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ARCHITECTURAL RECORD

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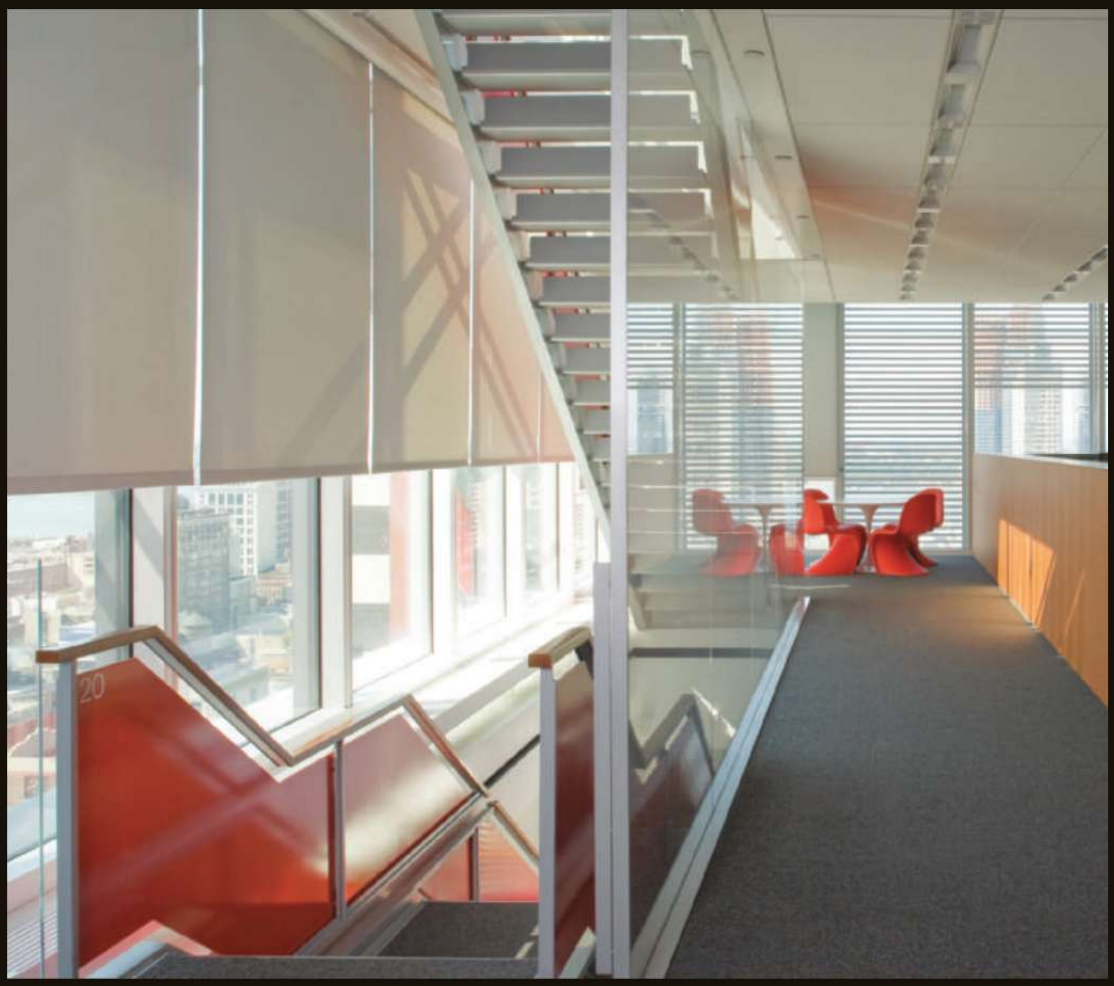

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NEWS

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ARCHITECTURAL TECHNOLOGY

1. **National Stadium, Taiwan, by Toyo Ito,** *page 64.*
2. **UXL Furniture Line, by Smith System,** *page 84.*
3. **Roy Romer Middle School, California, by Johnson Fain,** *page 94.*

ON THE COVER: Linked Hybrid, China, by Steven Holl Architects. Photograph © Shu He Photography Studio.

THIS MONTH ON architecturalrecord.com

New this month on our Web site, we visit a residential project in Hannover, Germany, for **House of the Month**, as well as MoMA's **Bauhaus** exhibition. We also look at how one firm benefited from the federal **stimulus plan**, and we present an extended video interview with **Paolo Soleri**.

[HOUSE OF THE MONTH]

Walls of glass and steel settle gently in a landscape of meadows and fields in this project by German architect Susanne Nobis. The a single-level house features skylights to bring in natural light from above, and the transparent walls create sweeping lateral views.

ONLINE EXCLUSIVES

GALLERIES | VIDEOS | BLOGS | FORUMS | RESOURCES

1 | RECORD TV

Ninety-year-old Italian-American architect and theorist Paolo Soleri discusses contemporary urbanism.

1

[READER'S FORUM]

"Presidential libraries are typically pretty subdued designs, so I'm not surprised by the restrained image this presents (Polshek's design for Clinton's being a notable exception). It seems to be conceived as a part of the campus, as opposed to a jewel surrounded by the campus. It's kind of funny that all the figures in the renderings are more 'mature' adults."

— Anonymous on "Robert A.M. Stern Unveils Design for Bush Library"

2

2 | EVENTS

Take a slide-show tour of the exhibition *Bauhaus: Workshops for Modernity, 1919–1933*.

3

3 | RECESSION & RECOVERY

In our special section on design and the economy, we profile WDG Architecture and how it was able to take advantage of the American Recovery and Reinvestment Act.

EXPANDED COVERAGE

PROJECT PORTFOLIO

Read our coverage of Steven Holl's Linked Hybrid from design to completion.

AR2

Ian Harris and David Krantz make a feature-length documentary on studio culture.

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READER'S **GALLERY**

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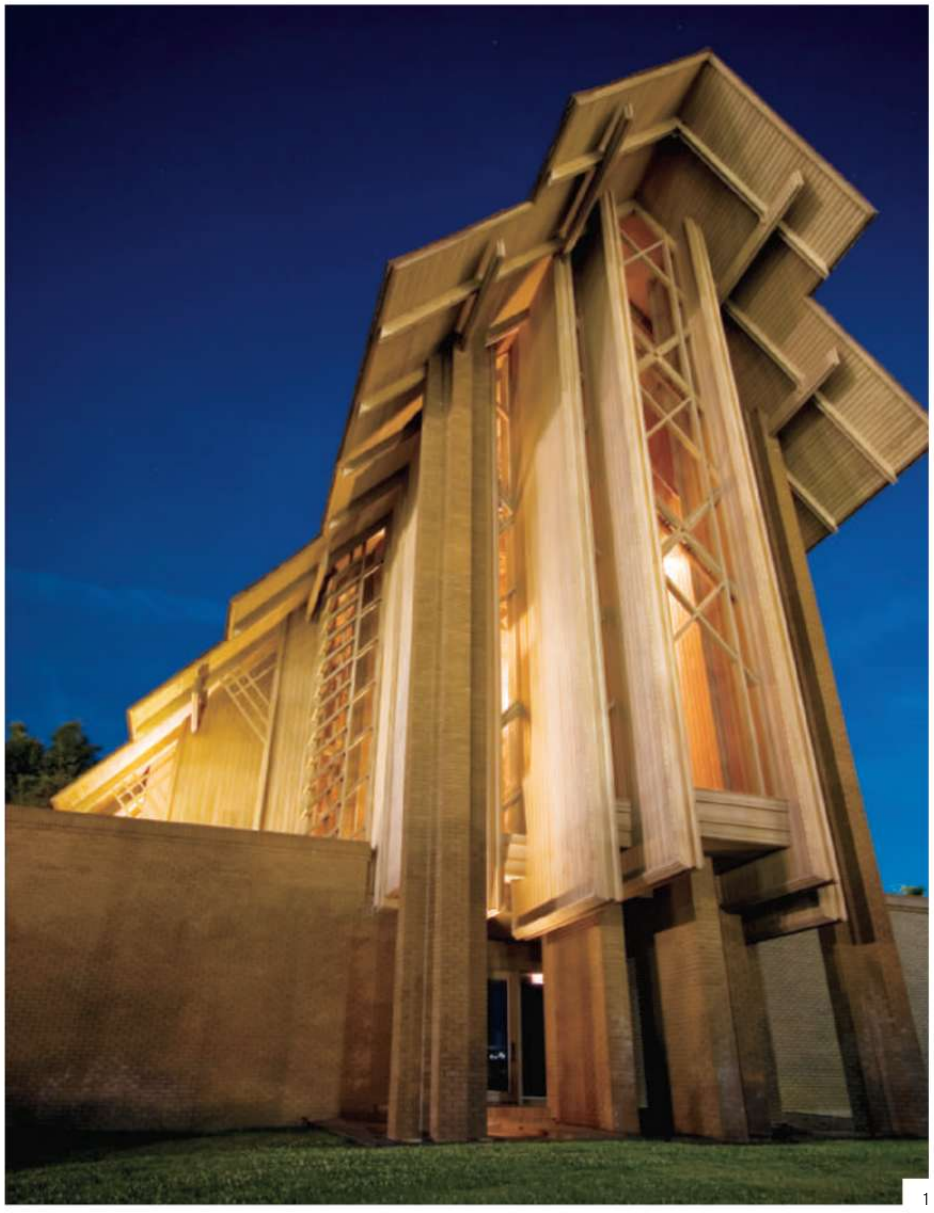

1. **E. Fay Jones's Marty Leonard Chapel in Fort Worth. Photo submitted by "photography.burns."**

2. **Morphosis's 41 Cooper Square at the Cooper Union for the Advancement of Science and Art in New York City. Photo submitted by "jchororos."**

3. **WHA Architecture and Planning's AKA Virginia Square in Arlington, Virgina. Photo submitted by "chris."**

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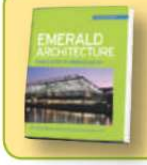

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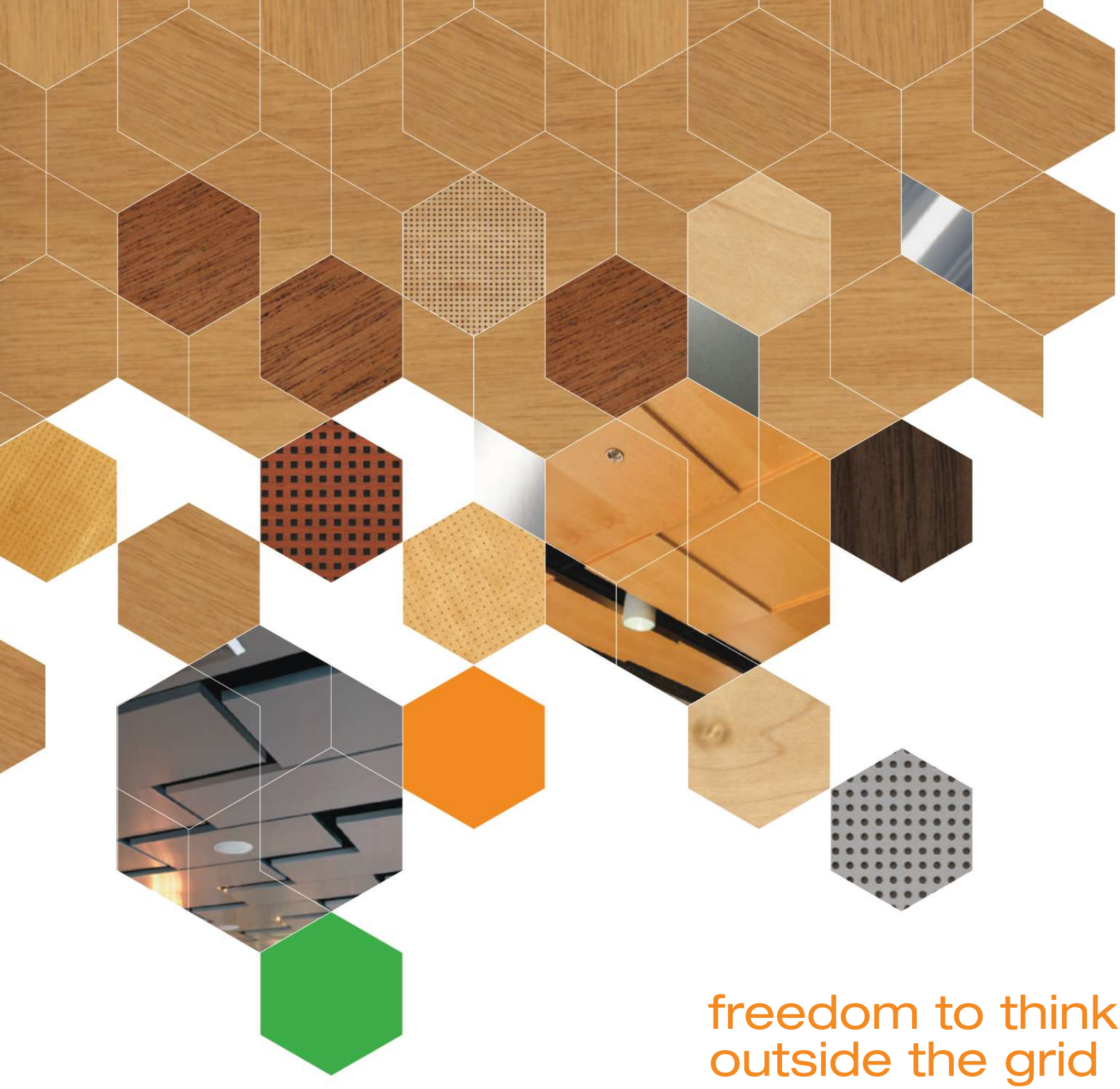

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CIRCLE 09

Through the Looking Glass

Government's ambitious building plans

BY ROBERT IVY, FAIA

IN 2010, THE TABLES HAVE TURNED. In a challenged economy, government looks more attractive to architects than the private sector. With the enactment of the American Recovery and Reinvestment Act in 2009, government was tapped by the current administration to help stimulate the nation, with building and rebuilding as cornerstones of economic recovery. Architects took note.

The recent infusion of capital may obscure the fact that federal agencies, and the General Services Administration (GSA) in particular, have been at the forefront of developing and promulgating contemporary design and building practices, including implementing aggressive, positive programs for streamlining selection processes; devising new ways of bringing projects to the marketplace and under construction; adopting environmental guidelines; and ensuring design quality.

It has not always been so. In a panel discussion on the role of government buildings in the 21st century, convened in Washington, D.C., on December 9, 2009, by the Woodrow Wilson International Center for Scholars, the GSA's Commissioner of Public Buildings Service, Robert Peck, reminded us that as late as 1962, it took the gravitas of Senator Daniel Patrick Moynihan to inveigh against mediocrity in building and planning and signal government's potential symbolic role in fostering the subsequent Design Excellence Program. Mercifully, Moynihan's arguments, as articulated in *Design Excellence in Federal Architecture*, took hold.

The result is a "through the looking glass" era in which worthy public projects such as courthouses, border stations, and federal office buildings by leading practitioners populate cities across the United States. Such projects not only challenge our design boundaries but help implement advanced engineering and environmental solutions for a client that demands long-term, optimal performance. It helps to have a client with a long-term viewpoint, and the GSA often intends to own its properties for more than a century.

Obviously, the GSA does not stand alone. Other agencies play a critical role, commissioning work domestically and abroad, many with stimulus dollars. The Department of the Interior bears responsibility for major renovation of historic properties, such as Ellis Island. Its own guidelines form the structural backbone for millions of dollars of preservation work accomplished by, and for, others. The Department of Defense (facility upgrades and new construction), the Veterans Administration (medical facility upgrades), and Housing and Urban Development all have money, and work.

Why don't we feel the stimulus fully yet? As of July 1, 2009, we reported that only $1.1 billion of an anticipated $5.5 billion in design and construction had been spent on 120 buildings. However, the GSA hopes to spend roughly 90 percent of its entire $5.5 billion by the end of 2010 — an amazingly quick response. Among the anticipated work are mega projects, including a $435 million headquarters for the Coast Guard (see "A Stimulus Success Story," page 39) as well as $450 million for the Department of Homeland Security. Not all projects contain such overwhelming budgets: Numerous greenfield projects, such as courthouses and office buildings, will be built for a tenth that sum, together with retrofits for energy and functional improvement to the large stock of midcentury structures that populate most cities in the United States.

When one agency, in this case the GSA, is commissioning such intense work, and all of it is outsourced, it inevitably raises the question if it is possible or advisable — that is, as AIA EVP/C.E.O. Christine McEntee has noted, is it in fact a question of whether a project is "not shovel ready, but shovel worthy." Consider how the numbers of GSA employees has shrunk from more than 40,000 in the 1970s to approximately 12,000 today. Les Shepherd, the chief architect of the GSA, admits that while things are moving swiftly, architects report that enforced tight schedules are yielding greater profitability — a first for many firms when working for the agency.

The list of challenges facing government buildings mimics those faced in the public sector, though some have heightened consequence. In addition to the questions of sustainability (how energy efficient should a new building be if it is to eradicate its total carbon footprint?), government buildings confront the need of increased security, a thorny issue, while continuing to serve as the visible, accessible symbols of this nation's ideals — a lofty, and hopefully not unattainable, goal.

Furthermore, the country's demographics and preferences are changing. Former minority populations, such as Hispanics, are growing, and immigration continues, bringing in waves of people with differing ambitions and expectations of the role of government and of the workplace. Simultaneously, the nation is increasingly moving toward its urban centers, underscoring the need for a coordinated planning effort that recognizes societal change through the social services and amenities, transit, landscapes, and buildings we provide.

Thankfully, at a low ebb in our corporate health, the nation's largest client and largest property holder has embraced an enlightened approach to planning, architecture, and construction. The Design Excellence Program, now led by director Casey Jones, stands intact, with support from the agency's leadership, with a goal of expanding the definition of excellence to all commissions. Architects will look, amazingly, to government in 2010, not as Big Brother, but as a partner, helping to kick-start the engine, and even to point the way toward quality practices for the future.

PHOTOGRAPHY: © ANDRÉ SOUROUJON

Chilly climate
In 2007, RECORD outlined a shift in its reporting on the built environment, vowing that "suitability will trump aesthetics." This change in focus was based on dire predictions from the U.N. Intergovernmental Panel on Climate Change about the alleged effects of man-made global warming. The U.N. findings relied significantly on global temperature data from the Climate Research Unit of East Anglia University, now implicated in massive scientific fraud. While this revelation does not again make profligate energy consumption fashionable, it does raise questions about this publication's journalistic priorities going forward. Will the band play on as though nothing has changed, or will there be a more forthright acknowledgement that we've been duped?
Tom Houg
South Pasadena, Calif.

The editors reply:
The case in question began when the Climate Research Unit's e-mail system was hacked, and scientists' correspondence and documents regarding their research was released. On November 27, the university announced it was making an independent inquiry into both the breach of security and possible issues of fraud in the Climate Research Unit. Its former director resigned on December 1. In spite of this controversy, we maintain that addressing environmental concerns is critical to the creation of good design.

Ending on a high note
Thank you so much for the December issue of RECORD. I absolutely *love* its fresh new bounce (particularly the cover), audaciously taking us into a new decade. Well done!!!
Chris Morris
Via e-mail

I really liked "Design Vanguard 2009." Bravo! Martin Filler's thoughtful Critique ["Fame: A Fickle Mistress," page 33] was also very good. This will compensate for Bob Campbell's thing on golf! [Critique, October 2009, page 51.]
John Parman
Berkeley, Calif.

Looking ahead
The article examining *DesignIntelligence*'s ranking of architectural schools in your November issue ["America's Best Architecture Schools, 2010," page 85] took the short view. If one takes the long view and compares graduates from the top schools after 10 or 20 years of practice, I think one has a more accurate assessment of ranking.
James Oleg Kruhly, FAIA
Philadelphia

Corrections:
A photograph that appeared in the November 2009 project story about 41 Cooper Square in New York City [bottom of page 97] should have been attributed to Iwan Baan. In October's Archrecord2 Work story on MEx [page 48], the bottom right image should have been cited as Patten Studio's Sensetable. An October 2009 feature on U.S. embassies [page 64] misspelled the name of Berlin's "planning czar," Hans Stimmann. A November News story [page 36] stated that the architecture program at City College of New York (CCNY) was founded in 1968. In fact, according to CCNY's library archivist, it was established in 1961 and was part of the School of Engineering and Architecture. In 1968, the architecture program became a separate school.

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[GRAND OPENING]

Now Introducing the Burj Dubai

DUBAI HAS MADE HEADLINES in recent weeks for its financial woes, and many are saying this once-booming desert metropolis has gone bust. But the emirate does have something to celebrate: The Burj Dubai, the world's tallest building, is due to officially open on January 4.

Precisely how many feet this superlative tower rises into the sky remains a mystery. "The final height is still being guarded closely," says George Efstathiou, FAIA, managing partner in charge of the project at Skidmore, Owings & Merrill. "We're bound to keep it a secret."

The skyscraper is widely believed to be 2,684 feet tall, but recent changes to the way the Council on Tall Buildings and Urban Habitat measures building height complicates such estimates. Still, regardless of final calculations, the Burj Dubai will rise considerably higher than Taiwan's 1,667-foot-tall Taipei 101, which opened in 2004 and has held the record for the world's tallest building in terms of "height to architectural top."

Situated in the city center, the roughly 160-story Burj Dubai will consist primarily of luxury apartments, office space, and an Armani Hotel. Encompassing more than 3 million square feet above grade, with an additional 2 million square feet below, the tower was built with some 327,000 cubic yards of concrete and 35,700 metric tons of rebar. At the peak of design activity, SOM had a team of 100 employees dedicated to the project in its Chicago office, along with a handful in Dubai.

The tower was originally scheduled to be completed in 2008, but developer Emaar pushed the date back several times in response to height modifications, construction worker strikes, and changes to interior finishes. "The obstacles were nothing more than normal" for a supertall tower, Efstathiou reports, noting that in terms of structure, the building was on solid footing from the beginning due to its Y-shaped base. He adds that although the tower will formally open in January, "polishing" work will continue for a few months.

Efstathiou says his team's excitement has escalated in recent months, as the building nears completion. But he adds, "There's also some sadness that this journey we've been on for over six years is now coming to an end." *Tim McKeough*

ON THE WEB

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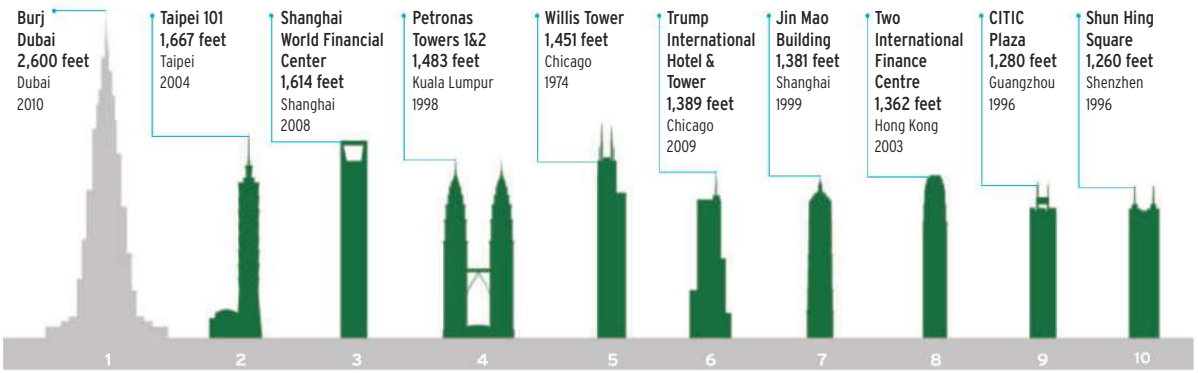


[JUST ANNOUNCED]

World's Tallest Buildings Reconsidered

THE COUNCIL ON TALL BUILDINGS and Urban Habitat (CTBUH) has changed the way it measures building height.

Announced on November 17, the Chicago-based organization now includes below-grade, open-air pedestrian entrances in its calculations; previously, measurements were made from the sidewalk outside the main entrance. CTBUH also eliminated a "height to roof" category due to increased use of spires, parapets, and other features. The revisions reflect "the most recent trends in tall-building development around the world," says Peter Weismantle, CTBUH height committee chairman.

The modifications have prompted a slight change in the ranking of the world's 10 tallest buildings. SOM's Burj Dubai, opening this month and rumored to rise 2,684 feet, will still reign supreme. But Chicago's Trump International Hotel & Towers, also by SOM, gains 27 feet, moving it up from the no. 7 to the no. 6 spot; it displaces SOM's Jin Mao Building in Shanghai. *Tony Illia*

[IN PROGRESS]

Stern Unveils Design for Bush Library

AFTER YEARS OF RUMORS, speculation, and rhetorical jousting, the George W. Bush Presidential Center is finally public. Former first lady Laura Bush and architect Robert A.M. Stern unveiled the final design on November 18 at Southern Methodist University (SMU), Mrs. Bush's alma mater and the center's future home.

With an estimated $250 million budget, the 227,000-square-foot center will contain a museum, library, and archive, plus a private Policy Institute that some SMU faculty and trustees have denounced as a partisan think tank. The center will overlook a rolling landscape of native Texas grasses and wildflowers by Michael Van Valkenburgh.

Stern was selected in 2007 to design a library "compatible with the distinct architectural character [i.e., Georgian] of SMU that commemorates and celebrates the accomplishments of President Bush." He responded with a redbrick and creamy Texas limestone building featuring an entry plaza, colonnade, and tall square tower that recalls the more fanciful cupolas on other SMU buildings.

"We wanted to be sympathetic to Georgian without being literal," Stern explained. "But we didn't want a building that looked as if it belonged on a ranch either."

He characterized the center as nonpartisan. "It doesn't say anything specific about President Bush. It's not a portrait or a defense. It's about the presidency and the dignity of the office."

Michael Van Valkenburgh's rustic garden, covering roughly half of the site's 23 acres, provides a sharp contrast to the formal landscape of the rest of the campus. He said the fluid design reflects the wishes of the Bushes for an informal space that functions as a park for the neighbors and SMU. Mrs. Bush attended most of the architect meetings and vetted designers' ideas with the president. "There was always a sense that his voice was in the room, even though he wasn't," said Van Valkenburgh.

One remaining hurdle is a property owner's lawsuit claiming that SMU misled him about its plans, causing the owner to sell his condominium for below market value. If the suit is settled soon, construction could start next spring, with a dedication in February 2013. *David Dillon*

View a slide show online.

IMAGES: COURTESY SOM (OPPOSITE); MICHAEL MCCANN/ROBERT A.M. STERN (THIS PAGE, LEFT TWO); AIA (THIS PAGE, RIGHT TWO)

[RECESSION REPORT]

One of Boston's Largest Firms Shuttered

CUBELLIS, A TOP-EARNING international architecture and engineering firm headquartered in Boston, has closed. The 23-year-old company, which has 12 offices, including one in Dubai, told its employees of the shutdown the day before Thanksgiving, according to the *Boston Business Journal*.

The immediate cause of the closure was Sovereign Bank's denial of a key line of credit, which made the firm unable to pay the salaries of its 170 employees. But the general industrywide collapse is also to blame, according to Tom Bergerson, a principal in the firm's office in Newport Beach, California, which at its peak had 24 employees. "Clients can't get the funding to do the projects they want to do," says Bergerson, adding that over the past 18 months, his office had not been paid for certain front-end work.

In 2008, Cubellis earned $51 million in architectural revenue and ranked 60th in RECORD's list of the 250 most successful U.S. firms. *C.J. Hughes*

[ACCOLADES]

AIA Announces Award Winners

THE AMERICAN INSTITUTE of Architects has announced the winners of several prestigious annual awards. All recipients will be honored during the AIA's 2010 National Convention, scheduled for June 10 to 12 in Miami, Florida. *Jenna M. McKnight*

GOLD MEDAL

The 2010 Gold Medal goes to Peter Bohlin, FAIA, founder of Bohlin Cywinski Jackson. The annual prize recognizes an individual whose work has made a lasting impact on the theory and practice of architecture. Bohlin's 200-member practice has designed dozens of award-winning projects in both rural and urban locales, including the Seattle City Hall (above).

FIRM AWARD

Pugh + Scarpa has won the 2010 Architecture Firm Award, which honors a firm that has consistently produced distinguished architecture for at least a decade. For 35 years, California-based Pugh + Scarpa has seamlessly blended architecture, art, and craft. Its portfolio includes a house design (above) for the "Make It Right" rebuilding effort in New Orleans.

TOPAZ MEDALLION

Michael Graves, FAIA, is the recipient of the 2010 Topaz Medallion for Excellence in Architectural Education. The award, given by the AIA and the Association of Collegiate Schools of Architecture, honors a person who has contributed to architecture education for at least 10 years and has influenced a broad range of students. Graves taught in Princeton's School of Architecture from 1962 to 2001.

WHITNEY M. YOUNG, JR. AWARD

Benjamin Vargas, FAIA, will receive this social service award, given annually to an architect or organization. Vargas, a native of Puerto Rico, was chosen for his tireless efforts to increase diversity in the profession.

EDWARD C. KEMPER AWARD

This award, which recognizes contributions to the AIA, goes to James Logan Abell, FAIA, who has worked with the institute's Regional and Urban Design Assistance Teams for 35 years.

[TECHNOLOGY]

Hoberman's "transformable design" idea gains momentum

"TRANSFORMABLE DESIGN" is the term that Chuck Hoberman uses to describe the focus of his multidisciplinary practice, Hoberman Associates. The 19-year-old New York City–based firm fuses sculpture, engineering, and product design to create objects with the ability to change size and shape. It is perhaps best known for a toy that relies on a series of scissorlike joints to collapse from an open polyhedron to a tightly packed sphere. But Hoberman's oeuvre also includes retractable domes, medical instruments, and a stage for the Salt Lake City Winter Olympics.

The firm is also applying its expertise to buildings in order to create automated and responsive enclosures that provide shading or ventilation. Facades are ripe for such adaptive components, according to Hoberman. "The envelope plays the single largest role in building performance," he says. "Not only in relationship to energy consumption, but also with regard to occupant comfort."

Hoberman, who has envelope projects under way with Foster + Partners and Kohn Pedersen Fox, among others, completed his first building with an adaptive skin in October – a mixed-use tower on Tokyo's Ginza. The 15-story structure, designed by Japanese architecture firms Nikken Sekkei and Yasuda Atelier, houses offices and a cosmetics company showroom. Within the 3-foot-deep cavity of its street-facing, double-skin facade, 185 polycarbonate operable shutters shield the interiors behind the all-glass southeast elevation from direct sunlight. Photo sensors and a building-management system control the shading devices, helping cut heat gain by as much as 10 percent, says Hoberman. At night, the shutters move in concert with a colorful lighting scheme.

ABOVE: **Hoberman recently completed his first building with an adaptive skin. Polycarbonate operable shutters shield the interior of the 15-story tower.**

To further the development of responsive facades, Hoberman's firm has formed a 50/50 joint venture with global engineering consultancy Buro Happold. The two companies have a long history of working together on transformable structures, including an expanding elliptical video screen for the band U2. But the new entity, named the Adaptive Building Initiative (ABI), differs from these previous collaborations. Instead of providing services on a project-by-project basis, ABI will focus on longer-term technology development with the ultimate goal of creating unitized, dynamic envelope assemblies.

The joint venture is working to form partnerships with fabricators and manufacturers so that it can "deliver not only design and engineering, but complete adaptive systems," says Hoberman. The ABI partners hope to make such systems commercially available within three to five years. *Joann Gonchar, AIA*

[GROUNDBREAKING]

Tower by SOM Rising in Seoul

SKIDMORE, OWINGS & MERRILL has broken ground on the $1.7 billion Digital Media City Landmark Tower in Seoul, South Korea. With a planned height of 2,100 feet, it is expected to be East Asia's tallest tower by the time it is completed in 2014.

The 725,000-square-foot concrete skyscraper, clad in aluminum and glass, appears to swell slightly as it rises, evoking traditional Korean pottery that is slender at the base and flared at the top. The 133-story tower is topped by a crown that extends beyond the inhabitable floors; it is meant to accentuate the building's height, capture light, and help power an array of wind turbines. With a host of other energy-producing and energy-saving features, such as natural ventilation from a powerful stack effect and photovoltaic panels that double as shading elements, SOM estimates it will be able to reduce the building's energy use by up to 65 percent, compared to more conventional towers.

The skyscraper will offer retail spaces, offices, a hotel, and residential units and will be the centerpiece of a new district for media companies. It is one of several towers planned for Seoul, including the Lotte Super Tower 123 by Kohn Pedersen Fox and a Daniel Libeskind–designed tower in the Yongsan International Business District. *Tim McKeough*

[INTERIORS]

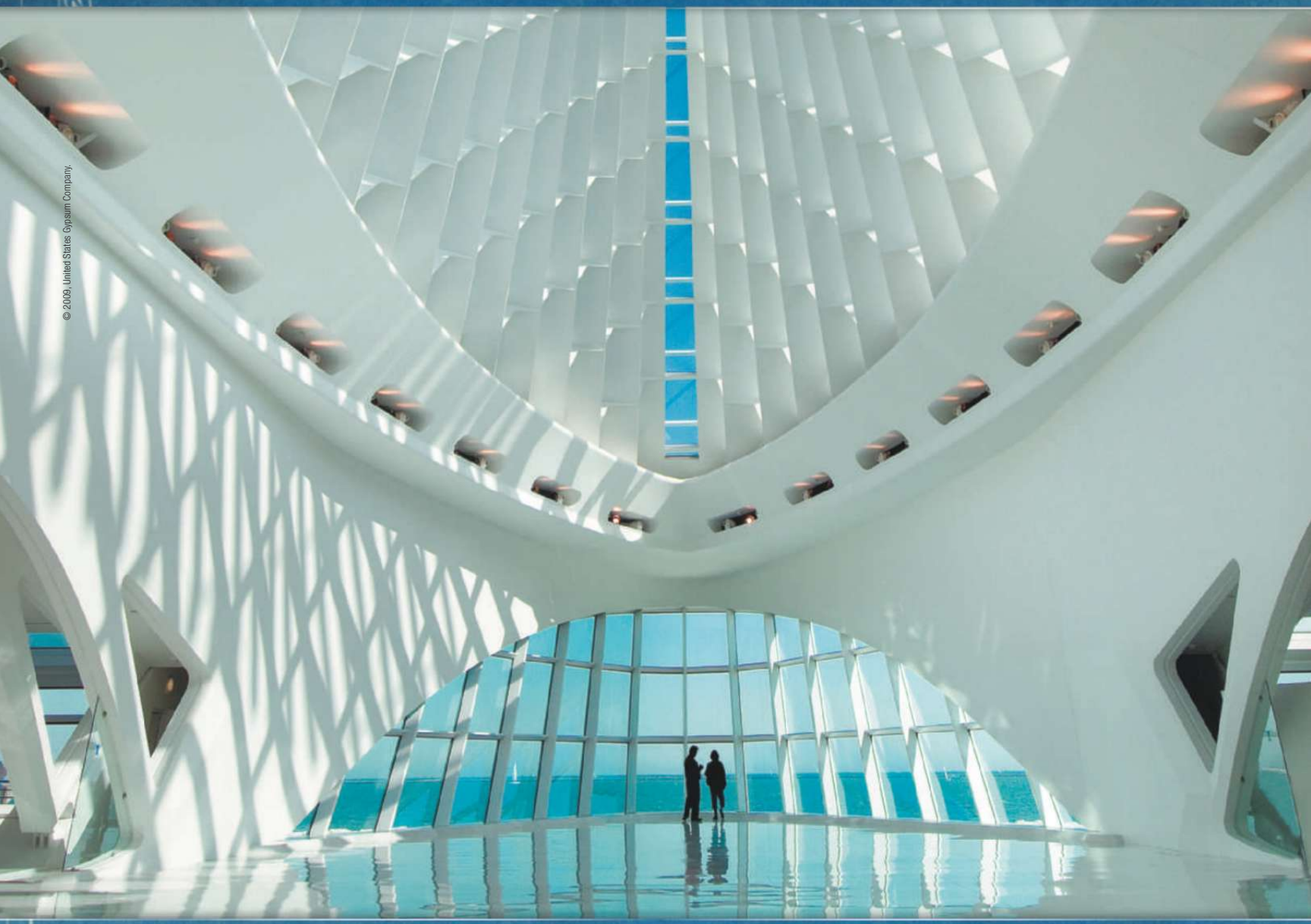
The Wright Opens at the Guggenheim

SHARING A LEGACY with such acclaimed museum dining rooms as The Modern at The Museum of Modern Art, and Terzo Piano, at the Modern Wing of The Art Institute of Chicago, The Wright, a new restaurant at the Solomon R. Guggenheim Museum in New York City, opened in December to coincide with the Frank Lloyd Wright–designed building's 50th anniversary.

The work of New York–based firm, Andre Kikoski Architect, the 1,600-sqaure-foot eatery evokes its architectural pedigree but is not overwhelmed by it. According to Kikoski, he and his design team took cues from Wright's geometry and materiality, basing the room's shapes and proportions on the motifs and forms of the structure. A stretched ceiling echoes its ribbonlike spirals, as does the uplit tiered wall above the banquette.

The white palette lends a gallerylike setting for the hues of Chef Rodolfo Contreras's cuisine and a site-specific installation by artist Liam Gillick commissioned by the museum. Its bold planks of powder-coated aluminum are a fitting gesture, says Kikoski. "Like the building the art completes the architecture as the architecture complements the art." *Linda C. Lentz*

PHOTOGRAPHY: © MAMORU ISHIGURO (LEFT TWO); COURTESY SOM (TOP RIGHT); PHILIP GREENBERG (BOTTOM)



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CIRCLE 12

Master of the Metropolis

Planning Commissioner Amanda Burden discusses her ambitious blueprint for America's largest city.

NOW THAT NEW YORK CITY'S Mayor Michael Bloomberg is remaining in office for a third term, presumably the agenda set out by Amanda Burden, director of the Department of City Planning and chair of the planning commission, will stay its course.

Appointed head of city planning in 2002, and a planning commissioner since 1990, Burden approaches the future from a position of perceptible strength. In October she was named the 2009 laureate for the J.C. Nichols Prize for Visionaries in Urban Development awarded by the Urban Land Institute (ULI). Burden then turned around and gave the $100,000 prize money back to ULI to establish the Global Award for Public Open Spaces. Such a generous gesture accords well with her thrust as a city planner to encourage more urban parks and open space.

PHOTOGRAPHY: © NYC DEPARTMENT OF CITY PLANNING

To facilitate the conversion of the derelict, elevated railroad tracks along Manhattan's west side into the linear High Line park [RECORD, October 2009, page 84], Burden spearheaded the rezoning of the Special West Chelsea District, which extends generally from West 16th Street to West 30th Street, between 10th and 11th Avenues. With air rights transferred from the city-owned High Line property, the new district allows higher-density residential construction along the avenues. The zoning not only seeks to keep low-rise buildings for art galleries and shops on the cross streets intact, but has also lowered street wall heights on portions of 10th to keep new development in scale with the existing context.

The Chelsea rezoning is only one of 100 rezonings – totaling 8,400 blocks, or about a fifth of the city – that Burden has undertaken in New York's five boroughs. "We were prompted by projections of a population of 9.1 million in the city by 2030," she says. "We needed a strategic blueprint so that development could occur where a significant infrastructure for transit existed." Areas that lack this infrastructure, she determined, should not get too dense. She estimates 80 rezonings, such as for City Island in the Bronx or Bensonhurst in Brooklyn, actually were executed to protect the neighborhood's scale and character.

With a reported 450 projects across the city now on hold, the recession is having an impact on planning agenda. The down time has enabled Burden to focus on strengthening the city's sustainability initiatives, which includes finding ways to give building owners incentives to save energy. Burden also envisions more walkable neighborhoods with mixed uses and mixed incomes, and currently her department is working closely with agencies for housing, transportation, and health to heighten the awareness of "smart growth" techniques.

Another goal is developing a comprehensive waterfront development plan. In addition to bringing open space and parks to the rivers' edges, Burden says her department is studying ways to improve public and freight transport. She adds: "This will be a fantastic legacy for the city." *Suzanne Stephens*

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CIRCLE 13

CO2 Cube Debuts in Copenhagen

EACH MONTH, THE AVERAGE RESIDENT in a developed country emits 1 metric ton of carbon dioxide. To demonstrate what that amounts to, several designers teamed up to create the *CO2 Cube*, which was on display in Copenhagen in December to coincide with the United Nations climate change summit.

The 27-foot-by-27-foot-by-27-foot cube symbolized the space that 1 ton of CO_2, measured and stored at standard atmospheric pressure, would occupy. Composed of 12 shipping containers wrapped in metal mesh, the structure sat on a platform floating in St. Jørgens Lake; digital images were displayed on two sides via projectors mounted on a nearby building. The cube was designed by L.A.-based architect Christophe Cornubert and the Danish artist Alfio Bonanno, in collaboration with Obscura Digital. *Alanna Malone*

PHOTOGRAPHY: © JOSHUA BROTT (LEFT); COURTESY WAF (RIGHT)

Global Architecture Awards

A TECTONIC SHIFT took place among winners at the 2009 World Architecture Festival (WAF), as projects from developing countries accounted for a significantly larger percentage of the honors than they had in the past.

Thirteen of the 25 award winners came from nations with emerging economies, such as China, Mexico, and Croatia. The World Building of the Year also hailed from the developing world. Members of a "super-jury" (including Rafael Viñoly, Peter Cook, Will Alsop, and Kengo Kuma) selected the Mapungubwe Interpretation Centre (above right) in South Africa by Peter Rich Architects for the grand prize, citing the way the building connects with the landscape and engages the local community.

Organized by EMAP and held in Barcelona, the second annual WAF attracted over 1,500 attendees and drew 620 project entries. Visit RECORD News online to see more winners. *Clifford A. Pearson*

Sejima to Direct Venice Biennale

KAZUYO SEJIMA HAS BEEN NAMED DIRECTOR of the 2010 Venice Architecture Biennale, scheduled for August 29 to November 21. She is the first woman to hold the position. Sejima is cofounder of the Tokyo-based firm Sanaa, whose noted portfolio includes the 21st Century Museum of Contemporary Art (2004) in Japan, the New Museum of Contemporary Art (2007) in New York, and the 2009 Serpentine Gallery pavilion in London. *J.M.*

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Prominent Firm Pares Down Its Name

SEATTLE-BASED OLSON SUNDBERG KUNDIG ALLEN Architects has changed its name to Olson Kundig Architects, effective this month. The firm was founded in the late 1960s and today has five owners: Jim Olson, Tom Kundig, Rick Sundberg, Kirsten Murray, and Alan Maskin. The name modification is due to several factors: Murray and Maskin became partners in 2008; Scott Allen left this year to start his own studio; and Sundberg, who remains a partner, plans to start a philanthropic organization focused on architecture. The firm has received many honors, including the 2009 AIA Architecture Firm Award. *J.M.*

Five Designers Win $50,000 Grants

ON DECEMBER 14, the United States Artists Foundation announced the 50 winners of its annual $50,000 fellowships. In the architecture and design category, there were five recipients: Neil Denari, a Los Angeles–based architect and professor; Laura Kurgan, director of the Spatial Information Design Lab at Columbia University; Rick Lowe, an activist-artist who started Project Row Houses, which involves refurbishing one of Houston's oldest African-American neighborhoods; and Kate and Laura Mulleavy, fashion designers in California. The foundation was started in 2005 with $22 million in seed funding from various philanthropic organizations. *Jane Kolleeny*

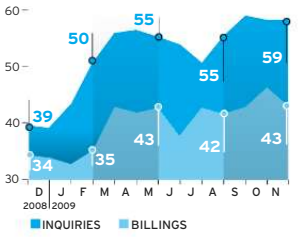
PHOTOGRAPHY: COURTESY BJARKE INGELS GROUP

Young Danes Think Big

THE COPENHAGEN-BASED architectural firm of Bjarke Ingels Group (BIG), featured in RECORD's Vanguard issue [December 2009, page 52], recently expanded its partnership. Ingels, who founded the firm in 2005, now has five full partners: Thomas Christoffersen, Jakob Lange, Finn Nørkjaer, Andreas Klok Pedersen, and David Zahle. In addition, Sheela Maini Søgaard, the firm's managing director, and Kai-Uwe Bergmann, director of business development and communications, have been named associate partners. Since the youthful (35-year-old) Ingels started BIG, after having cofounded PLOT Architects in 2001, the firm has mushroomed to 60 people. *Suzanne Stephens*

Architectural Billings

The billings index dropped to 42.8 in November, down from 46.1 the prior month. The inquiries score was 58.5. "There continues to be a lot of uncertainity in the construction industry that likely will delay new projects in the near future," says Kermit Baker, the AIA's chief economist.



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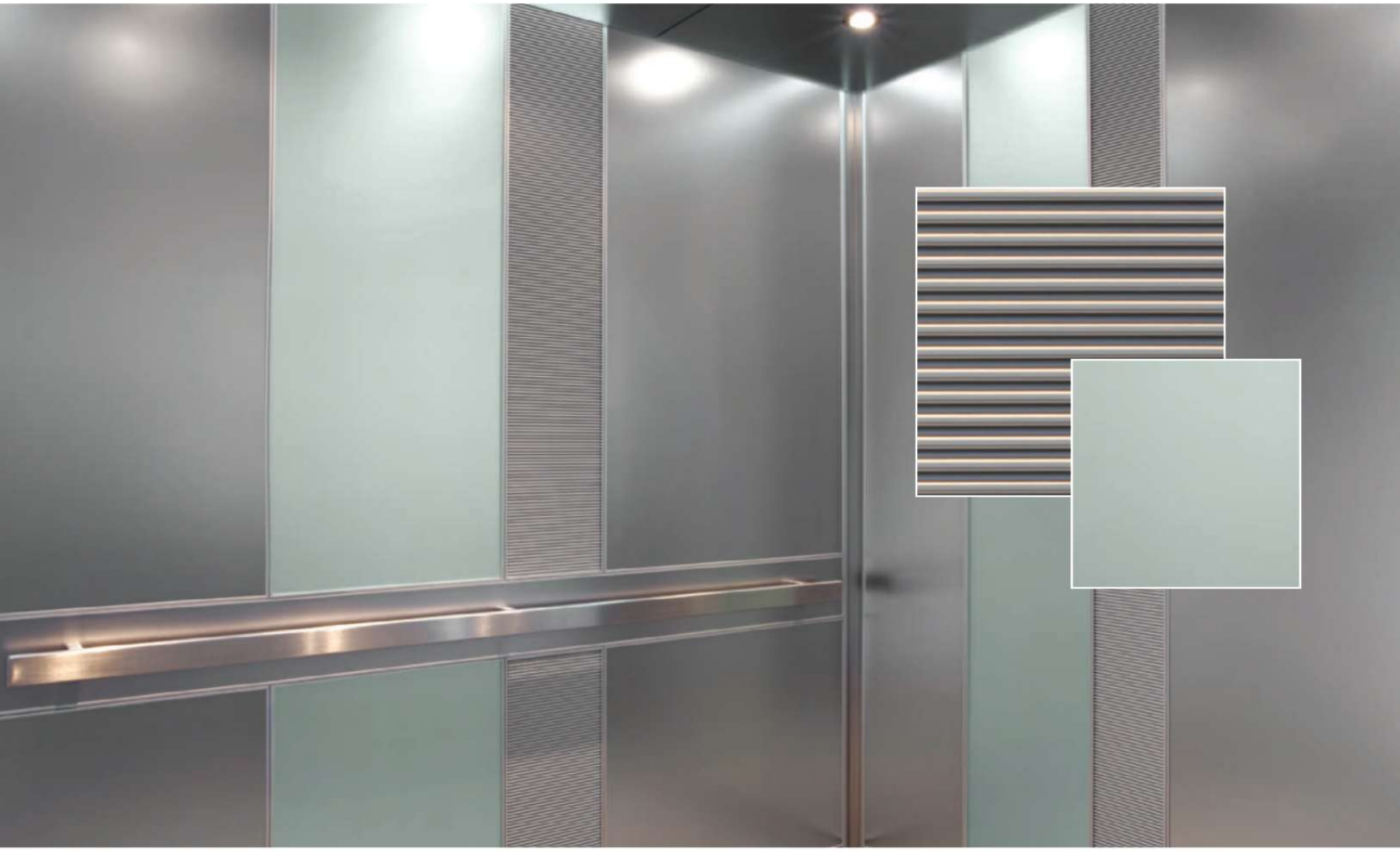

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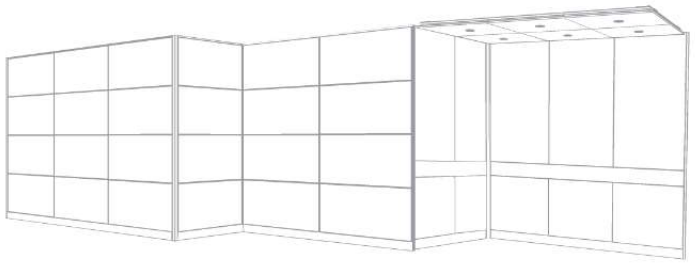

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The emerging architect

SHE HAS AN UNDERGRADUATE DEGREE from the University of Civil Engineering in Bologna, Italy; an M.Arch. from UCLA; and she teaches at SCI-Arc in Los Angeles – but don't try to pigeonhole Elena Manferdini. With her firm, Atelier Manferdini, which has a team of four working at its Los Angeles base and two people in Bologna, Manferdini switches hats easily from engineer to architect, product designer, fashion designer, and artist. "Perhaps it's less common here to branch into many different fields," she says, "but in Italy it's more understood that a creative person can be creative in more than one discipline." For Manferdini, those diverse disciplines aren't just hobbies. Her firm has working collaborations with a slew of companies from a variety of industries, including MTV, Fiat, Nike, Alessi, Guzzini, Ottaviani, Moroso, Valentino, and Rosenthal. Manferdini gives some credit for her versatility to her European upbringing, but mostly, she says, "it's digital tools. With them we can break boundaries. They've changed the way we produce, they've changed the way we craft, and given us less of a division between all areas of design."

