel building materials and finish choices, their effect on educational environments is increasingly viewed through the lens of life cycle analysis or assessment (LCA), say experts in innovative schools design. This shift in emphasis appears in LEED 2009, which employs LCA in its credit weighting, while CHPS generally "rewards the use of materials and products that have undergone life-cycle analysis," specifically in its Credit 6, Sustainable Materials – LCIA. LEED 2009 uses EPA's TRACI1 environmental impact categories – including LCA, industrial ecology and pollution prevention – to weigh credits.

In product evaluations for educational facilities, LCA techniques help answer questions about toxicity, total greenhouse-gas emissions and durability. It also reduces the sole focus on first cost, instead favoring the life-cycle cost benefits of highly durable materials such as metal, stone and glass block, which have low maintenance needs and consistent long-term performance. "The main advantage of metal surfaces is longevity," says Blake Batkoff, director of marketing and sales with Petersen Aluminum Corp., Elk Grove, Ill. "Once a metal system is installed as roofing or wall cladding, it should be the last application for a school facility."

Related benefits for products with good LCA results include minimal maintenance, low embodied energy, and options for

Material Conservation Credits

CHPS:
Materials & Waste Management (ME)

Reuse building shell and employ materials with recycled content (percentage or prescribed)
— ME3: Building Reuse – Shell & Structure
— ME4: Recycled Content

LEED for Schools:
Materials & Resources (MR)

Reuse building materials and incorporate recycled materials and/or regional materials.
— MR-1.1 Reuse Existing
— MR-3 Materials Reuse
— MR-4 Recycled
— MR-5 Regional Materials

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recycling or reuse. Natural materials may also benefit student health. "Natural stone and ceramic tile are natural choices for the walls and floors of K-12 and higher-education buildings because of their inherent antimicrobial and cleaning properties as well as favorable LCA and life-cycle costs. These are highly durable materials," adds Sean Cilona, director of marketing with Lexington, Ky.-based manufacturer, Florida Tile.

"Life-cycle costing is a key improvement to all types of development for our clients and the public in general," says David M. Sikorski, P.E., a managing director with AECOM's Alternative Delivery Group in New York City. "In the not-too-distant past most projects were low bid. While that may have saved the client money up front, it probably did not over the life of the facility. Now we consider life-cycle in design and maintenance costs, and we're producing better results."


Photo courtesy of Florida Tile

Increasingly, universities and K-12 schools are using ceramic tile and natural stone finishes because of their durability, low toxicity and favorable life-cycle performance. The University of Florida provides an example.


Photo courtesy of Bison Innovative Products

The University of British Columbia Law School, which is LEED Gold certified, includes a landscaped rooftop deck with underfoot tiles made of certified wood – FSC-C013454, to be precise – which can contribute to LEED points.

SUSTAINABLE, MAINTAINABLE GROUNDS

With more use of indoor-outdoor educational models, architects are also focusing on how to maximize the enterprise life cycle of investments in building sites, landscaping and outside areas such as plazas, terraces, rooftops, and open-air atriums and walkways. The Sustainable Sites (SS) sections in both CHPS and LEED for Schools take aim at increasing open area in general as well as heat-island effects, stormwater control, and restoring native vegetation as natural habitat.

As one result, "Applications of vegetated green roofs have gained popularity on college campuses and K-12 facilities," notes Mark Fusco, LEED AP, a green-roof consultant with Bison Innovative Products, a Denver-based manufacturer of wood tiles and pedestal-supported rooftop decking. "Administrators at educational institutions are beginning to understand the human and environmental benefits of adding green roofs to buildings." Fusco points to two LEED Gold projects, including Centennial College near Toronto – which features a green roof and an indoor green wall – as well as the University of British Columbia Law School, with a landscaped rooftop deck that uses wood tiles certified by the Forest Stewardship Council, or FSC.

Green certifications reward these rooftop gardens, raised plantings atop former concrete or asphalt surfaces, and other means for adding habitat. SS credits in LEED for Schools may be earned with facility designs that incorporate high-albedo roof surfaces as well as vegetated roof planes. Albedo can be measured by solar reflectance index (SRI), and LEED for Schools generally requires an SRI of greater than or equal to 29 for paving materials, non-roof surfaces and at least 75% of steep-sloped roof area. For low-slope roofs (less than or equal to 2:12), the SRI requirement jumps to 78 or more. Two calculation methods allow for a combination of high-SRI materials and vegetated areas on rooftops to reduce heat-island effect (LEED for Schools' SS Credit 7.2; see diagram online).

Just as important as specifying the right rooftop materials is integrating the results into the curriculum, says Bernardo Fort-Brescia, FAIA, founding principal of Arquitectonica, headquartered in Miami. "Historically there has been an emphasis on durability, particularly in high schools, but there is a new awareness of materials and systems that teach about sustainability," he explains. Rooftop gardens, such as the one atop the firm's School of International and Public Affairs at Florida International University, allow students and faculty appreciation of Florida's unique climate and plant species.

At the Metro Career Academy in Oklahoma City, says Lander, glass panels allow students to view the geothermal system's inner workings. Other examples include The Willow School in Gladstone, N.J., a new stone-walled independent elementary school that incorporates sustainable-living principles into its curriculum. Each classroom has large windows and a dedicated door so students can readily appreciate "elements of responsible living" such as local flora and an integral rainwater catchment system.

