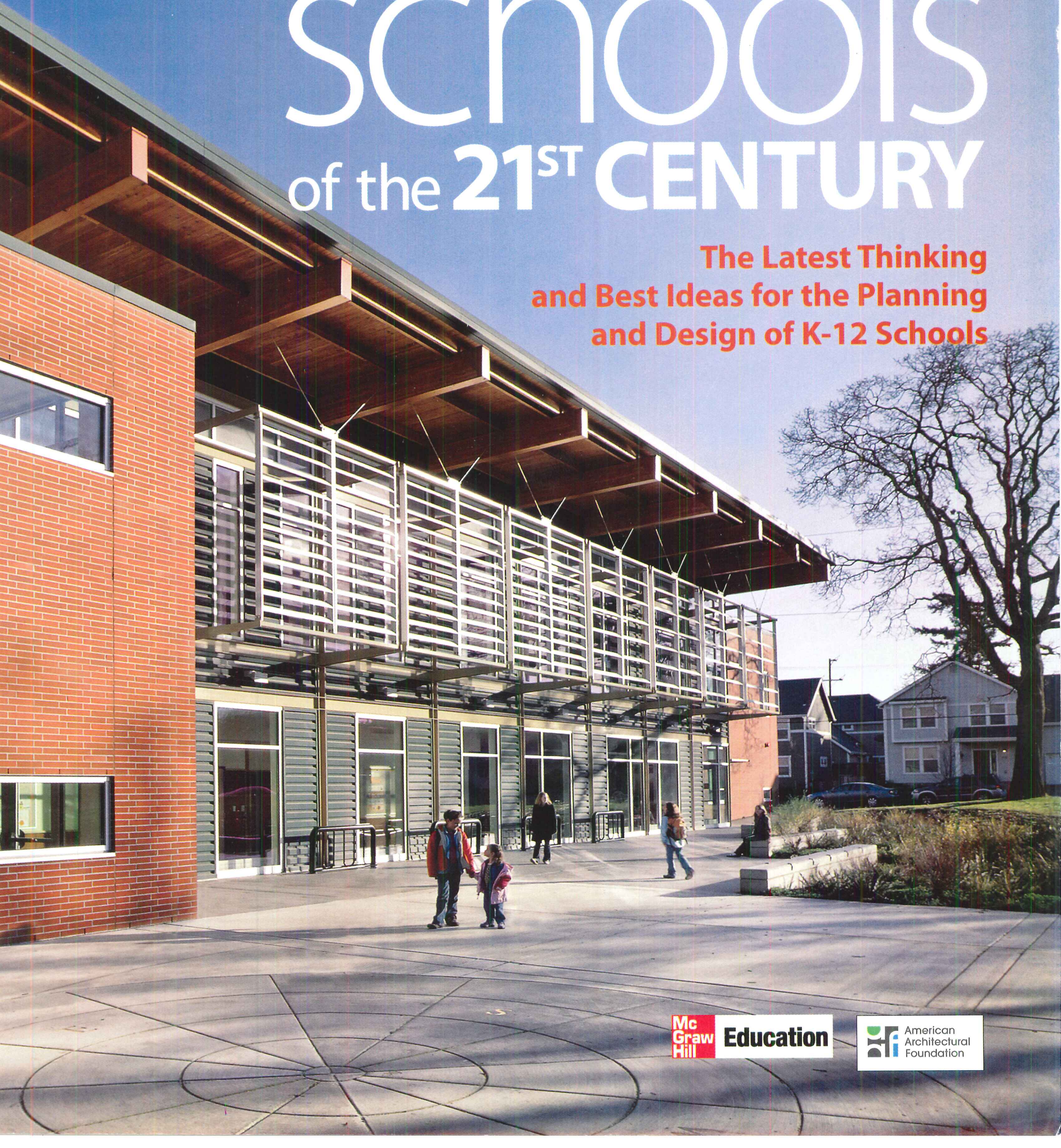
A SUPPLEMENT TO

ARCHITECTURAL RECORD

schools of the 21ST CENTURY

The Latest Thinking and Best Ideas for the Planning and Design of K-12 Schools



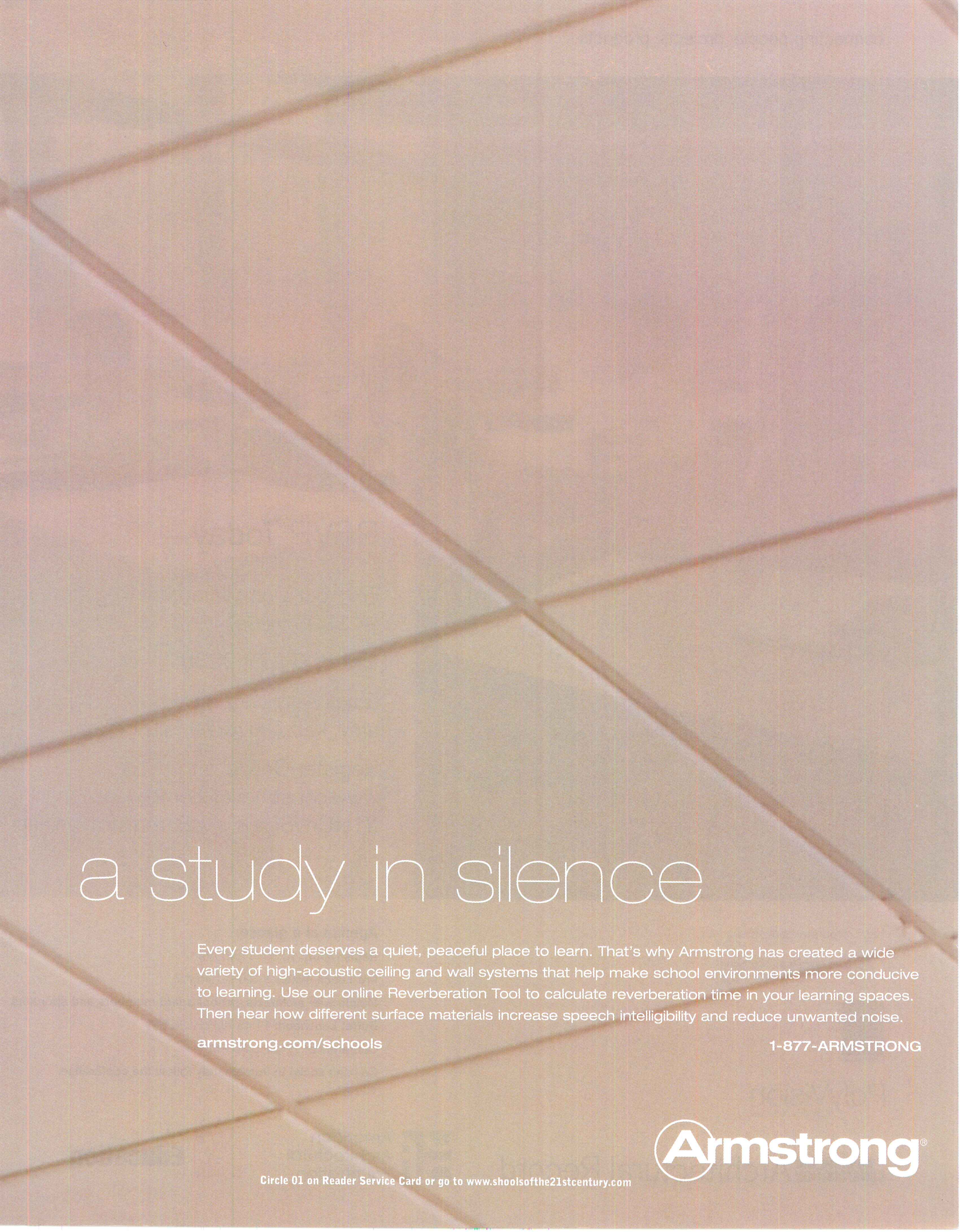
McGraw Hill Education

American Architectural Foundation

CEILING & WALL SYSTEMS

[Between us, ideas become reality.]®

Mary Bray Elementary School, Mt. Ephraim, NJ / The Thomas Group, Princeton, NJ


a study in silence
Every student deserves a quiet, peaceful place to learn. That's why Armstrong has created a wide variety of high-acoustic ceiling and wall systems that help make school environments more conducive to learning. Use our online Reverberation Tool to calculate reverberation time in your learning spaces. Then hear how different surface materials increase speech intelligibility and reduce unwanted noise.
armstrong.com/schools
1-877-ARMSTRONG
Armstrong®
Circle 01 on Reader Service Card or go to www.shoolsofthe21stcentury.com

connecting people_projects_products

Agenda at a glance:

Registration: 10:30–11:45 AM

Pre-Lunch Mixer: 11:00–11:45 AM

Mingle with architects, school board members and sponsors.

Buffet Luncheon: 11:45 AM–12:30 PM

Conference: 12:30–5:30 PM

Cocktail social to immediately follow the conference.

Key Corporate Sponsors:

Armstrong

EFCO
a Pella Company

PolyVision
A Steelcase Company

McGraw_Hill CONSTRUCTION Architectural Record

American Architectural Foundation

McGraw Hill Education

Be a Part of Designing Schools of the Future

schools of the 21ST CENTURY

Be a Part of the 'Schools 21' Symposium

March 28, 2008 • Orlando, Florida

As a architect, you can make a powerful difference in the design and construction of America's schools.

Each day, more than 59 million students, teachers and education employees spend considerable time in our nation's schools. With school enrollment projected to increase at record levels through 2013, and spending on school construction, renovation and maintenance expected to total nearly $30 billion annually, the need to transform our schools has never been more urgent.

The "Schools of the 21st Century Symposium" offers architects and school officials the chance to take a quick course in the latest school design trends, free of charge.

The Head of Their Class: Case studies of innovative school construction projects

Small Learning Communities: Find out how the schools-within-a-school concept is gaining acceptance and getting great results.

Panels Discussions about new school construction materials and techniques, designed to make schools more attractive, safer, and healthier environments, while simultaneously improving student learning and lowering operating costs

Research Trends: A recap of the latest research conducted by McGraw-Hill Construction Analytics on school spending trends and "green school construction"

MARS127SP

Go to www.construction.com/event/21stCrtySchools_08/registration.asp

The McGraw-Hill Companies

A SUPPLEMENT TO ARCHITECTURAL RECORD

Schools of the 21st CENTURY

EDITORIAL DIRECTOR	Robert Ivy, FAIA, *rivy@mcgraw-hill.com*
SCHOOLS OF THE 21ST CENTURY EDITOR	Charles Linn, FAIA, *linnc@mcgraw-hill.com*
GROUP DESIGN DIRECTOR	Anna Egger-Schlesinger, *schlesin@mcgraw-hill.com*
SENIOR EDITOR	Joann Gonchar, AIA, *joann_gonchar@mcgraw-hill.com*
ASSOCIATE ART DIRECTOR	Encarnita Rivera, *encarnita_rivera@mcgraw-hill.com*
DESIGN CONSULTANTS	Shostak Studios, NYC, Mitch Shostak, Susana Soares
MANAGING EDITOR	Beth Broome, *elisabeth_broome@mcgraw-hill.com*
PRODUCTION MANAGER	Juan Ramos, *juan_ramos@mcgraw-hill.com*
ILLUSTRATOR	I-ni Chen
INTERNS	Rebecca Ward, Henry Ng
EDITORIAL SUPPORT	Linda Ransey, *linda_ransey@mcgraw-hill.com*
	Monique Francis, *monique_francis@mcgraw-hill.com*
WEB EDITOR	Jenna M. McKnight, *jenna_mcknight@mcgraw-hill.com*
WEB DESIGN DIRECTOR	Susannah Shepherd, *susannah_shepherd@mcgraw-hill.com*
WEB PRODUCTION	Laurie Meisel, *laurie_meisel@mcgraw-hill.com*

VICE PRESIDENT & PUBLISHER	Laura Viscusi, *laura_viscusi@mcgraw-hill.com*
VICE PRESIDENT, MEDIA SALES	Paul Bonington, *paul_bonington@mcgraw-hill.com*
DIRECTOR, MARKETING COMMUNICATIONS	Deborah Smikle-Davis, *deborah_smikle-davis@mcgraw-hill.com*
VICE PRESIDENT, CIRCULATION	Maurice Persiani, *maurice_persiani@mcgraw-hill.com*
DIRECTOR, CREATIVE SERVICES	Susan Valentini, *susan_valentini@mcgraw-hill.com*
PRODUCTION MANAGER	Stephen R. Weiss, *stephen_weiss @mcgraw-hill.com*
ACCOUNT SERVICES, CONTINUING ED.	Robyn Feller, *robyn_feller@mcgraw-hill.com*
ADVERTORIAL DESIGN	Angela Haliski, *angela_haliski@mcgraw-hill.com*
	Matthew Healy, *matthew_healy@mcgraw-hill.com*
	Hector Gonzalez, *hector_gonzalez@mcgraw-hill.com*
DIRECTOR, SALES, PRODUCT NEWS	Janet McLiverty, *janet_mcliverty@mcgraw-hill.com*
DIRECTOR, FINANCIAL OPERATIONS	Ike Chong, *ike_chong@mcgraw-hill.com,*
BUSINESS MANAGER	Tom Maley, *tom_maley@mcgraw-hill.com*
ASSISTANT, MEDIA DEPARTMENT	Pina Del Genio, *pina_delgenio@mcgraw-hill.com*

MCGRAW-HILL CONSTRUCTION MEDIA

VICE PRESIDENT, GROUP PUBLISHER James H. McGraw, IV
VICE PRESIDENT, INTEGRATED MEDIA Laura Viscusi
DIRECTOR, MARKETING COMMUNICATIONS Deborah Smikle-Davis
SENIOR DIRECTOR, ONLINE Dora Chomiak
DIRECTOR, ACCOUNT & MEDIA SERVICES Jeanine Boffa
DIRECTOR, FINANCIAL OPERATIONS Ike Chong
ASSISTANT, MEDIA DEPARTMENT Pina Del Genio
GROUP PRODUCTS EDITOR Rita Catinella Orrell
VICE PRESIDENT, EDITORIAL DIRECTOR Robert Ivy, FAIA
VICE PRESIDENT, MEDIA SALES Paul Bonington
VICE PRESIDENT, CIRCULATION Maurice Persiani
VICE PRESIDENT, CUSTOM PUBLICATIONS Mark Kelly
DIRECTOR, CREATIVE SERVICES Susan Valentini
GROUP DESIGN DIRECTOR Anna Egger-Schlesinger
EDITORIAL DIRECTOR, DIGITAL MEDIA Bryant Rousseau
WEB DESIGN DIRECTOR Susannah Shepherd

MCGRAW-HILL CONSTRUCTION

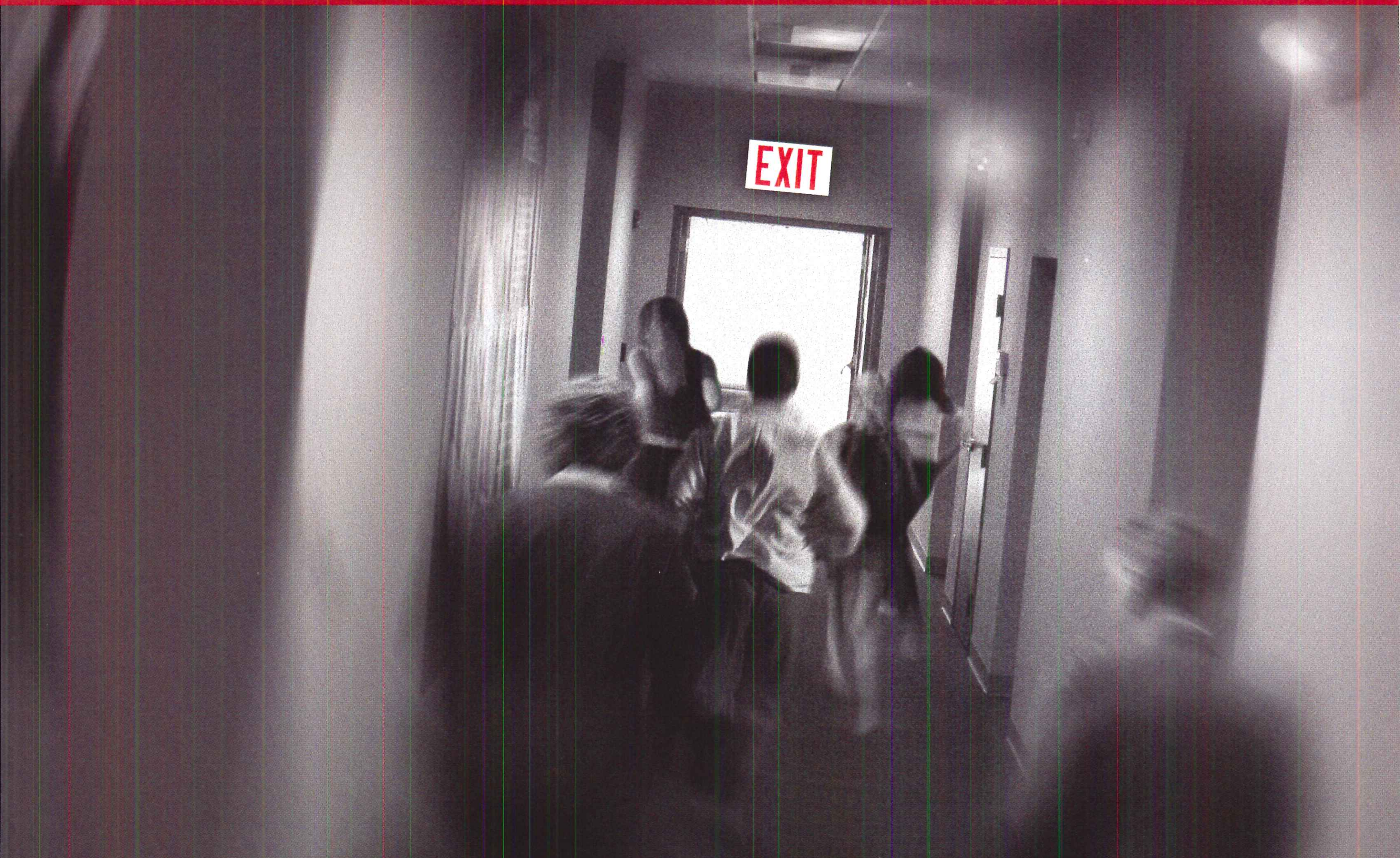
PRESIDENT Norbert W. Young, FAIA
SENIOR VICE PRESIDENT Howard Mager
VICE PRESIDENT, CONTENT & PRODUCTION Tim Ryan
SENIOR DIRECTOR, FINANCE Nilo Ramos
VICE PRESIDENT, MARKETING & PRODUCT DEVELOPMENT Potoula Chresomales
VICE PRESIDENT, ANALYTICS & ALLIANCES Harvey Bernstein
VICE PRESIDENT, TECHNOLOGY John P. Banks

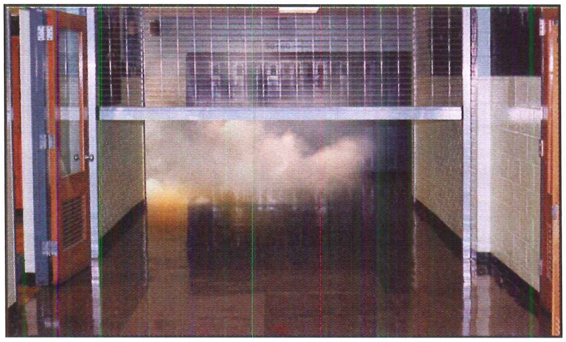
ARCHITECTURAL RECORD SCHOOLS OF THE 21ST CENTURY SUPPLEMENT: January 2008 **OFFICERS OF THE MCGRAW-HILL COMPANIES:** *Chairman, President and Chief Executive Officer:* Harold McGraw III. *Executive Vice President and Chief Financial Officer:* Robert J. Bahash. *Executive Vice President, Human Resources:* David L. Murphy. *Senior Vice President and General Counsel:* Kenneth M. Vittor. *Principal Operating Executives:* Kathleen A Corbet, *President, Standard & Poors;* Henry Hirschberg, *President, McGraw-Hill Education;* Glenn S. Goldberg, *President, McGraw-Hill Information and Media Services.*

PRINTED IN USA

SCHOOLS OF THE 21ST CENTURY Supplement is a special addition to ARCHITECTURAL RECORD, a publication of the McGraw-Hill Companies. The publisher and editors of this publication gratefully acknowledge the assistance of: the American Architectural Foundation, Ron Bogle, president and CEO; Nancy Zivitz Sussman, program director; Kerry Leonard, AIA, past chair of the American Institute of Architects Committee on Architecture for Education, and Charlotte Frank, Senior Vice President, McGraw-HIll Education.


207


EXIT



CONTENTS 01.08

ON THE COVER: ROSA PARKS SCHOOL, BY DULL OLSON WEEKES ARCHITECTS
PHOTOGRAPH BY GARY WILSON PHOTO/GRAPHIC.

PHOTOGRAPHY: © KARL BACKUS

WINCHESTER THURSTON SCHOOL


style
rubber flooring
When it comes to performance and selection, FLEXCO® rubber flooring is leading the way. Naturally resistant to mold and mildew, FLEXCO rubber floors are designed for durability, versatility and slip resistance, plus they're very quiet and comfortable under foot. Choose from textured, smooth, and environmentally friendly tile, in colors and patterns to match any design or application.
800.633.3151 | flexcofloors.com
THAT WILL LEAVE YOU FLOORED.
FLEXCO
innovative design. flooring performance.
Circle 06 on Reader Service Card or go to www.shoolsofthe21stcentury.com

Schools of the 21st Century

SPONSORED ARTICLES CONTENT GUIDE

www.schoolsofthe21stcentury.com

Need Another Reason to Select MFMA Maple for Your Next Sports Floor?

✓Quality ✓Value ✓Longevity

Maple Flooring Manufacturers Association —
The Sports Flooring Authority

60 Revere Drive • Suite 500 • Northbrook, Illinois 60062 • Phone: (888) 480-9138 • email: mfma@maplefloor.org

Circle 07 on Reader Service Card or go to www.shoolsofthe21stcentury.com

Everybody's an expert, right?

ASK THE MAN ON THE STREET FOR AN OPINION ON HOW A school building should be designed, and chances are, he will have one. That's to be expected, of course, since virtually everyone in our society went to school somewhere, and undoubtedly was changed, for better or worse, by the places where they learned. But, no, not everybody's an expert, and that's what makes weighing all of the options and opinions out there so difficult. What makes a school design enhance or detract from the learning experience, despite all of the attention that has been devoted to objectifying it, is anything but clear-cut.

That's why we created this second edition of our SCHOOLS OF THE 21ST CENTURY supplement to ARCHITECTURAL RECORD. If you received a copy of this magazine, that means we consider you one of America's most important school construction decision makers. You may be an architect, a school board member, an administrator, or a teacher, but certainly you are someone who cares about kids and their school buildings. Our intent is to bring you the information you need to understand current trends in educational building design and construction so you may improve *your* schools. We have gathered case studies from around the U.S., consulted with experts on sustainability, and trends such as the small schools movement. We have been greatly assisted in the preparation of the editorial by the American Architectural Foundation, as well as members of the American Institute of Architects' Committee on Architecture for Education. ARCHITECTURAL RECORD is published by McGraw-Hill Construction, and we have also benefitted from the support of McGraw-Hill Education, one of the world's leading producers of textbooks, assessment and instruction materials, and books for professionals.

On March 28, 2008, SCHOOLS OF THE 21ST CENTURY will be on the road. Join us in Orlando for a free, half-day symposium on school design. We'll have presentations—and great conversations—with some of the nation's leading experts on trends in school design, school construction spending, and sustainability. If you are interested in attending, please go to www.schoolsofthe21stcentury.com for details.

Want to be an expert on school design? We can't guarantee that our publication and symposium will make you one, but we hope we will get you close.

LAURA VISCUSI, PUBLISHER

CHARLES LINN, FAIA, Editor

Charles Linn, FAIA, Editor, and Laura Viscusi, Publisher

On March 28, 2008, SCHOOLS OF THE 21ST CENTURY goes on the road. Join us in Orlando for our school design symposium.

www.schoolsofthe21stcentury.com

What's Small and Green?

If you said, "A less-crowded, more environmentally sustainable school building!" your answer would be correct.

BY CHARLES LINN, FAIA

Two of the most important design trends to gain traction recently are that where facility size is concerned, smaller is better, and the second is that "green" schools aren't just a fad—their advantages are so striking that the practices that make them green will become standard in the years ahead. Not only are the energy efficiencies inarguable, but also there is early evidence that some of the improvements inherent in these buildings can help test scores and reduce absenteeism.

ENROLLMENT DRIVES CONSTRUCTION

As enrollments continue to climb the future will look bright for school construction. The National Center for Education Statistics says that 49.6 million students will be enrolled in 97,000 public primary and secondary schools in the 2007-08 school year. In addition, 6.1 million students are enrolled in private schools, and 1.1 million are being home schooled. The Center also says that K-12 enrollments will grow by 3 million between 2005 and 2015. While robust, this does not quite keep up with growth experienced in the 1990s. Educational construction starts peaked in 2001 at 273 million square feet. However, in 2008, only 222 million square feet are anticipated, according to the *McGraw-Hill Construction 2008 Outlook* report. The current slowdown is due to turmoil in the housing market and weakness in the economy. But, with 300,000 new students enrolling each year, about 12,000 classrooms need to come on line annually. If the past is any indication, many of these classrooms will come from additions and alterations. McGraw-Hill Construction's figures say remodeling projects typically outpace new construction by a ratio of 4 to 1.

Mahlum Architects' Rosa Parks Elementary is a beautiful example of Redmond, Washington's commitment to small neighborhood schools.

SMALL IS BEAUTIFUL

The logic behind economies of scale, that it is cheaper to run one large institution than many small ones, seems unassailable. And yet, research indicates that the financial savings that were to come from consolidating small schools into large ones were often absorbed by the bureaucracies created to run them while leaving principals little decision-making authority. At the same time, the many benefits of small schools, such as the ability for students and teachers to work together closely, a sense of community that most children crave, and the active engagement of parents were lost in the shuffle. Unfortunately, it is still the case that even where school boards and administrators agree that building small from the ground up is the way to go, some states' policies hold back funding if proposed schools are too small. Florida and Vermont are two states that have reversed themselves and encourage small school buildings.

