ARCHITECTURAL RECORD

SCHOOLS OF THE 21ST CENTURY

STUDIO GANG'S CHICAGO BOATHOUSE
H3'S BROOKLYN THEATER
ROJKIND'S MEXICO CITY CINETECA

Schools of the 21st Century

As U.S. educators and government officials continue to examine the quality of the nation's K–12 education, a growing number of astute communities and school boards are working with architects to develop improved learning environments. The "All American" review that follows explores eight of the country's most innovative projects, both public and private, ranging from a striking high-rise college-prep school in Chicago and a transformative factory-turned-design school in Baltimore, to a gently assertive elementary school building in Fayetteville, Arkansas (pictured). Light-filled and dynamic, each aims to raise the grade for a building type ready to graduate to a higher level.

View additional school projects at architecturalrecord.com

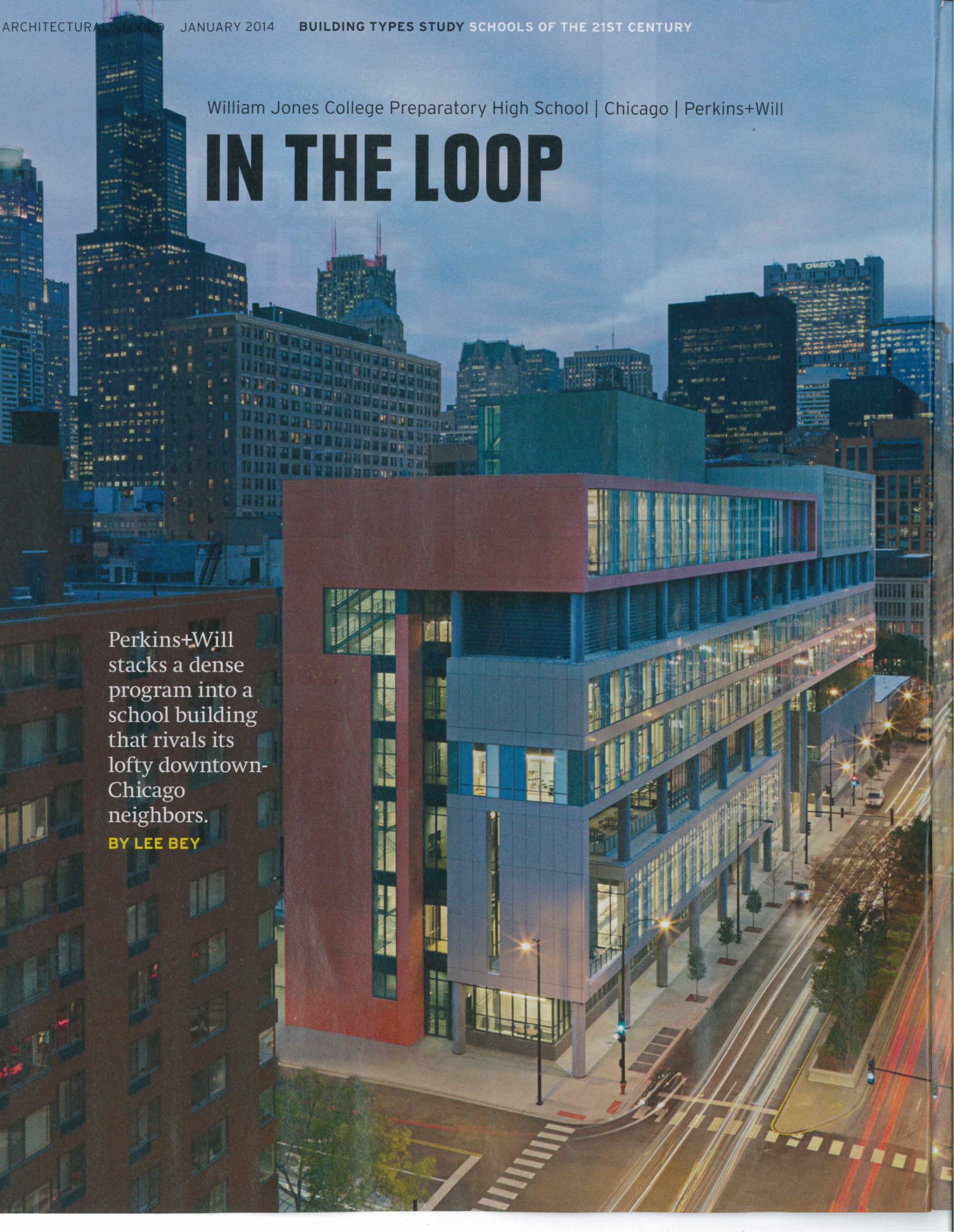
FAYETTEVILLE MONTESSORI ELEMENTARY SCHOOL BY MARLON BLACKWELL ARCHITECT

William Jones College Preparatory High School | Chicago | Perkins+Will

IN THE LOOP

Perkins+Will stacks a dense program into a school building that rivals its lofty downtown-Chicago neighbors.

BY LEE BEY



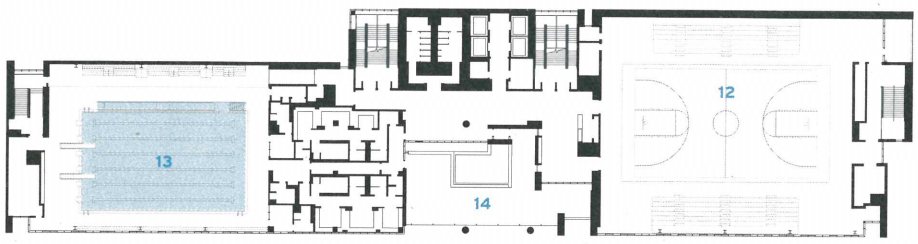
PHOTOGRAPHY: © JAMES STEINKAMP

PICTURE THIS: in the shadow of Chicago's famously tall downtown, a public school for 1,200 students now stands to rival the towers around it. In certain ways, William Jones College Preparatory High School is like any typical new urban school: big, glassy, flexible, and colorful. But the similarities pretty much end there. As opposed to sprawled-out high schools built on enough horizontal real estate to provide space and parking for all, Jones College Prep is stacked on its site in Chicago's South Loop neighborhood. There's even an underground garage beneath the building. "It's an interesting example for the future, particularly as cities densify," says the school's lead architect, Ralph Johnson, global design director of Perkins+Will. "People are now living downtown."

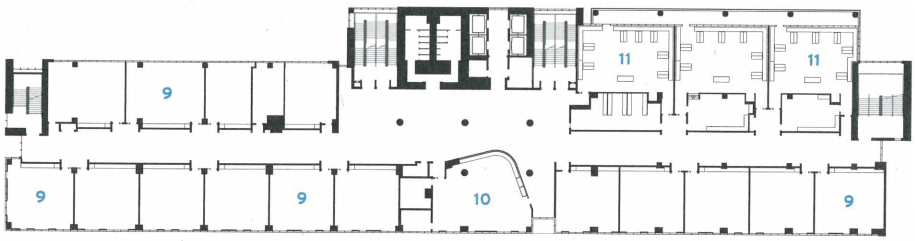
The $115 million Jones College Prep, which opened last August, is actually seven stories tall, but higher than normal ceilings give it the stature of a 10- or 11-story building. The first floor contains a spacious three-story lobby that doubles as the school's town square. It also serves as an overflow space for the adjacent auditorium. The city's Balbo Drive dead-ends at the lobby's glass curtain wall, providing views out to nearby 1920s buildings, the Elevated train across the street, and Grant Park, which is only about three blocks east. "Downtown is the school's campus," says Erin Lavin Cabonargi, executive director of the Public Building Commission (PBC) of Chicago, the agency that built the school. "The views are incredible."

The 278,000-square-foot school just about doubles the capacity of an existing facility located on the north end of the same block. Built in 1967 as Jones

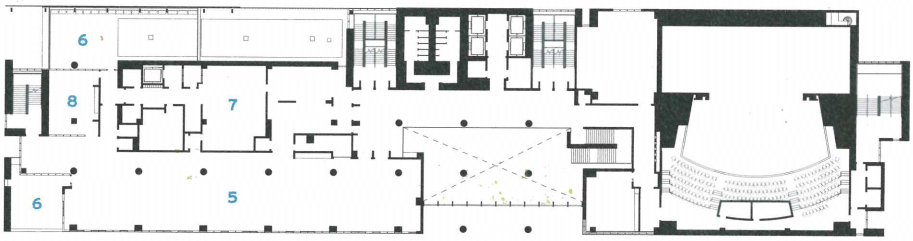
DOWNTOWN SHUFFLE
Higher than normal ceilings make this seven-story building appear much taller (opposite), while long classroom bays give the eastern facade a strong horizontal appearance (above).



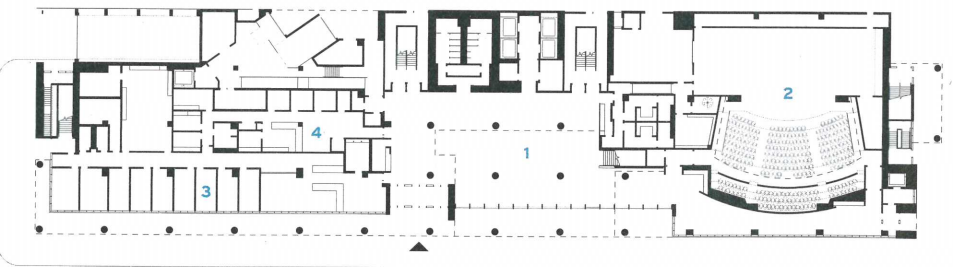
SEVENTH FLOOR



FOURTH FLOOR



SECOND FLOOR



FIRST FLOOR

0 30 FT.
9 M.

SECTION-PERSPECTIVE

1 LOBBY
2 AUDITORIUM
3 ADMINISTRATION
4 NURSE/COUNSELING
5 CAFETERIA
6 DINING TERRACE
7 KITCHEN
8 TEACHERS' DINING
9 CLASSROOM
10 ART CLASSROOM
11 SCIENCE LAB
12 GYMNASIUM
13 NATATORIUM
14 TERRACE

credits

ARCHITECT: Perkins+Will – Ralph Johnson, design principal; Michael Palmer, managing principal

ASSOCIATE ARCHITECT: The Architects Enterprise

ENGINEERS: Halvorson & Partners, Drucker Zajdel Structural Engineers (structural); Primera Engineering (m/e/p); Terra Engineering (civil)

GENERAL CONTRACTOR: Walsh Construction Company II

CLIENT: Chicago Public Schools

SIZE: 278,000 square feet

COST: $114.6 million (total); $90.9 million (construction)

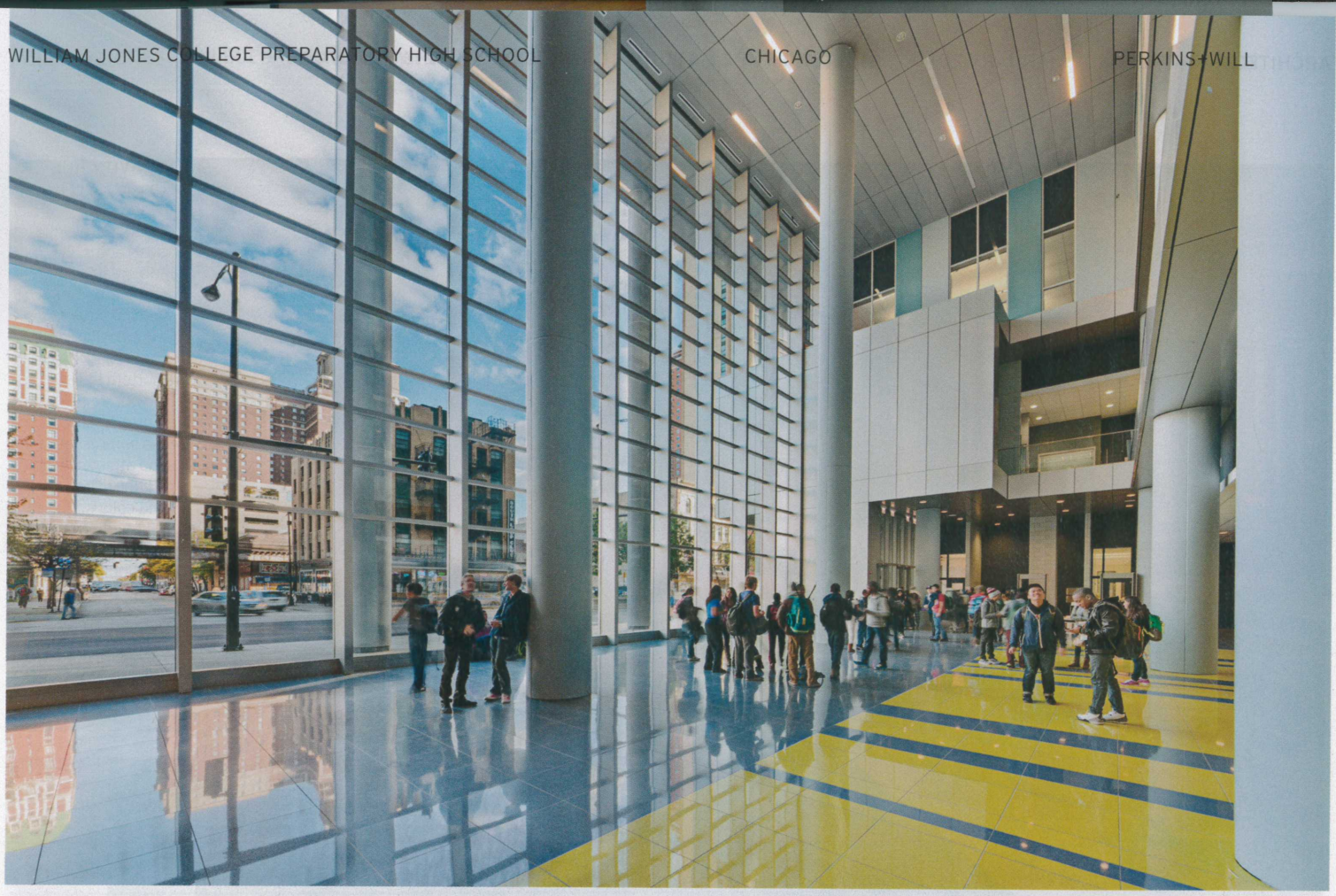
COMPLETION DATE: August 2013

SOURCES

MASONRY: Sioux City Brick & Tile

CURTAIN WALL: Crown Corr, Oldcastle BuildingEnvelope

SPECIAL SURFACING: 3Form



OPEN LEARNING Floor-to-ceiling windows extend along the entire eastern side of the building, flooding the interiors—including the three-story-tall lobby—with light (opposite and top). The school features wide hallways and staircases to create open spaces for learning and congregating (bottom).

ACTIVITY HUB
The architect used a "stacked" approach, placing classrooms, library, and media center on the middle floor (left). Staircases were designed for congregating (bottom left). Expansive terrace (bottom right) adj the library, cafete and athletic facili A light-filled corri and colorful tile e way-finding (oppo top). Located on top floor, the gymnasium offe views of the sch downtown neigh (opposite botto

Commercial High School to train students to be secretarial and office workers, the main structure of that old campus—also designed by Perkins+Will—is a slit-windowed, six-story building. The school switched to an academic program in 1982, then a college-preparatory curriculum in 1998—and has since been named one of America's Best High Schools for four straight years by *U.S. News & World Report*. However, the building, which was originally programmed like an office complex, is still in use, and there are plans to restore the Modernist concrete structure and then link it to its larger sibling.

The new Jones is taller, broader, and more complex than its predecessor. The site, previously occupied by a parking lot and the city's historic Pacific Garden Mission (since relocated), is relatively small for a high school. And the Printer's Row neighborhood, which is listed on the National Register of Historic Places, abuts the site's western edge. So there was no place to build but up. "Most schools are horizontally communicating," Johnson says. "This one communicates vertically, which was a key strategy."

In addition to classrooms and offices, the school, which has selective enrollment, required long spans for large spaces that would typically go on a ground floor, such as its 475-seat auditorium, a gymnasium, and a competition-size swimming pool. According to Perkins+Will senior project architect Bryan Schabel, the challenge was arranging the big parts, the heights and weights, so that the overall design made sense structurally and economically.

The lobby, administrative area, and auditorium's main floor take up most of the school's first story. The auditorium, on the north end, has a balcony and a fly space, which gives it greater height. "Everything else in the building has to line up," notes Schabel. To balance the auditorium's height, the architect stacked a cafeteria and media center on the second and third floors of the building's south side. They configured long bands of classrooms, laboratories, and other instructional areas on the fourth and fifth floors, and placed the natatorium above them on the south end of the building, so that the pool's great weight is efficiently transferred downward through the classroom space beneath. The gym, which is at the opposite end of the hall on the school's north side, weighs less than the pool. "So it went over the auditorium and has a large transfer truss," says Schabel.

Together, the architects and PBC are seeking LEED Gold certification for the building, which has a green roof and a system that collects rain and releases it slowly into the city's stormwater system. Other sustainable measures include LED lighting and occupancy sensors.

Rather than hide the design and structural choices behind a monolithic facade, Johnson chose to express them. The exterior reads horizontally where long classroom bays are located, whereas terraces and reading gardens appear as recesses and voids, giving the facade depth. Acknowledging its historic neighbors, the south and west facades, which face Printers Row, feature terra-cotta-colored precast concrete panels to match the red-brick exteriors of nearby buildings. "We really wanted this building to be part of the fabric of the city," says Johnson. ■

Lee Bey discusses and writes about architecture for Chicago public-radio station WBEZ-FM.

Baltimore Design School | Baltimore | Ziger/Snead Architects

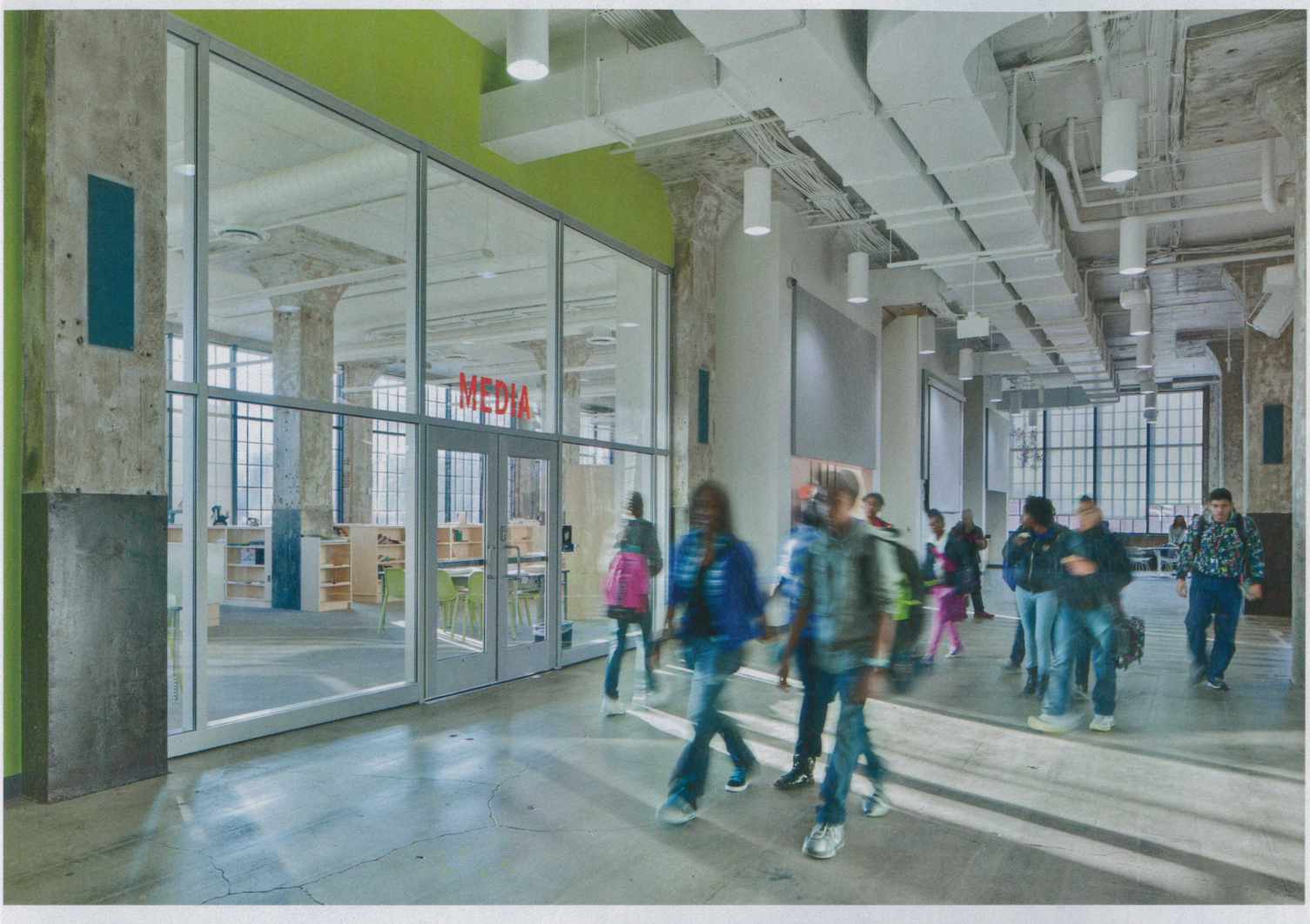
LEARNING BY DESIGN

An early-20th-century industrial building sets the scene for a dynamic public school model in the midst of a growing arts community.

BY SHARON MCHUGH

CLEAR VISION A resolute team of community leaders, residents, and professionals turned this former factory into a cutting-edge public design school for middle and high school students.

PHOTOGRAPHY: © KARL CONNOLLY



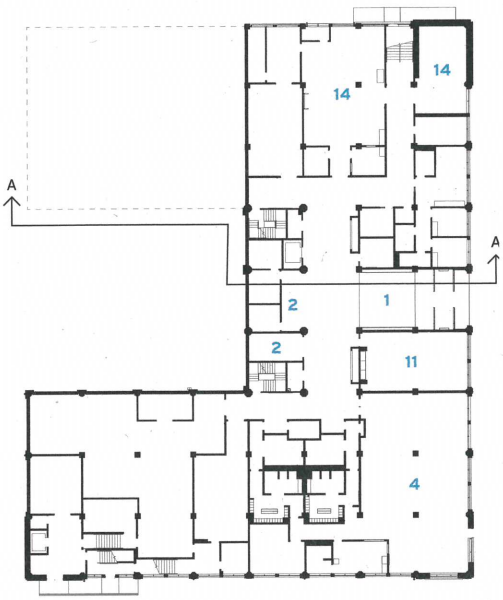
BUILT IN 1914, the four-story industrial building at 1500 Barclay Street in Baltimore's North Central Historic District was innovative for its time, with expanses of glass and a unique ventilation system designed by the architect, Otto G. Simonson, to improve working conditions. Nearly 100 years later, the masonry structure is again breaking new ground. Originally home of the Cork Crown & Seal Company, a bottle-cap manufacturer, and later occupied by the Lebow Brothers Clothing Company, a maker of men's suits, the building has been transformed into the dynamic Baltimore Design School (BDS) by the Baltimore-based architect Ziger/Snead.

The existing 115,000-square-foot building had a leaky roof, spalling concrete, and thick vegetation growing out of its walls. It needed structural repairs, new windows, and a complete systems overhaul. "It was in such bad shape that it was used as a set for the popular TV crime drama *The Wire*," says design principal Steve Ziger. There were still coat racks, sewing machines, and barrels of buttons from 1985 when the building was shuttered due to a labor dispute.