From a dress to a table to a building, it's all about a shift in scale for Manferdini's design process. She freely admits that her work is recognizable in all its forms, because she designs "from a unit to a component. The small scale informs the larger." The smaller the scale, the fewer constraints. Her laser-cut clothing line, called "Cherry Blossom," designed as part of the West Coast Pavilion representing the U.S. at the 2006 Architecture Biennale in Beijing, informed the design of the pavilion itself, which Manferdini was invited to design as curator of the West Coast USA session of the *Emerging Talents, Emerging Technologies* exhibition. The pavilion, a sandwich of undulating plastic layers that flowed through and around its volume, followed many of the fabrication techniques used for the laser-cut clothing. "For me, the small-scale projects are really case studies and incubators of ideas," says Manferdini. "They're relatively free of constraints. One object is an instance that can lead to something larger, with a longer life. It's a circular process, and in a way the continuity makes it all feel like the same project."

The continuity in Manferdini's body of work carries certain themes – lace and cutouts appear again and again, from her

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1. **The Fabric Tower in Guiyang, China, would measure 161,000 square feet, if built. The residential tower's envelope is an homage to local, traditional women's headdresses.**

2. **The Ricami line, from the Italian word for embroidery, features a laser-cut metal stool (right) and table distributed by Arktura.**

IMAGES: COURTESY ATELIER MANFERDINI/LISA WYATT (PORTRAIT); ATELIER MANFERDINI (1); ATELIER MANFERDINI/TERI LYN FISHER (2)

design

Atelier Manferdini

PRINCIPAL:
Elena Manferdini

LOCATION:
Los Angeles and Bologna, Italy

FOUNDED: 2004

DESIGN STAFF:
4 in L.A., 2 in Bologna

WORK HISTORY:
Academic – SCI-Arc, Los Angeles, 2003–current

EDUCATION:
University of Civil Engineering, Bologna, Italy; University of California, Los Angeles

KEY PROJECTS: Fabric Tower, Guiyang, China, unbuilt; Arktura Ricami table and stool, 2008; West Coast Pavilion and Cherry Blossom clothing line, Architecture Biennale Beijing, 2006

KEY CURRENT PROJECTS: Museo Calamante, Macerata, Italy, 2014; Alessi Fruit Basket, 2010

WEB SITE:
ateliermanferdini.com

View additional images online.

clothes to her Ricami stool and dining table (*ricami* is the Italian word for embroidery) to her installation at SCI-Arc in 2008 called *Merletti* (from the Italian word for lace) to her design for a residential tower in Guiyang, China, which features an intricate draped skin akin to Guiyang women's traditional filigree headdresses. Manferdini is one of 11 architects chosen to provide a single part of Guiyang's master plan, and her proposal is a response to the site's landscape and cultures. "For me, the relationship with the client is a huge creative component," she says. "For a project like this, you really have to be inventive." Not only for this project; inventive thinking is second nature to Manferdini. "My teaching, my work, my life in Los Angeles, it's all very motivating," she says. "You have to open your mind to the possibilities." *Ingrid Spencer*

The details found in the laser-cut Cherry Blossom dress line — designed for a fashion show held on the opening night of the Architecture Biennale Beijing in 2006 — have elements that resemble traditional Chinese lacquer artwork.

work

Archiculture

PROJECT:
Archiculture, a documentary film

DIRECTORS:
David Krantz, Ian Harris

KEY INTERVIEWS:
Shigeru Ban, Bryan Bell, Phil Bernstein, Peter Bohlin, Joe Brown, David Byrne, Sway Calloway, John Cary, Maurice Cox, Zaha Hadid, James Howard Kunstler, Steven Lewis, Thom Mayne, Toshiko Mori, John Peterson, Mayor Joe Riley

WEB SITE:
archiculturefilm.com

View additional images online.

MANY HAVE MUSED THAT an architecture studio would make the perfect setting for reality television: The combination of caffeine-fueled all-nighters, high stress, and unsympathetic critics would be sure to produce dramatic footage. Ian Harris and David Krantz are taking this idea a step further by making a feature-length documentary about studio culture.

Harris, an architecture graduate, and Krantz, a landscape architecture graduate, met in 2006 at their first professional jobs in a San Francisco firm. They bonded over their mutual love of film and frustration that the architecture profession fails to engage the public. Krantz recalled his fourth year of school, when he realized that "everything I had studied came together and made sense." This moment of enlightenment was the inspiration for the film. "Studio culture becomes the vehicle for telling the bigger picture," Krantz believes.

Originally dubbed *Architorture*, the film is titled the more PR-friendly *Archiculture*, but Harris and Krantz don't shy away from the gritty realities of the studio. "How do you explain that experience to outsiders?" contemplates Harris. But the film is more ambitious than that, tackling issues of sustainability, technology, and environmental psychology, as well as the social responsibility of making architecture. Interspersed throughout will be interviews with professionals offering insights, including "starchitects" Zaha Hadid and Thom Mayne; nonprofit pioneers Bryan Bell and John Cary; Charleston, South Carolina, mayor Joe Riley; and musician David Byrne.

Harris and Krantz selected Pratt Institute in Brooklyn, New York, as their host school, where they filmed hundreds of hours of footage chronicling fifth-year thesis students. Once the editing process began, the directors narrowed their focus to five students, taking care to avoid reality-TV typecasts. While the core audience of *Archiculture* — students, professors, and practitioners — has lived the experience, the directors hope the characters and story line will appeal to the general public, much like the documentary *Spellbound*, which followed National Spelling Bee champion hopefuls.

The trailer premiered in September at the New York City Center for Architecture. Currently in postproduction, the directors are aiming for a final cut in summer 2010. Raw, unedited footage and photos can be viewed online, depicting the students working as well as taking breaks — such as in a game of tracing-paper basketball — hinting that the film will contain plenty of comic relief. It is this sort of camaraderie that creates lifelong bonds in the studio: "Half of your education is who is sitting next to you," Harris affirms. *Murrye Bernard*

1. **Ian Harris interviews Bryan Bell, Design Corps executive director, at a recent migrant-farmworker flea market project in Newtown Grove, North Carolina.**
2. **Harris interviews David Byrne at his *Playing the Building* installation at Battery Maritime Building, New York City.**

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PHOTOGRAPHY: COURTESY ATELIER MANFERDINI/ROBERT ROBERT (TOP LEFT); MEGHAN ROBERTS (PORTRAIT); ARBUCKLE INDUSTRIES (1,2)

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CIRCLE 15

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CIRCLE 16

Taking the Bauhaus Back to School

MoMA focuses on the institution behind the mythology

BY WILLIAM HANLEY

THE FIRST OBJECT THAT VIEWERS find when they arrive at *Bauhaus 1919–1933: Workshops for Modernity* at New York's Museum of Modern Art is not a tubular steel chair or any of the other icons that have come to represent the storied German school. Instead, it is a photograph showing a group of students posing inside a stack of gridded shelves taken as a memento when founding director Walter Gropius departed. Blown up to the full height of the title wall, the photo signals that if MoMA's first – and only previous – Bauhaus exhibition, which Gropius organized in 1938, sought to cast the Bauhaus as the crucible for his theory of Modernism, this show will be about something more complex and more playful, the Bauhaus as a design school.

Organized by MoMA's chief curator of architecture and design, Barry Bergdoll, and Leah Dickerman, curator in the department of painting and sculpture, the exhibition, which runs through January 25, includes some 150 objects, limited to work created at the school. The volume of objects allows the curators to show the full range of media, production methods, and aesthetic ideas employed in the school's discipline-blending curricula, displaying the work of masters alongside that of their students.

The exhibition's biggest success is drawing visual connections among varied works without imposing a standard evolutionary idea of the school's development. A 1919 painting by Johannes Itten, who taught a mysticism-infused foundation course until 1923, appears at the beginning of the show, and it establishes a palette of saturated colors that reemerge in everything from Herbert Bayer's graphic work to drawings made years later by students in Ludwig Mies van der Rohe's architecture class to textiles by Anni Albers, Otti Berger, and Gunta Stölzl – highlights of the show. These colors are probably best associated with wall painting in the school's Gropius-designed Dessau facility (1926), and several of the walls in the exhibition have been painted in the bold hues to great effect. They not only pull out the color in the work on view, but they orient viewers in galleries packed with objects.

The exhibition also shows the range of production methods advocated by the school, from early workshop-produced materials to a gallery dedicated to the affordable, mass-produced objects designed for the conceptual *Volkswohnung* (people's apartment). The latter were developed under Hannes Meyer, director from 1928 until 1930, who, bookended by Gropius and Mies and historically criticized for his emphasis on class politics, gets something of a resurfacing in the show.

The overarching sense in the exhibition is of experimentation. Far from uniformly developing a Modernist program and style – a reputation cultivated by some of the Bauhaus marketing material on view – what emerges is a school adapting to and fueled by the complexities of social, technological, and aesthetic change while charting the course for the kind of interdisciplinary learning championed by today's design schools. ■

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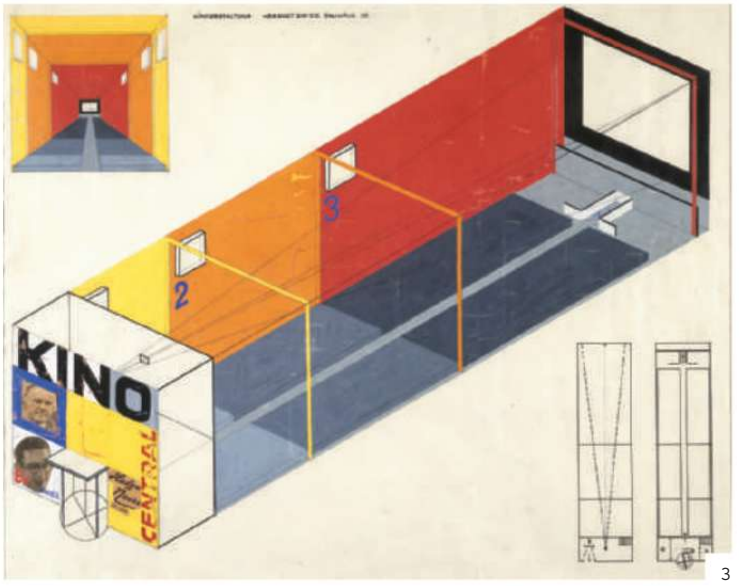

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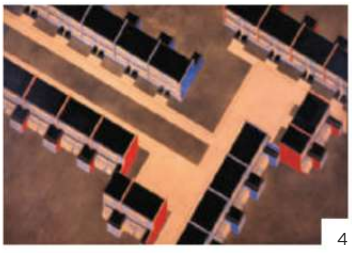

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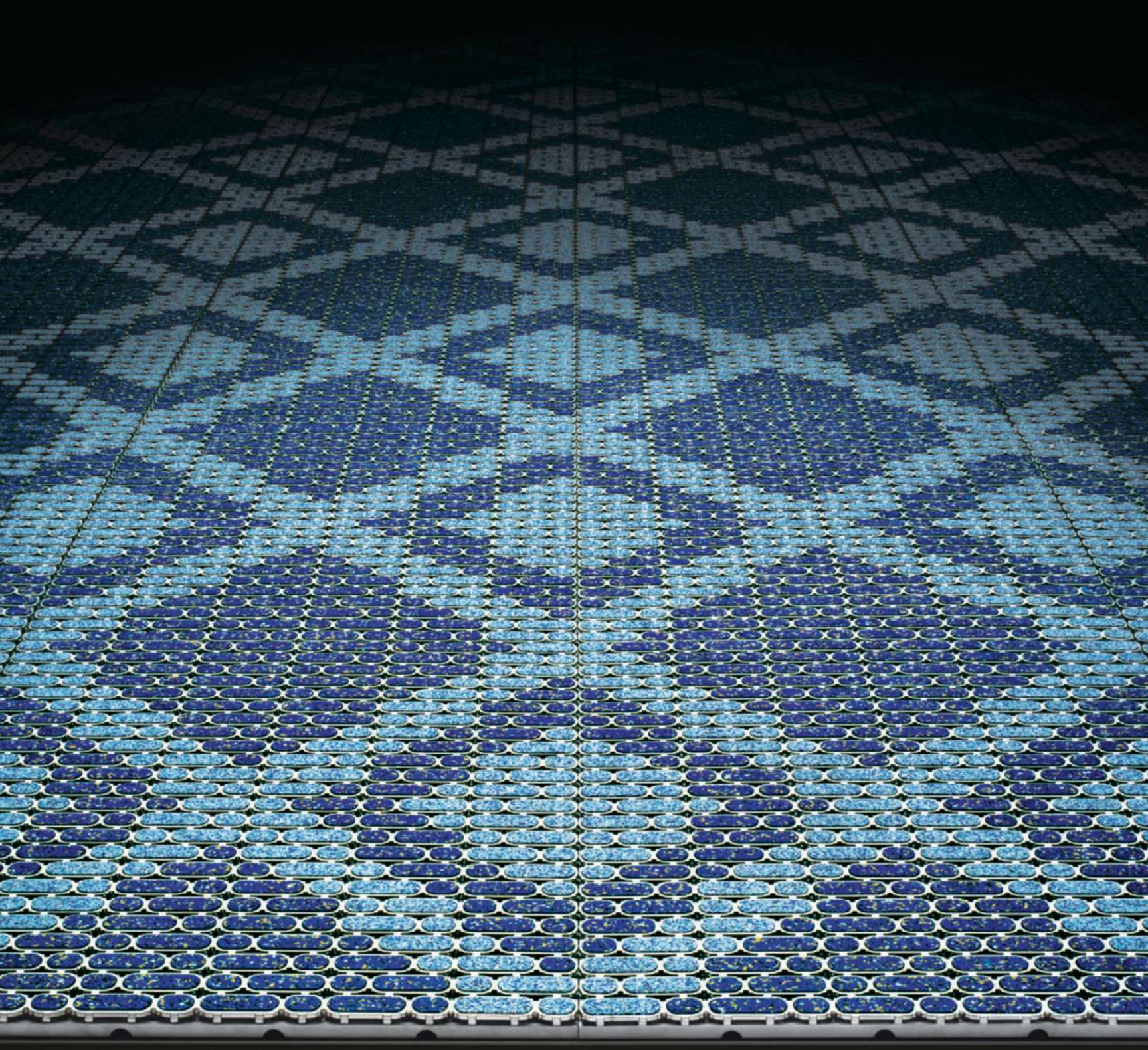
1. **Herbert Bayer, illuminated advertising sphere, 1924.**
2. **Josef Albers, set of stacking tables, c. 1927.**
3. **Herbert Bayer, design for a cinema, 1924–25.**
4. **Walter Gropius, drawing for Törten housing estate, Dessau, 1926–28.**

PHOTOGRAPHY: COURTESY HARVARD COLLEGE/ALLAN MACINTYRE (1); THE JOSEF AND ANNI ALBERS FOUNDATION (2); HARVARD COLLEGE (3); HARVARD COLLEGE/KATYA KALLSEN (4)



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CIRCLE 17

Vertical Reading

Skyscrapers: A History of the World's Most Extraordinary Buildings, *by Judith Dupré and Adrian Smith. New York: Black Dog and Leventhal Publishers, 2008, 160 pages, $25.*

New Urban Giants: The Ultimate Skyscrapers, *edited by Antonino Terranova and Gianpaola Spirito. White Star, 2008, 216 pages, $20.*

"Shelf-scraper" was the apt term coined for the 1996 first edition of Judith Dupré's popular *Skyscrapers: A History of the World's Most Extraordinary Buildings* – now reissued with a decade's worth of updating. At 18 inches high and just over 7 inches wide, it's taller than the 15-inch *New Urban Giants: The Ultimate Skyscrapers*, edited by Antonino Terranova and Gianpaola Spirito, both of the University of Rome, in Italy.

Dupré's book is more of a history, which is underscored by its black-and-white-only illustrations, the same as in the original volume (which the publisher claims has more than a half-million copies in print). Dupré begins with the late-19th-century origins of the building type, including the work of William LeBaron Jenney and Louis Sullivan, then moves forward quickly through the Flatiron, Woolworth, and other New York towers, to Art Deco all-stars and the serene glass boxes of postwar Modernism. This takes us to the midpoint of her book and to the 1980s, when architects went nuts. Led, or misled, into Postmodernism by Philip Johnson (who is the brand-name interviewee in Dupré's 1996 volume, as Adrian Smith is for this edition), the movement marked a low point in the careers of many fine designers, and certainly in the evolution of the skyscraper. Ironically, the flamboyant towers of the 1980s and '90s seem to prefigure the license that proliferates in the Middle East and elsewhere today.

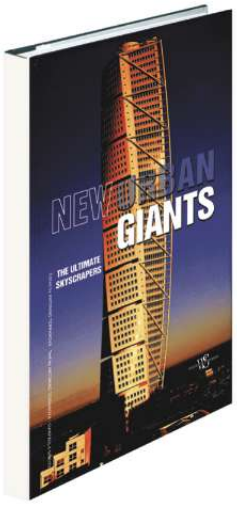
While Dupré conscientiously contextualizes her 61 towers with a few short, intelligent essays with titles such as "Ancient Roots" and "Materials and Technology," her book is a chronicle of interesting cameos, not a synthetic history. The key concept and virtue of the volume is its signature layout, which gloriously fills each left-hand page with a full-height photograph.

One wishes that the books might go beyond treating most skyscrapers as one-offs.

Following the dozen or so new towers – from Foster's "erotic gherkin" to Calatrava's "Turning Torso" to SOM's Burj Dubai – Dupré's concluding essay alights on a range of recent topics, from supertalls to sustainability. Unfortunately, the book's summary thoughts are printed in black on a dark-gray, ghost-image background that makes the type nearly invisible. This is a shame, since the graphics otherwise deftly meet the challenge of organizing a daunting array of information

on a double-page spread. A final dubious design choice is the dust-jacket image: Jean Nouvel's Tour de Verre, set to soar above New York's Museum of Modern Art – or will it? Shouldn't the measure of a great skyscraper – at least as cover art – come after it's built?

New Urban Giants is a gorgeous book that adapts Dupré's formula in glorious color, but puts most of its 32 poster towers on the right side of the page. Published in Italy by White Star, its purview is decidedly international: About a third of the buildings are in Europe; a third in China; and the remainder from the rest of the world, including four in the U.S. (all of the American entries are in New York City). The earliest example is the 1996 Shung Hing Square in Shenzhen, China – not famous, but comparatively tall at 1,260 feet. The European buildings, constrained by strict laws and conventions, are shrimps: The shortest in the book are the below-500-foot Vienna Twin Towers, Torre Agbar in Barcelona, and Tour EDF in La Defense, Paris. The giants are Taipei 101, completed in 2004 and still officially the world's tallest skyscraper at 1,671 feet; the 1,614-foot Shanghai World Financial Center, opened last fall; and the phenomenal Burj Dubai. The spire of the 160-story Dubai tower, scheduled to open this month, reaches a height of 2,674 feet – nearly 1,000 feet taller than Taipei 101! Organized simply by date, the buildings are each allotted four or more pages to accommodate drawings, sections, interior photography, and even a few floor plans; all of the images are well chosen and illuminating.



But the text is unreadable in more ways than one. The first problem is a curvy, hair-thin font so faint it strains the eyes. Second, while the individual building descriptions are clear enough, the introductory essay suffers from opaque theorizing and run-on sentences. Seduced by "starchitects" in his selection of entries, Terranova cannot settle on a way to categorize their work, describing it as euphoric, illusory, obscene, "archisculptural, spectacular-farcical, the mask that does not seem to mask anything, contained in a form without corresponding contents." Is this good or bad? Ask Nietzsche, who is quoted in the introduction's concluding sentence: "One must still have chaos in oneself to be able to give birth to a dancing star."

Well, anyway, writing is not the point of either *Skyscrapers* or *New Urban Giants*, which are lush picture books, conceived by their publishers as mass-market products. They are priced affordably at $25 and $20, respectively, and offer great value for the money. Still, one wishes that they might go beyond treating most skyscrapers as one-offs and using chronology as a substitute for history. Maybe in their next editions.

Carol Willis

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CIRCLE 18

A Stimulus Success Story

Long-term planning pays off for a D.C. firm

BY BRUCE BUCKLEY

WHEN PRESIDENT OBAMA signed the $787 million American Recovery and Reinvestment Act (ARRA) into law in February 2009, hopes ran high that architects would get a boost. While many have found ARRA opportunities limited, one firm that has benefited is WDG Architecture, which was chosen last August to play a key role in the largest stimulus project to date: the new $435 million Coast Guard Headquarters. Earning this commission is the result of years of strategic decisions by the firm, and indeed, its long-range plan offers lessons for other firms wanting to land government contracts.

Founded in 1938 and based in Washington, D.C., WDG has long been known as a preeminent architect among private developers of commercial and multifamily projects. In recent years, the firm, which has 75 people in its D.C. office (and 20 in its Dallas office), has built such award-winning projects as the 1.2-million-square-foot Arlington Gateway in Virginia and the 12.5-acre Rockville Town Square in Maryland, both mixed-use developments.

Even as the residential and commercial development boom was at its peak in the early 2000s, WDG saw the need to diversify, particularly with regard to the public sector. In 2003, it launched an initiative to hire leaders for its government and higher-education practices. "We knew it wouldn't pay dividends right away, and that was okay," says Eric Liebmann, AIA, a managing principal and director of design. "It was R&D for the future."

The firm's early efforts looked promising but yielded few results, admits John Lowe, AIA, a principal who in 2004 was wooed away from Gensler's D.C. office to lead WDG's federal pursuits. Many projects from agencies such as the U.S. General Services Administration (GSA) didn't procure funding and stalled.

Ever determined, the firm chose to focus on the well-funded Base Realignment and Closure Act of 2005. The multiyear, multibillion-dollar BRAC program includes relocating numerous federal agencies and departments to new or renovated facilities on military bases. After failed attempts to gain federal IDIQ (indefinite delivery/indefinite quantity) contracts on its own, Lowe says the firm homed in on design-build work, where it could leverage its existing relationships with contractors to better position itself in the bidding environment.

Eric Liebmann (left) and John Lowe play key roles in the firm's federal practice.

Still, the firm had to craft a résumé that would meet the necessary qualifications to be considered for government work. It expanded its institutional portfolio by pursuing more nonfederal design-build projects, including the $80 million Oakland Hall at the University of Maryland in College Park.

"Design firms have to be smart about this," Lowe says. "The Army Corps [of Engineers'] provisions say you have to have relevant projects within a certain time frame to qualify. That can be a significant barrier to entry to firms like us. If you don't have that experience, you won't get past the first step in the selection process."

Ultimately, it was the strength of relationships in the private sector that gave WDG its big break in the federal world. The firm had worked extensively with Maryland-based developer Foulger-Pratt on commercial and mixed-use projects since the late 1960s. Three years ago, WDG began discussions with the developer's construction division to team up

[TIMELINE]

WDG Architecture's early steps lead to large federal contracts

2003 — Launches initiative to hire leaders in government and higher education

2005 — Focuses on military programs under Base Realignment and Closure Act

2008 — $33 MILLION Estimated cost of Army's Missile Defense Agency Headquarters

2009 — President Obama signs stimulus bill into law

2010 — $50 MILLION Estimated cost of Army Test Evaluation Command Headquarters

2010 — $435 MILLION Estimated cost of Coast Guard Headquarters. Largest GSA project to date funded by ARRA

2010 — Firm pursuing more federal work

PHOTOGRAPHY: © BRUCE BUCKLEY

WDG Architecture is the architect of record for the new 1.3-million-square-foot Coast Guard Headquarters (above).

and pursue federal work. The plan paid off in the fall of 2008, when the duo was awarded a design-build contract for the Army's $33 million Missile Defense Agency Headquarters building at Ft. Belvoir, Virginia. The 99,000-square-foot administrative building is scheduled for completion in 2010. This past spring, the two firms followed up with a design-build contract for the new $50 million, 141,000-square-foot Army Test Evaluation Command Headquarters in Maryland, which is scheduled to be completed in 2011.

In August, the firm landed its biggest federal commission yet: a prominent role in construction of the new U.S. Coast Guard Headquarters, the largest stimulus-funded project to date. Four architecture firms are part of the design-build team, all led by contractor Clark Construction Group of Maryland – another long-time partner of WDG.

Building off a concept originally conceived by Perkins+Will before it was bridged over to the new team, WDG serves as architect of record for the 1.3-million-square-foot project. St. Louis–based HOK is providing interior, landscape, and sustainable design; Quinn Evans Architects will handle historic preservation duties; and McKissack and McKissack is architect of record for a 1,000-car garage and central utility plant. Completion is slated for 2013.

"This win is a stabilizing force that enables us to confidently move forward over the next couple of years, even as architects in general continue to face so many challenges in this market," Liebmann says, noting that, after cutting staff in early 2009, the firm is now hiring back some positions. He adds that federal work is helping keep the firm afloat. "Most of our private sector clients are on the sidelines," he adds. "They are positioning for the future, but that doesn't pay the bills today."

Although WDG has seen numerous federal-sector wins in short succession, Lowe notes that transformation can't be made overnight. "Just because you're a successful architect doesn't mean you can go in and just start doing this type of work," he says. "It's a process. It's about understanding the [federal agencies'] programs, knowing how to match that with your strengths, and having a good partnership with a contractor that knows how the game is played and how not to make mistakes." ■

Stimulus Roundup

While opportunities have been limited, some architects are getting work thanks to the American Recovery and Reinvestment Act BY JENNA M. MCKNIGHT

PROJECT
Smithsonian Arts and Industries Building
ARCHITECT
SmithGroup
LOCATION
Washington, D.C.

SmithGroup is working on restoring and modernizing the Arts & Industries Building on the National Mall, a $24 million project that received the go-ahead last summer thanks to ARRA money. The firm is working on two additional stimulus-funded projects: a window replacement and facade thermal/security performance improvement for the John F. Kennedy Federal Building in Boston, and a $25 million renovation of the 27-story Patrick V. McNamara Federal Building in Detroit (the building was designed by SmithGroup in 1976).

PROJECT
Multimodal facility
ARCHITECT
RATIO Architects
LOCATION
Normal, Illinois

RATIO Architects, in Indianapolis, was called in last spring to work on construction documents for a $32 million multimodal facility in Normal, Illinois, that had been put on hold but was revived due to the ARRA. The documents are scheduled to be finished this month. The firm is also looking to play a role in some stimulus-funded preservation and urban-planning projects.

PROJECT
50 UN Plaza
ARCHITECT
HKS & Architectural Resources Group
LOCATION
San Francisco

The GSA has allocated $121 million in ARRA funding for the design, renovation, and seismic upgrading of 50 UN Plaza, a 350,000-square-foot Beaux-Arts building in San Francisco's Civic Center area. In August, the agency hired HKS and Architectural Resources Group to oversee the first phase of the project. Design work is expected to be completed by September 2010.

PROJECT
U.S. District Courthouse
ARCHITECT
Mack Scogin Merrill Elam Architects and PageSoutherlandPage
LOCATION
Austin, Texas

Construction of a new, $107 million U.S. District Courthouse is under way in downtown Austin thanks to federal stimulus funds. The seven-story concrete building will house eight courtrooms and jury assembly rooms, along with offices for the district clerk, federal attorney, and public defender. The 212,000-square-foot project is designed to earn LEED Silver certification.

PROJECT
Old Town Newhall Library
ARCHITECT
LPA
LOCATION
Santa Clarita, California

Thanks to $500,000 in ARRA money, the firm is able to integrate a more energy-efficient HVAC system into a 30,000-square-foot, $15 million library it has designed for Santa Clarita. Two additional LPA projects in California – a 42,500-square-foot police facility in Hesperia and a 40,000-square-foot city hall in Laguna Niguel – received stimulus funding; the money will be used to purchase and install photovoltaic panels for the buildings.

IMAGES: COURTESY PERKINS+WILL (TOP LEFT); (TOP TO BOTTOM RIGHT): COURTESY SMITHGROUP; RATIO; TAKASHI FUKADA/ARCHITECTURAL RESOURCES GROUP; WHITE CONSTRUCTION COMPANY; LPA

Read more about how the ARRA is affecting architects at **architecturalrecord.com/news/economy**.


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CIRCLE 144

Flooring Options That Work Harder

To earn their place underfoot, these floors offer high performance, underfloor access, and/or high reclaimed material content

RITA CATINELLA ORRELL

MODERN FURNISHINGS MANUFACTURER ARTEK and forest products group UPM jointly introduced two new products featuring UPM's ProFi wood-plastic composite material at the Salone del Mobile held last April in Milan. The UPM ProFi Floor tile, designed by Artek Studio, and the 10-Unit System modular furniture range, designed by Japanese architect Shigeru Ban, a 2009 Product Reports winner [RECORD, December 2009, page 157], both capitalize on the potential of this new composite material. This is the second time these two Finnish companies have collaborated: In 2007, Ban designed the Artek Pavilion made of UPM ProFi for the Triennale garden in Milan [RECORD, November 2008, page 233].

Made of wood-plastic composite, UPM ProFi Floor is a new tile designed for a range of outdoor solutions, including balconies and terraces. According to Markku Koivisto, director of UPM ProFi in Helsinki, the flooring can be used to create a high-quality surface on a hard, even, and load-bearing material like concrete or stone. The tiles, available in five nature-inspired colors, offer an alternative to ceramic, concrete, and wood tiles in balcony and terrace applications, and to carpet and laminate in exhibition and showroom applications. Channels found underneath the tiles can manage cables, and an X-shaped clip system allows for quick installation and disassembly.

The main raw material of the tile is surplus paper and plastic left over from UPM's production of self-adhesive label stock. The recipe is similar to the one used for UPM's ProFi Deck product introduced last year, but it has been adjusted to meet the needs of injection molding versus extrusion.

The product is not only made of recycled material but is recyclable and doesn't contain any harmful chemicals, so it can be incinerated or thrown out (it will not decompose). "We recycle all of our production waste back into the process," says Koivisto. "We would like to collect all material back from the market and recycle it into new ProFi products, but it is not yet possible." UPM is currently selling the product for indoor use only; final outdoor testing of the product is still ongoing, but it should be available soon for those applications. Although UPM is searching for a suitable sales channel for the U.S. market, ProFi products are not currently available here except for larger-scale projects where the manufacturer can arrange for direct deliveries.

According to Koivisto, UPM is putting a great deal of emphasis on further developing the material's potential applications. The composite will make its next major appearance at the Shanghai World Expo in 2010, this time in the form of a modern shingle cladding for the Finnish Pavilion, designed by Helsinki-based JKMM Architects. UPM, Westmont, Ill. www.upmprofi.com **CIRCLE 200**

ABOVE: **Four colors in the tile line are shown with the 10-Unit System chair made of the same wood-plastic composite material.**

1. **The tile's X-clip system allows for quick installation and disassembly.**

2. **The tiles are available in five colors and two patterns; Marble White in Wave is shown below.**

1

2

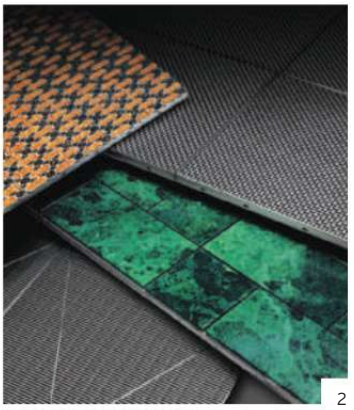
1 | product **Rescued Maple**
manufacturer **Aged Woods**
agedwoods.com

Launched by Aged Woods at last year's GreenBuild, the Rescued Maple collection of strip maple flooring is removed from old factories and warehouses and then refurbished to produce a LEED-compliant hardwood flooring option with a face width ranging from 2" to 2½". The flooring has FSC Chain of Custody certification and can contribute points in the categories of Reclaimed Materials and Regional Materials for most LEED projects in the Mid-Atlantic region. **CIRCLE 201**

1

2 | product **C/S Floorometry**
manufacturer **Construction Specialties**
c-sgroup.com

This modular entry system installs like tile and features slip-resistance and heavy-rolling-load and clean-out capability. Offering a departure from the linear entrance-flooring look dominating the market, C/S Floorometry's 18" x 18" modules are constructed of a removable top surface designed to trap dirt and water, a bond breaker that collects debris, and a permanent mud plate that secures the panel. **CIRCLE 202**



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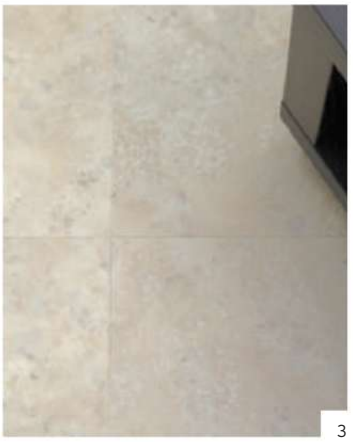

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3 | product **Spacia Access**
manufacturer **Amtico International**
amtico.com

Spacia Access creates the upscale look of hardwoods and stone with vinyl flooring. Nine patterns feature Amtico's new releasable adhesive that speeds installation and allows tiles to be removed and replaced easily for changing floor plans. Installed using Amtico's modified loose lay system, the resilient flooring can be used with any type of access flooring or laid over existing hard surfaces. **CIRCLE 203**

4 | product **Norament 925 Serra**
manufacturer **nora systems**
nora.com/us

Nora systems worked closely with architects and designers to develop Norament 925 Serra, a high-performance floor covering inspired by natural landscapes. Serra offers a choice of 25 nature-inspired colors in various hues of brown, gray, green, and red. The PVC-free, 3.5-millimeter product is suitable for high-traffic areas, does not require waxing or sealing, and is Greenguard-certified. **CIRCLE 204**

4

5

5 | product **Nesso Access Floor**
manufacturer **Steelcase**
steelcase.com/architecturalsolutions

The Nesso Access Floor provides a surface that feels solid and strong in a range of premium finishes, including marble, granite, slate, ceramic, linoleum, rubber, wood, and vinyl. Nesso connects the infrastructure throughout the workplace, allowing easy access to power and data, and was designed to complement Steelcase's collection of furnishings for more open, connected work spaces. Floor finishes come fused to fire-rated core material composed of gypsum, recycled paper, and cardboard. **CIRCLE 205**

流

Flow

Together with the flow of historical eras, design trends are undergoing constant change. While absorbing the fashions of the times and occasionally setting new trends, Elmes has devoted more than fifty years to the manufacture of door handles.

Door handles have long exceeded the frame of their functional role. Through the free play of colors, sizes, shapes, and textures, they may be embedded within the flow of any scene, with an indelible presence that gives the first impression of a space.

T1780

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CIRCLE 22

PRODUCTS IN BRIEF

1

1 | product **Falce Partitions**
manufacturer **Morita Industries**
moritaalumi.co.jp/falce.html

The Falce partition system uses stretchable fabric and a combination of straight and curved frames to divide space in residential and commercial projects. The lightweight aluminum frames easily reposition. The machine-washable, fire-retardant polyester fabric comes in five color options and can be custom printed. In addition to a space divider, the system can be used as a projection screen or trade-show stand. **CIRCLE 206**

2

2 | product **The Audubon Collection**
manufacturer **Olympic Paint**
olympic.com

The Audubon Collection by Olympic Paint is one of Audubon's many licensing programs to help raise awareness of natural resources and the organization's conservation work. The collection includes eight color palettes drawn from the work of renowned photographer Tim Fitzharris and the paintings of John James Audubon. Each of the more than 48 colors is available in Olympic Premium's environmentally preferred, zero-VOC, low-odor formula. **CIRCLE 207**

2

3 | product **Convert Design Platform**
manufacturer **InterfaceFLOR**
interfaceflor.com

InterfaceFLOR, the first North American carpet manufacturer to receive a third-party-verified Environmental Products Declaration (EPD) has achieved a second EPD for postconsumer-recycled-content products. All InterfaceFLOR products under the Convert Design Platform manufactured with either Nylon 6,6 or Nylon 6, including Cap & Blazer (shown), are now covered under an EPD. EPDs address consistent factors based on full life-cycle assessment. **CIRCLE 208**

3

4

4 | product **PORT Technology**
manufacturer **Schindler Elevator**
us.schindler.com

The Personal Occupant Requirement Terminal (PORT) system integrates seamlessly with any elevator system regardless of original manufacturer and is ideal for use in both new and existing buildings. Featuring a sleek, touch-screen user interface (shown) the intuitive elevator control system learns and adapts to the specific traffic patterns of each tenant. Each PORT features a processor designed to consume the lowest amount of energy possible, reducing a building's total energy consumption. **CIRCLE 209**

connected living

Steven Holl's Linked Hybrid in Beijing provides a vision of mixed-use development that engages the city around it and operates sustainably

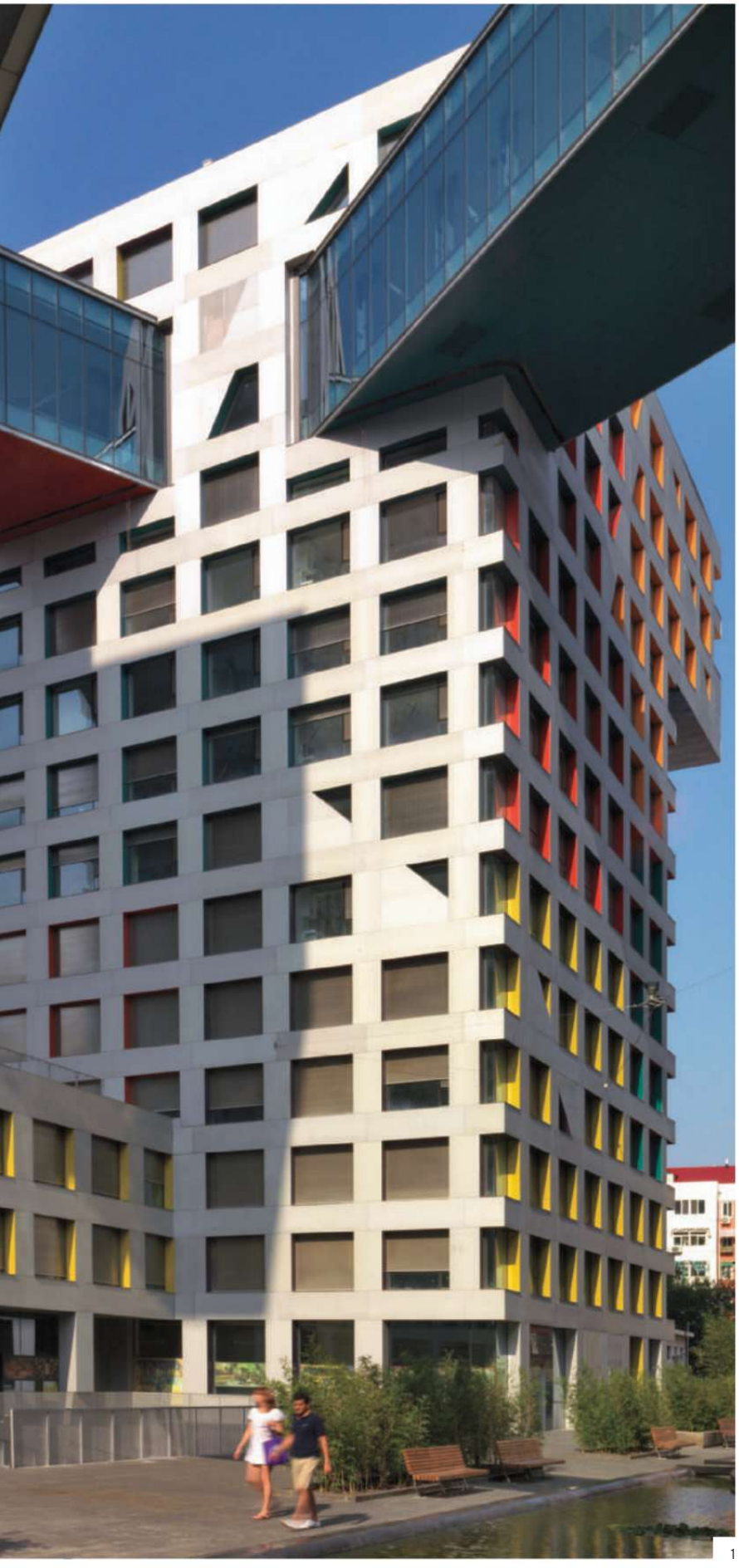
BY CLIFFORD A. PEARSON

PHOTOGRAPHY: © IWAN BAAN (PREVIOUS SPREAD AND 2,4); ANDY RYAN (1,3)

With more than 17.4 million residents and a growing middle class eager to trade its Mao-era housing for new apartments, Beijing has been building residential towers at a breathless clip for much of the past decade. In the process, it has erased entire neighborhoods of single-story, courtyard houses on the old streets and lanes known as *hutong*, unraveling the tight social fabric that connected residents, shopkeepers, and other local businesses. While a few rich Chinese and foreigners have lovingly restored or modernized old courtyard houses, most middle-income families have moved into new apartment towers that stand alone or in gated clusters.

Steven Holl's Linked Hybrid complex offers an alternative model of residential development—one that applies striking, Modern architecture to the age-old pattern of housing mixed with shopping, dining, education, and entertainment. Holl and his Beijing-based partner Li Hu made a concerted effort to open the 2.37-million-square-foot development to the surrounding area, welcoming nonresidents to its grassy perimeter and landscaped central plaza. And throughout the project, the architects employed an impressive set of sustainable design strategies, pointing this heavily polluted city in a new direction.

Built by the Modern Green Development Company—a Beijing-based developer that has worked with foreign architects such as the Austrian firm Baumschlager Eberle—Linked Hybrid comprises eight apartment towers ranging from 14 to 21 stories that are connected near their tops by one- and two-story bridges. Rather than serve merely as a circulation element, this so-called "sky loop" provides programmed space for art galleries, shops, cafés, and even a fitness club with a swimming pool. (People began moving into the complex in early 2009, but the developer has yet to find an operator for the bridge spaces. In the meantime, the company has held events, parties, and exhibitions in them.) More shopping and dining areas occupy a loop at the base of the towers, while a preschool and a kindergarten nestle in grass-covered structures tucked along the perimeter of the site. With roughly 650 apartments, the project "has enough density to keep both loops active,"



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1. **Steel bridges connect the eight concrete-frame residential towers.**

2. **A green roof open to the public tops the multiplex cinema.**

3. **A grass-covered pavilion on the perimeter of the complex houses a preschool and kindergarten.**

4. **Located in a former industrial area, the project overlooks new housing developments in some directions and construction sites in the others.**

4

1

1. **Some of the bridges slope to connect towers at different floors.**

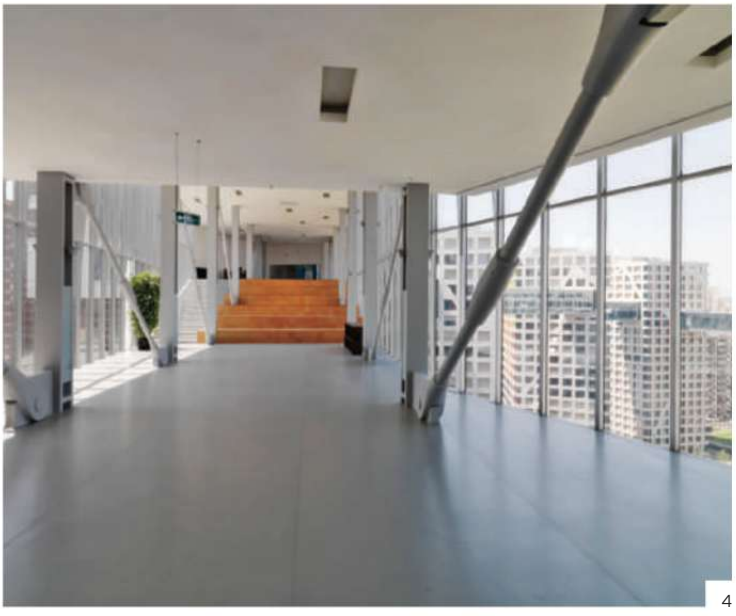
2. **A swimming pool occupies one of the connecting structures.**

3. **The sky loop offers great views of the complex.**

4. **Steps on some bridges can be used for social gatherings.**

2

3



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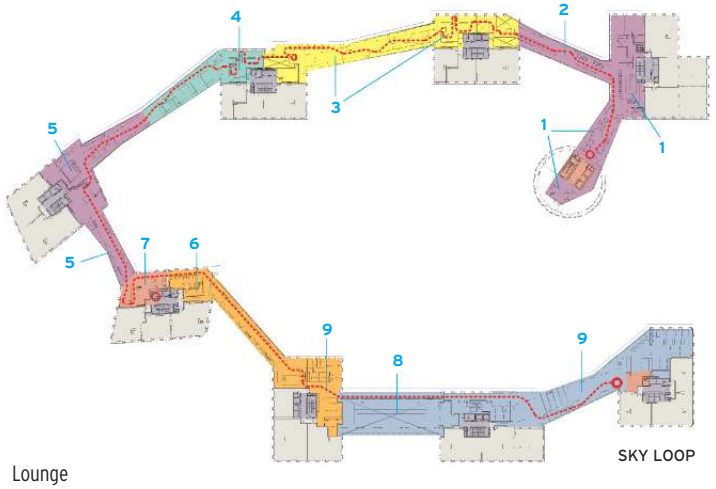


SKY LOOP

1 Lounge
2 Dining
3 Gallery
4 Bookstore
5 Café
6 Hair/nail salon
7 Food store
8 Pool
9 Spa/fitness center

says Holl, refuting any notion that Linked Hybrid might repeat the errors of Minneapolis's skybridge system, which strangled street life. "We created a porous place that invites people inside," explains the architect. "This project offers a new urban model for Beijing," states Li Hu.

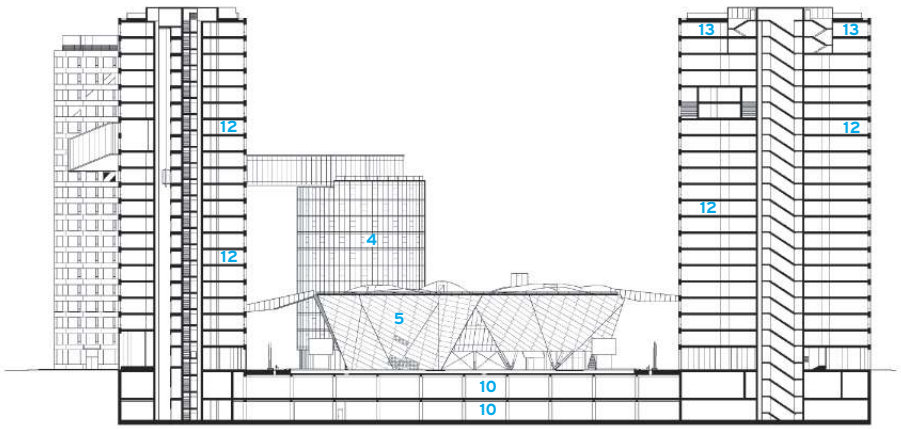
When Modern Green first approached Holl in 2003, it asked simply for a residential complex. But the architect pushed the client to develop a mixed-use program, including a multiplex cinema and a hotel to draw outsiders to the project. Six years later, Modern Green has built almost all of these elements, including a cylindrical hotel and an angular multiplex—both rising from a large reflecting pool at the heart of the complex. The hotel, though, has yet to open, and at least part of it may be used as service apartments.

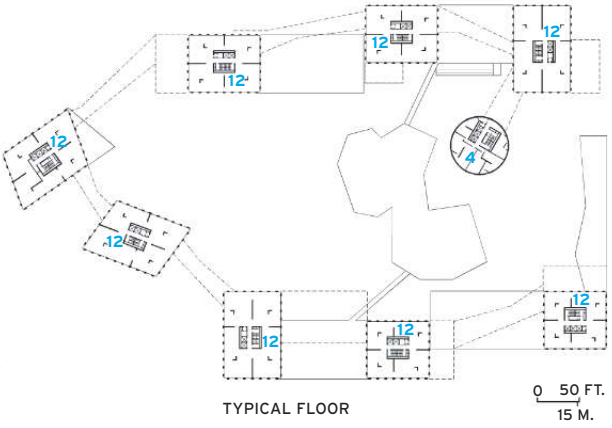
The project's location just outside Beijing's Second Ring Road (the city now has six) and within a 15-minute walk of a subway station makes it a convenient place to live. In the 1950s and '60s, Mao Zedong developed this area for industrial uses, so Modern Green didn't have to knock down any houses to clear the site, only a factory. "I wouldn't work on a project that requires people to be relocated," states Holl.