Continues at ce.architecturalrecord.com

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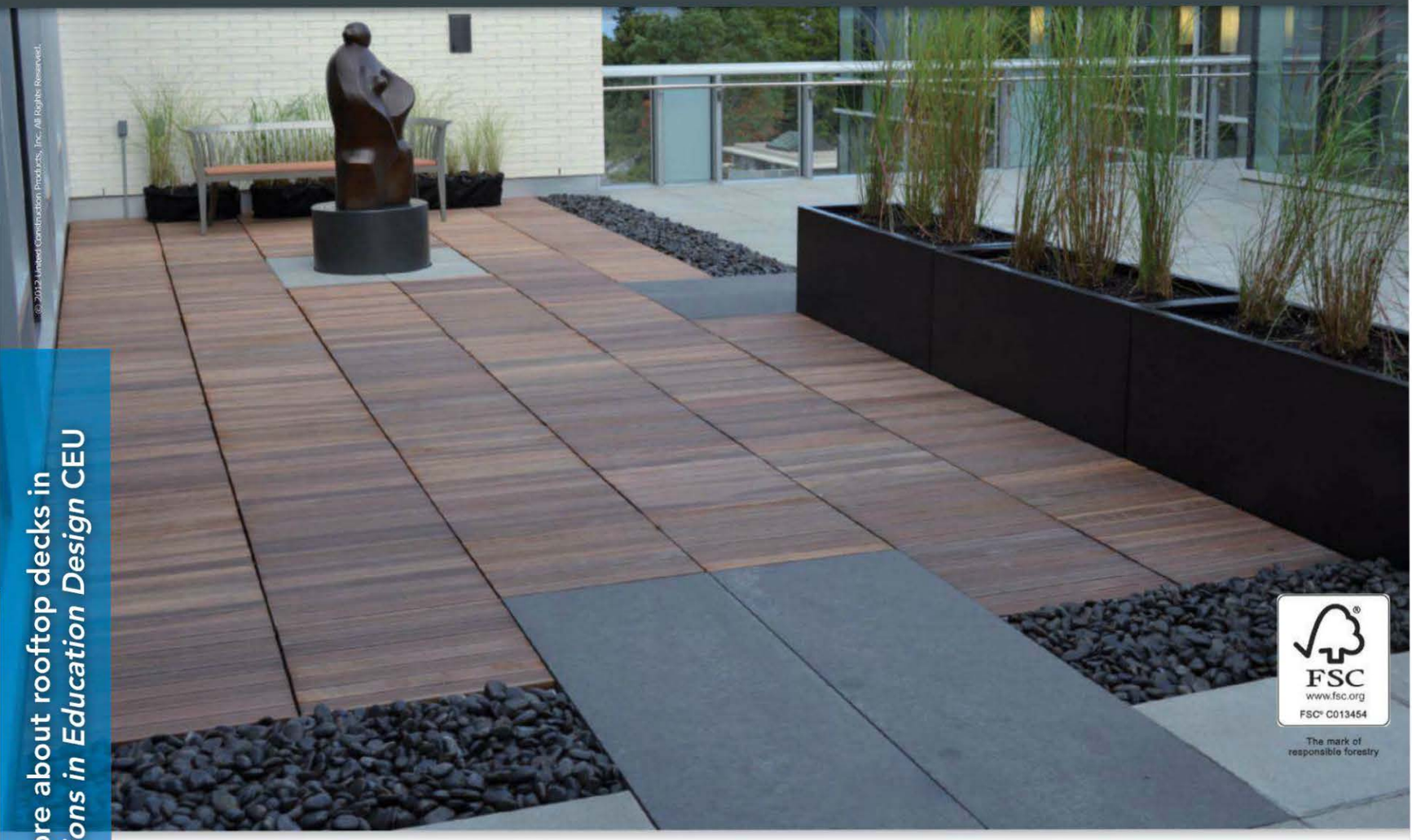

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University of British Columbia Law School

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CIRCLE 19

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Program title: **"Innovations for Educational Facility Design" (01/12, page 149)**. AIA/CES Credit: This article will earn you one AIA/CES hour of health, safety, and welfare/sustainable design (HSW/SD) credit. (Valid for credit through January 2014). **Directions:** Refer to the Learning Objectives for this program. Select one answer for each question in the exam and fill in the box by the appropriate letter. A minimum score of 80% is required to earn credit. **To take this test online and avoid handling charge, go to ce.architecturalrecord.com**

1. Instead of using lecture-style teaching methods and traditional classroom organization, educators and architects are grouping together learning areas and opening up school interiors, in response to:
- ❑ **a.** requirements codified in LEED for Schools.
- ❑ **b.** Federal regulations dictating school design.
- ❑ **c.** project-based, student-centered learning methodologies.
- ❑ **d.** increased science and math course loads.

2. To some degree, natural lighting in educational facilities can help improve student academic performance, in aggregate. According to a study by the California Energy Commission, this can also be said of:
- ❑ **a.** improved air quality.
- ❑ **b.** dimmable lighting.
- ❑ **c.** outdoor views.
- ❑ **d.** ambient noise.

3. Energy efficiency is a core element of green-building certification for educational facilities. The California version of CHPS, for example, requires that facilities meet or exceed:
- ❑ **a.** ASHRAE 90.1.
- ❑ **b.** ASHRAE 189.1.
- ❑ **c.** LEED Silver.
- ❑ **d.** Title 24, Section 6.

4. According to the EPA, energy consumption within school buildings is driven primarily by:
- ❑ **a.** mechanical systems.
- ❑ **b.** solar heat gain.
- ❑ **c.** answer
- ❑ **d.** answer

5. LEED for Schools employs life-cycle assessment (LCA) in its credit weighting. The Collaborative for High-Performance Schools (CHPS) program also rewards the use of materials and products that have undergone LCA. In which credit area does this appear?
- ❑ **a.** Leadership
- ❑ **b.** Sustainable Materials
- ❑ **c.** Greenhouse Gas Emission Reduction
- ❑ **d.** Innovation

6. Both CHPS and LEED for Schools have a Sustainable Sites section, in which credits toward building certification include all of the following EXCEPT:
- ❑ **a.** increasing open area on the site.
- ❑ **b.** reducing heat-island effects of building materials.
- ❑ **c.** restoring native habitat on the site.
- ❑ **d.** improving air quality in occupied outbuildings.

7. Vegetated roofs and materials with high solar reflectance may earn points toward LEED for Schools certification. For paving materials and steeply sloping roofs, a solar reflectance index (SRI) of 29 is required. For low-slope roofs with a rise of 2:12 or less, the required SRI is:
- ❑ **a.** less than 78.
- ❑ **b.** 78 or greater.
- ❑ **c.** between 29 and 78.
- ❑ **d.** None of the above

8. LEED for Schools awards a point if 75% of classrooms and core learning areas have daylighting, and further awards a bonus point is given if 75% of other regularly occupied spaces have daylighting also.
- ❑ **a.** True
- ❑ **b.** False

9. According to a national report on classroom acoustics, based on average speech intelligibility ratings for typical learning environments, students may be unable to hear how much of their teachers' verbal communications?
- ❑ **a.** 5%
- ❑ **b.** 25%
- ❑ **c.** 35%
- ❑ **d.** 75%

10. In Europe, the terms "thematic schools" or "intensive schools" are equivalent to what in the United States?
- ❑ **a.** Learning landscapes
- ❑ **b.** Small learning communities, or SLCs
- ❑ **c.** Magnet, charter and discovery schools
- ❑ **d.** Project-based, student-centered curriculum

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Material resources used: This article addresses issues concerning health, safety, welfare and sustainable design.