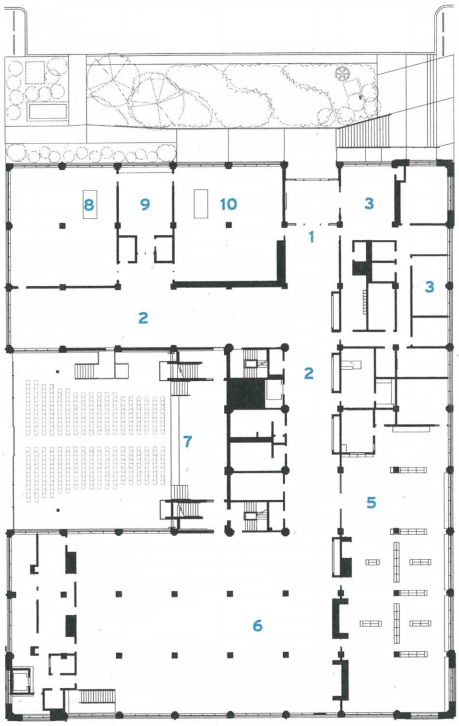
A gritty, formerly working-class neighborhood dotted with factories is not the first place you would think of locating a school for kids. Yet the founders of the BDS, a public school offering concentrations in fashion design, architecture, and graphic design to middle and high school students, knew it

ZIGER / SNEAD GALLERY

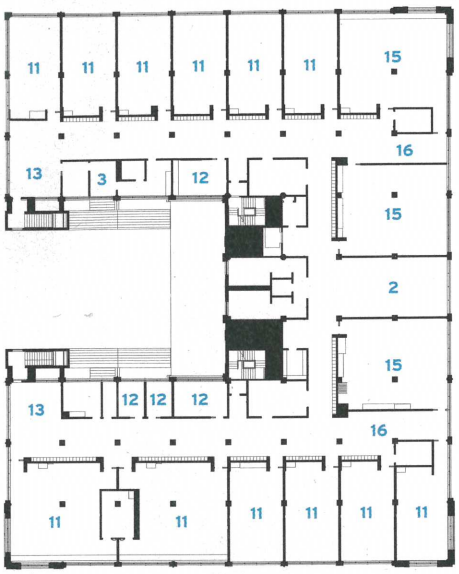
LAYERS OF TIME The architects balanced new and old by maintaining as much of the existing structure as possible and exposing its rough elements so students could experience the power of design every day. Transparent sunlit studios and a media room (opposite, top) line the spacious corridors, surfaced with polished-concrete floors and dotted with newly installed galleries (above). A vibrant turquoise packs a punch (left), within one of two external corrugated-aluminum stairwells the architects installed along facing walls in the courtyard (opposite, bottom).



FIRST FLOOR

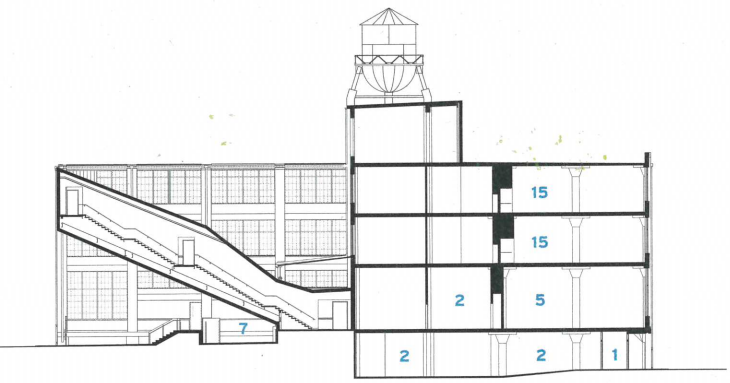


SECOND FLOOR



FOURTH FLOOR

0 30 FT.
10 M.



SECTION A - A

0 30 FT.
10 M.

1 ENTRY
2 GALLERY
3 OFFICES
4 GYMNASIUM
5 MEDIA CENTER
6 CAFETERIA/MULTIPURPOSE
7 OUTDOOR STAGE
8 FASHION LAB
9 FABRICATION LAB
10 ARCHITECTURE LAB
11 CLASSROOM
12 BREAKOUT/STUDY AREA
13 LOUNGE
14 METAL/WOOD SHOP
15 STUDIO
16 CRIT SPACE

credits

ARCHITECT: Ziger/Snead Architects – Steve Ziger, design partner; Hugh McCormick, managing partner; Katherine LePage, Matthew Rouse, Sukanya Walsh, Jonas Risén, Miharu Morimoto, project team

ENGINEERS: Henry Adams (m/e/p/fp); Gower Thompson (civil); Columbia Engineering (structural)

CONSULTANTS: Ashton Design (graphics); Lazarus Design Associates (landscape)

GENERAL CONTRACTOR: Southway Builders

CLIENT: Baltimore Design School/ Seawall Development Company

SIZE: 115,000 gross square feet

COST: $26.9 million

COMPLETION DATE: June 2013

SOURCES

CURTAIN WALL: Kawneer; EFCO

ALUMINUM WINDOWS: Seal Craft

GLAZING: Cardinal Glass

DOORS: Assa Abloy

CEILINGS: USG Interiors

PAINT: Sherwin-Williams

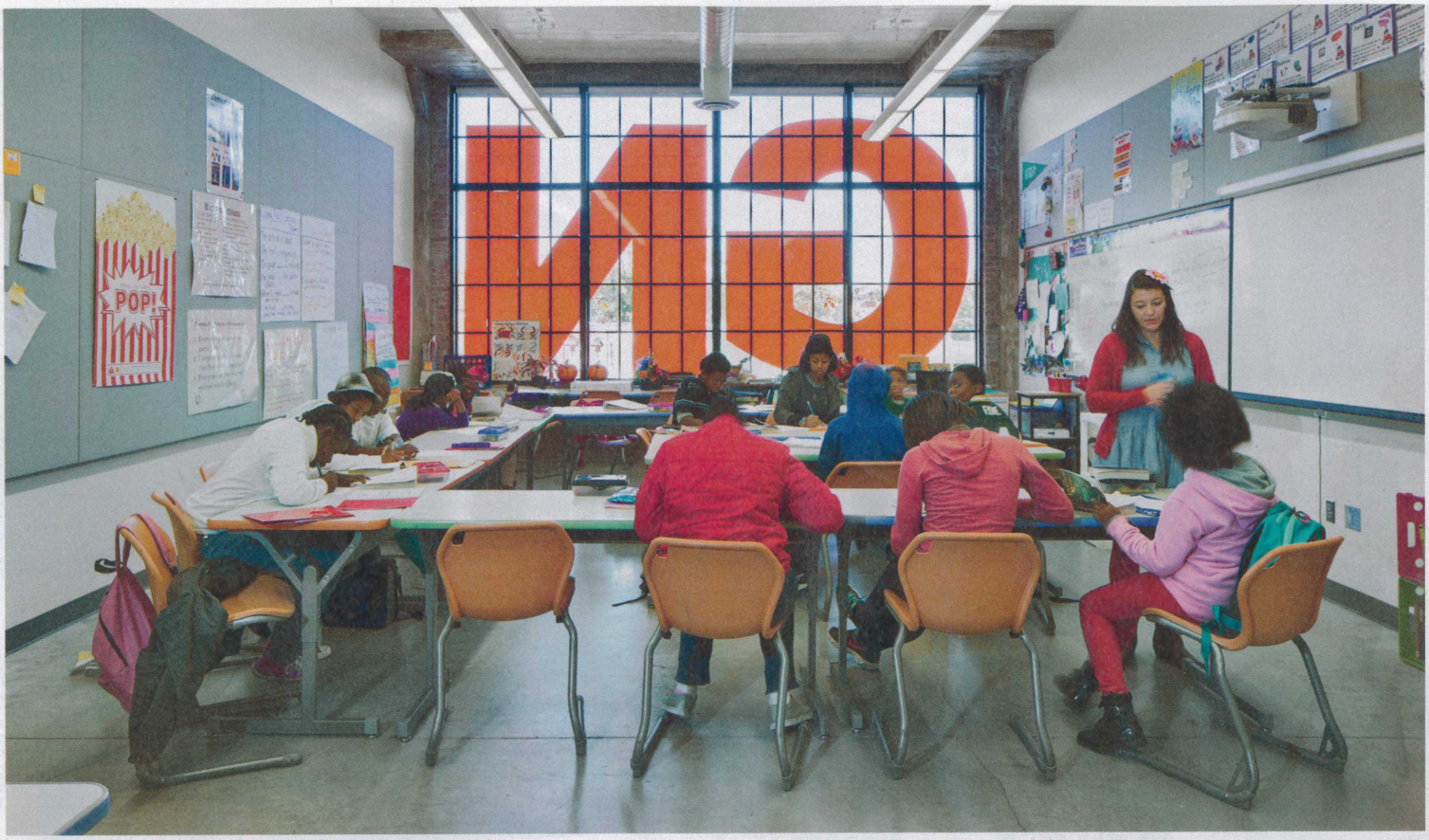
STAINLESS-STEEL STAIR NET: Jakob

WOW EFFECTS
The interior fit-out and furnishings of the BDS are not your standard school-grade fare. The finely crafted, concrete restroom sinks (opposite) were designed and donated by the Baltimore-based Luke Works, while the orange Groovy chairs by Beaufurn that enliven the cafeteria (above) were purchased by the design team for only $70 apiece.

was right. Located near the city's Pennsylvania Station, the Station North Arts and Entertainment District is a gentrifying neighborhood containing artist live-work lofts, theaters, galleries, row houses, and businesses, anchored by the nearby Maryland Institute College of Art (MICA). Adapting a historically significant abandoned building here, a district listed on the National Park Service's National Register, would qualify BDS for community-investment and historic-preservation tax credits.

The school, which opened in 2011 at a temporary location, was the vision of State Senator Catherine Pugh, who pushed to provide the students with a new, state-of-the-art facility. In this endeavor, Pugh was assisted by a team of community leaders and professionals, including Ziger, MICA President Fred Lazarus (both on the school's Board of Directors), and Dr. Andrés Alonso, former CEO of the Baltimore City Public Schools (BCPS). The $26.9 million project is the result of a unique public-private partnership financed by public and developer funding, tax credits, private bonds, and fund-raising. A local developer was tapped by the BDS board to arrange and manage financing, design, and construction.

"The guiding architectural idea was to have a dialogue between the historic structure and the new work," explains Ziger. "We wanted the intervention to be clear and simple. And we wanted to keep those ideas throughout." To do this, Ziger/Snead maintained as much of the existing structure as possible. The architects gutted the building, cleaned the brick, and installed energy-efficient windows with profiles replicating the original ones. They created a series of loftlike spaces, configuring them to encourage collaboration, adding modular pods between the classrooms and the hallway to facilitate point-of-use storage and mechanical needs. Each of these discrete 5-by-16-foot units houses such elements as lockers, computer stations, and teachers' cabinets, as well Variable Air Volume boxes, air supply, and acoustic panels. "The pods were conceived as a way of organizing a variety


POP!


JEAN MICHEL BASQUIAT

of program elements in a clearly new component," says Ziger. While standardized, the pods vary to suit programmatic needs.

One of the biggest challenges was to design code-compliant stairs within a tight budget. Taking their cues from Diller Scofidio + Renfro's High Line in New York, the architects filled the core of an existing interior stairwell with woven stainless-steel netting that stretches the full-height of the building. Outside, they suspended two corrugated-aluminum-wrapped stairways diagonally along facing walls of the courtyard, now used as a place to gather or watch fashion shows staged on the former loading dock.

Construction costs totaled $19 million, or $164 per square foot, which is lower then the $225 per square foot the BCPS typically budgets for this type of work. Dollars were further stretched through a number of pro-bono services and professional relationships. Adobe Foundation's Youth Voices Program sponsors a creative lab staffed by an Adobe instructor and equipped with computers loaded with the company's Creative Suite. Luke Works, a local designer of concrete surfaces and furnishings, gave sinks. Ziger/Snead, Gensler, and Ayers St. Gross donated interior-design services. Ashton Design pitched in with environmental graphics. Much of the furniture outside of classrooms was donated, and the bright-orange cafeteria chairs, discovered at NeoCon East, were purchased for under $70 apiece.

The raw look of the building, that of a "work in progress," is intended to inspire the students. "If you engage design thinking early enough in a kid's life, he or she can apply those skills to solving life's problems," says Ziger.

A fresh approach to school design—and community development—the Baltimore Design School's new home is exciting, open, and transparent, crafted largely through a thoughtful design process and goodwill. "To know that these kids can have a voice and make a difference is huge," says Ziger. "It's a message filled with hope." ■

Architect and writer Sharon McHugh, based in Princeton, New Jersey, and New York, is a correspondent for Abitare *and* World Architecture News.

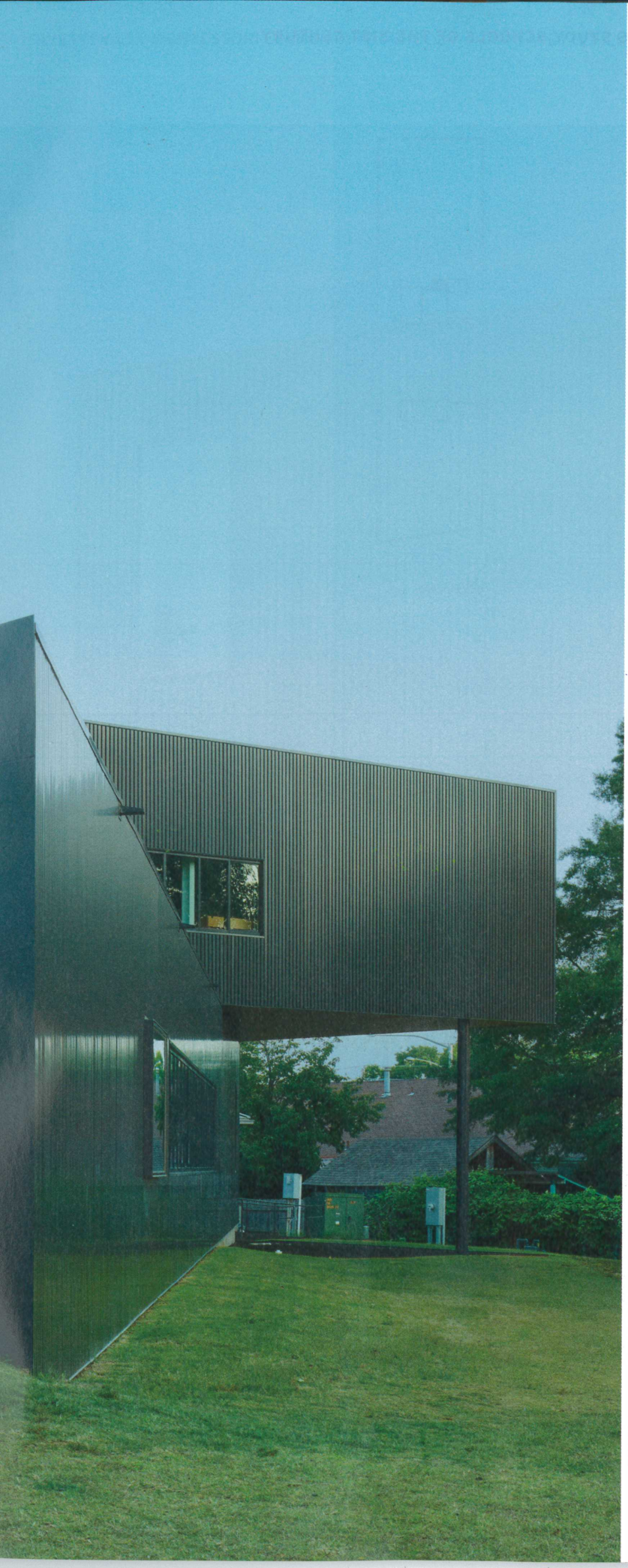
RISING STARS Presently populated by 350 sixth- through ninth-grade students, the Baltimore Design School will eventually serve 670 students through 12th grade. To create an environment in which they would thrive, Ziger/Snead installed historically accurate energy-efficient replacement windows that filter copious amounts of daylight into the classrooms (opposite, top); they filled the core of an existing stairwell with stainless-steel netting (left) for both its safety and its sculptural qualities; and they created open, communal areas in the corridors, such as crit spaces (opposite, bottom), lounges, and galleries.

Fayetteville Montessori Elementary School | Fayetteville, Arkansas | Marlon Blackwell Architect

EVERYTHING IN ITS PLACE

In Northwest Arkansas, a design firm responds to a hemmed-in site for a Montessori elementary school with a playfully inventive plan.

BY WILLIAM HANLEY



PHOTOGRAPHY: © TIM HURSLEY

AT THE BEGINNING of the 20th century, Maria Montessori wrote, "Education is a natural process carried out by the human individual, and is acquired not by listening to words, but by experiences in the environment." The line paints in broad strokes the educational philosophy that bears her name, with its emphasis on independent, creative, and hands-on learning over classical rigid instruction. But when Victoria Butler, owner of a thriving Montessori school in Northwest Arkansas, decided to add an elementary school to her primarily early-childhood program, she found that the city of Fayetteville had a more traditional, textbook-like approach to rules and regulations.

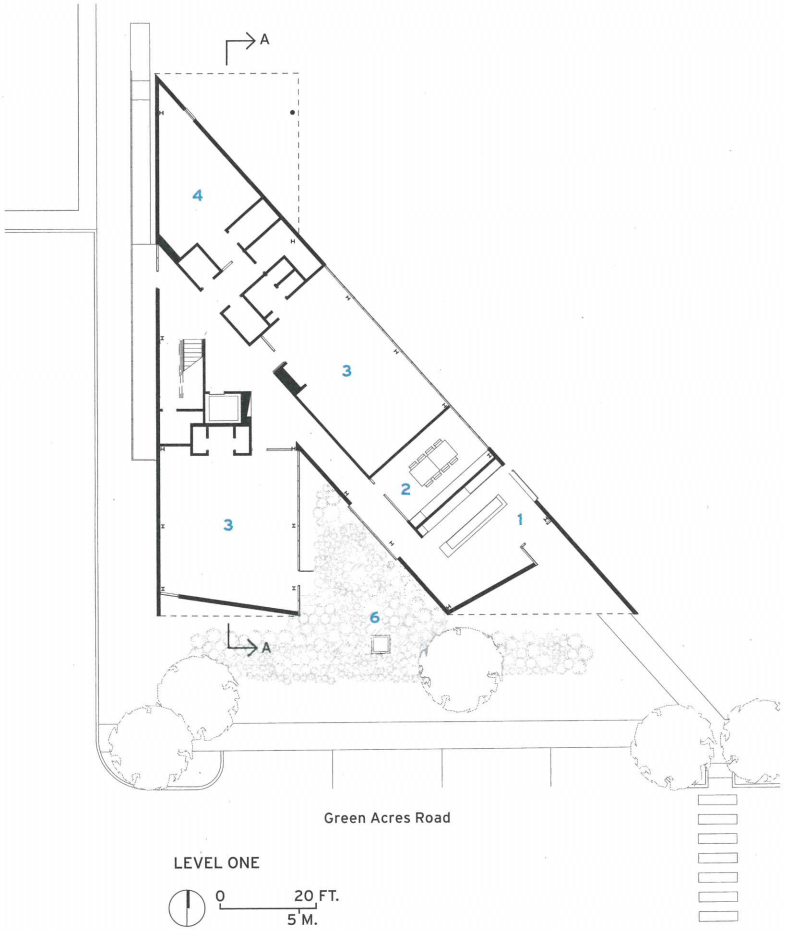
Butler's school occupies a cluster of five residential-scale buildings, hemmed in on one side by an aggressively bland shopping center but bounded on the other by a grassy field and a creek. She chose a lot in the middle of her existing buildings for the elementary school but discovered that in the decade or so since she acquired the property, a city ordinance had extended the boundary of the creek's floodplain to include nearly two thirds of the site, leaving only a triangular sliver of buildable area. The building code also required that, to avoid runoff's flowing directly into the stream, the small area had to retain and filter into the soil not only its own stormwater but also any that drained into the site from the neighboring parking lots. "It was a hell of a difficult site," says Marlon Blackwell, whom Butler hired to design the project, and whose two children attended her school. "We really only had a small triangle to build on."

Blackwell and his firm responded to the site constraints by playing with blocks. They designed a 7,940-square-foot, steel-frame building with two simple geometric volumes. Following the line of the floodplain, the ground floor has a triangular plan with a cut into its south side that turns it into a V shape. The upper floor is a rectangular box stacked on one wing of the V. It juts out over the floodplain in the rear of the building to create a shaded play area below. A single column, the maximum allowed in the floodway, supports the protruding section of the structure. "We tried a doughnut, we tried a big box raised above the ground, we tried all kinds of forms," says Meryati Johari Blackwell, Marlon's wife and a member of the design team. "But basically these shapes are the ones that best served the client's needs."

To manage the stormwater, the firm planted a green roof on the single-story wing of the V and lined the south, street-facing side of the building with a rain garden that extends into the courtyard made by the cut-away section of the ground floor. Teachers frequently incorporate the verdant area into nature-focused classroom activities.

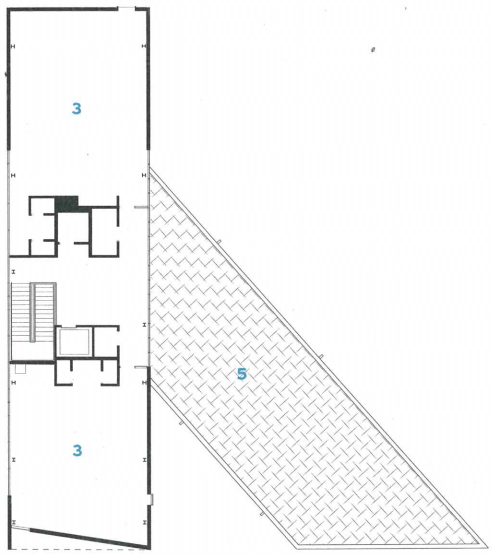
Set among the greenery, the building strikes a compromise between the inviting and the economical with its facades. The firm clad the two primary street-facing eleva-

STACKING BLOCKS To accommodate four square classrooms on a wedge-shaped site bounded by a floodway, Marlon Blackwell and his design team placed a rectangular volume on top of a triangular one, allowing the upper floor to jut out above the restricted section of the site.



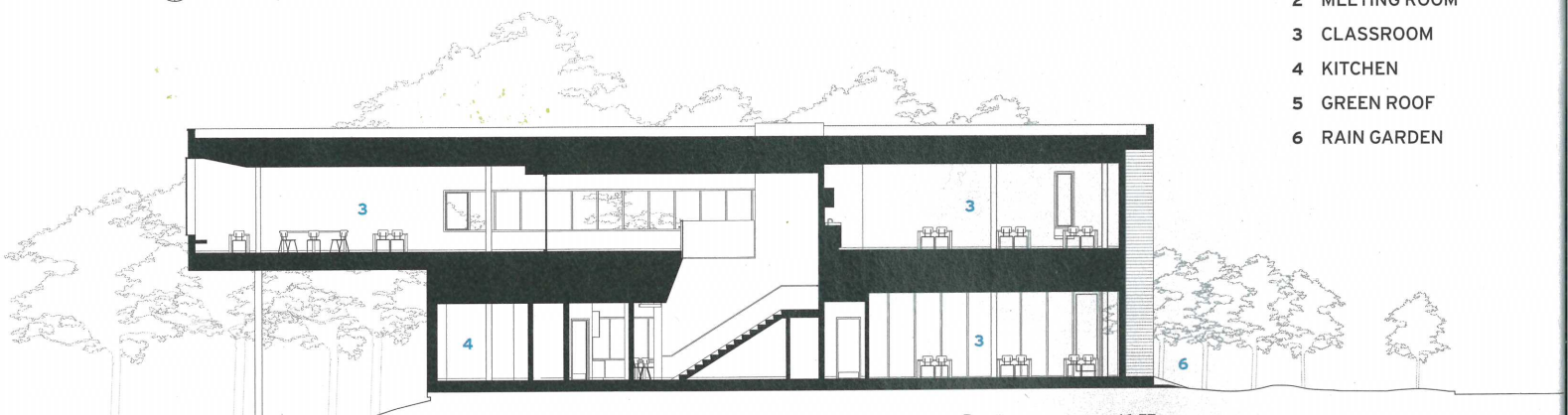
LEVEL ONE

0 20 FT.
5 M.