Collaborating with structural engineers at Guy Nordenson and Associates and the China Academy of Building Research, Holl's team designed the eight towers with concrete exoskeletons that eliminate columns inside apartments. As a result, the buildings' envelopes are the structure—a scheme that the designers expressed in diagonal lines that chart the seismic forces on the facades. Concrete floor slabs are equipped with radiant heating and cooling. The project's iconic steel-and-glass bridges, which range in length from 65 to 197 feet, were assembled on the ground, then hoisted into place. Roller mounts with huge ball bearings connect the bridges to the towers, allowing the bridges to move independently during earthquakes. The most difficult parts of the project to build, says Holl, were the 33-foot-long, multistory steel cantilevers at the top of five of the towers. (See technology story on page 138.)

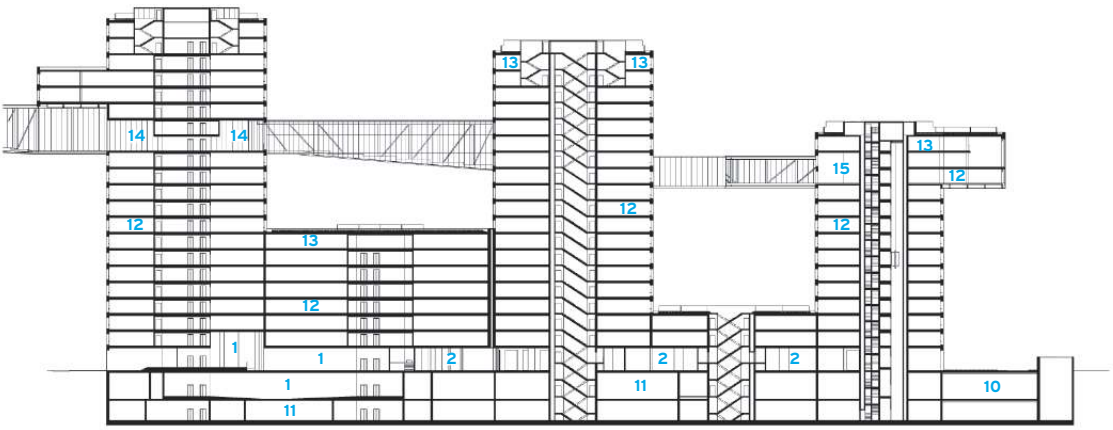
As he has done on other projects, such as Simmons Hall at MIT [RECORD, May 2003, page 204], Holl introduced color on window soffits. For Linked Hybrid, he applied saturated hues to powder-coated aluminum panels on the header and two jambs of each window. Holl

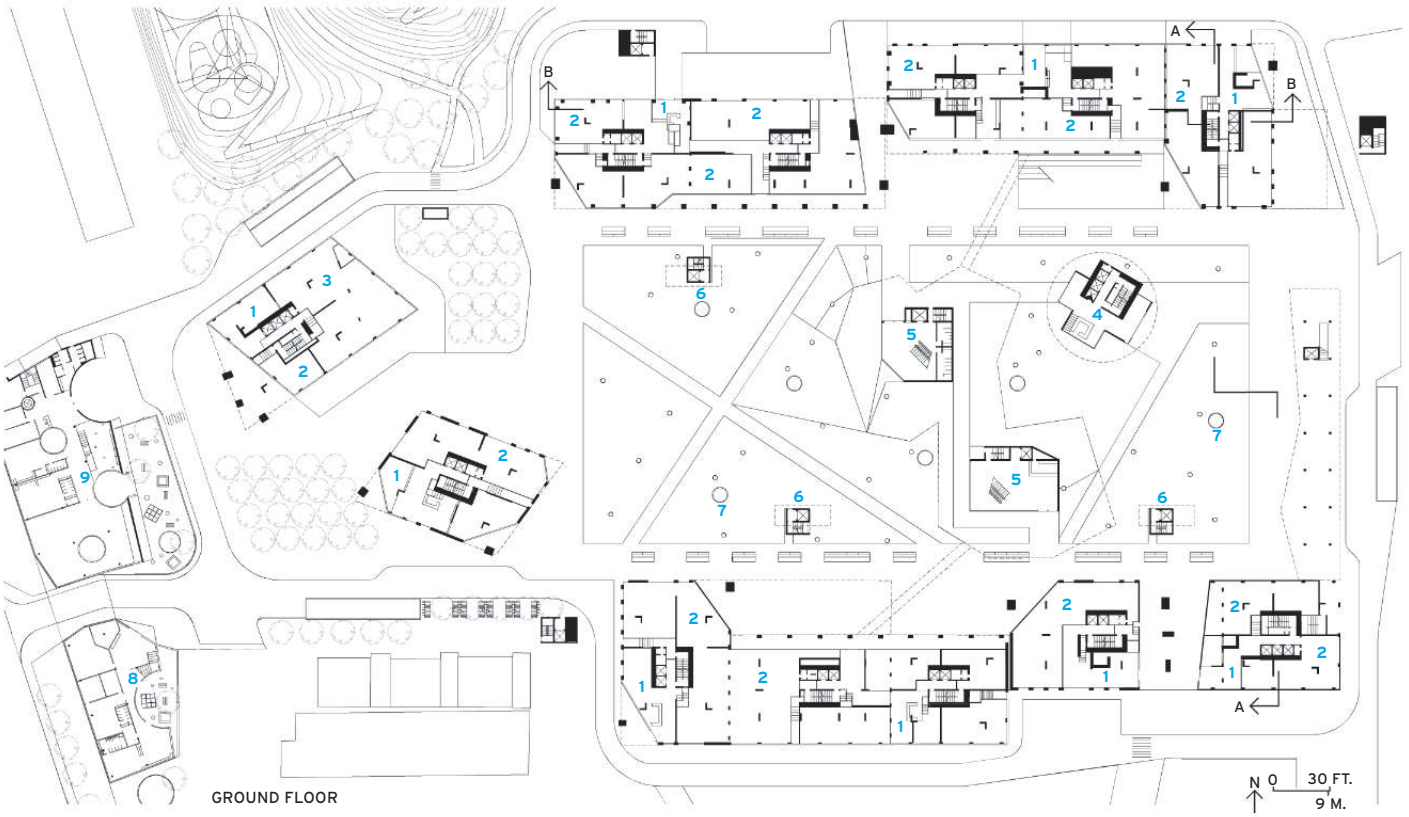
PHOTOGRAPHY: © IWAN BAAN (3); ANDY RYAN (1,2,4)

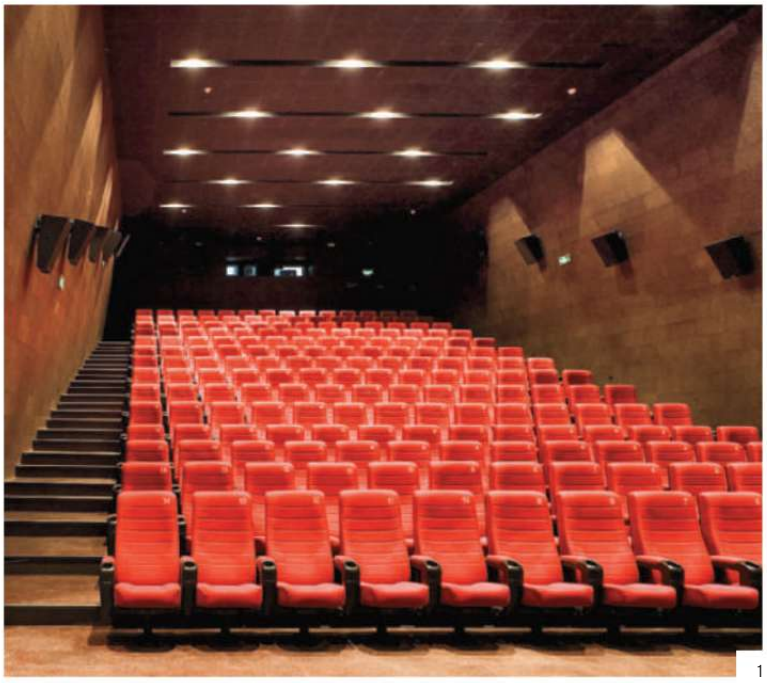


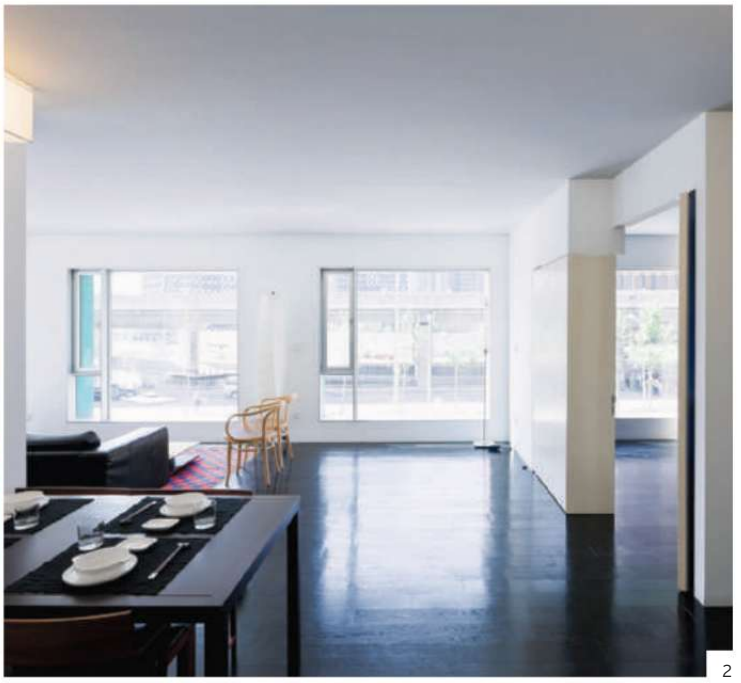


1 Lobby
2 Commercial
3 Café
4 Hotel
5 Cinema
6 Teahouse/parking exit
7 Air intake for parking
8 Preschool
9 Kindergarten
10 Parking
11 Bicycle parking
12 Apartment
13 Duplex
14 Gallery
15 Bar









1. **The multiplex cinema is one of the amenities that help draw people from outside the complex.**

2. **Most apartments occupy a quarter of a tower floor, so they enjoy views in two directions and cross ventilation.**

3.,4. **Double doors allow residents to open one room onto another and adjust the layouts in their apartments. The units range from one to three bedrooms and from 800 to 1,600 square feet.**

OPPOSITE: **Landscaping, ground-level shops and the cinema all help activate the central plaza. Holl used colors taken from Buddhist temples on window soffits.**

says he took the colors from polychromatic Buddhist temples, then used the I-Ching to determine the pattern.

Sustainable strategies drove much of the design, starting with the 655 geothermal wells dug 330 feet deep, which provide 5,600 kwh per year of energy in the summer and 3,700 kwh per year in winter, enough to handle most of the complex's heating and cooling needs. A backup system kicks in when more energy is needed. Plumbing recycles gray water to irrigate planted areas, while the central reflecting pool doubles as a retention pond. With water becoming an increasingly precious commodity in Beijing, Linked Hybrid's goal of reducing potable-water use by 41 percent represents an important example for other developments to follow.

Four apartments occupy each floor, so each unit sits in its own quadrant and enjoys views in two directions. Typical units range in size from 800 to 1,600 square feet and from one to three bedrooms. Double doors that can open one room onto another allow residents to use the apartments in a variety of ways, including as offices, and the absence of interior columns enables many different layouts. Operable windows on two facades encourage cross ventilation, but the buildings also provide mechanical ventilation and radiant cooling.

Holl sees Linked Hybrid as a "city within a city" and says it represents "a value change" in the design of tall buildings. "It's not about being tall," he states. "It's about being sustainable and making connections to the urban context." There's a danger, though, that the developer may fence off the property and provide only gated access to residents. And if the hotel remains empty and the programmable spaces on the bridges aren't leased, then the project may never reach its full potential as a model for more vibrant residential development. Building such an ambitious complex stands as a remarkable accomplishment—one that would be unlikely in today's United States. Now the managers of Linked Hybrid need to show they can fill it with the kinds of activity that will make it truly come alive. ■

PROJECT: Linked Hybrid, Beijing

ARCHITECTS:
Steven Holl Architects – Steven Holl, FAIA, Li Hu, design architects; Hideki Hirahara, project architect

ASSOCIATE ARCHITECT:
Beijing Capital Engineering Architecture Design Co. (BCEAD)

ENGINEERS: Guy Nordenson and China Academy of Building Research (structural); Transsolar, Cosentini, BCEAD (mechanical)

GENERAL CONTRACTOR: Beijing Construction Engineering Group

SOURCES

ALUMINUM CURTAIN WALL: Xi-Fei

GLAZING: Saint-Gobain

EXTERIOR LIGHTS: iGuzzini

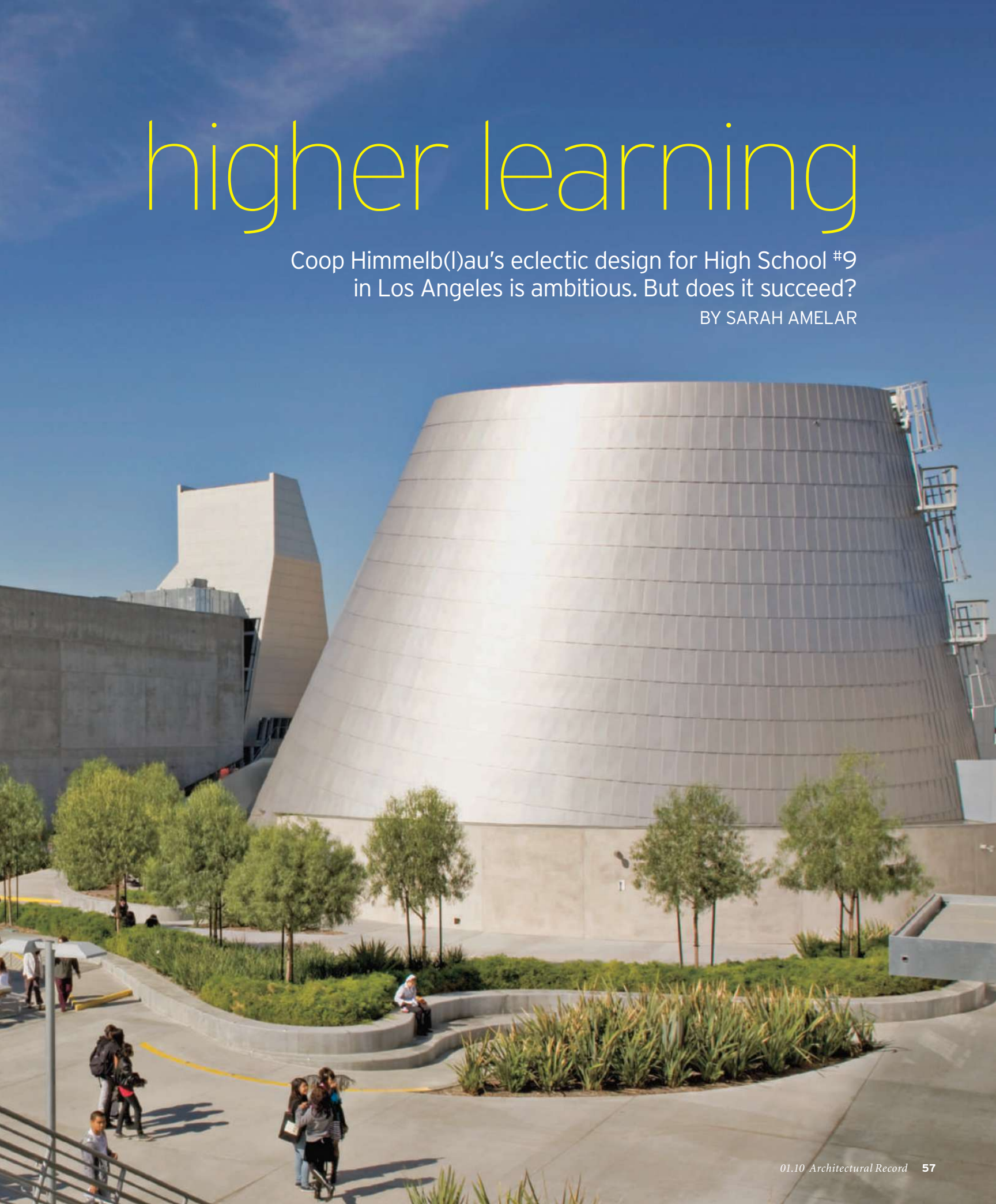
SWIMMING POOL: Astral Pool

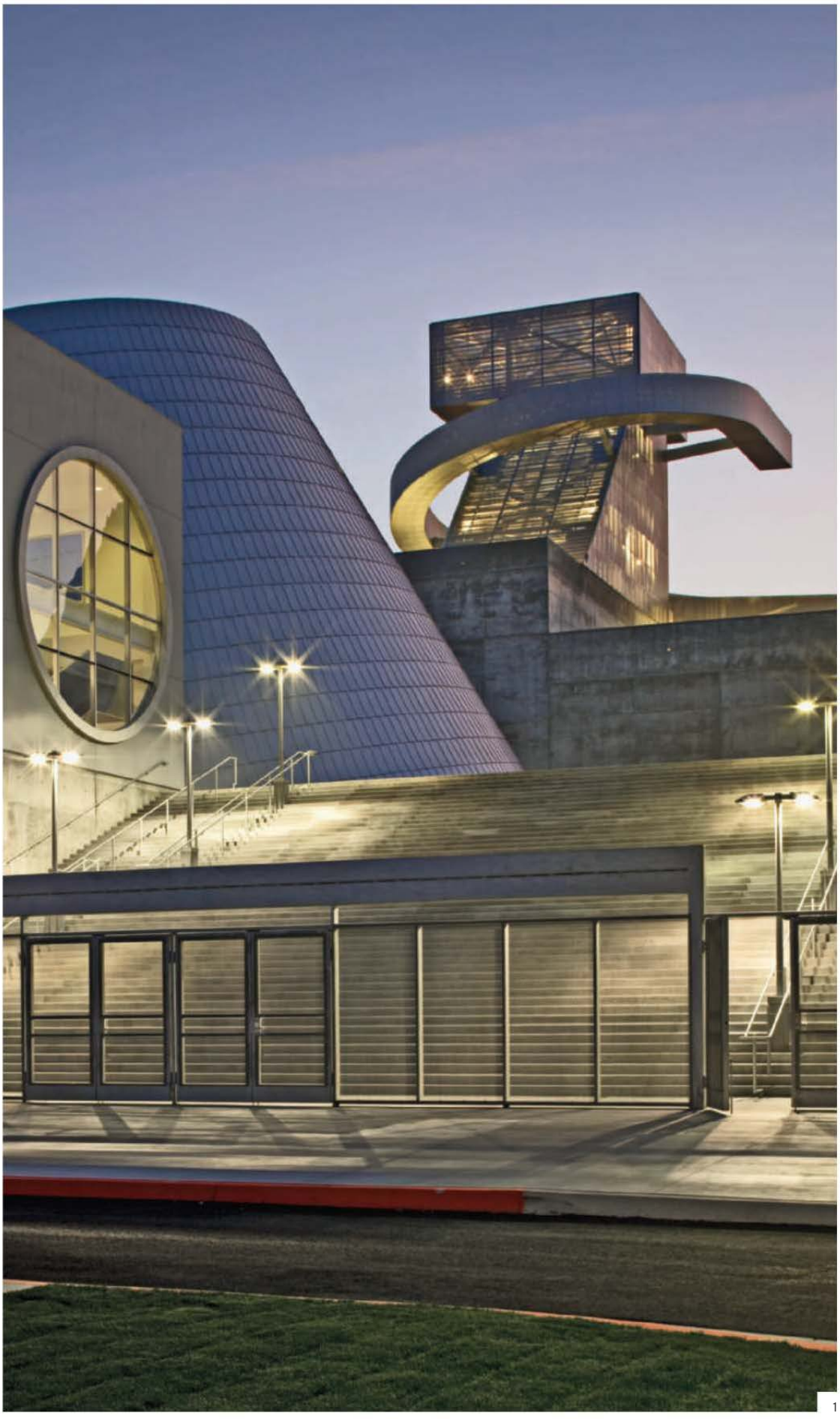
PHOTOGRAPHY: © IWAN BAAN (THIS PAGE); ANDY RYAN (OPPOSITE)

higher learning

Coop Himmelb(l)au's eclectic design for High School #9 in Los Angeles is ambitious. But does it succeed?

BY SARAH AMELAR





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PHOTOGRAPHY: © DUCCIO MALAGAMBA, EXCEPT AS NOTED; © TOM BONNER (OPENING SPREAD AND THIS SPREAD, 1, 2, 3)

2

3

4

High School #9 commandeers your attention, even as you're zooming along the Hollywood Freeway in central Los Angeles. Ringed by a roller-coastering ramp, the school's tower comes into view, a triangle topped by a cantilevered box, like a beach ball balanced on a seal's nose. Just as Encounter, the futuristic "spaceship" restaurant at the city's gateway airport, announces the local tone, the school's dynamic 140-foot-high sentinel has immediate "only in L.A.!" impact. But this landmark's high visibility and iconic exuberance also make it an unexpectedly complex symbol: a lightning rod for controversy. ¶ The bottom line is HS #9's final price tag: $232 million for 230,000 square feet (completely fitted out), widely translated as a stunning $1,000 per square foot (though construction and landscaping costs of $171.9 million bring it closer to $745 per square foot). Meanwhile, the project's most publicly recognized element, the tower, remains an empty shell, pending uncertain completion of its spectacular room at the top. So, for now, this component is purely symbolic, a billboard along the freeway, entangled in a disconnected ramp to nowhere, configured whimsically as an unraveled number 9. And that's just one piece of an ambitious, unconventional, and eclectically expressive design, making it awfully easy to fault the architecture. But for all its quirks—and the challenge of separating this architecture from the complicated forces behind it—the design has much to commend.

The scheme, by Coop Himmelb(l)au, is often likened to torqued chess pieces—with a tilted, conical, freestanding library, clad in gleaming steel; rhomboid light chimneys projecting from the cafeteria; and blocky classroom buildings, punched with oversize portholes. But the project also bears the thumbprints of unremarkable beginnings.

In 2000, the notoriously overcrowded and under-resourced Los Angeles Unified School District (LAUSD), with unprecedented bond funding, engaged AC Martin Architects to design a traditional high school for the 9.8-acre downtown site, formerly LAUSD headquarters. By 2001, AC Martin's scheme was, according to Coop Himmelb(l)au, "fully designed and engineered through construction documents." Yet billionaire philanthropist Eli Broad, with other local leaders, convinced the district to switch course and create instead a high school

OPENING SPREAD:
The cafeteria's outdoor dining areas face the conical library, clad in stainless steel.

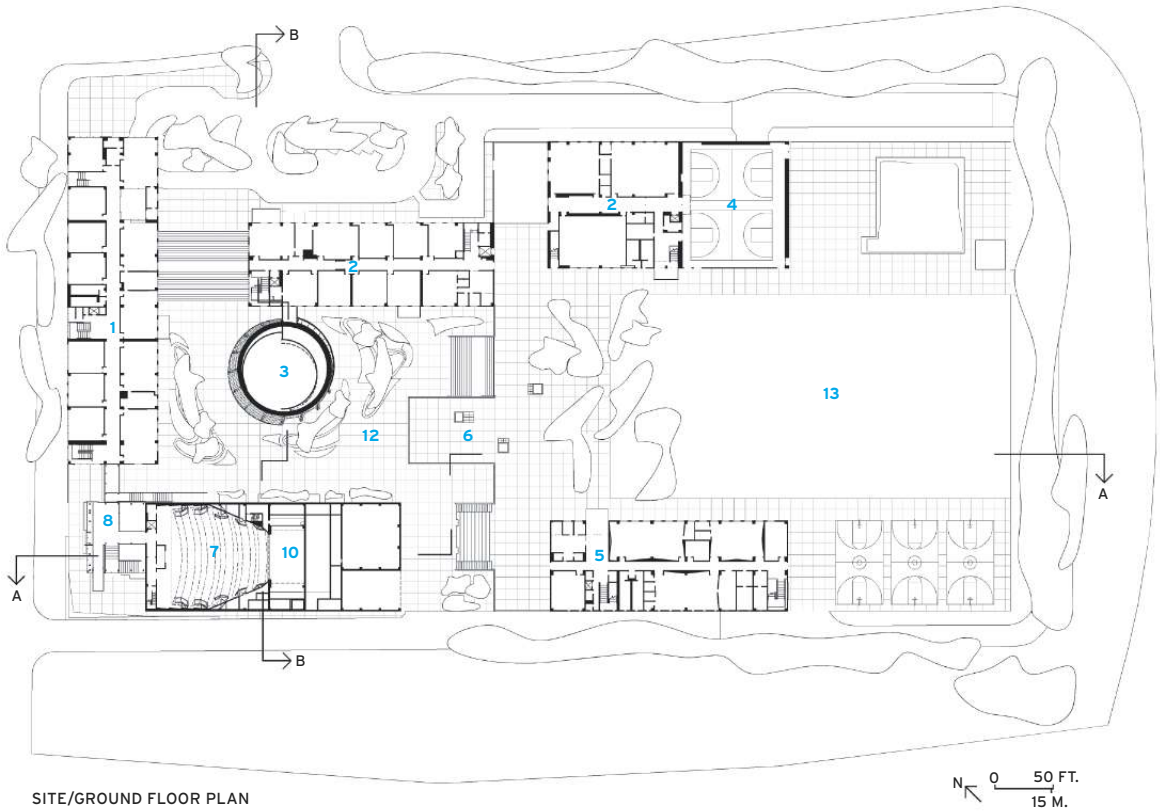
1. **Students enter via wide concrete steps, cut off from the public realm by security gates.**

2. **The theater entrance provides public access independent of the school's other buildings. The tower's perforated-steel sheathing appears veil-like by night, revealing the structural skeleton.**

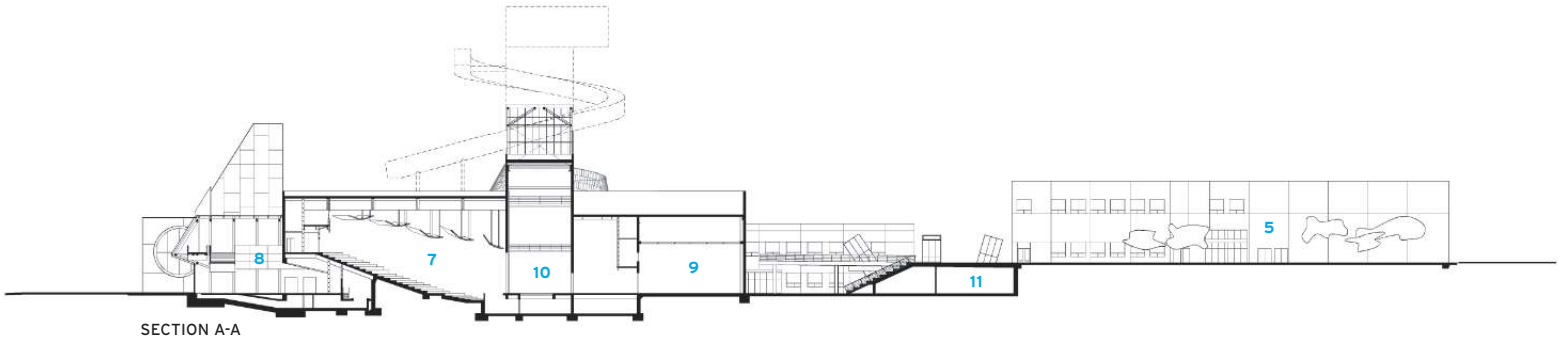
3. **The iconic tower, crowning the theater's fly space, forms a gateway with the city's cathedral, directly across the freeway.**

4. **Large portholes bubble across the classroom buildings' street facades.**

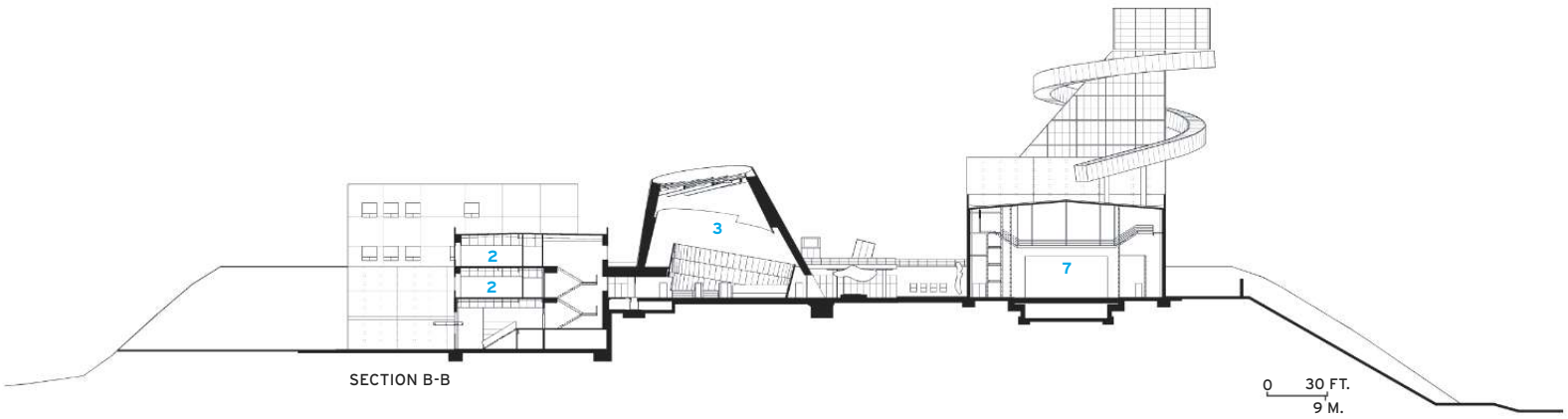
1 Art
2 Dance
3 Library
4 Gymnasium
5 Music
6 Cafeteria
7 Theater
8 Lobby
9 Black-box theater
10 Stage
11 Service space
12 Sunken courtyard
13 Athletic field



SITE/GROUND FLOOR PLAN



SECTION A-A



SECTION B-B

composed of four "academies": music, theater, dance, and visual arts. The idea was to exploit the educational opportunities of the site, bordering inner city and Grand Avenue's cultural district, along with Gehry's Disney Hall, Isozaki's Los Angeles Museum of Contemporary Art, and Moneo's Cathedral of Our Lady of the Angels. Instrumental to Disney Hall's realization and the future Grand Avenue Development, Broad wanted an architectural luminary (and later contributed $5 million) for HS #9.

An international competition ensued, won by Coop Himmelb(l)au. The firm's approach emphasized "the importance of making icons people could identify and take 'mental ownership' of," says principal architect Wolf D. Prix, who faults architectural anonymity for the assault on buildings during Paris's 1968 student uprisings and L.A.'s Rodney King riots. "We needed to create something exceptional and memorable in the anonymous fabric of the city." Hence the school's spiraling, Tatlinesque tower, forming an urban gateway with the cathedral campanile directly across the freeway. Beneath the tower, a 950-seat, state-of-the-art theater—an ambitious piece of the revised program—anchors a corner with a glassy public lobby.

But budgetary guidelines kept certain straightforward AC Martin elements in place: a central rectangular plaza and the boxy massing of classroom buildings, tweaked by Coop Himmelb(l)au with big, round, playful (verging on silly) windows bubbling across the street facades. These blocky volumes, each housing a separate "academy," have become successful foils to the quirkier structures, much as Le Corbusier's Chandigarh Secretariat plays rectilinearity against a roofscape of similar objects.

Set on a hill, HS #9's campus rises from wide entry steps, originally envisioned as a community perch. But LAUSD mandates, introduced late in the game, resulted in security gates at the stair's base (rather than its summit), awkwardly severing it from the public realm. The steps lead to the campus's protected center, its outdoor meeting ground and crossroads, with access to the library cone, cafeteria (burrowed in the hill), classrooms, and theater—a strikingly surreal landscape of silvery objects amid downtown skylines. Amphitheater steps ascend to the gym and soccer field–cum–open-air arts space.

A secure precinct, locked during classes like any LAUSD school, the campus conveys a remarkable sense of freedom and spatial expanse. "My kids are so excited to study here," reports one parent (echoed by students across the Internet). "It makes them feel special—they keep saying, 'Wow, this is like college!' "

Despite the gates, HS #9 is not elitist, accepting 70 percent of its 1,700 students from its inner-city neighborhood. And, unlike high-powered arts high schools, it does not base admissions on auditions or portfolios. Yet the facilities and fittings—from cutting-edge theater technologies to music synthesizers—would be the envy of most college and professional arts venues. And that's where the school's dazzling cost and architectural expression reenter the discussion.

True, the price owes much to unfortunate timing and unforeseen obstacles: an overheated economy, multiple LAUSD leadership changes, and a site complicated by archaeological findings and a defunct rail tunnel. But even so, in a school system plagued by impoverished

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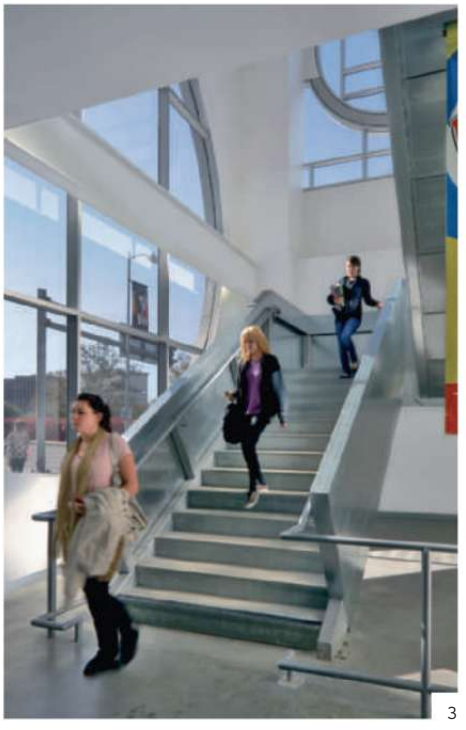


3

1. **The 9.8-acre campus, which includes a swimming pool, is near City Hall and many downtown cultural institutions.**

2. **The steel-shingled "pyramid" over the theater lobby houses a dramatic stair to upper tiers of seating.**

3. **Huge round windows illuminate the stairwell in an administration/ classroom building. Galvanized aluminum wraps the balustrade.**

PHOTOGRAPHY: COURTESY PCL CONSTRUCTION LEADERS/WARREN AERIAL PHOTOGRAPHY (1)

facilities, does it ever make sense, vis-à-vis cost and image, to splurge on a flagship? (AC Martin's more typical, no-frills scheme was estimated at a third of HS #9's final cost.) Though hardly the architect's call, this question touches on the choice of designer and matters of perception. LAUSD might have been prudent to select an architect known for inventive yet legible economy of means, even when cost-efficient Coop Himmelb(l)au's exuberant form-making rarely conveys that message. (And an idiosyncratic, partially cantilevered tower over a theater's column-free space undeniably boosts the price.)

Some critics have portrayed the project as a showpiece emphasizing exterior public image over student experience. But quiet, minimally distracting spaces have their value here. Though the wide corridors between classrooms are standardized, their simple ingredients shine: good proportions, daylight, and authenticity of materials, including handsomely durable polished-concrete floors and galvanized-aluminum balustrades. And here, straightforward classrooms gain unexpected variety and luminosity through multiple sizes and positions of portholes.

Halfway into HS #9's first year, the jury is still out on its success. Mirroring student feedback across the Internet, one blogger wrote: "For those who keep asking what the big spiral is for, if that even matters, it's to show art students we have to reach for success, soar to new heights. This place is great." "Dayum!" another added.

It's only a pity the tower-top theater reception room, with dramatic views, remains vacant. The school deferred completion to trim costs, despite its earning potential as a rental event space. But HS #9's surreal architecture has inspired another revenue stream—as a top movie and TV shooting location. "It's exciting," says assistant principal Ken Martinez, "but we only do it if it's not distracting. Remember: Our first priority is the students." ■

PROJECT: High School #9, Los Angeles

ARCHITECT:
COOP HIMMELB(L)AU
Wolf D. Prix / W. Dreibholz & Partner ZT GmbH – Wolf D. Prix, FAIA, design principal; Karolin Schmidbaur, project partner

ENGINEERS: TMAD Taylor and Gaines (structural); AC Martin (civil)

CONSULTANTS:
HMC Architects (executive architect); PCL Construction Services (general contractor); ACEA (HVAC); Roshanian and Associates (electrical); Melendrez Design Partners (landscape); JK Design Group (theater consultant and lighting); Martin Newson & Associates (acoustics)

SOURCES

CAST-IN-PLACE CONCRETE:
Morley Builders

STRUCTURAL STEEL CONSTRUCTION:
Maya Steel Fabrications

FRAMING, DRYWALL, PLASTER:
Davcal

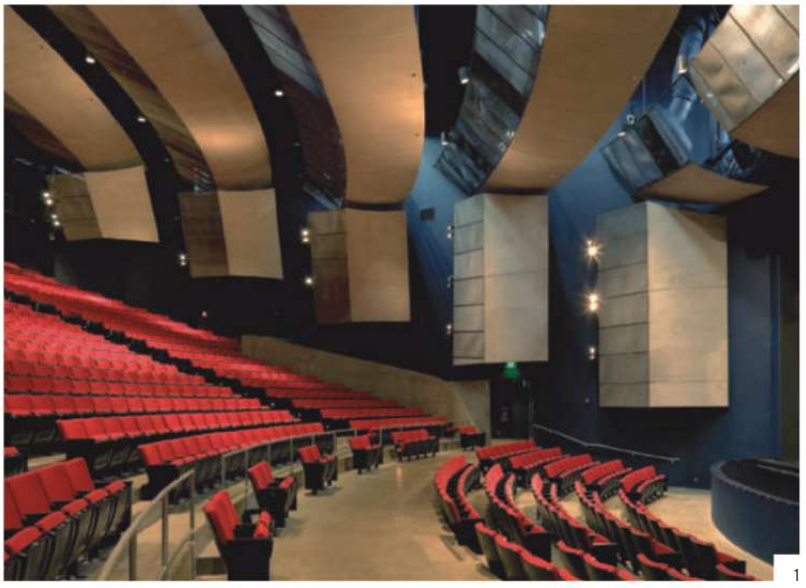
CUSTOM METAL PANELS, SHEET-METAL CONSTRUCTION:
CMF Custom Metal Fabricators

GLAZING: Huntington Glazing

LOBBY SLOPED GLAZING DESIGN AND CONSTRUCTION:
ASI Advanced Structures

SKYLIGHTS:
Metcoe Skylight Specialties

SUSPENDED CEILINGS:
Cali U.S.A. Acoustics



1. **The theater has acoustic "clouds" overhead, a full orchestra pit, a 30-student tech booth, and 32 drops in the stage floor.**

2. **the diagonal steel structure is revealed in the dance studios, as well as elsewhere throughout the classroom buildings.**

3. **One classroom was designed specifically for choral work.**

OPPOSITE: **A skylight atop the library cone illuminates its interior.**

play time

Toyo Ito raises the bar for sports facilities with his graceful, sustainable design for the National Stadium in Kaohsiung, Taiwan

BY NAOMI R. POLLOCK, AIA

PHOTOGRAPHY: © CHRISTIAN RICHTERS/VIEW, EXCEPT AS NOTED; © FU TSU CONSTRUCTION (1, 2, 3)

In a fitting match of design and program, Toyo Ito performed a feat of architectural athleticism with his National Stadium of the Sports Affairs Council in Taiwan. Combining the grace of a ballet dancer with the strength of a body builder, its lithe, sinewy form encircles a playing field, while its brawny concrete and steel components do the heavy lifting. Located in Kaohsiung, a city of 1.5 million people 234 miles south of Taipei, the 40,000-seat arena (Ito's first work in Taiwan) opened in time for the 2009 World Games, which took place from July 16 through 26. ¶ Having teamed up with the Japanese design and construction company Takenaka Corporation plus architects Ricky Liu & Associates and Fu Tsu Construction Company, both of Taiwan, Ito won an international competition held in 2005. The objective of the clients, Taiwan's National Council on Physical Fitness and Sports and the Kaohsiung Bureau of Public Works, was to erect a stadium with a 1,300-foot-long track and a soccer field that met the specifications of the Fédération Internationale de Football Association and the International Association of Athletics Federation while complying with local government guidelines for integrating green building technology.

In addition to satisfying these criteria, Ito's goal was to revamp the typology's closed, concentric parti by opening the arena to the landscape and loosening up its form. "Usually stadiums are very static and symmetrical, but this time we wanted to make a more fluid and dynamic shape," explains Ito.

Located on the grounds of a former navy base north of downtown Kaohsiung, the stadium begins with a long "tail" that greets sports fans, who mostly approach from the subway station nearby. Containing ticket booths and concessions shops, this appendage starts out small in section but expands steadily as it ascends the ground's gentle slope. When the land levels off, the tail merges with the arena's top-heavy body: a soaring, C-shaped grandstand that whips around the field and terminates abruptly at the "head."

Holding upper and lower seating areas (plus room for an additional 15,000 temporary chairs), the arena opens to an internal lawn on the south, and the main gate connects to a broad terrace fanning out in front. "You can stand outside and still sense what is happening on the field," says Chih Hsun Su, deputy chief engineer in the Construc-

OPENING SPREAD: **The stadium's dynamic form terminates abruptly at its south end, where the main entrance is located.**

1. **The structure's "tail" directs pedestrians from the nearby subway station to the ticket windows.**

2. **Built on the site of a former naval base, the stadium borders a residential area.**

3. **Embedded to reduce wind, the grass field requires more than five hours of sun daily.**

OPPOSITE: **Wrapping the cantilevered beams, steel tubes carry lateral forces and support the glazed and solar roof panels.**

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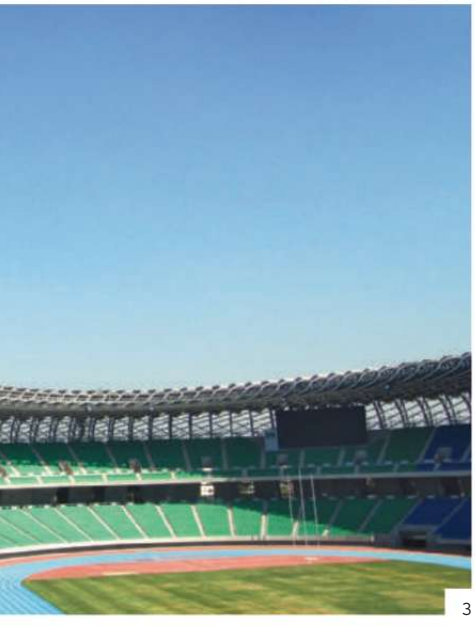

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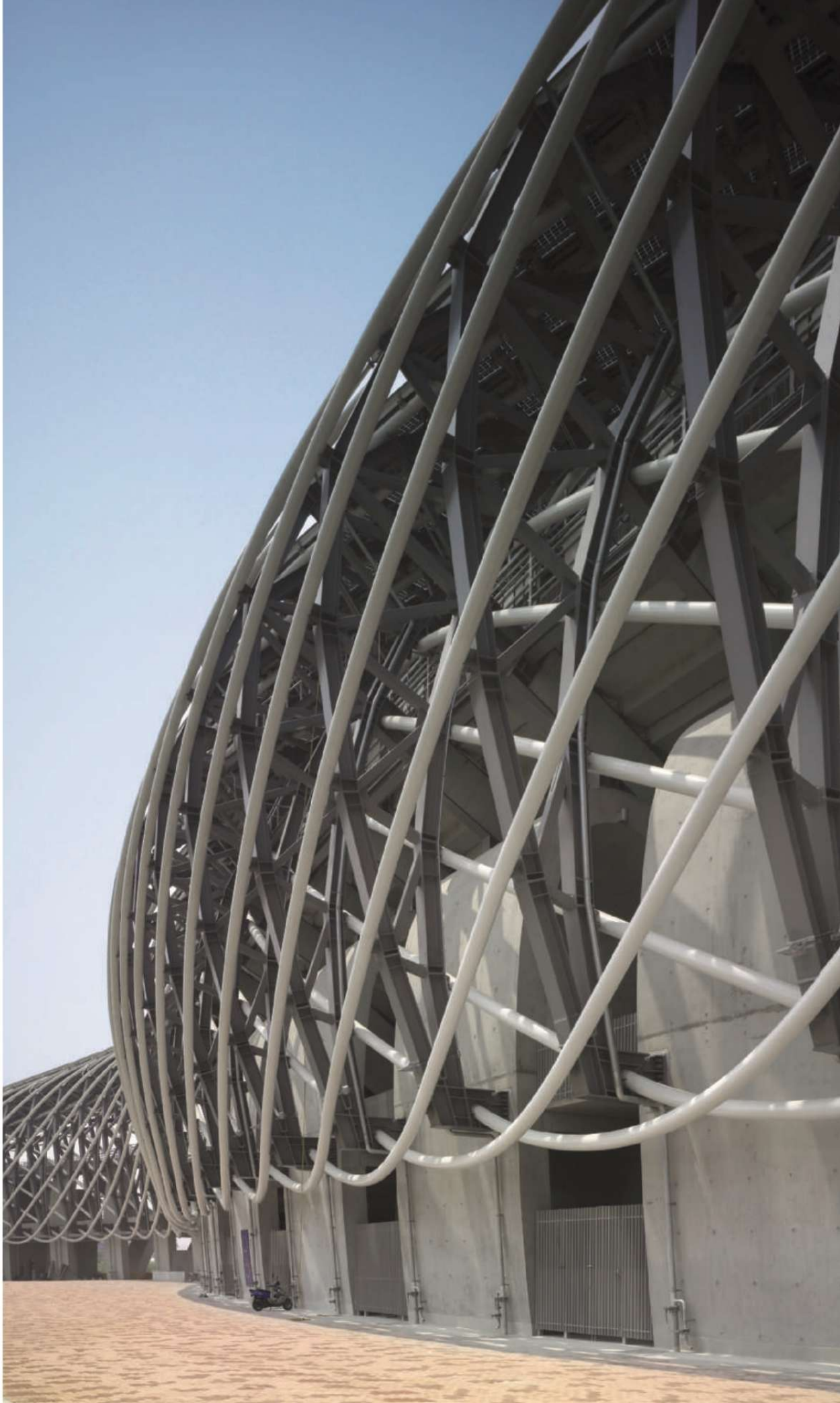
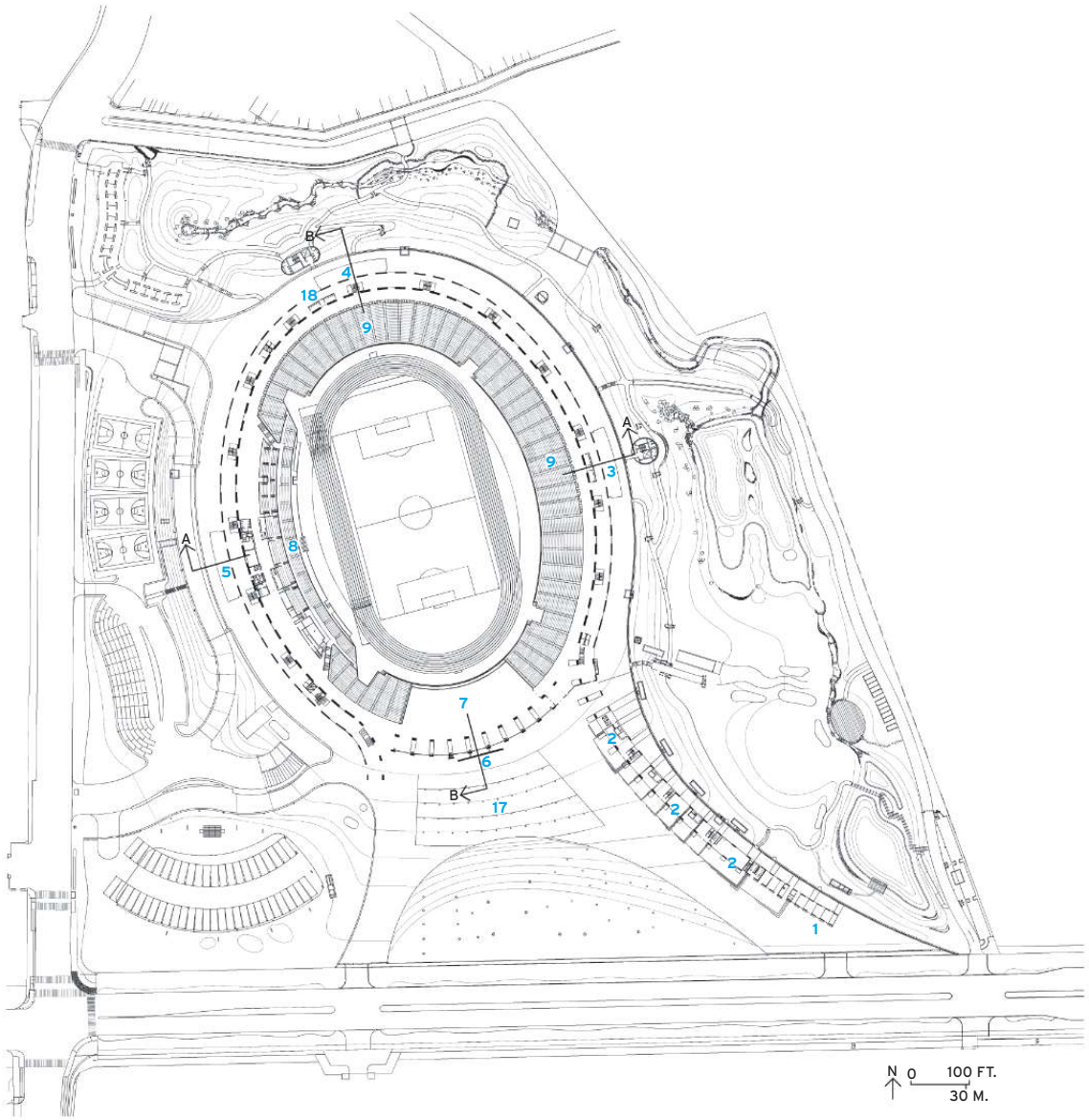
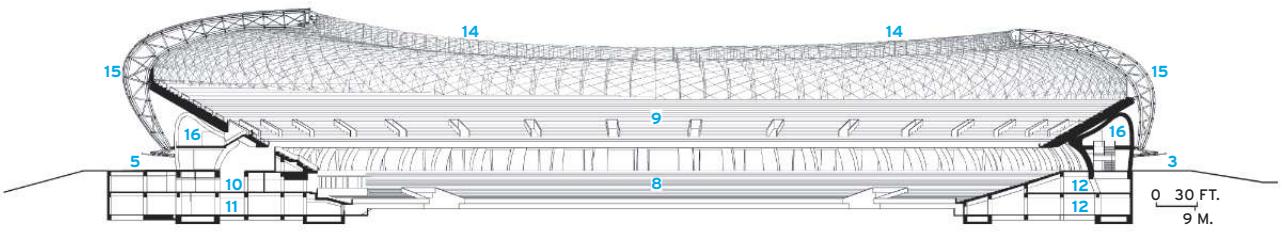
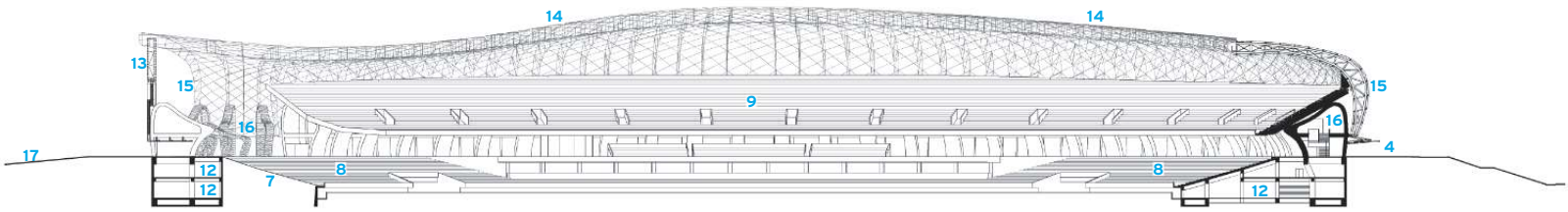


1 Ticket counter
2 Restaurants and sports bar
3 East entrance
4 North entrance
5 West entrance
6 South gate entrance
7 Lawn seats
8 Lower stand
9 Upper stand
10 VIP lobby
11 Athletes' lobby
12 Car parking
13 LED display
14 Glazed and solar roof panels
15 Cantilevered trusses
16 Concrete supports
17 Front terrace
18 Shop



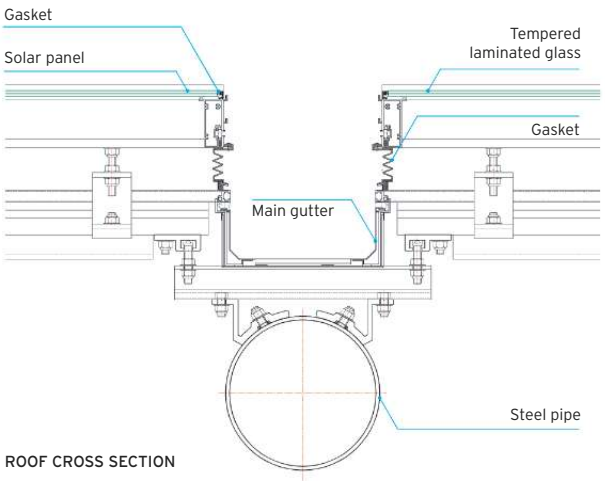


SECTION A-A



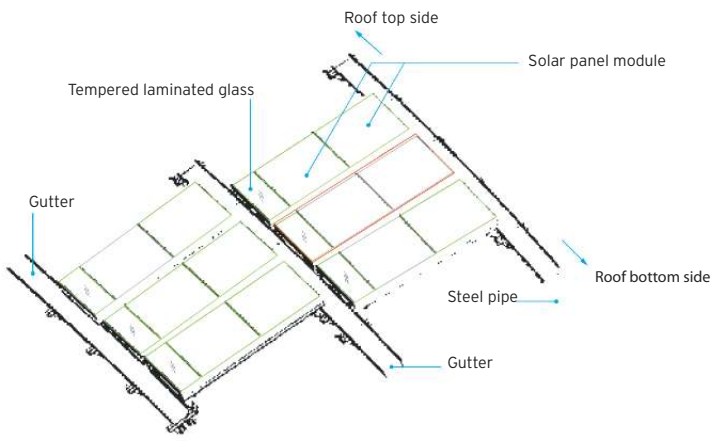
SECTION B-B

While shading the stadium's spectators, the aluminum-framed glazed roof panels — most of which are solar — harvest the sun's energy.