Where small schools are possible, the trend is to take the idea one step further. Long corridors are out, replaced by small learning communities within schools. Seattle-based Mahlum Architects used such an arrangement at Rosa

Parks Elementary School in Redmond, Washington. Each small learning community comprises four small classrooms grouped around a shared activity area. Classes can choose to work together or not, depending on the project. Glass sliding doors provide a connection between both types of spaces so that teachers can supervise both simultaneously. The arrangement is intended to allow interdisciplinary teaching and learning teams.

Another form of the school-within-a-school movement has large student bodies being separated into smaller ones, in both new and existing buildings and campuses. Even the change-challenged New York City Department of Education has opened an Office of Small Learning Communities. Its reform strategy includes breaking 60 large high schools into smaller ones, and replacing the lowest-performing, large high schools with 200 new, small, "academically rigorous" high schools. When small schools are created within large school buildings, it is desirable that schools be physically separate from each other, and some remodeling may be required to accomplish this. Students from all of the schools must have equal access to specialized shared facilities such as labs, gyms, and cafeterias, but this can often be accomplished through creative scheduling.

Rosa Parks Elementary's library shares light with the corridor. Each small learning community (plan) has four classrooms grouped around an activity area.

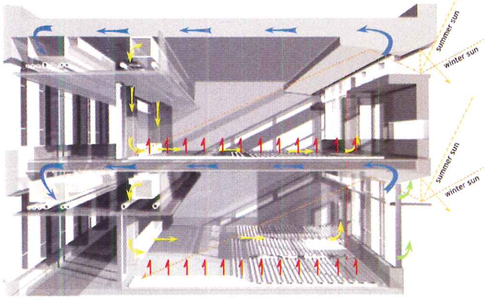
It is worth noting that school districts with large schools are under pressure to break them up simply because they are now competing with charter schools, which boast their small size as a major selling point. Few charter schools can afford fabulous facilities. However, their student-to-teacher ratios are often lower than those in public schools.

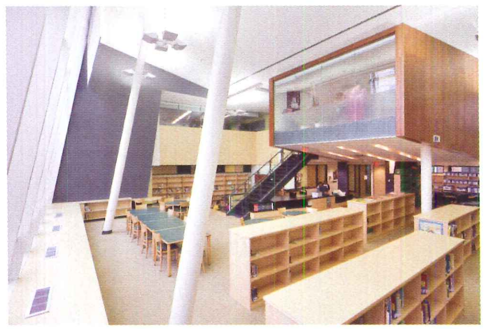
GETTING GREEN

Our parents always said that fresh air and sunshine are good for us, and it seems as if folks are lining up around the block to reaffirm the

First Floor

1 Classroom **2** Activity area **3** Kindergarten **4** Resource room **5** Commons **6** Gymnasium **7** Library





The LEED-rated Thomas L. Wells School in Toronto uses daylighting, high-performance glazing, low-VOC finishes, high-efficiency boilers, and a heat recovery system to save energy. The diagram shows how the heating and ventilating system works.

notion. In fact, a 2005 market study of green building by McGraw-Hill Construction's *Education Green Building SmartMarket report*, released in January of 2007, found that educational buildings were the fastest growing sector for green building, and that school boards and administrators have the most influence in getting schools to go green. A second driver is the increasingly widespread adoption of policies that require public buildings to have green characteristics.

The most immediately measurable advantage to greening a school can be seen simply by scanning its generally lower-than-average utility bills. Special attention is paid to designing lighting and mechanical systems so that this can be done while improving occupant comfort. More research is needed to determine whether the health and productivity of students and faculty in green schools are improved over a control group. The advantages seem intuitively obvious: The use of non-toxic materials and better ventilation, for example, should improve air quality and reduce respiratory illnesses. If attendance improves, users will teach better and learn more.

Two recent developments are sure to stimulate interest in green schools. The first is the release in early 2007 of a version of the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) for Schools. LEED for Schools is not a means of evaluating schools that have already been built, but rather a method of guiding the design and construction of new buildings. All LEED-rated schools incorporate sustainable design and construction attributes from the earliest stages of their design. These include energy and water efficiency, daylighting, alternative transportation options, and recycling. All LEED projects have their environmental systems fine-tuned after construction in a step called commissioning. But, for a school to earn a LEED rating, issues of particular importance in schools, such as children's sensitivity to chemicals, classroom acoustics, joint use of facilities, and mold prevention must also be addressed. At the end of 2007, about 70 schools had attained LEED certification; about 500 more were seeking it.

Use the Web sites listed below to find out more about many of the topics discussed in this article.

McGraw-Hill Construction Publications
construction.ecnext.com/coms2/analytics

National Center for Educational Statistics
nces.ed.gov

USGBC LEED for Green Schools
buildgreenschools.org

Dollars & Sense I and II
goodsmallschools.org

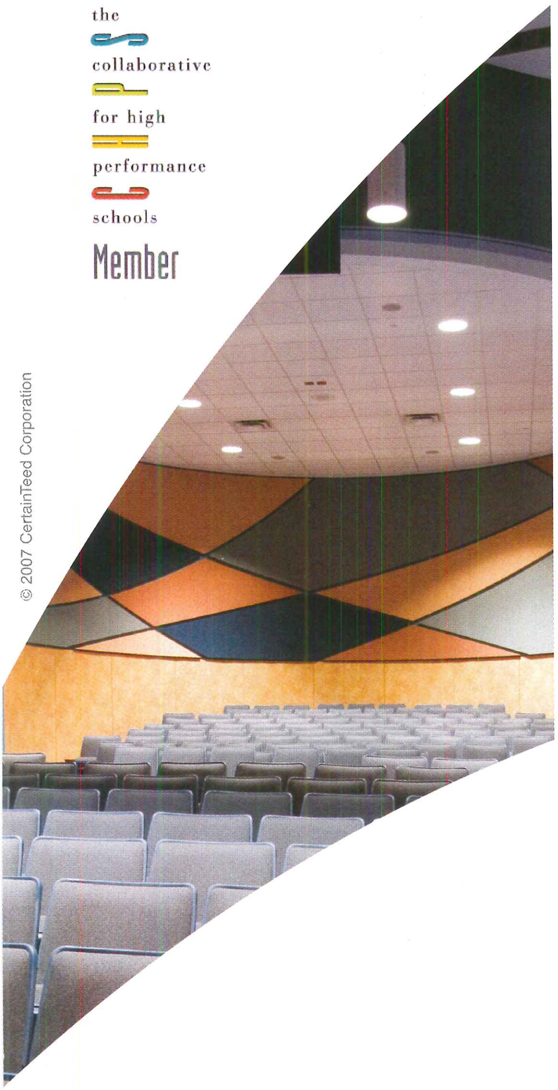
New York City Office of Small Learning Communities
www.nycslc.org

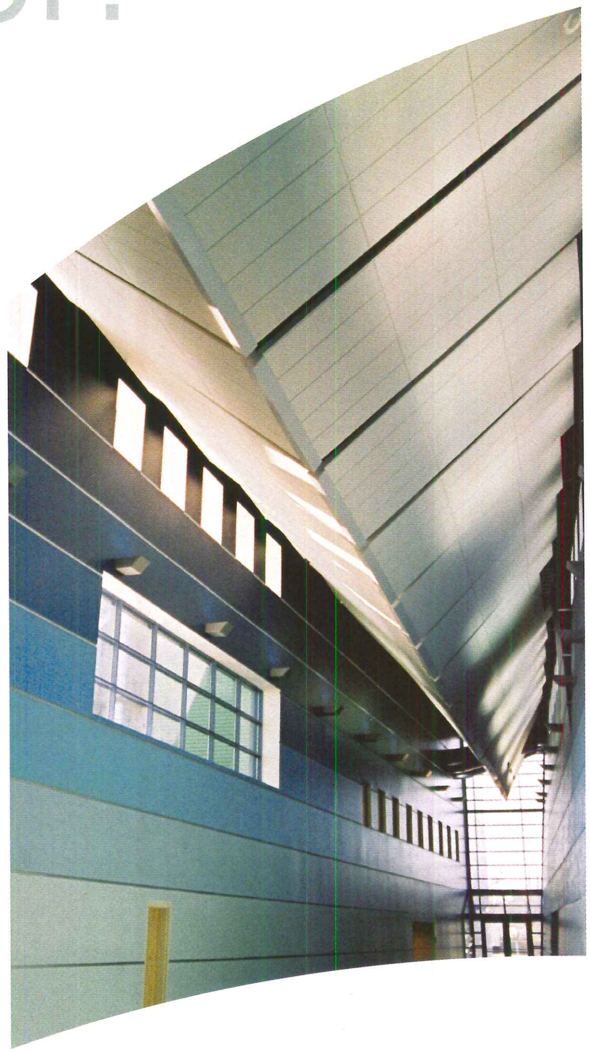
Charter Schools
uscharterschools.org

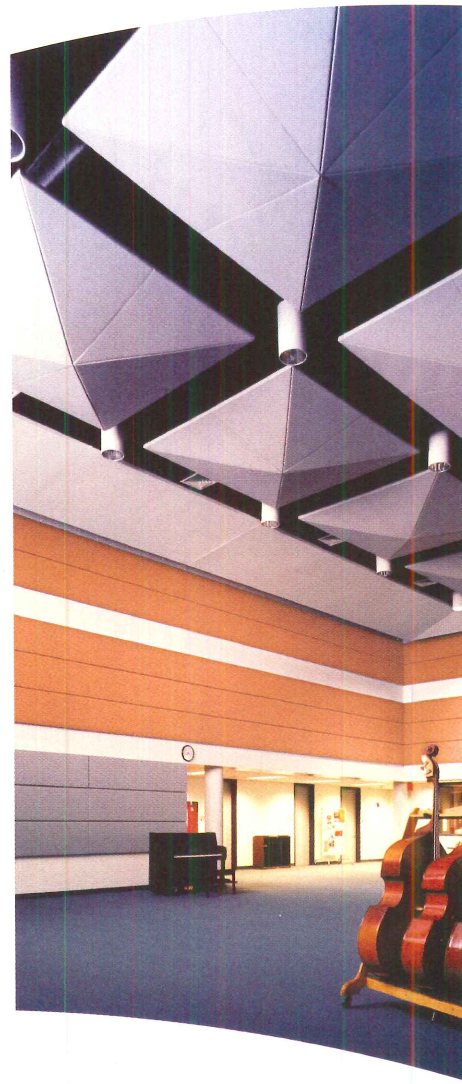
The Thomas L. Wells School in Toronto, completed before LEED for Schools was introduced, received a Silver LEED–Canada New Construction rating. It has high-efficiency boilers, a heat recovery system, and high-performance glazing to cut energy use. Bart Sampson Neuert architects paid particular attention to air quality, and used low-VOC materials throughout the project. Finishes, such as porcelain tile flooring, that would not require stripping and waxing like standard vinyl composition tile, were chosen because cleaning chemicals are a major source of indoor air pollutants that can be harmful.

Yet another force that could have a profound influence on the greening of schools is that in early November of 2007, the Clinton Climate Initiative announced it was partnering with the USGBC and at least two dozen other organizations to start a green schools program, whose ambition is to make all American schools green within a generation. The program will help schools reduce energy consumption as well as educate a new generation of students about the effects that buildings have on the environment. Considering that the number of existing schools that need improvements to achieve such a goal likely exceeds 87,000, the challenge and the potential for positive change are both enormous. ■


Paint with nature in mind.
How do you respond to demands for environmentally responsible paints and still meet requirements for quality, durability and aesthetics? Just ask Sherwin-Williams. We're the ultimate source for zero or low-VOC, low odor coatings, including Duration Home®, Harmony® and Pro Green 200®. Coatings designed to help you meet green specifications without compromising performance.
For more information about our green initiatives, visit sherwin-williams.com/pro/green, see your Architectural Account Executive or call the Architect and Designer Answerline at 1-800-321-8194.
COVER THE EARTH
SHERWIN WILLIAMS.
SW 6725 Pickle | ©2007 The Sherwin-Williams Company
Circle 08 on Reader Service Card or go to www.shoolsofthe21stcentury.com







Listening vs. Hearing

CEILING CHOICES THAT MAKE A DIFFERENCE TO A CHILD'S EDUCATION


Ecophon Gedina tiles uses high-density fiberglass to achieve a high sound absorption in quiet areas for improved student focus.

THE RENOWNED ACOUSTICAL SCIENTIST DAVID LUBMAN is said to have once observed, "We put kids in classrooms where they can't hear, but we would never put them in a classroom with the lights turned off." This reference is to the startling lack of attention given to the acoustical design of classrooms over the last quarter century. The capacity to understand the teacher's words can be compromised by a concept as basic as where a child sits in the classroom. If the student sits in the front, the lesson is understandable. If he or she sits elsewhere, it is not. This inequity is compounded for students with special needs who are part of so many mainstream classrooms across America. These special needs may include children with hearing and speech impairments, learning disabilities, central auditory processing disorders and those for whom English is a second language. Even the temporary hearing loss that results from the common cold or an ear infection can have a substantial effect on a child's ability to hear the teacher on a particular day. The solution is simple: quiet classrooms. Unfortunately, achieving the solution is more complicated because of technical, financial and even political obstacles.

New to the quiet classroom movement is the U.S. Green Building Council. Their recently issued LEED® for Schools provides an acoustic element under "Indoor Environmental Quality." USGBC's reference to the landmark ANSI S12.60 2002 American National Standard Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools may have a cumulative effect as more states mandate LEED® certification for public building projects.

CertainTeed Corporation is a part of Saint-Gobain Corporation, a world-wide sponsor of independent academic research on classroom acoustics. At CertainTeed Ceilings, the company feels it is their obligation to share their accumulated knowledge with stakeholders in this essential part of school design: architects, interior designers, school boards, acoustical consultants and parents. They recognize that only through public awareness will quiet classrooms become the norm rather than the exception.

Finally, access to excellent products is a vital component of this effort. CertainTeed Ceilings offers a wide array of products that combine superior acoustic performance with other technical superlatives. They are proud to be a member of the Collaborative for High Performance Schools (CHPS), and the vast majority of the company's products are listed on their "Low-emitting Materials Table." CertainTeed Ceilings' commitment to quiet spaces is unsurpassed. Contact CertainTeed Ceilings and let them describe how they can help. ■

AGC Takes Schools to a New Level of Safety, Security and Energy-Efficiency

San Ramon Valley Center, Contra Costa Community Center District, Diablo Valley College, utilized Pyrobel®-45 fire-rated glazing insulated with Comfort Ti-AC 40™ on a tinted substrate.

AGC FLAT GLASS NORTH AMERICA IS PROUD TO BE A leader in a variety of products that, either individually or combined, offer an array of advanced products to meet the growing needs of our educational markets.

AGC InterEdge Technologies, a subsidiary of AGC, is leading the way with a complete line of clear fire-rated glazing products and systems for interior and exterior applications. These include PyroEdge™—a low-cost 20-minute glazing, manufactured in five locations for strategic regional delivery; the U.S. Schott Pyran®—a unique glass-ceramic glazing offering quick turnaround for fire glass replacements from twenty minutes to three hours; Pyrobel®—their TRI-Safe™ glazing, offering the ultimate in fire, human impact safety, and radiant heat protection, allowing uncompromising egress and property protection.

AGC has a variety of options to expand the surrounding visual qualities that exemplify the ultimate environment for learning. These include large expanses of glazing with their Vision 60 System™—a butt-glazed, 60-minute transparent wall, without intermediate framing or mullions, that still allows excellent clarity and sound reduction to reduce disturbing influences.

The multiple framing options, including the low-cost 60- and 120-minute Quick-Frame™; the StileLite 60™—a fully-welded segment system—and the 7000 Series™ curtainwall are just a few examples of AGC's commitment to bring the architectural community products to meet ever-changing and demanding design requirements.

Outstanding product quality, dedicated customer service and the creation of innovative new products have been central to the AGC vision.

By combining AGC InterEdge Technology products with those manufactured and distributed by their parent company, they also offer the ultimate in energy-efficiency, as in the project pictured here, where Pyrobel fire-rated glazing was insulated with AGC's Comfort Ti-AC 40™ on a tinted substrate to meet energy-efficiency requirements at the Diablo Valley College—where temperatures routinely reach triple digits in the summer months.

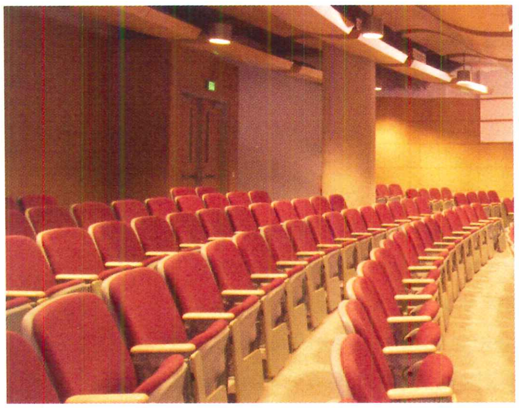
Outstanding product quality, dedicated customer service and the creation of innovative new products have been central to the AGC vision—a vision that is transforming our schools, colleges and universities to a more open and free learning environment.

Look beyond...to AGC for glazing opportunities that meet your total design needs. ■

PHOTO COURTESY OF: AGC INTEREDGE TECHNOLOGIES

Smart Spaces = Student Success

Inspiring design solutions for K-12 environments






Smart spaces inspire achievement. KI's award-winning educational furniture encourages both interaction and autonomy in K-12 learning environments. That's why more administrators are choosing high-performance KI products in the classroom and beyond.

Durable and flexible. Attractive and ergonomic. KI has the products, resources and expertise to foster student success through smart design.

1-800-424-2432 | www.kieducation.com

KI

Competition Yields Insights

Thoughtful "Redesign Your School" entries show what kids want in their schools.

BY BARBARA J. SAFFIR

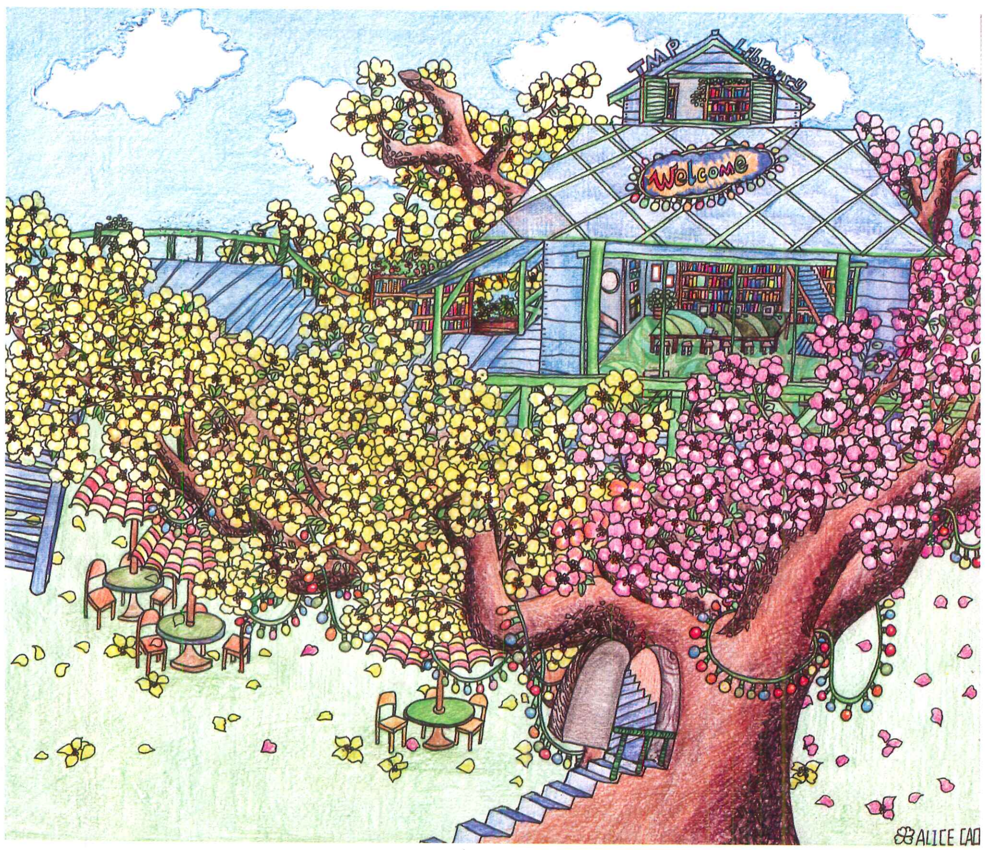
Ban boxy, boring schools that resemble prisons. Choose daylight over fluorescent lighting. Connect with the community. Go green. Those are some key messages high school students delivered in the first annual "Redesign Your School" contest sponsored by the American Architectural Foundation (AAF) and Target.

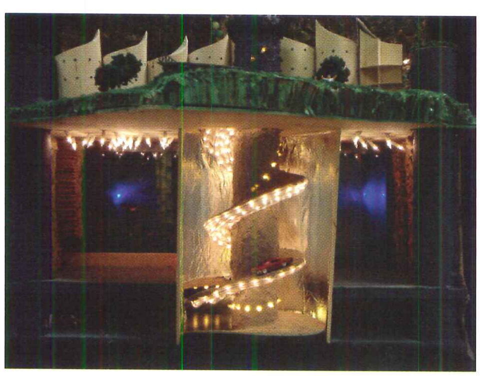
"Aesthetics really affect the mood and what you even think about a place," said Tyler Rush, the grand prize winner from Austin, Texas, who created the "Light + Nature School." A great school design, he said, "has the potential to make student performance better."

Some experts agree. That's one reason the AAF sponsored the national design competition, which is part of the its "Great Schools by Design" program to create innovative 21st-century learning spaces and encourage students, educators, parents, designers, and the media to share ideas.

Ronald E. Bogle, the AAF's president and CEO, said the goal was not only to recognize the work of individuals, but to "add student voices" to the national dialogue on school design and to "harvest their ideas."

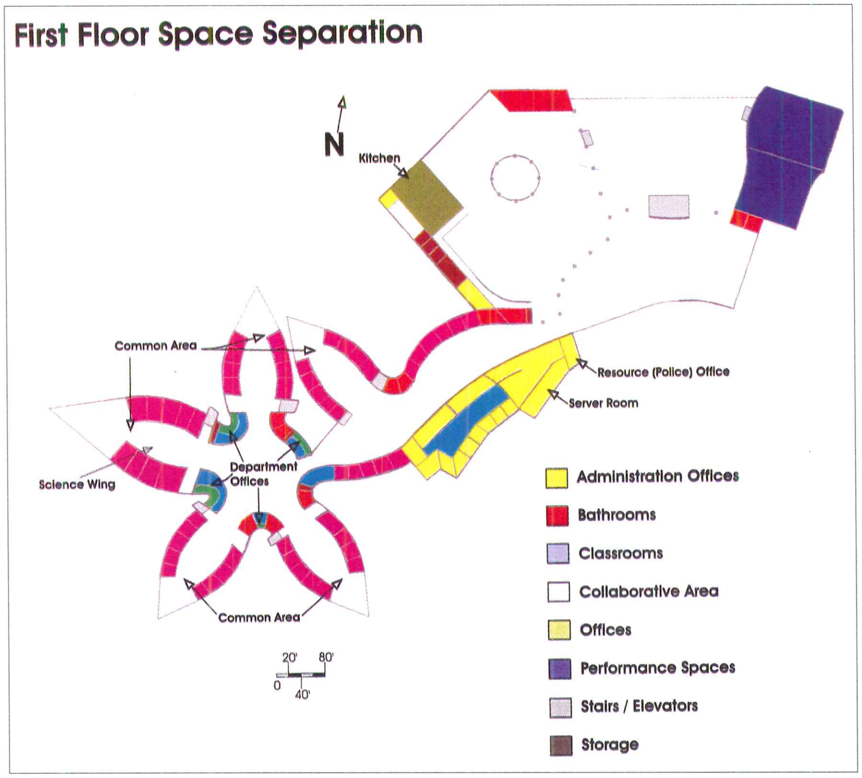
"This is a process we hope not only enriches students but enhances the design process," said Bogle, who is also a former school board member. Karen Casanova, senior specialist for community relations for

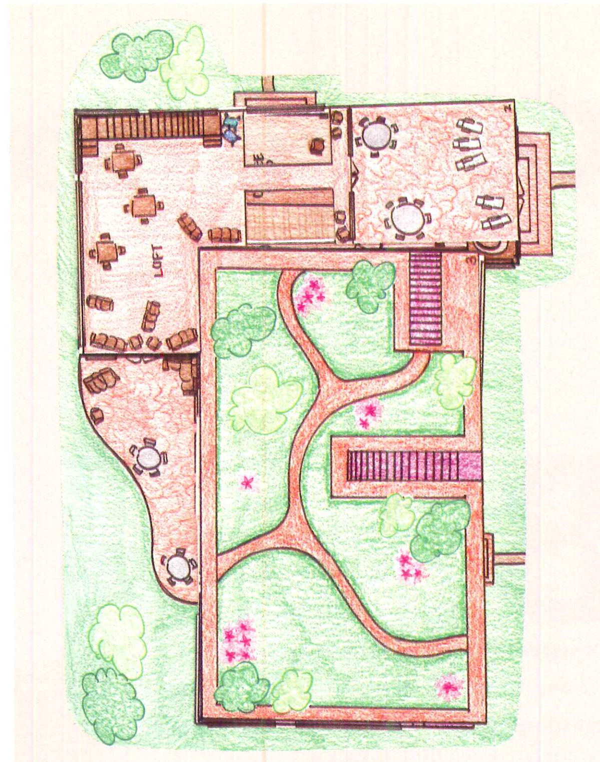




The idea that school buildings are often intimidating was a common theme, and Alice Cao's imaginative drawing of a school in a tree full of flowers even featured a welcome sign. Oscar Lucero built a model around an aquarium and photographed it as his entry. It was complete with lighting and model cars.

Target, says the company hopes the contest will "spark an outcry for better" school design. "We're passionate about education," she said. "We're passionate about design. This program unites the two."





Free-flowing, organic forms characterized some winning entries, in particular those from Aaron Tobey (above). Drawings by Alixis Clark (upper right) and Tannie Duong (lower right) emphasized their desire for a strong connection between learning environments and the out-of-doors. Patcharin Saefrung's entry (below) was notable for its joyful expression of all the things school should be.

Their competition is the largest national design contest for high school students. It attracted a diverse mix of ninth through 12th graders, boys and girls from all over America. More than 5,000 initially registered online for the competition, which ran from March 1 to June 30. Then, 250 submitted projects. They competed for a top prize of a $10,000 college scholarship and seven $5,000 scholarships along with a trip to Washington, D.C., for the November 5th awards presentation. Twenty other finalists won $100 Target department store gift cards.