LEVEL TWO

1 LOBBY
2 MEETING ROOM
3 CLASSROOM
4 KITCHEN
5 GREEN ROOF
6 RAIN GARDEN



SECTION A - A

0 16 FT.
5 M.

credits

ARCHITECT: Marlon Blackwell Architect – Marlon Blackwell, principal; Bradford Payne, project manager; Meryati Johari Blackwell, Jonathan Boelkins, William Burks, Stephen Reyenga, Michael Pope, Justin Hershberger, project team

LANDSCAPE ARCHITECT: Appian

ENGINEERS: Myers-Beatty Engineering (structural); HP Engineering (m/e/p); Bates & Associates (civil)

GENERAL CONTRACTOR: Nabholz Construction Corporation

CLIENT: Victoria Butler, Director, Fayetteville Montessori School

SIZE: 7,940 square feet

COST: $1.4 million

COMPLETION DATE: August 2012

SOURCES

CURTAIN WALL: EFCO

WOOD SIDING: Estes Wood Designs

EPDM ROOFING AND GREEN ROOF: Firestone

ACOUSTIC CEILING: Armstrong

SHARP TAILORING To give workaday metal cladding a level of polish, the architects collaborated with fabricators to create custom cap pieces for the rear corner of the triangular first floor. The detail refines the building's geometry and adds a sense of seamlessness to the facade.

OUTSIDE IN
Tall operable windows allow natural light and ventilation to enter the classrooms, which look toward the creek or the rain garden (above) on the ground floor and over the green roof on the second (left). Circulation through the lower volume follows one wing of its V shape before turning up toward the stair (opposite). The plan gives each of the classroom spaces the the best views of the surrounding greenery.

tions in a clear-sealed cypress, and recessed the entry on one side and a row of windows on the other. "South-facing porches are a big part of our southern vernacular," explains project architect Bradford Payne. The rest of the building is sheathed in a dark bronze-colored corrugated metal, the type typically used for garages, sheds, or big-box stores.

The contrast between the warmth of the light wood and the chill of the dark metal allows the building to read as both welcoming and sophisticated, a move designed to appeal to the parents of older students. "The culture used to be that students remained here until kindergarten," says Butler. "I wanted to expand the elementary school, but I couldn't do that in a building that looked like a day-care center. It had to look like something parents could relate to as a school."

By stacking a box on top of a triangular volume, the firm fit four rectangular classrooms onto the building's footprint, which was essential, says Payne, for allowing standard Montessori furniture to be reconfigured easily for different activities. The interior finishes take a cue from the simplicity of the child-size bookshelves and other spare, wooden furnishings. White walls, light wood, and glass create a bright, neutral atmosphere interrupted only by the school's collection of corals, fossils, and other objects meant to spark students' curiosity (a buffalo skin hangs over the stairwell). The materials provide a platform for student art projects as well—on a recent visit, a class had made miniature versions of artist Roxy Paine's signature metal tree sculptures, one of which stands outside the Crystal Bridges Museum of American Art in nearby Bentonville.

Even for an adult, the school has an inspiring but calm air brought about by the building's creative response to the strictures of its location. "When we start a project, our design process begins with exploring what the site gives us," says Payne. Montessori would have approved of that discovery-focused approach. ■

Hunter's Point Campus | New York City | FXFOWLE

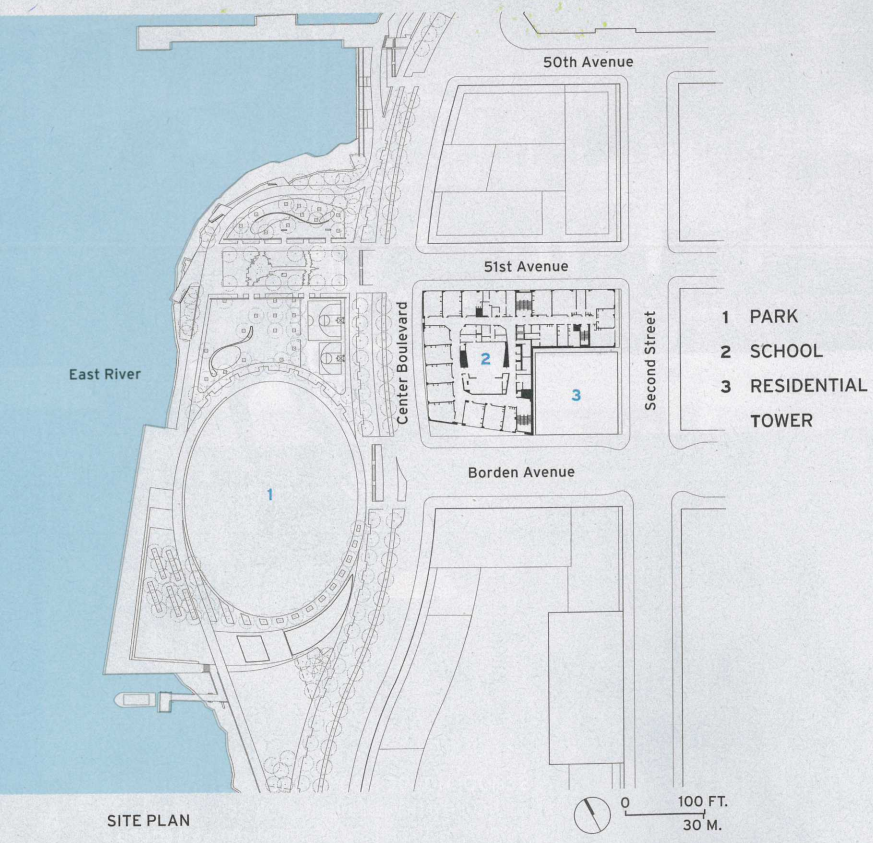
VIEW MASTER

Located on the East River in Queens with panoramic views of Manhattan, a new public school by FXFOWLE lives up to its arresting site.

BY LAURA MIRVISS

PHOTOGRAPHY BY DAVID SUNDBERG/ESTO

SCHOOLHOUSE ROCK Conceived as a dark rock anchoring a developing neighborhood along the waterfront, the muscular school makes a strong statement and stands out when viewed from the United Nations headquarters across the river in Manhattan.



SITE PLAN

WHEN THE ACADEMY for Careers in Television & Film (ACTvF) learned it would be one of three schools coming into a brand-new facility with spectacular views of Manhattan, both students and staff felt as if they had won the lottery. At the time, the city public school was located in the basement of a rundown building in Astoria, Queens. "It's an extreme upgrade," says Alan Metzger, a former television director, who cofounded ACTvF in 2008. "We are the American Dream—we went from the basement to the penthouse in five years."

The new digs at the Hunter's Point Campus—a charcoal iron-spot-brick building, designed by FXFOWLE, on the East River waterfront—are particularly notable in light of the school's strong performance. (With a 96 percent graduation rate, among the highest in New York City, the school was No. 2 on a recent ranking of the more than 400 public high schools.) This relocation presents the successful program and the sparkling new building as a single package, a showpiece within a showpiece.

The facility can accommodate more than 1,000 students dispersed among the three schools. In addition to the high school, the building contains the newly created Hunter's Point Community Middle School, with an ecology focus, and the Riverview School for special-education students. Located on a former industrial site, most classrooms—along with the light-filled hallways, library, and cafeteria—treat students to a sweeping panorama of the Manhattan skyline. "Even though it's an urban school, we've tried to make it feel as if it's part of a dynamic landscape," says FXFOWLE senior

LONG VIEW On the terrace, a 10-by-20-foot installation by local artist Natasha Johns-Messenger frames orange-tinted views of the Manhattan skyline (below). The accent color continues indoors, where the auditorium is wrapped in orange tiles with a matte or gloss finish (opposite, left). Glazed cutouts fill the hallways with daylight (opposite, far left).

partner Sylvia Smith. "The challenge was creating a narrative that reflected this amazing site."

Just one subway stop from Grand Central Station in Manhattan, Hunter's Point South is a rapidly developing 30-acre neighborhood in the borough of Queens, where mixed-income residential towers are rising alongside retail shops and office spaces. The five-story, 145,000-square-foot school, which opened in the fall of 2013—along with a beautifully manicured 5.5-acre park designed by Weiss/Manfredi (RECORD, September 2013, page 30)—are two of the public amenities in the master plan meant to support the influx of new families to the area.

A bold move for the city's school system, the dynamic new building riffs on the traditional school box. FXFOWLE chipped away at the solid form to bring in daylight, carving a terrace across the top floor and slicing glazed wedges down through the brick to bring light into the corridors. For extra punch, Smith and her colleagues defined the voids, including the cantilevered roof canopy, with bright orange metal panels, and wrapped the ground-floor gymnasium with translucent fiberglass panels. Says Smith, "It needed to have muscle and weight, but we also wanted a certain sculptural, artistic quality."

The architect's chief goal was maximizing light and views, which was a challenge because of the idiosyncrasies of the L-shaped site, which hugs two sides of a residential tower (under construction). Working from the inside out, they inserted the auditorium into the core of the third and fourth floors and tucked many of the mechanical and storage spaces into the wedge occupied by the neighboring tower, allowing them to position the classrooms around the building's perimeter.

Metzger says this layout has been a tremendous success.

FIFTH FLOOR

THIRD FLOOR

GROUND FLOOR

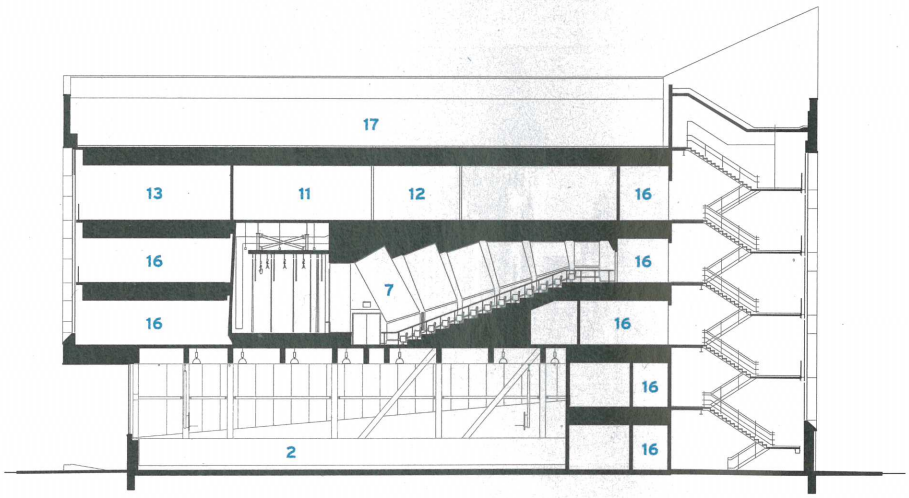
0 30 FT.
9 M.

1 LOBBY
2 GYMNASIUM
3 CLASSROOM
4 ADMINISTRATION
5 STORAGE
6 M/E/P SPACES
7 AUDITORIUM
8 DRESSING ROOMS
9 SCIENCE LAB
10 MUSIC ROOM
11 CAFETERIA
12 SERVERY & KITCHEN
13 ART ROOM
14 STAFF DINING
15 TERRACE
16 CORRIDOR
17 ROOFTOP/ MECHANICAL SPACE

"One thing that really works about this building is the flow patterns," he says. "In our old space, we had one central hallway, and it was so crowded—it was impossible for students not to run into each other." He says that in the new structure, the light and airy corridors act as small plazas where students can congregate without creating a bottleneck. Smith compares the auditorium to a rock in a stream, with circulation flowing around it.

The most daring aspect of the architect's scheme was bringing the cafeteria to the top of the building. With the terrace, it gives the students an uplifting place to have lunch and hang out, and the administration uses the space for parent meetings and events. "The idea of putting the gym on the ground floor and the cafeteria on the fifth floor was marvelous," says Edgar Rodriguez, the high school principal. "Instead of doing what was cheapest or most expedient, engineering-wise, they figured out how to best use this location. It's the signature of the building."

For a high-profile project on a coveted site, the school system took a risk and hired a top-flight architecture firm that had never built a public school in New York City from the ground up. "You can't even put a value on it, it's so fabulous," says Rodriguez. "We have the most beautiful school building in the whole city." ■



SECTION A - A

0 15 FT.
5 M.

credits

ARCHITECT: FXFOWLE – Sylvia Smith, Nicholas Garrison, Ann Rolland, project principals; Eric Van Der Sluys, Tim Macy, project managers; Jiyoung Lee, Scott Melching, Heng-Choong Leong, Mark Nusbaum, William Haskas, Violette de la Selle, Fernanda Freitas, project team

ENGINEERS: Ysreal A. Seinuk (structural); Kallen & Lemelson (m/e/p/fp); Langan (civil/landscape/geotechnical)

CONSULTANTS: Tillotson Design (lighting); Cerami (acoustical)

GENERAL CONTRACTOR: Skanska USA

CLIENT: City of New York/NYC School Construction Authority

SIZE: 145,000 square feet

COST: $61 million

COMPLETION DATE: August 2013

SOURCES

BRICK: Endicott Clay Products

GLASS: Guardian

LIGHT TOUCH The original scheme for the ground-floor gym (above) called for transparent glazing, which was later swapped for translucent fiberglass panels as a security and privacy precaution required by the NYC School Construction Authority. At the building's core, a 350-seat auditorium (left) has stadium seating, and bridges the third and fourth floors. Middle school students enter on the lower level, near the stage, while high schoolers enter from above.

Earl Shapiro Hall, University of Chicago Laboratory Schools | Chicago | Valerio Dewalt Train Associates

STARTING AT THE TOP

Carved masses and open spaces characterize the university-affiliated school for experimental education.

BY BLAIR KAMIN

LIKE THE institution it serves, the new early-childhood learning center of the University of Chicago Laboratory Schools is anything but ordinary. The $52 million, three-story Earl Shapiro Hall, designed by Joe Valerio of the Chicago firm Valerio Dewalt Train Associates, with FGM Architects, is as notable for its commodious, carefully conceived interior as for its exterior's exuberant expression.

The building for pre-kindergarteners through second graders belongs to a tradition of Chicago-area education design for progressive schools that stretches back to 1940 and the Crow Island Elementary School in Winnetka, Illinois, by Perkins, Wheeler & Will, with Eero and Eliel Saarinen. Though it doesn't match Crow Island's exemplary synthesis of civic presence and village-like intimacy, Earl Shapiro Hall still offers lessons for forward-thinking pedagogy.

The renowned educator John Dewey founded the Lab Schools in 1896, shaping a curriculum that emphasized "learning by doing" rather than relying on rote memorization. Before Barack and Michelle Obama became President and First Lady, they sent their daughters Malia and Sasha to Lab. For decades, Lab's early-childhood learning facilities were ensconced in and around this school's neo-Gothic enclave, about seven miles south of Chicago's Loop, which housed

ELEVATED EDUCATION
The entrance is marked by a cantilevered library atop the wing for administration (above). Next door, aluminum fins shield the beige-brick-clad, steel-framed classroom block from the sun's glare and allude to the Collegiate Gothic tracery of the nearby university buildings. On the upper level, a high, glazed reading room (right) offers expansive views of the neighborhood.

pre-kindergarten to 12th grade classes. Placing Earl Shapiro Hall a few blocks east of these friendly confines challenged Valerio to devise a fresh architectural framework that would simultaneously foster the school's myriad traditions, such as piano-accompanied "sings" in the lobby, and open the door to even better education. That was a rare opportunity, and not just because the project had enlightened clients and a generous budget.

"Not many buildings have been built for our youngest children," said David Magill, the Lab Schools' director. "Usually, they're in homes or in other buildings that have been renovated. To build one from scratch . . . is something you could only dream about."

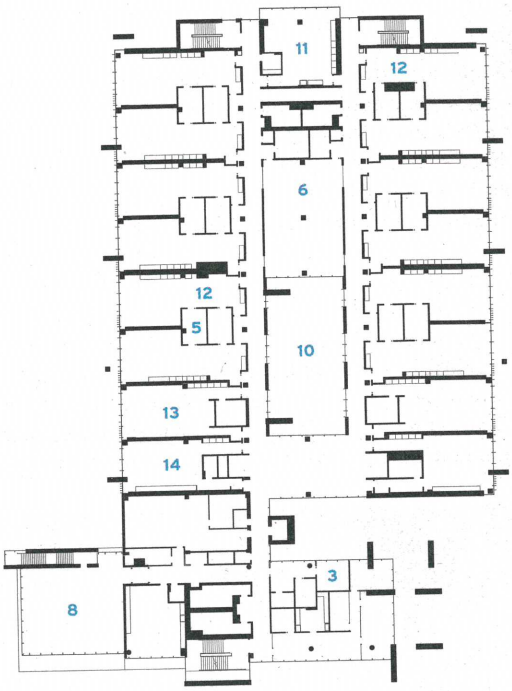
Valerio's solution pairs a steel-framed administrative wing—topped by a cantilevered, "look-at-me" library—with a restrained classroom wing that's mostly framed in precast concrete. These disparate parts are effectively tied together by an elegant cladding of oversized, cream-colored brick, energy-efficient glass, and perforated aluminum fins, arranged in a variation of the Fibonacci sequence. Confronted with a tight urban site, the architect transformed rooftops into outdoor "playscapes" and located small outdoor play areas directly outside first-floor classrooms, a feature reminiscent of Crow Island.

The outcome succeeds on several levels, the most important of which is that Earl Shapiro Hall's airy, chiseled volumes project a welcoming openness. The building is of the city, more town than gown, but it doesn't stray too far from the University of Chicago's architectural roots. While making a contemporary statement with its folded south-facing facade, the design achieves a subtle allegiance to the Collegiate Gothic in its asymmetrical massing, projecting piers, and tracery-like fins. And while the exterior can be justly criticized for lacking kid scale—it could be a corporate headquarters for one of Valerio's Silicon Valley clients—its boldness is not arbitrary. With the grandly scaled Museum of Science and Industry, a legacy of the 1893 World's Columbian Exposition, across the street, Valerio either had to go big or go home.

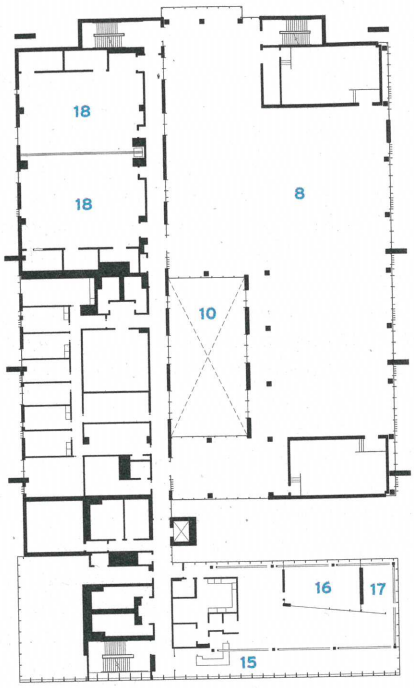
The container expresses the innovative arrangement and spirit of its contents. The 13-foot-high light-washed corridors, 7 foot 9 inches wide in contrast to the typical 6 feet, exude a sense of calm—an important feature for educators dealing with an age cohort that delivers the daily tumult of broken toys and spilled milk. The floor-to-ceiling glass that encloses classrooms opens the building to its surroundings, including verdant Jackson Park to the east. Lab administrators characterize the ever-changing views as being, rather than a distraction, a novelty that will stimulate young brains. "Dead, really controlled space is pretty deadening," said Valerio.

The most significant advance is the multiplicity of differently scaled learning spaces and their attendant flexibility. Paired classrooms share a small breakout room, where teachers can meet with small groups of students—or little builders can make wood blocks go clack-clack without disturbing a reading circle. Each classroom floor also has a glass-sheathed "learning lab," larger than a typical classroom, that can serve as an indoor play space or a spot for dancing or other activities involving two or more classes. The interior culminates in the expansive truss-supported library, a beacon of learning, which also functions as a kid-friendly academic tree house.

To be sure, there are faults. The building's glass-walled lobby lacks the old-shoe domestic scale of its counterpart in Blaine Hall, the James Gamble Rogers–designed Gothic Revival charmer that previously housed Lab's early grades. "You don't get that hugging space," Magill said, adding that art or banners may be introduced to break down the scale and add texture. Nevertheless, Earl Shapiro Hall earns high marks as a thoughtfully conceived, precisely executed model of early-childhood learning. Here, modernism isn't an aesthetic straitjacket but an enabling agent that gives a legendary institution new capacity to carry out its progressive mission. ■



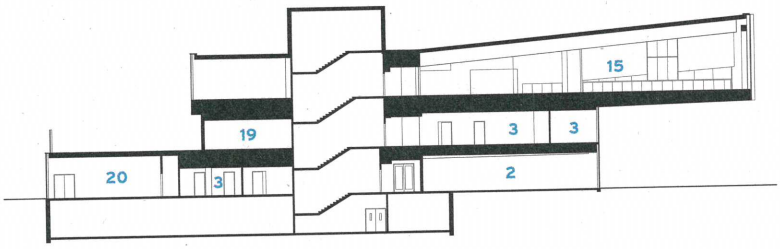
SECOND FLOOR



THIRD FLOOR

1 ENTRANCE
2 MAIN LOBBY
3 ADMINISTRATION
4 NURSERY
5 BREAKOUT ROOM
6 LEARNING LAB
7 COURTYARD
8 OUTDOOR PLAY SPACE
9 SOUTH LOBBY
10 OPEN TO BELOW
11 AFTER-SCHOOL SPACE
12 FIRST AND SECOND GRADE CLASSROOM
13 MUSIC CLASSROOM
14 ART CLASSROOM
15 LIBRARY
16 COMPUTER LAB
17 STORYTELLING ROOM
18 GYMNASIUM
19 TEACHER WORK ROOM
20 LOADING AREA

FIRST FLOOR



SECTION A - A

credits

DESIGN ARCHITECT: Valerio Dewalt Train Associates – Joseph Valerio, principal; Randy Matteis, Sheri Andrews, Robert Webber, Stephen Droll, team

ARCHITECT OF RECORD: FGM Architects

ENGINEERS: Rubinos & Mesia Engineers (structural); ARUP (m/e/fp); Primera (electrical)

SUSTAINABILITY: HJ Kessler Associates

CLIENT: The University of Chicago

SIZE: 128,000 square feet

COST: withheld

COMPLETION DATE: July 2013

SOURCES

MASONRY: Belden Brick

CURTAIN WALL: Innovation Glass

GLASS: Viracon

ENTRANCES: Kawneer

WORLD VIEWS
Along the glazed perimeter of the classroom block, the students on the first floor have access to the outdoors (above left), while the expanses of glass on both floors ensure that learning areas inside get plenty of natural light (above). An interior court brings more light and open space into the middle of the classroom wing, as the second floor hall (left) shows. The 13-foot-high ceilings of precast-concrete planks and precast concrete beams give the space a sense of solidity. Acoustic metal panels along the walls have magnetic properties for hanging displays.

North Atlanta High School | Atlanta | Cooper Carry

OPEN FOR BUSINESS

A visionary plan transforms a former IBM office complex into a high school that's anything but textbook.

BY LAMAR ANDERSON

AT A TIME when many K–12 architects are designing neighborly clusters of classrooms and modest buildings that open onto the landscape, the students at North Atlanta High School are pushing elevator buttons and riding to class in a concrete tower. From the top floor, eleven stories up, a bay of lockers overlooks the treetops and, in the distance, the Atlanta skyline. More floor-to-ceiling windows across the corridor command views down to the small lake this 1970s-era high rise straddles. Downstairs, parents drive through what is probably the city's most corporate-looking school drop-off loop, watching their teenagers disappear through glass doors, past a large spiral staircase and an imposing wood accent wall, where a North Atlanta High School sign has replaced the IBM logo that once hung there.

That structure—originally built in 1977 by Thompson, Ventulett, Stainback & Associates—and the rest of the 56-acre grounds became available when IBM decided to move during the depths of the recession, in 2010. At the same time, Atlanta Public Schools was preparing for a spike in the neighborhood population that promised to overwhelm existing high schools. With scant open real estate, the school district considered buying the IBM site—an unconventional idea spurred by the district's facilities department, which happens to be headed by two architects. "It takes someone with vision to look at this and say, 'Yeah, we can build a high school here,'" says Margarita Perez of Collins Cooper Carusi Architects. That firm served, with Paul Cheeks Architects, as associate architect on a design team led by Cooper Carry.