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Signature **Date**

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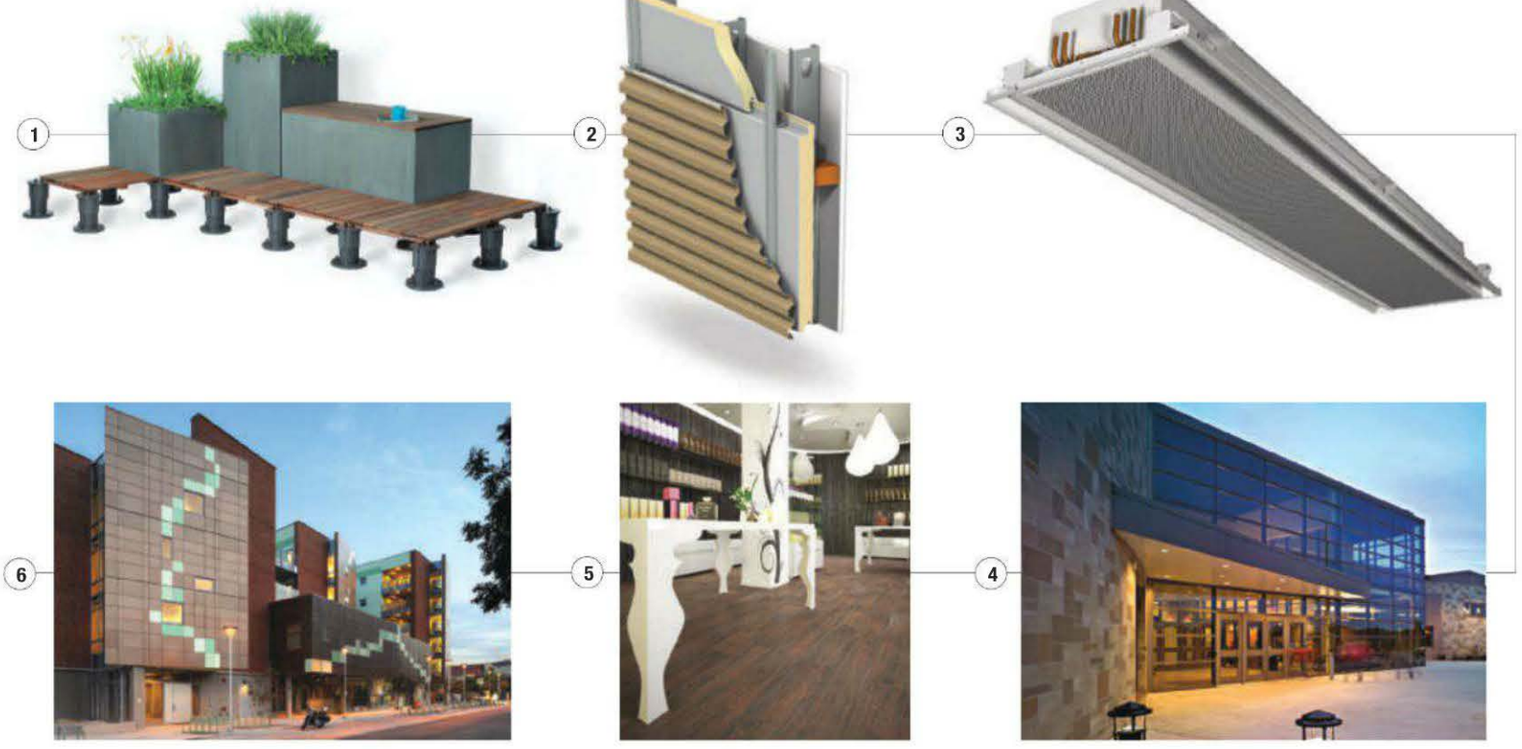
Innovations for Educational Facility Design:

PRODUCT REVIEW



1. Bison Innovative Products

INNOVATIVE BUILDING PRODUCT LINE

Bison products include: deck supports (made in USA, 20% post-consumer recycled materials, gravity-based system); cubes (modular planters with recycled content, custom colors, finishes and sizes that integrate with Bison Decks); and wood tiles (commercial grade, Class A fire rated, FSC® certified [FSC -C013454] with custom sizes available).

www.BisonIP.com circle 135

2. CENTRIA

INSULATED COMPOSITE BACK-UP PANELS

The unique single-panel design of CENTRIA's MetalWrap™ Series insulated composite back-up panel makes it the best choice to provide thermal and moisture protection for building exteriors with metal, brick or terra cotta by eliminating the need for traditional multi-component back-up systems.

www.buildbetterwalls.com circle 136

3. Price Industries, Inc.

ACTIVE BEAMS DELIVER ENERGY-EFFICIENT COMFORT

Active beams are one of the most energy-efficient heating and cooling solutions available to schools, and work by harnessing the superior power of water to transport energy. A hybrid air-water solution, beams can reduce air duct sizes, thereby reducing the mechanical footprint of a building. Beams can also deliver draft-free comfort to classrooms and common areas.

www.price-hvac.com/sustainable circle 137

4. Guardian SunGuard

ADVANCED ARCHITECTURAL GLASS

Guardian SunGuard Advanced Architectural Glass offers a variety of appearance and light transmission options with outstanding solar energy control. SunGuard SuperNeutral high-performance products allow architects to incorporate natural light into their designs while reducing solar heat gain. Their neutral appearance is the most similar to clear uncoated glass.

www.sunguardglass.com circle 138

5. Florida Tile

PORCELAIN WOOD-LOOK TILE

Berkshire HDP, with its rich colors and hand-scraped texture, looks and feels like panels of reclaimed lumber that have already lived a lifetime. With up to 40% recycled content and available in 6x24 planks, the five-color palette offers both contemporary and traditional design options that take your traditional hardwood and put it to the test in high-traffic areas.

www.floridatile.com circle 139

6. Dri-Design

MAINTENANCE-FREE WALL PANEL SYSTEM

The patented, 100% maintenance-free Dri-Design wall panel system is a true dry joint pressure equalized rainscreen system. These single skin plate panels have no potential to delaminate and can be made from a variety of metals. No standard colors and no standard sizes, these panels are detailed to meet the specific unique design requirements of each project.

www.dri-design.com circle 140

CONTINUED ON PAGE 164

Smart Design Starts By Digging Deep.