"The finalists truly shook up our assumptions about what mattered most to students," said juror Daniel S. Friedman, FAIA, dean of College of Architecture and Urban Planning at the University of Washington in Seattle. "For example, an overwhelming number of entries proposed the integration of school and community programs; most incorporated sustainable technology."

The prize-winning projects and their presentations varied as much as the contestants. Two kids crafted colorful hand-drawn sketches with no architectural plans, while others submitted videos and professionally detailed designs. Some were super detailed with items such as an HVAC plan and color samples (beige "cornmeal" and pale-green "aloe vera").

All incorporated nature or green principles either literally or figuratively: from glass tables that doubled as fish ponds to outdoor lunch patios to waterless urinals to efficient classroom shapes based on a honeycomb's "hexagonal tessellation."

Several students created radial designs and curvy classrooms or corridors. Rectangles were rare. Others fashioned college-like campuses.

"There were a lot of kids who said 'I want a campus,'" said juror Carol Rusche Bentel, FAIA, of Bentel and Bentel in Locust Valley, N.Y.

Her fellow juror Kerry Leonard, a principal of Chicago-based OWP/P architects, said: "What the students have told us is that they

THE WINNERS

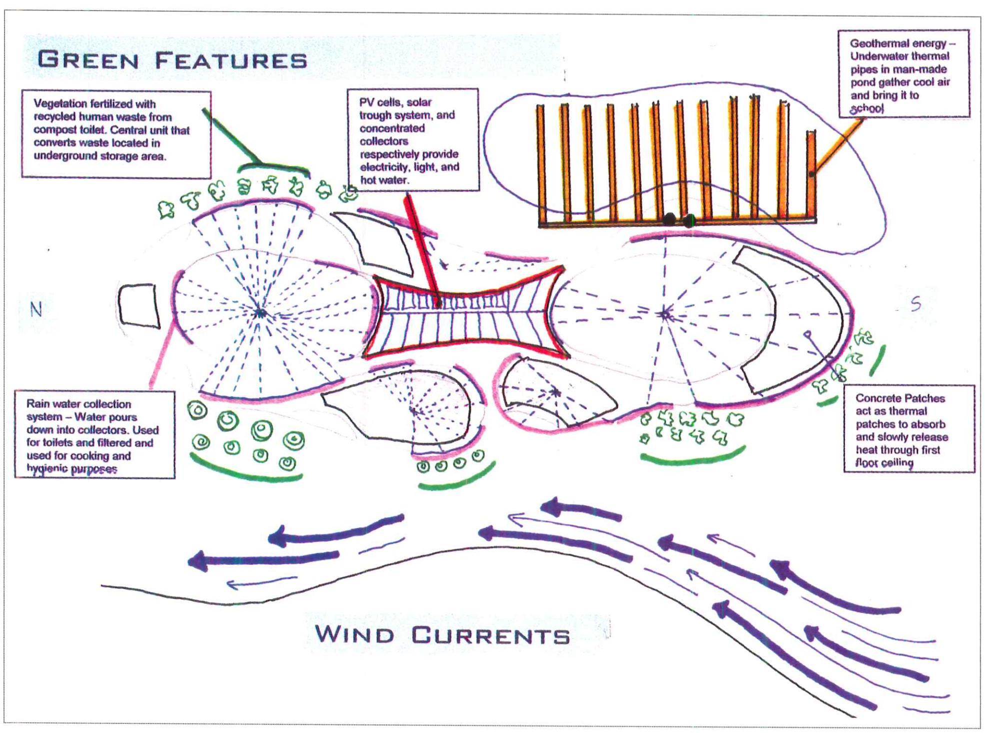
The winners of the American Architectural Foundation's Redesign Your School competition came from many different cultural backgrounds. They are:

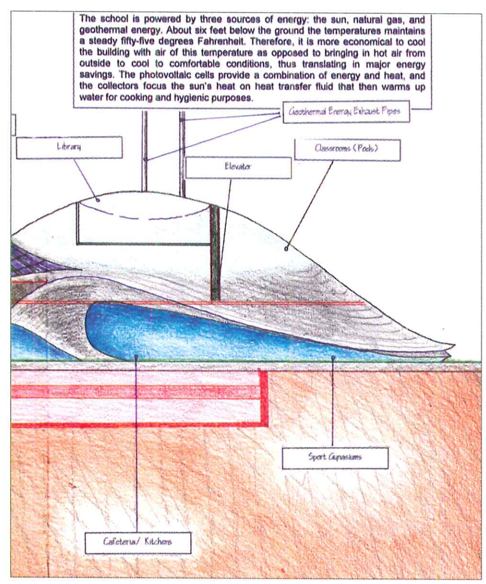
Grand Prize Winner

- **Tyler Rush, Westlake High School, Austin, Texas**

Finalists

- **Alice Cao, Thomas More Prep-Marian High School, Hays, Kansas**
- **Alixis Clark, Westwood High School, Austin, Texas**
- **Tannie Duong, La Quinta High School, Westminster, California**
- **Oscar Lucero, East Haven High School, East Haven, Connecticut and Educational Center for the Arts ACES, New Haven, Connecticut**
- **Irina Papuc, Woodstock High School, Woodstock, Illinois**
- **Patcharin Saefrung, San Jose High Academy, San Jose, California**
- **Aaron Tobey, Western Albemarle High School, Crozet, Virginia**





Irina Papuc's design for a green school draws its inspiration from forms found in nature. The sophisticated design considers such issues as natural ventilation, security, photovoltaics, solar heating, and water conservation.

want places of learning where they feel welcome; they want personalized spaces and they want social spaces."

The winners were judged on creativity and their presentations. They could submit almost any type of work that fit into an 11-inch by 17-inch envelope, including sketches, computer-assisted drawings, videos, model photos or PowerPoint presentations.

In addition to their visual designs, they had to write up to 1,000 words explaining their ideas. They also had to address at least one of the AAF's eight "Principles of School Design." These are to design schools to support a variety of learning styles; enhance learning by integrating technology; support a small, neighborhood school culture; create schools as centers of community; engage the public in the planning process; make healthy, comfortable, and flexible learning spaces; and to consider nontraditional options for school facilities and classrooms.

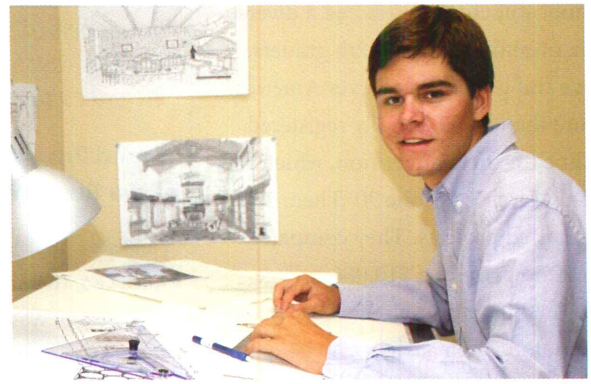
The contest was divided into four geographical regions. Regional juries initially chose semifinalists. Then they sent those names to the final jury in Washington, D.C., in September. The six male and four female jurors (eight architects and two educators) selected one winner from each of the four regions and four others regardless of location. The grand prize winner was chosen from the eight finalists after an interview.

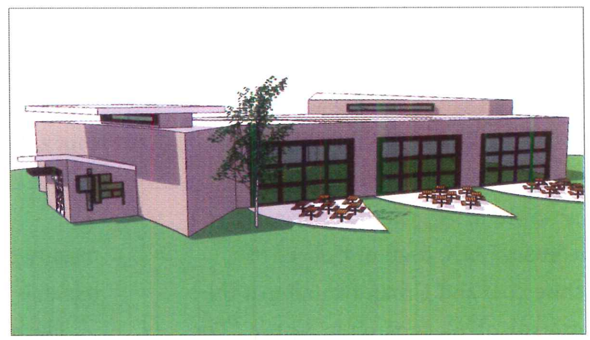
All the contestants said they wanted to improve their schools. As one student put it in his video: "It all comes down to one thing: learning. That's what it's all about."

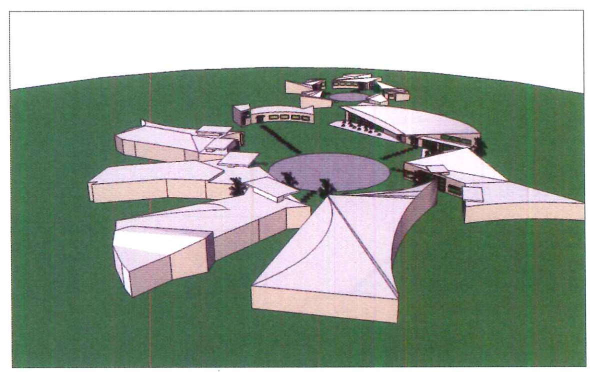
Juror Cynthia Weese, FAIA, of Chicago's Weese Langley Weese, said a well-designed school is essential because it's "a critical place" for America's youngsters. As she put it: "It's their introduction to the world." ■

Barbara J. Saffir is a Fairfax, Va. freelance writer who covers architecture and design in the Washington, D.C. area.

GRAND PRIZE WINNER'S SCHOOL LETS THE SUN SHINE IN







Tyler J. Rush thinks school should be a happy place. But the Texas teen feels that schools' typical small, windowless rooms fail to evoke a feel-good vibe that encourages learning. So he designed the "Light + Nature School."

His ideal campus features asymmetrical buildings with "translucent, tensioned fabric" roofs to shine daylight throughout each space. Rush designed it to mimic the outdoors where he's happiest—tromping through the woods, frolicking in the river or just chilling out under the sun.

"The school is centered around an outdoor courtyard, which acts as a natural interaction space for students," he said. It's "a new, healthy way to look at school design centered around nature."

Most of the eleven angular buildings on his campus boast massive windows. The photovoltaic-powered building is a community resource with a shared stadium, fitness center, cafe, and 24-hour library. He clustered class areas by subject to create a "small school culture" so kids can learn in cozy groups. His wireless, high-tech campus relies on laptop computers more than books. Rush said he was inspired by Frank Lloyd Wright's Taliesin West and the Denver International Airport.

He wowed the jury with his presentation. "Holy cow," said one juror as he opened the spiral bound notebook with its 15 pages of professional-looking drawings. Ron Bogle, president and CEO of the American Architectural Foundation, later said that Rush "had a well-developed philosophy about his concept" and he "expressed it with a tremendous amount of sophistication."

Rush created his project with Google's "SketchUp" software. It took "many, many late nights," he said.

Born in San Jose, California, Rush moved to Austin when he was five. His mom, Terri, is a former interior designer. Dad, Ira, is a computer engineer. When he's not hanging outdoors, the 18-year-old is strumming a guitar.

Rush started getting hooked on architecture after his parents built two custom-designed houses. Last summer he interned at an architectural firm and enrolled in a two-week exploratory course at Clemson University. Now he's engaged in a mentoring program with an architect at Westlake High School. Next stop: architecture school. The high school senior is now working on his college applications. — *Barbara J. Saffir*

CEILING & WALL | SYSTEMS

[Between us, ideas become reality.]®

Available online!
Classroom Acoustics CEU
at armstrong.com/ceu

Classroom Acoustics

Enhancing the learning environment through better speech intelligibility.

Armstrong®

classroom acoustics

On any given school day, thousands of students across the country are unable to understand 25 to 30 percent of what's said in their classroom.

The reason: excessive noise and reverberation within the classroom interferes with their ability to clearly hear their teacher.

The result: a decreased level of concentration, an increased level of stress, and an overall reduction in the level of learning.

Considering that the primary mode of teaching involves speech and listening, is it any wonder that good speech intelligibility is required in classrooms?

Acoustic environment

The quality of the acoustic environment in a classroom is vital to all students because all need to understand the teacher, but it is of particular importance to students who have hearing impairments or learning disorders; to very young students with limited vocabularies; to students for whom English is a second language; and to students with a temporary hearing loss due to illness such as a head cold.

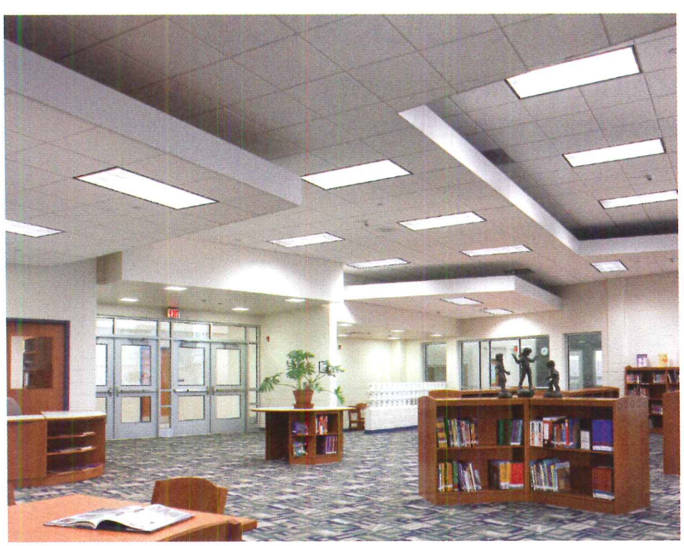
To help remedy problems caused by inadequate acoustic design, the American National Standards Institute (ANSI) approved ANSI Standard S12.60 for Classroom Acoustics.

Titled "Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools," the standard provides an enhanced learning environment for students and teachers alike by improving the conditions for good speech intelligibility.

ANSI Standard S12.60

ANSI Standard S12.60 addresses both the issues of reverberation time and of background noise as they affect speech intelligibility by setting maximum permissible levels on each.

Under the standard, the maximum acceptable reverberation time in unoccupied but furnished classrooms with volumes up to 10,000 cubic feet is 0.6 seconds, and 0.7 seconds for classrooms between 10,000 and 20,000 cubic feet. Reverberation time is the time required for sound reflections within a room, such as from a loud hand clap, to become inaudible.



The maximum acceptable background noise allowed in these classrooms is 35 decibels (dBA). By comparison, the loudness of a normal face-to-face conversation is about 60 dBA.

These acoustical performance requirements apply to the design and construction of new classrooms of small-to-moderate size, and, as far as is practical, to the renovation of existing classrooms.

At the present time, the ANSI standard is voluntary unless referenced by a code, ordinance or regulation. Individual school districts, for example, may require compliance with the standard as part of their construction documents for new schools.

New classrooms

ANSI Standard S12.60 is a performance specification in that it states desired results but not how to attain them. However, it does include a number of appendices that are prescriptive in nature, with specific design suggestions, including choice of materials.

Designing a classroom to meet the acoustical requirements of the standard is neither difficult nor costly. The key is to include acoustic concerns early in the planning and design stages. With this in mind, general guidelines are described below.

Reverberation time. For any given room, reverberation time decreases as additional sound absorptive materials are added in the space. Both the amount of sound absorptive materials and its location in the space are important considerations that affect the quality of sound within the room.

- For classrooms with ceiling heights of approximately 10 feet, place most, if not all, of the sound-absorbing material on the ceiling. This is usually the easiest and lowest cost solution. For best results, choose an acoustical ceiling panel that has a Noise Reduction Coefficient (NRC) rating of at least 0.70.
- For rooms with ceilings between 12 and 14 feet high, it may be advantageous to place some of the absorptive material on the walls as well as on the ceiling.
- For ceiling heights 15 feet or over, it is usually necessary to utilize wall absorption. Acoustical wall treatments usually consist of 3/4" to 1" thick mineral fiber or fiberglass backer board with a vinyl or fabric covering.
- If there is no possibility of acoustical wall treatment, try to ensure that three-dimensional furnishings such as bookshelves are distributed around the room to diffuse sound reflections, thereby reducing the possibility of echoes.

Carpeting may also help reduce reverberation, but not as much as a good acoustical ceiling because most commercial carpeting is generally a poor absorber (NRC of 0.25 or lower). However, carpeting can help reduce background noise caused by the sound of people walking, and desk and chair shuffling.

Figures #1 and #2 show the difference in sound paths in a classroom that is not acoustically treated compared to one that is.

Background Noise. There are many sources of background noise that may intrude into a room. How these are handled depends of the path the noise takes in entering the room. The primary contributors to background noise are described below.

Noise Traveling Through the Plenum. Some rooms are constructed with walls that are only as high as the suspended ceiling, rather than extending all the way up to the roof or floor deck above. As a result, noise from an adjacent room can

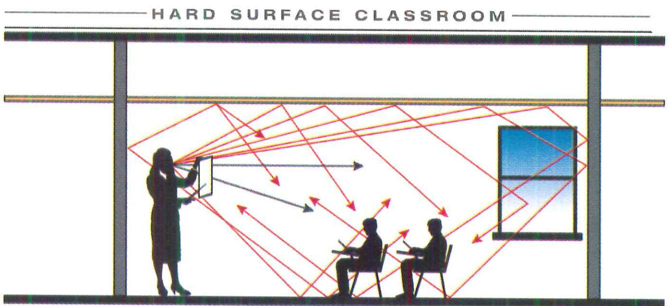


Figure 1: Black arrows represent direct sound with a clear path from teacher to student. Red arrows represent reflected sound. Note the many red arrows which indicate the longer, more indirect path taken to reach the student.

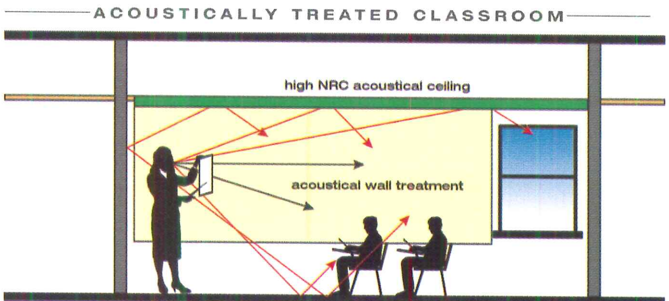


Figure 2: The addition of sound absorbing materials reduces late arriving reflected sound, lowers reverberation time and improves speech intelligibility.

penetrate the ceiling plane and move unimpeded throughout the ceiling plenum. Some portion of this plenum noise will pass back down through the ceiling into adjoining rooms, thereby adding to the background noise in each room. To help reduce plenum noise intrusion:

- Choose an acoustical ceiling panel that has a Ceiling Attenuation Class (CAC) rating of 35 or higher.
- Backload the suspended ceiling with R-11 fiberglass building insulation batts.
- Install a gypsum board plenum barrier between adjacent rooms, being sure to seal all penetrations such as pipes, ducts, cable runs, etc.

Noise Traveling Through the Walls. Years ago, interior school walls were built of brick or concrete block, so intrusion of sound through a partition wall was not much of a problem. Today, noise intrusion must be addressed because most walls are constructed using metal studs with a layer of gypsum wallboard on each side.

According to the ANSI standard, the minimum Sound Transmission Class (STC) rating of a wall separating two adjacent classrooms is 50. To achieve this rating and reduce noise transmission between rooms:

- Add R-11 fiberglass insulation in the cavity between the gypsum board layers.
- Add a second layer of gypsum board to each side.
- Seal all gaps between the walls and the floor and ceiling.
- Seal any openings in the wall such as piping, electrical outlets, and HVAC registers.

HVAC Noise. The main source of background noise in classrooms is usually the heating, ventilation and cooling (HVAC) system. A centralized system is usually much quieter than window or room units which usually contain high velocity fans that are very loud and difficult to treat with sound absorbing materials in the room. To help reduce HVAC noise:

- Locate air handlers and rooftop mechanical equipment away from critical listening spaces such as classrooms.
- Locate the equipment over spaces that are inherently noisy, such as corridors, cafeterias and gymnasiums.
- Position units over hallways and then run ducts to nearby classrooms.

Existing classrooms

A classroom designed without regard to good acoustics will often include a high ceiling of plaster or gypsum board; masonry or gypsum board walls; and a hardwood or tile floor.

Unfortunately, numerous classrooms fitting this description were built in the days before sensitivity to acoustical needs. In such a classroom, long reverberation times tend to destroy speech intelligibility, especially for younger children.

Acoustical problems in existing classrooms can be solved, but the options are often limited. This is because little can be done to change the architectural infrastructure or HVAC system without great expense. Consequently, the most common and affordable solution is to control reverberation through the addition of sound absorptive materials. To improve the acoustical environment of an existing classroom:

- Install a suspended acoustical ceiling in a classroom that does not have one.
- If an acoustical ceiling is already in the room, replace panels that have a low NRC (0.50 or lower) with panels that have a higher NRC (0.70 or higher).
- Add acoustical wall treatments and "space absorbers" (baffles).
- Add carpeting.
- Seal as many openings in the common walls as possible.
- Add a second pane of glass with an air gap to the windows, if possible, to help block exterior noise.
- Install vibration isolators under HVAC equipment, and silencers in the ductwork.

Solutions such as these do not add significantly to the construction cost of a new building. It is when they are included as part of a retrofit that additive costs usually apply.

Quiet classrooms

The need for good classroom acoustics and the methods for attaining them have been known for decades. However, in the absence of a standard, far too many schools have been built with little or no concern for good hearing.

The establishment of ANSI S12.60 fills that void by providing clear design goals for both school planners and administrators. It also raises awareness of the learning problems associated with poor acoustics and, hopefully, eventually eliminates design problems from being repeated as new schools are built.

Resources

The information on classroom acoustics and ANSI Standard S12.60 has been provided by Armstrong Ceiling Systems. There are additional resources available to you to meet your needs. They include:

- Classroom Acoustics CEU course at armstrong.com/ceu
- Online Reverberation Tool at armstrong.com/schools
- Reverberation Calculations through TechLine™ at 1-877-ARMSTRONG
- Reverberation Calculation Form at armstrong.com/schools
- "Classroom Acoustics, a resource for creating learning environments with desirable listening conditions;" Acoustical Society of America, asa@aip.org
- Your Armstrong Ceiling Systems representative at 1-877-ARMSTRONG

Case Study

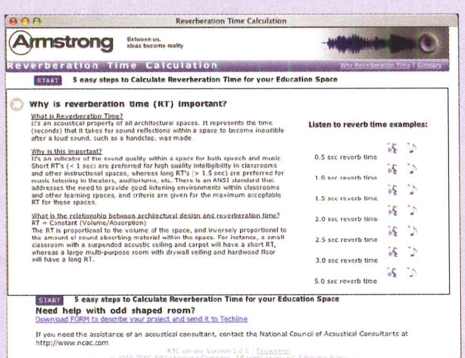
An evaluation conducted by Dr. Kenneth Roy, senior principal research scientist for Armstrong Building Products, demonstrates the difference a high performance acoustical ceiling can make in a classroom renovation.

The acoustic test took place in a sixth grade classroom at the Robert E. Lamberton Public School in Philadelphia, PA. Built in 1949, the 24'x44'x11' classroom had a spray-applied 1/2" fiber-on-plaster ceiling, concrete block walls, and a vinyl tile floor. The NRC of the existing ceiling was estimated to be approximately 0.25.

The reverberation time in the existing room was 1.1 seconds averaged over the frequency range specified by ANSI S12.60, far exceeding the maximum acceptable reverberation time of 0.6 seconds.

An Armstrong School Zone™ Fine Fissured suspended ceiling with an NRC of 0.70 was then installed. This ceiling is designed specifically for educational facilities and features more uniform sound absorption than most conventional ceiling panels commonly used in these applications. Following the change in ceilings, measurements were re-taken and the average reverberation time was now 0.56 seconds, within the acceptable limit.

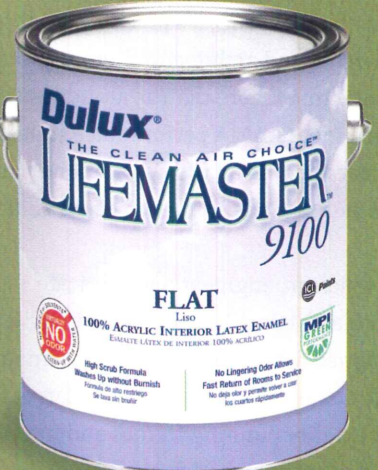
Reverberation Calculator



To help demonstrate the beneficial effect of acoustical treatment in a classroom, Armstrong Ceilings has developed a web-based, interactive Reverberation Calculator that allows users to hear the difference in sound quality both before and after treatment. It will even provide recommendations for a new space or an upgrade to an existing space.

To access the calculator, simply log on to armstrong.com/schools and follow the prompts regarding a description of the space and its surface materials. The program will first calculate the current reverberation time and allow users to hear the quality of the sound. Following selection of acoustical treatment options, the program will then allow users to hear the difference in sound quality with lowered reverberation time.

The *Clean Air* Choice®



- Meets all LEED® specifications including LEED® for schools
- Contains zero VOCs
- Approved by Master Painters Institute for Low Odor/VOC
- No lingering odor for quick re-use of rooms
- Ideal for interior wall and ceiling applications
- High scrub formula

ICI Paints

Dulux®
Your Vision. Delivered.™

Call 1-800-984-5444 or visit
www.duluxpaints.com/green

Circle 15 on Reader Service Card or go to www.shoolsofthe21stcentury.com

Fenestration Solutions Earn High Marks

EXPRESSIVE DESIGN PROVIDES COMFORT AND SECURITY TO TODAY'S LEARNING ENVIRONMENTS

CARVER HIGH SCHOOL: Atlanta, Ga.

ENSURING THAT STUDENTS HAVE SAFE, HEALTHY AND comfortable learning environments is a top priority for all of us. However, budgets are tightening and student populations are growing. As a result, administrators, teachers and architects are being asked to do more and more, with less and less.

Providing products that are efficient and affordable is a must—and EFCO takes pride in their long tradition of doing just that.

>>> ORIENTATION:

A member of the Pella family of companies, EFCO is headquartered in Monett, Missouri, where they provide careers for more than 1,600 employees.

In business for more than 50 years, EFCO is known for their long-standing commitment to innovation, efficiency, expressive design and a level of quality unsurpassed in the industry.

Since their inception, they have grown into a leading manufacturer of architectural aluminum window, curtain wall, storefront and entrance systems for commercial architectural applications. Their products can be found in everything from sports arenas, shopping malls and government office buildings to high-rise residential and commercial buildings.

However, it's the hundreds of schools and collegiate building projects across the country that makes them most proud.

>>> ELECTIVES:

For customers, educational institutions especially, EFCO's vertically integrated manufacturing helps ensure design solutions that are both innovative and sensible. For EFCO, it's precisely what makes them a leader in commercial- and architectural-grade products.