The Brutalist campus offered plenty of amenities: an L-shaped plan with two long, narrow towers (the second added in 1987, linked to the original by a glass atrium), a four-level garage, and a surfeit of surface parking. Leaving much of the

PHOTOGRAPHY: © JOSH MEISTER, EXCEPT AS NOTED

CORPORATE PERKS The main academic building of the new high school occupies an 11-story concrete tower, originally built in 1977 (left). In the lobby, a North Atlanta High School sign (above) replaces the IBM logo that once hung there.

BIG MAN ON CAMPUS
Set on a 56-acre site, the top floors of the academic building offer views of the Atlanta skyline. It is linked via an existing glass atrium to a newly constructed addition that includes a gym and performing-arts center (above).

PHOTOGRAPHY: © BOB HUGHES (ABOVE)

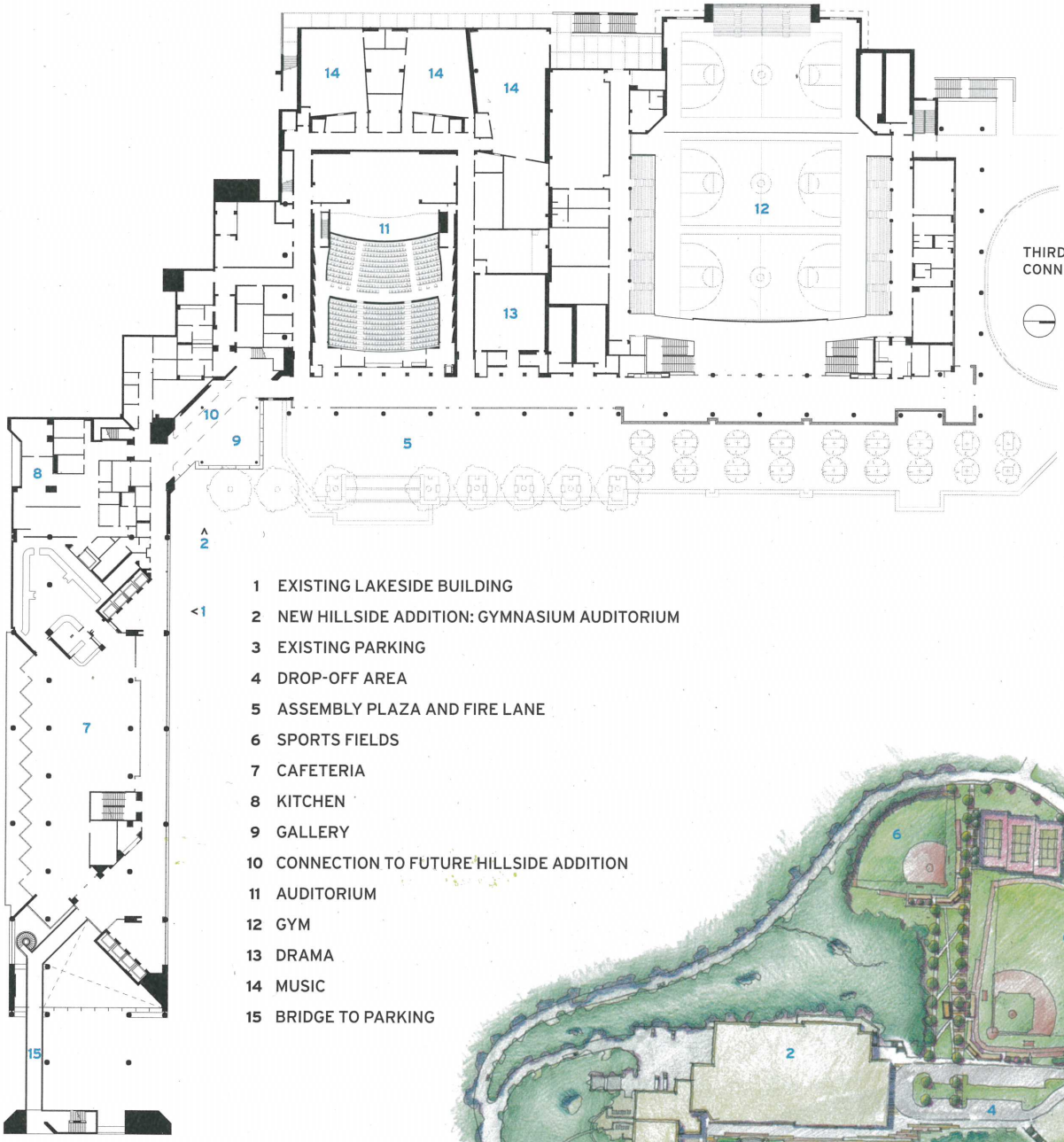
hilly, forested site undisturbed, the architects shoehorned the school's functions into the existing built footprint. They adapted the 1977 post-tensioned, cast-in-place concrete structure as the main academic building, demolished the 1987 tower and replaced it with a smaller but wider gym and performing-arts center, and repurposed the parking lots as sports fields. The school's 1,520 students moved into the academic building this fall; the performing-arts and gymnasium wing opens this month. At 507,093 square feet, the finished complex can accommodate 2,400 students.

Schools tend to sprawl out as they grow, not up. "The trick was, how to adapt an office building for use as a public school," says Cooper Carry chairman Jerry Cooper. The design team needed to turn a high-rise defined by long, bland corridors—ideal for cubicles, not so much for social interaction—into a place where you'd want to show up every day without being paid to do so. "When we came in here, it was really austere," recalls Perez. "We wanted to introduce some energy while keeping it sophisticated." The architects concentrated the public spaces on the lower floors and divided the upper floors into four academies of two stories for each grade. In each academy, they removed a section of the top floor and inserted a broad staircase to open up the corridors and render activity more visible. Between classes, students making short trips scurry up and down the stairs to avoid piling into the elevator. Color schemes assigned to each grade enliven the hallways and make every floor recognizable for elevator passengers. To lessen gridlock, the design team used destination-elevator software, which prioritizes groups going to the same floor, directing passengers heading the same way to a particular car.

Beyond practical interventions—such as detensioning and retensioning the structure to carve out a central stair and replacing all the floor-to-ceiling windows with roughhousing-proof, high-performance laminated glazing—the architects let the views do the work. They lifted classroom ceilings 10 inches, to 9 feet, by routing ductwork through hallways. For Cooper, giving those breathtaking views to students represents an important shift for public school kids, who aren't often treated as clients. "The skyline is a visual gift," he says, though his team made the calculated move to turn the desks away from window walls to curb distraction.

With its base forming a bridge 30 feet over the lake, the academic building is largely cut off from the landscape. But the new wing, clad in white metal panels and wrapped with a poured-concrete trellis that echoes the tower's facade, opens onto an outdoor plaza that faces the lake. The architects used the existing glass-box atrium to link the academic wing's third floor with the main level of the addition, which is situated uphill from the original. "We wanted to make the transition seamless," says Perez, "so you don't feel as if you're stepping out of one building into another."

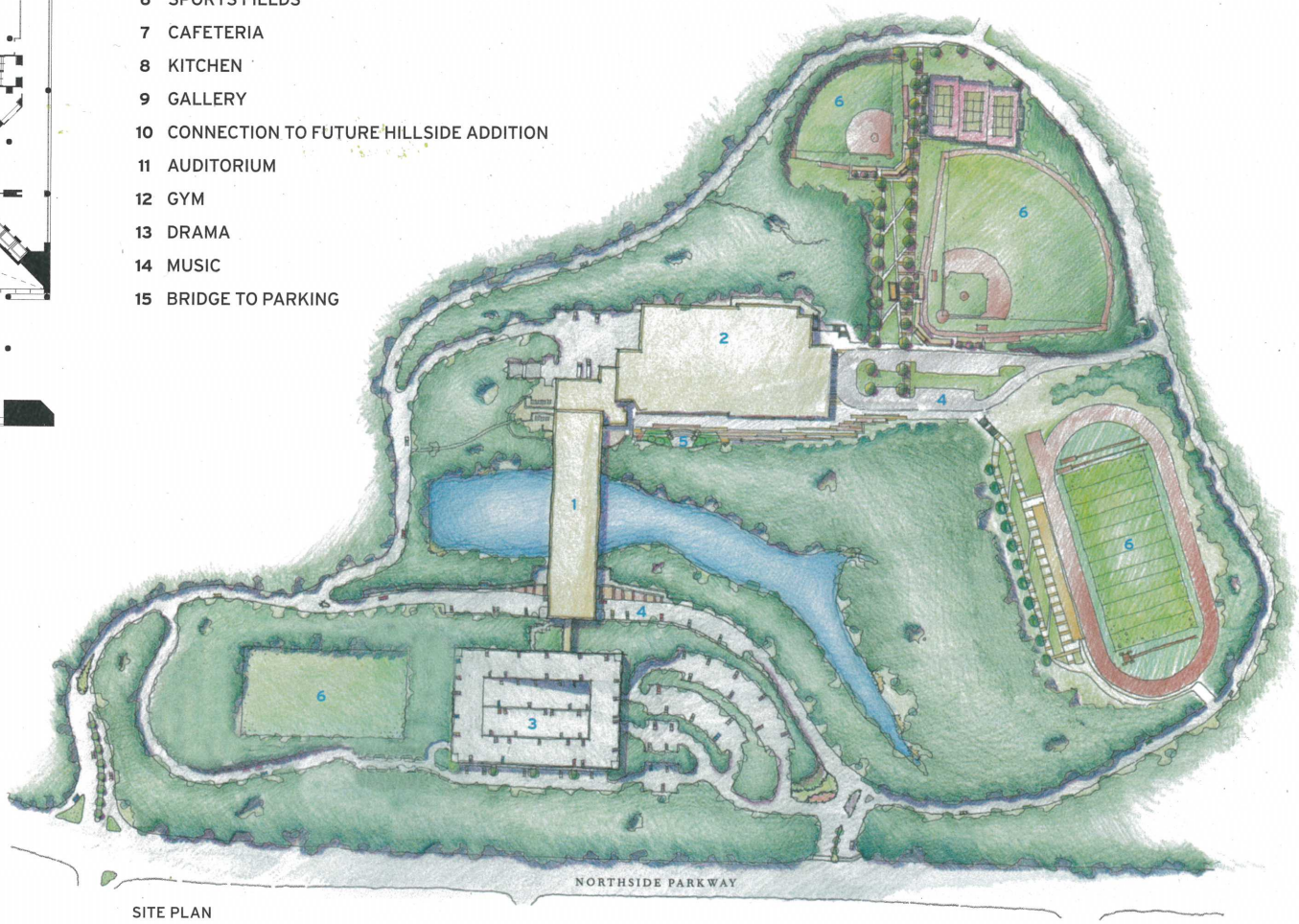
Despite the novelty of sending high schoolers to class in an office tower, it could be seen as doubly retrograde to insert a traditional classroom layout into an outmoded office template. But as an adaptive reuse that gives existing building stock new life, North Atlanta High School is as forward-looking as they come. ■



THIRD FLOOR PLAN WITH MAIN STREET CONNECTION TO HILLSIDE ADDITION

0 60 FT.
20 M.

1 EXISTING LAKESIDE BUILDING
2 NEW HILLSIDE ADDITION: GYMNASIUM AUDITORIUM
3 EXISTING PARKING
4 DROP-OFF AREA
5 ASSEMBLY PLAZA AND FIRE LANE
6 SPORTS FIELDS
7 CAFETERIA
8 KITCHEN
9 GALLERY
10 CONNECTION TO FUTURE HILLSIDE ADDITION
11 AUDITORIUM
12 GYM
13 DRAMA
14 MUSIC
15 BRIDGE TO PARKING



SITE PLAN

credits

ARCHITECT: Cooper Carry – Jerome M. Cooper, design principal in charge; Robert A. Just, project director, resources

ASSOCIATE ARCHITECTS: Collins Cooper Carusi Architects; Paul Cheeks Architects

ENGINEERS: Uzun & Case Engineers (structural); Barret, Woodyard & Associates (m/e/p); Eberly & Associates (civil)

GENERAL CONTRACTOR: JE Dunn Construction

CLIENT: Atlanta Public Schools

SIZE: 507,093 square feet

COST: $87 million (construction only)

COMPLETION DATE: August 2013

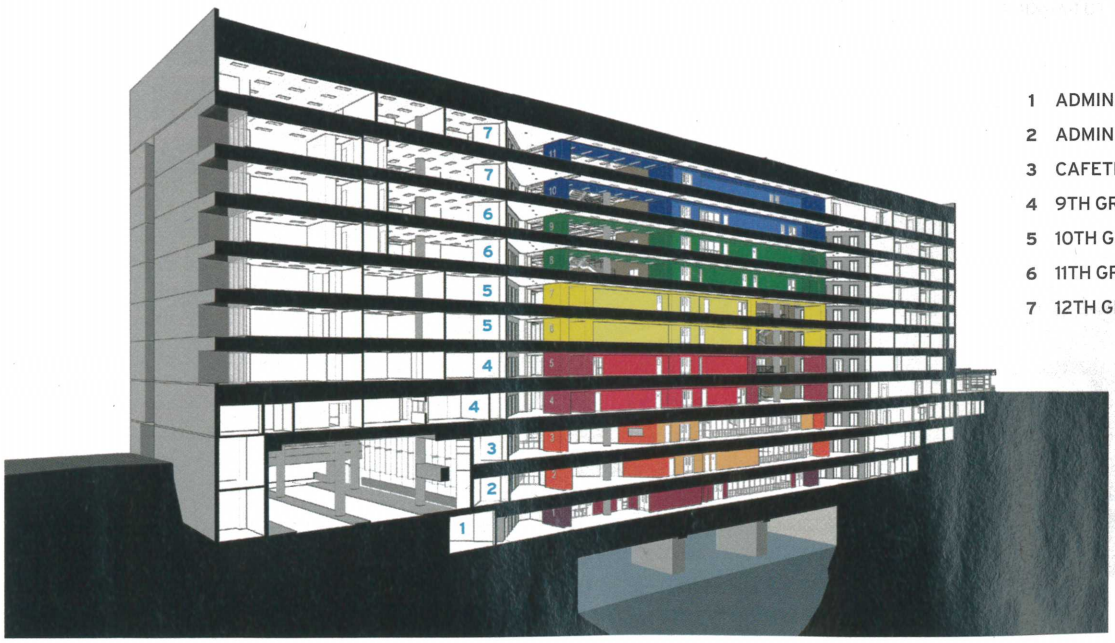
SOURCES

CURTAIN WALL: YKK AP America

METAL PANELS: Firestone Metal Products; Una-Clad Insulated Wall Panels

GLAZING: Viracon

ELEVATORS: ThyssenKrupp



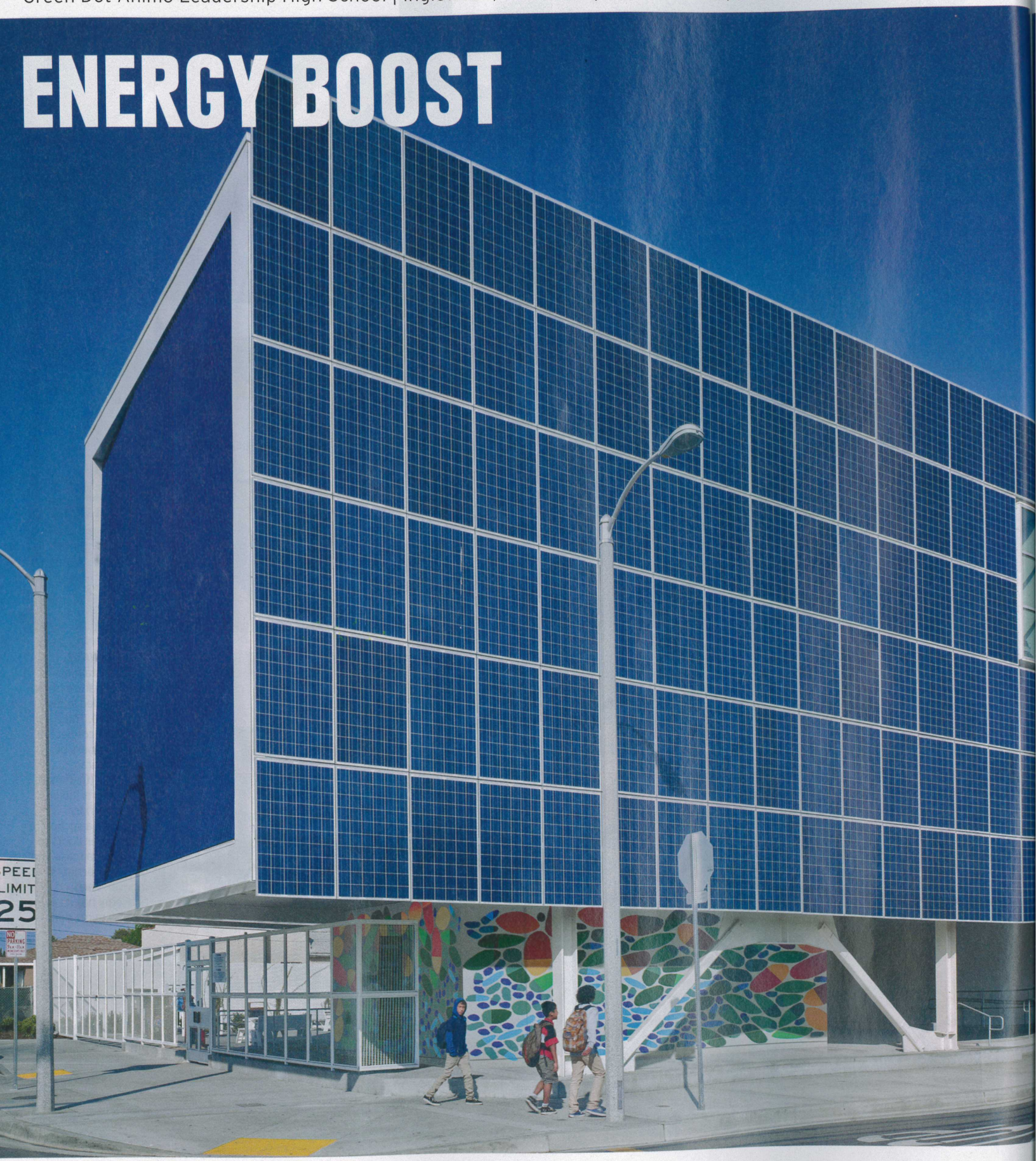
LAKESIDE SECTION-PERSPECTIVE

1 ADMINISTRATION AND PUBLIC GATHERING
2 ADMINISTRATION AND MEDIA CENTER
3 CAFETERIA
4 9TH GRADE ACADEMY
5 10TH GRADE ACADEMY
6 11TH GRADE ACADEMY
7 12TH GRADE ACADEMY

COLOR WAYS
A spiral staircase is a main feature of the glass-walled lobby (opposite). The architect connected the two floors of each separate academy (freshman, sophomore, junior, and senior) by removing a section of their upper floors to insert a staircase and open up corridors (above). Each academy has its own color scheme (left).

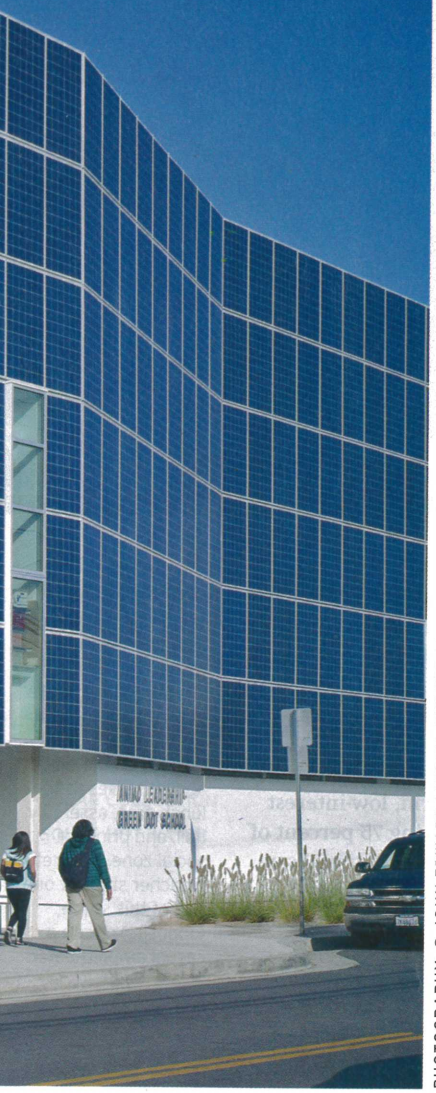
Green Dot Ánimo Leadership High School | Inglewood, California | Brooks + Scarpa Architects

ENERGY BOOST



On a tough site, a public school touts its forward-thinking mission with design, while providing a model for sustainability.

BY SARAH AMELAR



PHOTOGRAPHY: © JOHN EDWARD LINDEN, EXCEPT AS NOTED

ABOVE THE door to every classroom at Ánimo Leadership Charter High School, in Inglewood, California, a glowing green sign reads: The Road to College Starts Here. Though the student population is mostly low-income, and the school occupies a tough site—near the 105 Freeway and the approach to Los Angeles International Airport—this is a place of soaring aspirations.

Overcoming obstacles to academic achievement and real-world success, this public school's core values have shaped everything from its personalized teaching approaches to the architecture. Here, the V-shaped new building encourages a sense of community, while also connecting with its neighbors. "In low-income areas, like this Latino neighborhood, people just hope for spaces that function, but I think it's unfair for them not to get beautiful places for learning," says Marco Petruzzi, CEO of Green Dot Public Schools, the nonprofit that founded and operates the school. His organization began in 1999 with a mission to transform public education in Greater Los Angeles, whose Unified School District (LAUSD) has seen staggering high school drop-out rates. In place of dysfunctional academic warehouses, Green Dot proposed small charter schools, "where everyone knows your name," says Petruzzi. Today, the organization's 19 schools across the county—some start-ups and others "turn-arounds" of existing troubled institutions—typically cap enrollment between 500 and 650 students each, with relatively small classes, a pervasive college-oriented culture, and emphasis on quantifiable, standardized test data. One essential factor is direct engagement of students' families and school administration in the learning process.

Yet when Petruzzi, a self-described architecture buff, approached various firms to design the 28-classroom Ánimo Leadership school, he got disheartening responses. Given the tight (30,300-square-foot) site, budgetary restrictions, and low-rise residential neighbors, "everyone said we could just do a 'shoebox' for classrooms, with a stair at either end. Period," he recalls. "They told us to forget about casual 'hangout' spaces, or even a lunch area."

But Los Angeles–based Brooks + Scarpa Architects (BSA) had a different idea—and it dovetailed with Petruzzi's ambitions to reverse the downward

BRIGHT IDEA
Nearly 500 PV panels across the south-facing entry facade (left) meet much of the school's energy needs. The mural at the building's base was the architects' temporary stand-in for the public art to be painted there in the future, with student participation. The east elevation (above) is more delicately detailed, responding to the surrounding modest single-family homes. Open-air stairways provide natural mingling places.