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CIRCLE 25

Innovations for Educational Facility Design:

PRODUCT REVIEW

continued

7. ClimateMaster, Inc.

HIGH-EFFICIENCY WATER-SOURCE HEAT PUMPS

The Tranquility 27 Two-Stage (TT) Series blends the most advanced technology with the most advanced design to create some of the highest efficiency water-source heat pumps available today. In addition, it utilizes EarthPure® (HFC-410A) refrigerant along with the Copeland UltraTech two-stage compressor and ECM variable speed motor to bring unmatched performance and comfort.

www.climatemaster.com circle 141

8. Roxul Inc.

STONE WOOL INSULATING PRODUCTS

BEDR™ Wall* — Insulating Solutions for High-Performance Rainscreen Systems. Roxul's premium quality stone wool insulation products meet the increasing need for higher energy efficiency, sustainability, durability and better overall performance in commercial buildings. Stone wool is also fire resistant for added safety. *Building Envelope Designed with Roxul.

www.roxul.com circle 142

9. SAFTI *FIRST* Fire Rated Glazing Solutions

CLEAR FIRE-RATED SOLUTION

SAFTI *FIRST* offers SuperLite, advanced fire-rated glass with superior clarity and performance for every application. From fire-rated doors and windows to custom-engineered wall assemblies, you can count on them to deliver high-quality products with fast lead times and competitive pricing made here in the USA.

www.safti.com circle 143

10. National Terrazzo & Mosaic Association, Inc.

TERRAZZO EARNS HIGH MARKS

Whether you are seeking to complement or contrast a specific building design, depict a school logo, or simply inject a splash of vibrant color, terrazzo can earn your next school project high marks across the board.

www.ntma.com circle 144

11. Petersen Aluminum Corporation

METAL ROOFING PANELS

SNAP-CLAD Panels feature architectural panel aesthetics and structural panel performance. SNAP-CLAD is corrective leveled to provide superior flatness. PAC-CLAD® Kynar 500® finish, covered by a non-prorated 20-year warranty, is available in 38 colors on steel and aluminum. Most colors meet LEED®, ENERGY STAR® and cool roof certification requirements.

www.PAC-CLAD.com circle 145

12. NanaWall Systems

OPERABLE GLASS WALL SYSTEMS

NanaWall FlexSpace: NanaWall operable glass wall systems optimize limited floor space in schools, increase classroom flexibility, enhance student learning, and create a more rewarding teaching environment for educators. Teaching staff can use the operable glass walls to either combine classroom activities or to separate students for specific activities.

www.Nanawall.com circle 146

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CIRCLE 31

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DATES & EVENTS

Ongoing Exhibitions

Design with the Other 90%: CITIES
New York City
Through January 9, 2012
This is the second in a series of themed exhibitions that demonstrate how design can be a dynamic force in transforming lives. The exhibition will explore design solutions that address the challenges created by rapid urban growth. At the United Nations. For more information, visit cooperhewitt.org.

Drift: An Exploration of Urban & Suburban Landscapes
Sharjah, United Arab Emirates
Through January 14, 2012
This exhibition at the Sharjah Art Foundation features works from the Foundation's collection by 10 contemporary artists, including Hala Al-Ani, Tarek Al-Ghoussein, Kader Attia, and more. The artists' work offers a personal response to specific landscapes, or to the ideas and conventions that influence how society constructs a common view. For more information, visit sharjahart.org.

Muntadas
New York City
Through January 16, 2012
Antoni Muntadas, who was born in Barcelona and has lived and worked in New York since 1971, is best known for his multimedia works and public art installations that address social and political issues. The works included in this exhibition at the Bronx Museum focus on the relationship between public and private spaces; the media; how information is conveyed, interpreted, and manipulated; and the way that public opinion is shaped. For more information, visit bronxmuseum.org.

Francisco Mangado: Architecture with the Left Hand
Berlin
Through January 26, 2012
Born in 1957, Francisco Mangado is one of the most prominent and prolific of his generation of Spanish architects. Among his most widely published and acclaimed works are the Baluarte Congress Center and Auditorium in his native Pamplona. Through models of building projects, digital representations of interior fixtures, and furniture, this exhibition presents a large part of Mangado's output as an architect and industrial designer. At Aedes am Pfefferberg. For more information, visit aedes-arc.de.

Gwathmey Siegel: Inspiration and Transformation
New Haven, Connecticut
Through January 27, 2012
This exhibition at the Yale School of Architecture is the first museum exhibition devoted to the work of Gwathmey Siegel and Associates Architects, which practiced for more than 40 years and was one of the most influential architecture firms of the modern period. With original architectural drawings, sketchbooks, reproduced drawings, and more, the exhibition examines the close relationship between art and architecture in projects designed by the firm. For more information, visit architecture.yale.edu.

Engaging Architecture, Landscape, and Ecological Renewal: The Work of Artist Michael Singer
Copenhagen
Through January 29, 2012
The American architect and artist Michael Singer creates sculptures, landscapes, and architecture that weave into their surroundings in a convincing way, whether the subject is a natural or an urban environment. His works range from paintings and drawings, sculptures and installations, to large-scale architectural

projects that bridge the gap between the aesthetics of nature and city. The Danish Architecture Centre showcases a selection of Singer's works that contribute to new perspectives on architecture and to active use of sustainable strategies in the creation of beautiful architectural projects. Visit dac.dk.