> ***Windows.*** EFCO manufactures more than 25 aluminum window systems, all of which meet AAMA performance standards. And the company provides them in all the applications that ensure they'll meet clients' demands: hung, projected, sliding and special-purpose.

They can also custom-design, engineer and fabricate windows to meet any project's specifications. Additionally, their Trim-All® system is designed for restoration or replacement applications, such as the one recently completed at Carver High School in Atlanta. Their exterior panning frames and interior trims snap into place over existing wood or steel frames—making for easy installation and immediate energy savings.

> ***Curtain wall.*** EFCO manufactures curtain wall systems in a variety of depths, profiles and finishes. Their systems meet key specifications for resistance to air, water and impact, as

PHOTOS COURTESY OF: EFCO CORPORATION

PERFORMING ARTS BUILDING: Texas A&M Corpus Christi Campus, Corpus Christi, Tx.

well as modern expectations for sustainability and structural and thermal performance.

As you can see from Texas A&M's Performing Arts building, which utilizes EFCO's E-Wall, that variety allows the company to offer a comprehensive, cutting-edge line that combines design and performance.

Their E-Wall reduces labor time and costs, because its molded-corner silicone gasket means there are no internal joint seals, mullion plugs, pressure plates or snap-on covers.

› ***Entrances and storefronts.*** EFCO has entrance and storefront systems that meet the unique needs of schools and universities —such as the system at Ozark Technical Community College in Springfield, Missouri. Specifiers are consistently impressed by the sheer variety of EFCO's products and their durability, versatility, low maintenance and unequaled quality.

OZARK COMMUNITY COLLEGE: Richwood Valley Campus, Ozark, Mo.

The company's entrances are designed to integrate easily with their entire family of storefronts. Available for the full spectrum of applications and requirements, EFCO entrances and storefronts provide reliable air, water, thermal performance, along with maximized security—important advantages for busy schools and university buildings.

EFCO's vertically integrated manufacturing helps ensure design solutions that are both innovative and sensible

With EFCO, you get all the choices that ensure an expressive design, while they deliver quick fabrication—in the shop or in the field.

»» "GREEN" CLASSROOMS:

At EFCO, they understand the need to provide long-term, energy-efficient and earth-friendly options that help keep operations costs down. In fact, EFCO has lessened the environmental impact of their products in a number of ways:

› ***Recyclable materials.*** EFCO offers a product line comprised largely of glass and aluminum—two of the world's most abundant recyclable materials. Recycled aluminum is identical to smelted aluminum and is an extremely effective building material. Plus, it only takes a small fraction of energy to produce and is easily recycled.

NORTH DAKOTA STATE UNIVERSITY: Fargo, N.D.

EFCO offers a number of products that withstand severe weather and massive force

› *Thermal innovation.* Many EFCO products save energy by incorporating their E-Strut® technology for thermal isolators. In addition, a new pultruded process supports their fiberglass E-Shield™ window. North Dakota State University is just one example of an educational institution that has utilized this cost-saving advantage.

› *Reduced VOCs.* The company's Ultrapon™ and Ultraflur™ painted-finish systems contain high solids, which decrease the pounds of Volatile Organic Compounds (VOCs) per gallon of paint without sacrificing performance.

› *Anodizing finishes.* When producing EFCO's Class I anodic finish, they filter the water and chemicals used in this process. As a result, a "cake" of aluminum hydroxide is made—and then reclaimed and sold to processors to produce alumina.

››› KEEPING KIDS SAFE:

While the company hopes they are never needed, EFCO offers a number of products that withstand severe weather and massive force. These products are specifically designed to keep students safe.

After all, schools in coastal regions like Florida's Gibbs High School are susceptible to some of the country's most extreme weather. And with the potential for man-made disasters, whether intentional or accidental, safety is a critical consideration wherever a school building is constructed.

To ensure that their impact-resistant products withstand extreme conditions—whatever the cause—EFCO maintains extensive R&D and laboratory testing facilities to make certain their products meet and exceed standards even before they're independently tested. They also apply their own expertise before outside verification. For instance, their engineers and researchers develop and test their Impact Grade products in EFCO facilities.

GIBBS HIGH SCHOOL: St. Petersburg, Fla.

BLYTHEWOOD HIGH SCHOOL: Blythewood, S.C.

> ***Making the Grade.*** EFCO recognizes and works toward all the accepted standards for impact resistance:

- ***Impact Grade.*** Products are manufactured in accordance with Miami-Dade and ASTM 1996 & 1886, which have been adopted along much of America's eastern coastline.
- ***Blast Grade.*** Designed to help ensure that a building and its occupants survive an explosion, products are tested to ASTM 1642-03.
- ***Ballistic Grade.*** Tested to UL 752, products provide superior resistance to projectiles of various shapes and sizes—a particularly important feature for educational institutions that face a variety of threats daily.
- ***Hurricane Grade.*** Manufactured and tested to comply with Dade County Hurricane Code, EFCO's products are designed to preserve structural integrity, keeping roofs and walls intact and preventing the intrusion of damaging winds and windborne objects.

Their products also undergo missile-impact testing, which measures structural performance against high-velocity windborne projectiles.

From research and development to manufacturing and testing, EFCO applies the knowledge and dedication of experienced professionals. This attention to detail ensures security and peace of mind.

With EFCO, you have a single source for products and information that help you meet regulatory standards. And you have the confidence that your building will help protect the students inside it.

>>> EXCELLING IN THE CLASSROOM AND BEYOND:

For EFCO, success and growth are what happens when you spend decades working with your customers to meet their needs.

Their products are designed with students' well-being in mind. From maximized natural lighting that enhances the learning atmosphere to ventilation capacity that further ensures health and safety. And they address all of today's security, energy and environmental challenges.

Throughout their history, EFCO has set high standards and then met them all—with their industry-best windows, curtain wall, storefronts and entrances and more.

The company looks forward to continuing to work hand-in-hand with the educational community, offering products that meet your needs as they strive together to build and improve America's schools well into the 21st century. ■

PolyVision®...

Leading the Education market in environmentally-responsible writing surfaces

Supporting sustainability in our classrooms, only PolyVision offers writing surfaces featuring *e^3 environmental ceramicsteel*™, the industry's premiere, ecologically intelligent writing surface for whiteboards and chalkboards.

The first writing surface in the industry to receive global Cradle to Cradle℠ Silver, GREENGUARD for Children & Schools℠, and GREENGUARD Indoor Air Quality® certifications, e^3™ assures architects, designers, and specifiers that the PolyVision products they select support a healthy indoor air environment.

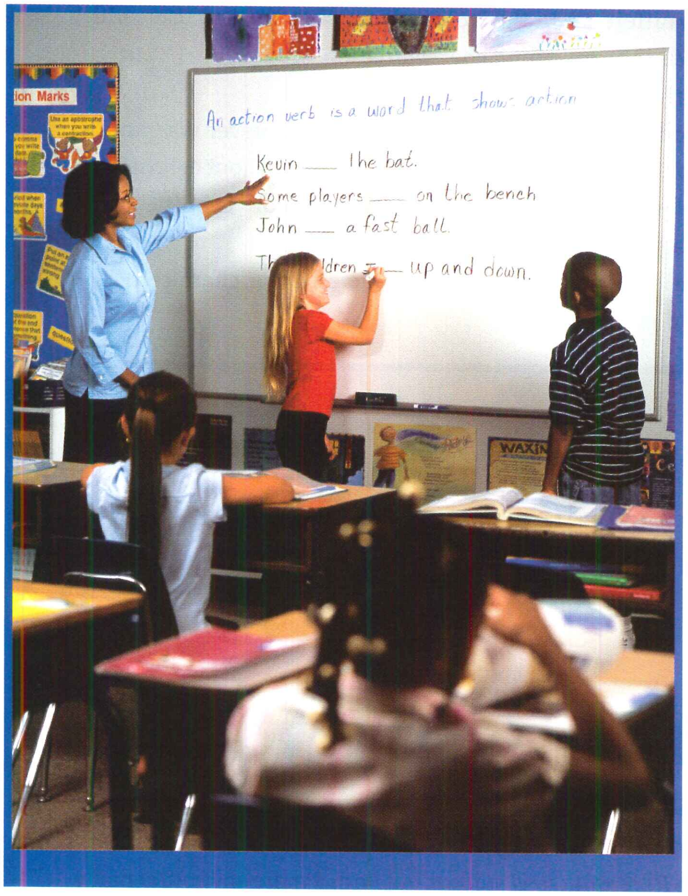
1.800.620.POLY | www.polyvision.com | info@polyvision.com

PolyVision®
A Steelcase Company

Circle 18 on Reader Service Card or go to www.shoolsofthe21stcentury.com

What Color is Your Whiteboard?

ENVIRONMENTALLY RESPONSIBLE COMMUNICATION PRODUCTS BRING SUSTAINABILITY TO EDUCATIONAL SETTINGS



PHOTOS COURTESY OF: POLYVISION CORPORATION

ENVIRONMENTAL CONSIDERATIONS HAVE NEVER PLAYED a more important role in new school construction and refurbishing than today. Every year, more and more green schools are built, saving energy, reducing environmental contaminants, and keeping our children healthy. The Council of Educational Facility Planners International estimates that schools will spend $5.3 billion on green building by 2010, a rapid growth from almost nonexistence a few years ago.[1]

There is incredible momentum to this important work, as evidenced at Greenbuild International Conference and Expo held in November 2007. Greenbuild experienced record attendance, with the keynote speech given by former President Bill Clinton, urging conference attendees to spread the word about the economic benefits of sustainable design. The green movement is further supported by an increasing number of green school initiatives, such as the Collaborative for High Performance Schools (CHPS), which works to design, build and operate a new generation of schools that are efficient, green, healthy learning environments for children and helps facilitate and inspire change towards more environmentally responsible planning, design, maintenance and operation of our educational system.

According to the U.S. Environmental Protection Agency (EPA), 20% of the U.S. population, approximately 55 million people, spend a majority of their time in more than 120,000 schools. Roughly half of these schools have indoor air quality problems, which pose a health risk to children and educators. Indoors, products and materials release volatile chemicals and particles into the air that may negatively affect human health. The EPA, the American Lung Association, and the World Health Organization view indoor air pollution as one of the greatest risks to human health.[2]

Children are at greater risk of developing health problems due to poor indoor air quality because they are still growing and are more vulnerable to hazardous environmental exposures. Indoor pollutants such as certain Volatile Organic Compounds (VOCs), pesticides, and allergens are more harmful to younger generations;[3] asthma, for example, is the leading cause of school absences and results in 14 million missed school days each year.[4]

Whether it's reducing the ecological footprint by using greener materials, or ensuring a healthy classroom for our children, the environment is a key consideration for architects, designers, and specifiers involved in the construction of today's schools.

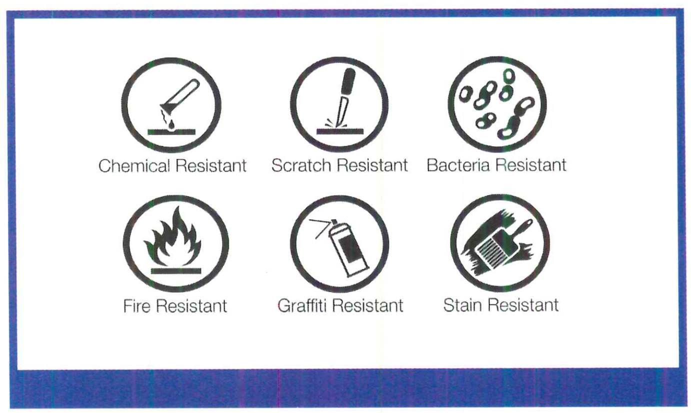
Supporting sustainability in the classroom, PolyVision®, A Steelcase Company and the world leader in visual communication products, has stepped up to take the role of leader in the industry with regard to environmental stewardship. With a key focus on the K-12 market, PolyVision recognizes that architects, specifiers, school administrators and parents alike are all concerned about the quality of indoor air as well as reducing the ecological footprint wherever possible. As schools are being built or refurbished, each party needs to explore and understand the impact that each product selection will have on the air, environment and most importantly, the health of our children. Studies show that as schools are better lit and better ventilated, attendance improves—which means better students, and smarter kids![5] "PolyVision believes everyone has a duty to be environmentally responsible," says Mike Dunn, President and CEO of PolyVision Corporation. "We are dedicated to taking the lead in the development and distribution of products that comply with both the spirit of the world's evolving ecological interests and the requirements of today's classrooms and work spaces."

Architects face many challenges when building green schools and sustainable buildings. The best remedy is accurate information and viable options. There are many choices today in the category of visual communication products, however, PolyVision offers a unique combination of leading-edge and environmentally responsible solutions from the simplest traditional whiteboard to sophisticated collaboration tools.

PolyVision believes that sustainability is an important business practice in today's global economy. In late 2004, the company set out to develop an environmentally responsible version of their *P³ ceramicsteel®*, the world's best-selling writing surface for whiteboards and chalkboards.

During the development of this new technology, they were determined to create products that complied with both the spirit of the world's evolving ecological interests and the requirements of today's workplace. It was critical that there be no difference in the look, feel, or use to the end user, which included the following characteristics:

- Virtually indestructible surface
- Product protected for life (PolyVision's Forever Warranty)
- Non-porous surface that erases easily without "ghosting"
- Allows for smoother writing and superior visibility
- Magnetic
- Resistant to stains, scratches, bacteria, fire, chemicals, and graffiti



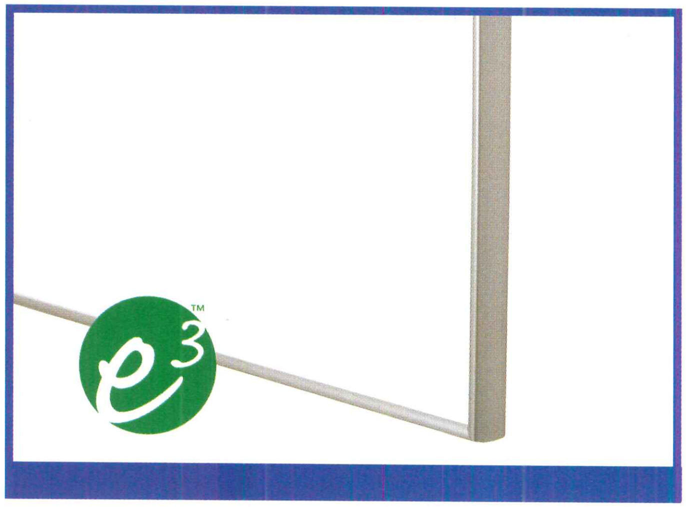
The result of this development process was *e³ environmental ceramicsteel™* writing surface, which offers the same features as the *P³ ceramicsteel* surface, but with a more environmentally responsible composition: the total amount of heavy metals (cadmium, mercury, hexavalent chromium, and lead) contained in *e³™* is less than 0.1%; the surface is free of arsenic and antimony and contains no VOCs. In addition, the steel core is made from a minimum of 30% post-consumer and post-industrial waste and the surface is 99% recyclable.

The company began to scrutinize the entire supply chain and, from their key learnings, developed eVision™, their corporate environmental policy. Following the eVision principles, their Production, Supply Chain, and Research and Development teams continually evaluate alternate resources and process improvements for new and existing products. This cycle of continual improvement has enabled PolyVision to capitalize on technology and material efficiency to reduce their environmental footprint while developing products that advance human health, social responsibility, and economic success.

To validate PolyVision's product development and to help customers assess environmental merits, the company researched available environmental standards worldwide and selected two third-party certification programs that were most applicable to their goals and product offering.

e^3 environmental ceramicsteel surface is the first and only writing surface to receive International Cradle to Cradle℠ Silver certification, awarded by McDonough Braungart Design Chemistry (MBDC). Cradle to Cradle certification focuses on the characteristics of sustainable materials, products, and systems and places a major emphasis on the human and ecological health impacts of a product's ingredients, as well as on the ability of that product to be truly recycled or safely composted. "PolyVision continues to demonstrate a true commitment to the Cradle to Cradle design concept through its material choices, product designs and advanced manufacturing processes," said William McDonough, architect, designer and co-founder of McDonough Braungart Design Chemistry.

In addition, the company's marker and tack board range has earned GREENGUARD Indoor Air Quality® and the more rigorous GREENGUARD for Children and Schools℠ certifications, assuring specifiers and consumers that the products they select support healthy indoor air quality and do not emit harmful chemicals. Products that have Cradle to Cradle and GREENGUARD certification may also contribute to LEED® Innovation in Design credit.



PolyVision's environmental commitment extends to its technology portfolio of products, which also meets the strict standards for content pursuant to Reduction of Hazardous Substances (RoHS). Compliance with RoHS assures customers that heavy metals and other substances of concern have been eliminated from RoHS-certified products.

"PolyVision is dedicated to setting an example with the development and distribution of products that meet evolving ecological needs," says Mike Dunn. "We are proud to be at the forefront of environmental stewardship and are committed to developing products that enable more ecologically responsible work practices and healthier work and learning environments."

This commitment to environmental responsibility and stewardship has positioned the company as the industry leader, proving that innovation and sustainability not only go hand-in-hand, but are a vital part of responsible business practice in the modern marketplace. ■

---

1 Bonda, Penny. "The Proliferation of Green Schools: A Very Good Thing." *Interior Design*, August 2006. http://www.interiordesign.net/GreenZoneNews/CA6471311.html? subhead=Features

2, 3 GREENGUARD Environmental Institute, 2007. http://www.greenguard.org

4 *National Geographic*. "Green Guide – Top 10 Healthiest Schools." July-August 2006.

5 Kats, Gregory. "Greening America's Schools, Costs and Benefits." October 2006. p. 10

The New Standard in Water Efficiency

SLOAN ECOS™

The World's First TRUE Dual-Flush Electronic Flushometer

The new Sloan ECOS™ Dual-Flush Flushometer is the first electronic valve of its kind. Advanced Sensor Technology allows for hands-free operation while still delivering water-saving dual-flush performance. The valve senses the user's proximity and duration and delivers the proper flush volume based on these factors. Intuitive dual-flush override buttons ensure efficiency. Whether flushed manually or automatically, the new Sloan ECOS offers unequaled efficiency and reliable performance.

- Smart dual-flush sensing technology delivers appropriate flush volume – automatically
- Ground-breaking water efficiency
- Intuitive dual-flush override buttons
- State-of-the-art sensor eliminates false flushing

For more information, go to **www.waterefficiency.com**.

Generating Efficiency Through Technology

SLOAN®

800-9-VALVE-0
(800-982-5830) ext. 25609
www.sloanvalve.com

Patent Pending

Circle 20 on Reader Service Card or go to www.shoolsofthe21stcentury.com

Innovative Plumbing Systems for School Savings

SUSTAINABILITY WITH WATER- AND ENERGY-EFFICIENT PLUMBING

Purdue University has installed Sloan's UPPERCUT® dual-flush Flushometers in two administrative buildings on the West Lafayette, Ind., campus.

SLOAN VALVE COMPANY, THE WORLD'S LEADING manufacturer of water-efficient plumbing systems, offers a complete line-up of products for the education market.

For school restrooms and locker rooms, Sloan emphasizes water and energy efficiency with products such as its Sloan SOLIS® solar-powered faucet and other 0.5 gallon-per-minute sensor-operated faucets; low-consumption and water-saver Flushometers; SloanStone® solid-surface lavatory systems, which come in numerous colors and configurations; UPPERCUT®, the first commercially available dual-flush technology; Waterfree Urinals; 1.0-gallon FLUSHMATE® pressure-assist technology; SMOOTH® retrofit kits for converting manual Flushometers to electronic operation; self-cleaning Act-O-Matic® showerheads; and energy-efficient, ultra-fast XLerator® Hand Dryers.

Sloan's new innovations in efficiency include:

- complete High-Efficiency Urinal systems, which combine a vitreous china fixture with a manual or electronic Flushometer that utilizes only 1 pint of water to flush
- Sloan ECOS™, the industry's first electronic dual-flush Flushometer
- Sloan Graywater System that collects water that flows down sinks and reuses it for flushing

Sloan also addresses the plumbing needs of specialty areas in educational facilities. Choices include hand-washing sinks with sensor-operated gooseneck faucets in a number of spout options for classroom, foodservice, laboratory or medical needs.

Areas that are prone to vandalism or misuse could benefit from Sloan Monitored Systems, which enable centralized or remote monitoring and control of plumbing fixture usage. Administrators can pre-set usage parameters for toilets, sinks or showers, or turn off/on water as needed for maintenance, emergencies or seasonal facility shutdowns.

Sloan is committed to sustainability not only in what products it manufactures, but also in how it manufactures. The U.S. Environmental Protection Agency recently awarded Sloan with its Green Power Leadership Award, recognizing Sloan for how it offsets 100% of the energy used in its Franklin Park, IL, headquarters and manufacturing facility with clean, renewable wind energy.

Sloan's corporate mission toward sustainability also includes other initiatives, such as installing more energy-efficient lighting, which will significantly reduce its carbon footprint. Sustainability is also reflected in Sloan's material choices: about 89% of a Sloan Flushometer is made from brass casting alloy, 99% of which is from recycled sources and the Flushometer is completely recyclable or reusable in remodel projects.

Sloan is proud that it can provide commercial, industrial and institutional facilities worldwide with long-lasting, reliable plumbing products that help them reduce their water consumption without compromising performance. ■

PHOTO COURTESY OF: SLOAN VALVE COMPANY

Quality Certification Program: Stamp of Quality

The AWI Quality Certification Program (QCP) is a valuable quality assurance tool that ensures custom, interior architectural woodwork, one of the most highly visible aspects of many construction projects.

Endorsed by the General Services Administration (GSA) and the American Subcontractors Association (ASA), QCP is in its 11th year of operation. More than 1830 projects have been certified since QCP was launched in 1995.

Certification credentials are earned by architectural woodwork firms who, through comprehensive testing and inspection, demonstrate the ability to fabricate, finish and/or install work in accordance with the quality grade criteria set forth in the *Architectural Woodwork Quality Standards Illustrated* (QSI) book.

Based on Quality Standards

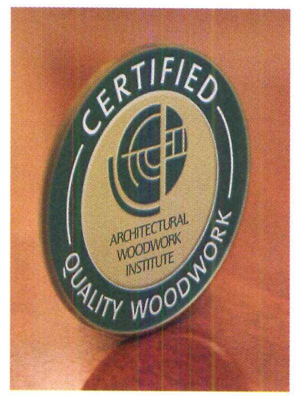
Published by the Architectural Woodwork Institute since 1961, the QSI is the authoritative reference for fine interior architectural woodwork recognized as a unified North American standard. Now in its 8th edition, the QSI contains 685 pages of standards demonstrated by technical and design illustrations. It covers architectural woodwork from raw lumber and veneer through factory finishing and installation.

QCP has earned a solid reputation as a stamp of quality recognized throughout the design and construction industries.

Benefits of QCP

A great designer strives to put a unique stamp on a project while balancing budgets and keeping schedules on track. A building owner deserves to receive what is expected. The QCP benefits design professionals, specifiers and owners:

- **Expertise.** All QCP-certified woodworking firms undergo rigorous testing and inspection by a national network of industry experts. AQCP-certified firm will handle your project with the utmost integrity.
- **Asset Protection.** When specified, the QCP protects the design professional and owner if woodwork delivered to a job doesn't meet specification upon inspection. The design professional and/or owner can call for an inspection at no cost, and the woodworker is required to correct any deficiencies within a specified timeframe.



- **Peace of Mind.** During inspection, the QCP representative, an industry expert, conducts a complimentary review of shop drawings to confirm they meet all specifications and quality standard requirements, significantly reducing the possibility of non-compliant work.

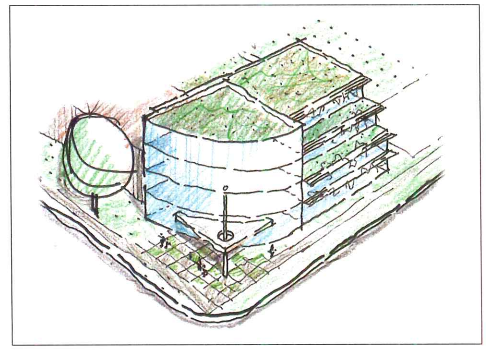
To locate a participating QCP architectural woodwork manufacturer, visit www.awiqcp.org and use the "Find a Certified Firm/Project" feature. You'll find over 453 QCP participants throughout the United States, Canada and several foreign countries.

AWI ARCHITECTURAL WOODWORK INSTITUTE

Quality Certification Program
800-449-8841 • 571-323-3630 (fax)
www.awiqcp.org

AMERICAN ARCHITECTURAL FOUNDATION

NATIONAL SCHOOL DESIGN INSTITUTE



44 St. Paul's Episcopal School
NEW ORLEANS, LOUISIANA

No One-Size-Fits-

BY CHARLES LINN, FAIA

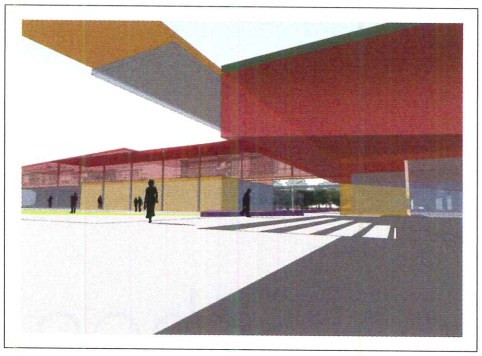
The American Architectural Foundation's second National School Design Institute gathered surprising solutions to building design problems faced by school districts across the country.

What if you had the opportunity to have two top school-design architects spend 24 hours doing nothing but working with you on the redesign of one of your district's schools? No doubt you would bring the most vexing problem you had, and work as hard as possible to solve it.

Such was the case with four school districts from across America who were selected to participate in the American Architectural Foundation's second National School Design Institute (NSDI) in Washington, D.C., this past September. It is part of the AAF's Great Schools by Design program. Its objective is to show that architecture and design can improve the quality of peoples' lives. Target was the AAF's presenting sponsor for the event.