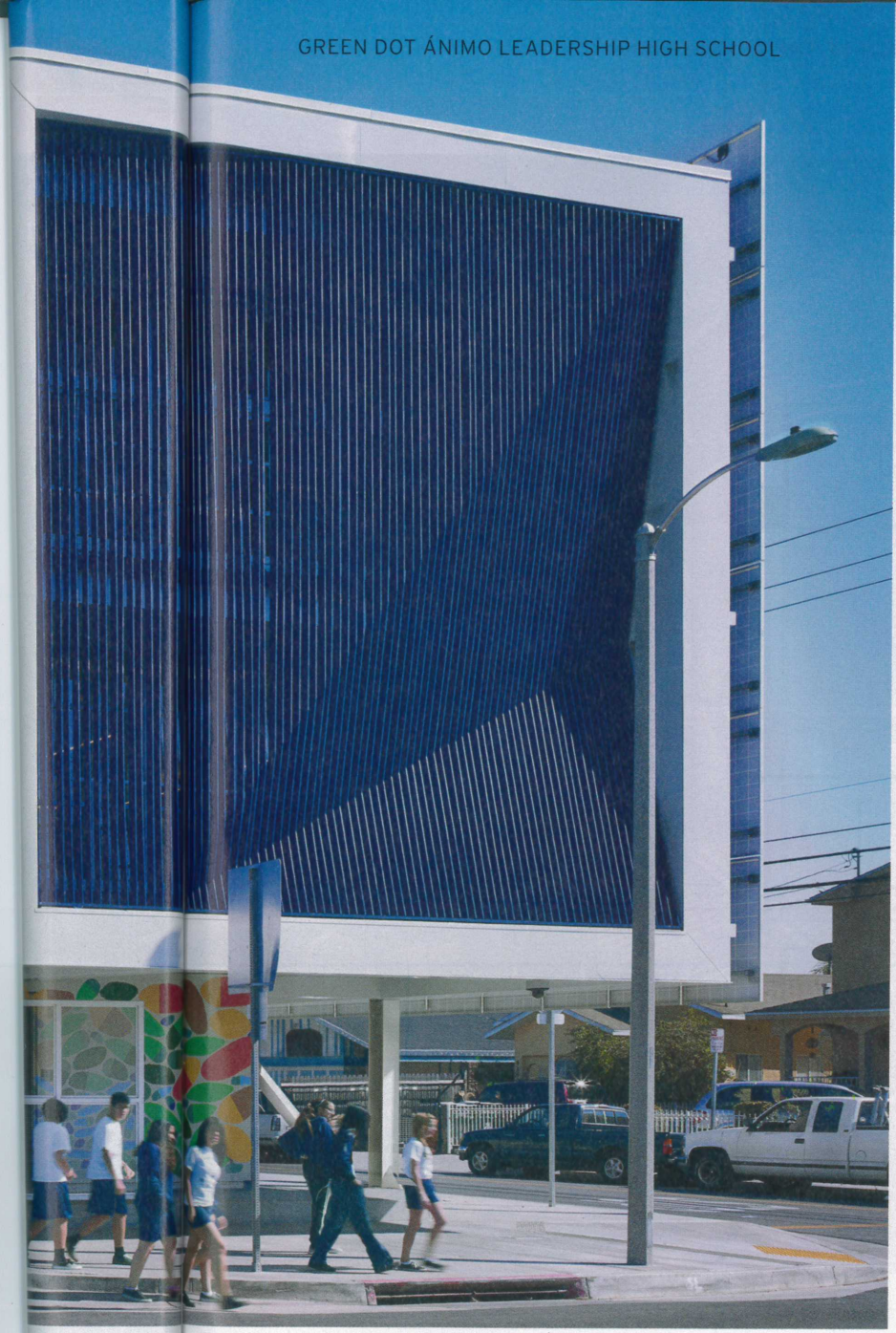
spiral of a rough neighborhood while providing a model of energy efficiency.

Certified by CA-CHPS (the environmentally focused California Collaborative for High Performance Schools), the 50,165-square-foot building BSA realized opens up the site at its core. Though the three-story structure is built out to the edges of its urban corner site, it ushers light and air into its center with a funnel-like courtyard, oriented to optimize passive shading and draw through-breezes. This outdoor room doubles as the lunch area, assembly hall, and prime mingling zone. Concrete stadium steps at one end serve as an amphitheater or perches for gatherings. "We wanted the five minutes between classes to be an important part of the experience," says BSA principal Larry Scarpa. "We actually created more stairways than required, to increase meet-up opportunities." Within this building—clad in white-pigmented cement plaster—wide open-air corridors embrace the temperate climate.

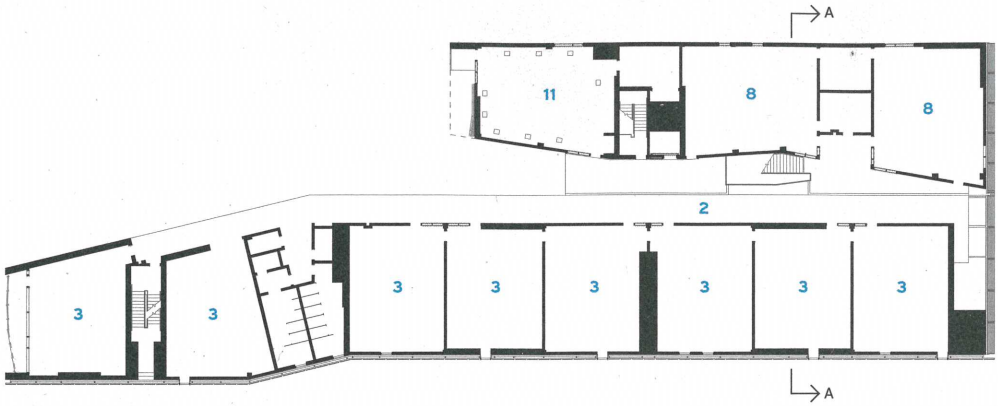
BSA sheathed the long south-facing front facade in nearly 500 PV panels. The feature's $688,000 price tag may seem like a big chunk of the building's $15.2 million cost. But Petruzzi says favorable financing made the array feasible and beneficial—in both the short- and long-term. As he explains, California Proposition 55, the Kindergarten–University Public Education Facilities Bond Act of 2004, covered half the project costs and gave Green Dot a long-term, low-interest loan for the remainder. With the PVs meeting 75 percent of the school's energy needs, Scarpa estimates an annual savings of $70,000. So, payback for the apparatus is modest and gradual, while the impact on operating costs is substantial.

Ánimo Leadership's other material components are humble: concrete floors, white-pigmented cement-plaster outer walls, exposed ductwork in classrooms, and white-painted metal railings and mesh along the staircases and the broad, single-loaded corridors. The building's tight V-plan—

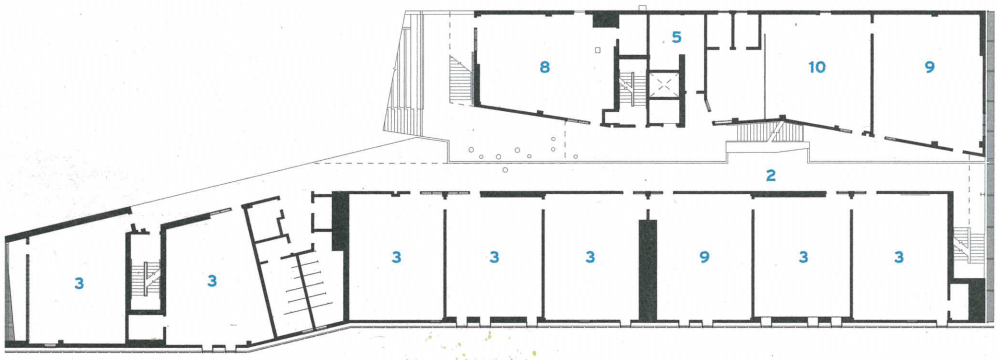
BLUE RAYS
Sculpturally arrayed blue fins shade the western facade (above). With a sense of openness to the community, the courtyard (left side of above) serves as the lunch area, assembly hall, and principal social zone. Concrete bleacher steps at one end of this space (opposite) create a casual amphitheater.



1 BUILDING MANAGEMENT SYSTEM ENSURES OPTIMUM PERFORMANCE OF ALL SYSTEMS
2 AUTOMATIC SENSORS AND INTELLIGENT THERMOSTATS
3 BUILDING CONFIGURATION ENCOURAGES USE OF STAIRS AND DE-EMPHASIZES ELEVATOR USAGE
4 BUILDING CONFIGURATION INDUCES AIR FLOW AND NATURAL VENTILATION
5 NARROW FLOOR PLATE INCREASES NATURAL DAYLIGHT, WHILE CROSS VENTILATION REDUCES COOLING LOADS AND ENERGY USAGE

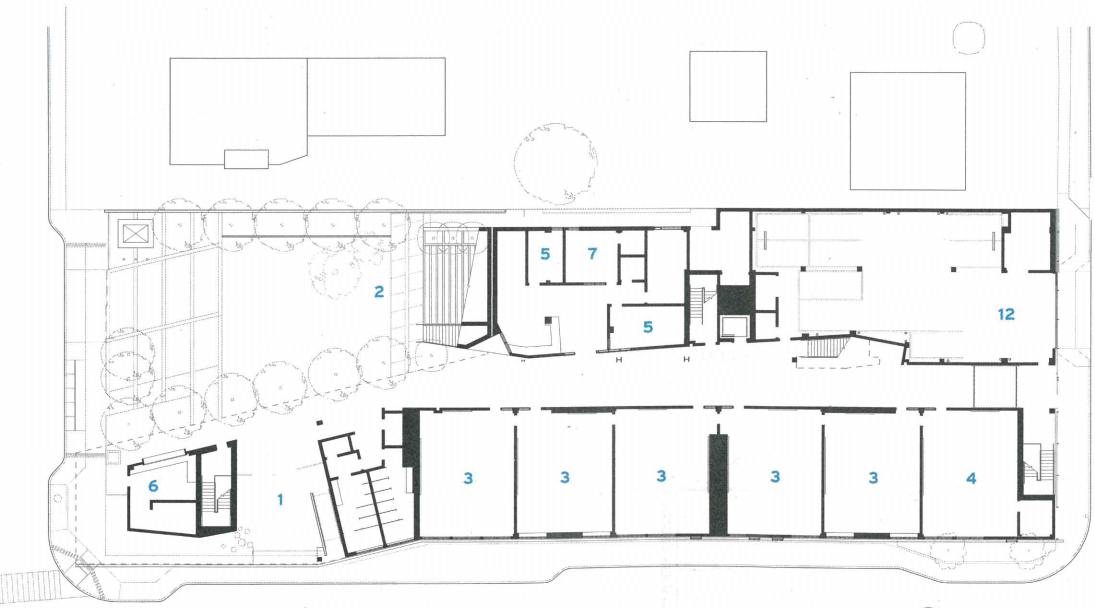


THIRD FLOOR



SECOND FLOOR

1 ENTRY COURT
2 TERRACE/OPEN-AIR CIRCULATION
3 CLASSROOM
4 MUSIC ROOM
5 OFFICE
6 FOOD SERVICE
7 NURSE
8 SCIENCE LAB
9 COMPUTER LAB
10 MEDIA LIBRARY/COLLEGE CENTER
11 CHEMISTRY LAB
12 PARKING



FIRST FLOOR

PHOTOGRAPHY: © TARA WUJCIK (OPPOSITE)

BUILDING BLOCKS The western facade's blue fins filter late-day sunlight into a classroom (left). On the building's southern side, however, photovoltaic panels block some of the windows (as in this room, facing the student), leaving other classrooms with sparse daylight, school officials report. Humble materials throughout the facility include polished concrete floors as well as exposed ductwork, and structural members sprayed with an acoustic coating.

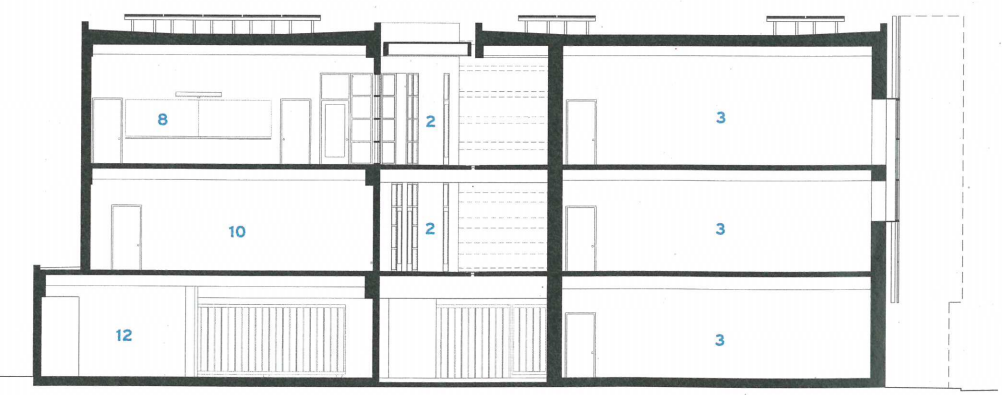
like a solid block with a jagged, converging chasm of circulation cut through it—invites views and social interaction across the central open space.

The building opened in 2012, and, so far, the results are encouraging. The school (begun in temporary quarters in 2000) currently boasts college admissions for 98 percent of its graduating class, with many the first in their families to achieve higher education. In 2013, *Newsweek* ranked it among the nation's 2,000 most effective public schools for producing college-ready graduates—and one of the country's "Top 25 Transformative High Schools" (or "game-changers" for youth below the federal poverty line).

But, like any ambitious undertaking, it has met bumps in the road. The gym BSA designed for a separate site nearby is not yet under construction. (The school has improvised by leasing local parks, playing fields, and gyms, and has already succeeded in winning some state championships.)

Among the features value-engineered out was courtyard landscaping. And the public art intended for the building's base—a mural to be painted with student participation—has not yet taken form. For the grand opening and photos shown here, BSA temporarily installed a mural of its own design. Without it, the entry area is currently a bit drab. But the litmus test: students seem to be thriving. On a recent visit, a small group of them worked intently after hours with a teacher in a chemistry lab. And after school lets out, they can be spotted throughout the neighborhood (most live within walking distance) proudly sporting their Ánimo Leadership sweatshirts.

"Larry Scarpa captured the essence of what we wanted," says Petruzzi, "a sense of openness and connection with the surrounding community, even on such a compact site. When everyone else said, 'Forget it,' we didn't give up." ■



SECTION A - A

credits

ARCHITECT: Brooks + Scarpa Architects – Lawrence Scarpa, principal in charge; Angela Brooks, Mark Buckland, Ching Luk, project architects; Brad Buter, Silke Clemens, Omar Bárcena, Emily Hodgdon, Gwynne Pugh, Sri Sumantri, project design team

ENGINEERS: Thornton Tomasetti (structural); Barbara L. Hall, P.E. (civil); E2DI (m/e/p)

CONSTRUCTION MANAGER: Telacu

CLIENT: Green Dot Public Schools

SIZE: 50,164 square feet

COST: $15.3 million

COMPLETION DATE: June 2012

SOURCES

METAL/GLASS CURTAIN WALL: U.S. Aluminum

BUILT-UP ROOFING: CertainTeed

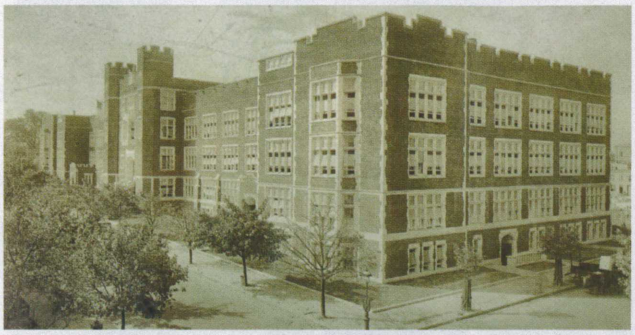
GLASS: PPG

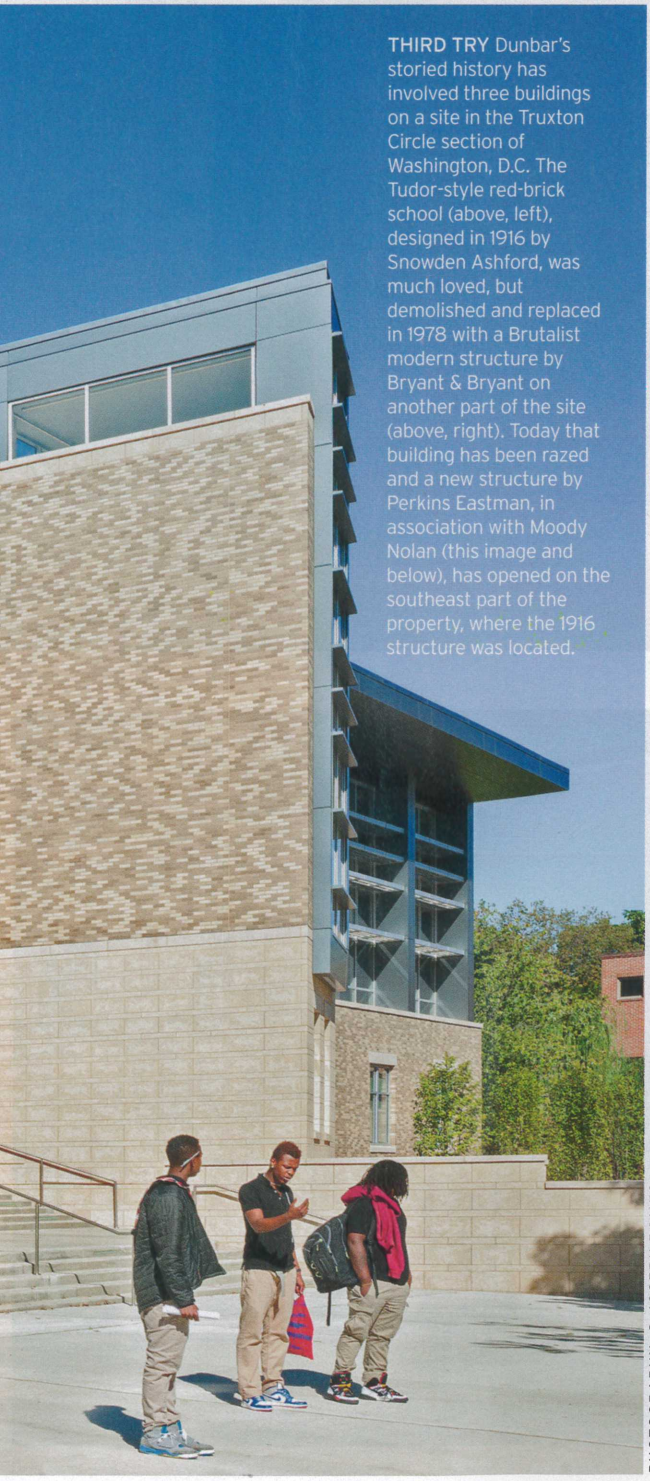
Dunbar Senior High School | Washington, D.C. | Perkins Eastman and Moody Nolan

HISTORY LESSON

A famous school gets back on track blending modern and traditional design elements.

BY SUZANNE STEPHENS





THIRD TRY Dunbar's storied history has involved three buildings on a site in the Truxton Circle section of Washington, D.C. The Tudor-style red-brick school (above, left), designed in 1916 by Snowden Ashford, was much loved, but demolished and replaced in 1978 with a Brutalist modern structure by Bryant & Bryant on another part of the site (above, right). Today that building has been razed and a new structure by Perkins Eastman, in association with Moody Nolan (this image and below), has opened on the southeast part of the property, where the 1916 structure was located.

PHOTOGRAPHY: © JOSEPH ROMEO

"THIS BUILDING has light, energy, and life!" exclaims Dunbar Senior High School's principal Stephen Jackson. "I love it, love it, love it!" Jackson is raving about the 280,000-square-foot brick, glass, and steel structure that opened in August in the Truxton Circle section of Northwest Washington, D.C. It will soon accommodate 1,100 students, but for now a few more than 600 are populating its halls. The public high school, designed by Perkins Eastman in association with Moody Nolan, is a four-story facility with an L-shaped plan (one wing for academics, the other—a chunkier block—for sports and arts), partly enclosing an athletic field.

Jackson's declaration bears up as you ascend the broad steps to the entrance. Walking into a large skylit atrium, you find floor-to-ceiling windows opening to vistas of the surrounding residential neighborhood. In the gym, a 29-foot-high glass wall overlooks the sports field to the west. Underneath the gym, an expansive clerestory brings daylight into the partially below-grade 75-foot-long swimming pool. Even the maple-paneled auditorium with 600 seats has a glass wall backing the stage—with access to a terrace.

The majestically modern edifice is the third incarnation of Dunbar on this site. In 1870, Dunbar was founded as the Preparatory High School for Colored Youth, the first of its kind in the United States, in a church basement at 15th and R streets. By 1916, the school took the name of the poet Paul Laurence Dunbar and moved into a new Tudor-style red-brick structure in the present spot. Recognized for its intense academic curriculum, Dunbar thrived. Its alumni include Congresswoman Eleanor Holmes Norton, Brigadier General Elmer Brooks, and current D.C. mayor, Vincent C. Gray.

"The 1916 school was a stately building, designed with a flair that enhanced its tremendous educational mission," says Mayor Gray. Eventually, however, the facility needed modernization. In spite of a lengthy battle fought by preservation-

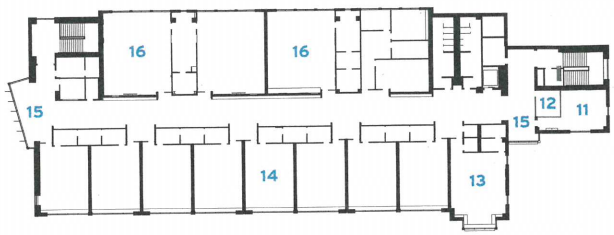
ists to keep the venerated structure, it was torn down in 1977. Its replacement, designed by a prominent local African American architectural firm, Bryant & Bryant, occupied the northwest corner of the site. Both its concrete Brutalist-modern style and the open-plan method of teaching reflected prevailing design and educational thinking of the time. The paucity of windows was also a response to the growing violence in the inner city. Says Gray, "This Dunbar looked like a prison." Jackson adds, "It had lots of hiding places, and it was cramped. As research shows, crowding people together creates tension and aggressive behavior."

Around 2000, it became clear that both architecture and education were suffering. The Dunbar Alumni Federation pressed for a brand-new facility—one that would incorporate features of the historic 1916 structure, including an "armory" like the one where high-school Reserve Officers Training Corps (ROTC) practice once was held and where students could hang out.

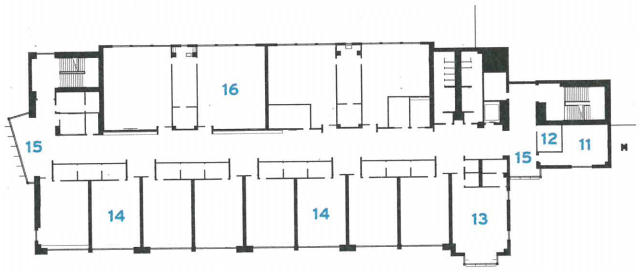
The architects responded with a design distinguished by articulated facades, deeply profiled mullions, louvers, cornice-like canopies, and statuesque piers. "We wanted to create a sense of scale, especially on the academic wing," says Sean O'Donnell, principal in charge at Perkins Eastman, "and express the structure's varying functions on the exterior."