ROOF CROSS SECTION

Gutters direct rainwater to underground cisterns for the irrigation system.



ROOF DETAIL

Energy-harvesting units are fabricated to fit the structure's curves.

PHOTOGRAPHY: © FU TSU CONSTRUCTION

tion Office of the city's Public Works Bureau. The stands' energetic form is secured in place by a concrete base containing two partially underground levels, both below grade at the building perimeter but open to the sunken playing field in the middle. The upper basement contains parking, administrative offices, and VIP suites that open onto box seats; the lower basement has prep areas for the athletes and more parking.

As in many Ito-designed buildings, the stadium's architecture and structure are essentially one. Since the arena has little need for full enclosure, a series of massive structural elements, each one clearly articulated and connected to the next, defines the building. The sequence begins with the piles and raft foundations. These support the basements' reinforced-concrete slabs and walls, which provide lateral stability as well as vertical load distribution. Most of the downward force comes from the concrete saddles above. Interspersed with openings and aligned like vertebrae, these monumental arches create the stadium's double-decker circulation spine. Their irregular forms—nine different types in the body of the building alone—were made of poured-in-place concrete, as were the shoulder-angled beams supporting the upper seat decks and the roof.

Bolted to the saddles and the beams are 159 cantilevered steel trusses. Arranged radially, they extend out over the seats and hold up the roof. Tying the trusses together, 32 oscillating spirals of steel pipe stand out as the exterior's most distinctive feature. Composed from hollow pieces measuring 13 inches in diameter and 20 feet in length, the tubes were factory made to Ito's 3D specifications. Once welded together on-site, the pipes take on an entirely new character. Crossing over and under the trusses, they imbue the entire stadium with a sense of movement.

In addition to their strong visual impact, the coiled steel members act as lateral bracing that holds the framework for the 229,314-square-foot roof. This intricate, scalelike surface shades the spectators with its 6,482 aluminum-framed glazed units. It is also a massive solar collector, as 4,482 of these sections contain pairs of 4-foot-square solar panels. Tempered glass plate of variable length mediates the energy-gathering units' rigid flat shape and the stadium's irregular, curved geometry.

"Connecting these 2D and 3D elements was extremely difficult," says L.P. Lin of Fu Tsu Construction. In locations unsuitable for solar-energy collection, the glazing is made entirely of tempered glass. Rubber gaskets smooth out the roof's plane, while narrow troughs (or gutters) gather rainwater and direct it to underground cisterns supplying the soccer field's irrigation system.

The largest solar-energy-generating stadium in the world, the building produces 1.1 million kilowatt hours annually—many times more energy than it needs. As a result, the system funnels the excess directly to the Taiwan Power Company, eliminating the need for costly and space-consuming storage batteries. When the stadium hosts a major event, it simply buys back extra electricity for lights, air-conditioning, and twin JumboTron screens. Furthermore, according to Fu Tsu Construction, the solar panels are responsible for reducing the building's CO_2 emissions by as much as 660 tons annually.

Another beneficiary of the sun is the grass field. To ensure that the lawn gets its required daily exposure of 5½ hours, the stadium's long

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1. **Encircling the field, concrete saddles, aligned like vertebrae, enclose the stadium's main concourse and support the seat decks above.**

2. **Interspersed beneath the open weave of the steel-tube envelope, the saddles define the naturally ventilated, light-filled inner concourse.**

3. **Freestanding saddles continue beyond the seating and greet visitors at the South Gate entrance.**

4. **Stairs connect the upper and lower concourses.**

OPPOSITE: **Cantilevered trusses wrapped with tubular steel support the roof and arch over the saddles.**

3

4

axis tilts 15 degrees north-northwest. This orientation also keeps most of the bright rays out of the athletes' eyes—an important consideration that could impact the outcome of the game. Of equal concern was the ability to control the wind. Because the stadium opens to the south, it is able to corral the strong gusts that buffet the site during Kaohsiung's scorching summers. While the resulting natural ventilation maintains comfortable temperatures for spectators, breezes are likely to disturb play. To prevent such mishaps as the ball blowing around during a game, the architects embedded the field into the earth.

Visually, the verdant plain relates to the grass-covered slope inside the stadium as well as the grounds outside—a mixture of existing and newly planted trees. "We wanted to attract the public with a new urban park typology," explains Ito.

Nevertheless, while landscaping mollifies its impact, the voluminous building hardly blends with the residential neighborhood around it. Yet no one seems to mind. On the contrary, Ito's landmark has invigorated the area and is a big score for Kaohsiung. ■

PROJECT: National Stadium of Sports Affairs Council, Kaohsiung, Taiwan

ARCHITECTS: Toyo Ito & Associates – Toyo Ito, principal in charge; Toyohiko Kobayashi, project architect – with Takenaka Corporation and Ricky Liu & Associates

ENGINEERS: Takenaka, Hsin-Yeh (structural); Takenaka, Teddy & Associates, C.C. Lee & Associates (mechanical)

CONSULTANTS: Lancaster (lighting design); Takenaka, Ricky Liu & Associates (interior design); Takenaka, Laboratory for Environment & Form (landscape design); Fu Tsu Construction (construction)

SOURCES

PHOTOVOLTAIC SYSTEM: Solar Energy Systems at Delta Electronics

ROOF FRAMEWORK: San Unity

STEEL: Chun Yuan Steel Industry Company (structural, spiral tubing)

TRACK: Mondo (Super X Performance)

PHOTOGRAPHY: © FU TSU CONSTRUCTION (2)

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CIRCLE 23

SCHOOLS OF THE 21ST CENTURY

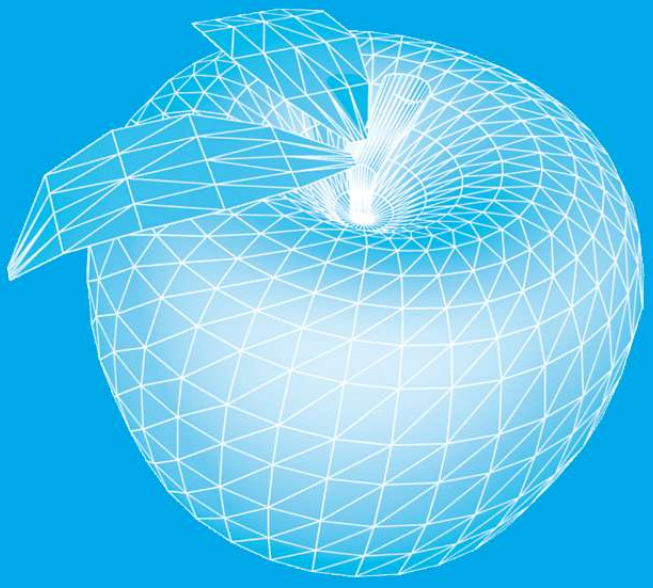
INSIDE

Learning From the City

URBAN PUBLIC SCHOOLS ARE POSSIBLY the most challenging of the K-12 building type. Many of the districts where they must be built find that costs continue to grow faster than their tax bases. Good building sites are difficult to come by. And while the community often clings tightly to old buildings that symbolically represent prosperity in times gone by, these facilities are invariably obsolete and often practically beyond repair. Student populations in urban areas are usually ethnically diverse and often impoverished. Yet, in examining several dozen school projects submitted to us this year, we found the majority of well-designed projects were located in urban areas. Our seven case studies are from all over the U.S. and range from a brand-new high school dedicated to the biological sciences in Phoenix to a temporary grade school that is located in a hospital annex building in New York City. Great urban schools are worth the investment if for no other reason than that they represent progress and give hope to communities that sometimes need it desperately.

THIS IS THE FOURTH YEAR in a row that ARCHITECTURAL RECORD has published a special report on schools called "Schools of the 21st Century." The previous three editions were printed separately and sent to architects, school administrators, and school board members.

Architects who were seriously involved in school design reported that they hadn't received the special issue, and because in some parts of the nation school construction is one type of construction that is moving (if not galloping) along in spite of the recession, we decided this year to include our special report in the January issue of the magazine while continuing to distribute the issue to school board members. RECORD will also present our Schools of the 21st Century Symposium again this year. It will be held prior to the National School Boards Association meeting in Chicago on Friday, April 8, 2009. For details, see our Schools of the 21st Century Web site, architecturalrecord.com/schools. *Charles Linn, FAIA*



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CIRCLE 24

Energy-efficient Roofing: More Than a Simple Black and White Issue

REFLECTIVE, COOL ROOFS ARE NOT ALWAYS THE ANSWER

Reflective roofs like this one can help save energy in warm, southern climates, but they are typically not the most efficient option in cooler, northern locations.

HEATING AND COOLING COSTS ARE NO LONGER A RELATIVELY insignificant line item on a school's budget. Oil, natural gas and coal price increases and instability have led to higher heating and cooling costs, and schools are doing all they can to minimize them by using energy-efficient building materials.

Over the past decade, energy efficiency within the roofing market has been focused on cool roofing, utilizing light-colored materials such as thermoplastic polyolefin (TPO) and polyvinyl chloride (PVC) to reflect sunlight and solar energy away from a building. The commercial roofing market share of TPO increased from 10% in 2001 to 29% in 2007. At the same time, EPDM and asphalt-based roofing have seen their share within the market drop by 7% and 11% respectively.

But the widely held belief that reflectivity is the best option for reducing energy consumption is a misconception. The energy savings that buildings experience due to reflective roofing materials are most often realized in warm, southern climates where air conditioning is more prevalent than heating. To help reduce heating-related energy demands, which are greater than air conditioning demands in northern regions, dark-colored materials such as EPDM membranes are most often beneficial because they absorb heat and transfer exterior solar energy into a building.

The 2007 Buildings Energy Data Book, published by The Building Technologies Program within the U.S. Dept. of Energy's Office of Energy Efficiency and Renewable Energy, outlines energy use intensity in various commercial building types, comparing heating and cooling as a percentage of total energy consumed. The average results show that heating accounts for 33% of the energy consumed within an educational facility, while cooling totals a mere 5%.

These numbers indicate that the move toward reflective roofing on schools throughout many parts of the country may be counterproductive in minimizing energy consumption and that there should be more focus on cutting heating costs, not cooling costs, making dark-colored membranes an important asset in the push for energy efficiency.

The U.S. Dept. of Energy (DOE), in conjunction with the Oak Ridge National Laboratory (ORNL), has developed a Cool Roof Calculator to help determine the most efficient, cost-effective roof system for any given project by simulating building energy consumption based on a building's location and the type of roofing membrane and amount of insulation installed.

"Research shows that from an energy perspective, insulation often negates membrane color," says Andres Desjarlais, group leader for building envelope research at the Oak Ridge National Laboratory (ORNL) in Oak Ridge, TN, the research wing of the DOE. "Reflective roofing should not take the place of quality design, of which insulation is a key factor."

A superior option for any low-sloped roofing, white or black, is to utilize two layers of fully adhered insulation, minimizing the effect of thermal escapes at fasteners and joints, resulting in a more airtight, efficient assembly. "The key factor should always be the amount of insulation utilized in the assembly," states Carlisle SynTec's Director of Design Services, Samir Ibrahim. "Insulation is the most influential component by which sustainability can be achieved."

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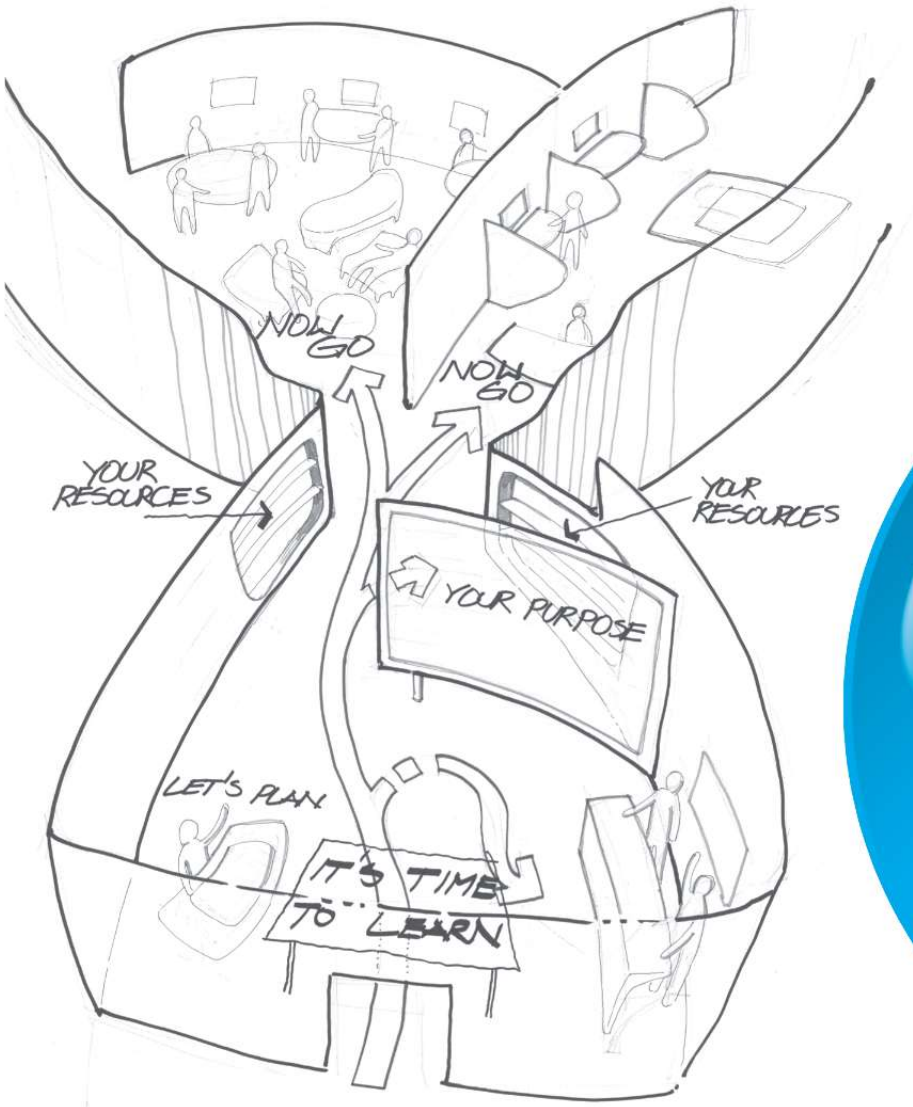

School of ONE

A personalized instruction program's needs challenge the conventional classroom

BY CHARLES LINN, FAIA

AMONG THE CASE STUDIES PUBLISHED in the 1855 edition of Henry Barnard's *Practical Illustrations of the Principles of School Architecture* was the Ingraham Primary School House in Boston. With the exception of the fireplace, and wonderfully enormous windows, its 30-by-22-foot classrooms aren't much different from those in use today. Typical classroom shape and dimensions haven't changed much, and many would argue there's nothing wrong with that, because with rare exceptions, the way a teacher delivers information to 25 or 30 students in a classroom hasn't changed much either. Joel Rose, the New York City Department of Education's chief executive for human capital, wants to change that. He's leading a pilot program called School of One that has the potential to drastically change the way children are taught, and the way classrooms are designed.

Rose saw firsthand that conventional instruction has serious shortcomings when he was a fifth-grade teacher, particularly in dealing with the fact that students learn at different rates and in different ways. "There was an incredible diversity of needs in my students," he says. "It was a myth that I could ever personalize my instruction to the needs of each one. I had kids who read on a second-grade level, and kids who could read on an eighth-grade level."

Rose says that one day he was visiting a technical school when he had a revelation. "There is a big sign that says, 'Choose your modality,' meaning that students could choose to learn using the teaching modality that worked best for them. That could be in a classroom, online at home, or by coming in and meeting with a teaching assistant. A big lightbulb went on in my head." One of the keys to dealing with students' diversity of needs was to allow them the option of learning in different ways so they could work at their own pace.

"The idea that every iota of learning needs to come through an adult at the front of a room is very 18th century. We know kids can also learn online, in groups, or through virtual tutors or live ones." Rose felt that if all of these modalities could be integrated in a single setting, and each child's progress could be monitored every day, several things could be accomplished. First, lesson plans could be constantly personalized on the basis of what a child needed to learn, and the best instructional materials for teaching it could be changed at any time. Second, students and their teachers could choose the modality that would produce the best results. "Kids who like to learn in groups can spend more time

in groups. Kids who like to learn online can spend more time online. But that doesn't mean that a child is going to sit in front of a computer all day."

It's easier said than done — but new tools make it possible. One is a teaching-support system. Extensive testing is done at the beginning of each term in order to evaluate which skills each individual student needs to acquire to keep up with their particular grade level. School of One students also take a survey that establishes their learning styles and preferences. Based on these assessments, a "playlist" of skills that students must master during the term is developed. Appropriate instructional materials drawn from a multitude of different sources can be used in the modality that suits each student. But the thing that really sets it apart is that each student's progress is monitored at the end of each day, and their playlists are updated constantly. As Rose says, "This program sorts out who is failing to get which concepts today and to determine which lesson to apply tomorrow morning."

NEW ARCHITECTURE FOR NEW INSTRUCTION

New instructional models always challenge architectural conventions. The American Architectural Foundation's (AAF) Great Schools by Design program studies innovative schools and often dispatches resource teams to work with school districts that are implementing new ways of teaching. Its C.E.O., Ron Bogle, Hon. AIA, says, "We have been doing focus groups of schools that are recognized as having been exceptionally well designed, and we're finding that they have evolved around new kinds of instruction. A school that is traditionally designed will reinforce a traditional way of teaching. Innovatively designed buildings send a signal that says, 'Beware. Those who enter here do not teach the old way.' " He says that in these cases, architects are working with educators to "figure out how to design spaces that support collaboration, cooperation, teamwork, community, and transparency."

Last spring, the AAF dispatched a resource team to hold a charrette with the educators and administrators who would be responsible for running the first School of One pilot at Middle School 131 in New York City over the summer. The purpose was twofold. Not only would they help assess the space available for the pilot and plan the way it might be used, but they would also examine the way architectural design could be used in support of the School of One instructional methodology. John Weekes, AIA, of Dull Olson Weekes Architects, led the charrette. "I'm not sure there's only one way a kid

PROTOTYPES

So, what might a School of One school look like? To find out, New York City Department of Education's School of One faculty and staff gathered with architects John Weekes, AIA, of Dull Olson Weekes Architects; John Pflueger, AIA, of Cuningham Group Architects; and educational planner Susan Wolff, director of Wolff Designs. The occasion was a charrette put on last May by the American Architecture Foundation and sponsored by Target.

It became immediately apparent that there would be major differences between a School of One and conventional schools. First, because each School of One student would have his or her "playlist" (a list of skills they must acquire during the current term) updated every morning, they would need a place to check in when they arrived for school. This area could be similar to a reception area in an office building. A perspective (1) and the sketch on the previous page show such a space. Monitors in these areas would display where each student should go for their lessons that day.

One of the concepts behind School of One is that a variety of instructional modalities would be available for each student so they could choose the one that works best for them. This would require a variety of different kinds of spaces. In the conceptual axonometrics (3,4), some spaces would be used for lectures for 20 to 30 students, but most of the spaces are smaller. For example, a student could study with others in a small group led by a teacher or do self-directed study using a laptop. He or she could also be tutored one-on-one by a mentor.

This new kind of school would also feature a wide variety of furniture: a combination of tables and chairs that one might ordinarily expect to find in a classroom (2), as well as more comfortable lounge chairs one might find in a library. Partitions that could be moved on the fly as well as semipermanent walls that could be changed between terms would give the spaces great flexibility.

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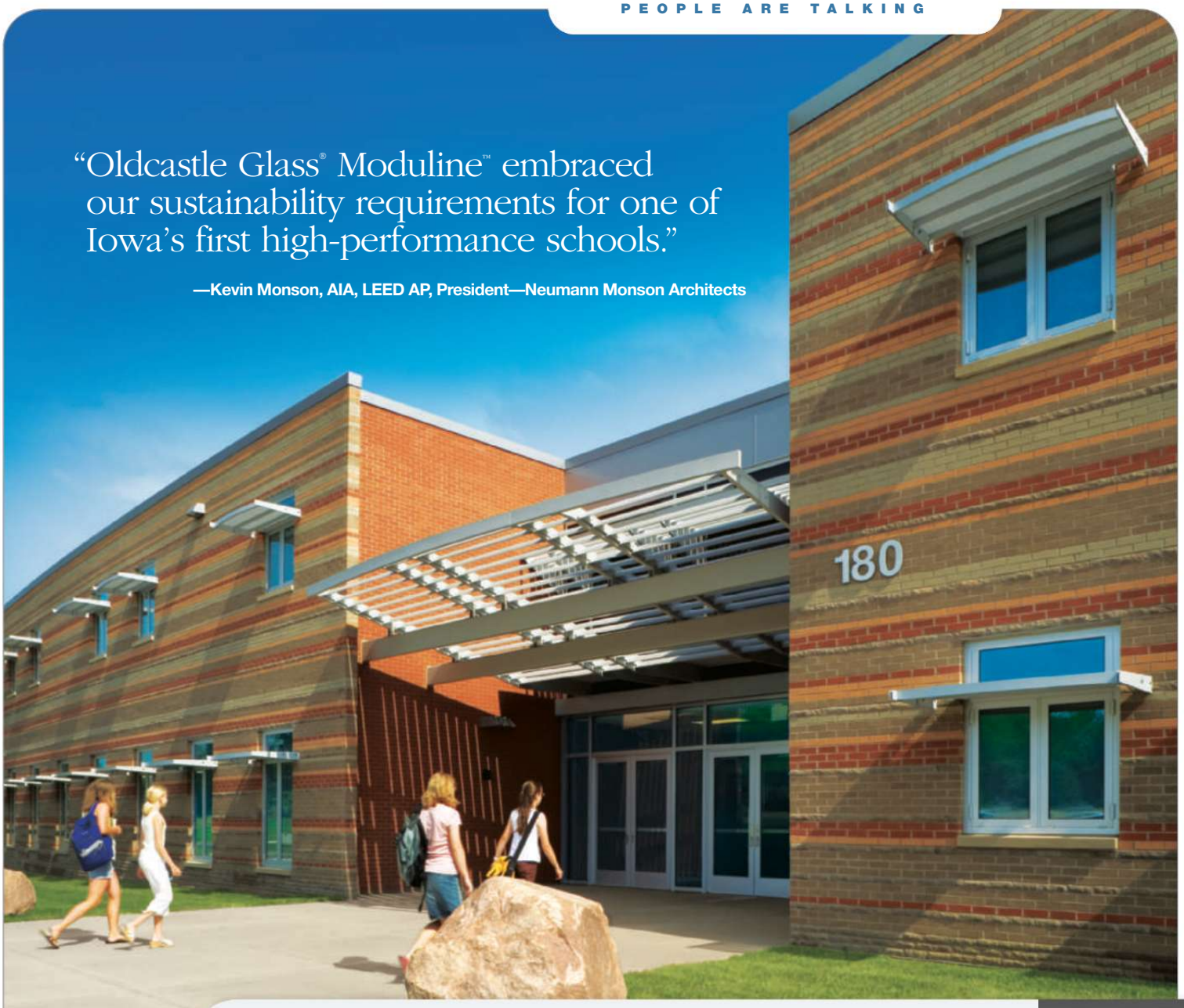

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CIRCLE 27

IMPLEMENTATION


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Last summer, 80 students, four teachers, and four teacher interns took part in the very first School of One pilot, held at Middle School 131, in New York City's Chinatown. Its library was transformed into the very first classroom of this type. The library was chosen because it had the largest open area in the building that also had low ceilings for acoustical control and good lighting. It was not desirable to erect permanent walls for the summer, so makeshift partitions were used to divide the space. The AAF charrette held to help plan the space yielded some surprises. School of One founder Joel Rose says, "We learned that for different modalities there is often an optimal furniture configuration." Two of the modalities used in the program were self-guided instruction using laptops (1,3) and small-group instruction (2,4). "And we found the number of modality types exceeded the number of spaces and types of furniture we had."

learns. In a typical school, we create a classroom for one way of instruction, and everyone has to fit that. What is different about the School of One is not just that the instructional modalities are changing, but when you take the teacher out of a direct-instruction environment and make him or her more of a participant in the learning, and put the kids in charge of their own instruction, it fundamentally changes the way spaces get organized." The drawings show how such a school might appear someday (see previous page). Rooms are smaller than one might find typically, and a variety of furniture types and partitions can be rearranged quickly and easily.

The students begin their day at a central gathering space. "That's like a living room, where the students go in the morning and pick up their new playlist, and see what they will be doing that day." Although classrooms for large-group instruction are available, "We envision that they could be rearranged in 12 or 15 different ways," Weekes says. "But most of the time, students will be in small groups of 10 to 15, or working individually or in groups of two or three." Students who are doing individualized instruction will be using wireless laptops or PDAs; some computing will be mobile, although computers in other rooms will be hardwired. Smaller learning centers, which are basically extensions of the central area, allow the space that is generally devoted to corridors to be utilized more efficiently.

For the pilot program itself, the AAF resource team toured the school looking for a space that would adequately host the 80 students and 10 faculty and staff members. Traditional classrooms available in the school would not have allowed the flexibility that was necessary, and no single classroom could accommodate all the students at the same time. Eventually the staff found ways of temporarily dividing the too-large library, using portable partitions and relocating shelves.

Acoustical privacy during the pilot was also not the issue that people expected it might be, which yields a lesson that could apply almost anywhere. "I think students get distracted if they are getting content they are not ready to learn," says Rose. "They were ready, and that cut down the distractions. In a conventional classroom, kids may look like they are paying attention but sometimes their minds are in another place. That was not the case here."

EVALUATION AND THE FUTURE

Does School of One work? The progress of students participating in the program last summer was independently assessed by the Education Development Center's Center for Children and Technology. It found a significant improvement. In a comparison of pre- and post-program test scores, students had an average increase of 28 percent in the number of test items they answered correctly. The New York City Department of Education is betting on the project and will expand it into three city schools in January, and five more next fall. Apparently, it is a good bet: School of One was named one of *Time* magazine's "50 Best Inventions for 2009."

Rose says, "I think that the architecture community is scapegoated because of the experiments with open classrooms 40 years ago. I don't think the absence of walls was the problem. The problem was the absence of a clear instructional program that delivered on student outcomes." Rose worries about the open-classroom stigma because he believes open space is one of the keys to personalized learning. He cautions both the architecture and education communities, saying, "It isn't enough to be focused on the next whiz-bang school. We have to shift our brainpower to the business problem that we have, which is, How do we improve the problem of teaching and learning in our schools? The extent to which we can have a solution requires an integration of all the pieces." ■

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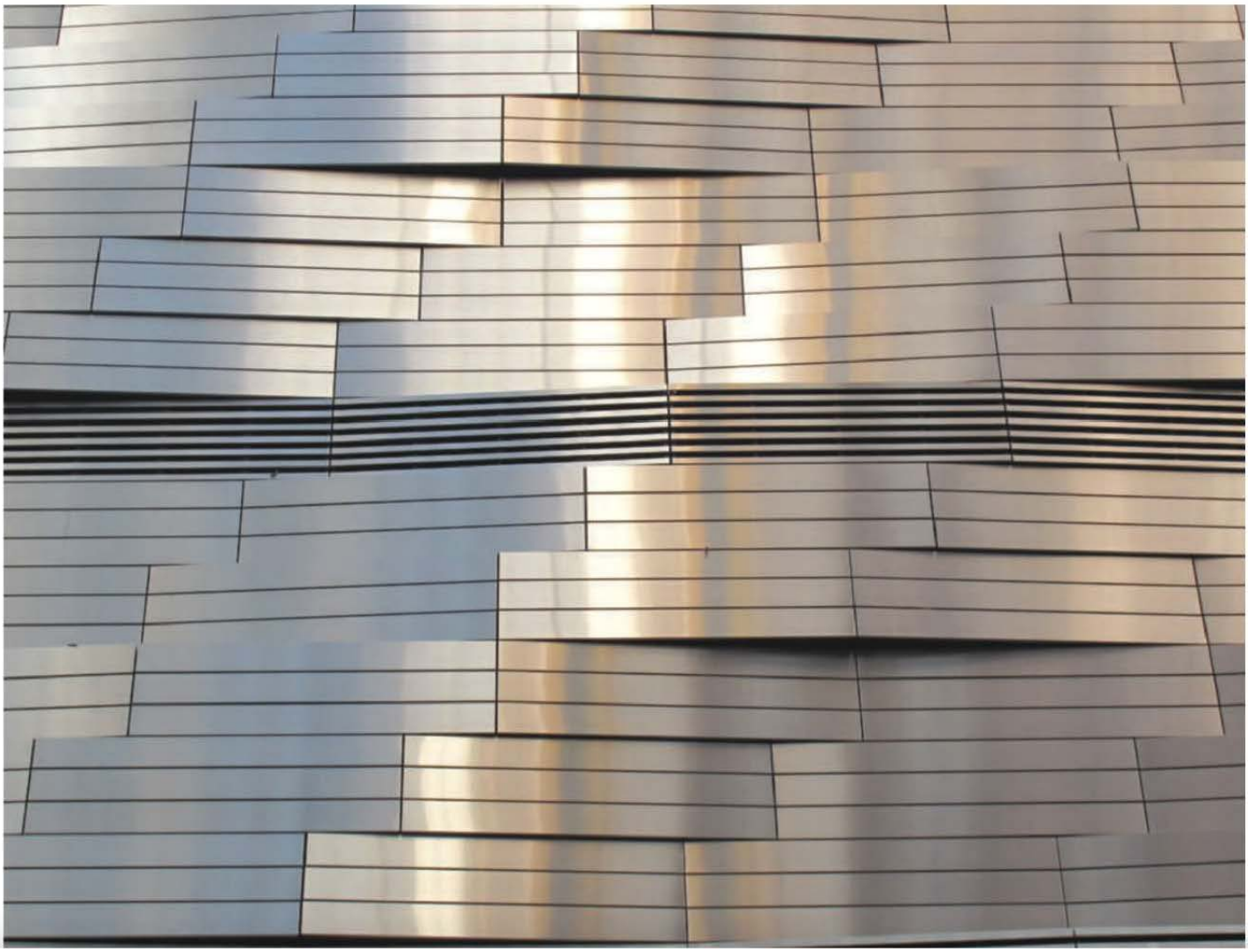

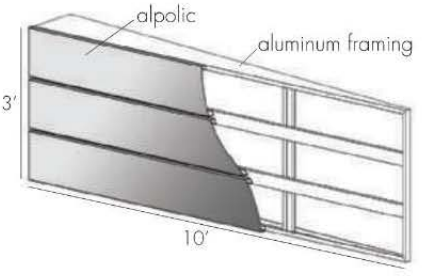

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ARCHITECT: *Gensler Architects*

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1

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Smith System's UXL seating options for high schools and colleges are available in 17 different colors, and many of the chairs offer a choice of two colors for different seat and back colors. Add-on accessories, including book baskets and arms, are available with most of the UXL seating optons. Smith System's desks come in nine different desktop colors and 17 edge molding colors. **CIRCLE 210**

2

2 | PRODUCT **Custom Playground Equipment**
MANUFACTURER **Little Tikes Commercial**
littletikescommercial.com

Chicago's Jesse Owens Park, designed by Chicago-based Hitchcock Design Group, features an Olympic stadium theme, including custom Little Tikes Commercial play structures. Using Olympic colors — red, blue, black, yellow, and green — the playground includes a preschooler area with a tot-size ticket booth, double slide, and climber, while older kids have a separate area with sports-themed equipment, including climb-through rings. **CIRCLE 211**

3 | PRODUCT
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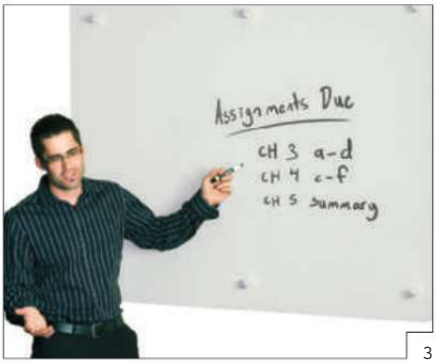

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4 | PRODUCT **Custom Sunshades**
MANUFACTURER **Kawneer**
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The new Hot Springs Intermediate School in Hot Springs, Arkansas, features an open floor plan with natural light throughout. To help control glare and maximize natural light, a combination of Kawneer's 1600 SunShade and custom sunshades were utilized. Using Kawneer's 190 Narrow Stile Entrance door rail materials, Valley Building Specialties built the outside perimeter of the vertical sunshade, glazed the inside with perforated panels, and then incorporated these into the 1600 SunShade. **CIRCLE 213**

5

5 | PRODUCT **EcoSpec WB**
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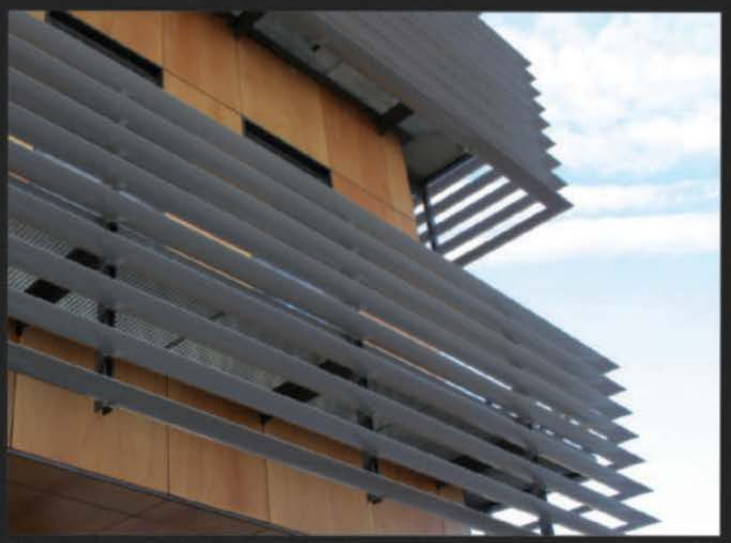

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CIRCLE 66

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CIRCLE 67

Jeremiah E. Burke High School

Boston, Massachusetts | Schwartz/Silver Architects

BY **Beth Broome**

THE RENOVATION OF THE JEREMIAH E. BURKE HIGH SCHOOL in the Dorchester section of Boston had been in planning for years when Mayor Thomas M. Menino stepped in and scrapped the project. A nearby branch library was in need of updating and expansion, so why not combine the two programs? Going back to the drawing board, the city brought in Boston-based Schwartz/Silver Architects and charged them with renovating the 1934 school and expanding it to include a community center and public library. The result is the first new facility to exemplify the mayor's Community Learning Initiative, a collaborative effort by Boston Centers for Youth & Families, Boston Public Schools, and the Boston Public Library to promote education and literacy across the city.

ARCHITECT: Schwartz/Silver Architects – Robert H. Silver, FAIA, principal in charge; Mark Schatz, AIA, design principal; Randolph Meilklejohn, AIA, principal; Angela Hyatt, AIA, interior design principal; Nelson Liu, project manager; Michele Baldock, Assoc. AIA, project designer; Peter Kleiner, AIA, Philip Chen, AIA, Susan Morgan, Richard Lee, team

CLIENT: City of Boston: Boston Public Schools, Boston Public Library, and Boston Centers for Youth & Families

SIZE: 65,000 square feet (new); 144,000 square feet (renovation)

COST: $37.5 million

SOURCES

METAL PANELS: Morin/Metecno; Alucobond

GLASS CURTAIN WALL: Alumicor

GLASS: Oldcastle Glass; Solera; Vanceva

ROOFING: Tremco (built-up); Sarnafil (elastomeric)

PANELING: Plyboo (bamboo)

CEILINGS: Armstrong; Tectum

PAINTS, STAINS: Sherwin-Williams, Valspar

PANELING: Plyboo (bamboo)

The new wing facing Geneva Avenue gleams like a beacon of possibility in its rugged environment of auto-repair shops and vacant lots. "This is one of the toughest streets in Boston," says design principal Mark Schatz, AIA, referring to the area's high crime and murder rates, "but they have this beautiful Art Deco high school." Schwartz/Silver used a light hand in the renovation, restoring exterior masonry, updating interiors and systems, and expanding the cafeteria. The program called for a minor expansion of the school's gym, but the architects envisioned a regulation basketball court as part of the new wing. To bring the public library and community center down to street level, they located the gym on the top floor and sandwiched the high school library below. Connections between the program elements were made flexible so facilities could be shared after school hours.

While incorporating granite and red brick on the new building to tie it to the original school, Schwartz/Silver distinguished the steel-framed volume by cladding the gym level in aluminum, topping it with a clerestory to lighten the overall mass. Expanses of glass prompted push-back from the community, which was concerned about drive-by shootings. But a luminous, transparent volume was critical to the goal of creating an open and inviting facility. The community eventually gave the nod, and the architects created a sense of enclosure with a low planter along the building's front, and situated the children's room and teen spaces away from windows.

The school library is linked to the old building by a glass-and-aluminum bridge and can be accessed from the public library below by a long stair running through its center. The libraries function separately until the end of the school day, when the school library opens to the public. Similarly, the gym connects to the old building at the third level. It is accessible to the public (once the school connection is closed off) via a stair by the community center entrance.

With a flexible and user-friendly design, Schwartz/Silver has effectively managed circulation and different levels of controlled access between the various programs in the old and new buildings. And the architects have done so while maintaining transparency and openness and keeping security concerns at the forefront. With this project, they are helping to make the mayor's vision for shared resources and community building a reality. ■

PHOTOGRAPHY: © ALAN KARCHMER

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1. **The front entry level is 28 feet below the elevation of the entry on the other side, allowing a mezzanine to be inserted above the public library's main floor.**

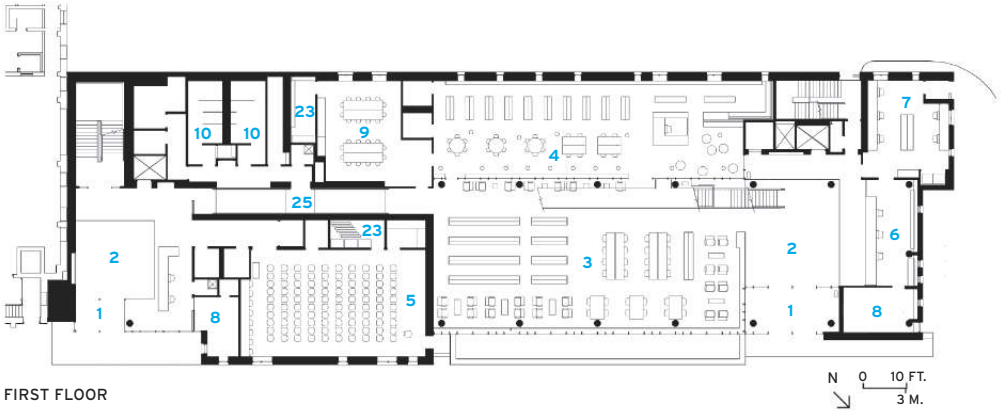
2. **The architects used colorful laminated glass on both the ground floor branch library and the school library one level up to add a playfulness to the facade, and so the spaces would be perceived as a single entity.**

3. **Aluminum clads the upper gym level of the extension. Red brick, used sparingly around the community center's street entrance, acknowledges the original building.**

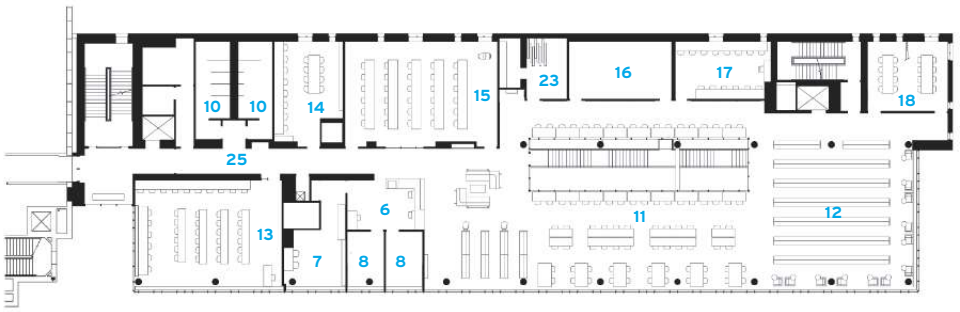
3

DRAWINGS

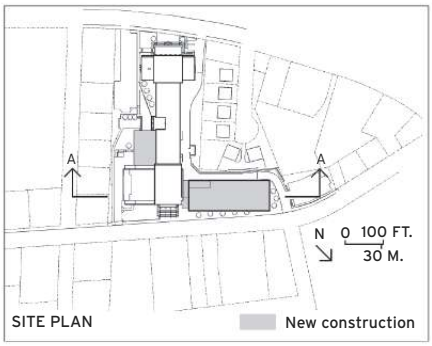
1 Entrance
2 Lobby
3 "Living Room"
4 Children's room
5 Meeting
6 Circulation
7 Staff workroom
8 Office
9 Multipurpose
10 Restroom
11 Seating
12 Collections
13 Career center
14 Teachers' planning
15 Media center
16 Studio production
17 Editing suite
18 Group study
19 Gymnasium
20 Mezzanine
21 Weight room
22 Locker room
23 Storage/ mechanical
24 Auditorium
25 Corridor



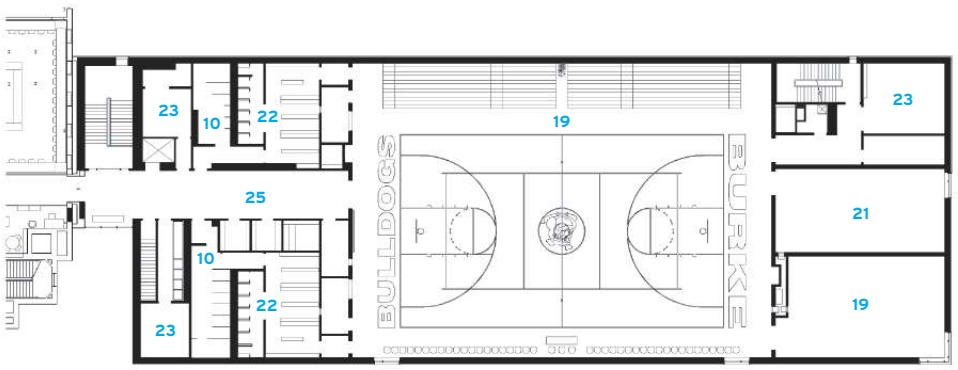
FIRST FLOOR



SECOND FLOOR



SITE PLAN



THIRD FLOOR

SECTION A-A

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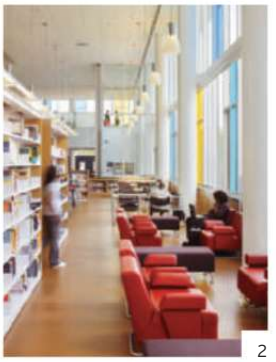

2

1. **A long run of stairs, with bright laminated glass sides, connects the public library's main floor and mezzanine to the school library at the top, and boldly announces the flexibility of the space. Maintaining clear sight lines was also critical to the design.**

2. **Visible from the street, the public library's "Living Room" is an emblem of the new facility's openness and accessibility. Sustainable systems and finishes were used throughout.**

3. **The high school library computers are a valuable resource for the community after school hours.**

4. **The regulation basketball court employs two concrete floor slabs: one structural, the other on isolation springs to deaden sound.**

5. **The Art Deco auditorium in the original building was restored to its former state.**

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Roy Romer Middle School

North Hollywood, California | Johnson Fain

BY **Sarah Amelar**

BEFORE THE ROY ROMER MIDDLE SCHOOL pushed open its doors on the first day of classes in September 2008, its section of North Hollywood represented a gaping hole in Los Angeles Unified School District (LAUSD)'s vast patchwork of educational facilities. This predominantly Latino neighborhood had been forced to ship its sixth-through-eighth graders to distant schools, running year-round. For LAUSD, severe, chronic overcrowding had become a fact of life.