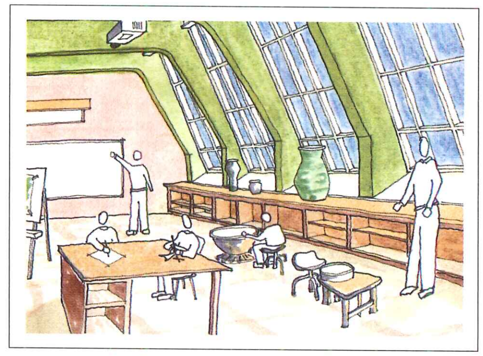
The format for the NSDI—several intense, tightly scheduled design sessions followed by a presentation of the results of the work—is known as a "charrette" in architectural circles. These particular charrettes demanded that teams—consisting of teachers, principals, district facilities managers; architects already working for the districts; plus two resource architects who had not previously worked with them—focus quickly on the analysis of the problem and its solution. The purpose of the NSDI is not only to help a few school districts work on their problems, but also to gain an understanding of how other school districts across the country could address similar problems.

Of all the schools that participated this year, St. Paul's Episcopal Church and School in New Orleans might have the most unique circumstances. A levee collapse after Hurricane Katrina left its 3-acre campus 5 feet underwater for several weeks. In the two years since this happened, the school has made a remarkable recovery. It is up and running, however, with half the students it once had. This gives St. Paul's an opportunity that few have: to completely rethink not just the way its buildings are organized, but also how well the structures support their educational programs. But they must act quickly, since they need to enroll more students in order to regain financial health. The master plans created by architects Chris Graae, AIA,



48 Jefferson High School
PORTLAND PUBLIC SCHOOLS, PORTLAND, OREGON

52 Thomas Jefferson High School for Science and Technology,
FAIRFAX COUNTY PUBLIC SCHOOLS, FAIRFAX, VIRGINIA



56 Cleveland High School
ST. LOUIS PUBLIC SCHOOLS, ST. LOUIS, MISSOURI

All Solutions

and Steve Crane, AIA, truly reflect the courage, vision, and passion for rebirth brought by the St. Paul's team.

Many cities have old high school buildings that suffer from poor maintenance, and with configurations that no longer work. Built for a few thousand students, many are now attended by just a few hundred. Two districts brought this scenario to the NSDI and got very different kinds of advice. Representatives from the Portland Public Schools in Oregon presented Jefferson High School. Insensitive additions have transformed this once-magnificent structure into a rabbit warren of disconnected rooms completely unsuited for the small learning academies that have been formed to serve its student body. And the school's site did not allow it to take advantage of its adjacency to a community college across the street. The district agreed with architects Pat Bosch and Paul Winslow, FAIA, that the best solution would be to demolish the school and rebuild a campus of small buildings.

Representatives from St. Louis Public Schools working with Amy Yurko, AIA, and James Hoagland, AIA, found the opposite. The district's currently-closed Cleveland High School should definitely be saved, and could likely be configured to accommodate theme-based small learning communities.

Fairfax County Public Schools' team brought Thomas Jefferson High School and a problem that plagues many districts: what to do with a spread out, single-story,1960s-era high school that is bursting at the seams? John Pfluger, AIA, and Laura Wernick, AIA, helped them determine that selective demolition and a multistory addition would work. Their solution emphasized science labs and social-learning spaces.

The charrette process used at the NSDI is one that can yield fantastic results in a short time, although some groups are better at it than others. Readers who have never been involved in one may find our guidelines (below) to be of assistance. ■

TRY THIS AT HOME

Steps for a successful charrette

1. Hire one or two school-design consultants who are experienced in the charrette process to lead the exercise.
2. All of the people who have an interest in the outcome should be represented. This could include community leaders, politicians, school board officials, principals, the architect currently working on the problem, and the district's facilities people.
3. Include high-ranking officials who have decision-making power. When high-ranking officials are involved in the charrette process, they can grant permissions and give approvals that might otherwise be unthinkable—or impossible to gain later.
4. Locate the charrette where there will be minimal disruptions. Block off a period of time when the stakeholders have little choice but to participate in the process. There should be limited access to telephones, PDAs, and e-mail.
5. Allow two days with no more than six hours each day for the design charrette to occur. After that, a formal presentation of the results to a larger group tends to force the team to come to a conclusion.
6. It's a good idea to hire consultants from "out of town." They come to the activity without baggage or preconceptions; they aren't likely to compromise because they will appear before the school district to interview for work later.
7. Abandon all preconceptions. Groups should be open to all possibilities. In particular, don't get hung up on the budget.
8. No one should pull rank. Frequently one or two people take over the charrette. The student's input is just as important as the superintendent's.
9. Come with a well-defined design problem. Open-ended problems tend not to yield useful results.

St. Paul's Episcopal School

New Orleans, Louisiana

The staff of a destroyed school used the charrette to reconsider its master plan and the organization of their classroom buildings.

ST. PAUL'S EPISCOPAL SCHOOL AND CHURCH ARE LOCATED IN THE HEART OF Lakeview, a neighborhood in northwest New Orleans. In August of 2005, Hurricane Katrina collapsed a section of the 17th Street Canal levee near St. Paul's, and Lakeview became one of the most severely devastated sections of the city. Seventy percent of the families and faculty lost everything in the flood. The neighborhood is now showing signs of renewal, although the return of infrastructure, businesses, and services has been slow. Only 40 percent of the residential community around the school has returned. The current enrollment numbers allow for a comfortable existence in the present building configuration, however, student enrollment is now about half of what it was before the storm, as is the size of the faculty. The school will not survive unless it returns to full enrollment.

THE CHALLENGE

In 2005, St. Paul's had 260 students and a reputation for excellence in general academics. It also was known for its science, arts, and community-outreach programs. The campus was made up of six buildings, a play area, and parking lot, and it stretched across three acres. Of the original buildings, two for the primary

The photo above of the sanctuary at St. Paul's Church was taken about eight weeks after the storm. The photo at left shows what St. Paul's Episcopal School looked like five days after Hurricane Katrina.

The St. Paul's team, clockwise from left: Chris Graae, AIA, Cox Graae + Spack Architects; Rebecca Buras, St. Paul's business and project manager; Joy Tessman, curriculum specialist; Margaret Kirn, junior warden of the vestry, St. Paul's Episcopal Church; Merry Sorrells, head of school; Steve Crane, FAIA, VCBO Architecture. Not pictured: Reverend Will Hood

grades were renovated and reopened in the fall of 2006. A third building, designed to house the youngest students, was restored and opened in the fall of 2007.

THE SOLUTION

"Come hell or high water" and "the little school that could" became the themes for the new St. Paul's Episcopal School, and the mission of the school is equally ambitious—to create a learning environment where students are positioned to be global citizens and stewards of both the earth and each other through innovations in both the learning environment and curriculum. The core would be teaching the connection—and impact positively or negatively—that each person can have on our environment, our community, and the world beyond.

After articulating this lofty goal, participants of the charrette began to recognize that realizing it demanded an unrestricted rethinking of both the layout of the campus and the way the buildings are organized. The group began with an analysis of the conditions and usage of the campus and its assets before and after Katrina.

The site analysis revealed several problems that are not uncommon among campuses that have grown up over time. The school's entrance was obscured from the street and unwelcoming. Within the site, vehicular circulation conflicted with pedestrian traffic. There was a need for a central gathering space, and a central campus arrival, drop-off, and distribution point. In addition, outdoor spaces were not being fully utilized or oriented to surrounding buildings. And finally, the buildings that still existed were oriented in such a way that future development opportunities were impeded.

The first master plan that was developed explored the first of a multi-phased expansion of the campus. Various parts included the replacement of a damaged two-story classroom building adapted from a house with new state-of-the-art science center that would transparently express its purpose at an important corner of the site. The vehicle circulation and student dropoff point would be relocated, allowing the construction of a bright, welcoming central lobby in the main school building. A bridge would connect the interior circulation paths through this central space at the second floor of the main school building; it would overlook the new lobby. Reconfiguration of second floor classroom spaces would better accommodate the school's new educational program.

A proposed second-phase development plan suggested ideas for subsequent development and campus expansion. These included acquisition of the northeast quarter of the block where the campus is located, exploration of a public/private partnership for a performing arts center that did not exist in the area. Vehicular circulation would be relocated to the perimeter of the site to promote a safe and cohesive campus center.

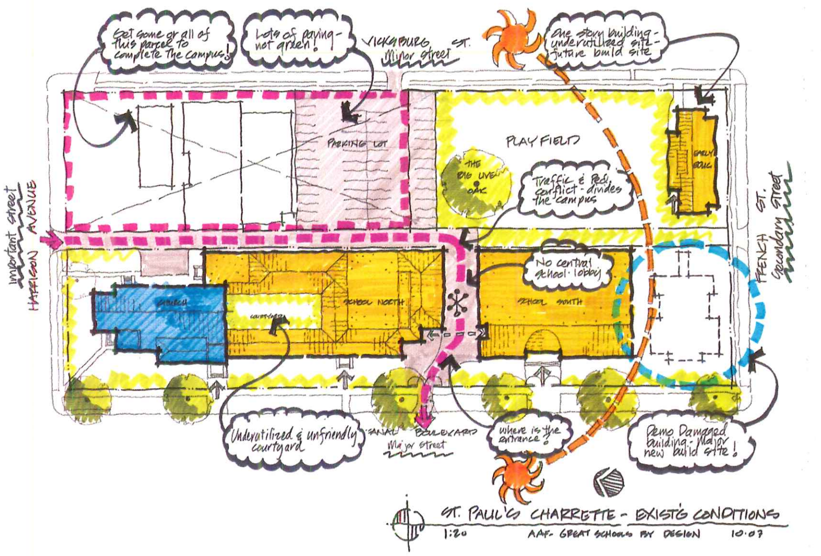
The surface parking lot would be replaced with a more efficient, expanded multistory parking garage. Finally, the one-story early education building that was recently constructed, but not master planned, would be replaced with a new multi-story academic building. One of the new plans offered ideas of how St. Paul's environmental orientation might be integrated into the site and buildings. Its new buildings

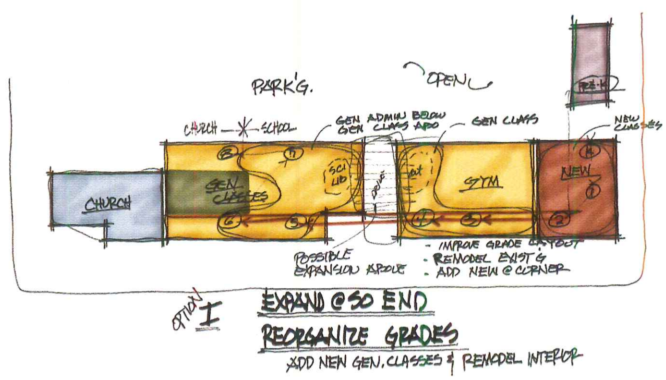
During the charrette, "come hell or high water" and "the little school that could" became themes for the new St. Paul's Episcopal School.

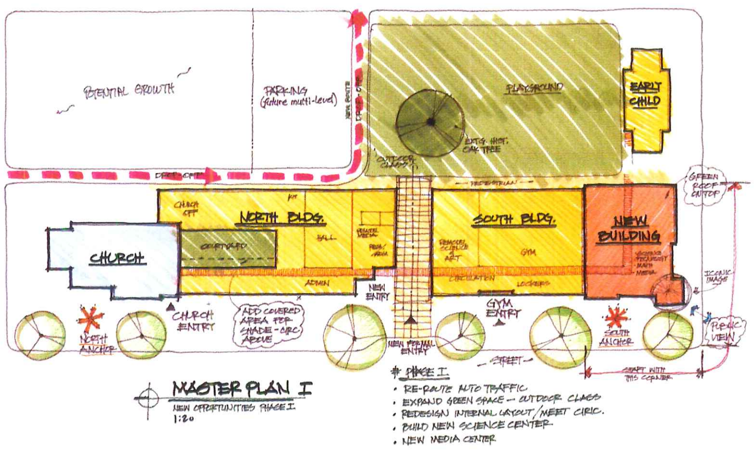
Master plans

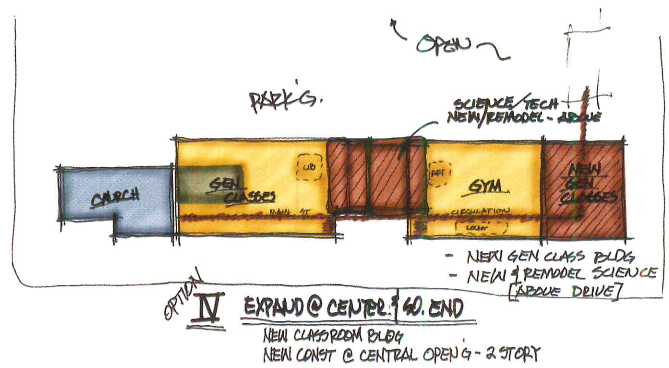
The plan at left examined existing conditions at the site. Below it, Master Plan I looks at new traffic patterns and short-term needs. Master Plan II looks at possible long-range plans, including acquisition of new property.

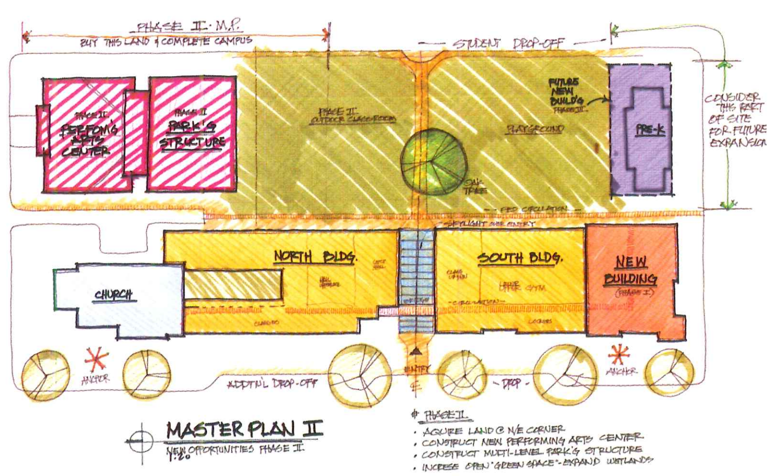
Below are three of five plans that resulted from a detailed examination of how the halves of the main school building, rendered in ochre, might be reorganized to reflect the school's educational programs.

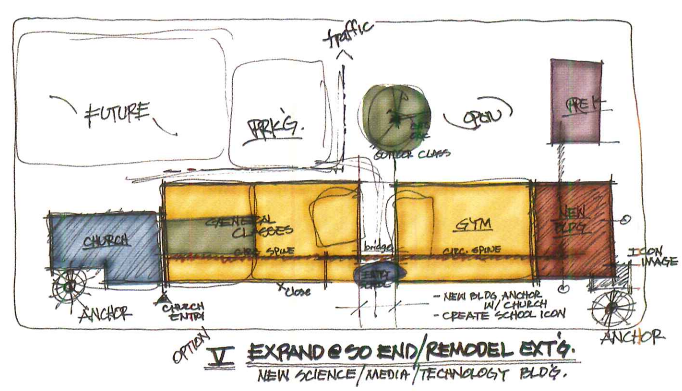












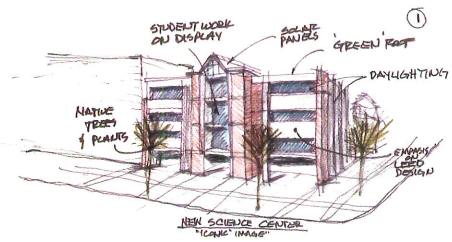
should embody LEED Silver–level high-performance building standards in design and materials specifications, expressing energy efficient systems architecturally to promote learning and understanding. Many ideas were explored, including the incorporation of onsite storm water management principles; the use of geothermal well fields to support heat pump systems; use of wind and solar power, natural ventilation, and daylighting; rainwater collection and graywater recycling; trash and materials recycling; reduction of runoff and heat island effects through the use of permeable pathway systems, and green landscapes; highly reflective and green roofs; and a living outdoor classroom and lab to promote understanding of indigenous plants and food crops.

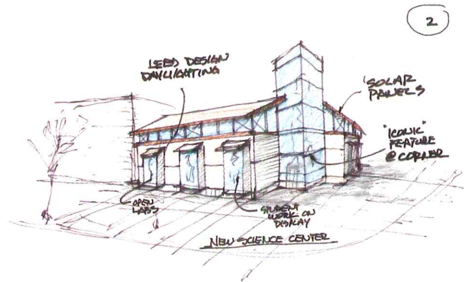
As the charrette drew to a close, the school's short-term needs, long-term master planning, and concept-design goals were all summed up in a series of drawings and bullet points. St. Paul's representatives believe the work done at the charrette will help inform their constituents, so all may move forward in their quest to revitalize their campus and engage their community.

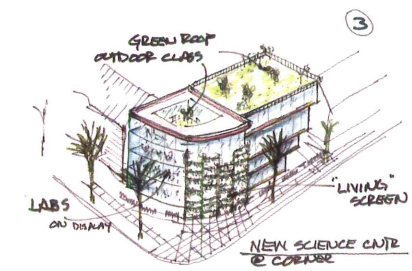
Solutions for securing the future of St. Paul's will have to come from within. The future of the school, the neighborhood, and the city are interwoven. It is through this interconnection that the solution for St. Paul's is to be found. The school is looking to the future with a bold vision for the study of the sciences that will incorporate the highest standards of sustainable "green" planning and design, along with a comprehensive curriculum incorporating study of environmental issues at every grade level. Now, having been through Katrina, students throughout the region seem to have a unique sensitivity to environmental issues and their impact on daily life. This rebuilding plan will give all of the students in this area the opportunity for innovative learning, which may well provide the basis for them to create real-world solutions in the future.■

The cornerstone: a science center

Below are quick sketches of a new science center at the corner of the site. It would demonstrate the school's dedication to innovation and sustainability.







LESSONS LEARNED

+ Faith, persistence, and perseverance are keys to success for any group that has suffered serious losses.

+ A shift in purpose from simply restoring school buildings as quickly as possible to helping to restore the community is a holistic solution beneficial to all.

+ Creating a plan that features community use of spaces and facilities will enhance the design.

+ To gain support from the stakeholders, it is imperative to bring all constituents, including community members, into the master planning process.

+ Dare to dream, and then work to fit that dream into the realistic parameters.

+ Networking and collaboration are keys to designing the ideal project.

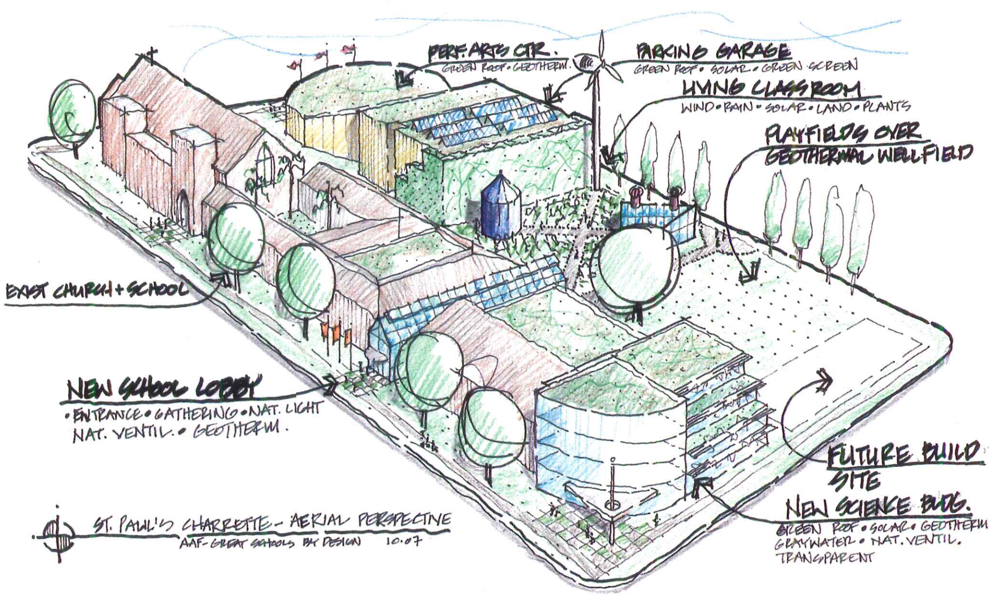
+ The charrette process is greatly aided by gathering as much information as possible. Building code and zoning information, documentation, and evaluation of existing conditions, existing plans, even real estate appraisals can be helpful.

+ Once a master plan is developed, incrementally phased improvements can be made intelligently. The plan should include a detailed program of present and future requirements.

+ Though there was an urgency to rebuild and reopen the school, great benefit would have been derived from a master planning-phase prior to the new construction.

The green sheet: a sustainability master plan

This axonometric shows the overall site layout, including many of the proposed sustainability features.



Jefferson High School

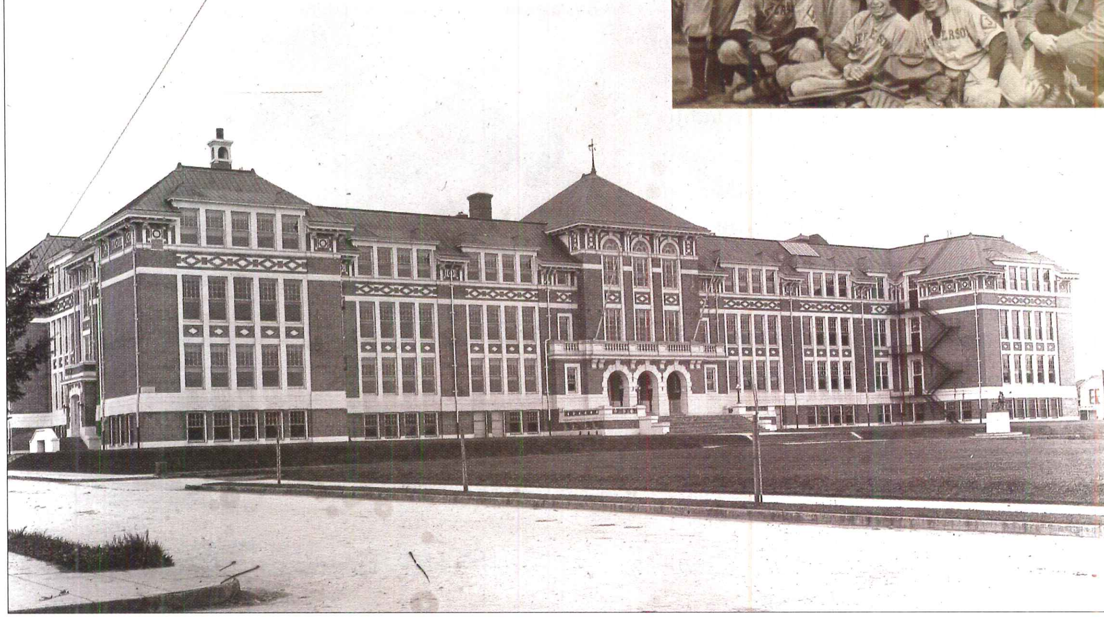
Portland Public Schools, Portland, Oregon

Some vintage school buildings aren't worth saving, even if the history and tradition that surround them are.

PORTLAND PUBLIC SCHOOLS IS THE LARGEST SCHOOL DISTRICT IN THE PACIFIC Northwest. Eighty-five percent of all students within its boundaries attend public schools, and its current enrollment is about 46,000. Over the past 10 years, funding has declined dramatically, enrollment has contracted, and educational quality has slid downhill, particularly at the high school level. To address these issues, the school board and superintendent have worked to stabilize funding and began to realign educational programs to improve results. They closed schools and began re-evaluating their remaining facilities. The district has a total of 96 school buildings, with an average age of 62 years. Most facilities are in need of modernization, repair, or replacement. Jefferson High School, in particular, is one that deserves significant attention. The district has only constructed two new schools in the past 30 years.

THE CHALLENGE

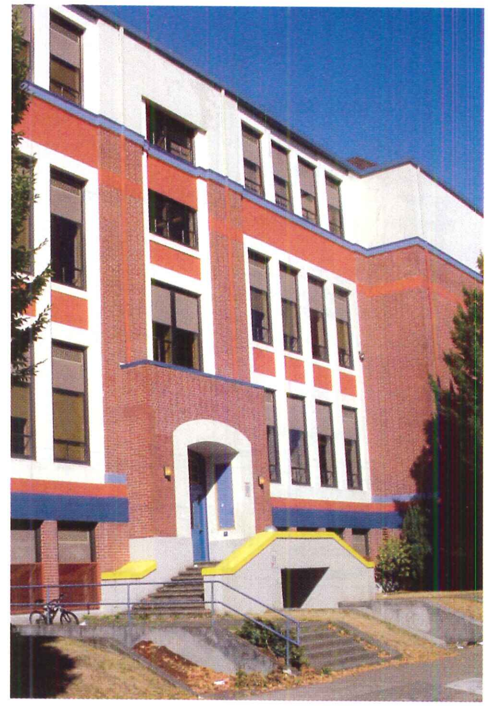
To lift the human spirit is a goal that transcends ethnicity, social class, and personal history. Jefferson High School has the potential to recreate its previous luster as a school known for both academics and athletics. Enrollment once reached over 3,000 students; today it has fewer than 700. Students come from ethnically



Proud Jefferson High School

Jefferson High was built in 1909 and was home to many championship athletic teams, such as this feisty group of sluggers photographed back in1916.

JHS team from left: John Weekes, AIA, Dull Olson Weekes Architects; Justin Devers, facilities, PPS; Pat Bosch, Perkins + Will; John Wilhelmi, director of high schools; Cynthia Harris, principal, Jefferson High; Algie Gatewood, president, Portland Community College; Paul Winslow, FAIA, Orcutt/Winslow, Cathy Mincberg, COO, PPS



Once-glorious Jefferson High School is not what it used to be. Its hip roof was removed, and its beautiful brickwork covered with paint and plaster.

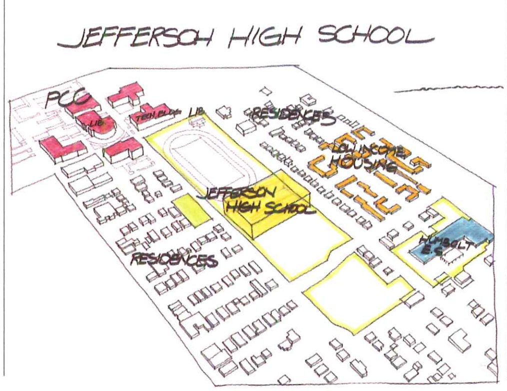
diverse backgrounds, and most are from low-income households. The building, which was once a handsome and impressive facility that showed the prominence that education held in the community, is no longer functional.

Discussion of the current condition of the buildings on the campus revealed that repair and refurbishment is difficult. Although the building is safe for use, the presence of asbestos in its building materials makes even the most minor repairs and improvements cost prohibitive. Additions have created a maze of corridors. Further, the original glorious building had been amputated by the removal of sections of the original hipped roof, which adds to the utilitarian feel of the campus. Furthermore, the campus's playing fields are split by the building, causing difficulties in managing safety.