The new school, built on the southeast corner of the site

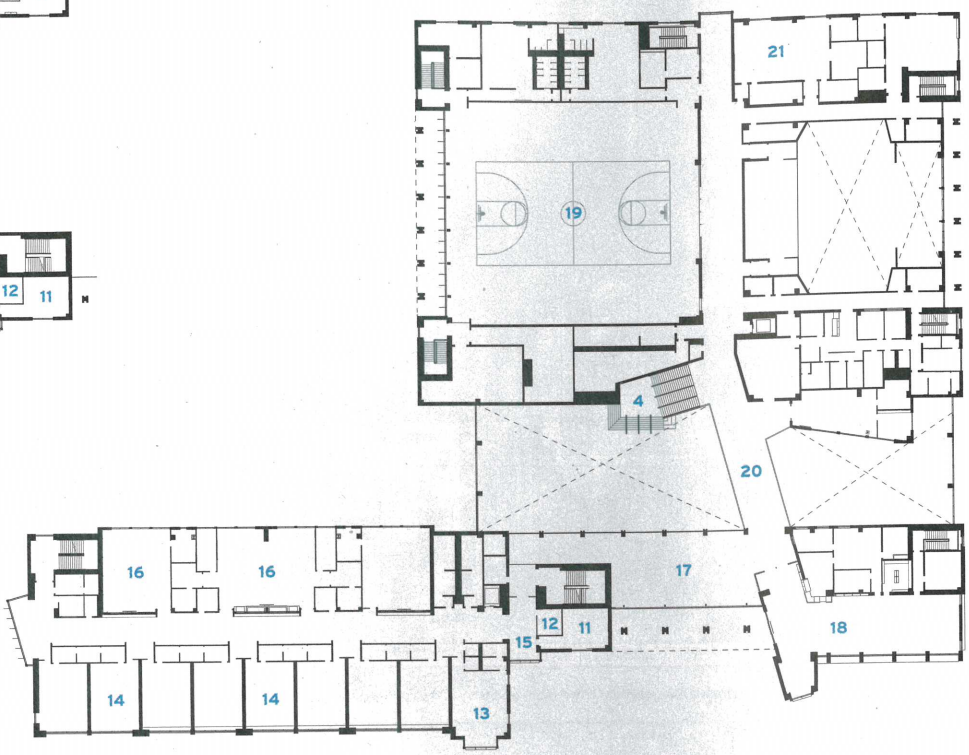
HALLOWED HALLS
A sky-lit atrium called the "armory," after one in the revered 1916 school, has a food court on the east end (opposite, top) edged by a glass wall. Ample windows also bring light into classrooms and labs (opposite, bottom). On the second level, the generous proportions of the hall (above, left) and media center (above, right), along



FOURTH FLOOR



THIRD FLOOR

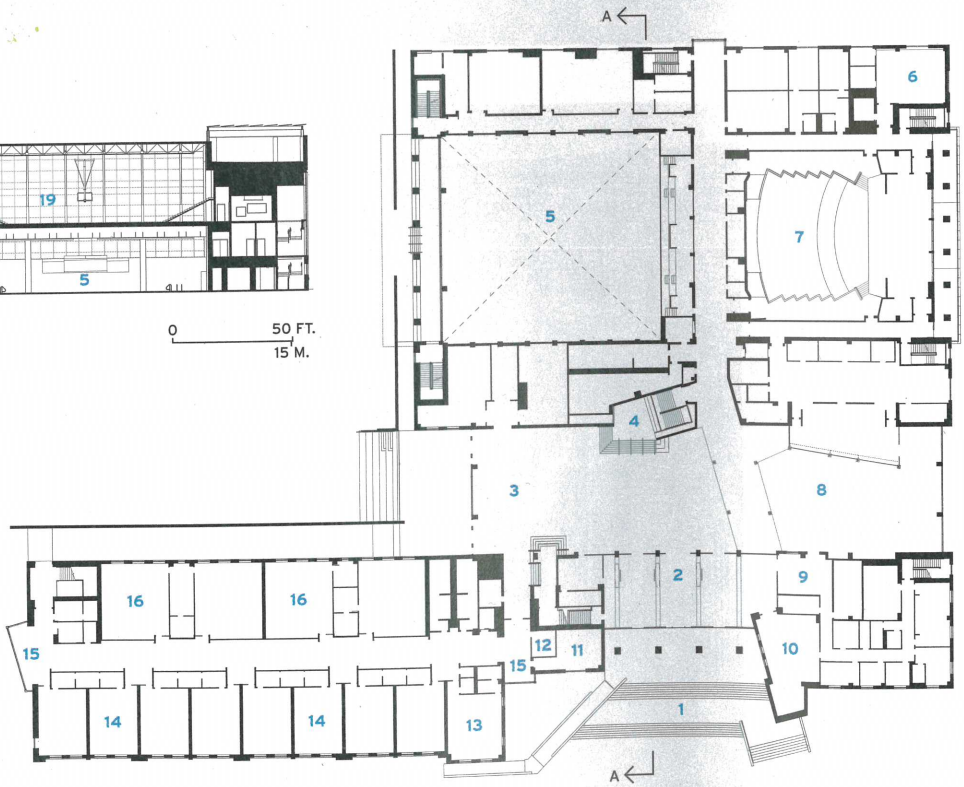


SECOND FLOOR

1 ENTRY
2 VESTIBULE
3 ARMORY
4 GRAND STAIR
5 POOL
6 CHORAL ROOM
7 AUDITORIUM
8 FOOD COURT
9 WELCOME CENTER
10 MUSEUM

SECTION A - A

0 50 FT.
15 M.



FIRST FLOOR

0 50 FT.
15 M.

11 TEACHERS' WORKROOM
12 OFFICE
13 SPECIAL NEEDS CLASSROOM
14 CLASSROOM
15 EXTENDED LEARNING
16 LABS
17 SENIOR LOUNGE
18 MEDIA ROOM/READING
19 GYM
20 BRIDGE
21 BAND ROOM
22 ART ROOM

STAGE VIEW
The 600-seat auditorium is sheathed in maple panels and backed by a glass curtain wall behind the stage. There, a terrace overlooking a tree-lined street accommodates receptions before or after ceremonies and performances. As journalist Alison Stewart writes in *First Class: the Legacy of Dunbar, America's First Black Public High School* (2013), the design conveys

formerly occupied by the 1916 building, does not feature its dark-red brick: instead, the architects devised a syncopated pattern of multitonal shades of beige. While this seems a bit jazzy, the mayor (who still has a brick from the 1916 school) calls it "aesthetically pleasing, with a dignified look."

The brick alternates on the exterior with a deep-blue-gray aluminum composite material for trim and panels, all of which continue into the atrium—or, as it is deferentially called, the "armory." The armory isn't what one might expect: a food court occupies its east end, and a wide stair leads to a bridge that diagonally crosses the main space to the south-side mezzanine. There, a sunlit senior lounge and an enclosed media room are endowed with the stately proportions and art deco aura reminiscent of Radio City Music Hall's ancillary spaces. Heightening its cultural image and connection to the community is a museum below, next to the entrance, where an exhibition proclaims the contributions of illustrious alumni.

In terms of its educational goals, Dunbar has created four "academies." After the ninth grade (the first academy), students choose among three, whose curricula are education; business, law, and public policy; or pre-engineering. Those involved in pre-engineering "will find features in the building that correlate with their

credits

ARCHITECT: Perkins Eastman – Sean O'Donnell, principal in charge; Matthew Bell, design principal; William Griffin, senior project architect; David Shirey, project manager; Abbie Cronin, project architect

ASSOCIATE ARCHITECT: Moody Nolan – Patrick Williams, manager; Jon Guldenzopf, design architect

ENGINEERS: SK&A (structural); Setty & Associates (m/e/p/fp)

CLIENT: D.C. Department of General Services/D.C. Public Schools

SIZE: 280,000 square feet

COST: $128 million (total)

products **education**

INNOVATIVE FURNISHINGS AND FINISHES, AS WELL AS SIMPLE EXTERIOR ELEMENTS AND EQUIPMENT, ENLIVEN NEW AND EXISTING K-12 SCHOOLS. **BY SHEILA KIM**

Designers and educators join forces to create a new classroom furniture system

NEW CLASSROOMS At the William P. Gray School in Chicago, the first school to implement the Learning Module furniture system, the units feature a combination of open storage cubbies, cabinet doors, sliding whiteboards, and power/data poles, and partitions off the various learning zones.

PHOTOGRAPHY: © DARRIS LEE HARRIS

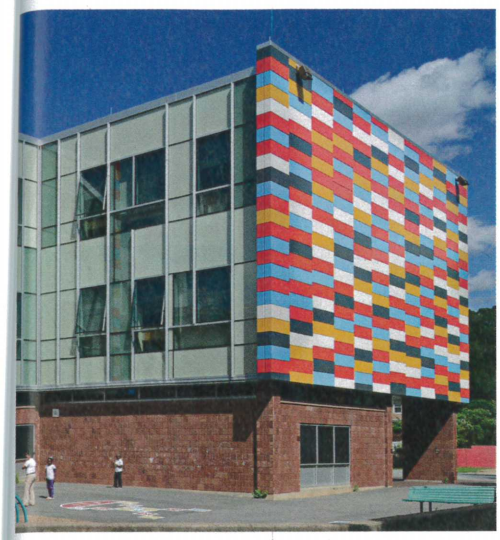
WHEN A progressive middle school program called Teach to One: Math launched in 2011, it challenged a group of architects and designers not only to rethink the learning environment, but to develop a furniture system capable of supporting its education model. Devised by the nonprofit organization New Classrooms, the program proposes more effective instruction through a range of experiences within a single room: interactive group activities, peer-to-peer learning, independent study on computers or through printed lessons, and traditional live teacher instruction. With guidance from the American Architectural Foundation (AAF) and funding from the Target retail corporation, the team produced a design guide with floor plans and suggested furnishings, including a new core multifunctional furniture piece—the Learning Module.

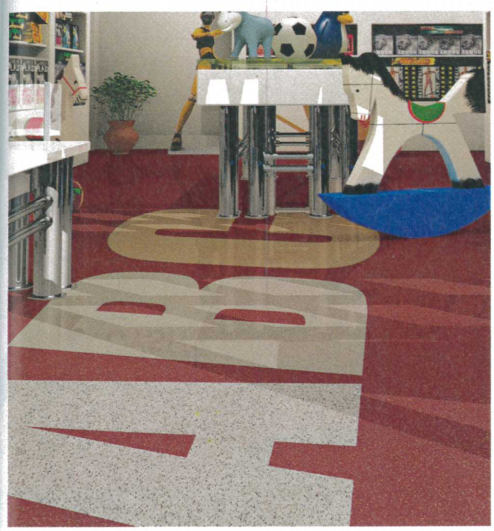
Now available in conjunction with the program, the Module is a made-to-order birch plywood shelving system that doubles as a space divider, and each can be specified with varied open-cubby and door configurations in different widths and heights. "The furniture shapes the spaces, helping students focus but still maintaining sight lines for teachers," says Caroline Otto, a senior associate of Anderson Architects. Otto collaborated on both space and furniture development, along with Scott Lauer, an independent architect formerly with the AAF, and Jonas Milder, principal of furniture design company Milder Office and himself a teacher.

The system was designed to be flexible and easy to install without compromising stability and durability. Mounted to the floor, the units have fixed and removable shelves to meet changing storage needs for printed or object-based lesson materials, or to create more openness or a lower partition. Because the Learning Module defines space, schools implementing the program can quickly readjust their Teach to One: Math centers during the summer before the school year begins again, without the cost and complication of renovating a space.

The integrated solutions of the system eliminate the need for extraneous fixtures: the Modules can support the monitors that direct students to their assigned areas; poles can be inserted to provide power and data access points for computer equipment; and tracks can be installed for sliding whiteboards and interactive boards. Otto sums up, "Existing furniture pieces could do one or two functions, but not the six, seven, or eight that our pieces are actually doing."

newclassrooms.org CIRCLE 213





Aluminum Wall Panel System

Dri-Design dri-design.com

Rainscreen systems can revitalize older school buildings while providing a sound, cost-effective envelope. In Boston, architecture firm Gale Associates replaced Mattahunt Elementary School's failing 40-year-old exterior while giving it a facelift using Dri-Design's aluminum-panel rainscreen system. The panels—specified here in six colors to add visual punch—are available in any Kynar color and also zinc, copper, or stainless steel, alternatively. CIRCLE 214

Grazie Seating Collection

KI ki.com

Designed by Giancarlo Piretti for Wisconsin furniture manufacturer KI, the Grazie seating collection is defined by a minimalist, ergonomic seat and back shells of injection-molded polypropylene. The backrest can flex up to 15°, while the seat is upholstered with a 1"-thick foam cushion. Grazie is offered as an armed or armless stacker with four legs or glides; tablet chair (shown) with four legs, glides, or casters; task chair with casters. CIRCLE 215

Natural Ventilation System

Big Ass Fans bigassfans.com

For the Oakland Unified School District's Downtown Educational Complex in California, new construction regulations prohibited installation of traditional HVAC systems (compressor-based refrigeration). Big Ass Fans worked with Taylor Engineering to develop a solution: thermal-mass walls absorb solar heat while central air-handling units bring in outdoor air to be circulated by large custom low-speed ceiling fans, maintaining comfort throughout the school. CIRCLE 216

Choices for Good Program for K–12

Mannington Commercial choicesforgood.com

Choices for Good is a pay-what-you-can program newly launched by Mannington Commercial to provide K–12 schools with high-performance flooring. Eligible schools can pay a greatly reduced price and choose from a selection of stocked carpet, resilient sheet (shown), vinyl-tile, and rubber-tile products. CIRCLE 218

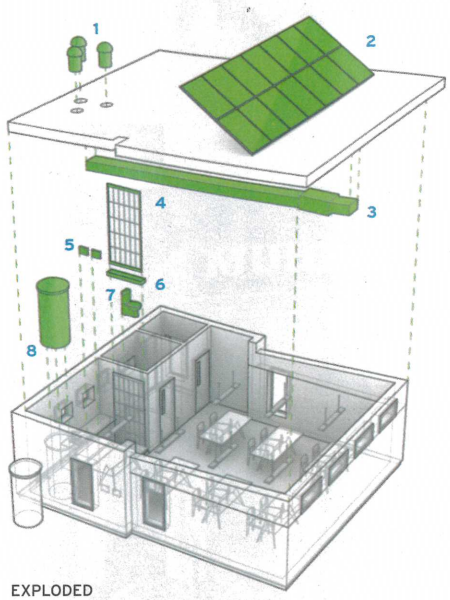
Lamberts Linit Channel Glass in Enamel Colors

Bendheim Wall Systems bendheimwall.com

Linit channel glass by Lamberts can be specified in a range of hundreds of Pantone-like enamel colors to create dynamic facades, storefronts, or interior walls. Because the enamel is fused under high temperature onto the back, interior side of the U-shaped glass during the tempering process, it offers advantages over paint such as resistance to peeling, scratching, and cracking. The enameled channels, available in lengths of up to 23', appear completely opaque from the outside—as demonstrated at the Eppendorf school (above) in Hamburg, Germany—but still filter light to the interior. Linit by Lamberts is exclusively distributed in the United States through Bendheim Wall Systems. CIRCLE 217

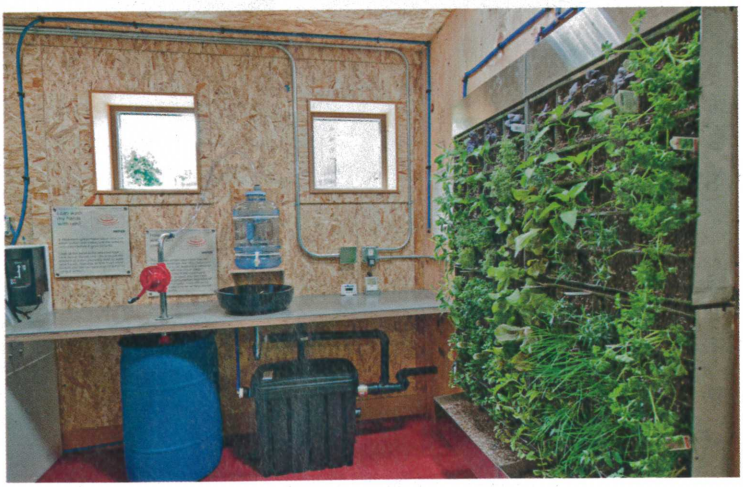
Modular Classroom Makeover

New designs for portable school buildings make improvements that are more than cosmetic. By Joann Gonchar, AIA



EXPLODED AXONOMETRIC DIAGRAM

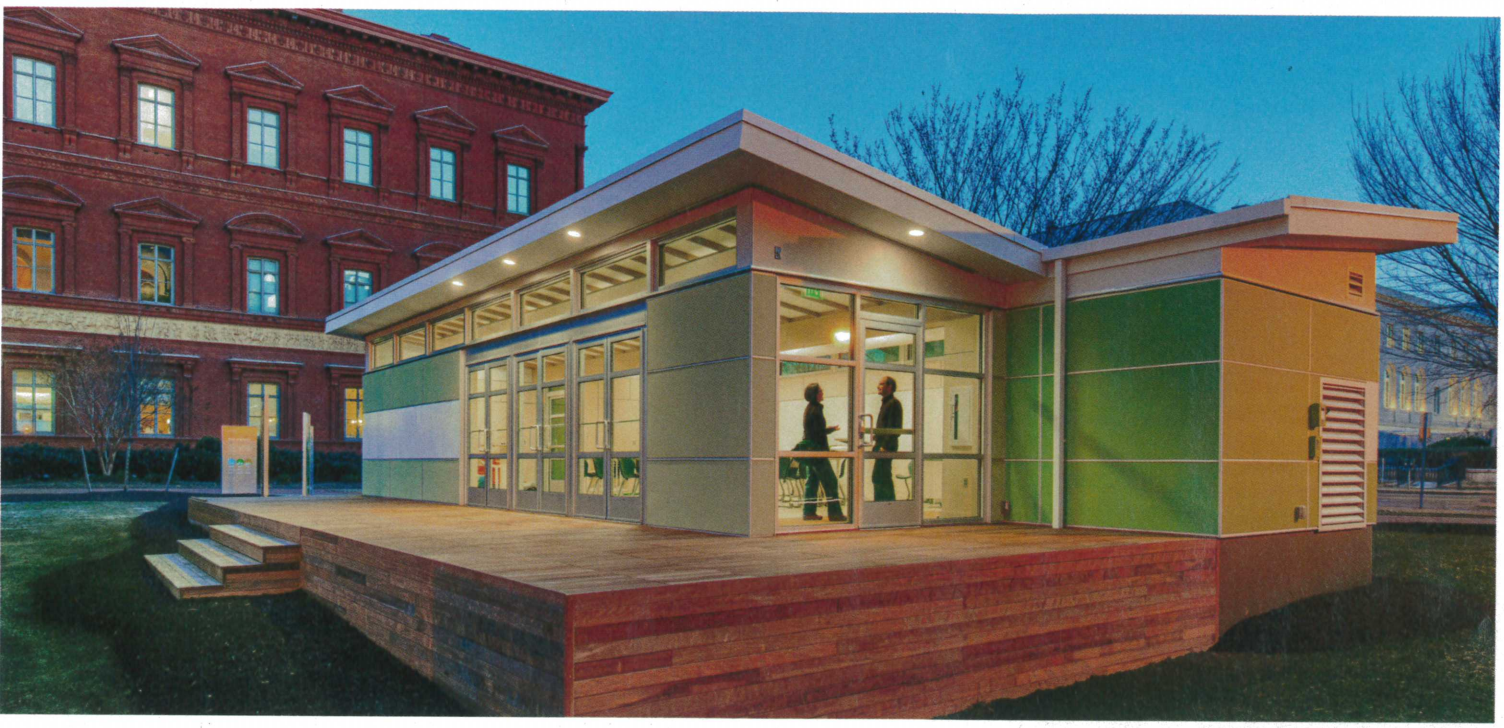
1 TUBULAR SKYLIGHTS
2 PHOTOVOLTAIC ARRAY
3 ENERGY-RECOVERY VENTILATOR
4 GREEN WALL
5 ENERGY AND WATER MONITORS
6 HAND-PUMP SINK
7 COMPOSTING TOILET
8 CISTERN



SEED CLASSROOM The unit developed by the SEED Collaborative is made of structural insulated panels exposed on the interior (top) and clad with fiber cement on the exterior (above left). In addition to the clearly visible structure, its teaching tools include a living wall fed by treated graywater (above).

THE MENTION of "portable" classrooms—or any similar term—puts fear into the hearts of parents with school-age children. Regardless of whether you call them portable, modular, or temporary classrooms, they conjure up unwelcome images of shoebox-like structures with few windows, stuffy air, and noisy but ineffective mechanical systems.

Although there isn't much current literature addressing the performance of portable classrooms, older research supports this dubious reputation. One study conducted in 2004 by the California Air Resources Board and the state's Department of Health Services found a much higher instance of environmental problems in the relocatable units as compared with permanently built school buildings. The inves-



tigation documented conditions such as inadequate ventilation, excessive noise, poor thermal comfort, low lighting levels, and high concentrations of formaldehyde.

Despite these shortcomings, many school systems can't do without portable units. According to the trade association the Modular Building Institute (MBI), across the U.S. about 260,000 classrooms are in "relocatable" buildings—buildings that are designed to be reused multiple times on different sites and are partially or completely constructed in a manufacturing facility. The National Center for Education Statistics estimates that a third of American schools have such classrooms.

These classrooms exist because they fulfill critical needs. Districts can respond to fluctuations in enrollment quickly and cost-effectively. Since almost all of the construction occurs off-site, portables ordered in the spring can easily be built and installed over summer break. And because they are generally less expensive than traditionally constructed schools, the units can often be paid for with funds from operations and maintenance budgets, allowing districts to avoid the lengthy and uncertain bond-approval process. "There are many good reasons portable schools exist," says Margarette Leite, a principal at the Portland, Oregon–based architecture firm Palleroni Leite Design Partnership (PLDP). Leite and fellow PLDP principal Sergio Palleroni have designed (along with others, including architecture and engineering students at Portland State University, where both teach) a higher-performing alternative to the typical modular school.

SPROUT SPACE Designed by Perkins+Will, a Sprout Space (above) was installed last spring on the grounds of the National Building Museum in Washington, D.C., as part of a Green Schools exhibition. The building has ample glazing and a butterfly roof that directs rainwater to storage cisterns. Marker boards replace drywall on the interior (right) and—allowing teachers to bring the classroom outside—some of the exterior cladding panels.

Palleroni and Leite's classroom, which they have dubbed SAGE for "Smart Academic Green Environment," features an efficient mechanical system that depends on an energy-recovery ventilator, materials with no or very low levels of volatile organic compounds (VOCs), and ample daylighting through clerestory windows. Following the debut of a prototype in late 2012 at the U.S. Green Building Council's Greenbuild conference in San Francisco, the first SAGE classroom will be installed later this winter at a Waldorf School in Corvallis, Oregon. But it is not the only option for schools looking for ways to expand quickly and sustainably. Several design firms, nonprofit organizations, and prefab building companies are also developing improved portable classrooms that already have begun to attract orders from both independent schools and public school districts.

For example, a new charter school in Chattahoochee Hills, Georgia, is planning an entire campus made out of Sprout Space units. Designed by Perkins+Will, the Sprout includes elements intended to promote student health and productivity such as architectural-grade storefront glazing, dimmable LED lighting controlled by daylight and occupancy sensors, and marker boards and tack surfaces as substitutes for typical finishes.

And Project Frog, a San Francisco–based developer of component building systems established in 2006, is in the midst of fulfilling its largest contract to date—more than 250,000 square feet of educational facilities on 15 different campuses in the South San Francisco Unified School District (SSFUSD). The buildings are designed to perform 40 percent better than Title 24, California's strict energy code, mandates.

SAGE CLASSROOM A SAGE classroom clad in mostly yellow fiber-cement board was erected in front of San Francisco's Moscone Center during the Greenbuild conference in late 2012 (left). The classroom features clerestory windows to enhance daylighting, exposed ductwork, and a clearly evident flitch beam supporting the roof.

Project Frog developed the panelized system it is deploying at SSFUSD in collaboration with HMC Architects—a firm that specializes in education facilities, among other building types. The system relies on load-bearing wall sections with electrical chases included, laminated wood beams, and an acoustical metal ceiling and roof deck that acts as a structural diaphragm. These elements are fabricated in a factory and flat-packed for transport to the site, where they are erected on top of an on-grade slab. "This component assembly approach is derived from the lean manufacturing techniques used by companies like Boeing and Toyota," says Ash Notaney, Project Frog executive vice president of product and innovation.

Arguably, the portable classroom with the most ambitious set of performance goals is the one developed by the Seattle-based nonprofit SEED Collaborative. The SEED (Sustainable Education Every Day) is designed to meet the criteria of the Living Building Challenge—a "beyond LEED" building certification program administered by the International Living Future Institute (ILFI). In order to earn Living Building designation, a project must satisfy 20 tough-to-achieve "imperatives." Among these is a requirement for net zero energy: the building must produce enough renewable energy on-site to meet or exceed demand on an annual basis. It must also comply with the Challenge's materials standards prohibiting the use of 14 potentially toxic substances on the certification program's Red List. Many, such as formaldehyde and PVC, are commonplace in building materials and prevalent in conventional portable classrooms.

A prototype SEED manufactured by Method Prefab—an off-site builder of homes and commercial structures—was displayed as part of an ILFI conference held in Seattle last April. The 32-by-28-foot classroom has a durable building envelope with a high R-value (a measure of thermal resistance or insulating value). It is made of structural insulated panels exposed on the interior and clad on the exterior with a fiber-cement rainscreen. Additional features include triple-glazed windows, a photovoltaic (PV) array, and a composting toilet.