But today, the Romer School – with its colorful cluster of rectilinear buildings – has 1,800 students, all from "within walking distance," reports principal John McLaughlin. "Except for special ed, no one's bused in." This change resulted from the massive construction and modernization program currently under way in Los Angeles, funded by $20.1 billion in bond measures (the largest capital project in the U.S.). Since 2001, it has created 80 new schools and upgraded hundreds of existing ones.

Like the program itself, North Hollywood's new middle school owes much to Roy Romer, LAUSD's superintendent from 2001 to 2006, who emerged, literally and figuratively, as a groundbreaker. A septuagenarian tractor salesman with a cowboy twang, he was Colorado's governor before tackling this job, steering L.A.'s ambitious but troubled facilities initiative back on track. Engaging design architects from the outset, he interviewed them on his weekly public-access TV show, introducing the design strategies to a larger public forum.

Consistent with LAUSD's current goals, the Romer School echoes local scale and density while positioning such facilities as gym and athletic fields for double duty as community amenities. Unlike the breathtakingly tight urban sites of many of its sister schools, the Romer – serving a student population 89 percent below the federally defined poverty level – has a generous 9.5-acre, L-shaped corner parcel. Creating 157,000 square feet of interior space, architects Johnson Fain deftly stacked the massing toward the site's east side, fronting an arterial boulevard with linear three-story classroom/administration buildings. Bridging this commercial strip to the residential neighborhood along the campus's west side, the massing steps down with smaller buildings – a gymnasium, library, and cafeteria, as well as multipurpose and media centers – opening toward the school's "town square" and playing fields.

Though far more conventional than LAUSD structures by

ARCHITECT: Johnson Fain – Scott Johnson, FAIA, design partner; William H. Fain, Jr., FAIA, managing partner; Larry Ball, AIA, senior project manager; Arnold Swanborn, AIA, senior design architect; Tom Brakefield, AIA, project architect

CONSULTANTS: William J. Yang & Associates (mechanical and plumbing); Mia Lehrer & Associates (landscape)

CLIENT: Los Angeles Unified School District

SIZE: 157,111 square feet

COST: $58 million

SOURCES

MASONRY: Orco Block

METAL/GLASS CURTAIN WALL: United States Aluminum

GLASS: Viracon; Glas Pro

SKYLIGHTS: Metcoe

LIGHTING: Lithonia Lighting (interior); WE-EF Lighting USA (exterior)

PLASTIC LAMINATE: Pionite; Nevamar; Lamin-Art; Lamitech; Formica

WOOD DOORS: Oshkosh Door Company

CARPET: Mohawk

PHOTOGRAPHY: © FOTOWORKS/BENNY CHAN

1

1. **North Hollywood's Roy Romer Middle School presents a collage of red and purple synthetic plaster cladding and corrugated steel.**

2. **The colorful cluster of rectilinear buildings opens toward the school's "town square" and playing fields.**

3. **The buildings use durable, low-maintenance materials such as concrete blocks laid in two-tone stripes.**

4. **The school sits on a generous, 9.5-acre, L-shaped corner parcel.**

2

3

4

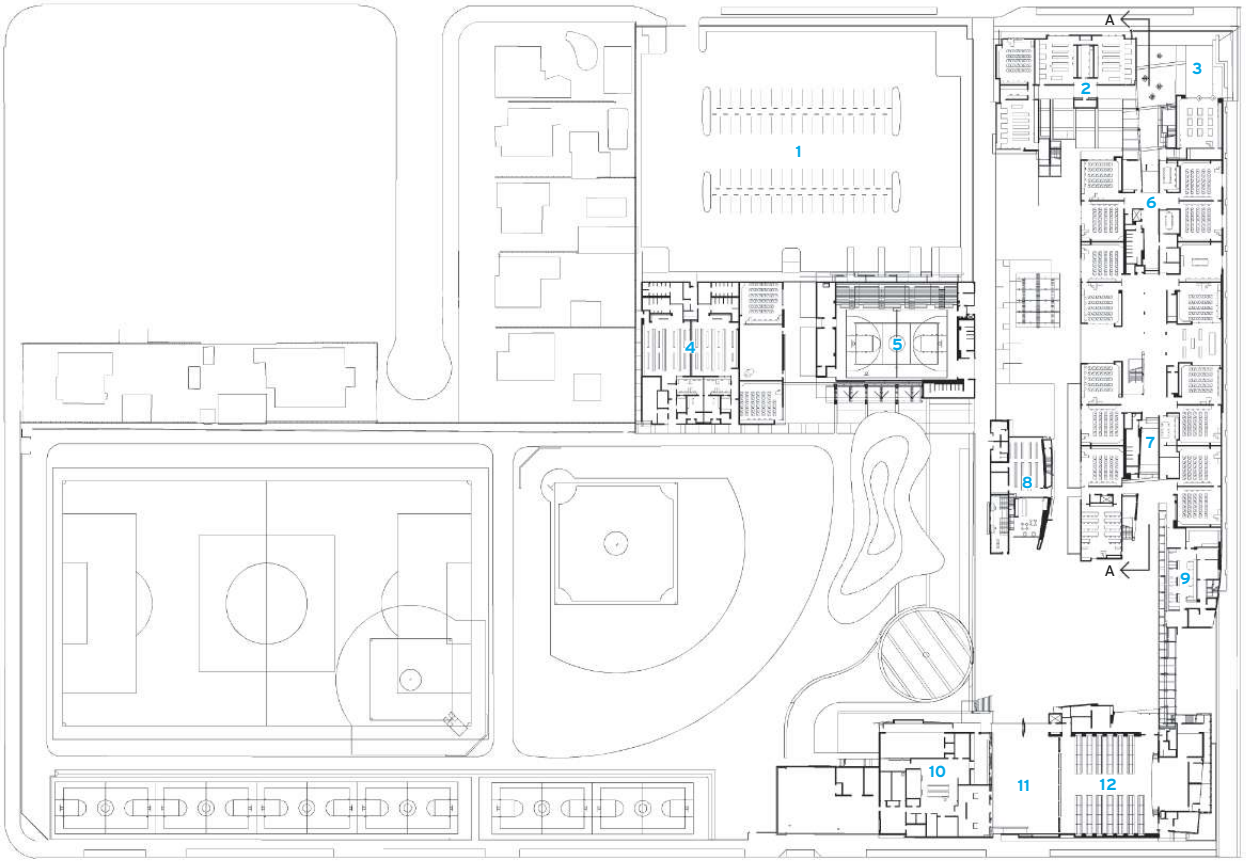
Coop Himmelb(l)au (see page 56) or Morphosis, the Romer School presents a collage of red and purple synthetic plaster cladding, corrugated steel, aluminum windows, and concrete blocks laid in two-tone stripes – all durable, low-maintenance, quasi-industrial, vandal-resistant materials.

Although the front gates get locked during class hours (and administrative offices sit strategically beside this entry portal), "the idea was to create a secure, self-contained campus that feels open, with long views out across the fields," says architect Scott Johnson, FAIA. "We wanted to avoid the lockdown feel – the high walls and razor wire – common in schools these days." Extensive glazing facing the schoolyard fosters a sense of openness and transparency, while courtyards between ground-floor classrooms allow outdoor learning. Reducing energy costs, Johnson Fain brought circulation corridors to the temperate outdoors, with steel-grate decks and translucent polycarbonate shading.

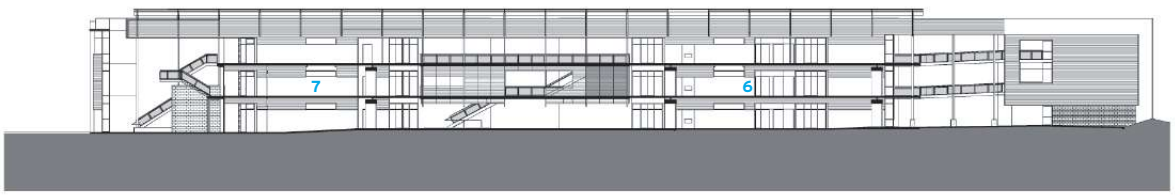
"Every square inch gets used, in ways you wouldn't imagine," says McLaughlin. On the downside, he concedes, "all the [outdoor] nooks and crannies pose security challenges – trouble has a habit of happening where we can't see it." Yet he values "how modern and bright the place is – so different from what everyone's used to," adding, "I constantly overhear parents proudly saying their kids go here." ■

DRAWINGS

1 Faculty parking
2 Science center
3 Arts courtyard
4 Locker rooms
5 Gymnasium
6 Classroom Building A
7 Classroom Building B
8 Library/media center
9 Administration
10 Cafeteria/kitchen
11 Dining
12 Multipurpose theater



FIRST FLOOR



SECTION A-A

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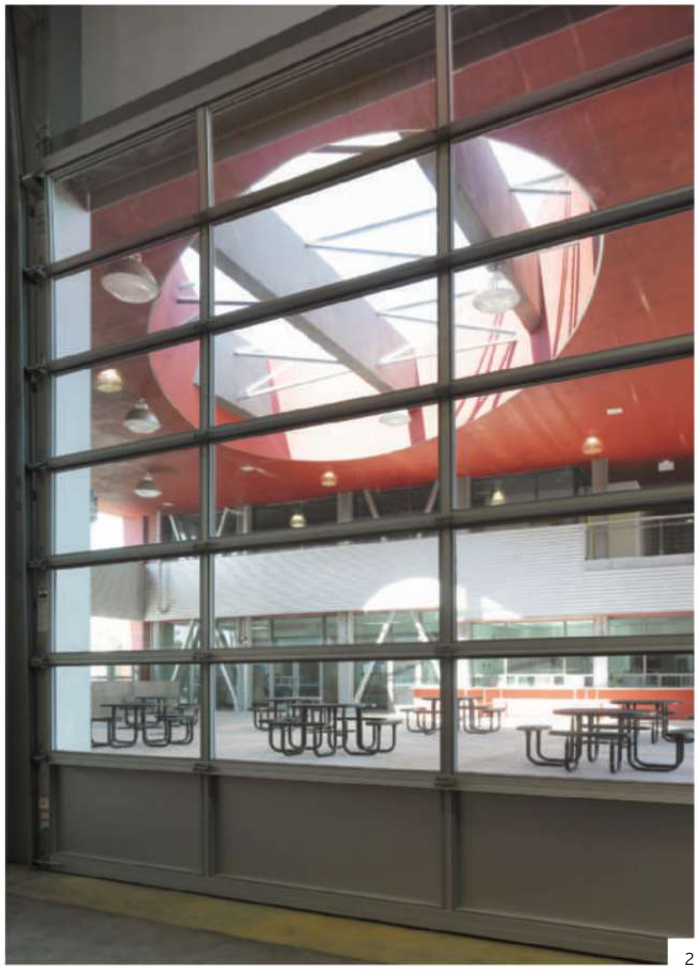

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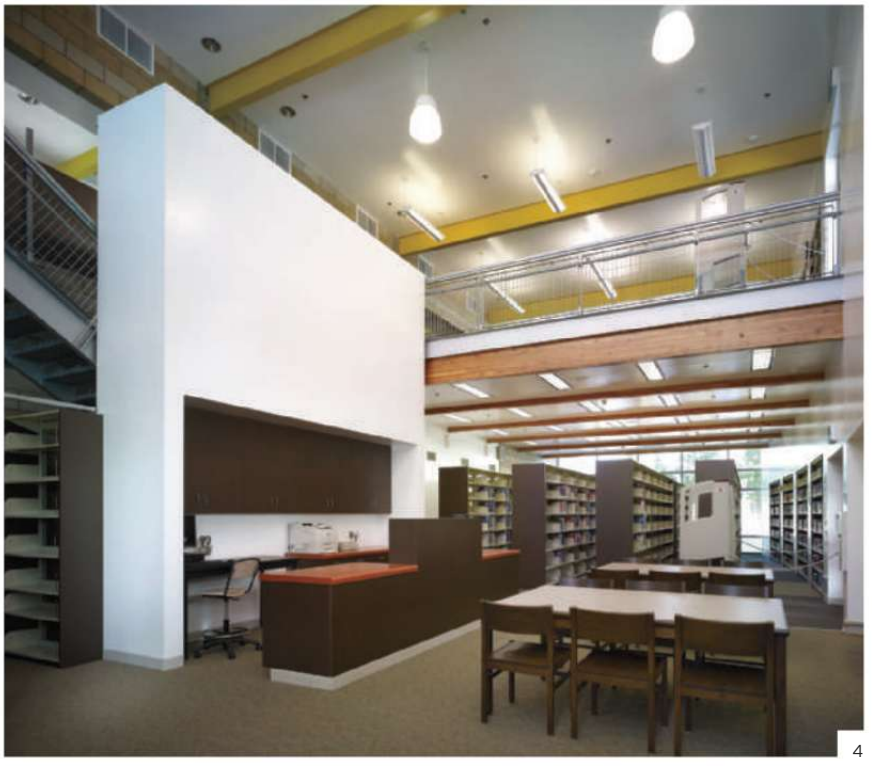

4

1. **The exterior's playful color scheme is carried over into interior spaces such as the multipurpose theater.**

2. **Courtyards between ground-floor classrooms allow for outdoor learning.**

3. **The same durable, low-maintenance, quasi-industrial materials that clad the buildings are used in interior spaces.**

4. **Long views out across the fields are possible from within the library as extensive glazing facing the schoolyard evokes openness and transparency.**

Latin American Montessori Bilingual Public Charter School

Washington, D.C. | Hickok Cole

BY **Joann Gonchar, AIA**

PHOTOGRAPHY: © ANICE HOACHLANDER

SINCE IT FIRST OPENED in a church basement in Northeast Washington, D.C., with 57 preschoolers in 2003, the Latin American Montessori Bilingual Public Charter School (LAMB) has had a nomadic history. The quickly growing LAMB, which offers a dual-language immersion program combined with a curriculum based on the philosophies of educator Maria Montessori, relocated four times in just six years. It shared quarters with other schools and spent one academic year in the newly renovated, early-20th-century school in D.C.'s Brightwood neighborhood that would eventually become its permanent home. But before settling in for good, LAMB temporarily relocated one last time to ease construction of an approximately 19,000-square-foot addition. Peripatetic staff and students returned to the expanded Federal Style structure last January.

Local firm Hickok Cole is responsible for both the renovation and expansion projects that transformed the landmarked, almost century-old school with four classrooms into one that could support LAMB's approach to learning and accommodate its growing population (enrollment is now at 171 students through fourth grade). To the rear of the two-story, load-bearing masonry structure, the architects added a straightforward but thoughtfully designed brick-clad box containing offices and two classrooms. Between the old and new, they inserted a strip of circulation space, glazed at both ends. This slotlike zone provides a new main entry, reorienting the building toward an adjacent park and away from the busy avenue to the south, just beyond the historic school's original portico-covered front door.

The arrangement also allowed designers to take advantage of the site's steep slope and create entrances into the new circulation zone on two different levels – an upper one from a plaza to the reception area, and another from a lower elevation to a basement multipurpose space. A welcoming steel-tread stair, with both adult- and child-scaled handrails, connects the two floors.

Within the circulation zone, the historic brick facade is left exposed, creating a contrast with the new construction's supporting steel columns and beams. Leaving these elements visible was in tune with Montessori philosophy, explains Diane Cottman, LAMB executive director, who hopes the students will learn from the structure. This goal of using the building as a teaching tool, in addition to a desire to reduce stormwater runoff, also provided the motivation for installing a green roof over the entry lobby. Although the roof is not accessible, students can view it from several second-floor windows.

The classrooms are basic but appealing. In the historic building, contractors repaired plaster-on-masonry walls; reinforced wood-paneled ceilings to support new light fixtures; and refurbished existing, double-hung wood windows. In the new wing, classrooms have suspended ceilings that partially reveal ductwork, and generous high-performance windows that provide a connection to the outdoors. Holly Lennihan, Hickok Cole project designer, says that these "mute" surroundings should foster development of children's concentration skills. Creating a setting to support learning is like designing a gallery, she explains. "The room is the backdrop for the art." ■

ARCHITECT: Hickok Cole Architects – Michael E. Hickok, AIA, principal in charge; Holly Lennihan, project designer; John Murray, AIA, project manager; Elba Morales, Sheena Spearman, project architects; Susan Pelczynski, Vy Horwood, interior designers

CONSULTANTS: VIKA (civil); Structura (structural); Hurst & Associates Consulting Engineers (m/e/p)

CLIENT: Latin American Montessori Bilingual Public Charter School

SIZE: 19,257 square feet (new); 12,179 square feet (renovation)

COST: $5.7 million

SOURCES

MASONRY: Carolina Ceramics

CURTAIN WALL: Kawneer

ELASTOMERIC ROOFING: Firestone

GREEN ROOF: American Hydrotech

ELEVATORS: Kone

ACOUSTICAL CEILINGS: Certainteed

SUSPENSION GRID: Armstrong

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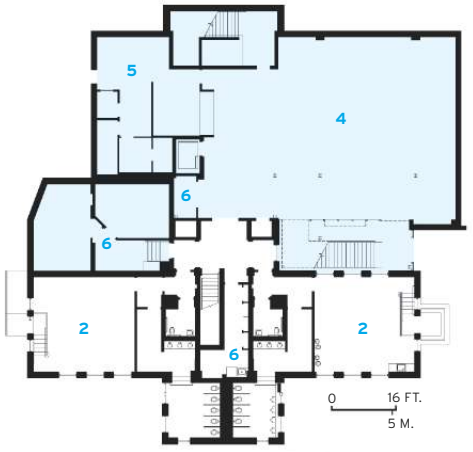
1. **The architects gave the school a new primary facade with entrances on two levels — an upper one from a plaza to the reception area, and another from a playground to a basement multipurpose space.**

2. **An interior stair with both adult- and child-scaled handrails connects the basement entry to the first-floor reception area.**

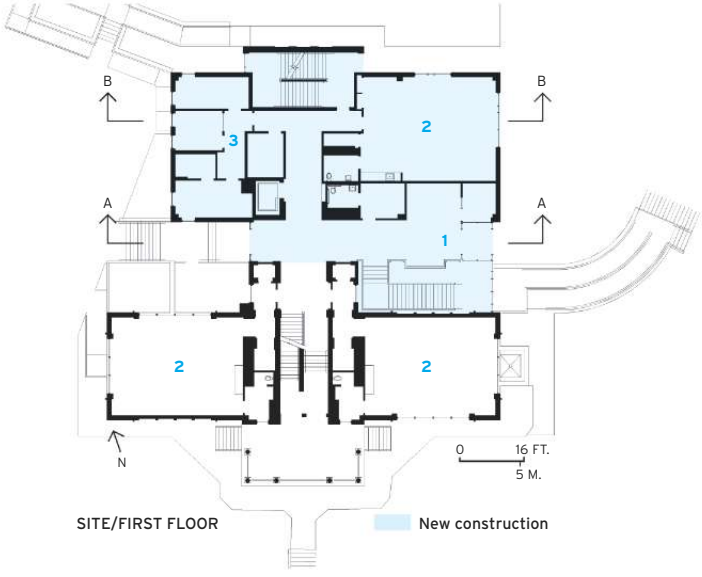
3. **The exterior walls of the historic school and the new construction's supporting steel structure have been left exposed within the circulation zone.**

DRAWINGS

1 Reception
2 Classroom
3 Administration
4 Multipurpose
5 Kitchen
6 Storage/utilities
7 Library
8 Green roof



BASEMENT New construction



SITE/FIRST FLOOR New construction

SECTION A-A

SECTION B-B

Booker T. Washington High School

Dallas, Texas | Allied Works

BY **David Dillon**

3

PHOTOGRAPHY: © JEREMY BITTERMANN (1,2); HELENE BINET (3)

THE OLD BOOKER T. WASHINGTON High School for the Performing and Visual Arts was dark, dingy, and chaotic, with students forced to rehearse in stairwells and parking lots, an eight-lane freeway on one side, empty warehouses and vacant lots on another. Yet in spite of all the urban grit, the place was electric, Fame with a Texas twang, where students could be messy and loud and not worry about what the grown-ups thought. Any school that can produce Norah Jones, Edie Brickell, and Erykah Badu is doing something right.

Allied Works Architecture won a 2001 competition for a new school building by honoring this freewheeling creative spirit while giving students the clean, well-lighted studios and rehearsal spaces they had never had. "We wanted to create some privacy and protection for the kids, yet also to connect the school to the expanding Arts District down the street," explains lead designer Brad Cloepfil, AIA. "So we made the building spiral both in and out."

The winning scheme had two main components: a four-story, L-shaped "art factory" containing loft studios and rehearsal spaces organized around extra-wide corridors and tall atriums that serve as interior streets and plazas and emphasize light, cross views, and transparency. The second was the renovation and reprogramming of the 1922 building, connected to the new school by a bridge and courtyard.

Opened in 2008, the Arts Magnet, with its new shorthand name, retains the old spirit. Live music floats down the corridors. Dancers practice their pliés in lobbies and studios, which are now visible from the street. Even the cafeteria has a sprung floor (for dancing) and opens to an outdoor stage and amphitheater, called the Green Room, where the entire school can gather for performances. "All this space and flexibility inspires students to try new things and to push limits," says principal Tracie Fraley. "The building is a performance machine."

Clustering studios and performance spaces in the new building allowed Dallas-based Booziotis & Company to restore the historic structure for labs, classrooms, and offices. Windows and staircases that were blocked off for decades were reopened, flooding the interior with light. A lunchroom was converted into a gallery, and a dated auditorium into a state-of-the-art black-box theater.

Not everything sings. The gray brick on the exterior is too dark, and when continued inside produces a somber, prisonlike feel. The ceilings' exposed ducts and conduit, though consistent with the building's industrial aesthetic, have often been slapped up instead of visually organized. And for all their energy, the students have yet to claim the school with murals and mobiles. Cloepfil said from the start that he wanted students to "mess" with his building, and he is disappointed that this hasn't happened. "It's just a bunch of simple brick and concrete spaces that need to be personalized," he explains. "It can take it." Fraley agrees and is working hard to bring donors and board members around to that point of view.

Yet everyone also seems to agree that being in the booming Dallas Arts District – which contains major museums by Renzo Piano and Edward

ARCHITECT: Allied Works Architecture – Brad Cloepfil, AIA, principal; Chris Bixby, David Suttle, AIA, Tenna Florian, Nathan Roelofs, Brent Linden, Andrew Hamblin, project team

ASSOCIATE ARCHITECT: Booziotis & Company – Aaron Farmer, AIA, principal

CONSULTANTS: Datum Engineering (structural); G&S Consulting (m/e/p, fire); Jaster Quintanilla (civil); Encore Design Group (theater systems); WHJW (acoustics); Caye Cook and Associates (landscape)

CLIENT: Dallas Independent School District

SIZE: 170,000 square feet (new); 32,000 square feet (renovation)

COST: $55 million

SOURCES

MASONRY: Endicott Clay Products

CURTAIN WALL: Umicore

ALUMINUM WINDOWS: Kawneer

ACOUSTICAL CEILINGS: ICC Sonaspray

FLOORING: American Harlequin (dance studios)

ELEVATORS: Schindler

WATERCOOLERS: Halsey Taylor

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1. **Booker T. Washington High School's location in central Dallas's developing Arts District offers students proximity to major museums and performance spaces.**

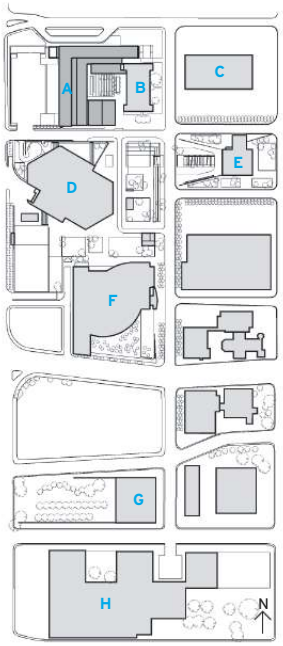
2. **Students gather in the Green Room, an outdoor amphitheater nestled within the center of the old and new buildings.**

3. **The glazed walls of the Arts Theater performance hall contrast with the dark brick of the building's other facades.**

Larrabee Barnes, a concert hall by I.M. Pei, and as of October, a new $350 million performing arts center featuring an opera house by Foster + Partners and a theater by REX/OMA – is a huge plus for the school. Students have only to walk a block or two to see, hear, and work with outstanding artists and musicians. And the Arts District gets 800 warm bodies flowing through it five days a week, generating the street life that until now has been mostly wishful thinking. Planners call this cultural symbiosis; the students, and the Arts District, hope it's more like spontaneous combustion. ■

Contributing editor David Dillon is the former architecture critic for The Dallas Morning News.

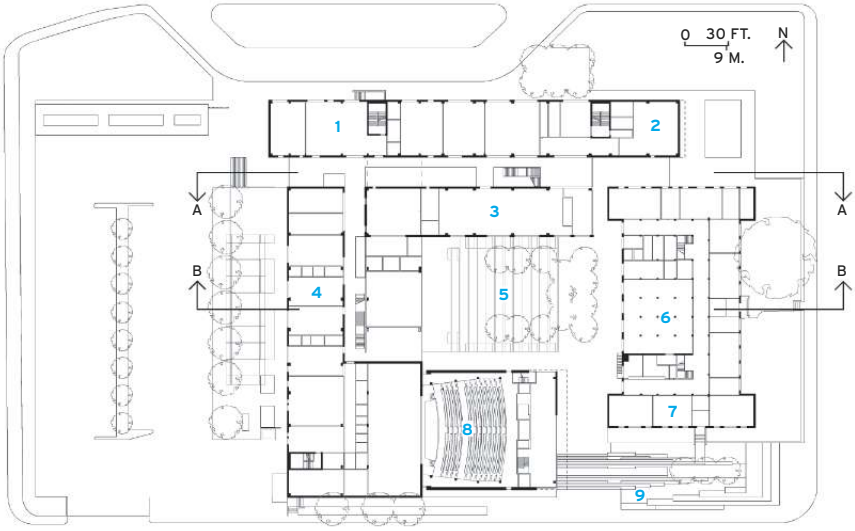
DRAWINGS



SITE PLAN

A New Arts Magnet building
B Historic school building
C City Performance Hall
D Winspear Opera House
E Wyly Theater
F Meyerson Symphony Hall
G Nasher Sculpture Center
H Dallas Museum of Art

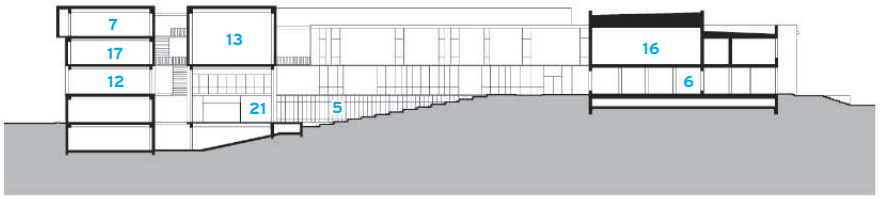
1 Dance studio
2 Rehearsal studio
3 Library
4 Visual arts studios
5 Green Room courtyard amphitheater
6 Student art gallery
7 Academic classrooms
8 Arts Theater performance hall
9 Arts Theater forecourt plaza
10 Movement studio
11 Music studios
12 Theater studios
13 Orchestra room
14 Band room
15 Computer lab
16 Black-box experimental theater
17 Science labs
18 Recording studio
19 Historic school building
20 North atrium
21 Café/commons



GROUND FLOOR

SECOND FLOOR

SECTION A-A



SECTION B-B

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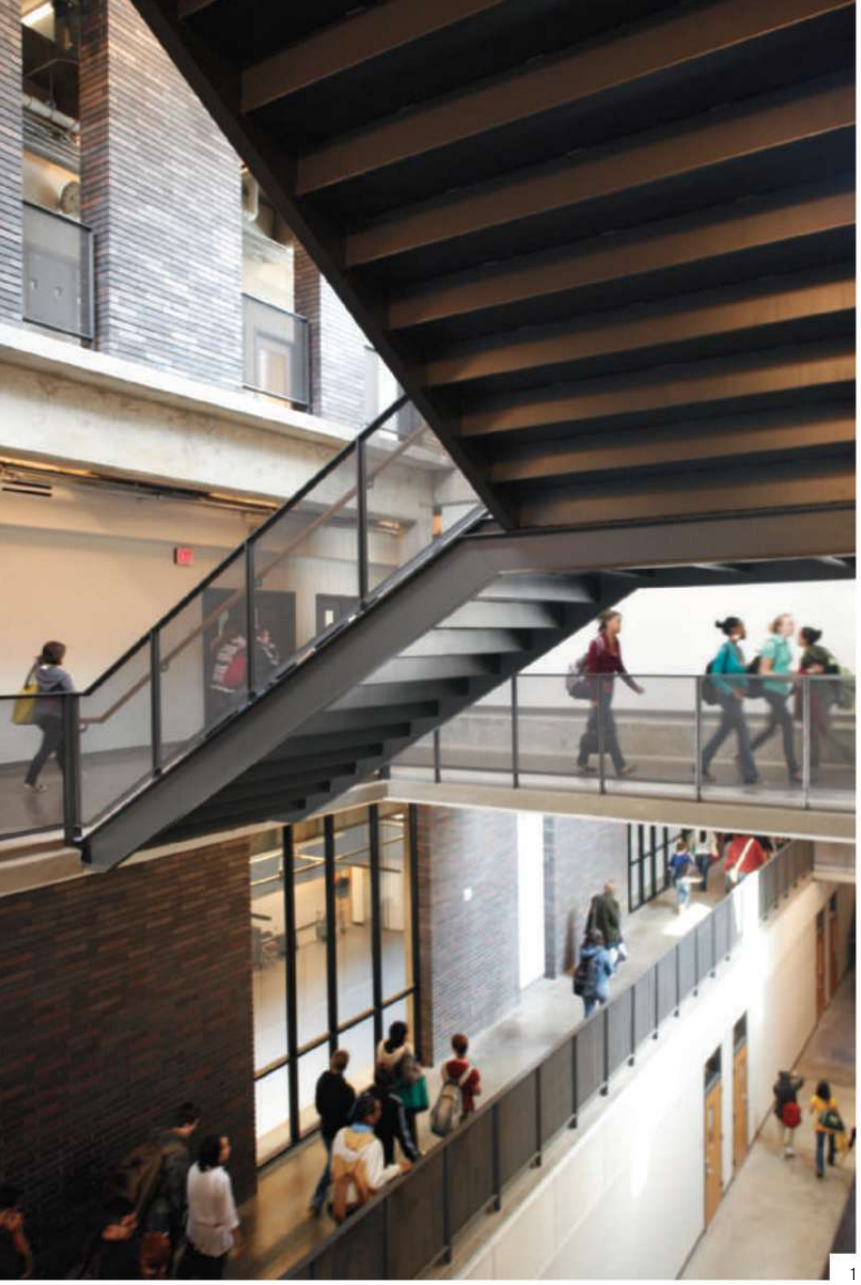
9 M.

THIRD FLOOR



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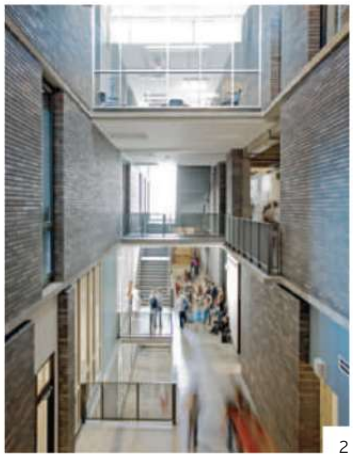


2

3

1. **Extra-wide corridors and tall atriums serve as interior streets and plazas and emphasize light, cross views, and transparency.**

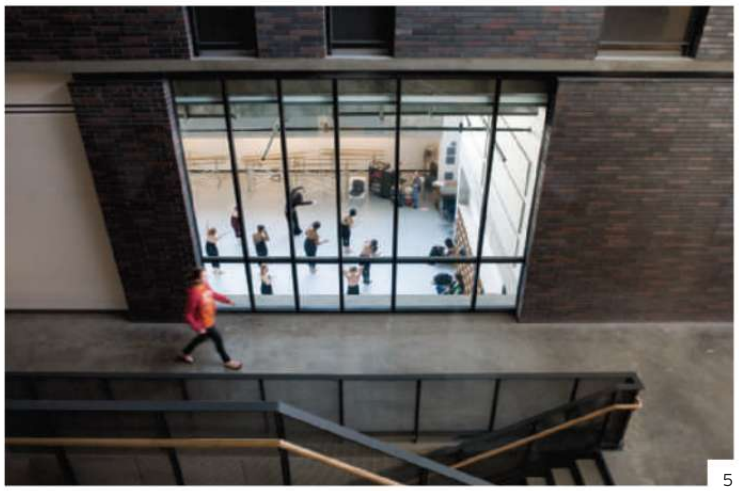
2. **The north atrium is flanked by theater and visual arts studios.**

3. **Stairs, edges, and landings offer opportunities to sit and write, practice and reflect.**

4. **Students rehearse on stage inside the 475-seat, full proscenium theater.**

5. **The artistic disciplines are encouraged to intermingle by their room placement.**

6. **While dancers still practice their pliés in lobbies, the new building's many studios offer large, bright rehearsal spaces that were lacking in the historic structure.**



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PHOTOGRAPHY: © JEREMY BITTERMANN (1,2,5,6); HELENE BINET (3,4)

PS 59 – The Beekman Hill International School

New York City | Ehrenkrantz Eckstut & Kuhn

BY **Josephine Minutillo**

NOTHING ABOUT THE DESIGN OF PS 59 was by the book. The K-5 school's temporary new home inside a former hospital annex building on Manhattan's Upper East Side is the result of a unique public-private partnership between the developer, The World Wide Group, and New York City's School Construction Authority (SCA). They hired Ehrenkrantz Eckstut & Kuhn (EE&K), a firm originally founded as a school practice. It skillfully transformed the 1917 Italianate structure, unoccupied since 2000, into a cheerful learning environment for PS 59's students until renovations to its permanent building, located just a few blocks farther downtown, are completed and a different school can move in. It's a complex juggling act that is becoming a familiar tactic as New York City's student population rapidly exceeds the amount of space available for it.

Adapting a school program to a building designed as a nurses' residence proved a considerable challenge. But the architects converted diminutive dormitory rooms into flexible classrooms with areas for small group learning; and narrow, fixed corridors into lively circulation zones with nooks for storage and informal breakout spaces. "We saw an opportunity in the existing shell," says EE&K's James Greenberg, AIA. "And we were not willing to make any compromises."

The greatest challenge, though, came in locating the gymnasium, which doubles as the auditorium. The decision to put it on the top floor above five levels of classrooms necessitated robust structural and acoustical interventions. Existing interior columns throughout the floor were removed, and perimeter columns and transfer beams added in their place. Spring isolators installed between a new concrete slab and the wood floor and subfloor deaden noise and vibrations.

By including a rooftop playground – confined, in this case, to an area between small towers that originally housed a pergola – EE&K offers a nod to New York City's grand public schools designed under Charles B.J. Snyder at the turn of the 20th century. Similar to those schools, the playground here is shielded by a decorative screen, which provides a protective enclosure for the children at play and adds a bold design element to the historic exterior. The facade itself was cleaned and pointed, and its windows replaced with ones that use insulated glass with low-E coatings to reduce heating and cooling loads.

That EE&K was able to squeeze a full program – including a large basement cafeteria and ground-floor offices, and a community room – into a tight building envelope within a dense urban site is a feat in itself; that it got done in eight months – from start of construction to opening day of classes – is almost unheard of. But it didn't stop there. PS 59 is the first school in New York City to achieve compliance with the SCA's demanding set of sustainable design standards. In addition to a 42 percent reduction in water consumption, PS 59 has no boilers. It is heated with district steam produced as a by-product of electrical generation.

While those facts might go unnoticed by the school's young occupants, the revitalized building's playful character and colorful spaces provide the students with a bright and boisterous setting in which to learn and grow. ■

ARCHITECT: Ehrenkrantz Eckstut & Kuhn Architects – James Greenberg, AIA, managing principal; Raya Ani, AIA, lead designer; Emad Habib, Jo Merriman, project architects

CONSULTANTS: Gilsanz Murray Steficek (structural); Goldman Copeland Associates (m/e/p); The Hirani Group (civil); Shen Milsom Wilke (acoustical); Viridian Energy & Environmental (environmental)

CLIENT: The World Wide Group (owner); New York City Department of Education School Construction Authority (lessee)

SIZE: 50,000 square feet

COST: $30 million

SOURCES

ENTRANCES: Kawneer

GLASS: PPG

TILE: Daltile

METAL DOORS: Marshfield Door Systems

ELEVATORS: Concord

RESILIENT FLOORING: Armstrong

PLASTIC LAMINATE: Abet Laminati

CABINETWORK, FIXED SEATING: Petersen Geller Spurge

PHOTOGRAPHY: © ARCH PHOTO

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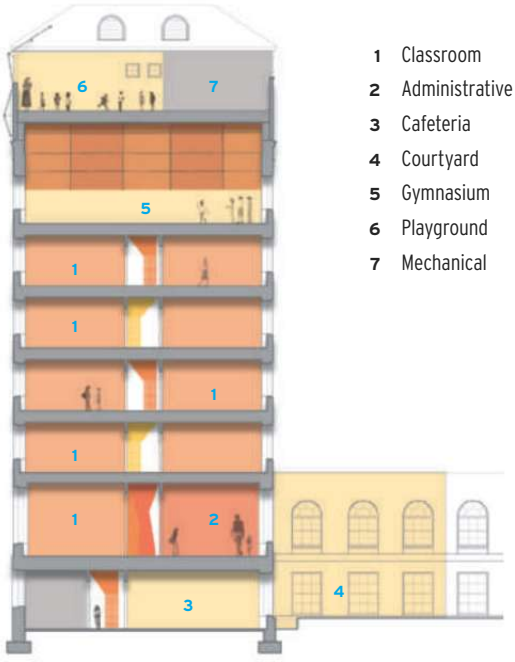


1 Classroom
2 Administrative
3 Cafeteria
4 Courtyard
5 Gymnasium
6 Playground
7 Mechanical

CROSS SECTION NORTH-SOUTH

2

3

5

6

1. **A perforated metal screen provides a protective enclosure for PS 59's rooftop playground and forms a sunscreen for the south-facing clerestory windows in the gym.**

2. **The screen's undulating red and orange bands add a playful element to the historic facade and restore the building's original profile by replacing a demolished pergola that once stood atop the former nurses' residence.**

3. **Existing conditions constrained the width of corridors. Bold color accents add rhythm by tying together ceiling lighting fixtures, walls, and the floor tile pattern.**

4. **The school's 22 classrooms have movable furniture to allow teachers flexibility in organizing classes.**

5. **A small, glazed entrance lobby leads to offices, a community room, and classrooms on the ground level.**

6. **To locate the gymnasium on the top floor, columns were removed and transfer beams introduced. The gym floor is supported by springs to minimize noise into classrooms below.**

Phoenix Union Bioscience High School

Phoenix, Arizona | Orcutt | Winslow

BY **Scott Blair**

LOCATED IN THE HEART OF DOWNTOWN Phoenix, the Phoenix Union Bioscience High School provides Arizona's most ethnically diverse school district with a highly specialized campus that takes full advantage of the city's rapid growth as a hotbed for biotechnical research and development. The school's 400 students focus on math and science and use nearby hospitals and biotechnical institutions through off-site projects and internships. "We embrace a multifaceted approach to learning, focused on relationships with community partners and extending learning beyond the walls of the school," says principal DeeDee Falls.

The 52,000-square-foot rectangular building houses 15 classrooms that can be combined or subdivided to fit a variety of lesson plans and projects. Double-size classrooms occupy opposite ends of the second and third floors and are used for team-teaching classes such as bioethics and "phalgebra," a combo of physics and algebra. With no dedicated faculty offices, students and teachers comingle in the same spaces, emphasizing the type of interaction and collaboration found at colleges and biomedical campuses. Open, flexible spaces dubbed student learning studios act as buffers between the double classrooms and hallways. Seven high-tech labs, some modeled after real labs found in biomedical facilities, are equipped with fume hoods, centrifuges, and other specialized devices. Rolling smart-board kiosks, laptop charging carts, and a mixture of group seating and independent areas add to the college feel. "We wanted it to be rigorous, yet provide students with more autonomy and responsibility," Falls says.

The architects at Orcutt | Winslow used building information modeling to convey their design to school officials. "We modeled everything, down to the light switches and gas ports," says project architect Russ Sanders, AIA.

The $11.4 million school uses a simple palette of materials. Sited appropriately for the Sonoran Desert environment, windowless tilt-up concrete panels on the east and west sides reduce solar gain. A large, three-story high, light-filled "town hall" along the south wall serves as a cafeteria and assembly area and is lined with three garage-style roll-up doors. A monolithic steel staircase ascends all the way to the school's top floor.

While not aiming for LEED certification, the design incorporates sustainable solar hot water in the labs, and waterless urinals and low-flow fixtures in bathrooms. A framework for photovoltaic panels was incorporated into the roof, intended for future student experimentation.

Since opening, Bioscience High School's test scores have validated its unique approach to learning. According to Falls, it "annihilated" the rest of Arizona in math scores, and its students have excelled in reading and writing. Incredibly, this is within a district where more than half the students come from homes where English is not the primary language.

"There's a sense of pride," Falls says. "The students love it here." ■

Phoenix-based Scott Blair is senior regional editor of Southwest Contractor *and Southwest bureau chief for* Engineering News-Record.

ARCHITECT: Orcutt | Winslow — Russ R. Sanders, AIA, project architect; Paul D. Winslow, FAIA, partner in charge; Ellen Tehan, interior designer

CONSULTANTS: Zee Engineering (electrical); Kraemer Consulting Engineers (mechanical); Hess-Rountree (civil); Caruso Turley Scott (structural); Sloat Landscape Architects

CLIENT: Phoenix Union High School District

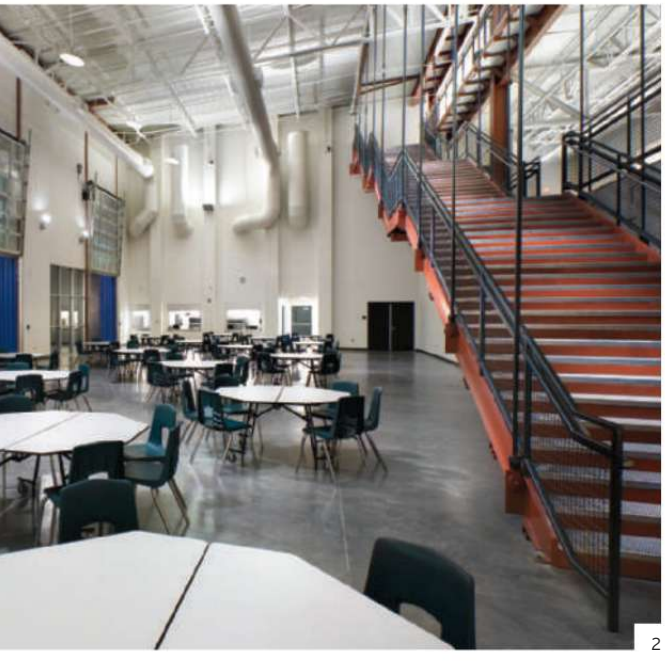
SIZE: 52,456 square feet
COST: $11.4 million

SOURCES

MASONRY: Sun Valley Masonry
CURTAIN WALL: Carlson Glass
CONCRETE: Tpac (precast); Jones Concrete (tilt-up)
ROOFING: Neogard
METAL DOORS: Nelson Holland
ELEVATORS: ThyssenKrupp
PLASTIC LAMINATE: Wilsonart; Formica
SPECIAL SURFACING: Corian
ACOUSTICAL CEILINGS: Armstrong
LIGHTING: Peerless; Zumtobel
LAB CASEWORK: Fisher Hamilton
CARPET: Lees

1

PHOTOGRAPHY: © A.F. PAYNE



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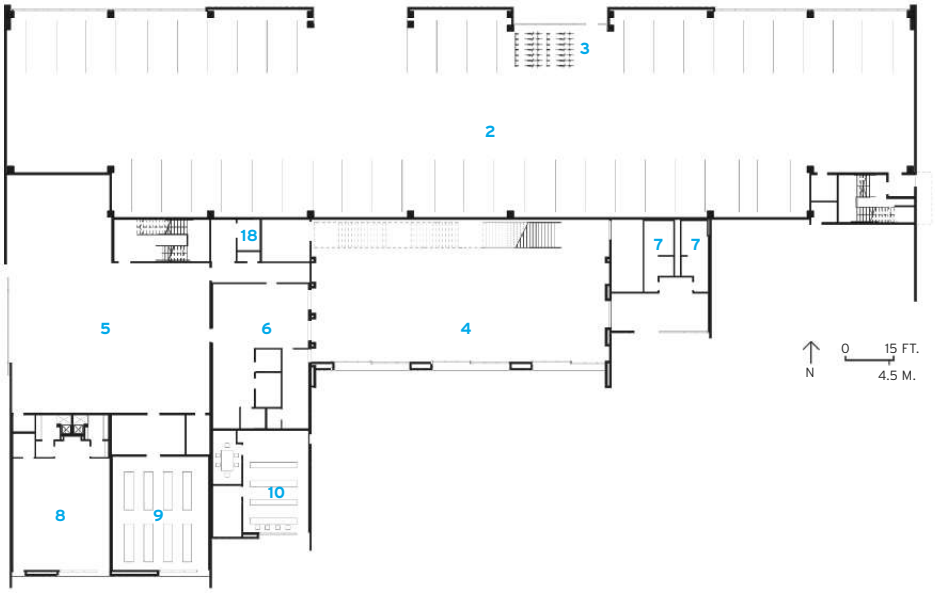
1. **Phoenix Union Bioscience High School's exterior panels feature a relief design depicting large fossil shapes. The design was created by pouring concrete over Styrofoam forms the architects made from computer models. Once the concrete set, the forms were carefully drilled out of the concrete.**

2. **A three-story high, light-filled "town hall" serves as a cafeteria and assembly area and is lined with three garage-style roll-up doors.**

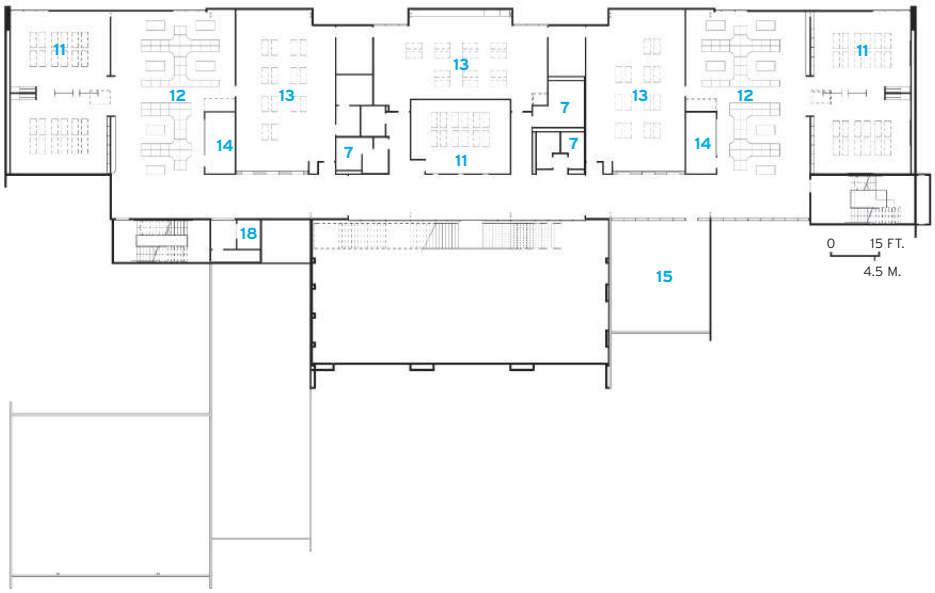
3. **A platform extends out from the rear of the building and is used as a stage for presentations, with students seated on the lawn. Most assemblies occur in the town hall.**

DRAWINGS

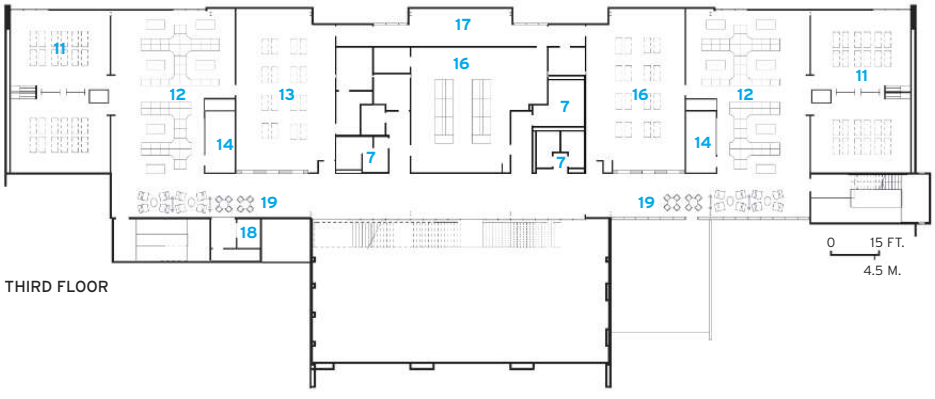
1 Historic school building
2 Parking
3 Bicycle storage
4 Town hall
5 Service yard
6 Kitchen
7 Bathroom
8 Exercise
9 Art
10 Music
11 Classroom
12 Student studio
13 Physics lab
14 Teacher workroom
15 Outdoor lab
16 Biochemistry lab
17 Lab prep
18 Elevator
19 Lounge



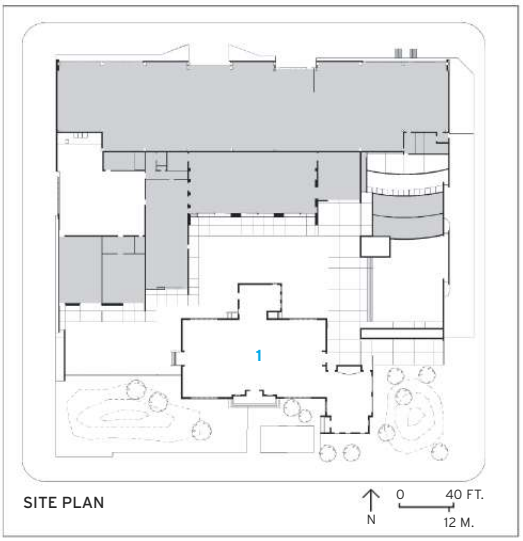
FIRST FLOOR



SECOND FLOOR



THIRD FLOOR



SITE PLAN

1. **The brightly colored lab prep area extends along the northern wall of Bioscience High School's third floor.**

2. **From the third-floor lounge, students can look out to views of downtown Phoenix. In the foreground is the McKinley School, the district's first elementary school, built in 1919. It is being renovated to house administration offices and additional classroom and lab space for the new high school.**

3. **Students conduct experiments in the generously sized physics lab.**

4. **A flurry of activity animates the chemistry lab. The school's high-tech labs were modeled after professional labs found in biomedical facilities.**

Washington Technology Magnet Middle School

St. Paul, Minnesota | Cuningham Group

BY **Christopher Hudson**

IN GENEROUSLY GLAZED COMPUTER LABS that overlook a soaring white atrium, science classes study robotics and observe a knee-replacement surgery via Skype while student-produced videos of school soccer games play on two large atrium screens. Meet the recently revitalized Washington Technology Magnet Middle School in the working-class North End neighborhood of St. Paul, a historic brick-and-limestone structure that surprises every first-time visitor upon entry. It's no Googleplex, but it comes as close as a 1924 school can to approximating the open, technology-laden environments its students are likely to inhabit in college and beyond.