On the bright side, several improvements in the organization of the school are already underway. First, it has initiated four academies: Arts and Technology, Science and Technology, the Young Men's Academy, and the Young Women's Academy. The Young Women's Academy is located at a separate site, but it would be preferable for all to be together. A major advantage the school has is that it is adjacent to one of Portland Community College's campuses and an elementary school. There are many advantages to having a K-14 continuum, and the opportunity for students from Jefferson to earn college and high school credit concurrently.

Existing site

A football field separates Jefferson High School from the Portland Community College campus.

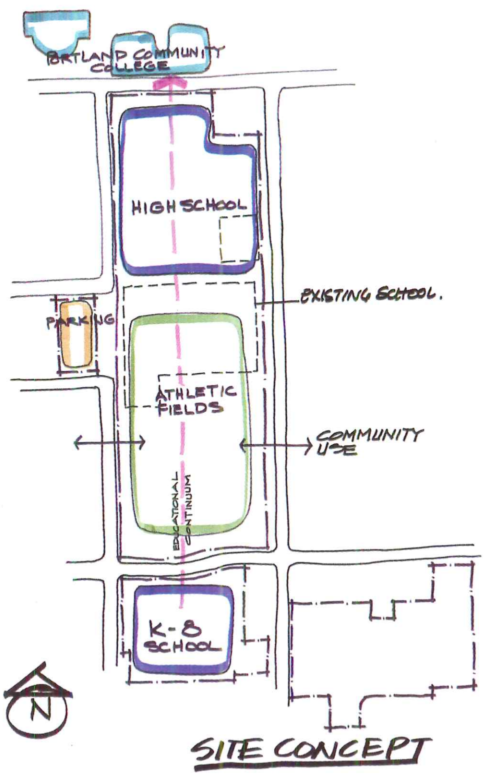


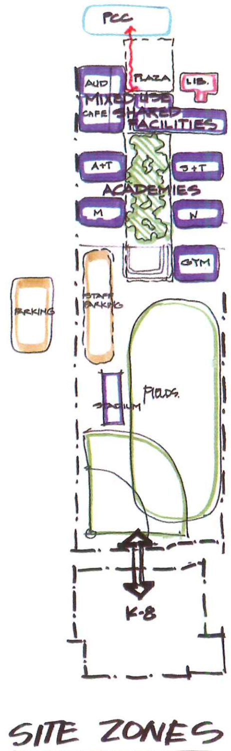
THE SOLUTION

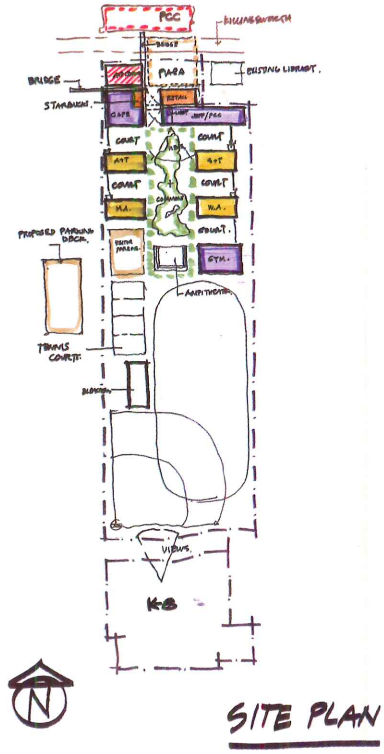
While modernization was considered briefly, the charrette team quickly came to the conclusion that the best option was to replace Jefferson with a series of new buildings. One building would accommodate each of the four academies that have been established, a key principle for the organization of the new campus. Each academy needs to have a sense of autonomy, including a separate entrance, but some functions, such as an auditorium and administration, would be shared.

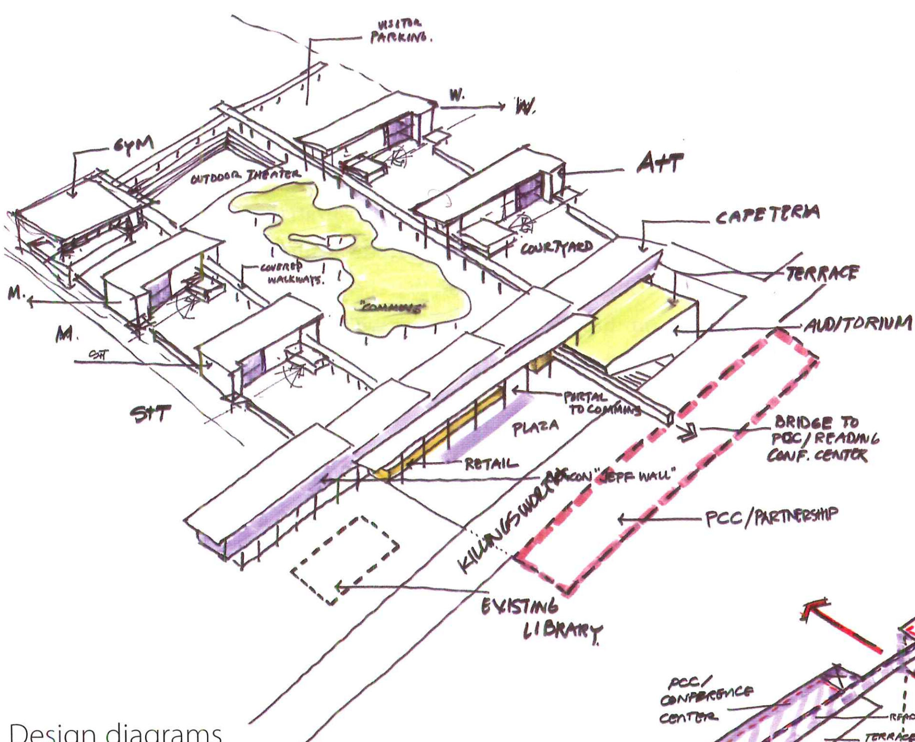
As conceived, interaction between academies would be limited. This requirement led the team to organize the academy buildings on an open green space, like a mall. To optimize solar orientation for daylighting, classroom blocks were oriented on an east-west axis, creating individualized courtyards between the building blocks.

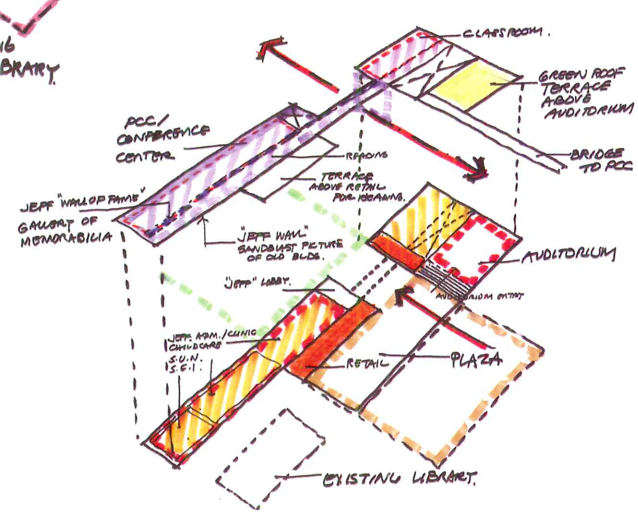
The auditorium and administration functions would be in a new a facility that would occupy the site across the street from the Portland Community College campus. This









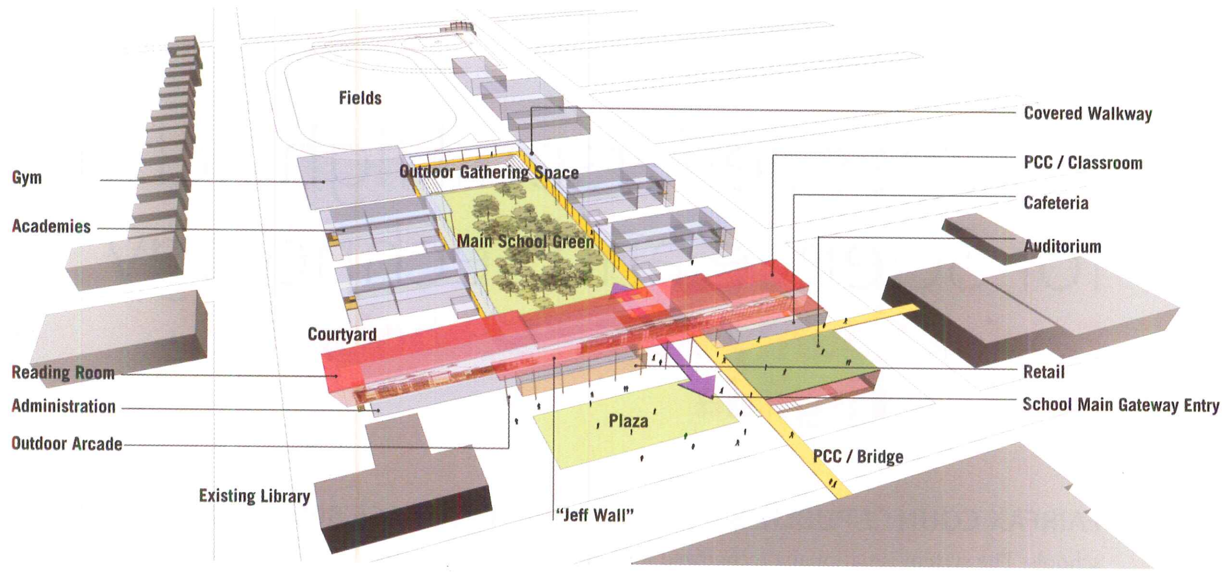


Design diagrams

Zone diagrams (top row) start basic and become more and more specific until a solution can be turned into perspective sketches. One sketch (above) shows the layout of the academies; another (right) explores zones in the administration building.

LESSONS LEARNED

+ Schools can create community centers with appropriate partners and gain community support.
+ A community and a city's identity can be restored if schools can make appropriate public partnerships, as well as provide academic curricula that supports and enhances, the community's future.
+ Schools with K-12 programs that allow partnerships with colleges are more successful in retention and enrollment. Long-term road maps allow students to develop loyalty, and that kind of commitment reinforces the success of a school.
+ A school must have a "brand," both as an academic and a community center. Students and communities identify with "Iconic" schools.
+ Creative business partnerships allow schools to minimize the cost of infrastructure and their physical plant. Allowing fields to be shared by others may provide opportunities for schools to generate revenue.
+ Schools that are arranged into individual, specialized academies often have better security than large schools and and can become localized centers of excellence.
+ School buildings with a prolonged history of neglect fall into a pattern that will not allow for their preservation in the long term. Failing to preserve buildings that have community and architectural value results in a social cost.
+ It is often better to start over than to try and save buildings that are functionally obsolete.



A new campus

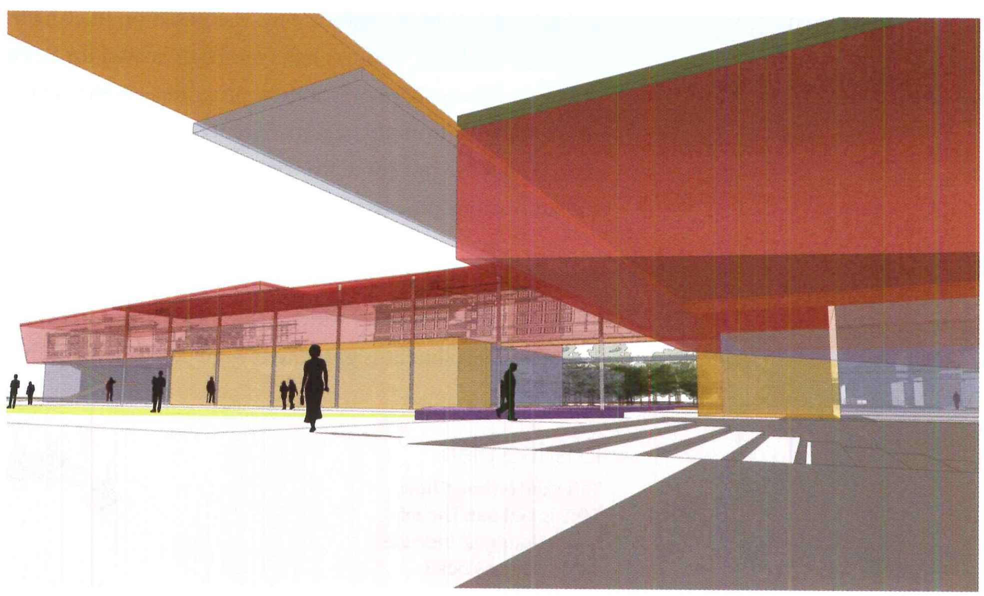
Four academies organized around a mall would share an entry building for the administrative offices, auditorium, retail, cafeteria, and other spaces.

building was conceptualized as having many purposes, among them being that it needed to be not just a school building but a point of connection to the community.

Many members of the community are reluctant to give up the old building because its long and glorious tradition symbolizes not just the history of the school, but of the neighborhood as well. Creating a means of carrying these memories forward was essential to the new complex. The charrette team decided that one way of doing this would be to create a "Jeff Wall." It would house trophies and memorabilia from the past, and represent expectations for the future. It was further proposed that an image of the original Jefferson High School would be etched into the second floor glazing of the administration building and would face the street.

The Jeff Wall concept became a central organizing feature around which the building housing the administrative offices, library and media center, food service, and gymnasium could be designed, and connected to the community and community college. Because public/private partnerships have become important ways of helping offset costs, it was visualized that the first floor of the administration building could house a Starbuck's or other vendor, or even a community-service function such as a low-cost medical clinic. A bridge over the street to the community college would act as a physical connection, and classrooms built next to it would allow the college extra capacity as well as provide meeting space for the community's use.

The charrette team did not want to stop there, and also began reviewing how the nearby elementary school could be rebuilt on nearby unused property owned by Portland Public Schools. Such an addition would complete the group's vision of an educational experience that begins in kindergarten and proceeds through community college on a single site. ■



Linking the past to the future

The main administration building acts as a gateway to the new campus. A central element would be the "Jeff Wall," a collection of trophies and memorabilia that honor the neighborhood and the original high school building. A proposed bridge would connect the school with Portland Community College across the street that runs in front of the site.

Thomas Jefferson High School for Science and Technology

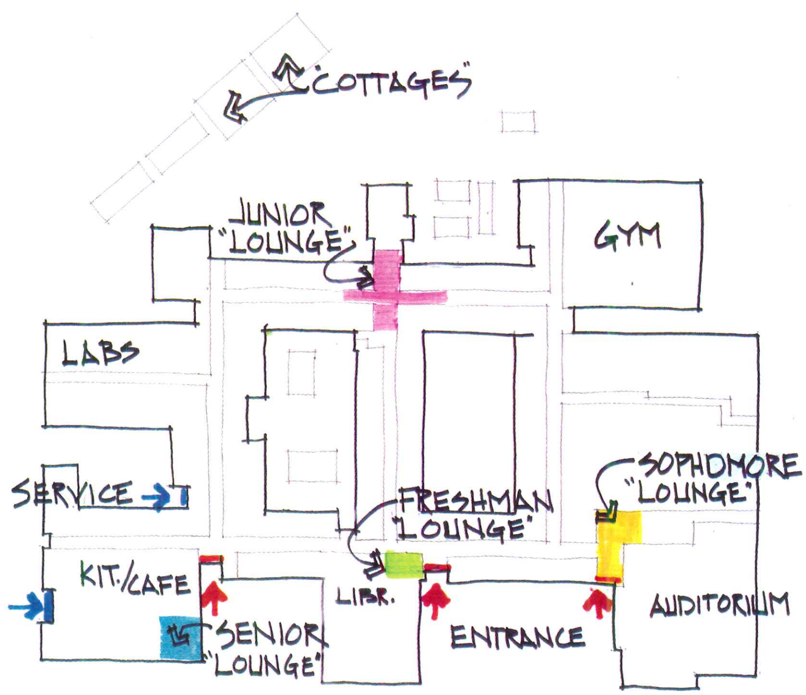
Fairfax County Public Schools, Fairfax, Virginia

An imaginative approach to updating a 45-year-old building will accommodate the unique needs of exceptionally bright students.

FAIRFAX COUNTY PUBLIC SCHOOLS SERVE ABOUT 165,000 STUDENTS IN 197 schools. The system is nationally recognized for academic excellence. Ninety-two percent of its graduates go on to postsecondary education, and Newsweek recently listed FCPS high schools in the top 3 percent of public high schools in the nation. This was based on the Challenge Index, which measures a school's effort to challenge students. Thomas Jefferson High School for Science and Technology (TJHS) is one of its show-places. It offers college preparatory programs emphasizing the sciences, mathematics, and technology and serves students from the region. Seventy-five percent of them are Fairfax County residents as required by its charter, and the rest come from surrounding areas. Students are selected through a competitive application and admissions process. TJHS has the only "magnet program" in Fairfax County.

THE CHALLENGE

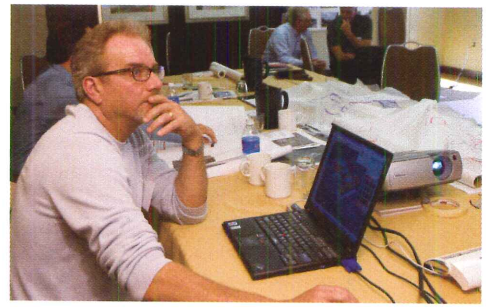
There are several ways in which TJHS's building is deficient. One is that the current facility has a capacity of 1,600, but enrollment is growing toward 2,000. Twenty-five "learning cottages" are used to house classes out-



Existing plan

This sketch shows how TJHS is laid out. The different "lounges" indicate space that has been taken over by different grades so they have a places to study and socialize. A new design would allow these activities to be grouped in a centralized location.

Fairfax team members left to right, Richard Moniuszko, deputy superintendent; Evan Glazer, principal; Geoff Lewis, AIA, community representative; Laura Wernick, AIA, HMFH Architects; Jack Dale, assistant superintendent; John Pfluger, AIA, Cuningham Group Architecture; Dave Printz, coordinator FCPS capital projects.

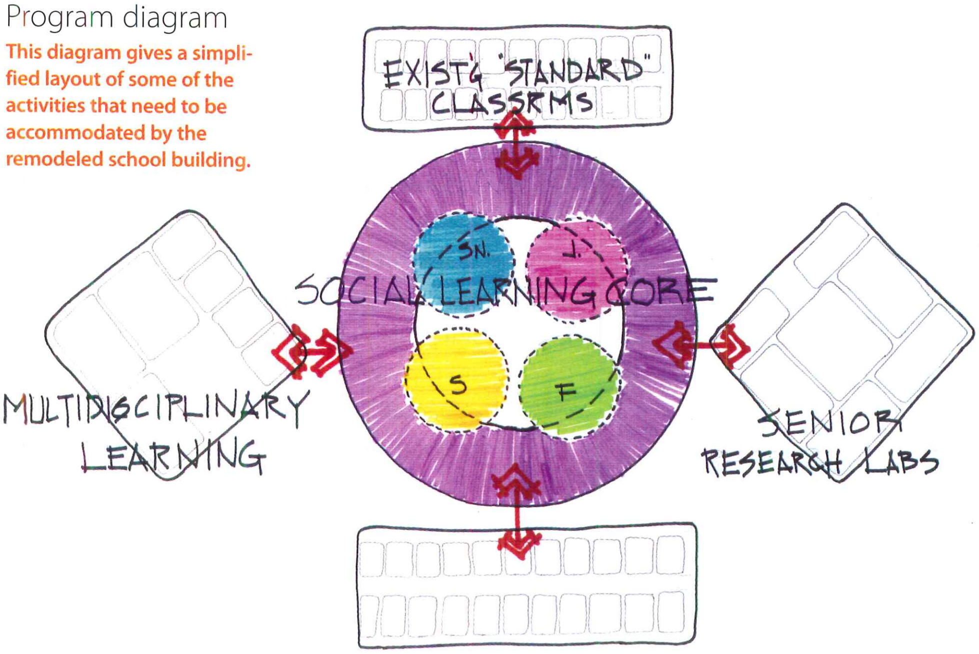


side the main building, separating students and teachers from their peers. A second issue is that students at TJHS need a central area to support students' informal interactions. They socialize, eat, teach each other, and learn everywhere in the building, often at inconvenient hallway intersections, and even spread themselves across the floors of the corridors. There is a need for interdisciplinary incubator spaces that would allow teachers from different subject areas to help students see how the cross-pollination of ideas can be used to generate innovative and multidimensional solutions to difficult problems.

Finally, the building does not present visitors with an image of the school's unique mission, that is, to be a technology school that is a living body of inquiry that supports the skills and values essential to critical inquiry and research, problem solving, intellectual curiosity, and social responsibility.

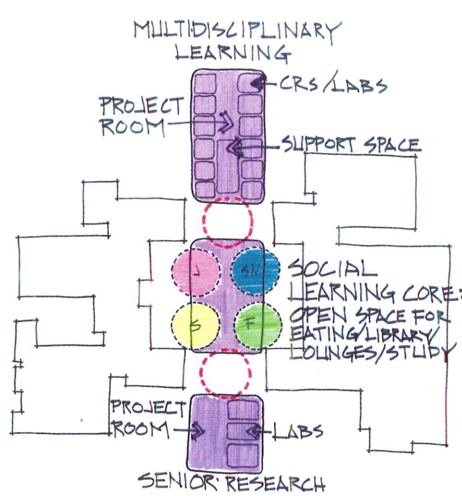
Program diagram

This diagram gives a simplified layout of some of the activities that need to be accommodated by the remodeled school building.



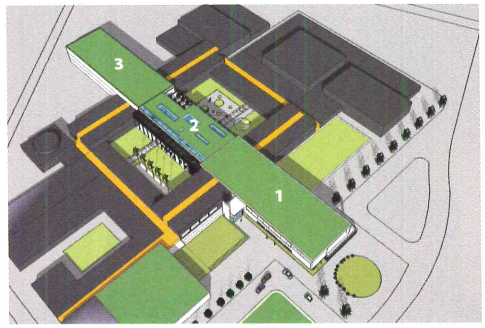
Program diagram to plan

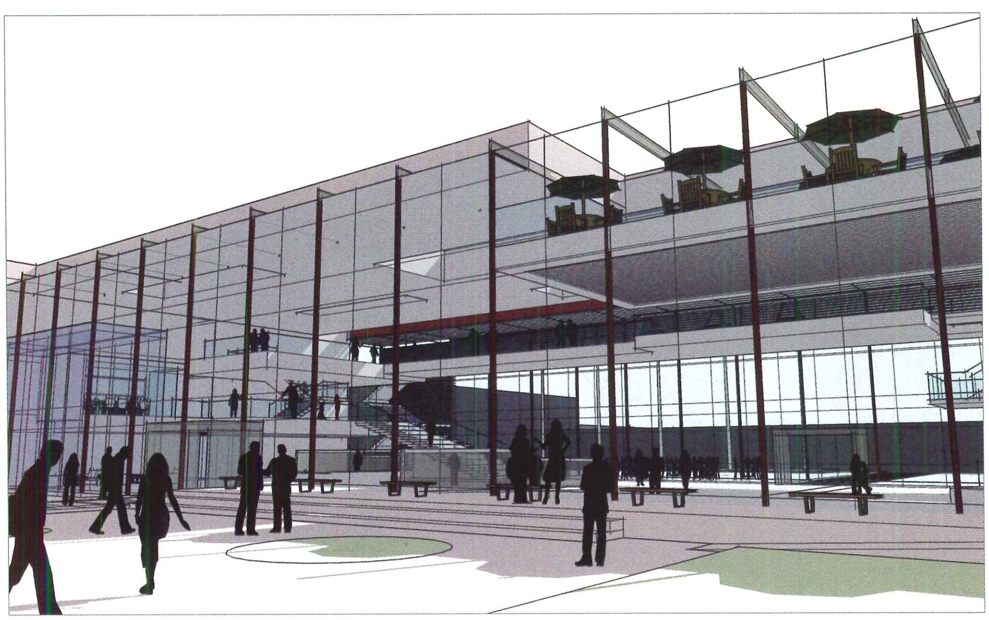
Here, the program is placed over the existing floorplan in order for the team to start exploring the ways the building might be reorganized.



Solution perspectives

The new addition takes the form of a central wing that runs through the middle of the existing building. It has three parts 1 Senior Research Center 2 Social Learning Core 3 Interdisciplinary Center. Perspectives show the Research Center (below) and the social learning core (bottom).





SOLUTION

Early diagrams captured what the school needed most, and that is an area for social learning. TJHS's culture comes from its highly motivated, high-initiative students. Here, the entire building is a place for studying and learning. Rather than forcing students to meet in narrow corridors or confining the library within four walls or separating eating from learning, all of these social learning activities need to be intertwined in a single, centrally located area within the building. The team's most important decision was to create a central wing as a social learning core for the entire school, with student lounges, the cafeteria and the library.

Gradually, other programmatic requirements became clear. Each senior at the high school takes on a major research project often in conjunction with a local government or private research facility. New and shared space is required for these research labs so large and small projects can be built. This lab needs to be transparent so students and visitors alike will pass it and constantly be aware of the innovative projects underway. At the charrette, a new three-story senior research center began to take shape at the main entrance of the building, with labs opening into large project spaces.

Another need is a place for multi-disciplinary learning programs within the school to support the interweaving of disciplines across the curricula. That area of the building had to have dedicated space designed to bring specific, yet disparate learning environments into close proximity to one another and needed a loose configuration of shared large and small group instruction spaces, lab spaces, project rooms, and associated support areas for equipment.

The final piece of the puzzle was the budget. Because a budget for the project had already been established, the team was determined to retain the strengths of the existing facility while not shortchanging the requirements of the proposed addition.