Imperfect Health: the Medicalization of Architecture
Montreal
Through April 1, 2012
Through a wide range of materials, including photographs, publications, art and design projects, and architectural models and drawings, this exhibition uncovers some of the uncertainties and contradictions in the current conception of health and considers how architecture acknowledges, incorporates, and affects health issues. At the Canadian Centre for Architecture. Visit cca.qc.ca.

Lectures, Conferences, and Symposia

Michel Rojkind: Over Stimulation
Los Angeles
January 25, 2012
Michel Rojkind is the founding partner of the Mexico City–based firm Rojkind Arquitectos. He studied architecture and urban planning at the Universidad Iberoamericana. He has been a guest professor at various universities and has lectured internationally. At SCI-Arc. For more information, visit sciarc.edu.

AIA Europe: International Conference and Chapter Meeting
Tel Aviv
April 19–22, 2012
In the throes of realizing itself as a uniquely cosmopolitan society based on deep roots in ancient history, Israel has become a complex and modern place, the source of many technological, artistic, and cultural inventions. This conference will consider the ways architecture connects the past with the present and the role of public architecture. Anticipated tours include the Tel Aviv Museum of Modern Art, Holon Design Museum, Bauhaus White City, the Israeli Supreme Court, and the Peres Center for Peace. Visit aiaeurope.org/telaviv.

Competitions

Open Call: Exhibition on Contemporary Architecture and Engineering in the Middle East
Deadline: January 13, 2012
In the spring of 2012, the Center for Architecture will host the U.S. debut of the exhibition "City of Mirage: Baghdad, 1952–1982, From Wright to Venturi." Submitted projects must be located in the Middle East, and all qualifying submissions will be included. Commissioned projects in design, under construction, or recently completed; and unbuilt competition entries will be accepted. All constructed projects must have been completed after January 1, 2000. Visit aiany.org.

New Practices New York 2012
Registration Deadline: January 15, 2012
New Practices New York recognizes and promotes new and innovative architecture and design firms. The competition honors firms that have utilized unique strategies, both for the projects they undertake and for the practices they have established. Visit aiany.org.

SEED Awards for Public Interest Design
Registration Deadline: January 16, 2012
The SEED Competition showcases and promotes projects that help create socially, economically, and environmentally healthy communities. Each of the six winners will receive an all-expenses-paid trip to present at the Structures for Inclusion conference at

the University of Texas, Austin, and a $1,000 cash prize. Each winning project will also be included in a documentary series by The UpTake. Visit designcorps.org/sfi.

Folly
Deadline: January 16, 2012
Socrates Sculpture Park in Queens, New York, and the Architectural League invite emerging architects and designers to apply for the opportunity to build and exhibit a full-scale project around the theme of an architectural folly, a fanciful architectural form built to lend interest to a view or serve as a conversation piece. The winner will receive a $5,000 production grant to fund the project, as well as full access to the resources and fabrication facilities of the park's outdoor studio during a two-month residency. Visit archleague.org.

SHIFTboston GLOW Competition
Registration Deadline: February 3, 2012
SHIFTboston is asking artists, architects, urban planners, sculptors, lighting designers, and landscape architects around the world to envision a new approach to activating Copley Square with lighting or glowing installations. SHIFTboston is looking for proposals that will make Copley Square one of the greatest public spaces in the world to visit after dark. For more information, visit shiftboston.org.

The Architectural League Prize for Young Architects + Designers
Deadline: February 15, 2012
Young architects and designers are invited to submit projects of all types, either theoretical or real, and executed in any medium. The jury will select work for an online installation, podcasts, and for an exhibition in June 2012. Winners will receive a cash prize of $1,000. A catalogue of winning work will be published by the Architectural League and Princeton Architectural Press. This year's theme is "No Precedent," in honor of a self-defining generation of young architects driven by the desire to create, to be heard, to keep busy, and to fulfill untapped and forbidden niches. Visit archleague.org.

Ceramics of Italy Tile Competition
Deadline: February 17, 2012
Sponsored by the Italian Trade Commission and Confindustria Ceramica (the Association of Italian Ceramics), the 2012 Tile Competition is open to all North American architects and designers who have used Italian ceramic tiles in their institutional, residential, or commercial/hospitality projects completed between January 2007 and January 2012. The competition is completely digital and is free to enter. Winners in each category will receive a $4,000 cash prize and a five-day trip to Bologna, Italy, to attend Cersaie in the fall. Past winners have included Bernard Tschumi, Karim Rashid, and Pentagram Architects, to name a few. Visit tilecompetition.com.

2011 Open Architecture Challenge
Registration Deadline: March 31, 2012
Decommissioned military installations leave their mark on the global landscape—symbols of triumph, pride, pain, and the unforeseen consequences of military aggression. This design competition seeks to reenvision the future of decommissioned military space. The design-and-construction community is asked to identify retired military installations in their own backyards; collaborate with local stakeholders; and reclaim these spaces for social, economic, and environmental good. For more information, visit openarchitecturenetwork.org/competitions/unrestrictedaccess.

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

ARCHITECTURAL RECORD

Good Design is Good Business 2012 CALL FOR ENTRIES

The editors of ARCHITECTURAL RECORD would like to invite submissions for the **2012 ARCHITECTURAL RECORD GOOD DESIGN IS GOOD BUSINESS** awards program (formerly the **BusinessWeek/Architectural Record Awards**).

Good design has become a top priority for leaders looking to rebrand, boost productivity, and attract customers. The Good Design is Good Business awards honor architects and clients who best utilize design to achieve such strategic objectives.

To learn more and to download the official entry form, visit architecturalrecord.com/call4entries.
Email questions to arcallforentries@mcgraw-hill.com. SUBMIT YOUR ENTRIES BY **01/15/2012**.