ARCHITECT: Cuningham Group Architecture – Tim Dufault, AIA, principal in charge; Margaret Parsons, AIA, project manager; Steve Albertson, AIA, project architect; Darryl Pratte, AIA, project designer; Janet Dray, interior designer

CONSULTANTS: Clark Engineering Corporation (Structural); Data Core Engineering (Technology)

CLIENT: St. Paul Public Schools

SIZE: 86,000 square feet (new); 131,500 square feet (renovation)

COST: $15.7 million

SOURCES

MASONRY: McAvoy Brick Company

ROOFING: GAF Materials

ALUMINUM WINDOWS: Traco

GLASS: Oldcastle Glass

SECURITY GRILLES: Cookson Company

SKYLIGHTS: Wasco Products

ACOUSTICAL CEILINGS: USG Interiors

PLASTIC LAMINATE: LG Surfaces Hi-Macs; Formica

SPECIAL SURFACING: 3Form

CARPET: Milliken

RESILIENT FLOORING: Mannington

Getting there wasn't easy. Both the school district and the generations of North End residents who attended Washington wanted to preserve the neighborhood landmark, but the tired building did little to support the school's 21st-century curriculum. Furthermore, as a consequence of several additions dating back to the 1930s that addressed programmatic needs seemingly without concern for flow and ease of navigation, the school had become a rabbit warren of half-stories and narrow stairs. The only corridor connecting the east and west sides of the building, for example, was choked at one end by a 6-foot-wide stair.

Cuningham Group's solution – surgically removing the center of the building (while school stayed in session!) and replacing it with a three-story, skylit technology gallery – dramatically clarifies and eases circulation and gives the school the cutting-edge identity it sought. Now teachers are able to supplement classroom lessons in all subjects with online learning in project labs – from the glassed-in rooms on the atrium to the computer-lined, multipurpose space on the gallery floor to the smaller lab in the new, 4,000-square-foot media center high above on the third level. The range of sizes offers flexibility that will serve (and preserve) the school for decades to come. "The need for smaller and larger spaces different from that of classrooms isn't going to go away as programs change," says Cuningham Group project manager Margaret Parsons, AIA. "It's the use or the function that may change."

Cuningham Group also renovated 131,500 square feet of existing space, most notably moving the administrative offices from the second floor to the east entrance and converting the old ones to small classrooms. Parents now have easy access to the offices, the auditorium (thanks to a new entrance carved out of an existing light well by the auditorium stage), and the basement-level cafeteria, and administrators can keep a watchful eye on all comings and goings. The west-entrance lobby, which handles traffic into the gym and the new presentation room, has added a new gate that closes off the rest of the school during evening events. And not all of the technology dollars were spent on the labs: Each full-size classroom boasts a SMART Board (interactive white board) and a ceiling-mounted digital projector – quite a sight in a classic 1920s schoolroom.

Students from across the school district flock to Washington's

PHOTOGRAPHY: © DANA WHEELOCK

1

2

3

1. **A soaring, skylit technology gallery at the center of the building gives Washington Technology Magnet Middle School the cutting-edge identity it sought.**

2. **On the exterior, the 1924 brick-and-limestone building remains a landmark in St. Paul's working-class North End neighborhood.**

3. **Cuningham Group's design for the renovation dramatically improved circulation within the old building.**

4. **The glazed, 4,000-square-foot media center on the third level overlooks the technology gallery.**

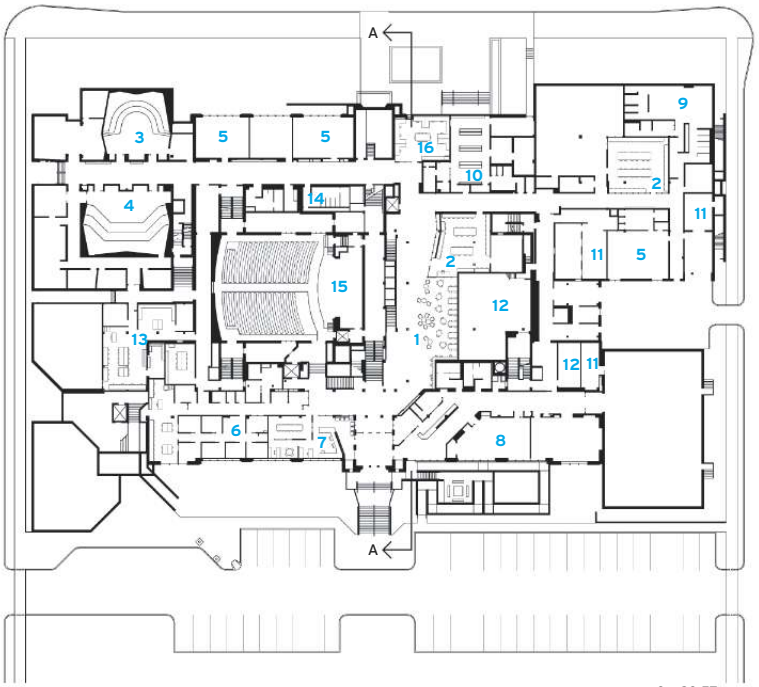
4

after-school and summer classes, where they create the next chart-topper on GarageBand or solve a fictional homicide, *CSI*-style. But is it all just high-tech fun, or do these 12- and 13-year-olds have a sense of the advanced educational opportunities afforded them? Washington principal Mike McCollor offers this insight: "When we take kids over to the University of Minnesota and they see a scanning electron microscope, they say, 'Oh, okay, that's the next step in the progression,' rather than, 'They've got all this cool stuff at the university, or out in industry, and we're going to go back and use chalkboards and read stuff out of a book.' The students are now able to see that connection between where they are and what their future is." ■

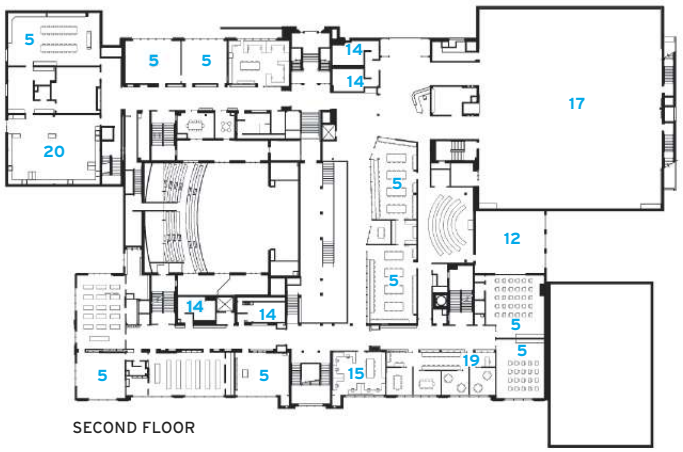
Christopher Hudson is the editor of Architecture Minnesota *magazine.*

DRAWINGS

1 Technology gallery
2 Project lab
3 Music
4 Band rehearsal
5 Classroom
6 Offices
7 Principal
8 Meeting room
9 Girls locker room
10 Boys locker room
11 Storage
12 Mechanical
13 Staff break room
14 Bathroom
15 Auditorium
16 Teacher resource
17 Gymnasium
18 Resource center
19 Reading
20 Family and consumer science



GROUND FLOOR



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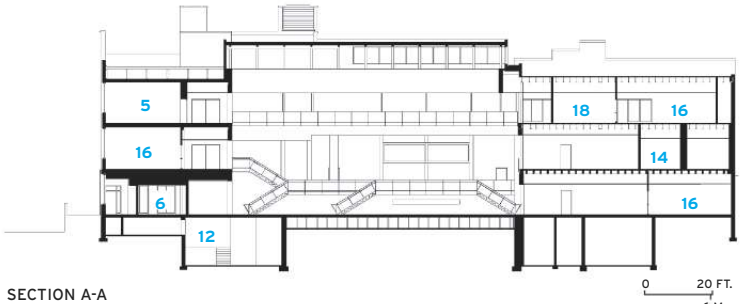
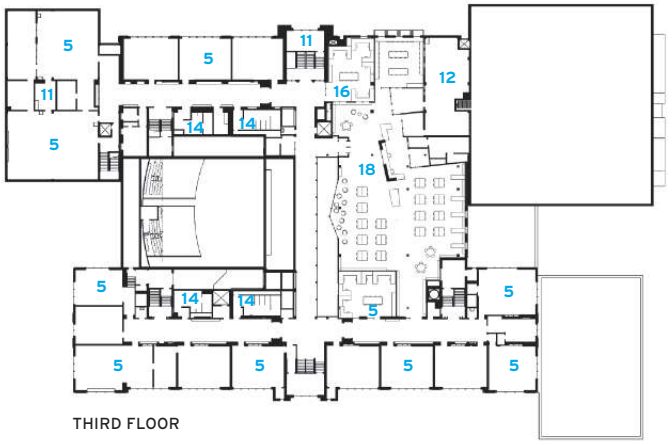


SECTION A-A



THIRD FLOOR

CSU Fullerton Rec Center in Fullerton, CA

Reece High School in New York, NY

North Layton Junior High in Layton, UT

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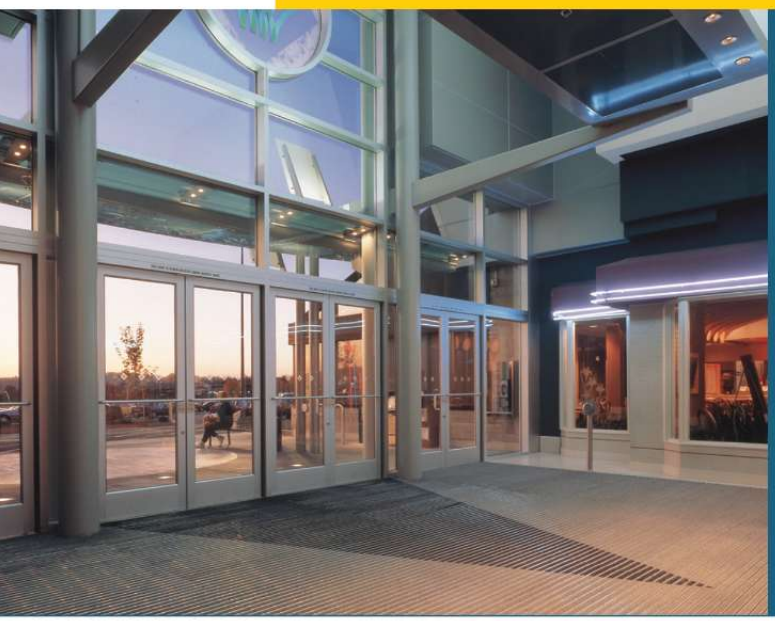

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117-121

Throw in the Towel: High-speed, Energy-efficient Hand Dryers Win Hands Down

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- 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

Sponsored by **Excel Dryer, Inc.**

123-127

Carpet for Schools: A Sustainable Solution that Enhances Learning and Health

Photo courtesy of the Carpet and Rug Institute

- Identify the benefits of installing carpet in schools that relate to health, learning, safety and sustainability
- Identify sustainability standards and ratings for carpet performance
- Explain how carpet improves air quality and helps reduce asthma and allergies
- Discuss methods for increasing the life cycle and sustainability of carpet in schools

Sponsored by **The Carpet and Rug Institute**

129-135

Can You Hear Me? Optimizing Learning through Sustainable Acoustic Design

Photo courtesy of Ceilings Plus. Architect: Gensler

- Discover new acoustical materials and technology that improve speech intelligibility in classrooms
- Discuss strategies for reducing building footprints using active acoustic systems
- Review ANSI/ASA 12.60-2002 Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools criteria for good learning environments
- Explore perforated metal and wood panel systems that contribute toward the sustainability goals espoused by schools

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Throw in the Towel: High-speed, Energy-efficient Hand Dryers Win Hands Down

Learn why a Life Cycle Assessment (LCA) is the "gold standard" for proving sustainability claims and revisit the conventional wisdom about hand drying in K-12 schools and other public restrooms.

High-speed energy-efficient hand dryer

Provided by Excel Dryer, Inc.
By Roger C. Brady, AIA, LEED AP

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.

CONTINUING EDUCATION

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 one AIA/CES Learning Unit, including one hour of health safety welfare/sustainable design (HSW/SD) credit, answer the questions on page 121, 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

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

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

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 (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.

• **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.

A peer reviewed, Life Cycle Assessment (LCA)... is the current "gold standard" in proving the case of a product's (relative) sustainability.

• **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.

Of special note, as schools face myriad budget cutbacks, Federal Stimulus money may be available to school districts for purchasing HSEE hand dryers that are "Made in USA" certified. The 2009 American Recovery and Reinvestment Act (ARRA) approved over $4.5 billion to convert and renovate federal facilities into high-

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."

performance, green buildings. A combination of ARRA funds and energy tax credit bonds may be available to help schools turn their facilities into energy-efficient, high performance buildings.

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.

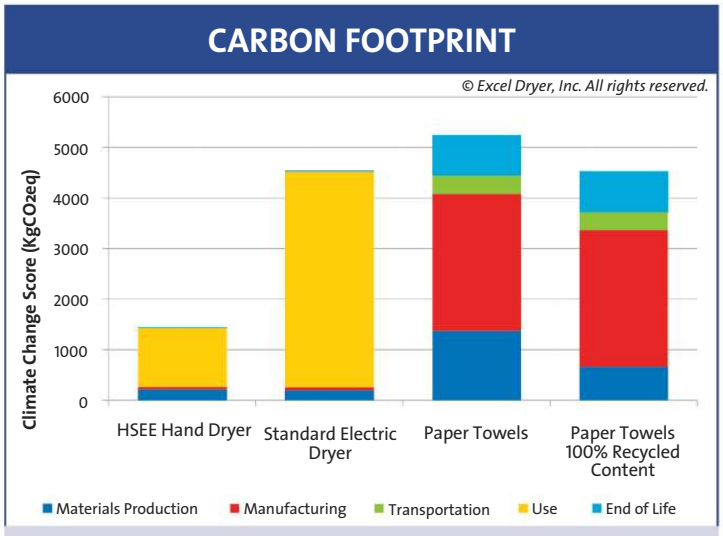
PAYING ATTENTION TO DETAILS

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 manufacturer 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 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.



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

• **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 manufacturer's offer a noise reduction nozzle for sound sensitive areas.

• **Cost and savings.** This benefit includes several components and is a variable, dependent on your dryer selection. Reduced energy use and no paper towels to buy are obvious financial benefits over conventional dryers and paper towel dispensers respectively. But initial cost of the new technology varies among manufacturers, which affects how quickly the realized savings can payback that cost. A somewhat hidden cost, but real nonetheless, is the labor cost for required service, scheduled maintenance, and repair by your staff and/or an authorized provider.

THE LCA PROCESS

Saying a product or process is sustainable or more sustainable than the alternatives is increasingly common, as most architects can attest. But where's the irrefutable proof? Sometimes it is intuitive or it just makes sense. Other times, it can be so complex to identify and measure the variables that we might just take it on faith or throw up our hands.

Very few manufacturers submit their product or assembly to the detailed scrutiny of an environmental Life Cycle Assessment (LCA), which has been peer-reviewed by an independent panel of experts to ensure compliance with the ISO 14040 and 14044 standards. This approach is the 'Gold Standard' of rigor that addresses virtually all the environmental issues involved to give design professionals and building owners the indisputable evidence necessary to "prove it" with regard to sustainability. An LCA of

hand drying systems was completed by Quantis of Salem, MA (www.quantis-intl.com) in July 2009.

The remainder of this course will examine the major steps of one such LCA process and discuss the methodology and its implications to architects as it relates to HSEE hand dryers.

The LCA method examines a broad range of environmental impacts at all stages of the product life cycle, including all material, energy, and pollutant inputs and outputs. For instance, global warming and the resulting climate change is one of 16 environmental categories or issues studied. (See nearby diagram)

The three systems compared in this study were a specific make and model of high-speed, energy-efficient (HSEE) electric hand dryer, a conventional electric hand dryer, and paper towels containing between 0% and 100% recycled content. Each system was evaluated to determine the environmental impact of providing 10 years of service (drying 260,000 pairs of hands or 500 uses per week), which was a conservative or lower range of use.

The peer-reviewed LCA is the only internationally recognized and accepted method for identifying and comparing the total environmental impacts of producing and consuming a product or service.

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."

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)
  *For projects within 500 miles of East Longmeadow, MA
- ID Credit 1: Innovation In Design - Path 1 (1 point)
- ID Credit 3: The School as a Teaching Tool (1 point)

A Life Cycle Assessment is comprised of the following four phases:

(a) Goal & Scope Definition: defining the purposes of the study, determining the boundaries for the system life cycle in question, and identifying important assumptions;

(b) Inventory Analysis: compiling a complete record of the important material and energy flows throughout the life-cycle, in addition to releases of pollutants and other environmental aspects being studied;

(c) Impact Assessment: using the inventory collide above to create a clear and concise picture of environmental impacts among a limited set of understandable impact categories; and

(d) Interpretation: identifying the meaning of the results of the inventory and impact assessment relative to the goals of the study.

An LCA is best practiced as an iterative process where the findings of each stage influence changes and improvements in the others to arrive at a study design that is of sufficient quality to meet the goals of the study and the principles, framework, requirements, and guidelines to perform an LCA as described by the international standards ISO series 14040 and 14044 (ISO 2006).

For this LCA, the objectives of the study were to:

1. Comprehensively **define the environmental impacts** over the whole life cycle for each of the three systems,
2. Provide an accurate **comparison of impacts** among the systems, and
3. Assess the **influence of several key variables** or characteristics, such as intensity of use (duration per dry or towels per dry), recycled content, alternative electricity sources, etc.

The intended audiences for this study included architects and interior design professionals, facility owners and operators, purchasers of hand dryers, and interested others. The intent of the study is to provide these audiences with the information they need to make a valid comparison of the life cycle environmental impacts of the systems in question. The impacts described in the study are estimates of potential impacts rather than direct measurements of real impacts.

The Functional Unit of the study is to dry **260,000 pairs of hands** over a 10-year life cycle, which applies to all three systems and serves as a common basis of comparison. A System Description is another key element of any LCA. The three systems were each manufactured in the USA, each was assumed to be distributed in the same way, their supply chain distances were assumed the same, with similar packaging material and recycled at the same rate, each had a motor, optical sensor for activation, and powered by batteries for the paper towel dispenser and electricity for the two hand dryers in question.

Continues at ce.ArchitecturalRecord.com.

See Quiz on the Next Page
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Program title: **"Throw in the Towel: High-speed, Energy-efficient Hand Dryers Win Hands Down" (1/10, page 117).** AIA/CES Credit: This article will earn you one AIA/CES LU hour of health, safety, and welfare/sustainable design (HSW/SD) credit. (Valid for credit through January 2012). **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, Hot air
- ❑ **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 principle 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. The Life Cycle Inventory lists numerous materials and processes – each with flows of energy, materials and emissions ¬– that are distributed and condensed into the Midpoint categories, which in turn are allocated and condensed into one or more of the Endpoint or Damage categories, which are a comprehensive and quantitative summary of the Life Cycle Assessment results.
- ❑ **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%
- ❑ **b.** between 30-50%
- ❑ **c.** from 50-75%
- ❑ **d.** <50%

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

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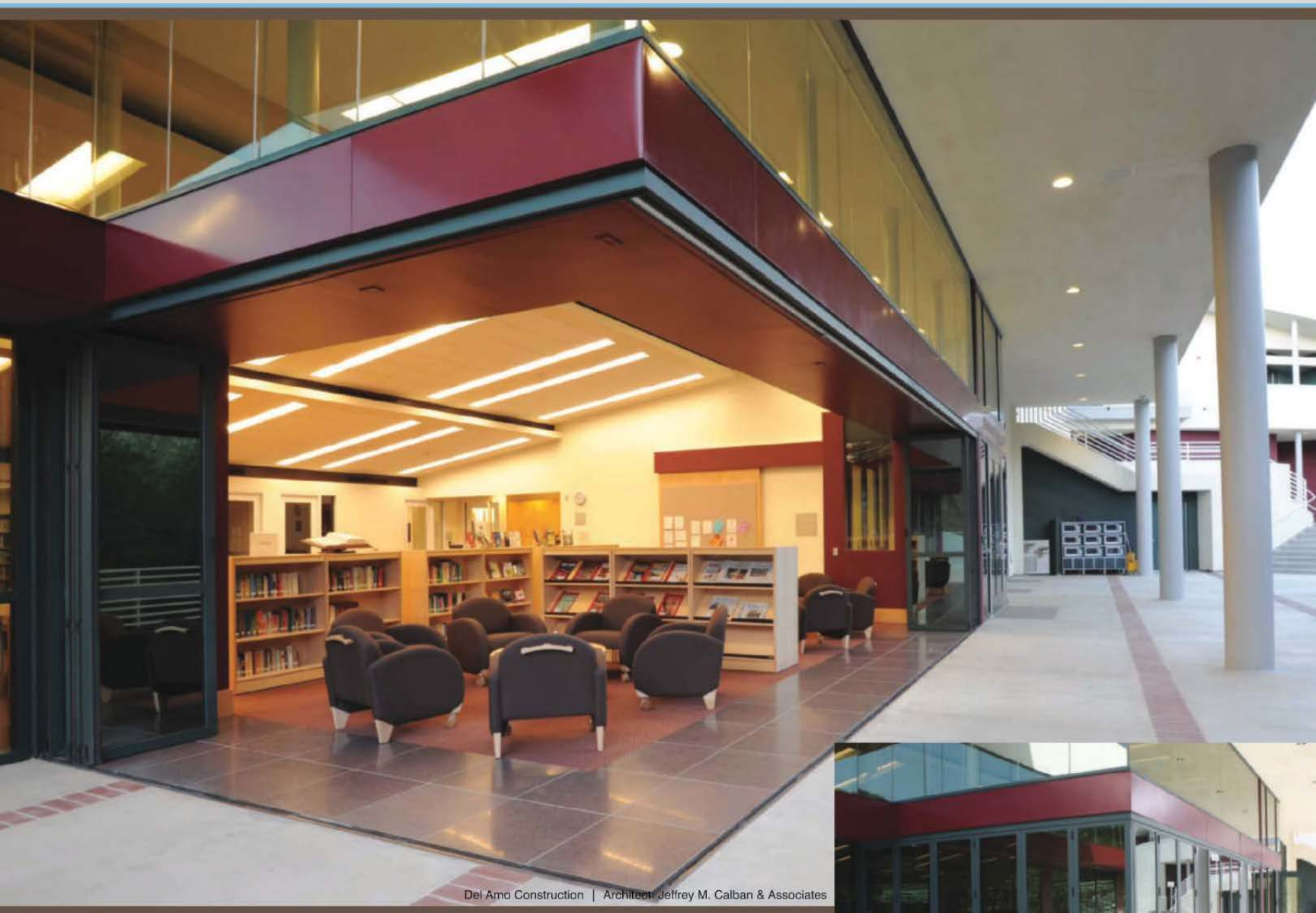

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EARN ONE AIA/CES HSW/SD LEARNING UNIT

Carpet for Schools: A Sustainable Solution that Enhances Learning and Health

Documented benefits of specifying carpet in schools include an enhanced learning environment, improved air quality and lower life cycle costs.

Photo Courtesy of the Carpet and Rug Institute

Provided by the Carpet and Rug Institute

From kindergartners to postgraduate students, a pleasing school environment is a plus that can add up to superior performance. Over the past several decades, school design has been widely recognized as a factor in creating a good learning environment that strongly affects student achievement, social development and attendance, as well as teacher retention and satisfaction. In a 2001 study by the Atlanta-based research firm, Beth Schapiro & Associates, more than 92 percent of teachers surveyed believe general classroom design has a strong impact on students' learning and achievement. In the same study, teachers identified the top five design elements that promote the best learning environment: comfort, safety, lighting, temperature control and good acoustics.

Carpet helps achieve several of these design goals, and is a factor in the creation of welcoming, friendly and less institutional classrooms that can contribute to a better educational environment for students, teachers and school personnel. In fact, more than 70 percent of teachers surveyed in the Schapiro study prefer carpet on their classroom floor.

This article will cover the sustainability, safety and health issues related to carpeting in schools, as well as guidelines to selecting the right carpet and keeping it a sustainable choice for the life of the product. The proper way to clean and maintain carpets will be explored, as well.

BENEFITS OF CARPETS

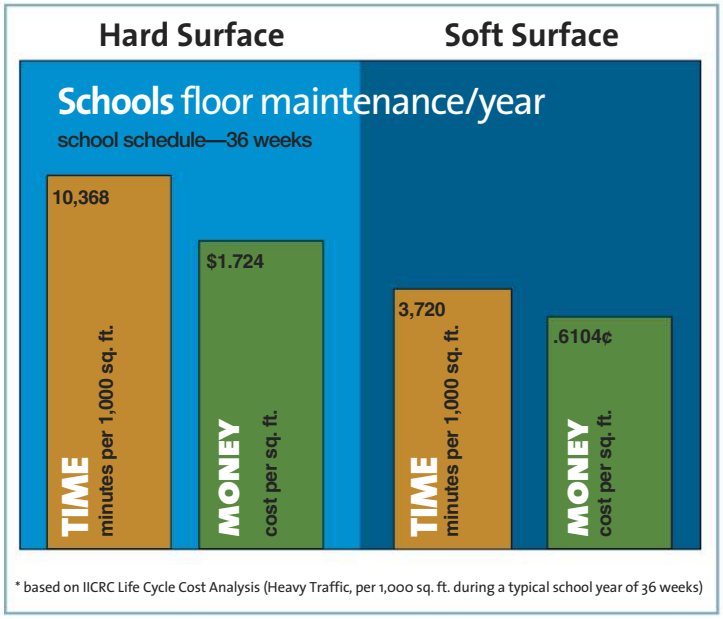
Carpet is a foundation for the look and feel of a room. It can provide a casual simplicity to reinforce a soft, livable ambiance or it can

CONTINUING EDUCATION

Use the learning objectives below to focus your study as you read **Carpet for Schools: A Sustainable Solution that Enhances Learning and Health.** To earn one AIA/CES Learning Unit, including one hour of health safety welfare/sustainable design (HSW/SD) credit, answer the questions onpage 127, 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:

- Identify the benefits of installing carpet in schools that relate to health, learning, safety and sustainability.
- Identify sustainability standards and ratings for carpet performance.
- Explain how carpet improves air quality and helps reduce asthma and allergies.
- Discuss methods for increasing the life cycle and sustainability of carpet in schools.



Source: The Carpet and Rug Institute

lend vibrancy to a room through strong colors and heavier textures. One of the easiest methods of personalizing an environment, carpet also offers a host of health and safety benefits.

Improved Safety. Because it affords more traction, carpet helps prevent falls. According to the above-mentioned Schapiro study, 77 percent of teachers agree that carpet helps prevent falls and injuries and makes a classroom safer. Not only do fewer slips and falls occur with carpeting, but when they do happen the chances of injury are greatly diminished on a soft floorcovering. Further, carpet provides a non-glare surface that reduces reflection and eyestrain.

Reduced Noise. With carpet, less acoustic protection is needed on the ceiling and elsewhere. This provides a better learning atmosphere with fewer distractions. According to the Technical Committee on Architectural Acoustics of the Acoustical Society of America, the speech intelligibility rating is 75 percent or even less in many classrooms, meaning that those with normal hearing can understand only 75 percent of the words read from a list. Research shows that background noise from inside and outside the classroom negatively affects learning. Excessive noise and reverberation interfere with speech audibility, leading to diminished understanding, learning and ability to focus on the lessons at hand.

Flooring is a major component of comprehensive noise management. Based on a study by the American Society of Interior Designers, carpet is deemed to be 10 times more efficient in reducing noise compared to other flooring options. When a cushioned backing made with polyurethane technology is added, noise levels can be further reduced.

Increased Comfort. For teachers and other staff, a cushioned walking and standing surface reduces leg fatigue. Several studies have investigated the influence of floor surfaces on the body during long-term standing, and results show that softer floor materials usually result in less postural discomfort than standing on hard floor surfaces (Redfern & Cham, 2000). According to Rys and Konz (1988), heart rate was higher after two hours of standing on a concrete floor compared to carpet, and perceived comfort was higher when standing on carpet. Similarly, In 1997, Madeleine et al. found that after two hours of standing, the comfort level was greater for a soft surface. Standing on a hard surface increased parameters, such as shank swelling and muscle fatigue. It also detrimentally changed subjects' standing posture.

Better Insulation. Carpet is warmer to sit on or work on, extending the learning areas to space on the floor. Thermal comfort is improved because carpet retains inside ambient temperatures for longer periods. Because of its fibrous construction, carpet traps a layer of air close to the floor. Air is an excellent thermal insulator and consequently carpet acts to increase the thermal insulation of a surface. Additionally, a pad beneath carpet can further increase this thermal insulation effect.

Research conducted at the Georgia Institute of Technology School of Textile Engineering tested the thermal insulation values (R-Values) of carpet and cushion and found that the total R-value was more dependent on the total thickness of the carpet than the type of fiber content. The research indicated that a carpet system comprising carpet and pad can increase the R-value of the floor by 2 to 4 points.

Lower Life-cycle Costs. Carpet that is properly selected, installed and maintained lasts up to 10 years or longer. When product, installation and maintenance supplies and labor costs are considered over a 15- to 20-year period, carpet showed lower life cycle costs than other flooring options. A 2002 report, "Life-cycle Cost Analysis for Floor Covering in School Facilities," prepared by the Institute of Inspection, Cleaning and Restoration Certification (IICRC), found that carpet could be 65 percent less expensive to maintain than hard surface flooring. In the study, buying and installing the hard surface flooring was less expensive than carpet. But when labor, supplies and equipment costs were calculated over a 22-year life cycle, carpet proved to be more cost effective. The life expectancy of the hard surface flooring was 22 years. The cost of replacing carpet after 11 years was factored into the analysis. The study also found that hard surface floors require two and one-half times more cleaning than carpet and that hard surface cleaning supplies are about seven times more expensive than supplies for carpeted floors.

The carpet industry is working to make carpet even longer lasting in schools by creating more durable fibers and fabrication methods, improving primary and secondary backings and increasing the number of different design and performance options. Modular carpets, the fastest growing segment of the industry, provide the option of replacing parts of a carpeted surface, instead of the entire carpet.

Improved Indoor Air Quality. The relationship between carpet, asthma and allergies has been the subject of numerous scientific and medical investigations. In a 2008 literature review for the International E-Journal of Flooring Sciences, Mitchell W. Sauerhoff, Ph.D., DABT, concluded that "carpet does not cause asthma or allergies and does not increase the incidence or severity of asthma or allergies symptoms. In fact with respect to asthma and allergies, multiple studies have reported fewer allergy and asthma symptoms associated with carpet." Allen Hedge, Ph.D., an indoor

environmental expert, in a paper at the 2001 annual meeting of the Council of Education Facility Planners, Ref. 34, reached the same conclusion: "concerns that carpeting in schools is contributing to an increase in respiratory problems, allergies and asthma in schools are unfounded."

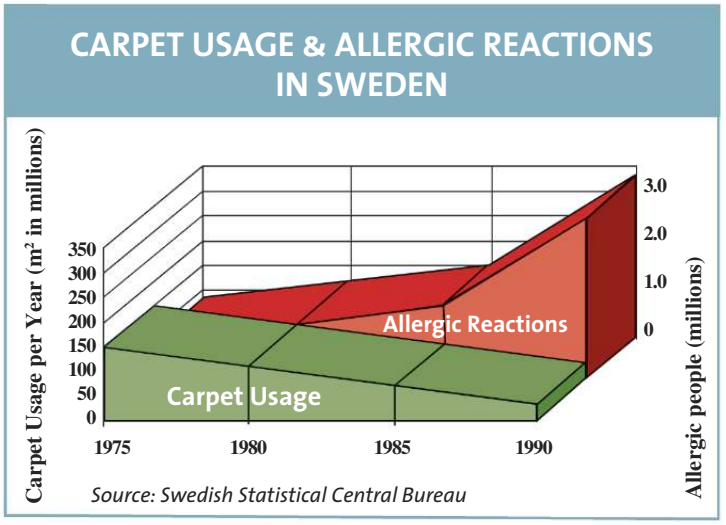
The reason is that allergies are usually affected by airborne particles. Carpet traps allergens in its fiber and does not allow them to circulate in the air, even with the activity of children. The allergens trapped in the carpet then can be easily removed by adhering to a regular cleaning and maintenance schedule that includes vacuuming and periodic extraction cleaning using Seal of Approval-certified products. Studies have compared the distribution of airborne dust associated with normal activities on hard and soft flooring surfaces. In 2002, research by G. Asbury titled, "Cleaning and Foot Traffic Emissions Analysis," for the Professional Testing Laboratory, Inc., in Dalton, Georgia, showed that walking on hard surfaces disturbed more particles. These particles became airborne and entered the breathing zone. In contrast, carpeted surfaces trapped more particles so that walking disturbed fewer particles. The result was less dust in the breathing zone over carpeted floors.

In another study by Research Triangle Institute (RTI) and University of North Carolina (UNC) researchers investigated two schools in North Carolina from the same school district and situated in rural locations with very similar outdoor environmental conditions (Proceedings: Indoor Air 2002, Monterey California – A Comparison of Biocontaminant Levels Associated with Hard vs. Carpet Floors in Non-Problem Schools; Results of a Yearlong Study.) Both schools followed almost identical cleaning programs. One school was mostly resilient vinyl tile floors while the other school had 70 percent to 75 percent carpet floors. The study found that, although the carpet flooring had higher concentrations of biocontaminants than an equal area of tiled floor, airborne contaminants were higher over tiled floors than over carpet.

Yet another investigation of thirteen Florida classrooms encompassing six schools presented at the 1996 International Indoor Air Quality Conference, concluded that carpet does not contribute to air quality problems: "Carpet can serve as a reservoir for non-viable spores that enter from the outside, yet there is no evidence to indicate mold spores or mite allergen leave the carpet."

In a government study in Sweden, when carpet was banned from public buildings and replaced with smooth surfaces, carpet's share of the total floorcovering market dropped from 40 percent in the mid-70s to only 2 percent in 1992. During this same time period, the incidence of allergies among Swedes increased approximately four-fold. The study authors believed that allergic reactions in sensitive individuals were not directly associated with carpet, but rather indoor air quality.

Dr. Hedge reports that carpet can improve indoor air quality because carpet captures and holds dirt, contaminants and allergens that would otherwise become airborne — "as long as schools keep floors clean and use high-efficiency microfiltration vacuum bags, carpets can be a healthy, safe and economical floor covering in schools and day care centers. Microfiltration bags will trap very small particles, such as dust mites and feces, so that these will not become airborne."



Another indoor air quality issue is that of carpet and mold. Clean carpet does not support mold growth even at prolonged and elevated temperatures. However, left unresolved, leaks and spills, heavy condensation and localized flooding, especially when followed by prolonged high humidity, can lead to mold growth in many areas of a school. For mold to grow, it needs water, oxygen, a warm temperature and something that contains nutrients to feed on, such as dirt, wood or paper. Moisture trapped below a carpet can result in mold growth and the release of mold spores and mold metabolic products (microbial volatile organic compounds (VOCs or MVOCs) into indoor air. Effective moisture control is critical to protect all building systems from the potential for mold growth. That said, studies have shown that the biggest source of mold spores is actually an improperly operated and maintained HVAC system. Shutting the HVAC system off at night or during downtime creates the perfect incubator for mold spores, which are then flushed into the breathing zone.

Indoor air quality also involves the emissions of volatile organic compound (VOC) levels from building materials. Carpet may be the lowest VOC emitter of common flooring choices and one of the lowest emitting products used in new construction and renovation, much lower than products such as paint. The already low VOC emission of new carpet drops significantly after 24 hours, even sooner with fresh air ventilation. According to Werner Braun of the Carpet and Rug Institute, the industry has developed a program known as the Indoor Air Quality Green Label Program to determine the level of VOC emissions from carpet, floor adhesives, and cushion products. Attached to a carpet, floor adhesive or cushion, the label signifies that a representative sample of the product type has been tested by an independent laboratory. The recent Green Label Plus is an enhancement that incorporates additional requirements to meet California's Collaborative for High Performance Schools (CHPS) low-emitting materials criteria. Products listed as CHPS-compliant materials have been chamber tested to meet the indoor air quality guidelines outlined in California's specification section 01350.

SUSTAINABILITY

With the plethora of carpet types available in the marketplace, selecting the most sustainable carpet can be a challenge. NSF 140-2007, certified by the American National Standards Institute (ANSI), is the prevailing sustainable carpet assessment standard. The standard is voluntary, based on life-cycle assessment principles, and provides a single rating system that recognizes levels of achievement — mandatory minimum standards of sustainable performance as well as silver, gold and platinum levels that define a more sustainable carpet. It establishes performance requirements and quantifiable metrics throughout the supply chain for public health and environment; energy and energy efficiency; bio-based, recycled content materials; manufacturing; and reclamation and end of life management. While the standard can be used to evaluate any carpet product, it is primarily intended for commercial carpets as its evaluation methodology is complementary to emerging commercial green building standards.

Selecting the Right Carpet. In many instances, new schools have incorporated a mix of floor coverings, with carpet in entrances and corridors to minimize dirt brought in and spread throughout the facility. Carpeting in these areas also provides extra traction for school children entering the building, particularly when it's wet or snowy outside. In elementary school classrooms carpeting is increasingly being used around teachers' and students' desks, with smooth surfaces reserved for around sinks and water fountains and in bathrooms and cafeterias.

Since choosing the right carpet is critical, the industry has developed guidelines to assist design professionals in selecting commercial carpet with acceptable texture retention performance in specific end-use applications (www.carpet-rug.org/pdf_word_docs/fact_sheets/CRI_Factsheet_TARR.pdf).

The Texture Appearance Retention Rating (TARR) system identifies the level of appearance change of a carpet surface resulting from foot traffic. Developed through a consensus process involving technical experts in the carpet industry and commercial and government specifiers, TARR ratings identify changes in appearance on a 1 to 5 numbered scale: 5 represents no change in appearance and 1 represents a very severe change from the original texture of the pile yarn expected in a given traffic area during the first year after installation. Carpet with a higher rating, such as 4.5 or 4.0, will retain its original new appearance longer under various traffic conditions than carpet with a lower rating. The rating does not reflect the potential influence of variable factors such as soiling, staining, maintenance and improper installation. To obtain the projected appearance retention performance, the carpet must be correctly installed following the manufacturer's instructions and in accordance with industry installation guidelines. Design professionals note TARR numbers on commercial projects.

The guidelines classify moderate, heavy, severe, or special end-use for each application based on the level of expected foot traffic. For example, school offices are classified as moderate use (≥ 2.5 TARR); school classrooms, conference rooms, lounges and libraries and classified as heavy use (≥ 3.0 TARR); and school corridors, entrances and lobbies are classified as severe use (≥ 3.5 TARR).

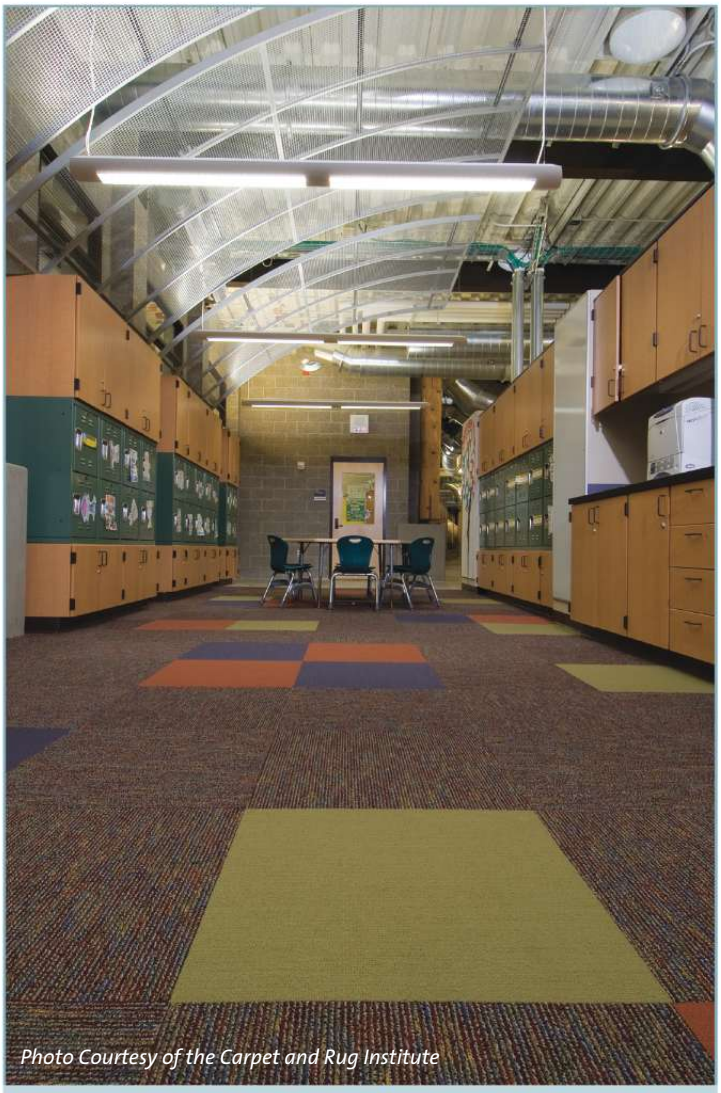


Photo Courtesy of the Carpet and Rug Institute

Variation in color and pattern can mask the effects of traffic in school settings.

Experience has taught that a low profile, densely tufted, tight loop construction is very functional in a school. Color selection is a prime factor in long-term appearance retention and facility managers and maintenance supervisors who understand this can increase the longevity of the carpet and save on future replacement costs. While a light color cut pile can make rooms and hallways look brighter, they are a poor choice in heavy traffic areas and can make successful maintenance more difficult. A darker color loop pile will retain its appearance longer and is a better choice in heavy traffic areas. Tweeds or patterns in the carpet are also a good choice as they add interest to the floor and hide soil.

Continues at ce.ArchitecturalRecord.com.

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Program title: "Carpet for Schools: A Sustainable Solution that Enhances Learning and Health" (1/10, page 123). AIA/CES Credit: This article will earn you one AIA/CES LU hour of health, safety, and welfare /sustainable design (HSW/SD) credit. (Valid for credit through January 2012.) 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. The percentage of teachers surveyed that prefer carpet on their classroom floor is:
- ❑ a. more than 70 percent.
- ❑ b. 50 percent.
- ❑ c. less than 30 percent.
- ❑ d. 15 percent.

2. Modular carpets:
- ❑ a. have less durable fibers than woven carpet.
- ❑ b. are more likely to wrinkle, ripple or buckle.
- ❑ c. provide the option of replacing parts instead of the whole carpet.
- ❑ d. are the slowest growing sector of the carpet industry.

3. A carpet and pad can increase the R-value of the floor between:
- ❑ a. 1 to 2.
- ❑ b. 2 to 4.
- ❑ c. 0 to 1.
- ❑ d. 4 to 6.

4. When product, installation and maintenance supplies and labor costs are considered over a 15- to 20-year period, carpet life cycle costs:
- ❑ a. increase by 2 years.
- ❑ b. are equal compared with those of hard surface flooring.
- ❑ c. are higher compared with vinyl tiles.
- ❑ d. are lower than other flooring options.

5. Over equal areas of tile and carpet, one study found a higher concentration of airborne contaminants:
- ❑ a. 12 inches above carpeted floor.
- ❑ b. over tiled floor.
- ❑ c. 3-feet above carpeted floor.
- ❑ d. 6-feet above carpeted floor.

6. Studies have shown that the biggest source of mold spores is:
- ❑ a. water trapped under carpet.
- ❑ b. carpet installed over uncured concrete.
- ❑ c. an improperly operated and maintained HVAC system.
- ❑ d. wet construction materials.

7. The prevailing sustainable carpet assessment standard is:
- ❑ a. NSF 140-2007.
- ❑ b. NSF/ANSI 160.
- ❑ c. ANSI 235-2005.
- ❑ d. NSF 360 -2001.

8. A Texture Appearance Retention Rating (TARR) ≥ 3.5 is considered:
- ❑ a. moderate.
- ❑ b. not suitable for heavy foot traffic.
- ❑ c. suitable for school corridors, entrances and lobbies.
- ❑ d. not appropriate for schools.

9. A darker color low profile, densely tufted carpet with tight loop construction:
- ❑ a. has increased longevity.
- ❑ b. makes successful maintenance harder.
- ❑ c. saves on replacement costs.
- ❑ d. a. and c. above.