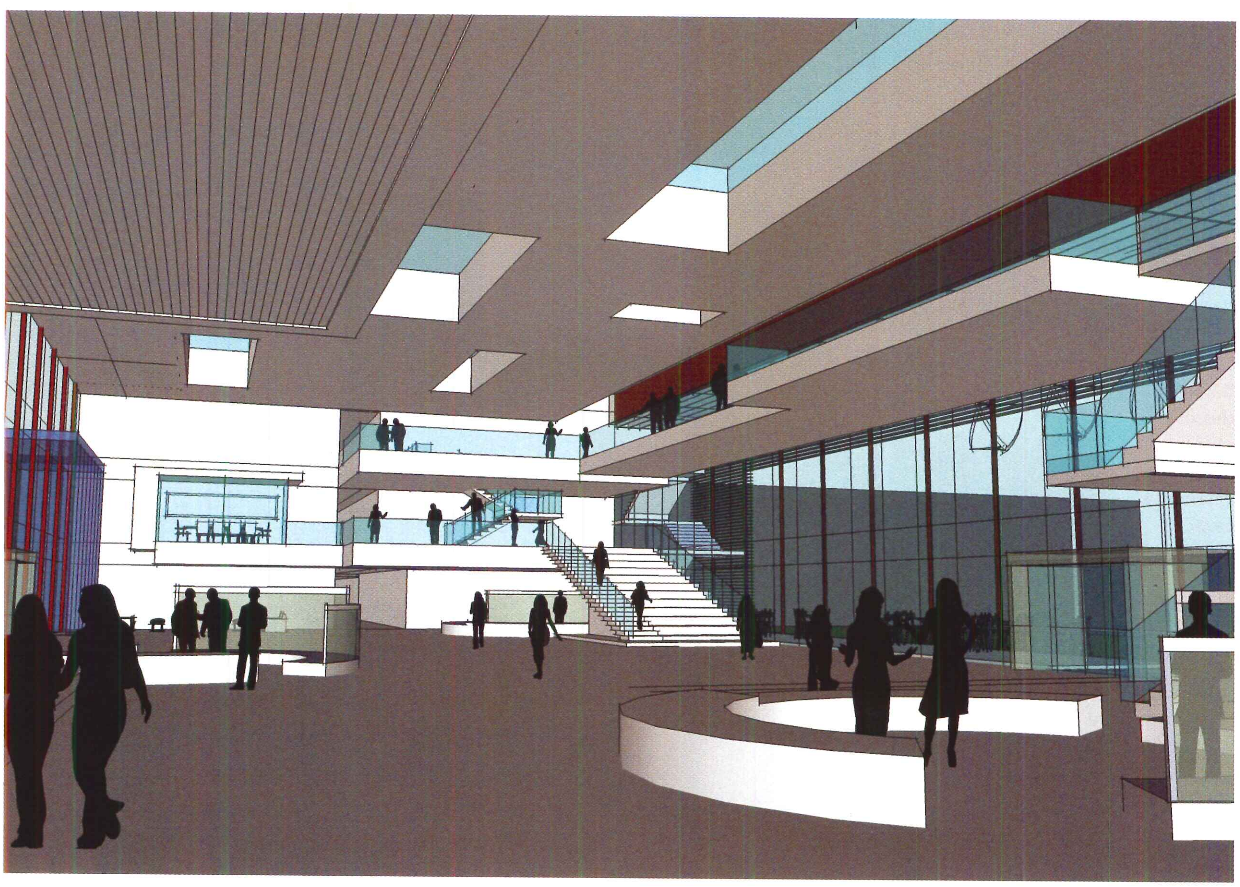
The solution was to demolish the center of the existing building, the library, and the planetarium. In their place a single new structure would be built, extending from the front through the middle and out the rear. In the center of this structure would be the wide-open, multilevel Social Learning Core, a space where students would mingle, eat, study, and carry out many of their daily school activities. The normal library functions would take place here but without walls. The space would open out into two courtyards, and connect easily with all the other parts of the school.

The Multi-disciplinary Center would extend from the Social Learning Core toward the back of the site. A new entrance to the school and the Senior Research Center would extend from the Social Learning Core toward the front of the site. This new addition would create a new face for the school, be cost-effective to create, and cause minimal disturbance to ongoing programs within the building. ■

Since the budget had already been established for the project, the team was determined to maintain the strengths of the existing building without shortchanging the proposed addition.

LESSONS LEARNED

+ A balance has to be maintained, reflecting the importance of having new facilities that enhance, support, and show off the uniqueness of the school and students.
+ During a charrette, everyone must be mindful of the very real budget constraints, yet continue to be creative.
+ Keeping construction systems simple can help keep costs down.
+ Budgets need to be realistic so the amount of money allocated for construction actually yields the space the school needs to operate.
+ Priorities may need to be re-examined as a project goes forward. The charrette helped establish that allowing visitors to view the research and how the students operate within the learning environment was imperative.
+ One potential strategy for this school would be to create inexpensive, large-bay space that then could be outfitted through research grants or foundation money.
+ Budgets should be flexible, so that as design goes on money can be allocated where needed, either to new construction or renovation.



The Core

TJHS students learn so much from each other that the Social Learning Core can function as a lounge-like classroom.

Cleveland High School

St. Louis Public Schools, St. Louis, Missouri

Demolition of this historic high school is out of the question. But it could be reused for small learning communities.

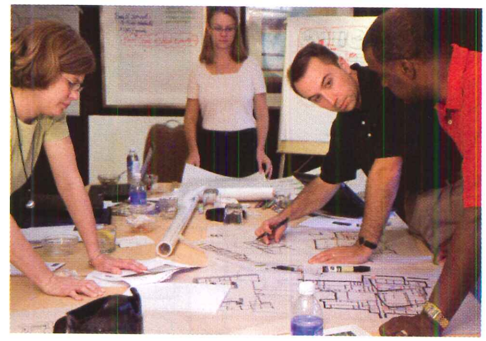
ST. LOUIS HAS MANY THINGS GOING FOR IT, BUT ALSO FACES SOME ENORMOUS challenges. The population losses suffered by the city since World War II have stabilized. The downtown is undergoing a renaissance, a new baseball stadium was completed recently, and new housing is being constructed there. In spite of these successes, the St. Louis Public Schools system has continued to decline. The number of students in the system during the 2006-07 school year was 32,700, and will likely drop to 30,000 this school year. The coming years will bring more challenges as 11,000 charter school seats become available. The challenges of preserving Cleveland High School's building, which is a community icon, are representative of those faced by many urban school districts.

THE CHALLENGE

Cleveland High School is a historic landmark building, designed in 1915 by St. Louis architect William Butts Ittner. The building is one of two comprehensive high schools in South St. Louis and has capacity for 1,000 students. It was closed in June of 2006 due to severe maintenance issues as well as declining enroll-

Cleveland High School was built in 1915 and graduated 91 classes before closing due to declining enrollment and severe maintenance problems. However, all agreed that demolishing the building would create unacceptable losses.

Cleveland High School team, clockwise from left: Debra Irwin, executive director, Dutchtown South Community Corporation; Roger CayCe, executive director of facilities management, building commissioner; Deanna Anderson, assistant superintendent of operations; Amy Yurko, AIA, Brain Spaces; James Hoagland, AIA, JCJ Architecture



ments throughout the district. The district spends $5,800 per month to keep the building open and prevent further deterioration. However, there is a recognition among the various stakeholders that Cleveland is an important historic landmark and cannot be demolished—its loss would hurt local businesses and cause conditions in the neighborhood to decline.

THE SOLUTION

The district representatives and resource team members explored many options during the charrette. A key starting point was the establishment of the idea that neighborhood representatives and the school district both favor renovation of the school for continued reuse as a comprehensive high school. And, in the process of rethinking the school, the needs of the community will be considered to determine the potential for opening up the building for its use. Hopefully, renovating the building would help re-grow enrollment. The thrust of the planning is to preserve the building as a learning facility in order to safeguard it as a center of the community.

One option is that with district-wide downsizing occurring, parts of the central administration could be relocated here. Other options include creating multiple, public-private partnerships to fund a collaborative renovation process, with a well-defined academic program that would re-establish the ROTC program formerly based at the school. A career education component that could include culinary arts, entrepreneurial training, or adult education, might also be appropriate.

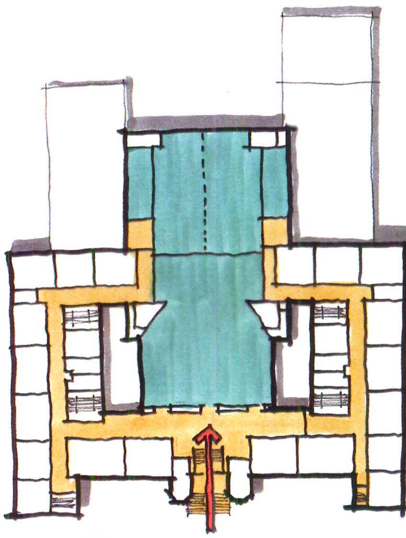
Maintenance at the shuttered school costs $5,800 per month, yet its demolition would be an unacceptable loss for the neighborhood.

One thing that Cleveland High School has going for it is that it only includes one building addition, a field house which is detached from the school and connected only by a single corridor. The original architecture essentially remains intact. Exterior light comes into nearly every teaching space through the building's geometry and its thoughtfully located light wells. Ceilings are high, corridors are wide, and finishes are durable. Deferred maintenance appears to be the key culprit for the building's physical challenges.

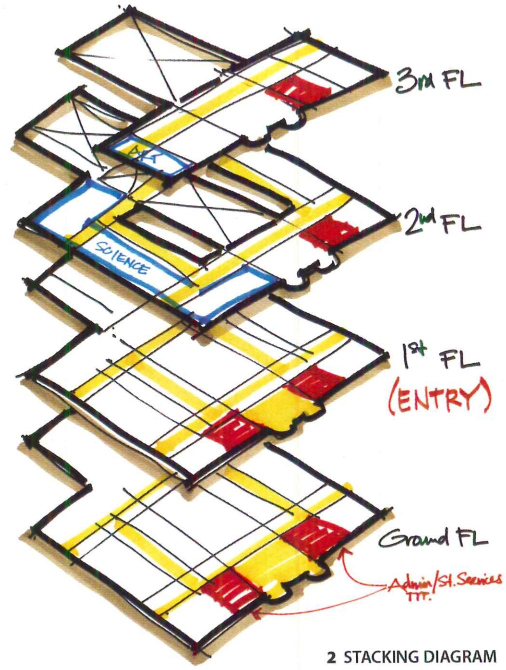
The most logical direction for the team was to explore the idea of approaching the building's renewal by using small learning communities (SLCs). One thing that makes this feasible is that specialty spaces such as those for art, technical education, performance, music, and physical education are appropriately spaced throughout the existing building, and the building's grand theater is centrally located. SLCs are helpful in encouraging students to be connected to their school, engaged in their work, and encouraged to develop skills necessary for their continuing success in life. A real-world, activity-based curriculum could support these students in smaller, perhaps theme-based learning communities. For example, the applied learning components of a health-and-human-services-themed curriculum could be sup-

Process

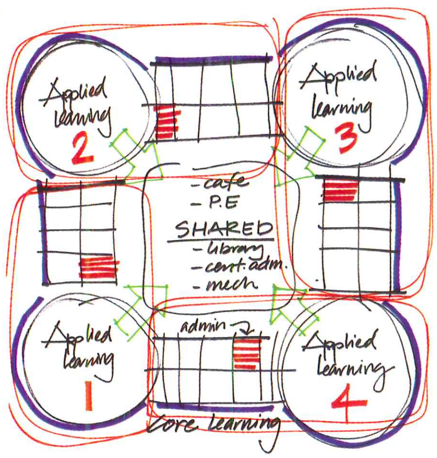
Diagrams were used to explore the feasibility of breaking Cleveland into SLCs. 1 A general plan shows the school's layout. **2** A stacking diagram shows how different SLCs might be distributed over this four story building. **3** Applied learning labs can be placed at the four corners of the building. **4** Sections illustrate how lightwells could serve as SLC commons. **5** Four learning-lab types were developed.



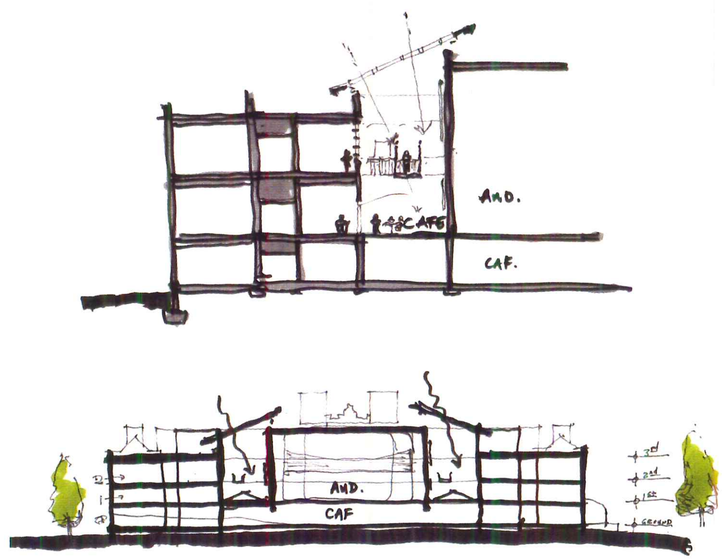
1 EXISTING PLAN



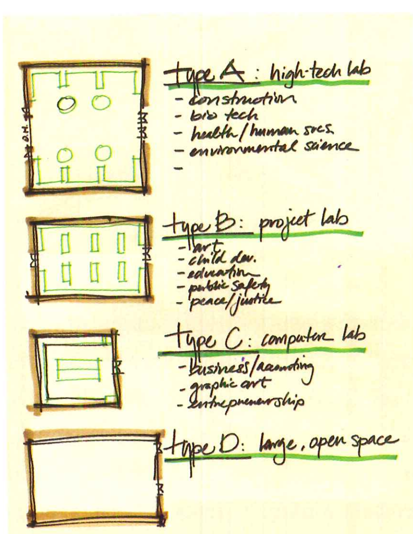
2 STACKING DIAGRAM



3 LEARNING LAB LAYOUTS



4 SECTIONS THROUGH LIGHTWELLS



5 APPLIED LEARNING LABS

LESSONS LEARNED

+ Academic needs/requirements can and should influence space planning.
+ Buildings that were well-planned when new can be transformed to meet the needs of future generations, regardless of how old they are.
+ The benefits of multiplexing a building into SLCs can be equally achieved even when some facilities are shared and common to all.
+ Connections within and between the site and the surrounding communities should be developed and leveraged to benefit all stakeholders.
+ School buildings have strong cultural, sentimental, and aesthetic value, which can be leveraged to strengthen relationships between past and future stakeholders.

ported in the spaces previously occupied by the home economics and lap-pool facilities, in addition to the nearby classrooms. Or, an engineering-and-industrial-technology-themed curriculum could be supported in the spaces previously occupied by the wood shop and drafting classrooms.

The existing building was surprisingly well suited to be transformed into relatively autonomous SLCs. Collections of general classrooms can take advantage of their proximity to specialty learning areas and, together with administrative spaces, form each SLC. The building's lightwells can be enclosed using skylights so the space beneath them can be used to provide a student commons for each SLC.

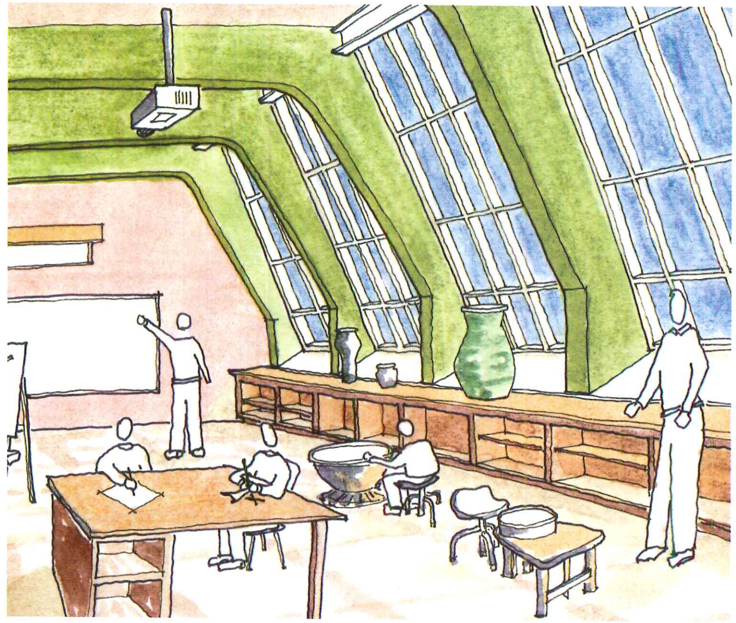
The resource team worked with the district representatives to define the key elements to be included in each SLC and which functions and spaces could or should be shared by all of them. To provide focus, leadership, and personalization, each SLC should include administrators, counselors, support facilities, and student social space in addition to classrooms. And, they should be connected to a collection of hands-on learning environments where the ideas and concepts of the core curriculum can be applied to real-life projects and experiences. Shared areas include support spaces such as the cafeteria, physical education, theater, library, and some centralized offices.

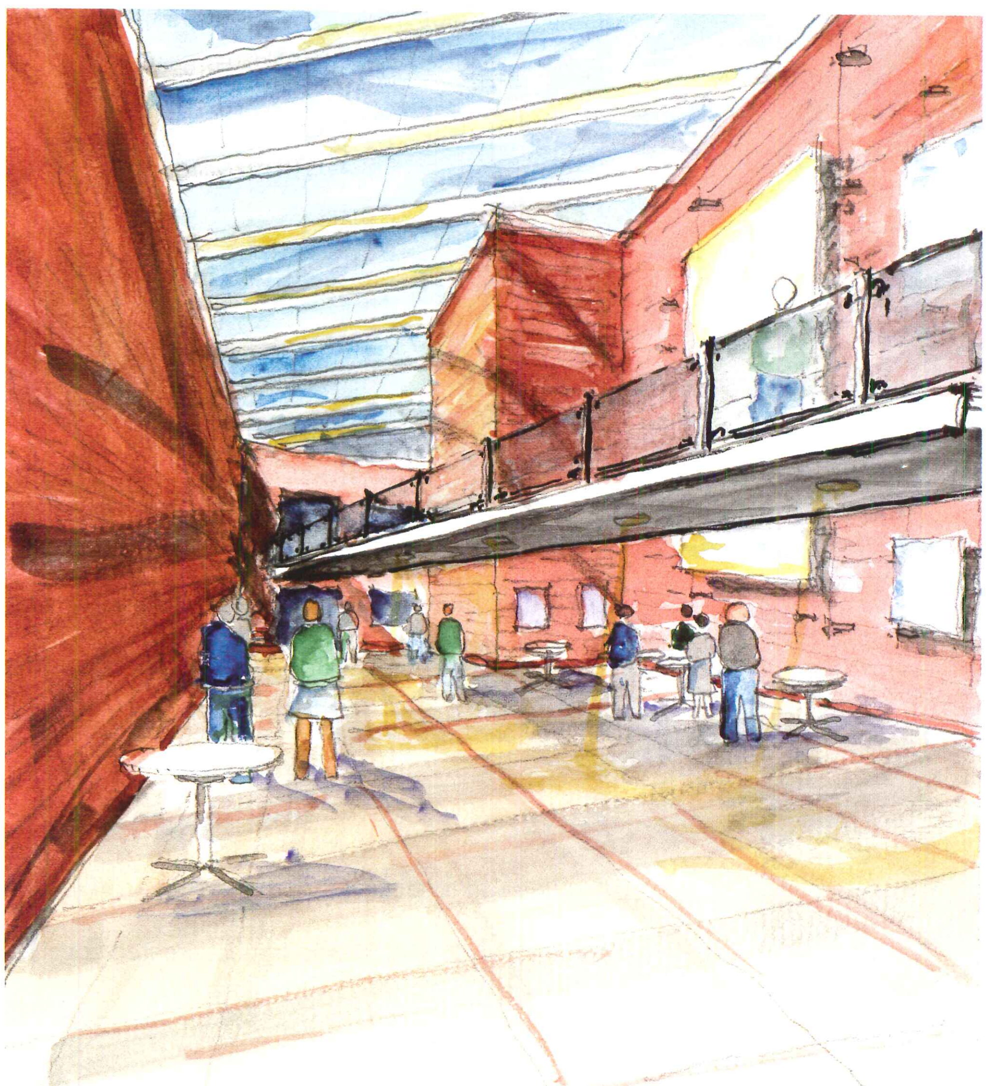
In addition to the building, the charrette team also drafted a reorganization of the site. Current plans include enlarging the football field to support soccer and a surrounding track. Parking on the urban site is minimal and contributes to traffic congestion in and around the school. The new solution the team proposed would close the street that currently separates the building and field while providing additional on-site parking.

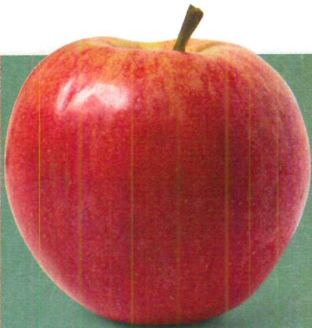
This solution seeks to transform the function of the school while protecting its historical and sentimental value. It seeks to provide a venue for the celebration of learning and the success of its students. ■

Sketches

An existing daylit room that is currently in ruins could be renovated into an art studio (right), and enclosing lightwells (below) would provide an open, airy feel to the new, small learning communities.



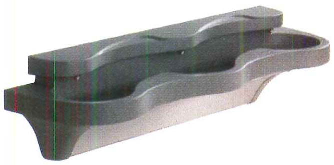


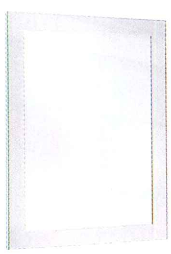


A Better Choice

FOR YOUR SCHOOL WASHROOM

WASHROOM EXPERTS FOR OVER 85 YEARS





With renovation and maintenance budgets tight, it makes sense to install fixtures that will last longer than the first week of school. Bradley knows that long-lasting, vandal-resistant, low-maintenance and water-conserving handwashing fixtures are a priority for schools. Bradley products are designed with these needs in mind.

Fixtures that make the grade...

Whether you're looking for products for school washrooms, locker rooms, shower rooms, or shop areas, Bradley has a product created specifically to meet your needs. From handwashing fixtures and accessories to showers, partitions and lockers, Bradley offers you a better choice.

1.800.BRADLEY
www.bradleycorp.com

Circle 24 on Reader Service Card or go to www.shoolsofthe21stcentury.com

Bradley

Design Meets Function

BRADLEY PROVIDES COMPLETE PLUMBING AND LOCKER SOLUTIONS FOR EDUCATIONAL FACILITIES

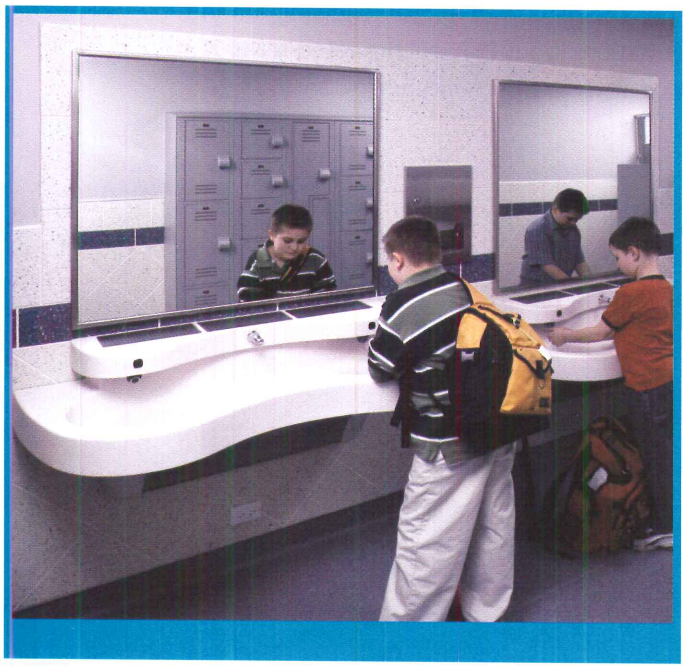


PHOTO COURTESY OF: BRADLEY CORP.

DESIGNING ATTRACTIVE, YET DURABLE AND FUNCTIONAL restrooms and locker rooms for schools can be a challenge. For instance, many schools now require that students wash hands before lunch to reduce the spread of germs. Yet, the facilities can make it tough for students and teachers to follow through because there are issues with traffic volume, supervision and even accessibility.

Your clients are looking for innovative design choices in plumbing fixtures and accessories that not only address issues like vandalism, traffic flow, water conservation and ADA compliance, but also offer contemporary styling and durability to help reduce life-cycle costs.

Bradley has been an industry leader for 85 years, and has a history of developing school solutions—from multi-height lavatory systems, juvenile-height washfountains and classroom sinks to solid plastic lockers and commercial showers. Bradley often partners with architects to ensure that products are designed to meet specific needs. For example, the multi-height Frequency® Lavatory System was created with input from designers and features a unique continuous wave shape as an attractive way to comply with ADA.

>>> MAKING THE FACILITIES EASIER TO USE AND MAINTAIN

The goal is to provide plumbing and locker solutions that take up less space so there's more space for learning. With corridor-concept washrooms in mind, the linear Express® lavatory system does the work of multiple individual lavs. Express lavs are available with ndite technology™, a proprietary energy management system that collects and stores restroom lighting, eliminating the need for electricity, as well as costly and time-consuming battery changes. These units require only one set of connections, reducing installation cost and time.

In shower areas, Bradley column showers, wall showers and pivoting wall showers can serve multiple users in less space at a lower cost. Units can be customized with different showerheads and valves, or modesty modules for privacy. Combined with thermostatic mixing valves and TouchTime® metering valves, schools can have the peace-of-mind knowing water temperature and use are under control.

Mention the name "Bradley" in many schools and universities and the feedback you'll get from custodians is about their new "maintenance free" lockers. Lenox® Lockers are made from 30 percent post-industrial recycled content HDPE plastic that will never rust, dent or delaminate—and they won't require any painting. A black option is made of 100 percent recycled material. All lockers, including a new "Z" option, come with a 20-year warranty. ■

Bradley Corp.
For more information call
Toll-free (800) BRADLEY,
or visit www.bradleycorp.com

Circle 25 on Reader Service Card or go to www.schoolsofthe21stcentury.com

Safety You Can Count On

SCHOTT'S PYRAN® FIRE-RATED GLASS-CERAMICS DELIVER SAFETY TO SCHOOL SETTINGS

SAFTEY IN SCHOOLS IS EVERYONE'S CONCERN. FOR FIRE-rated glazings requiring impact resistance, PYRAN® fire-rated glass-ceramics by SCHOTT are an ideal choice; they are wireless and offer a high degree of clarity, transmission and true color rendition. For safety-rated locations, they are available in a filmed and in a laminated format, which makes them ideal for use in locations such as door lites, transoms or sidelites and windows. Filmed and laminated PYRAN glass-ceramics are impact-rated according to ANSI Z97.1 and CPSC 16CFR1201 (Categories I and II). All products are fire-rated up to 90 minutes with the hose stream test. In addition, PYRAN fire-rated glass-ceramics withstand thermal shock, are suited for use with standard fire-rated frames with the same rating, and conform to positive pressure test standards. SCHOTT has more than 25 years of fire-rated glazing experience, making PYRAN glass-ceramics a safe choice.