The prototype has been purchased by the Perkins School, an 80-student independent elementary school for children in kindergarten through fifth grade, located in Northeast Seattle. Once the permitting process is complete and the unit installed, Perkins plans to use it as a science classroom. Part of what made the SEED so attractive was the learning opportunity afforded by its clearly evident structure, visible electrical conduits, and a digital dashboard. This will allow students to track the electricity generated by a 6-kilowatt

PHOTOGRAPHY: COURTESY PLDP

PV array, to be mounted on the roof of an adjacent building, as well as energy consumption. "The classroom inspires kids to look around them and think about intelligent design," says school head Barry Wright. These features also made fundraising relatively easy: the school was able to raise $130,000, about half of what is needed to buy and install the SEED, in less than three weeks, "because the concept is so intriguing," explains Wright.

The SEED classroom isn't the only green modular conceived as a three-dimensional teaching aid. For instance, teachers can point to the butterfly roof that tops Perkins+Will's Sprout and describe how it funnels rainwater for irrigation to two 50-gallon storage cisterns. Similarly, the expansion and contraction of a fabric duct suspended just below the Sprout's ceiling helps students understand how their classroom is heated, cooled, and ventilated.

The recent crop of higher-performing modular classrooms share more than a pedagogical philosophy—in fact, these new portable schoolrooms have more similarities than differences. With the exception of the Project Frog buildings, which are made up of a panelized kit-of-parts, a single classroom is generally formed from two long and narrow units whose dimensions respond to the limitations of what can be hauled by a semi-truck over bridges and roadways. The portable classrooms typically have simple shed roofs, or a variation on a shed roof, tweaked to maximize the opportunities for windows and daylighting. Structural elements are often left exposed—a strategy that not only allows teachers to explain what is holding the building up but also eliminates unnecessary materials. This approach helps keep costs in check and reduces the number of potential sources of VOCs. Those basic finishes that are included, such as linoleum flooring or carpet tile, are carefully vetted so that they do not negatively affect indoor air quality.

In addition, the green portables are designed for much longer lifespans than the typical relocatable units, which are intended for only 5 or 10 years of use—though in reality they often stay in place much longer. The SAGE, for instance, is a 50-year building, according to its designers. And although its superstructure is wood, its floor framing is steel—a feature that should make the unit easy to move multiple times, enhancing its longevity.

Although the developers of the green portables try hard to keep costs down, features like high-performance glazing, ultra-efficient mechanical systems, and extra insulation typically make them more expensive than standard-issue modular units. Leite estimates that in Portland, a SAGE unit would be about $160,000, excluding foundations and site work, while a standard modular classroom would cost about $125,000 in the same market. The cost of the SEED is comparable to site-built construction, according to Stacy Smedley, the SEED Collaborative's executive director. (At Perkins, the 900-square foot SEED will cost about $260,000 installed.) However, the classroom should pay for itself in operation and maintenance savings in only 11 years, she says.

Project Frog would not disclose the construction budget for the classrooms it is erecting in South San Francisco. However, the company maintains that the buildings' cost is equal to permanent modular construction (factory-built units installed on permanent foundations). But it still has the advantage of being high in quality and fast to complete. The on-site work for the district's almost 200 Project Frog buildings will extend over three summer breaks but total only 8 or 9 months, estimates James "Larry" Scott, the SSFUSD bond manager. Conventional new construction would have required a year and a half, he says.

Whether a schoolroom is delivered to the site as an almost-complete modular unit or in smaller prefabricated components, the architect's role is different from that of traditional brick-and-mortar construction. In the case of the Sprout Space unit, for example, Perkins+Will has licensed the design to a distributor, Triumph Modular. An interested school would enter into a contract directly with Triumph, who would in turn subcontract with a fabricator close to the site. For each unit sold, Perkins+Will will earn a royalty, explains

SOUTH SAN FRANCISCO UNIFIED SCHOOL DISTRICT The component building system developed by Project Frog and HMC Architects is being installed at South San Francisco schools as permanent modular construction on top of on-grade concrete slabs. The buildings have a stucco exterior finish applied on-site.

PHOTOGRAPHY: © JACOB ELLIOTT

Allen Post, Perkins+Will's Sprout Space team leader. But the architects may not have any subsequent involvement with the project—unless the client wants the standard unit customized, or desires the firm to design the site surrounding the classroom. In both cases, Perkins+Will would perform these services under a separate contract.

Although the architect's responsibilities may be different when modular construction is involved, the goal is the same, says Post. "We are trying to up the game and improve both temporary and permanent classrooms," he says. The objective is to make them "healthy, sustainable, and flexible."

Perkins+Will's Sprout Space, along with SEED, SAGE, and Project Frog, all have shared constraints and common design goals. Although the results can't be described as iconic architecture, this new generation of portables provides energy-efficient and daylight-filled environments that are conducive to learning. "The goal was never to make the sexiest modular classroom," says Leite of the SAGE unit. "It was to make an alternative to the everyday modular classroom." Phil Harrison, Perkins+Will CEO, echoes Leite's sentiment when he characterizes the aim of the Sprout Space: "If you want to make a difference, you have to make something that will be viable in the marketplace—something extremely pragmatic." ■

SOUTH SAN FRANCISCO UNIFIED SCHOOL DISTRICT The components making up the buildings in South San Francisco rely on factory-assembled load-bearing wall panels, laminated wood beams, and an acoustical metal ceiling that acts as a structural diaphragm. The elements are flat packed for shipment to the site.

1 ENTRY ALCOVE
2 CLERESTORY WINDOWS
3 LED LUMINAIRE
4 ACOUSTICAL/STRUCTURAL DECK
5 LAMINATED WOOD BEAM
6 OPERABLE WINDOW
7 AUTOMATED SHADE

SECTION- PERSPECTIVE

Continuing Education

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

Learning Objectives

1 Discuss the reasons portable classroom buildings have proliferated at schools across the country and describe some of the environmental shortcomings of typical portable classrooms.

2 Explain how designers are improving portable classrooms' indoor air quality, lighting, acoustics, thermal comfort, and energy efficiency.

3 Explain how a classroom delivered with a component building approach differs from that of one made of larger modules.

4 Describe some of the contractual roles architects play in projects involving modular construction.

AIA/CES Course #K1401A

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

PHOTOGRAPHY: © JACOB ELLIOTT

Photo courtesy of VS America, Inc.

For collaborative, project-based learning, Clarke County schools introduced opening glass walls, flip-top tables and stacking desks on casters, adaptable storage modules, moveable soft furnishings, and low partitions, among other innovations.

School Standards and Designs Advance

New techniques support Common Core, and more

Sponsored by AGC Glass Company North America, Bonded Logic, CENTRIA, ClimateMaster, ELP, Guardian Industries Corp., Miele Professional, The National Terrazzo & Mosaic Association, Inc., Nichiha USA, Inc., *Slip*NOT® Metal Safety Flooring, Space Plus, VS America, Inc., and Wenger Corporation | *By C.C. Sullivan*

The controversial rollout of the Common Core State Standards for public K-12 schools in 45 states has elevated the discussion of what tomorrow's schools will look like and how they will work. In recent months, critics have complained that the national standards for English language arts and mathematics could restrict teaching options and place undue pressure on students by demanding too much new testing. Yet the new curricula and teaching approaches are seen as instilling critical thinking skills in young students by using classroom setups and technology that prepare them better for college and employment.

Architects and their clients have seized upon the Common Core standards to consider new ways to build creative, effective learning environments. These will propagate, too: According to the National Governors Association and the Council of Chief State School Officers, the Common Core State Standards (CCSS) facilitate sharing between states on new policies and teaching tools, including:

- New textbooks and digital media aligned to the standards.
- Comprehensive annual assessment systems to measure student performance.
- Changes needed to support educators and schools in teaching to the CCSS.

That third, vague mandate for "changes" is where new facility designs enter the picture. According to the Association of American Educators (AAE), "In recognizing their unique design, there are certain changes that should be happening in the classroom as a result of Common Core."[1] (See sidebar "Building for the Common Core" on page 158.) The new schools and reconfigured learning environments are language-rich, highly engaging, and collaborative, encouraging deeper use of technology and, ultimately, understanding beyond memorization.

CONTINUING EDUCATION

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Learning Objectives

After reading this article, you should be able to:

1. Discuss the implications of new state educational standards including Common Core on today's school environments.
2. Describe how the increased use of technology and collaborative learning environments affects school building interiors designs, layouts, and specifications.
3. Identify sustainable and resilient design techniques that provide life-cycle benefits for school renovation and new construction projects, such as enhanced durability.
4. Explain how such design variables as daylight, lighting, and color can contribute to both improved energy efficiency and better student performance.

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

AIA/CES COURSE #K1401F

DING CREATIVE, EFFECTIVE RNING ENVIRONMENTS

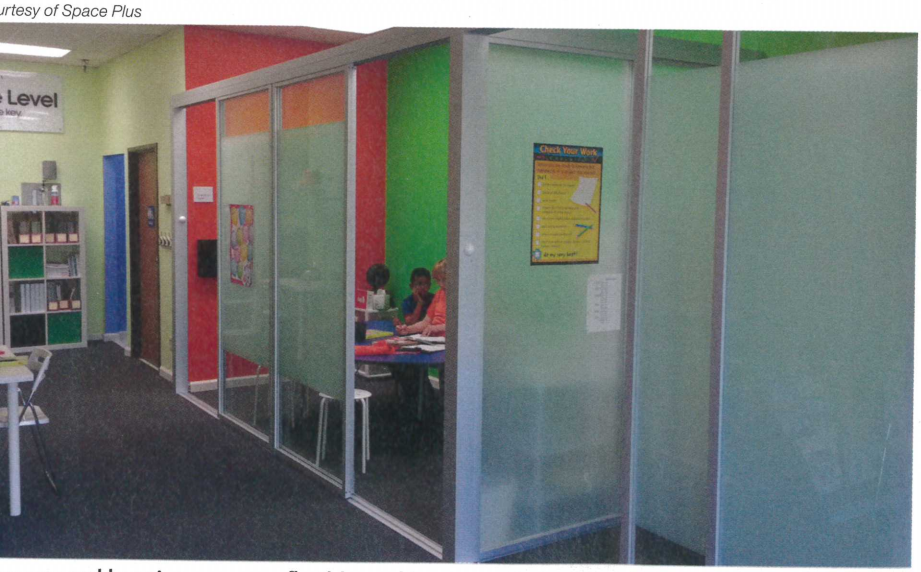
are several overarching needs for today's schools that are seen as essential for orting student and teacher needs as well as nstructional methods.

bility

ol spaces and learning are more flexible ," says Sheryl Hai-Ami, president of Plus, which makes operable interior partitions for schools and other end These include converting classrooms ne fly" from traditional lecture setups up learning, as well as moveable walls ex-spaces to increase or decrease room allow for multiple uses. "Also, teachers dministrators are moving from isolated ons into more flexible teams, with more or common areas and open environments nultiple configurations," says Hai-Ami. is thinking about adaptability and figurability has seeped into the design of lding systems—even heating, ventilation r-conditioning (HVAC)—that better school use patterns, says Tony Landers, a nical engineer and director of marketing mateMaster, which makes water-source umps. "Increasingly, geothermal and ng-based heat pumps are being used to operating costs, because the systems can energy or heat from one building area or hat's not occupied to another where the needed," says Landers. "Some systems can ee up space on the grounds or rooftops, ewer units may be needed."

e result is a more efficient school building so flexes according to the curricular needs mmon Core standards and other new ional trends.

urtesy of Space Plus



spaces and learning are more flexible, making operable interior glass partitions a helpful ch for converting classrooms "on the fly" from traditional lecture setups to group learning, as moveable walls and flex-spaces to increase or decrease room size or allow for multiple uses.

Photo courtesy of ClimateMaster

Geothermal and building-based heat pumps are used in schools like Gloria Marshall Elementary School in Texas to move energy or heat from unoccupied building areas to zones where heat is needed.

Technology

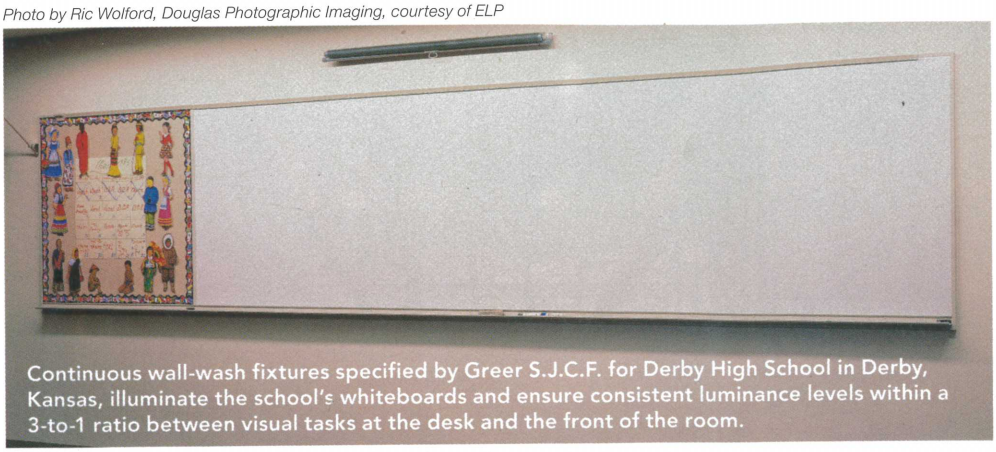
The use of technology also affects school planning, floor layouts, and even furniture designs, says Carmen Klaus, business development manager with school furniture and ergonomics company VS America, Inc. "Being untethered is vital to the classroom of the future, and technology is changing so fast that some desks and tables that incorporate technology directly may be outdated in a few years," she explains. "We've also seen a number of media-geared furnishings with integral displays and cords for attaching tablets and laptops directly, but these permanently tether the students, limit the number of participants to the number of connections, and some have become so heavy they can't easily be moved. That's why we're introducing completely new and untethered concepts."

According to AAE, Common Core schools demand more integration of technology and learning, as students are required to communicate and collaborate with others using Twitter, blogs, web services like Google docs, and new hardware such as smartphones, tablet computers, and Internet-based laptops such as Chromebooks.

With this in mind, the future of U.S. education will include more wireless setups and furnishings that can be moved from room to room, including classrooms with video screens, online education, and distance learning, says Lee Hedberg, director of engineering for Engineered Lighting Products (ELP), a commercial lighting specialist. "These projectors and new multimedia tools help with the transmission and receiving of information, but they make lighting in the classroom a real challenge," he says. "Architects are assessing the various functions of learning spaces and how to adjust lighting for the use of smart whiteboards, for example, when they are both in use and powered down."

These variables—along with new teaching modalities—add complexity in designing not only lighting systems but also classrooms that have never been seen before. Other specialized design needs include renovating and retrofitting school areas for arts, music, and other non-technology uses. "Proper acoustics for music rehearsal spaces is increasingly a

Photo by Ric Wolford, Douglas Photographic Imaging, courtesy of ELP



Continuous wall-wash fixtures specified by Greer S.J.C.F. for Derby High School in Derby, Kansas, illuminate the school's whiteboards and ensure consistent luminance levels within a 3-to-1 ratio between visual tasks at the desk and the front of the room.

challenge for schools now that the rooms are being used for various groups, not just band, orchestra, and choral uses," says Ron Freiheit, director of design engineering for Wenger Corporation in Owatonna, Minnesota. "There are new products that allow these spaces to be more flexible, including wall panels that convert from absorbers to diffusers, as needed, and digital sound systems."

Photo courtesy of Wenger Corporation

"Virtual acoustic environment" systems allow schools to customize the acoustics of their music rehearsal spaces by adjusting the panels as needed to act as diffusers or absorbers.

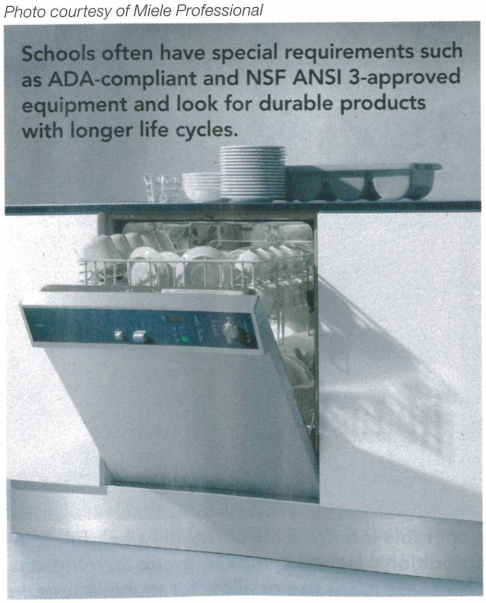
Durability

Underlying the new teaching tools and facilities is a built infrastructure that addresses basic issues of durability, life cycle, and resilience. For example, a multipurpose room that supports frequent reconfigurations and heavy traffic may require wainscoting, rail guards, and corner guards, as well as a long-lasting floor material such as terrazzo.

"When bond issues are passed, school districts are very closely evaluating the long-term use of the facility," says Richard Bruns, executive director of The National Terrazzo & Mosaic Association, Inc. (NTMA), a trade group based in Fredericksburg, Texas. "A lot of folks demand a greater life expectancy of the facility itself, and choices such as terrazzo floors are good for 30 years with minimal maintenance." Other durable products are also gaining traction, say architects.

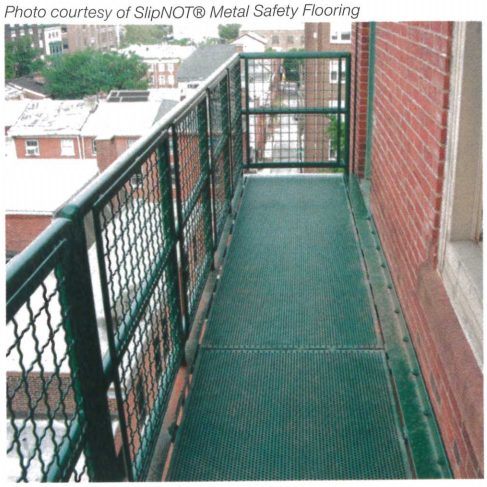
In fact, a renewed focus on durability is one of the surprises of the latest wave of school design, says Deborah Ruriani, manager of projects and construction business with Miele Professional, which manufactures commercial laundry and dishwasher systems as well as laboratory glassware washers for school laboratories, gymnasiums, cafeterias, and other uses. "Architects and school districts are working to identify the sustainability features, end-user advantages, and life-cycle cost benefits of using premium fixtures and systems," says Ruriani. "The increased focus on science, technology, engineering, and mathematics or STEM programs has helped curtail the long-held practice of choosing cheap, sometimes substandard machines simply because they are the least-cost option."

Photo courtesy of Miele Professional



Schools often have special requirements such as ADA-compliant and NSF ANSI 3-approved equipment and look for durable products with longer life cycles.

Photo courtesy of SlipNOT® Metal Safety Flooring



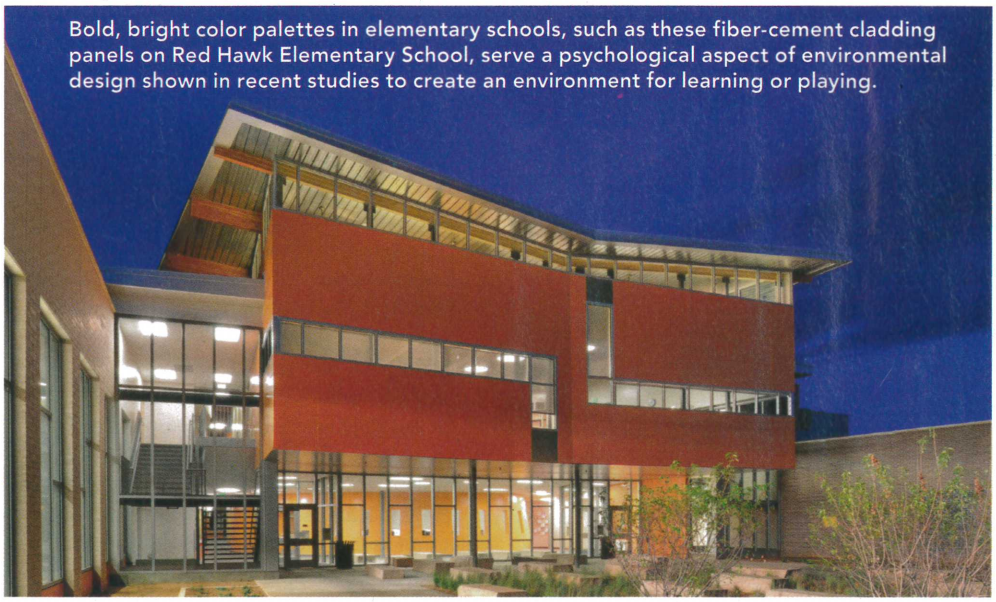
Architects specify slip-resistant metal floor components to eliminate hazards while still complying with ADA or OSHA requirements.

The same is true in the design of frequently used areas such as entryways or places where safety over time is a prime specification criterion, according to Jeff Baker, assistant general manager of *Slip*NOT® Metal Safety Flooring, which makes slip-resistant floor components such as plates, grating, stair treads, plank, and ladder rungs. "Schools are trying to eliminate slip-and-fall hazards while still maintaining compliance with the Americans with Disabilities Act," or ADA, Baker explains. "Using abrasive metal surfaces, schools have long-lasting, low-maintenance pedestrian areas that meet regulatory standards for the minimum required coefficient of friction."

Inspiration

Another aspect of newer school designs—whether they are designed for Common Core standards or other pedagogical needs—is the interest in introducing more color, daylight, plantings, and other ways to stimulate visual interest and provide *positive distraction*. According to the Clinical Solutions & Research team of the architecture firm HKS, a positive distraction is any environmental feature that both "holds attention without stressing the occupant" and "elicits positive feelings." The main goal? Stimulating, engaging, and inspiring students to work more productively and creatively.

Photo courtesy of Nichiha USA, Inc.



Bold, bright color palettes in elementary schools, such as these fiber-cement cladding panels on Red Hawk Elementary School, serve a psychological aspect of environmental design shown in recent studies to create an environment for learning or playing.

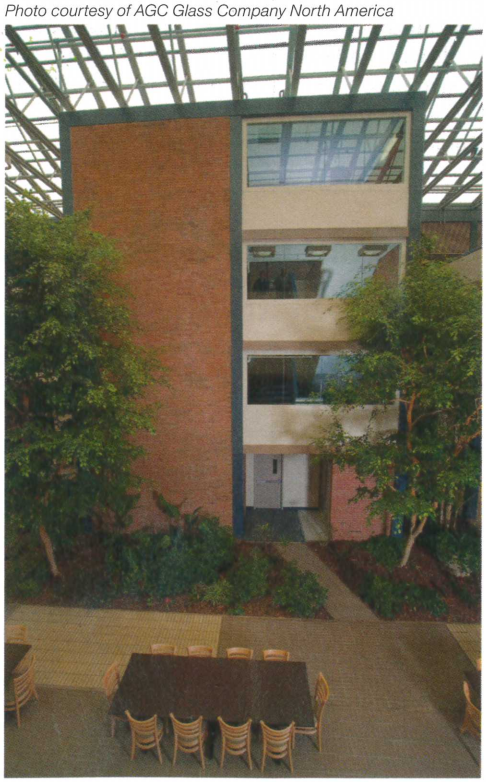
"The adaptation of bold, bright color palettes, especially for elementary schools, seems almost a requirement for school architecture now, based on interest we see from designers," says Michael Cobb, a construction industry veteran and vice president of sales and marketing for Nichiha USA, Inc., which manufactures fiber-cement cladding. "There is increased interest in custom colors that serve the psychological aspect of environmental design, and recent studies show how various hues create an environment for learning or playing, and how they can be used to further that intention." In a related trend, Cobb adds, some K-12 facilities are built with product finishes that match their school colors.

Like color, daylight and views to the outdoors are seen as conducive to better student performance. In addition to the classic 1999 Heschong-Mahone study that linked natural light with improved test scores, a 2003 study for the California Energy Commission[2] concluded that "student performance was higher in classrooms with a better, primarily larger, view to outdoors," according to Lawrence Berkeley National Laboratory's Indoor Environment Group.