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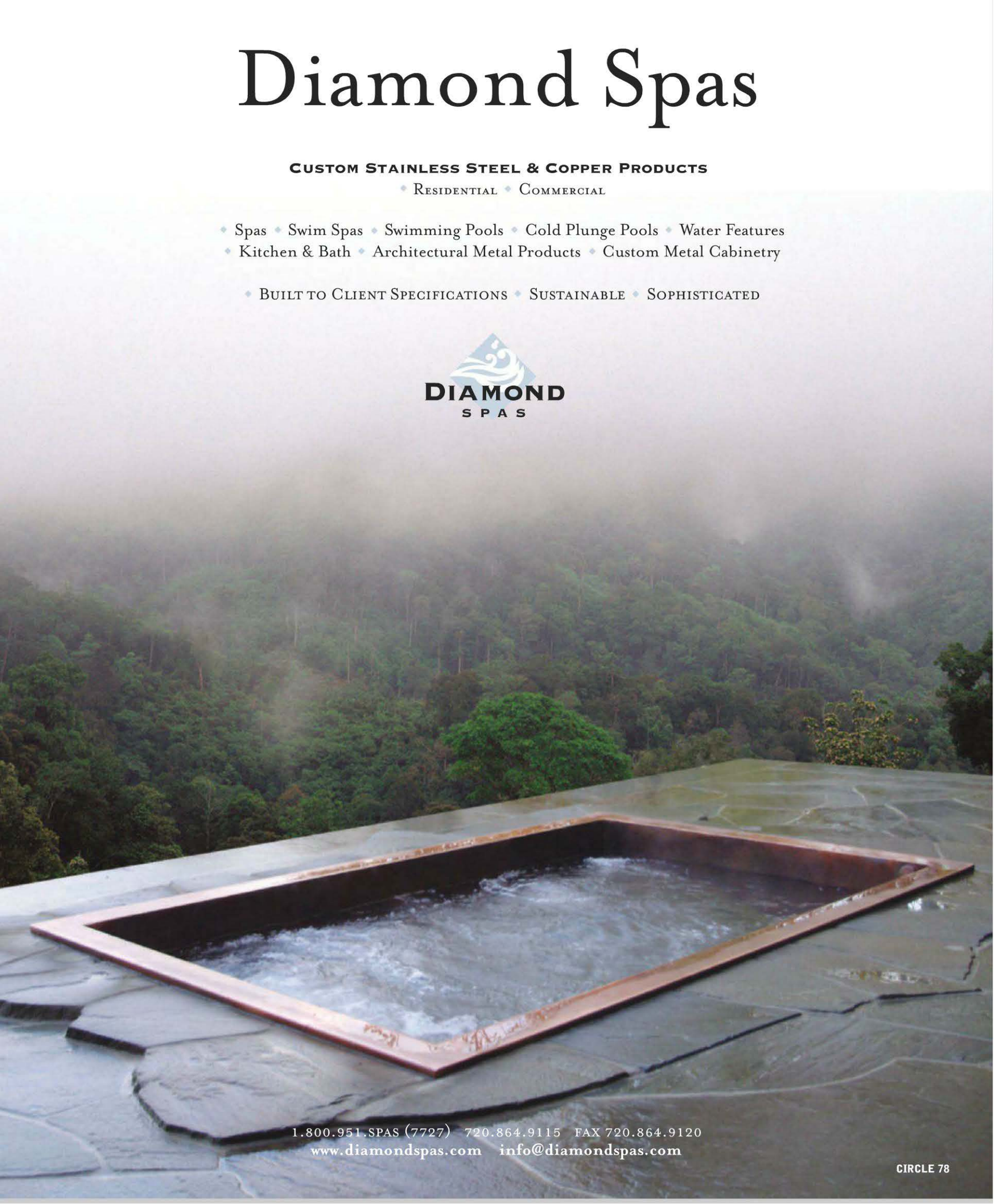

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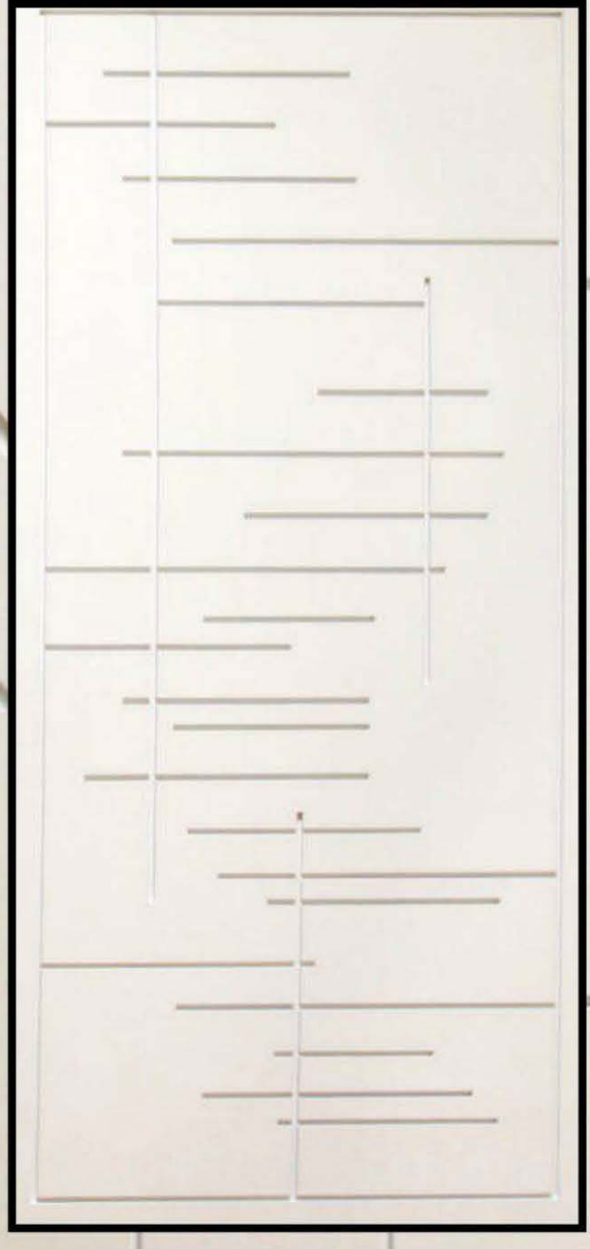