10. How many years can carpet last if properly maintained?
- ❑ a. over 22
- ❑ b. 11 to 15
- ❑ c. 5 to 7
- ❑ d. 7 to 12

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

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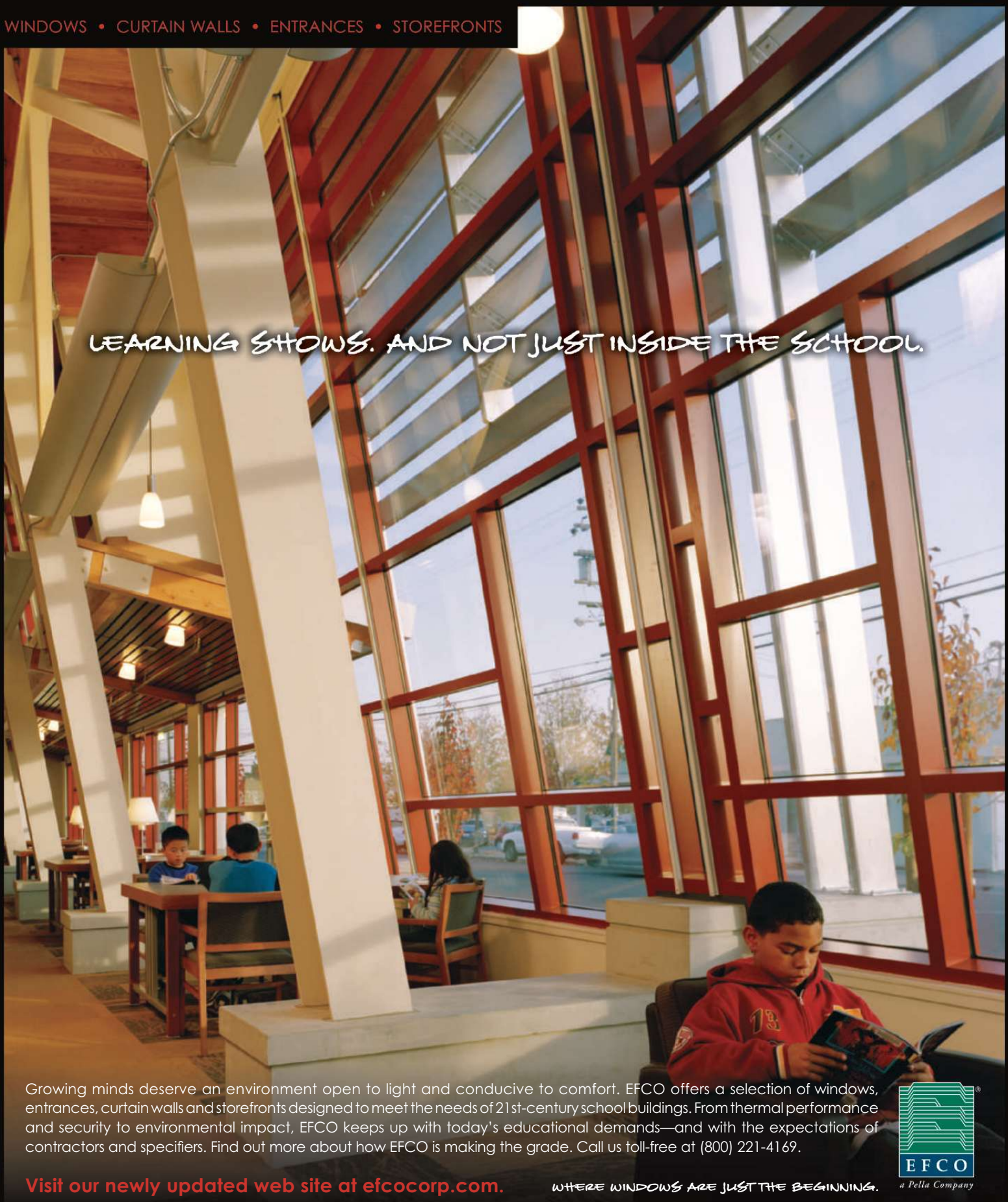
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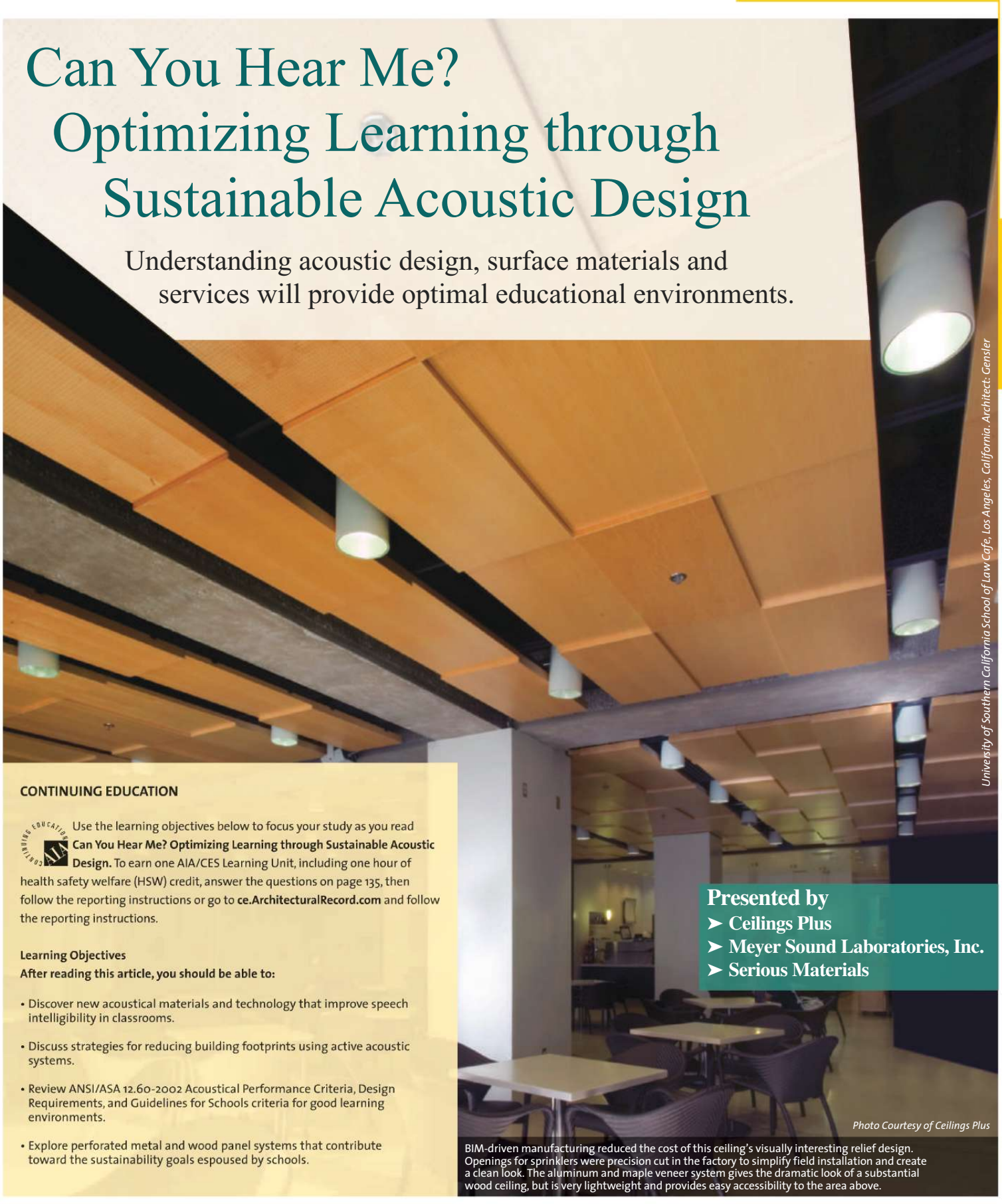
CIRCLE 36

EARN ONE AIA/CES HSW LEARNING UNIT

Can You Hear Me? Optimizing Learning through Sustainable Acoustic Design

Understanding acoustic design, surface materials and services will provide optimal educational environments.



University of Southern California School of Law Cafe, Los Angeles, California. Architect: Gensler

Presented by
- Ceilings Plus
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- Serious Materials

Photo Courtesy of Ceilings Plus

BIM-driven manufacturing reduced the cost of this ceiling's visually interesting relief design. Openings for sprinklers were precision cut in the factory to simplify field installation and create a clean look. The aluminum and maple veneer system gives the dramatic look of a substantial wood ceiling, but is very lightweight and provides easy accessibility to the area above.

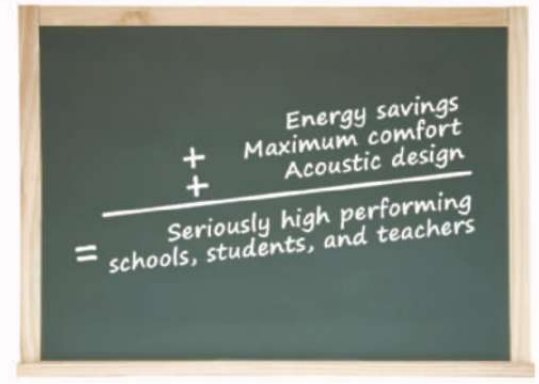
CONTINUING EDUCATION

Use the learning objectives below to focus your study as you read **Can You Hear Me? Optimizing Learning through Sustainable Acoustic Design.** To earn one AIA/CES Learning Unit, including one hour of health safety welfare (HSW) credit, answer the questions on page 135, 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:

- Discover new acoustical materials and technology that improve speech intelligibility in classrooms.
- Discuss strategies for reducing building footprints using active acoustic systems.
- Review ANSI/ASA 12.60-2002 Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools criteria for good learning environments.
- Explore perforated metal and wood panel systems that contribute toward the sustainability goals espoused by schools.

GET SERIOUS About Schools



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SERIOUS MATERIALS

CIRCLE 68

Can You Hear Me? Optimizing Learning through Sustainable Acoustic Design

By Celeste Allen Novak, AIA, LEED AP

Architects, engineers and researchers are learning more about how sound waves influence the learning environment and the design of schools for 21st century children and adults. This article will review some of the principles behind the acoustic properties necessary for great learning environments. The professional will review new high-performance acoustic materials, including "active acoustics" — the newest technology for the manipulation of sound in space. These new materials include lightweight gypsum wallboards dimensionally similar to a typical 5/8" drywall, but with superior acoustic absorption. In addition, this article will discuss new high-performance perforated wood veneer and metal panels that can satisfy any sustainable design checklist.

Active acoustic system as part of the design of the Laboral University in Gijon, Spain.

ACTIVE ACOUSTICS AND RIGHT- SIZING PERFORMANCE SPACES

"In general no one acoustic design is perfect for all performance types. Different modes of communication, whether it is speech or music, require the design of a different reverberation time. For speech intelligibility, a low reverberation time is required; for unamplified singing or instrumental music, long reverberation designs are necessary," says Roger Schwenke, Ph.D., architectural acoustics expert at Meyer Sound Laboratories, Inc. Rooms with high ceilings, large cubic volume and hard, heavy surfaces are needed for musical performances. For classrooms, where good speech intelligibility is important, rooms can be smaller and be made of lightweight absorptive surfaces. Because the physical volume and surface treatment are so different, these spaces are mutually exclusive and may require schools and colleges to invest in multiple performance spaces, as well as large classrooms, with limited usability over the school year.

One 21st century approach to acoustics is to design a flexible space that can meet the requirements of all types of performances, from classroom to concert hall. This perfect space can be constructed to optimize all of these performances through active acoustic systems, providing the listener as well as the performer with good sound quality. As schools slash budgets, new technology provides a means to reduce the building footprint in order to combine large spaces into smaller, more flexible lecture and performance spaces without losing acoustic viability.

The components

To design the room with an active acoustic system, professionals should specify, as a base configuration, a room volume sized for speech intelligibility. This room should have the recommended absorptive materials for low reverberation times even for low frequencies. Active acoustic systems can add reverberation electronically, tuning the sound in the room to meet the additional requirements for hearing music or other types of performances.

They can also increase speech intelligence by providing voice lift and create an "electronic orchestra shell" for listeners as well as for musicians to hear themselves on stage. These systems can be installed to be invisible to the eye, and they can be embedded in perforated walls or ceilings.

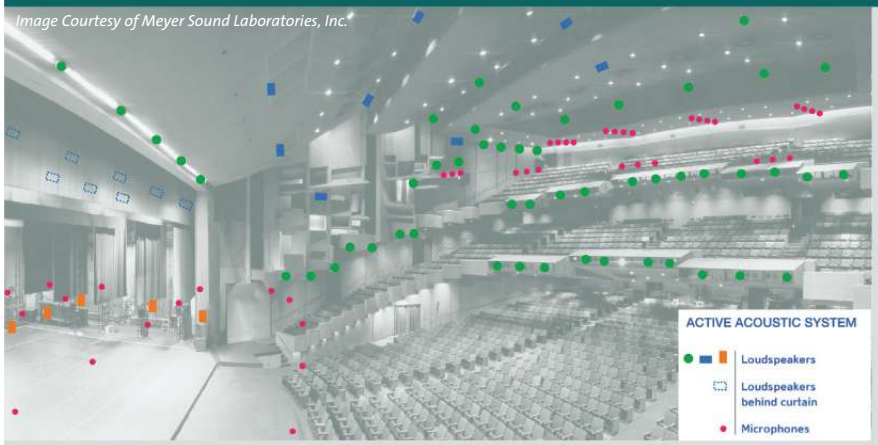
Active acoustic systems incorporate the following components:

- Microphones in the room to pick up direct sound near a performer
- Microphones in the audience to pick up existing reverberation
- Loudspeakers that regenerate sound to tune the performance to the required acoustic signal
- Digital signal processors that contain the communications hardware
- Services by trained experts who will locate equipment into existing buildings as well as work with the architect in the early stages of design to provide the minimal room design for performances in new facilities.

An active acoustic system added voice lift to make speech sounds intimate and intelligible during a technical seminar at the Pearson Theatre, Meyer Sound Laboratories, Inc, Berkeley, California.

Zellerbach Hall Acoustic Retrofit

Image Courtesy of Meyer Sound Laboratories, Inc.



An analysis of this auditorium determined the placement of the components of an effective active acoustic system at Zellerbach Hall, University of California Berkeley.

The 2,014 seat Zellerbach Hall was designed in 1968 as the permanent home and largest indoor venue of Cal Performances, UC Berkeley's premiere music, dance and drama events space. This building won an AIA award for design excellence and it has been the site for numerous performing arts programs including the home of the Berkeley Symphony Orchestra. It was designed for exceptionally diverse programming in the 1960s when architects Vernon DeMars and Donald Harrison had few options for dealing with the diverse acoustic demands of these performance types. Variable acoustics methods involving physical or mechanical means were expensive and electronic enhancement was in its infancy. The architects opted for the only reliable solution available at the time: a "happy medium" wherein the acoustics were acceptable for most of the hall's programs, if optimum for only some.

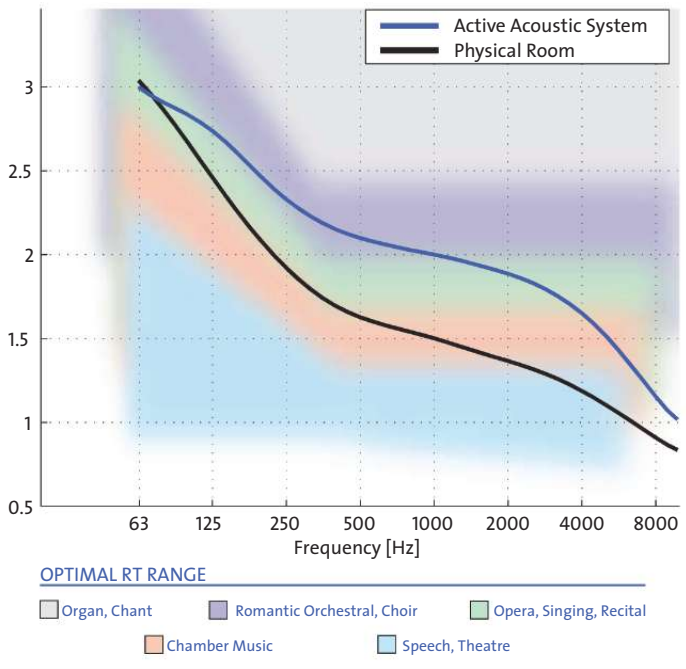
The resulting mid-band reverberation time ended up being 1.45 seconds. This was an ideal length for chamber music, opera and recitals, but at the high end of acceptability for dramatic and spoken-word performances. Music benefiting from a longer and more complex reverberation characteristic, such as orchestral and choral performances, and some types of ethnic and electronic music, was, of necessity, more compromised. They employed a traditional orchestra shell, to add projection and increase the ability of the musicians to properly hear one another, but it was labor- and time-consuming to construct and de-construct for each performance.

"We had been grappling with this issue of maximizing the hall's sound for a number of years," says Cal Performances director Robert Cole. "We know the acoustics are quite good as they are; many wonderful artists have performed here with great success. There have been, however, some instances, such as when a period orchestra like Philharmonia Baroque Orchestra performed, when I have wished we could modify the architecture of Zellerbach to better replicate the space in which the music was originally meant to be performed." The challenge presented by Zellerbach Hall was to extend and enrich the venue's excellent physical acoustics while gaining a second acoustical environment similar to that of a classic concert hall.

The auditorium also housed graduations and speakers throughout the years, in spite of the challenging acoustical environment. In 2006, the University was approaching its 100-year anniversary and for its gala celebration, they planned to include a wide array of performers from dance to opera. They met with an active acoustics engineering team and Cal Performances, setting three main acoustic goals. The first was to provide an enhanced level of natural-sounding reverberation throughout the hall when desired for selected types of performances. The second goal was to improve projection of sound into the hall, and to allow musicians onstage to clearly hear each other, when the orchestra shell is not in place — essentially by adding a "virtual orchestra shell" as an alternative to the hall's mechanical one. Lastly, the installation needed to be natural sounding as well as not visually obtrusive in this award-winning building.

The installation was successful in meeting all of its goals and as Cal Performances music director, Robert Cole, said, "we planned our Centennial Gala comprised of dance, music and a large orchestra and chorus all in one evening. Installing the active acoustics retrofit was the only way we could pull it off."[1]

Chart Courtesy of Meyer Sound Laboratories, Inc.



A broad range of acoustical characteristics can be provided by active acoustic systems and services. This graph of reverberaton time over frequency shows the range of responses available to Zellerbach Hall, from that of the pure physical acoustics to that with the active acoustics system.

Photo Courtesy of Serious Materials

Media rooms can be places for better listening using lightweight gypsum soundproofing wall boards.

Is it green?

According to Roger Schwenke, who is beginning a research study on the possible environmental benefits of active acoustic systems, these systems offer a means to change the acoustics of a room electronically. They are an alternative to physically variable acoustic treatments such as retractable curtains, or doors opening to reverberant chambers. They are green because they provide the alternative to building multiple performance spaces in schools, from K-12 to a university setting. By using active acoustic systems, the cubic volume in a room can be smaller, and therefore the amount of materials needed to construct the building, the energy used in the HVAC and lighting systems are reduced. A lower volume of construction means fewer materials in construction and to transport. Potentially, there is the added benefit of more open space on the site of a shrunken building envelope. Active acoustics can change the sound quality of a room by pushing a button, rather than constructing more square footage.

SOUNDPROOFING LIGHTWEIGHT GYPSUM MEETS ANSI SCHOOL CRITERIA

To point out the long history of acoustical concern by professionals, Brandon Tinianov, CTO of Serious Materials and current Chair of the Acoustical Society of America's Technical Committee on Architectural Acoustics, quotes Vitruvius: "Sound moves in an endless number of circular rounds, like the innumerably increasing circular waves which appear when a stone is thrown into smooth water." Long after this first-century explanation for sound, professionals continue to examine the complex interactions between architecture and sound waves.

When analyzing the sound transmission of wall components in schools, acoustic experts focus on three main characteristics of sound: level (or sound pressure level), frequency and reverberation. Sound pressure level measures the loudness of a sound, which can be affected by the numerous and complex interactions of sound waves with materials and background noises. The intensity of a sound is measured by the decibel level (dB) and in learning environments, the signal-to-noise ratio of the teacher to background noise is critical. Background noise can be transmitted through the walls from classroom to classroom and from hallways to classrooms. The frequency of sound refers to the pitch or vibration of a sound wave. Reverberation, as defined later in this article, can degrade comprehension of sounds, not just when one or more people are speaking, but also when competing mechanical noises or highway noises disrupt the listener.

Sound pressure level, frequency and reverberation can hurt or benefit speech intelligibility and affect learning. That is why the American National Standard Institute (ANSI) Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools (ANSI S12.60-2002) set maximum standards for reverberation time for different room sizes as well as for Sound Transmission Classifications (STC) and decibel levels for classrooms. ANSI also recommends minimum STC ratings for single or composite wall, floor-ceiling, and roof-ceiling assemblies that separate an enclosed core learning space from an adjacent space. (See ANSI standards in online version of this course.)

Traditionally, professionals specify multiple layers of sheetrock or drywall, or mass to adjoining walls with masonry or staggered studs. All of these solutions add weight, labor and materials to the project. A recent development in lightweight gypsum meets or exceeds the recommended noise attenuation levels for walls while reducing the materials required to achievehigh acoustic performance goals. When compared to other assemblies, soundproofing gypsum drywall provides higher STC values/labor and materials as seen in this 2009 chart using RS Means Building and Construction Cost Data. (See table at end of article in online section.)

Soundproofing gypsum drywall allows the designer to provide the auditory learning environment as recommended in ANSI/ASA S12.60-2002, as well as meet sustainability design goals. Depending on the wall assembly, and design application, the designer can choose between several types of soundproofing and moisture resistant materials. Although similar to sheetrock, these 5/8 inch drywall panels have a thin innerlayer that adds soundproofing to the wall system without adding the weight of additional layers of wallboard panels. This soundproofing drywall is screwed in place and does not need to have a resilient channel. Gypsum drywall can be perforated by screws without any loss to its soundproofing capacity. This drywall can be specified to be load

Graphic Courtesy of Serious Materials

Acoustic energy comes in contact with the wall. Constrained layer, damped panel converts acoustic energy to heat energy (in tiny amounts) which is absorbed.

Los Angeles Harbor College — Technology Instruction and Classroom Building

This "smart classroom" is a high-end conference space/auditorium that supports the college TV studio. The room is used for lectures and presentations, as well as for sending and receiving classroom content and live television broadcasts to and from remote locations.

Mark McVey, LEED AP, Design Principal at SmithGroup, explains that the acoustic considerations in this room were unique because the space is used for different purposes. "As a TV studio, the room should be dead, without any echo," he says. "But as a lecture space, it should be live enough to bounce the speaker's voice off the surfaces without too much amplification." The designers were able to achieve satisfactory results for both uses by installing perforated acoustic panels with fiberglass backing yielding an NRC (noise reduction coefficient) of 0.85.

Because of the need for the raised projectors and projection screen, there is a one-story portion and a two-story portion of the room. Since the designer knew there would be some echoing or problematic acoustics up in the higher portion, he decided to use acoustic ceiling panels. Then, when he discovered that metal panels could be made with a radius, McVey and his team decided to continue the rounded shape down throughout the lower area as well. "It was a design opportunity that came out of the properties of the material," he says.

The panel perforations are oblong. This was chosen for both acoustic and aesthetic reasons. "We needed a lot of porosity in the panel to get the acoustic benefits that were required," says McVey, "We thought that using standard circular perforation patterns would result in so many holes, and we wanted to be able to see as much of the material as possible." The aluminum was pre-finished before fabrication with a copper-toned paint that was chosen to give a warm look. Another ceiling achievement in this project was the designers' ability to incorporate a series of components in the room as flush elements, including mechanical registers, speakers, sprinklers, lighting, and projectors concealed behind perforated surfaces or in slots within the ceiling system.

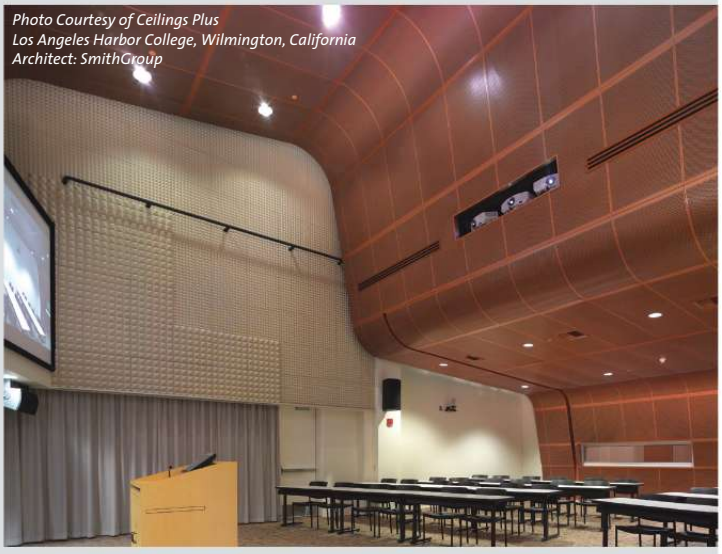


Photo Courtesy of Ceilings Plus
Los Angeles Harbor College, Wilmington, California
Architect: SmithGroup

This smart classroom in the new Technology Instruction and Classroom Building achieves both acoustic control and dramatic visual impact with the help of custom curved, perforated aluminum ceiling and wall panels that yield an NRC of .85.

Note: Perforated panels will be discussed in more detail in the online version of this course.

its soundproofing capacity. This drywall can be specified to be load bearing, or Type X, have a one hour fire-rating, can be specified as abuse-resistant, and can provide an STC 55 rating on single steel stud construction. The materials are as follows:

- For wood construction: a laminated or damped drywall designed for school applications that have a calcium silicate back face.
- For masonry construction: the same drywall as above but placed on one-inch wood furring strips. This application can be used for both interior and exterior walls.
- For metal studs: a gypsum face drywall with magnesium back.

Sustainability — more acoustic performance with less material

The soundproofing material inside of a 5/8-inch gypsum wallboard is less than one-thirtieth of an inch thick. Lightweight and soundproof, gypsum wallboards deliver soundproofing with many fewer layers of drywall — often less than half of the materials typically used in wall construction — while achieving the same acoustical performance values. Typical soundproofing wall construction used in school projects can use as much as four to six layers of traditional drywall. Other options include the design of walls with double studs to achieve higher performance values. Professionals specifying this product will use less material, less labor and will have less waste on the construction site, as well as gaining additional square footage. With this improved soundproofing technology, professionals can reduce drywall material useage in these situations or applications by up to 75 percent. Moreover, the primary and most sustainable reason to use soundproofing drywall is to enhance human performance and create a "high performance acoustic learning classroom." Soundproofing lightweight gypsum wall boards reduce noise from 70 to 97 percent and can result in STC ratings from 46 to 80 for walls — depending upon the wall assembly.

Continues at ce.ArchitecturalRecord.com.

Celeste Allen Novak, AIA, LEED AP principal at rizzolobrown + novak architects specializes in sustainable design materials and methods and teaches as an adjunct professor at Lawrence Technological University.

See Quiz on the Next Page
or
Take the Quiz Free Online

To receive AIA/CES credit, you are required to read the entire article and pass the test. Go to **ce.ArchitecturalRecord.com** for complete text and to take the test. The quiz questions below include information from this online reading.

Program title: **"Can You Hear Me? Optimizing Learning through Sustainable Acoustic Design" (1/10,page 129).** AIA/CES Credit: This article will earn you one AIA/CES LU hour of health, safety, and welfare credit. (Valid for credit through January 2012). **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. 1. Rooms with active acoustic systems can optimize what types of performances?
- ❑ **a.** Spoken words
- ❑ **b.** Electronic music
- ❑ **c.** Orchestral music
- ❑ **d.** All of the above

2. Active acoustics require engineering services to be involved in early stages of the design process before the cubic volume is determined.
- ❑ **a.** True
- ❑ **b.** False

3. Active acoustics provide the most flexibility when the room acoustics are designed to nominally accommodate:
- ❑ **a.** speech.
- ❑ **b.** music.
- ❑ **c.** high frequencies.
- ❑ **d.** hard materials.

4. When analyzing sound transmission through walls, school acoustic experts focus on which of these main characteristics of sound?
- ❑ **a.** Sound pressure level
- ❑ **b.** Frequency
- ❑ **c.** Reverberation
- ❑ **d.** All of the above

5. How is lightweight gypsum drywall different from traditional drywall?
- ❑ **a.** Heavier panels
- ❑ **b.** Thicker panels
- ❑ **c.** Has a thin soundproofing inner layer
- ❑ **d.** Cannot be used to prevent mold or mildew.

6. Lightweight gypsum can reduce drywall materials used for soundproofing up to:
- ❑ **a.** 10 percent.
- ❑ **b.** 25 percent.
- ❑ **c.** 50 percent.
- ❑ **d.** 75 percent.

7. To improve speech intelligibility in classrooms, the Collaborative for High Performance Schools (CHPS) recommends:
- ❑ **a.** limiting reverberation time to RT60=0.06.
- ❑ **b.** using resilient flooring to soften footsteps.
- ❑ **c.** limiting classrooms to no more than 20 students.
- ❑ **d.** using walls with a sound transmission coefficient greater than STC 45.

8. Which of the following benefits are offered by wood panels with an aluminum core compared to wood panel with a particleboard core?
- ❑ **a.** Lighter weight
- ❑ **b.** Better noise reduction with smaller perforations
- ❑ **c.** Resistance to changes in humidity
- ❑ **d.** All of the above

9. Which fact below *does not* contribute to the sustainability of perforated aluminum ceiling and wall panels?
- ❑ **a.** They can be laminated with FSC-certified wood veneer.
- ❑ **b.** They are factory pre-finished with zero-VOC finishes.
- ❑ **c.** The panels can be made in almost any size or shape.
- ❑ **d.** The aluminum contains up to 85% post consumer recycled material content.

10. What is the estimate of all children with a slight hearing loss?
- ❑ **a.** 10 percent
- ❑ **b.** 15 percent
- ❑ **c.** 20 percent
- ❑ **d.** 25 percent

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See Endnotes in online version of this course.

Can You Hear Me?
Optimizing Learning through Sustainable Acoustic Design

Product Review

Photo courtesy of Ceilings Plus
Architect: Steven Langford Architects, Inc.

1

Ceilings Plus

BARZ™ LIGHTWEIGHT AND VERSATILE LINEAR CEILING SYSTEM

Ceilings Plus introduces Barz, a lightweight linear ceiling system of different-sized beams, slats, bars and more. Linear elements of any profile are pre-assembled into lightweight panels for fast installation and accessibility. Available in a variety of real wood veneers on aluminum cores – as well as beautiful metal finishes – Barz can convey the feeling of deep beamed wood ceilings, with decreased cost and weight, and increased performance including acoustic noise reduction up to NRC .85. Barz uses aluminum containing up to 85% recycled content, and wood veneers are available from FSC-Certified sources. The result is a clean, trackless look that defines space without confining it.

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circle 38

2

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CONSTELLATION® ELECTROACOUSTIC ARCHITECTURE

Constellation electroacoustic architecture is a system that combines the natural acoustics of a space with powerful technology to create acoustics with natural characteristics and broad flexibility. Constellation gives venues the ability to supply appropriate acoustics for each kind of performance they host, all accessible with a single button press.

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circle 39

3

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– John Adams, Pulitzer Prize-winning composer

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Getting the Lay of the Land

With several projects nearing completion, Steven Holl Architects spreads out across the Chinese landscape

BY JOSEPHINE MINUTILLO

1

Continuing Education

Use the following learning objectives to focus your study while reading this month's ARCHITECTURAL RECORD/AIA Continuing Education article. To earn one AIA learning unit, including one hour of health, safety, and welfare (HSW) credit, turn to page 145 and follow the instructions. Other opportunities to receive AIA/CES credit can be found on pages 117, 123, 131, and 147.

Learning Objectives

1. Identify challenges in designing suspended structures.
2. Discuss different construction strategies for suspended structures.
3. Identify forces that act on buildings.
4. Recognize advantages of steel and concrete in various structural elements.

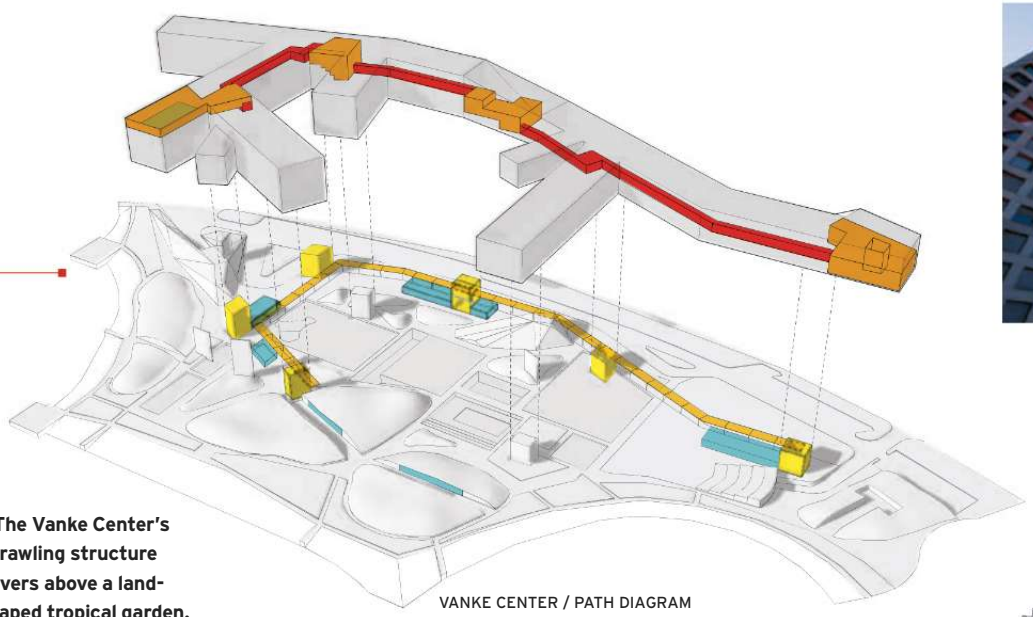
THERE WAS A SLIGHT TINGE OF IRONY when Linked Hybrid was named the Best Tall Building of 2009 by the Council on Tall Buildings and Urban Habitat (CTBUH) this past October. For one thing, Steven Holl Architects' well-known Beijing housing complex consists not of one, but nine towers, the tallest of which only rises 21 stories. Moreover, the most striking aspect of those towers – which include eight rectangular residential buildings and a cylindrical structure intended as a hotel – occurs not on the vertical plane, but within a horizontal loop of skybridges that connects the individual buildings.

To Holl, who admits that he doesn't do skyscrapers, the award represents a "value change." According to CTBUH executive director Antony Wood, "Linked Hybrid points the way forward for the intensified multiuse, multilevel connected cities of the future."

The Vanke Center, another Chinese project by Steven Holl Architects located in Shenzhen, goes a step further in connecting inhabitants. Referred to as a "horizontal skyscraper," the building is as long as the Empire State Building is tall, propped up on a series of legs that allows the massive structure to hover above a tropical garden. Inside, apartments, offices, hotel rooms, and headquarters for the Vanke Company mingle within the same walls. Additional services exist below grade as well, where a conference center, spa, and parking are located.

In Nanjing, halfway between Beijing and Shenzhen, Holl has hoisted into the air another building – the Nanjing Museum of Art and Architecture. While at a much smaller scale than the Vanke Center, the focus once again is on the horizontal, since the museum's elevated, spiraling upper gallery offers visitors multiple perspectives of the surrounding landscape, culminating in a view of the Ming Dynasty capital city.

PHOTOGRAPHY: COURTESY STEVEN HOLL ARCHITECTS, EXCEPT AS NOTED; © IWAN BAAN (2)

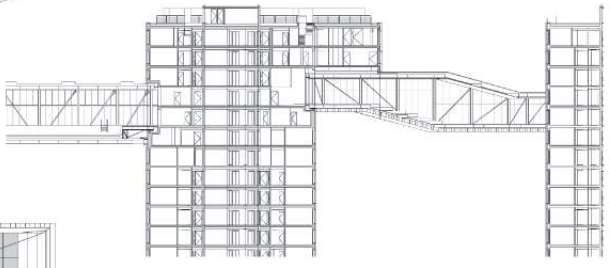


VANKE CENTER / PATH DIAGRAM

1. **The Vanke Center's sprawling structure hovers above a landscaped tropical garden.**

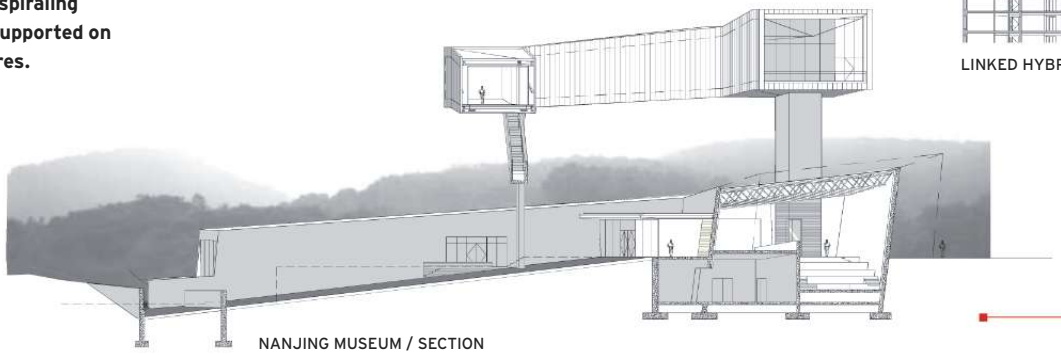
2

2. **Linked Hybrid's skybridges connect the residential towers at their upper floors.**



LINKED HYBRID / SECTION

3. **The Nanjing Museum's hoisted, spiraling form is supported on three cores.**

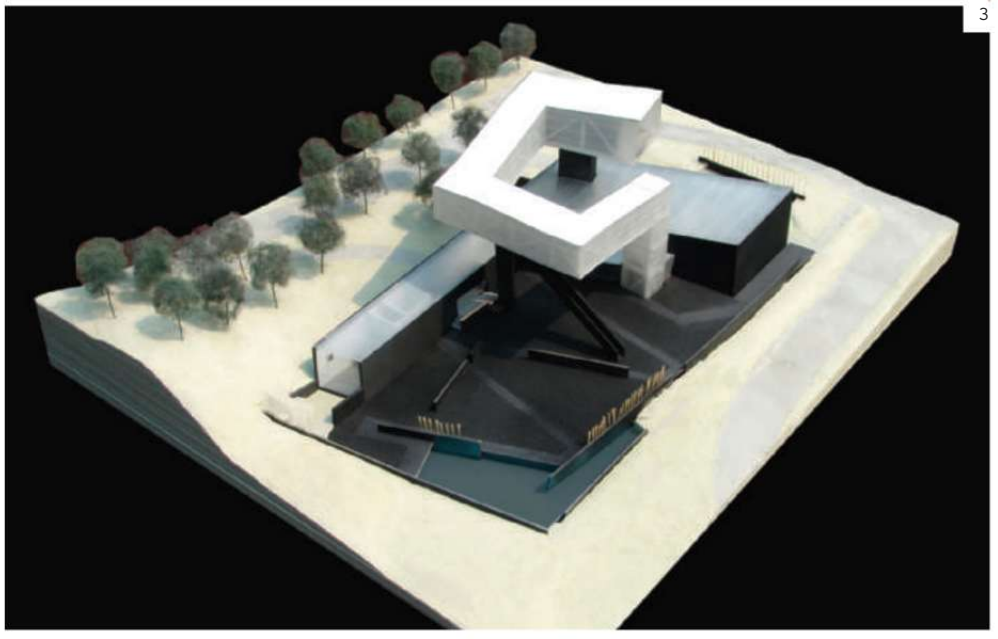


NANJING MUSEUM / SECTION

Building horizontal

The construction of Linked Hybrid (see page 48) is the first to reach completion — though it is not fully occupied yet. But getting there was a challenge from the outset. The project's bold design, by Holl's Beijing-based design architect Li Hu, together with structural engineers Guy Nordenson and Associates and the China Academy of Building Research (CABR), faced a stringent approval process.

While it may seem that there's an "anything goes" attitude toward new construction in China by foreign architects, especially in the wake of the radical structures erected for and around the 2008 Olympic Games in Beijing [RECORD, July 2008, Special Issue], there is a real chance that a project is subjected to an intensive redesign. "We were hoping to avoid CCTV's fate," Nordenson says, referring to the looping headquarters tower for China Central Television designed by Office for Metropolitan Architecture with Arup, whose initial



3

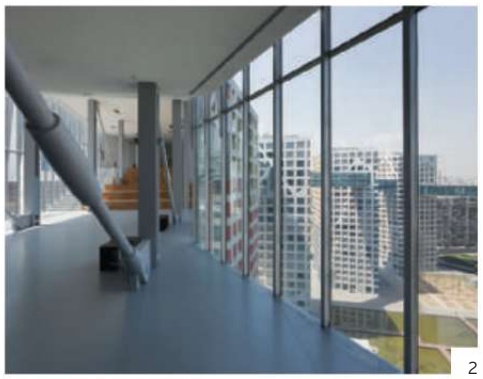
[PROJECT **LINKED HYBRID**]

1

1. **The friction pendulum isolators allow the skybridges to float between towers.**

2. **The skybridges' steel structure allows open spaces and clear views.**

3. **Diagonal lines in the facades' structural grid represent steel members that were inserted to counter added forces from the skybridges, cantilevers, and other conditions.**



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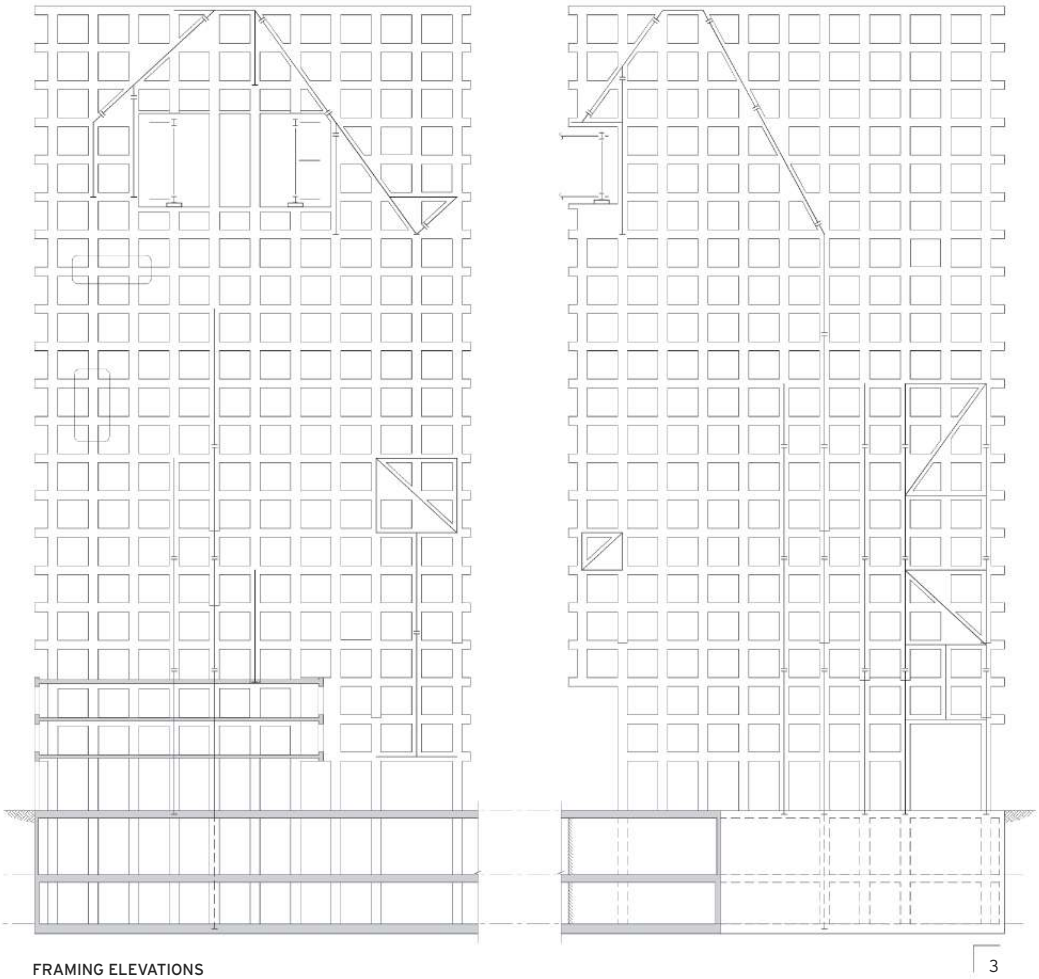

FRAMING ELEVATIONS

3

design was rejected. Nordenson adds, "Though the government pushes for radical buildings, there is an old guard of Communist-era engineers that maintains certain values of frugality and conservation of resources."

To that end, Holl and his team looked for ways to make Linked Hybrid's overall design as straightforward and repetitive as possible. Each building features a structural core, concrete slabs, concrete cross walls, and a perimeter concrete moment frame – all of which give it the necessary stiffness to contend with movement at the level of the skybridges.

The concrete structural components respond to the architects' and engineers' desire for simplicity and frugality, but the design gets daring wherever steel is introduced. The goal of the bridges' structural design was to maximize transparency and create floating hallways of light, traversing between 65 and 197 feet between the heavy concrete towers. (Some of the one- to two-story-high bridges slope to connect towers at different levels.) Each skybridge is composed of a steel truss whose rigidly connected vertical and horizontal members form a Vierendeel frame. Though the truss is strong enough to support the skybridges, diagonal cables were added.

The bridges, which were assembled on the ground and hoisted into place, rest on friction pendulum isolators. Nordenson proposed locating the isolators on only one side of each bridge, but Xiao Congzhen of CABR upped the ante, suggesting that the isolators be located on both sides. (As constructed, an isolator sits at each corner of a bridge, for a total of four per bridge.) This essentially means that the bridges are floating between towers. "You're counting on the fact that movement of the buildings away from the bridges is never going to be larger than the extent of the supports," Nordenson says. "That is the case, but it's still a fairly adventurous thing to do."

The isolators – provided by California-based Earthquake Protection Systems – are shaped with a radius to achieve a described period of vibration that will minimize the shear transfer by reducing the resonance. In an earthquake, the bridges will move up to 15 inches relative to the buildings, sparing them, and the buildings, from the effects of lateral forces. By virtue of the curved bearing surface, the structure is lifted as it slides sideways.

It is the 33-foot-long, multistory cantilevers at the top of five of the towers, however, that determined the seismic design. The structure of the cantilevers is also steel and completely independent of the skybridges, which in some cases sneak beneath a cantilever. In those instances, a gap between the structures keeps them separate, assuring that neither is supporting the other.

The massive cantilevers exert forces that are resolved through the introduction of discrete

PHOTOGRAPHY: COURTESY GUY NORDENSON AND ASSOCIATES (1); © IWAN BAAN (2)

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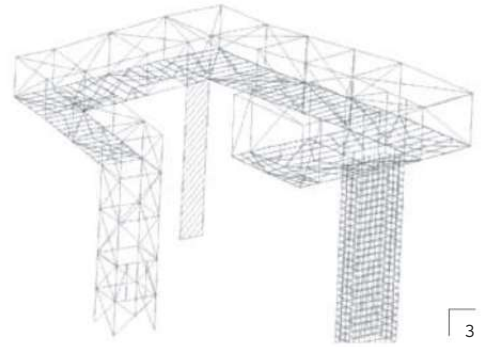

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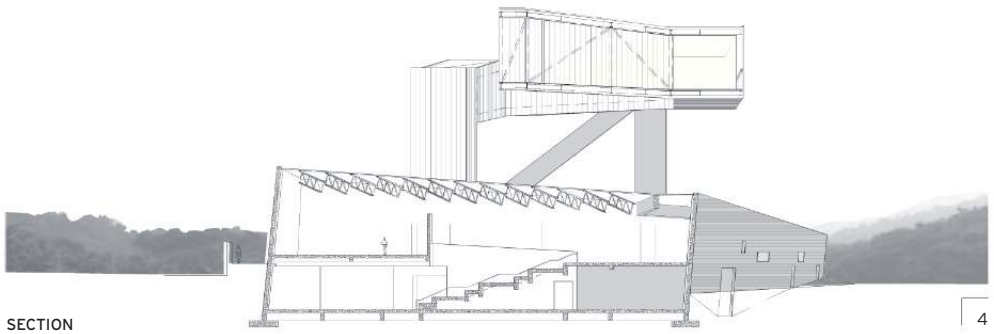


SECTION

4

1. **The suspended gallery features a double cantilever at one of its corners.**

2. **The upper gallery culminates in a view toward the city of Nanjing in the distance.**

3. **Three cores support a continuous box truss.**

4. **The straight passages of the ground level gradually turn into the winding passage of the suspended gallery.**

diagonals in the towers concrete exoskeletons. Rather than creating larger concrete forms, steel members are inserted in those diagonals. Additional diagonals are located where there is increased demand on the concrete structure as a result of the skybridges, or to reinforce holes in the grid. The overall seismic design was analyzed by performing a shake-table test, a common practice in China in which structural scale models of the building are subjected to a variety of simulated ground motions.

Like the daring design elements in Linked Hybrid, the Nanjing Museum of Art and Architecture's elevated gallery uses steel construction. (Nanjing itself is a center for steel production in China.) But compared to Linked Hybrid's massive scope and complex program, the Nanjing project is a folly of sorts, serving as a gateway to the China International Practical Exhibition of Architecture, curated by Arata Isozaki. (It was also Holl's gateway into building in China, as it was the first commission he got there, back to 2002.)

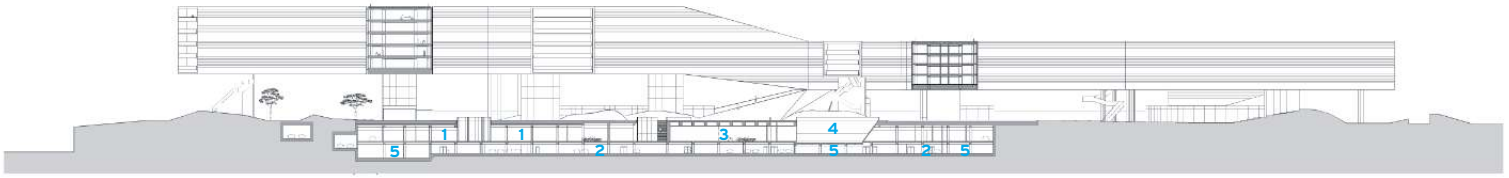
Composed of a continuous box truss supported on three cores, like a table on three legs, the precarious-looking structure demanded a leap of faith in more ways than one. "All building in China requires collaboration with local engineers," remarks Guy Nordenson. "Sometimes you submit drawings and don't hear anything for a year or so until you get photographs of the completed structure. That was the case with this building."

Suspended over 50 feet above the ground, the gallery — which varies in height from 15 to 20 feet as it travels along its path — goes up, over, and around, unwrapping in a clockwise turning sequence. Visitors travel through the space in much the same way that viewers experience traditional Chinese landscape paintings, which reject a single vanishing point perspective for multiple ones.

Because the structure is a box (composed of H-section truss members), it can contend with torsional forces that are developed by wind around its corners, a condition which is of particular concern at one corner that features a double cantilever. Two of the legs on which the structure stands are concrete, including an isolated wall and a stair tower. The remaining leg is composed of steel. The designers debated the degree to which the truss would be exposed, in the end deciding to control instances when the structure and views are visible to visitors.