Though not universally considered conclusive, these findings are leading to more architectural transparency and such solutions as increased use of fire-rated glazing in place of what have traditionally been opaque fire-rated separations. Not only do these glass walls invite more daylight into learning areas, they also improve visibility and safety, says Ken James, past president of the GANA fire-rated glazing council and sales and product manager for AGC Glass Company North America. "Glass wall products in entrance and egress areas, and their growing application to stairwells that traditionally are cinderblock walls, allow teachers and administrators increased visibility in stairwells and vestibules for the purpose of monitoring student activity," says James. "This results in a safer environment for the students and staff members."

James says that to design such applications, architects should carefully understand the differences between fire-resistive and fire-protective glass products and assemblies, including glazing and spacer requirements for insulated glass units (IGUs) and monolithic glazing. Fire-protective glazing is designed to contain fire, flames, and smoke to compartmentalize the building and keep the fire from spreading; fire-resistive glazing is also able to resist the transfer of heat through it. In the standard fire test, an assembly subject to 1,200°F fire for 10 minutes must allow a heat increase to the other side of the assembly of no more than 250°F above ambient temperature.

Photo courtesy of AGC Glass Company North America



Fire-resistive glass vision systems are being utilized effectively to block flames, smoke, and radiant heat for up to 2 hours, in lieu of traditional opaque walls or glass block.

Collaboration

Last, the Common Core standards also require the use of multiple learning methods and teaching modalities, not just the "sit and get" layouts associated with traditional lecture delivery. In particular, the Common Core favors collaborative learning techniques and student teamwork in addition to one-to-one and one-to-all instruction. "The key is to have both a collaborative product—to grade them on collaboration—and an individual product that holds students accountable to the other Common Core Standard," according to Andrew Miller, an educational consultant.[3] "Just remember you must teach your students how to collaborate before you can assess how well they do collaborate. This is good practice."

In practice, the need for collaborative learning implies either schools with shared spaces that allow for team-based work or learning environments with convertible furnishings, partitions, and openings. (They could also have a mix of the two.)

FLEXIBLE AND UNTETHERED

The idea of introducing "flexibility and untethered technology throughout a K-12 school facility" is one way to provide a collaborative learning platform, says VS America's Klaus, pointing to the "amazing work of project teams" like those at the Clarke County School District in Athens, Georgia, led by David A. Stubbs II, director of facilities planning and construction.

In a recent presentation to the Council of Educational Facility Planners International (CEFPI)[4], Stubbs described the overarching aim of the district's project—to give students and teachers the tools they need as a palette and blank canvas, so they can be used as needed. The three main goals include:

- "Integrating untethered technology into a learning environment [to] allow increased flexibility in a learning space," including the use of technology-enabled active learning, or TEAL, which is more common in higher-education settings.
- Using "elegant simplicity" to provide "multifunctional designs in a classroom to enhance the usefulness of a learning space."
- Employing more "baseline effective designs [that] respond and adapt to multiple learning and teaching styles."

Photo courtesy of Space Plus

Opening glass walls and retractable partitions help make educational spaces flexible and integral to the school's instructional vision, as applied to this school in Seattle.

The schools were interested in supporting both collaborative project-based learning as well as *problem-based learning*, which "simultaneously develops both problem-solving strategies and disciplinary knowledge bases and skills...by placing students in the active role of problem-solver confronted with an ill-structured problem that mirrors real-world problems," according to the researchers Finkle and Torp.[5] Some of the changes included using a *flipped classroom*, defined as putting the onus on the student to learn concepts first, such as through homework, and then to hone their knowledge in the classroom—the opposite of a traditional model.

For the Clarke County schools, the new designs introduced opening glass walls, flip-top tables and stacking desks on casters, adaptable storage modules, moveable soft furnishings, and low partitions, among other innovations. "The shapes all pair together, and 140 classrooms in this district, and there's no two that are the same," says Stubbs. Curves, colors, and figurative motifs were applied to formerly bland surfaces, with new nooks for study alone or collaborative work. Varied lighting schemes mix pendants, recessed fixtures, and focal points. Essential to the new learning spaces were the new desks, chairs, and TEAL furnishings: "When I hear the word adaptable, words like interchangeable and reconfigurable come to mind. Furniture must easily nest and pair into a multitude of configurations," says Stubbs. "And it's working: We are seeing 100 percent engagement of students because we allow them the opportunities to decide how they want to learn."

Opening glass walls and retractable partitions were also essential to making the spaces highly flexible and integral to the school's instructional vision—an approach that is seen more frequently in a range of educational spaces.

Common needs include separating a flexible classroom from a collaborative discussion space so that students can brainstorm ideas together, and the ability to hide displays and whiteboards when they are not in use. Examples are everywhere, says Hai-Ami of Space Plus, such as the recent renovation at California State University, Long Beach, where new frosted-glass partitions with whiteboards were added for visual privacy while also enhancing student collaboration. For another educational renovation in Galveston, Texas, sliding glass walls were added by the architect PGAL in Houston, to cover a whiteboard that could carry confidential messages or the answers to a pop quiz.

The idea of introducing "flexibility and untethered technology throughout a K-12 school facility" is one way to provide a collaborative learning platform.

Less common but growing in appeal are specialized techniques for increasing the adaptability of art, music, and special-purpose rooms to allow for an expanded curriculum or broader use. At Wayzata High School in Plymouth, Minnesota, for example, the music program required a better rehearsal facility so that the band, orchestra, and other music groups would have proper acoustics and a way to simulate the specific acoustics of various performance settings. Mark Gitch, the school's director of orchestras, considered the retrofit of a digital acoustical rehearsal system including a central processor and wall- and ceiling-mounted speakers.

After upgrading the music rehearsal space, Gitch can now simulate the Wayzata High School auditorium and nine other preset acoustical settings that replicate performance venues. "We had a good rehearsal space, even before the rehearsal system was installed," Gitch says. "Now when we're physically rehearsing in our orchestra room, we can feel like we're really rehearsing on our stage or we can choose an acoustically drier environment if we like. The system gives us many options."

TRADEOFFS BENEFIT ENERGY USE

Clearly, the idea of a more flexible and adaptable K-12 environment is supported by a variety of products and technologies, from the architectural to the ergonomic to the digital. Yet cost and maintenance are as critical to product selection as innovation is. Schools are often compelled to procure the least-cost solutions rather than those that are best able to support the Common Core standards or other education initiatives. In addition, multiple regulatory regimes require school districts to adhere to such mandates as building codes, energy standards, ADA accommodations, union rules, and OSHA safety statutes.

"School lighting is subject to state energy codes such as Title 24 in California and in other jurisdictions by the International Energy Conservation Code and the ASHRAE/IESNA standard 90.1, which limit watt per square foot, also known as lighting power densities or LPDs," says ELP's Hedberg. While the energy codes provide reasonable limits on lighting energy used, they also challenge the design team to employ daylight and dimming controls as well as zone-based lighting with occupancy sensors, and a large variety of fixtures for special needs. "Yet you have to make the system very simple for easy operations at a K-12 school," adds Hedberg.

At the Derby High School in Derby, Kansas, the specifier Greer Stafford / S.J.C.F. dealt with a challenging condition for marker boards in classrooms where eyestrain and whiteboard reflective glare are often issues. The firm used linear wall-wash fixtures mounted end to end to ensure consistent luminance levels within a 3-to-1 ratio from one visual task to another, such as looking from notes on a desk surface up to the board at the front of the class. In another case, the LEED Silver-certified Oakton Library in Fairfax

Photo courtesy of ClimateMaster

For the LEED Gold Gloria Marshall Elementary School, architects at SHW Group incorporated an on-site wind turbine and 10 kilowatts of roof-mounted photovoltaic cells in addition to a geothermal heating and cooling system.

County, Virginia, uses high levels of natural light and uplighting from wall-mounted overhead fixtures to reflect light into the library aisles.

According to Fairfax County officials, the Oakton facility cuts energy bills by 26 percent as "compared to a traditionally built library branch … producing a savings of about $10,000 per year." The savings come from maximizing natural light through seven oversized windows and a raised clerestory, but also by using sensors to automatically dim the lights to the greatest degree possible.[6]

Energy savings—and the associated budgetary benefits—are also driving the use of geothermal energy and other low-cost and renewable energy sources, according to ClimateMaster's Landers. As a recent example, he points to the Spring Independent School District (ISD) in Texas, which achieved LEED Gold at Gloria Marshall Elementary School, a new facility completed last year. Architects at SHW Group and Spring ISD administrators conceived the two-story, 105,000-square-foot building with an on-site wind turbine and 10 kilowatts of roof-mounted photovoltaic cells. Passive solar features and a reflective white roof also reduce cooling loads.

A 275-ton geothermal-based HVAC system was also included to boost the renewable energy profile and energy-efficient design, estimated at about 25 percent better than that specified by code. A network of 180 vertical wells, bored about 300 feet underground, provide geothermal heating and cooling—a first in the Houston area, according to Mark Seibert, principal at CMTA Consulting Engineers. It is also one of many built elements integral to the school's successful pedagogical approach called *discovery learning*, says Kathy Morrison, principal of Gloria Marshall, a technique of inquiry-based instruction that originated in the 1960s and allows students to use problem-solving and experimentation to "discover" answers.

"Everywhere you look there are teaching tools incorporated into the campus. In fact, the building itself is a teaching tool," Morrison says. "Using discovery learning, our students are involved in engaging projects that incorporate core subjects and have been designed with the learner in mind."

MORE DURABLE AND RESILIENT

Other changes to architectural design are focused on the challenges of reducing maintenance and improving serviceability while also shoring up the facilities against frequent reconfigurations of interior spaces, long-term abuse challenges, and even severe weather events.

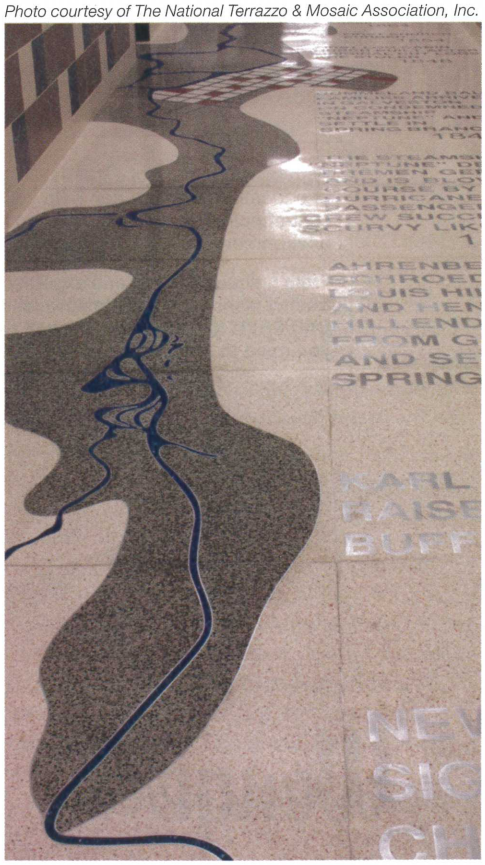
Many of these perennial issues are seeing subtle changes with the advent of new teaching techniques, according to NTMA's Bruns, such as the increased benefit of terrazzo in areas where classroom furnishings, moveable walls, and sliding doors can scuff and scratch softer floor materials. "In terms of ongoing maintenance and labor costs, terrazzo is among the easiest to maintain," says Bruns. "And when there is a need to renovate or retrofit, if there is existing terrazzo the schools only need to refinish and reseal the existing terrazzo to bring up the luster and gloss. In some cases, the architect will specify pouring additional terrazzo where walls have been moved, adding new colors or accent features to fill in the floor."

In many school districts, however, damage from recent storms such as Hurricane Sandy in the northeast and Katrina in the Gulf region have led to more careful specifications to limit losses due to flooding, high winds, and projectiles. At the Central Intermediate School in Ottawa, Illinois, for example, rains related to Hurricane Ike filled the Illinois River to overflowing in 2008, causing flooding inside the one-story, 90,000-square-foot structure. Boilers, insulation, wiring, furniture, and doors—many still intact and original to the 1947 building—were destroyed by the deep inundation. Original asbestos tiles were also detached from the floors, but the original terrazzo floors in the corridors were unaffected even though they were underwater for an extended period. Educators and architects took note: In some cases, the life-cycle benefits outweigh an initial cost premium.

"Often the schools affected by storms and flooding are not adequately prepared or budgeted to make repairs," says Andrew Franz, AIA, principal of New York City-based Andrew Franz Architect. "Working with Architecture for Humanity, we recently met with the principal and staff of PS 329-Surfside in New York and local families on a community design charrette. The goals was to design new sports and active learning spaces that not only meet their vision but also that are resilient enough to withstand water damage and minimize repairs."

A related example is the use of inherently slip-resistant materials in places where they have not traditionally been required or instead of applied protective coverings, such as doormats. The benefits run the gamut from lower accident rates and reduced liability to fewer absences and insurance claims for students, staff, and teachers.

Photo courtesy of The National Terrazzo & Mosaic Association, Inc.



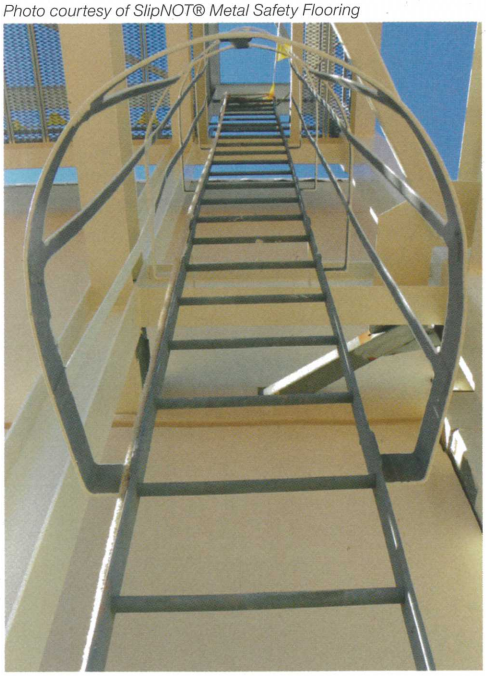
At Houston's Spring Branch Elementary School, a terrazzo floor shows a timeline along the Buffalo Bayou for the movement of settlers.

According to the Bureau of Labor Statistics, injuries from slips, trips and falls number about 226,000 incidents across the country.

At Valley View Elementary in York, Pennsylvania, for example, recently made strategic upgrades to the school were designed to improve safety. As seen in the 290-student school's strategic plan, attention to the needs of the most at-risk students is a core tenet of its culture supportive of learning, as is the development of *differentiated instruction* methods for its new mathematics program. To keep staff and teachers safe, the renovation completed in 2011 included non-slip aluminum ladder rungs for mezzanine access in the school's kitchen and mechanical room. Both areas quickly become slippery due to dust, grease, and other substances, even when maintained carefully. Valley View Elementary selected a product designed to maximize traction in these slippery conditions.

The simple fix specified 24 custom aluminum tube sections coated in Grade 2 aluminum slip-resistant surface to match the ladder design. The aluminum alloy will not have the rust and corrosion concerns associated with steel alloys while the patented, hardened coating provides a coefficient of friction of at least 0.85, where greater than 0.6 is considered safe and less than 0.4 presents a dangerous condition. According to OSHA, fixed metal ladders should be "corrugated, knurled, dimpled, coated with skid-resistant material, or otherwise treated to minimize slipping." OSHA also recommends a static coefficient of friction of at least 0.5 for walking surfaces, though the ADA Access Board has recommended a higher coefficient of friction of 0.6 for accessible routes and 0.8 for ramps. With this in mind, metal safety flooring is used increasingly in such educational settings as parking garages, performing art centers, pedestrian walkways, and at building entrances.

Photo courtesy of SlipNOT® Metal Safety Flooring



For schools like Valley View Elementary in York, Pennsylvania, some renovations include nonslip aluminum ladder rungs, especially in areas that may become slippery, even when maintained carefully.

Photo courtesy of The Adams Group

In this new renovation and addition designed by The Adams Group for the Garinger High School, new laboratory glassware washers were specified and installed.

LONG-LASTING PURCHASES

Treated metals using the anti-slip, primarily martensitic steel surface coverings or other random-hatch matrix substrates are also very durable and tend to last a long time with little maintenance. This quality is also being emulated in other procurement choices by school districts in recent years, as localities passing new school construction bond issues or capital project referenda seek to maximize their value, say observers like NTMA's Bruns and Miele Professional's Ruriani.

"Once the construction budget is depleted, schools rarely get enough money to repurchase products, and it is much too hard to get financing," Ruriani explains. "Architects and project teams today are reviewing equipment specifications to identify their life-cycle benefits and return on investment or ROI over the long term—not just the price tag to purchase." This is true of dishwashers used for special education rooms and science laboratory glassware washers: the appliances must be safe, easy-to-use, and automated whether to clean beakers and test tubes or simply lunch dishes.

With an increased focus on STEM programs at many schools, the investment in long-lasting lab equipment with a 10- to 20-year lifespan (about 15,000 operating hours) is seen as the baseline. Related benefits, such as water and energy savings, recyclability, and long-term cost advantages, help make the case for ROI.

This was true at the recent renovation of the 1957 Garinger High School in Charlotte, North Carolina, a modernist building originally designed by architect A.G. Odell, Jr., to fulfill city school superintendent Elmer Garinger's belief that nontraditional architecture could "stimulate student learning." The updates by Adams Group Architects added a new student lobby and administration building as the firm reworked the school's media center and refurbished the auditorium "to foster the predominant features of the existing campus while adding new functional and visual qualities." New lab glassware washers and other equipment types were also installed.

UNEQUIVOCALLY FUN AND FUNCTIONAL

As Garinger anticipated with the design of the original high school campus—a historic landmark with its courtyard design showcased in *National Geographic* in 1962—Adams Group could use a variety of techniques not simply to make the school more functional but to enliven and enhance the student experience to spark deeper learning. "Each classroom group or pod is multidisciplinary, like a school within a school, almost a standalone high school, and we've continued that today because it is still a current theme today," says Graham Adams, AIA. The firm added engaging shapes like new multicolored precast concrete panels in a weave pattern as well as a new, deep blue entrance floor echoing the original precast patterns, and a bright yellow feature wall punched with rectangular windows.

These colorful planes and patterned surfaces are inviting and stimulating, says Nichiha's Cobb, pointing to new studies on how colors create an environment for learning, creating, working, and playing. According to Pam Maynard, AIA, CID of HMC Architects, a

seminal study by Richard Koller in 1976 used electrocardiogram (EKG) readings showing that human heart rates are slower in more colorful rooms, and faster in gray rooms. "A dull environment leads us to turn to our inner self, showing symptoms of restlessness, irritation, and difficulty in concentration," says Maynard, while "a white or neutral environment does not provide a neutral effect on the user."

That's why the new Goodwin College Early Childhood Magnet School and others are using color as an organizing tool and step toward self-direction. Visual themes in the interior finishes and architecturally integrated artwork, a specialty of the project's architect, Svigals + Partners, include floor tiles in earth tones of blue, green, orange, and yellow that lead children in the direction of corresponding color-coded pods. The strategy that instills a sense of continuity and independence in young children by helping them avoid becoming lost. Likewise, rectangular plaques with one of four leaf patterns adorn the walls, providing another visual cue for orientation, as each leaf tree species corresponds to one of the four pods.

An example of the more audacious effects of color can be found in the high-performance addition to St. Francis High School in Wheaton, Illinois, designed by Serena Sturm Architects of Chicago and the architect-academic Keelan Kaiser, AIA. The new science and learning center consumes about one-third of the energy of a typical high school, with its "well-insulated building envelope, passive design, and high-performance mechanical systems" now tracking a rarity for high schools: LEED Platinum, according to Kaiser.[7]

Yet students won't immediately notice the sustainable qualities of the building. Instead, they will see the wide bands and scattered panels of bright orange, as well as a rounded projection, finished almost entirely in orange and punched with horizontal slit windows. Most of the new facility's exterior is clad in vibrant fiber-cement panels with a concealed fastener system and a backdrained, ventilated rainscreen. Further animating the composition are shading canopies and cantilevers to block the sun. Yet a walk through the new science center proves that ample daylight enters the spaces, such as the physics lab with its wide skylights.

As at the Wheaton prep school, other K-12 projects around the country are taking care to increase the amount of available daylight indoors. An important strategy is to open up interior walls with fire-rated glazing and framing products, which now allow increased freedom for architects, such as the construction of 60-minute-rated, butt-glazed glass separations. This type of assembly has been used at a number of schools including at the stairwell landings at the Houston Independent School District's new administration building and the mezzanine of the Lorry I. Lokey Graduate School of Business at Mills College in Oakland, California.

"Depending on the local codes, when the glass area is 25 percent or greater of the fire-rated separation, it is no longer considered an opening," says AGC Glass' James. "At that point it becomes a 'wall application' that has to perform like a fire-rated wall and hold back smoke, flames, and heat." These specialized assemblies include glass with intumescent interlayers that dissipate or block the heat: When temperatures reach a certain level, the clear glass product becomes opaque to help block heat and flames. Fire officials also contend that by turning the glass walls opaque, it also helps reduce panic during fire emergencies.

See endnotes in the online version of this article.

Continues at ce.architecturalrecord.com

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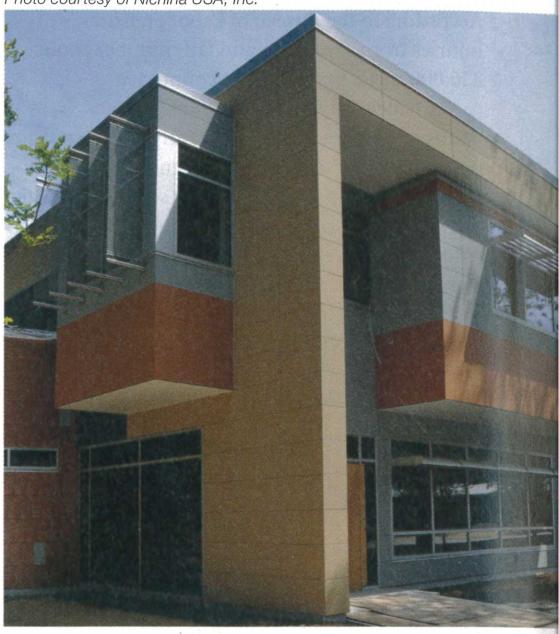
Photo courtesy of Nichiha USA, Inc.



Bold colors were used on a new facility for St. Francis High School in Wheaton, Illinois, designed by Serena Sturm Architects of Chicago and the architect-academic Keelan Kaiser, AIA, using cement-fiber panels in a high-performance envelope.

BUILDING FOR THE COMMON CORE

An analysis of the Common Core State Standards (CCSS) by the Association of American Educators (AAE) concluded recently that, "changes needed to support educators and schools in teaching to the CCSS" should be undertaken in school facilities around the country.

Recognizing the unique teaching approaches and student experiences involved in the typical Common Core curriculum, learning environments are being developed as more language-rich, collaborative, and technology-friendly places. The AAE's top-level recommendations include:

- Encourage "deeper-order thinking." Common Core does not encourage memorization. Instead, students need to know why an answer is correct. Teachers require students to "explain their thinking and to provide proof," says AAE.
- Make classrooms language-rich. Successful school facilities will provide opportunities to practice reading, writing, and speaking skills "across the board and every classroom from elementary to high school, from self-contained to subject specific."
- Maximize class time. Bell-to-bell instruction is essential for the more complex thinking skills that are taught in Common Core. With this in mind, architects must use products and techniques for reducing class setup or easing reconfiguration of the classroom.
- Build "create and learn" places, not "sit-and-get" lecture settings. Students must be engaged in their lessons to acquire and hone the Common Core's required thinking skills, says the AAE.
- Incorporate technology into learning. In a Common Core school, students are required to use technology to communicate with others and collaborate in the classroom. Architects need to create schools that not only incorporate laptop computers, tablets, and digital whiteboards, but that ease availability and use by students.

All in all, the Common Core school is a different place, where teaching modalities and student expectations have shifted significantly. Architects with new ideas on how to support the curricular and pedagogical shift will be in greater demand in the future.