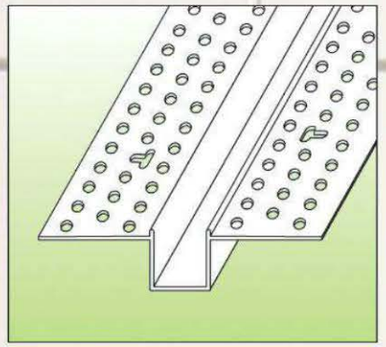

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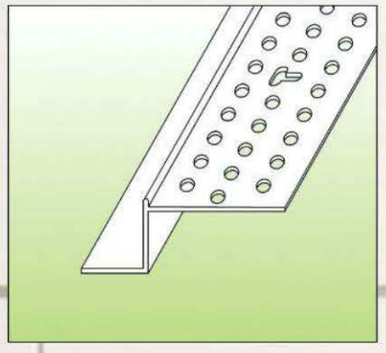

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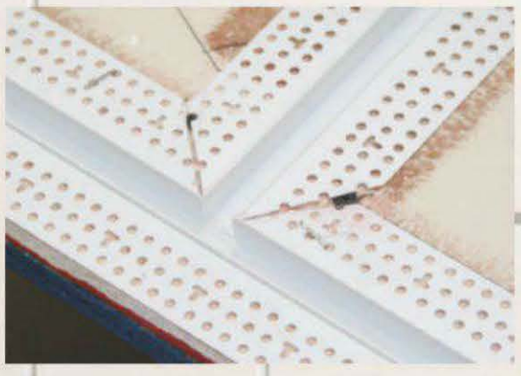

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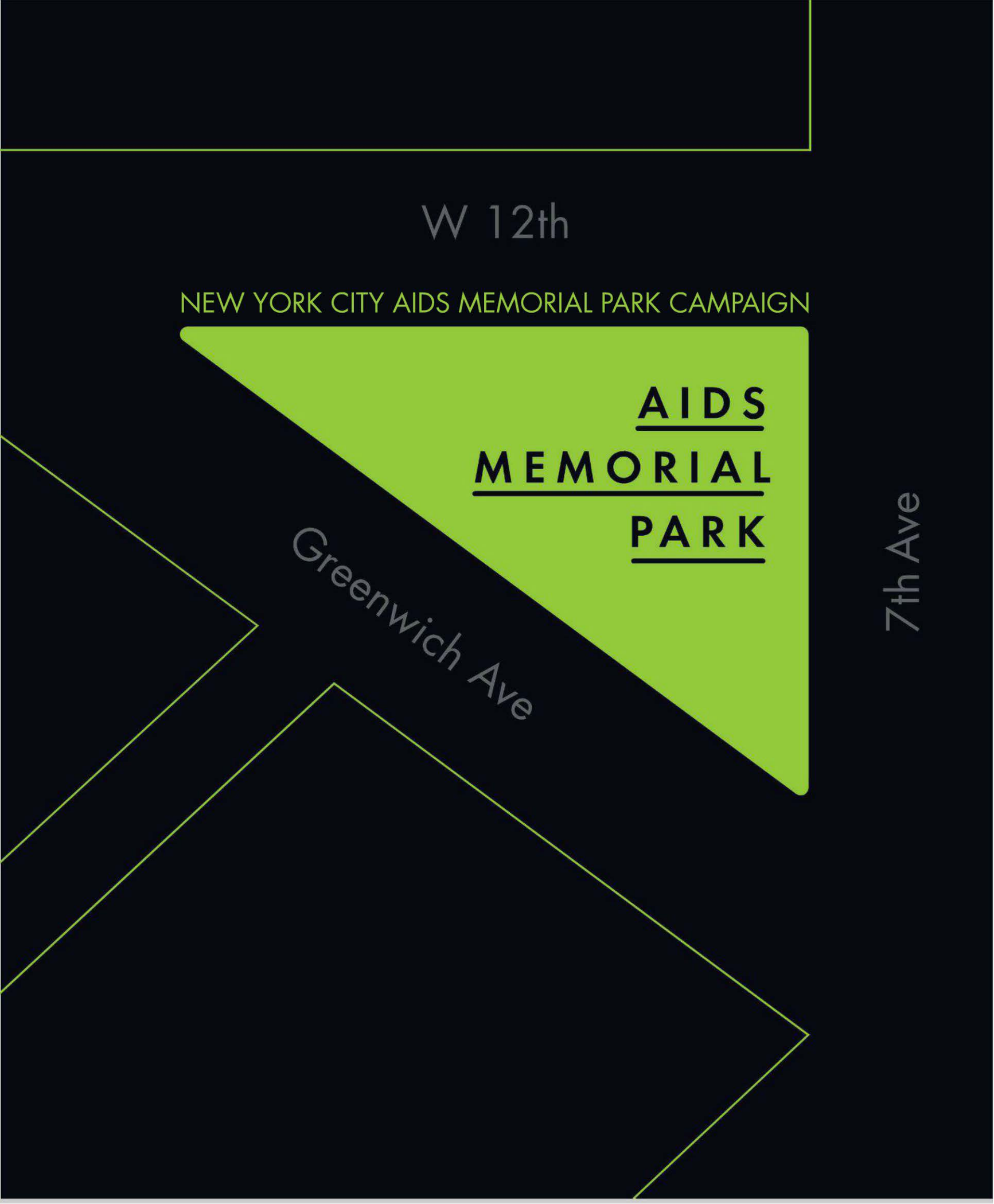
CALL FOR ENTRIES

WWW.ARCHITIZER.COM

Call for entries to design the AIDS Memorial Park across from St. Vincent's Hospital, "ground zero" of the epidemic that has claimed 100,000 New Yorkers' lives. The judging panel will be led by Michael Arad, designer of the 9/11 Memorial. | ARCHITECTURAL RECORD | Architizer | Deadline: January 22 at 11:59pm EST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CIRCLE 79