While the structure was erected rather quickly on a hillside, construction of the rest of the 32,000-square-foot building has stalled. The completed museum, tentatively scheduled to open this summer, will feature galleries, a tea room, a bookstore, and a curator's residence. And like Holl's other projects in China, sustainable features were incorporated into the design, including a

[PROJECT **VANKE CENTER**]



SECTION

1 Meeting room
2 Parking
3 Conference center
4 Water garden
5 Mechanical

1

1. **By lifting the entire structure to the height limit, expansive views are possible from all areas of the building.**

2. **The Vanke Center is as long as the Empire State Building is tall.**

3. **The unique, composite structure features cable stays.**

4. **Pools are part of the landscaped area beneath the building.**

2

3

4

ceiling made of solar collectors that permit 30 percent light passage to the interior. The museum's courtyard is paved with recycled *hutong* bricks from the destroyed courtyards in the center of Nanjing.

The hovering architecture of Shenzhen's Vanke Center uses a unique hybrid construction. In plan, the building resembles a tree trunk, kinked in several places, with smaller branches growing out of it on one side. The four- to five-story structure is lifted 30 to 50 feet off the ground, and reaches a maximum height of 115 feet, the limit for the site. According to Holl, by lifting the entire building in this way, expansive views of the lake and the South China Sea in front of the building, and mountains behind it, are possible from all of the main program spaces, not just select areas. The decision to float one large structure right under the 115-foot height limit, instead of several smaller structures each catering to a specific program, also generates the largest possible green space open to the public on the ground level.

The sprawling, floating building rests on eight poured-in-place concrete cores distributed throughout the length of the trunk and its branches. The cores are reinforced with steel to support the building's innovative feature. Borrowing from bridge design, the Vanke Center uses a cable-stay structure. "I threw the idea out on the table as a crazy joke," says Hu, who oversees Holl's projects in China. "And Xiao made it happen."

The building may be the first to combine a cable-stay system with a conventional column-and-beam concrete structure. "We decided on this system because of the desire for large spans and clear facades," says CABR's Congzhen. "A more traditional truss system would have obstructed the facades. This way, the main structure is inside the building." While other options might have been available using an entirely steel structure,

The cable-stay structure permits open facades.

this approach also saved money, since concrete construction is much less expensive in China.

Congzhen admits the construction process was difficult. The cores were constructed first, followed by the steel bottom slab, which was held up by supports from the ground until the cables were installed. Once the cables were in place, two concrete slabs of the upper structure were built and tension given to the cables. At this point, the ground supports were removed and the additional two or three upper slabs added. The cables – 511 ¼-inch-thick flexible steel members – are enclosed in a steel tube to reduce vibration.

The building features cantilevers up to 82 feet, and spans twice that long. The underside of the structure, finished in bright colors, becomes its main elevation. Below it, the 560,000-square-foot tropical landscape features sunken gardens, courtyards, and large planted mounds (inside of which are various program spaces, such as a theater). In addition to the planted areas, several types of permeable pavement – local river stones, crushed gravel, open-joint stone pavers, grasscrete, and compressed sand pavers – are used to retain rainfall before secondary gutters redirect overflow into a series of ponds and wetlands that are planted with marsh grasses and lotus.

Though construction on the Vanke Center was recently completed, like many built projects in China (including Linked Hybrid), the program is still developing. "That is one of the challenges of building here," says Hu. "It is very dynamic and always changing." Regardless, a public path connects the different zones of the nearly 1,300,000-square-foot-complex. Currently, the Vanke Company's staff have moved into their offices, located in two of the branches.

The building's glass facade is protected against the sun and wind by porous louvers. Holl once again incorporates green strategies in this project, which is aiming for LEED Platinum certification, a first in China. The building has a green roof with solar panels and uses local materials such as bamboo (also highly renewable) for doors, floors, and furniture.

Also on the horizon for Steven Holl is another mixed-use development, which the architect calls Sliced Porosity Block, located in Chengdu, in China's central Sichuan Province. The project addresses many of the same issues of openness, connectivity, and sustainability that Holl has explored in Beijing, Nanjing, and Shenzhen – spreading his unique design approach to all areas of the vast country. ■

For this story and more continuing education, as well as links to sources, white papers, and products, go to **architecturalrecord.com/tech**.

AIA/Architectural Record Continuing Education

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110EDIT

1 In Linked Hybrid, which of the following provides the necessary stiffness to counter movement in the skybridges?
- **A** the skybridges' isolators
- **B** the towers' concrete structure
- **C** both a and b
- **D** none of the above

2 Which of the following causes Linked Hybrid's skybridges to float between towers?
- **A** diagonal cables in the bridge
- **B** friction pendulum isolators
- **C** diagonal steel members in the towers' moment frames
- **D** all of the above

3 Why did the designers combine a cable-stay structure and concrete frame in the design of the Vanke Center?
- **A** to keep the facades clear
- **B** to save money on steel construction
- **C** both a and b
- **D** none of the above

4 Which of the following uses a box truss for its structure?
- **A** Linked Hybrid's rectangular towers
- **B** Linked Hybrid's skybridges
- **C** the Nanjing Museum's suspended gallery
- **D** the Vanke Center's elevated floors

5 The structure for which of the following forms a Vierendeel frame?
- **A** Linked Hybrid's rectangular towers
- **B** Linked Hybrid's skybridges
- **C** the Nanjing Museum's suspended gallery
- **D** the Vanke Center's elevated floors

6 Which statement about the Nanjing Museum is true?
- **A** it was Steven Holl's first project in China
- **B** it is part of a complex curated by Arata Isozaki
- **C** its design was inspired by Chinese landscape paintings
- **D** all of the above

7 Which design aspect is unique to the Vanke Center?
- **A** it incorporates sustainable features
- **B** a main feature of the building is suspended
- **C** it borrows a system from bridge design
- **D** its program spaces changed since the initial design

8 The Nanjing Museum's upper gallery is supported by which of the following?
- **A** three concrete walls
- **B** three steel trusses
- **C** three stair towers
- **D** none of the above

9 Spans in the Vanke Center reach how long?
- **A** 82 feet
- **B** 115 feet
- **C** 164 feet
- **D** 197 feet

10 Which of the following statements regarding new construction in China is true?
- **A** foreign designers are not subjected to a design approval process
- **B** foreign designers always collaborate with local engineers
- **C** a representative from the foreign architect's or engineer's office must be on-site at all times for construction to proceed
- **D** once construction has begun, changes to a building's use are not permitted

Program title
"Getting the Lay of the Land," ARCHITECTURAL RECORD 01/10, page 138.

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CIRCLE 46

EARN ONE AIA/CES HSW/SD LEARNING UNIT

Hardwoods in Green Building: Plantation-grown Eucalyptus Makes its Mark as a Versatile, Sustainable Exotic Species

Designers recognize the environmental benefits of specifying hardwoods from temperate and tropical zones.

Sustainably grown hardwoods help reduce greenhouse gases in the atmosphere.

Provided by Weyerhaeuser

As concerns grow about climate change and other potential impacts on the human and natural environment, design professionals are increasingly challenged in specifying sustainable architectural materials. Hardwoods have always been popular choices in architectural finish applications due to their natural appeal, beauty, and durability. Yet concerns about deforestation and illegal logging — especially in tropical areas — have led designers to question the role of hardwoods in green building.

CONTINUING EDUCATION

Use the learning objectives below to focus your study as you read **Hardwoods in Green Building: Plantation-grown Eucalyptus Makes its Mark as a Versatile, Sustainable Exotic Species**. To earn one AIA/CES Learning Unit, including one hour of health safety welfare credit and sustainable design, answer the questions on page 151, 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:

- Describe the environmental advantages of wood
- Explain how sustainable forestry practices and certification support green building goals
- Discuss the environmental benefits of plantation-grown eucalyptus
- Articulate residential and light commercial eucalyptus applications

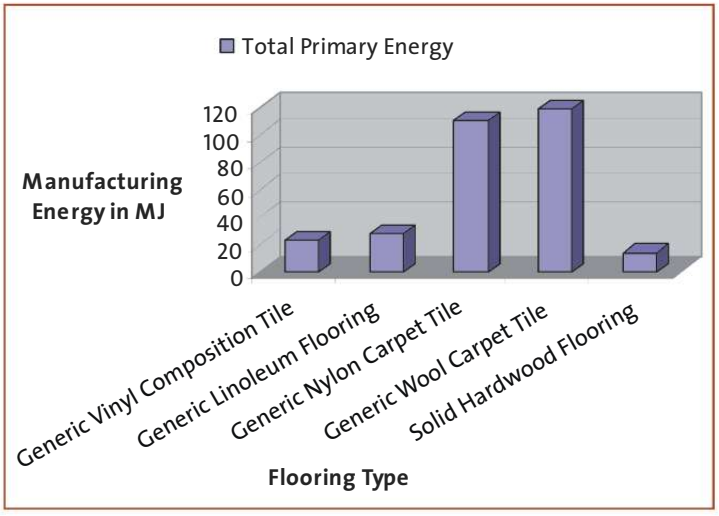
As an overall class of materials, wood products can play a significant role in helping reduce greenhouse gases in the atmosphere. The best way to ensure that trees — and hardwoods in particular — will provide for future generations is to select those woods that have been harvested according to sustainable forestry practices. This course will discuss sustainable forestry and other design issues to consider when selecting and specifying wood over other materials for architectural finishes. Also highlighted will be plantation-grown eucalyptus that has been certified by independent sustainable forestry programs as one type of increasingly popular hardwood that can help meet green building objectives.

ENVIRONMENTAL ADVANTAGES OF WOOD PRODUCTS

A primary advantage of wood in green building projects is that it comes from a renewable natural resource. Unlike petrochemicals used in making plastics and ores used to make aluminum, iron and other metals, trees obtained from plantations and forests that are properly managed can be harvested and replanted in subsequent cycles to help ensure a continuous supply, making wood one of the few truly renewable materials. In addition to its renewability, wood products have several obvious advantages over other types of building materials: they are non toxic, waste efficient, biodegradable and recyclable, and can make a contribution to combating global warming.


Photo courtesy of Weyerhaeuser

Wood comes from a natural, renewable resource.



Source: CORRIM

Storage of Atmospheric Carbon Dioxide

Selection of wood products actually helps remove carbon dioxide, a key gas implicated in global warming, from the atmosphere. Through photosynthesis, growing trees absorb carbon dioxide from the air and convert it to carbon and oxygen. The carbon becomes an integral part of the wood fiber where it remains stored in long-lived wood products well after the lumber is harvested. The amount of stored carbon adds up considerably. According to the Canadian Woods Council, a typical 2,400-square-foot wood-framed home holds 7 tons of carbon (28 tons of carbon dioxide), equivalent to the emissions of a fuel efficient car over seven years. Since young forests capture more carbon dioxide than older, more mature forests whose growth rate has slowed, harvesting mature trees and regenerating naturally or with tree seedlings can increase the amount of carbon sequestered from the atmosphere.

Primary Energy Requirements

Numerous studies attest to the fact that wood requires substantially less energy to manufacture than alternative materials. According to the Consortium for Research on Renewable Industrial Materials (CORRIM), solid hardwood flooring requires about one-half the energy to produce as vinyl composition tile and less than one tenth the energy of wool carpet tile.

Numerous studies attest to the fact that wood requires substantially less energy to manufacture than alternative materials.

CORRIM further found that compared to steel and concrete, wood-based building materials require less energy to produce, emit less air and water pollution, and result in lower amounts of CO_2 to the atmosphere. CORRIM researchers found that compared to a wood framed house, a steel-framed home used 17 percent more energy; had 26 percent more global warming potential; had 14 percent more air emissions and more than 300 percent water emissions. The concrete-framed home used 16 percent more energy; had 31 percent more global warming potential; had 23 percent more air emissions; had roughly the same level of water emissions and produced 51 percent more solid waste.

Material Utilization

The forest products industry uses virtually every portion of the log. Byproducts of converting a log to lumber — sawdust, bark, chips and slabs — have nearly a 100 percent utilization rate. Bark and sawdust may be used as bedding materials for nursery use, chips for paper-making processes, or wood fiber converted to plywood. Other wood byproducts are burned and converted to energy, with some manufacturers able to produce sufficient electricity to power their operations using residuals as bioenergy for heating on-site boilers for conditioning and drying processes. According to the Virginia Department of Forestry, the forest products industry consumes enough of its own by-products to save over 2 million barrels of oil annually.

Recycling

Because building construction uses large quantities of materials, considering recyclability and recycled content during product specification can help make more efficient use of raw materials and minimize waste going to landfills. While wood has not been a primary recycled material in the past, building professionals are paying closer attention to how it can be reused. Architectural finishing materials can often be salvaged from demolished buildings and recovered wood can be used to manufacture new products such as medium-density fiberboard and particle board or if untreated converted into mulch or used as fuel to help conserve other natural resources.

At the end of life, wood products are used in various ways: 8 percent is composted; 9 percent is recovered for reuse; 14 percent is burned for fuel; and 69 percent goes to landfills or dumps. Once

in a landfill, only 23 percent of the stored carbon is estimated to be emitted over time; the remainder represents a landfill sink of carbon.

MANAGING FORESTS FOR SUSTAINABLE SUPPLY

While the advantages of wood products are clear, where and how the wood is obtained ultimately determines its credibility as an environmentally sound building product. Basically, there are three forest types.

Protected forests. National parks or wilderness areas are protected areas and are not intended to produce forest products. These lands remain as protected forests to promote biological diversity, recreation, and other social and environmental values.

Wood-supplying forests. Among forests managed to supply wood, some are sustainably managed and some are not. Forests relying on natural regeneration can be sustainably managed, but timber harvesting in these natural forests can also be exploitative and not sustainable. An unsustainable forest is one in which the rate of removal of wood exceeds that of either the natural regeneration or replanting of trees. Sustainable forests are those in which trees are harvested, replanted or left to naturally regenerate, and managed over their life to ensure vibrant and healthy growth. This category of forest is managed to maintain more natural qualities, both to meet global needs for wood and to sustain local communities.

Intensely cultivated forests. A third type is a forest or tree plantation that is intensively cultivated, harvested and replanted to maximize the volume of wood produced, using tree planting or other practices derived from agriculture to grow high quality wood quickly and renewably. By enhancing the annual wood yield from each acre of land, managed forests and plantations reduce the footprint needed to produce wood products. The enhanced yield is a function of several factors: trees bred for both quality and growth; managed tree spacing and density that optimize wood growth and quality, and replanting trees, which speeds regeneration dramatically over seed fall. Also, by focusing growth and harvesting in specific, planned areas, tree plantations can minimize adverse impacts to environmentally sensitive areas such as waterways and steep slopes and protect wildlife habitat.

By enhancing the annual wood yield from each acre of land, managed forests and plantations reduce the footprint needed to produce wood products.

Each type of forest has its own carbon implications. In a protected forest, trees store carbon as they grow and eventually mature, die and decompose, which releases their trapped carbon back into the atmosphere. Over their full life cycle, trees are carbon neutral. In a managed forest, the harvested trees are converted into wood products, a portion of which store carbon long-term, making them net sequestering or carbon positive. An intensively managed forest like a plantation removes larger amounts of carbon dioxide from the atmosphere than a slower growing forest. The shorter harvest intervals increase the volume of wood produced, providing a greater amount of carbon storage capacity in finished wood products.

"There is a vision emerging among governments and nongovernmental organizations that the best way to sustain forest resources globally is through a balance of these three approaches," says Eric Anderson of Weyerhaeuser Forestlands International. "The idea is to manage plantations intensively to produce as much wood and fiber as possible while protecting the environment. This relieves pressure on the other two types of forest even as the demand for wood and wood products continues to grow."

FOREST CERTIFICATION PROGRAMS

Managed forests and plantations can help support sustainability goals, but not all managed forests or plantations are properly, or even legally, managed. According to the World Wildlife Fund, illegal logging practices result in the loss of nearly 36 million acres of natural forests across the world each year, an area roughly the size of New York State.

There is justifiably widespread concern about deforestation around the globe. Taking the Amazon basin as an example, 60 to 70 percent of deforestation comes from cattle ranching, and the rest from small scale subsistence. "Large-scale farming contributes relatively little to deforestation in the Amazon. And commercial forestry — logging followed by reforestation — is not deforestation," says Anderson. "However, studies do correlate unsustainable logging with future clearing for settlements and farming."

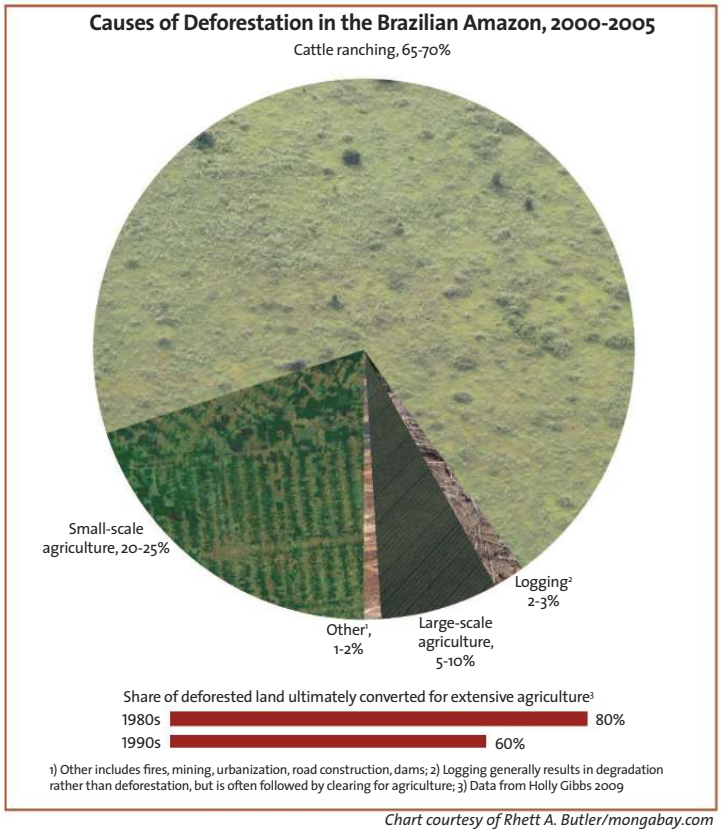
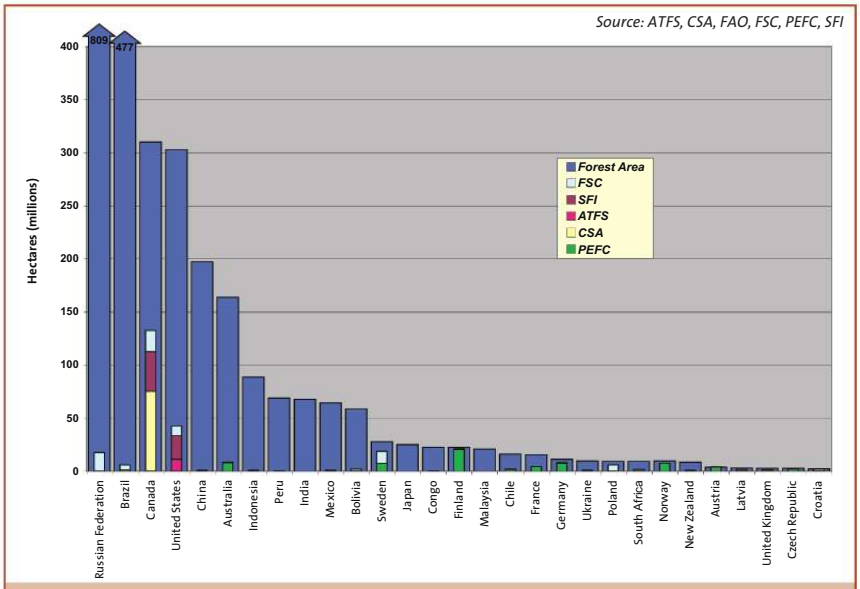


Chart courtesy of Rhett A. Butler/mongabay.com



Certification by country

The immediate challenge, says Anderson, is to combat illegal harvesting, poor forestry practices and over-exploitation that lead to deforestation. In the U.S., recent changes to federal law make it illegal to import, export, sell, acquire or purchase illegal or illegally acquired plants, including any plant illegally harvested and illegally harvested wood or wood products. In 2008, Congress amended the Lacey Act with the Combat Illegal Logging Act that helps combat illegal logging and promotes fair trade for legally sourced wood. The Lacey Act defines illegal wood as wood taken in violation of relevant laws in the source country, and holds the importing entity responsible for avoiding illegal wood.

In the 1990s, concern over forest conservation prompted the establishment of several different sustainable forest management standards. The differences between these standards were, and to some extent still are, a function of their origins. They were founded by different interests and tailored to national differences in government regulation. Over time, however, business realities and societal expectations have narrowed the differences. Many observers maintain that all major certification systems are credible standards for sustainable forestry. All have third-party certification procedures that validate a participant's compliance with the requirements in standards that are controlled by independent boards and all have representation from environmental organizations, forest products companies, and the wider forestry community and represent the environmental, social, and economic values required for sustainable practices. Generally, sustainable forest management standards also set rules for documenting the source of wood used in a product and the conditions under which a product can carry a certified product label.

The labels of forest certification schemes are showing up on more and more products every year. Certification provides design professionals with the assurance that the wood comes from responsible sources. Several creditable organizations worldwide address the unique environmental aspects of forests in both temperate and tropical climates. In tropical areas, there are three prominent certifying bodies: the Forest Stewardship Council (FSC); Programme for the Endorsement of Forest Certification (PEFC), and the Brazilian Forest Certification Program (CERFLOR), which is endorsed by PEFC. FSC and PEFC are umbrella programs operating around the world, with regional certification schemes, including ones specific to tropical areas and distinct subregions therein.

All three, however, are voluntary programs. They are designed to promote sustainable forestry practices and include measures addressing water quality, wildlife habitat, and threatened and endangered ecosystems, and all three programs call for harvesting and regenerating forests at sustainable levels. Critical to certifying programs is the chain of custody system that tracks the amount of wood from certified forests flowing into a mill, and the amount of certified labeled products coming out. Chain of custody does not usually mean that a certain piece of wood comes from a certified forest, but it ensures that certification labels accurately reflect the volume of wood coming from sustainable forests. "Certification is especially critical when specifying tropical hardwoods since many developing countries have historically had illegal or unsustainable logging," says Anderson, noting that building professionals can have a significant influence on the situation by specifying only those wood products that have been independently certified as coming from sustainable forests.

Yet even with this increase in promotion and demand for certified wood products, 90 percent of the world's forests have no certification at all — which makes it all the more important to source tropical wood that has been certified and/or comes from a company with operations that have been accredited to ISO 14001 standards.

EUCALYPTUS — A SUSTAINABLE EXOTIC HARDWOOD

Eucalyptus is the most commonly planted fast-growing hardwood in the world with more than 700 species in existence. Because of their fast growth, plantation eucalyptus trees were traditionally harvested as a source of pulp for the manufacture of tissue, printing and specialty papers. With demand escalating for rapidly replenishing and attractive hardwoods, eucalyptus plantations are increasingly being managed to produce solid wood for architectural finish products. Although eucalyptus is native to Australia and grows in the U.S.; it is in the tropical and subtropical regions where eucalyptus is not only prolific but also exhibits the strength and durability required for architectural finish applications.

Continues at ce.ArchitecturalRecord.com.

See Quiz on the Next Page
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Program title: **"Hardwoods in Green Building: Plantation-grown Eucalyptus Makes its Mark as a Versatile, Sustainable Exotic Species" (1/10, page 147).** AIA/CES Credit: This article will earn you one AIA/CES LU hour of health, safety, and welfare/sustainable design (HSW/SD) credit. (Valid for credit through January 2012). **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. The substance that is an integral part of wood fiber that helps reduce greenhouse gas emissions is:
- ❑ **a.** oxygen.
- ❑ **b.** hydrogen.
- ❑ **c.** carbon.
- ❑ **d.** sunlight.

2. Forests managed to supply wood are:
- ❑ **a.** sustainable.
- ❑ **b.** not sustainable.
- ❑ **c.** not certified.
- ❑ **d.** sometimes sustainable and sometimes not.

3. The enhanced yield in tree plantations is a function of:
- ❑ **a.** trees bred for both quality and growth.
- ❑ **b.** managed tree spacing and density.
- ❑ **c.** replanting trees.
- ❑ **d.** All of the above

4. In the Amazon basin, 60 to 70 percent of deforestation comes from:
- ❑ **a.** illegal logging.
- ❑ **b.** cattle ranching.
- ❑ **c.** subsistence farming.
- ❑ **d.** residential development.

5. In tropical areas, the prominent certifying bodies are:
- ❑ **a.** SFI, FSC, and PEFC.
- ❑ **b.** SFI and FSC.
- ❑ **c.** FSC, PEFC, and CEREFLOR.
- ❑ **d.** PEFC and CEREFLOR.

6. What percent of the world's forests have no certification?
- ❑ **a.** 90 percent
- ❑ **b.** 75 percent
- ❑ **c.** 20 percent
- ❑ **d.** All forests have some certification

7. The top exporter and producer of eucalyptus roundwood and pulp is:
- ❑ **a.** Argentina.
- ❑ **b.** Brazil.
- ❑ **c.** China.
- ❑ **d.** Africa.

8. Compared to a temperate forest, some eucalyptus plantations are:
- ❑ **a.** less productive.
- ❑ **b.** half as productive.
- ❑ **c.** 11 times more productive.
- ❑ **d.** twice as productive.

9. Plantation-grown eucalyptus is increasingly seen as a more cost-effective alternative to:
- ❑ **a.** cedar.
- ❑ **b.** walnut.
- ❑ **c.** mahagony
- ❑ **d.** wenge.

10. Which standard recognizes all credible forest certification programs?
- ❑ **a.** LEED.
- ❑ **b.** NAHB.
- ❑ **c.** FSC.
- ❑ **d.** Green Globes.

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

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New and Upcoming Exhibitions

Later Layer
Los Angeles
January 15–February 28, 2010
This exhibition will feature models and drawings of design work that Johnston Marklee architects are doing for DEVELOP RE and the DEPART Foundation in Italy, along with photographs and sculpture by Beshty from the DEPART Foundation Collection. Johnston Marklee's combined work is conceived as an alphabet of elemental building blocks for art exhibition, artist-in-residence studios, exhibition pavilions, creative offices, and residences. For more information, visit www.johnstonmarklee.com.

Iannis Xenakis: Composer, Architect, Visionary
New York City
January 15–April 8, 2010
Exploring the fundamental role of drawing in the work of Greek avant-garde composer Iannis Xenakis, this exhibition comprises over 60 documents created between 1953 and 1984, including rarely seen hand-rendered musical scores, architectural drawings, conceptual renderings, precompositional sketches, and samples of his pioneering graphic notation. A leading figure in 20th-century music, Xenakis was trained as a civil engineer, then became an architect and developed revolutionary designs while working with Le Corbusier. For more information, visit http://drawingcenter.org.

Ongoing Exhibitions

Thomas Jefferson's Academical Village: The Creation of an Architectural Masterpiece
Charlottesville, Va.
Through January 3, 2010
Exploring Thomas Jefferson's design for the construction of the University of Virginia, this exhibition will present the original drawings, prints, and letters that he exchanged with his colleagues as the plan for his iconic Academical Village took shape. For more information, visit www.virginia.edu/artmuseum.

Design for a Living World: Green Design Challenge
New York City
Through January 4, 2010
This exhibition showcases 10 leading designers who have been commissioned to develop new uses for sustainably grown and harvested materials in order to demonstrate the power of conservation and design. Students will work in teams to address a design challenge and to create a proposal for a sustainable product design. For more information, visit www.cooperhewitt.org.

The Art of Architecture: Foster + Partners
Dallas
Through January 10, 2010
Coinciding with the grand opening of the Winspear Opera House, this exhibition explores Foster + Partners' major architectural achievements over the past four decades. It features architectural models, drawings, renderings, photographs, and videos to give insight into the formal and conceptual underpinnings of the practice's work, as well as provide a context for better understanding their new contribution to Modernist architecture in Dallas. For more information, visit www.nashersculpturecenter.org.

Ghost Stories, New Designs from Nendo
New York City
Through January 10, 2010
The newest projects and prototypes from the renowned Tokyo-based design studio Nendo will be seen for the first time at the Museum of Arts and Design. Nendo has garnered international attention and more than 45 design awards for its beautifully simple yet surprisingly humorous work in interiors, furniture, product design, graphics, and architecture. For additional information, visit www.madmuseum.org.

Detour
New York City
Through January 10, 2010
This show documents notable architectural projects along Norwegian tourist routes that have gained national and international attention. The exhibition design is marked by a large cylindrical construction that transports the visitor to the Norwegian landscape through the use of films and models. To learn more, call 212/229-8919 or visit newschool.edu/events.

Concrete Works
Weiler, Austria
Through January 12, 2010
Aedes at Pfefferberg presents the first monographic exhibition of the Austrian firm Marte.Marte Architects. The firm's projects are distinguished by clear organization, conceptual rigor, and sculptural form. Besides timber, glass, and rammed earth, concrete provides the central formal element in the architectonic of Marte.Marte. For more information, visit www.aedes-arc.de.

Relics of the Cold War
Berlin
Through January 15, 2010
This exhibition features Martin Roemers's photographs of underground tunnels, abandoned control centers, old barracks, wrecked tanks, and ruined statues. In his images, the arms race appears ongoing and vivid, serving as a reminder for a future of peace. For additional information about the exhibition, visit www.willy-brandt-haus.de.

Context/Contrast: New Architecture in Historic Districts, 1967–2009
New York City
Through January 23, 2010
Accompanied by over three dozen photos by celebrated architectural photographer Elizabeth Felicella, this exhibition explores the role and regulation of contemporary architecture of five historic New York neighborhoods. At the AIANY Center for Architecture. For more information, visit www.aiany.org.

Bauhaus 1919–1933: Workshops for Modernity
New York City
Through January 25, 2010
A must-see at New York's Museum of Modern Art, the exhibition celebrates the 90th anniversary of the influential school's founding. Visit www.moma.org.

Palm Springs Modern: Photographs by Julius Shulman
Pittsburgh
Through January 31, 2010
This exhibition features almost 100 original photographs of iconic designs by Modernist architects such as Richard Neutra, Albert Frey, and John Lautner. Also presented are 20 original drawings and renderings of three key projects by Neutra. For more information, call 412/622-3131 or visit www.cmoa.org.

David Chipperfield Architects — Form Matters
London
Through January 31, 2010
With a style that is restrained, quiet, and thoughtful, David Chipperfield is of one of Britain's leading architects. This comprehensive overview will look at key moments in his development as well as at major recent projects, including the Museum of Modern Literature in Marbach,

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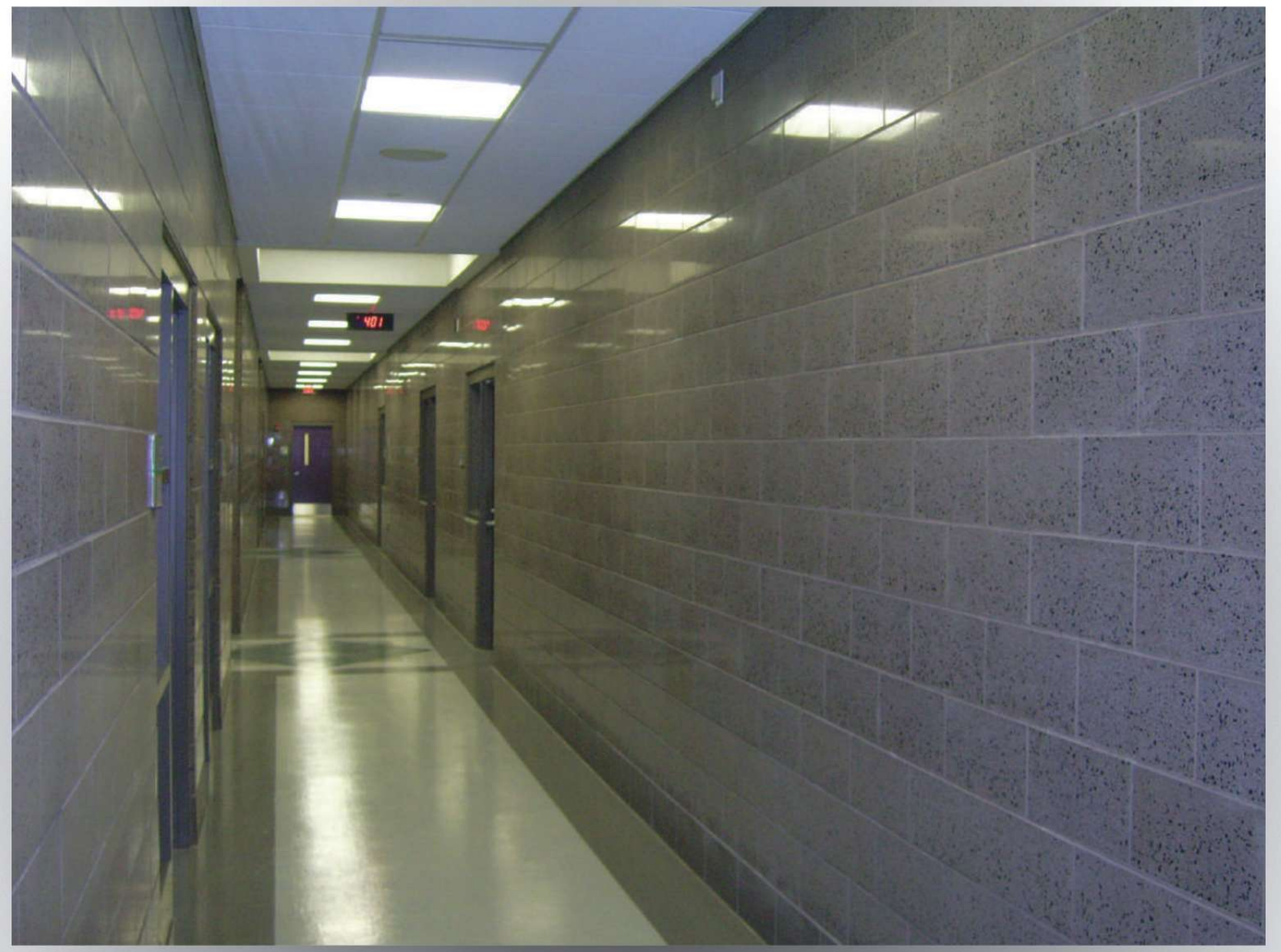

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Germany; the America's Cup Building in Valencia, Spain; the newly completed Neues Museum in Berlin; and the Hepworth Museum in Wakefield, Yorkshire. For further information, visit www.designmuseum.org.

What We Learned: The Yale Las Vegas Studio and the Work of Venturi, Scott Brown & Associates
New Haven, Conn.
Through February 5, 2010
Two separate exhibitions offer complementary perspectives on the legendary studio taught at Yale in 1969 and its subsequent impact on the teaching, research, and design work of Robert Venturi and Denise Scott Brown, two of America's most prominent architects. The first exhibition, *The Yale Las Vegas Studio*, consists of more than 100 color photographs, slide presentations, and miscellaneous original materials documenting the famed 1968 Yale "field trip" to Las Vegas led by Venturi and Scott Brown. The second exhibition, *What We Learned*, focuses on Venturi and Scott Brown's critical contributions to the urban landscape and our understanding of it. For more information, visit www.architecture.yale.edu.

China Prophecy: Shanghai
New York City
Through March 1, 2010
This exhibition explores the 21st-century skyscraper city of Shanghai, a vast metropolis of 18 million residents – the largest city in the world's most populous nation. At the Skyscraper Museum in Battery Park City. Call 212/945-6325 or visit www.skyscraper.org.

Zaha Hadid Retrospective Exhibition
Padua, Italy
Through March 1, 2010
A major retrospective on the works of Zaha Hadid Architects, this exhibition will examine the practice's continued experimentation and research into digital design and construction methods at the cutting edge of the industry. Addressing the demand for an increased level of articulated complexity, the practice has evolved its experimentation by means of retooling its research methods on the basis of parametric design systems. For more information, visit www.camron.co.uk.

Design USA: Contemporary Innovation
New York City
Through April 4, 2010
This exhibition celebrates the winners honored during the first 10 years of the National Design Awards, including works of fashion, technology, graphics, architecture, landscape, and product design. Following the exhibition, students will have two workshop options: In Chair Design or Graphic Identity. For more information, visit www.cooperhewitt.org.

John Portman: Art & Architecture
Atlanta
Through April 18, 2010
Featuring fifteen completed and current architectural projects of Atlanta-based architect John Portman, this exhibition explores five decades of national and international developments, including the Hyatt Regency Atlanta (1967), which is globally renowned as the first modern atrium hotel. For additional information, visit www.high.org.

Rewind Remix Replay: Design, Music & Everyday Experience
Scottsdale, Ariz.
Through May 23, 2010
Hosted by the Scottsdale Museum of Contemporary Art, this exhibition highlights how design can influence the production and consumption of music and in turn how making and consuming music influences design in fashioning our experience of music in everyday life. *Rewind Remix Replay* reflects strong community ties as well as national scholarship focusing on music and design. Visit www.smoca.org.

From Village to Grounds: Architecture after Jefferson at the University of Virginia
Charlottesville, Va.
Through May 31, 2010
This exhibition explores the wide range of solutions to the architectural and planning problems posed by adding to the Academical Village, from 19th-century picturesque ideals to the Classicism of McKim, Mead & White and the Modern architecture of the 20th and 21st centuries. For more information, visit www.virginia.edu/artmuseum.

House of Cars: Innovation and the Parking Garage
Washington, D.C.
Through July 11, 2010
For more than 100 years, the parking garage has provided design and engineering solutions to the parking problem; this is the first major exhibition to explore the history of this familiar structure and to open conversations about innovative designs and parking solutions for the future. Call 202/272-2448 or visit www.nbm.org.

Lectures, Conferences, and Symposia

SHIFTboston Forum
Boston
January 14, 2010
Celebrate the innovation of the SHIFTboston Ideas Competition that invited design professionals to unleash their wildest visions for Boston's public spaces. The top 25 entries and winner will be presented to an audience of local leaders in the arts, architecture, government, academics, and other professions. For more information, visit www.shiftboston.org.

Frank Lloyd Wright Preservation Trust Architecture Fantasy Camp
Chicago
March 5–8, 2010
In this chance-of-a-lifetime workshop experience, participants from around the world work with accomplished architects to plan and design a structure of their own. No architecture experience is necessary, as the skilled designers will help participants create a new addition to their home, remodel their kitchen, and design a picturesque dream home. For more information, visit www.gowright.org.

Global Construction Technologies and Building Materials
Doha, Qatar
March 28–29, 2010
This second annual conference aims to add to the key operational aspects of building materials and construction technologies, putting forward new and emerging trends in this dynamic field that will help professionals gain a competitive edge, build a sustainable built environment, and achieve business goals. It will feature international case studies on iconic buildings and structures, such as Tornado/QIPCO Tower, Dubai Towers, Ocean Financial Centre, and Masdar City Centre. For more information, visit www.marcusevans.com.

Return to Paradise: 6th Annual Modern Phoenix Home Tour and Expo
Scottsdale, Ariz.
April 10–11, 2010
This crowd-pleasing event draws architectural pilgrims from across the nation for behind-the-scenes tours of both lovingly restored and greatly modified midcentury homes. *Return to Paradise* features Paradise Gardens, an early 1960s development that is the only example of tract homes involving the

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Cast iron brewery floor, circa 1850 England

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AIA

input of nationally acclaimed architect Alfred Newman Beadle. One especially anticipated home on the tour repurposes industrial shipping containers to create a new master suite addition. For more information, call 480/994-2787.

China Eco Expo
Beijing
June 3–5, 2010
Featuring green-building products, technologies, and services from around the world, this high-level conference addresses China's need for more sustainable, ecofriendly growth. For more information, visit www.ecoexpo.com.

Glenn Murcutt International Architecture Master Class
Sydney
July 11–25, 2010
This intensive, two-week design-studio program involves a group design project and culminates with a design presentation by participants and a critique by Australia's best-known architect, Glenn Murcutt. The annual Master Class has created an active, international alumni network that includes practicing architects, academics, postgraduates, and senior students. To find out more, visit www.ozetecture.org.

Chicago: You Are Here
Chicago
Ongoing
This engaging permanent exhibition at the Chicago Architecture Foundation provides images, models, artifacts and video presentations, encouraging visitors to explore the architecture, infrastructure, and environment of Chicago. Visit www.architecture.org.

Competitions

Southeast Wood Design Awards
Nomination deadline:
January 8, 2010
This competition recognizes and celebrates buildings that display a commitment to reducing their environmental impact and highlights the benefits of working with wood, including its strength, beauty, versatility, and cost-effectiveness. For more information, visit www.woodworks.org.

Construction Excellence Awards
Submission deadline:
January 15, 2010
Recognizing the outstanding achievements of professionals in the design, fabrication, and functionality of acoustical and specialty ceilings as well as in interior systems construction, these awards also further their contributions to the architectural industry. Call 630/584-1919.

HB:BX Building Cultural Infrastructure
Submission deadline:
January 15, 2010
HB:BX is an open ideas competition to design an arts center on a bridge that connects Manhattan and the Highbridge area of the Bronx. Organizers call the competiton an "opportunity to explore how outdated infrastructure, including the High Bridge and Highbridge Water Tower, can be re-used and adapted to meet the current needs of the city. " For more information visit www.enyacompetitions.org

Tradewell Fellowship with WHR Architects
Submission deadline:
January 22, 2009
The Tradewell Fellowship was created to build the careers of aspiring health-care architects. Each year, the Tradewell Fellow is involved with clients in early master planning and design with a particular focus on healing environments and collaborative design methods. The

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fellowship begins and ends in July and includes employment at WHR Architects in Houston. Visit www.whrarchitects.com.

Ceramic Tiles of Italy Design Competition
Submission deadline: February 19, 2010
This competition, now in its 17th year, recognizes the exceptional work of North American architects and designers who feature Italian ceramic tiles in their institutional, residential, or commercial/hospitality spaces. Visit www.tilecompetition.com or call 718/857-4806.

IESNYC Challenge: Liminal Luminosity
Registration deadline: February 24, 2010
This competition challenges New York City students to interpret and express how light facilitates, defines, or bridges a point of transition. The students are to interpret and express this theme in the form of a three-dimensional abstract lighting composition, constructed of their choice of materials. Visit iesny.org or call 212/993-6460.

Personal Infrastructures
Submission deadline: March 31, 2010
Entrants to this competition are asked to answer the question: "What are issues that we should be addressing in our built world?" Submissions must take the form of a video under 3 minutes in length. Visit www.smibe.org

Atlantic City Boardwalk Holocaust Memorial Design Competition
Submission deadline: April 1, 2010
This is a two-stage international design competition to choose a winning proposal to build a fitting and compelling memorial to the Holocaust.Entry is anonymous and open to professionals and students in architecture, design, and the visual arts. Visit www.acbhm.org.

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


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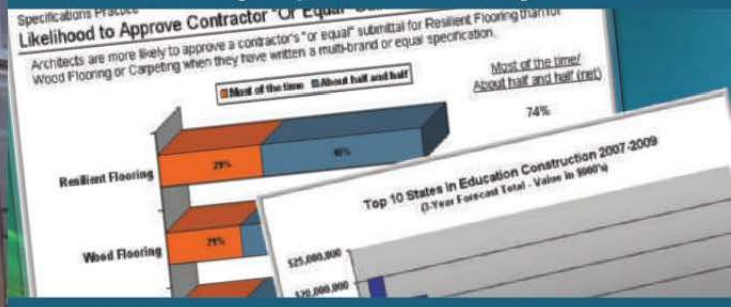

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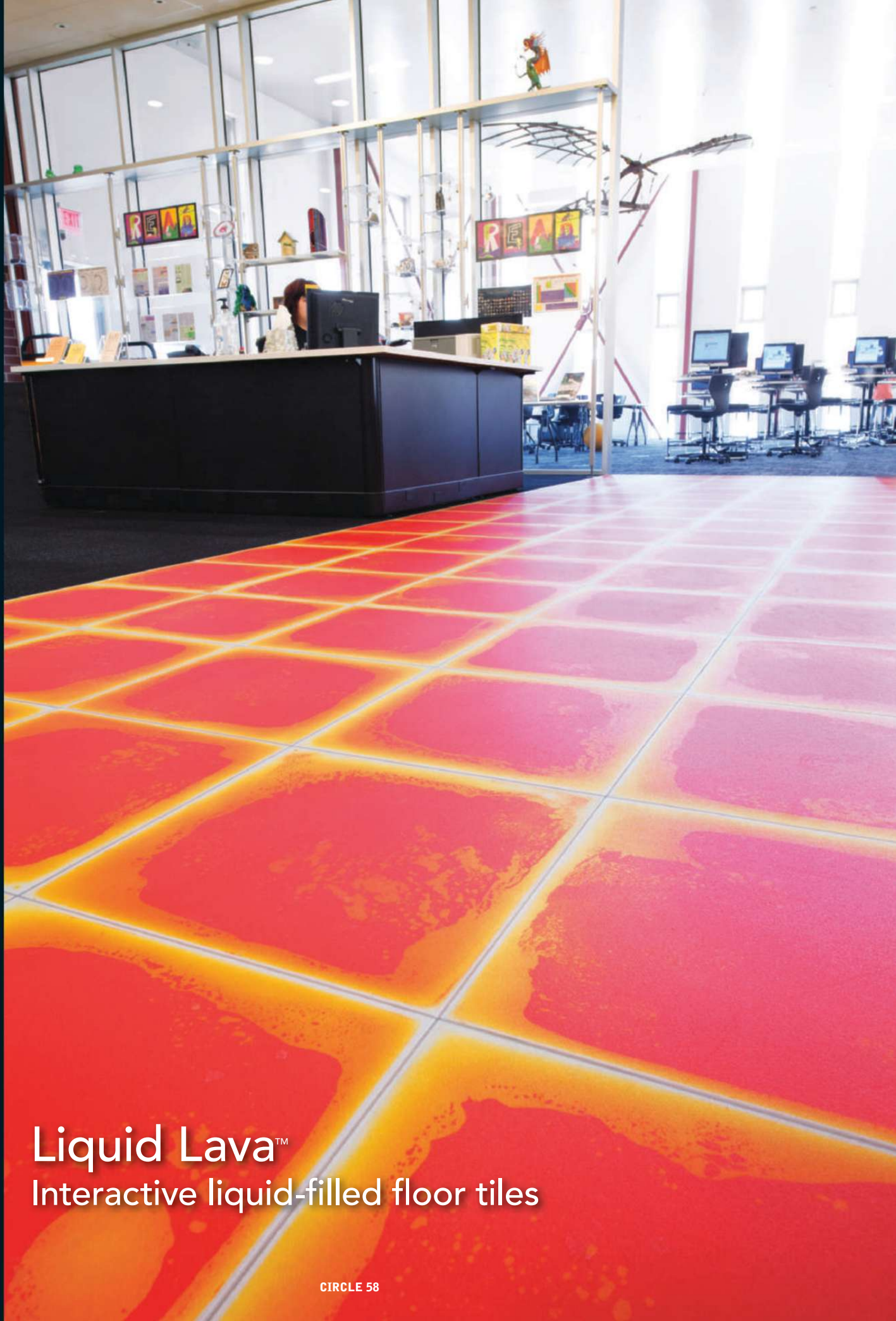

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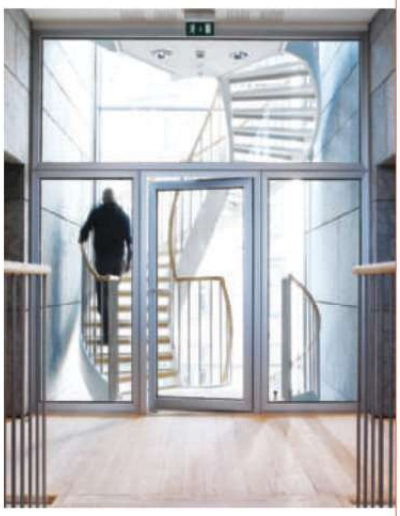

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PROJECT
Alpha Tomamu Towers
LOCATION
Hokkaido, Japan
ARCHITECT
Klein Dytham Architecture

WHAT CONSTITUTES ARCHITECTURE? Is it space? Structure? Or perhaps, can architecture be pure surface? Tokyo-based Klein Dytham Architecture's renovation of the 20-year-old Alpha Tomamu Towers at a ski resort in central Hokkaido, Japan's northernmost prefecture, suggests the latter.

The developer of the resort, known for his renovations of 1980s boom-era hotel properties, decided to reclad the failing facades of these 36-story towers in DuROCK ICF, an insulation overcladding commonly used in cold, wet-weather environments like Canada (this was its first use in Japan). Klein Dytham spent about three weeks designing the color scheme. Though the developer was perhaps expecting a simple "magnolia or vanilla or something," conjectures partner Mark Dytham, the firm proposed a camouflage of pixels in an attempt to make the towers disappear. One building was calibrated for the winter, the other for summer. Then, reacting to a fear that the towers would appear monolithic and menacing, they proposed a scattering of red panels that, according to Dytham, "are like baubles on a Christmas tree."

The resulting array of colors creates an unexpected illusion. Before their makeover, the towers had a relentless grid of windows against a uniform skin. But the complexity of the new composition, which prevents one's eyes from focusing on the buildings from a distance, breaks down that cohesion. "You just think they're flat," Dytham describes with wonder. "Your eyes can't work out quite what's a window and what's a panel. It's very, very weird." *Aleksandr Bierig*

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Langley Academy of Science,
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Architects: Foster + Partners
Photo: Courtesy of Levolux Ltd.

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