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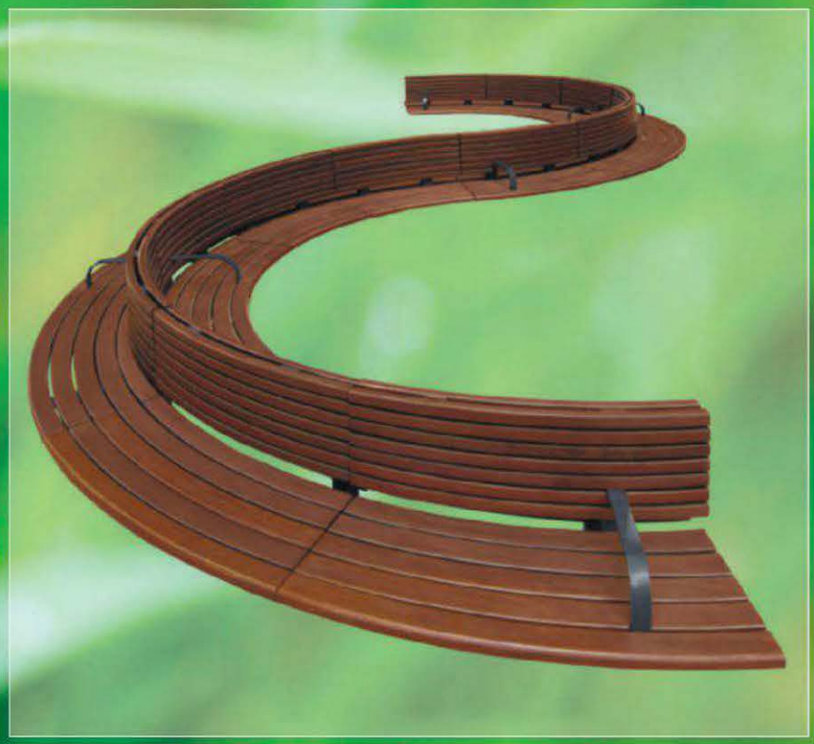

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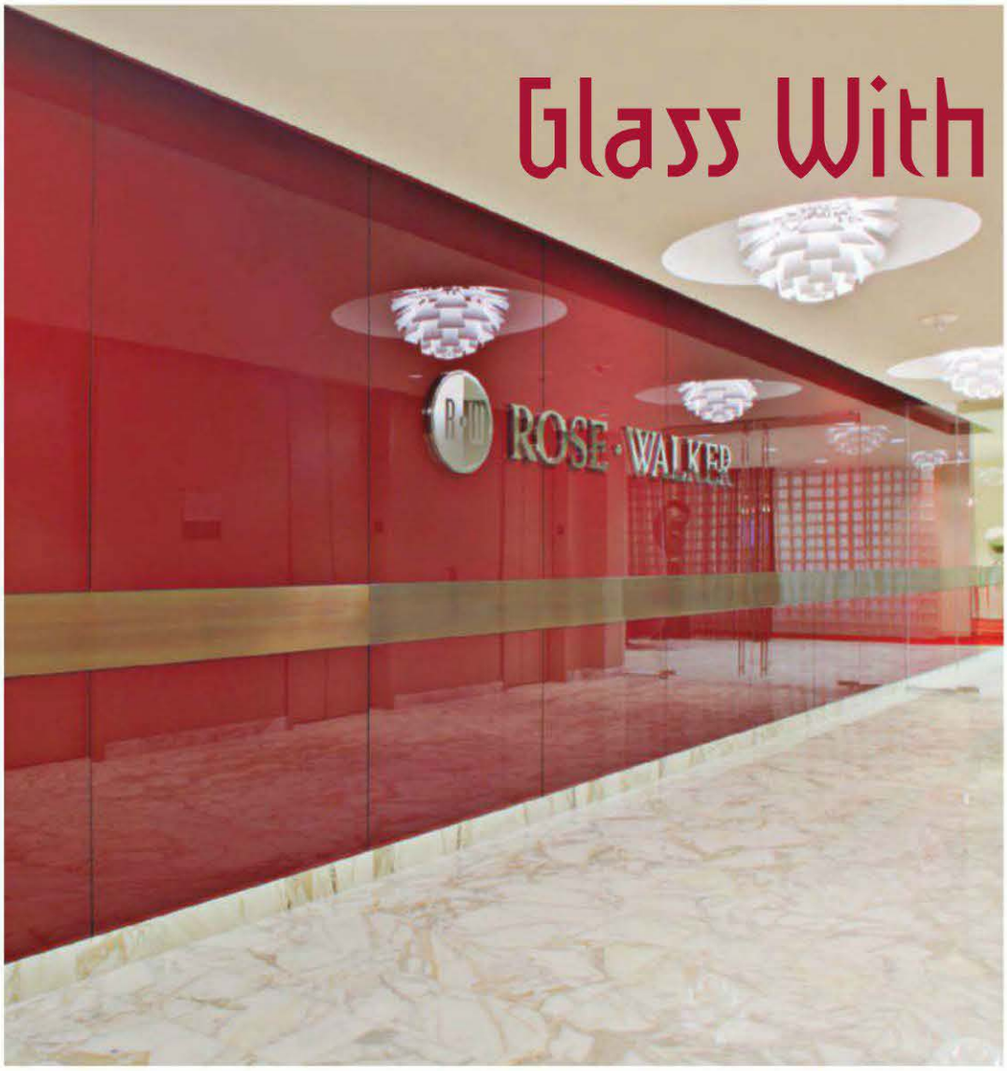

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SNAPSHOT

PROJECT MEDINA HARAM PIAZZA
LOCATION MEDINA, SAUDI ARABIA
DESIGNERS SL-RASCH

WHEN MUSLIMS MAKE their pilgrimage to Medina to pray at Islam's second-holiest mosque, there is now shelter from the extreme sun for the crowds that spill into the surrounding plaza. SL-Rasch, a German firm specializing in lightweight structures, constructed 260 giant umbrellas to provide shade for an area of over one-and-a-half million square feet. The firm worked with a team including SEFAR Architecture (supplier of the durable yet flexible PTFE fabric), to create the 49-foot-tall sunshades. To prevent the umbrella frames from colliding when opening and closing, the team programmed them to unfold sequentially with a slight delay, resembling a time-lapse video of a field of blooming flowers. When closed, each umbrella is encased in a narrow fiberglass column (several shown in background) that features integrated lighting. The sunshading project has successfully reduced the piazza's ambient temperature by 14 degrees Fahrenheit, ensuring a more comfortable environment for both body and soul.
Rita Catinella Orrell

PHOTOGRAPHY: COURTESY SEFAR ARCHITECTURE

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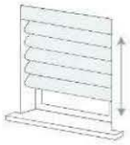
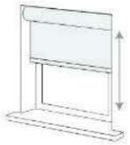


Roman Shades



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