In addition to PYRAN fire-resistant glass-ceramics, SCHOTT offers OKALUX® and OKASOLAR® insulated glass packages, which control glare and solar heat gain and are ideally suited for use in schools. Other SCHOTT architectural products include AMIRAN® anti-reflective glass, decorative glass products, RD 50 radiation shielding glass and fiber optic and LED lighting. When it comes to special glass for architectural applications, SCHOTT is likely to have a product to meet your needs.

The SCHOTT Group focuses on a particular area in the world of glass: special glasses and glass-ceramics. Over 100 years ago, Otto Schott, SCHOTT's founding father, discovered that the composition of glass could be varied and altered almost endlessly to produce properties that conform to clearly defined applications. Today, the SCHOTT Group that has evolved from Otto Schott's original "Glastechnisches Laboratorium," develops and produces special glass and glass-ceramics with chemical and physical properties adapted to a vast range of applications.

The international SCHOTT Group is technology-driven and sees its core purpose as the lasting improvement of living and working conditions through special glasses and materials and high-tech solutions. Its main areas of focus are the architectural, automotive, aviation, electronics, home appliances, lighting, optics, ophthalmics, pharmaceutical and solar energy fields.

PHOTO COURTESY OF: SCHOTT NORTH AMERICA, INC.

SCHOTT has a presence in close proximity to its customers through highly efficient production and sales companies in all of its major markets. It has more than 17,000 employees producing worldwide sales exceeding $3 billion. In North America, SCHOTT's holding companies, SCHOTT Corporation and its subsidiary SCHOTT North America, Inc. employ about 2,500 people in 14 operations. ■

SCHOTT North America, Inc.
For more information
call: 1-502-657-4417, fax: 1-502-966-4976,
email: pyran@us.schott.com
or visit www.us.schott.com/pyran

SCHOTT glass made of ideas

Circle 27 on Reader Service Card or go to www.schoolsofthe21stcentury.com

Modular Buildings Mean Optimal Learning

PHOTO COURTESY OF: WILLIAMS SCOTSMAN

ACCORDING TO McGRAW-HILL CONSTRUCTION, U.S. schools project to spend more than $162 billion on facilities construction over the next three years. While it may take another decade or so before sustainable designs are fully adopted, some industry leaders are making "green" buildings and classrooms a priority for the coming school year.

Unfortunately though, sustainable design practices often take a back seat to budget realities because many school business officials are unfamiliar with green building methods. The common misconception is that they represent more expensive facility investments. While initial costs may, in fact, exceed traditional buildings, the long-term benefits and cost savings in ongoing operations are certainly recognized. In some cases, districts are able to apply tax credits to help balance some of the additional up front costs. More and more school districts are beginning to recognize the benefits of building green in an effort to create more effective and cost-efficient learning environments, understanding the relationship between physical surroundings, student health, and academic performance.

One survey conducted by *School Planning & Management* magazine reports that 87% of executives at organizations involved with "green" K-12 facilities believe that community image is enhanced when sustainable design is incorporated into schools. Approximately 70% of these executives perceive benefits, including reduced student absenteeism and improved ability to attract and retain teachers.

The modular building industry has taken notice of the upswing in progressive building methods and looks to aid school districts in understanding what "green" means and how to introduce environmentally conscious concepts into school systems nationwide.

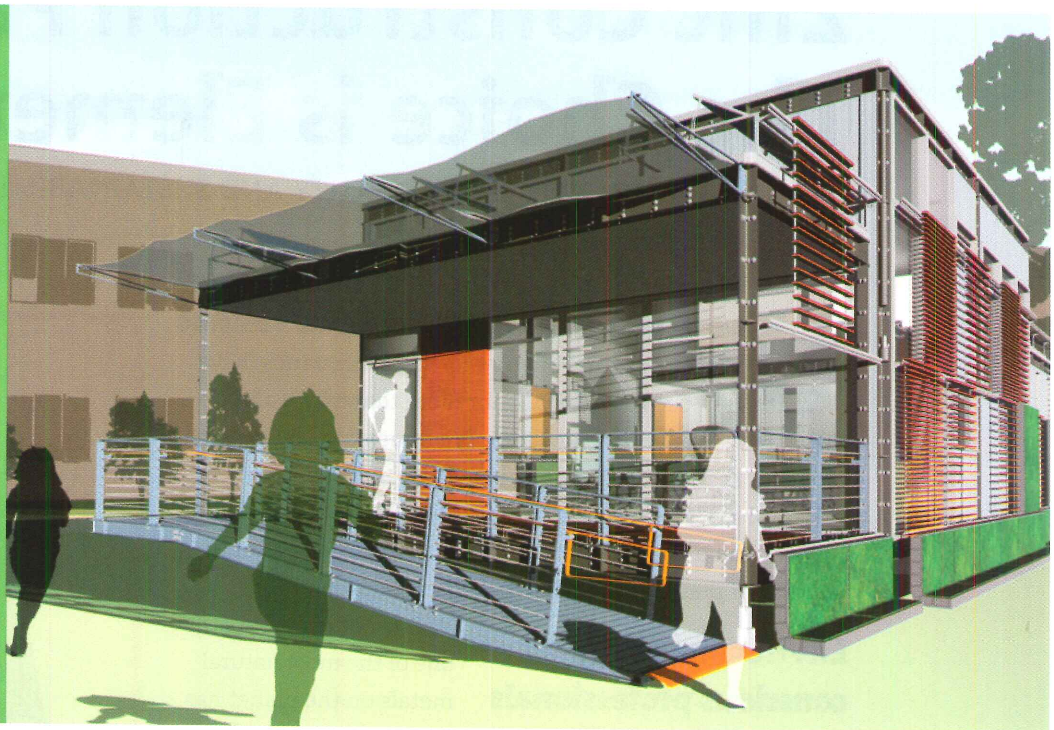
Industry leader Williams Scotsman, a leading provider of modular space solutions, is one of the first to incorporate sustainable design technology into its plans for future classroom products. In fact, Williams Scotsman has been working closely with the Baltimore-based architectural firm Hord Coplan Macht to develop environmentally friendly mobile and modular classroom designs.

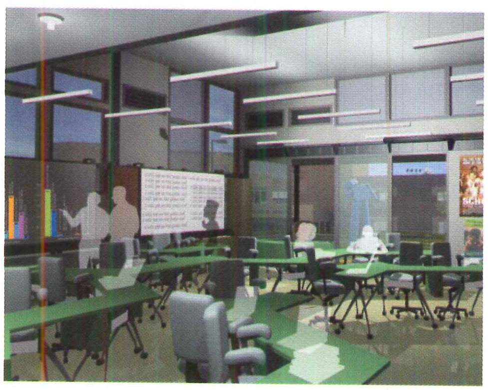
Thousands of educational institutions throughout North America have called upon Williams Scotsman to provide reliable relocatable and permanent modular buildings when their school systems need additional space. Currently, the company is committed to anticipate the influence that sustainable design will have on modular classrooms of the future. The company's unique approach harmonizes new technology and design concepts with long-term economies to ultimately create optimal learning environments at reasonable lifecycle costs for school systems. ■

Williams Scotsman... Looking towards the uture of modular classrooms today.

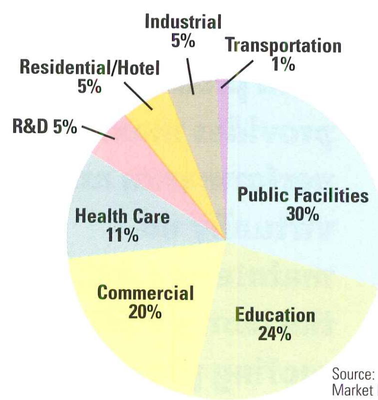
ducators are looking for classrooms where arning is not only enabled but actually inspired. y creating a modular product with space that voluminous, naturally day lit, adaptable, and vironmentally friendly and have it accomplished ith intuitive and understandable technologies e believe we can create true learning vironments for the 21st Century ”

– Rolf K. Haarstad, AIA, LEED, AP
Principal and Vice President for Hord | Coplan | Macht





The population growth rate for U.S. youth ages 5 to 19 continues to climb, creating a significant impact on the educational system. How do school administrators meet the challenge of too many students, not enough classrooms, higher accountability standards, and tighter budgets? Add one more factor: the demand for more sustainable and environmentally conscious buildings. Think modular. The inherent flexibility of modular building technologies paired with its fast-track timeline make it a perfect solution for kids that need a safe and clean classroom today – not two years from now. Is modular green? Yes, modular construction is more environmentally friendly because it is assembled in a factory and shipped to a job site. The result: less site disturbance, decreased construction time, reduced construction material waste, and increased recycling. Williams Scotsman is teaming with the architectural firm of Hord I Coplan I Macht to explore "greener" possibilities. The challenge: design and produce a modular unit that will balance sustainable design technology and materials with affordable and well-designed classrooms. Williams Scotsman has been responding to the needs of the educational market for over fifty years. An international company with local expertise delivered through a network of 86 offices, Williams Scotsman provides premier quality and service.



Source: Turner Green Building Market Barometer

Sectors Expected to Have the Most Green Building Activity

SPACE BY WILLIAMS SCOTSMAN®

800.782.1500

www.willscot.com

Circle 29 on Reader Service Card or go to www.shoolsofthe21stcentury.com

Zinc Construction Products: The Choice is Elementary

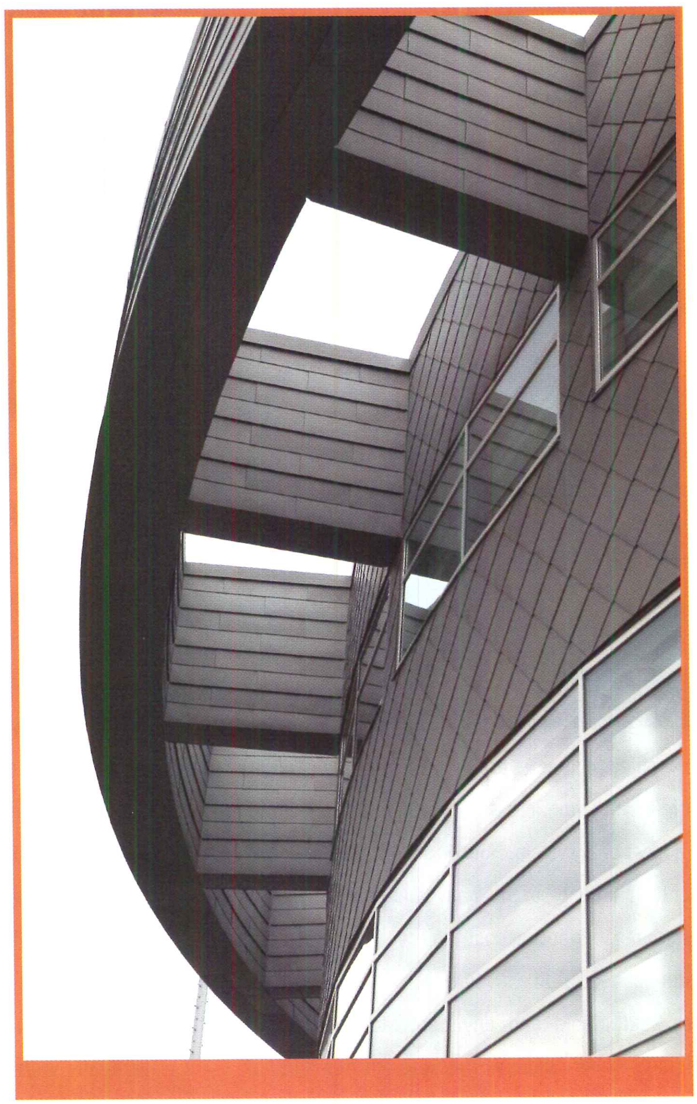
DESIGNING WITH ZINC LENDS QUALITY AND SUSTAINABILITY TO SCHOOL SETTINGS—NATURALLY

UMICORE BUILDING PRODUCTS IS THE WORLD'S LEADING producer of zinc construction products which, have been used successfully for more than 150 years throughout Europe and now for more than a decade in North America. The VM ZINC® line of panels for roofs and wall systems have been used on a wide range of projects including colleges and universities, museums, airports, libraries and an array of prestigious buildings across the country.

Environmentally conscious professionals look to VM ZINC® as a sustainable, long-term product that also provides maximum performance and virtually no maintenance to take the worry out of their roofing programs.

It is not surprising that one of the most natural metals on the planet has performed successfully for over a century. Now, more than 100 years later, the zinc panels have transitioned through their patina process and have again become a part of the landscape of the planet, the urban planet. VM ZINC® panels are as much a part of our environment as the water we drink. They begin as a natural element of the earth. They are crafted into panels for construction materials, such as roofs, and even after the building is gone, the zinc will continue to perform in another useful setting. The penultimate combination of nature and performance will never clutter a landfill.

Environmentally conscious professionals look to VM ZINC® as a sustainable, long-term product that also provides maximum performance and virtually no maintenance to take the worry out of their roofing programs.



PHOTOS COURTESY OF: UMICORE BUILDING PRODUCTS

>>> BENEFITS OF VM ZINC®:

› *Appearance.* VM ZINC® is available in two colors. QUARTZ-ZINC® is a rich natural grey color with a pre-weathered patina finish that provides the look of true weathered zinc. ANTHRA-ZINC® also comes in a pre-weathered patina with a velvet black color.

› *Performance.* VM ZINC® has no equal when it comes to long term performance. As a roofing material zinc products are still in use more than 100 years after original installation

Umicore is unique as a manufacturer combining its integrated refining capacity, rolling mills, and panel manufacturing to produce only the highest quality products.

with minimal maintenance. Wall panels made by UBP are designed to last the life of the building while holding its natural color and beauty.

› *Quality.* Umicore is unique as a manufacturer combining its integrated refining capacity, rolling mills, and panel manufacturing to produce only the highest quality products. This extraordinary degree of integration positively impacts its consistent quality and controlled costs. Working to the tightest specifications comes naturally to Umicore.

› *Environment.* VM ZINC® from Umicore has a recycled content of 39%. Moreover, the finished materials are fully recyclable at the end of their long and useful life. It is unlikely that any UBP materials will ever see a landfill. A pre-patina zinc or copper roof can easily last 75 years or more and walls can last more than a century. UBP panels require very little maintenance except the occasional cleaning or removal of debris. Since VM ZINC® is a natural material, its color does not peel or fade over time. Many LEED® Certified projects have incorporated zinc walls and roofs for those very reasons.

› *Services.* Umicore publishes standard specifications and CAD details on its website and on the Sweets website, as well. Umicore technical experts are on hand to work closely with architects and project managers to assist in proper detailing for the projects. ■

Finish Projects on Time and on Budget with Wood Framing

TRUSTED MATERIAL PROVIDES STRENGTH, ECONOMY AND BEAUTY—NATURALLY

BUILDING A HIGH-QUALITY SCHOOL THAT YOU AND THE community are proud of can be a challenge. Relentless design and construction schedules, high parent expectations, and tight capital budgets make schools among the most difficult buildings to design and construct. Fortunately, a tried and trusted product—wood—offers numerous advantages for a school's structural framing.

Wood has long been recognized throughout commercial architecture for its economy, ready availability, strength, durability and ease of use. Plus, wood is widely known for its beauty, allowing it to be used in open-framing designs, where its warmth can enhance the aesthetics of any space.

»» MEET DEADLINES

When faced with an unforgiving deadline—a school that must open by the start of the school year—specifying wood can help make the difference. Wood framing typically has shorter acquisition lead times than other materials, such as steel, making it easier to stay on schedule. Wide accessibility allows for adjusting delivery schedules, ensuring it's ready for installation when needed.

»» STAY ON BUDGET

As international competition for building materials grows and costs skyrocket, wood remains a cost-effective choice. And with fewer building trades required on the job site, labor costs are lower, helping meet the thin margins on school projects.

»» ENHANCE DESIGN FLEXIBILITY AND BEAUTY

In addition to its natural beauty, wood enables a high degree of design freedom. With the wide variability in sizes of spaces required in schools—from classrooms to gyms—wood framing can be adapted throughout. For designs using multiple, smaller-size buildings, architecturally interesting structures also can be built less expensively.

»» SUPPORT GREEN DESIGN

Wood framing comes from a renewable natural resource, and unlike other materials, the trees it comes from remove CO_2 from the atmosphere and store carbon for the long term in wood products. A report by the Consortium for Research on Renewable Industrial Materials (CORRIM) identified wood products as using less energy to produce and use than steel and concrete.

»» STRUCTURAL FRAMING SOLUTIONS FROM iLEVEL®

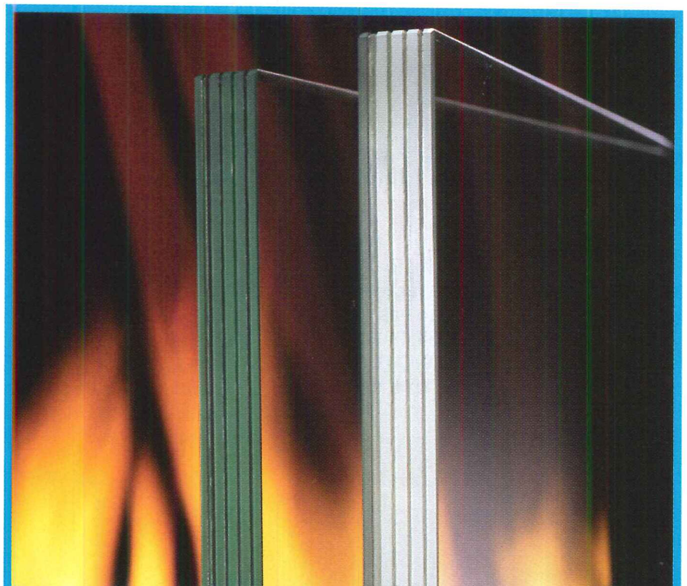
For wood structural framing, iLevel® Trus Joist® Commercial provides a single source for all needs, offering code-approved materials such as Parallam® PSL, TimberStrand® LSL, Open-Web™ trusses, and TJI® joists. iLevel also offers architects and designers a wide range of technical support services, including full shop drawings, advice on code conformance questions, design development assistance, and sizing information. ■

PHOTO COURTESY OF: ILEVEL® TRUS JOIST® COMMERCIAL


To learn more about fire-rated glazing and school design, download the "Handbook of Fire-Rated Glass for Schools" at fireglass.com.
Fire-Rated Glass
Nothing could be more important.
Fire protection takes on new significance when it has a face. When hundreds of school children are depending on you to safeguard them, each decision is critical. The glass you choose makes a difference, because the right glass can help keep a fire from spreading in that critical time when students are trying to evacuate the building. That's why Technical Glass Products offers so many choices in fire-rated glass and framing systems. Fire ratings up to 3 hours. High impact safety ratings. Complete UL approvals.
Life safety is too important to take chances. Rely on TGP for all your fire-rated glazing needs.
Pilkington Pyrostop
FireLite Family of Products
Circle 02 on Reader Service Card or go to www.shoolsofthe21stcentury.com
800.426.0279
fireglass.com
TGP
FIRE RATED
one source. many solutions
© 2007 Technical Glass Products. FireLite is a registered trademark of Nippon Electric Glass Co., Ltd. Pilkington Pyrostop is a trademark of Pilkington plc. Technical Glass Products and One Source. Many Solutions. are registered trademarks of Technical Glass Products.

Modern Fire-Rated Glass Adds Beauty and Performance to Life Safety

NEW PRODUCTS ALLOW ARCHITECTS AND DESIGNERS TO USE GLASS THROUGHOUT SCHOOLS



Pilkington Pyrostop™

FOR DECADES, POLISHED WIRED GLASS WAS THE ONLY fire-rated glazing product available for blocking the spread of flames and smoke. While it serves this purpose well, it can be broken relatively easily in the course of everyday use—such as is common in busy school hallways and classrooms. Because of the potential for injury from snags in broken wired-glass, in recent years, building codes have eliminated its use in hazardous locations such as doors, sidelites and openings near the floor. Fortunately, advances in materials have created new options that allow architects and designers to incorporate fire-rated glass that is impact-resistant, and does not have the institutional look of wired glass.

>>> CERAMICS

Transparent and wireless, ceramic glass offers a distinct aesthetic advantage. It comes in a range of make-ups that can provide many different characteristics, including fire ratings up to three hours, high-impact safety ratings (up to CPSC 16CFR1201, Category II), and sound reduction. Ceramic glass can also be beveled, etched or sandblasted without affecting the fire rating, and is available in insulated glass units (IGUs) that comply with energy codes for use in exterior applications.

>>> GLASS FIREWALLS

In stairwells, exit corridors and other locations where occupants could become trapped for long periods, fire-rated glass and frames must block the spread of flames and smoke and serve as barriers to heat. Transparent glass firewall and door units offer two-hour fire ratings and can be used in floor-to-ceiling designs with unrestricted amounts of glass. Tested to the same standards as solid walls, a fire could be raging on one side of the glass, yet the opposite surface remains cool enough to touch. In addition, glass firewalls offer high-impact safety ratings.

By incorporating modern fire-rated glass, architects and designers can provide fire protection for students and teachers, while capturing natural light and providing the openness and beauty of glazed areas.

>>> TECHNICAL GLASS PRODUCTS (TGP)—ONE SOURCE, MANY SOLUTIONS

Since 1980, TGP has been supplying innovative solutions for specialized glazing needs. TGP is the recognized leader in fire-rated glass and framing, working closely with building code officials, designers and manufacturers to identify glass and framing solutions for today's schools and commercial buildings.

The company is the sole North American supplier of the FireLite® family of ceramic glazing products, and offers a range of other fire-rated materials, including Pilkington Pyrostop™ glass and FireFrames® fire-rated framing. ■

PHOTO COURTESY OF: TECHNICAL GLASS PRODUCTS

Are Your Lockers Safe...

Or a Launching Pad for Drug-Resistant Bacteria, Fungi, Mold and Mildew?

Why take that risk?

Now you can specify Lyon lockers that are protected with an antimicrobial finish that suppresses the growth of these dangerous agents on locker surfaces, as well as the touch transfer of microbes on locker handles and doors.

TECHNOLOGY BREAKTHROUG

Our partners on this program are DuPont Powder Coatings and Agion Technologies, the patent holder for the antimicrobial compound.

The important thing is this: Our antimicrobial finish works 24 hours a day. It will continue to work for more than 20 years. And it is affordable, adding only 10% to the initial cost of your lockers.

In the interest of safety, please specify that an antimicrobial compound must be applied to all new locker surfaces in your facilities.

We look at it this way: *The cost is small. The peace of mind, immeasurable.*

PROTECTED BY LYON ANTIMICROBIAL COATING

LYON®
Workspace Products

Safe Secure Storage Solution

1-800-323-0082
www.lyonworkspace.com

Circle 36 on Reader Service Card or go to www.shoolsofthe21stcentury.com

in partnership with DuPont and AgION ANTIMICROBIAL

Textbook Cases

Five very different schools offer lessons in building with students and the environment in mind.

BY JOANN GONCHAR, AIA

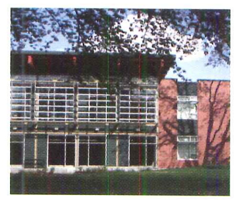
Since you've already perused some of the pages of SCHOOLS OF THE 21ST CENTURY, you already know that sustainable design is an undeniable trend in K-12 facilities. You've already read how districts around the country are going green in an effort to lower energy and operational costs, improve teacher satisfaction, and raise student achievement. But, you haven't yet had the opportunity for an in-depth look at completed schools that employ high-performance strategies.

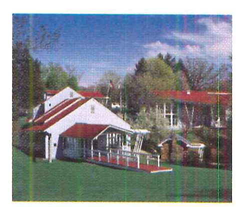
So, on the pages that follow, we provide an examination of five, very different, recently opened schools. Three of the schools—Rosa Parks School, in Portland, Oregon; Tarkington School of Excellence, in Chicago; and Fossil Ridge High School, in Fort Collins, Colorado—have already achieved, or are well on their way toward achieving, Leadership in Energy and Environmental Design (LEED) certification. The LEED rating system has become a nationally accepted tool for evaluating the environmental performance of buildings since it was launched by the U.S. Green Building Council roughly a decade ago. But so far, only about 70 schools nationwide have achieved certification.

Regardless of their LEED status, the case study schools included here all have environmental agendas. For example, all of the featured projects, to varying degrees, were driven by the goal of maximizing daylight for classroom illumination—a practice that should save energy and provide spaces conducive to learning. The plan of one of the schools, North Central Junior High School in North Liberty, Iowa, even mimics the path of the sun.

And, each of the schools, in its own way, establishes a strong connection between building and context. For the designers of the North Hills Campus of the Winchester Thurston School, tying the school to its former horse farm site near Pittsburgh meant a domestically scaled architecture with generous windows providing students with views of the still almost rural setting.

While talking to the educators who occupy these facilities every day, we discovered that many of the buildings' high-tech and high-performance features also serve to instill in students an awareness of their surroundings. Photovoltaic panels, light shelves, green roofs, and bioswales can help students better understand the built environment while instilling in them a sense of stewardship for the natural one. ■





CREDITS

OWNER: N4C-New Columbia Community Campus Corporation

ARCHITECT: Dull Olson Weekes Architects—John Weekes, *AIA, partner-in-charge;* Karina Ruiz, *AIA, project architect;* Mathew Braun, Barry Deister, Brian Greenwood, Thea Wayburn, Michael Monnier, John Schupp, Pamela Brown, *design team*

CONSULTANTS: KPFF *(civil);* ABHT *(structural);* Mazzetti & Associates *(mechanical & plumbing);* Reyes Engineering *(electrical);* Atlas *(landscape architecture);* SSA *(acoustics);* Walsh Construction *(general contractor)*

SOURCES

MASONRY: Mutual Materials

CURTAIN WALL: Kawneer Storefront

ACOUSTICAL CEILINGS: Celotex

PAINTS AND STAINS: Sherwin Williams *(interior);* Tnemec *(exterior)*

RESILIENT FLOORING: Forbo

CARPET: Shaw

A Successful Partnership

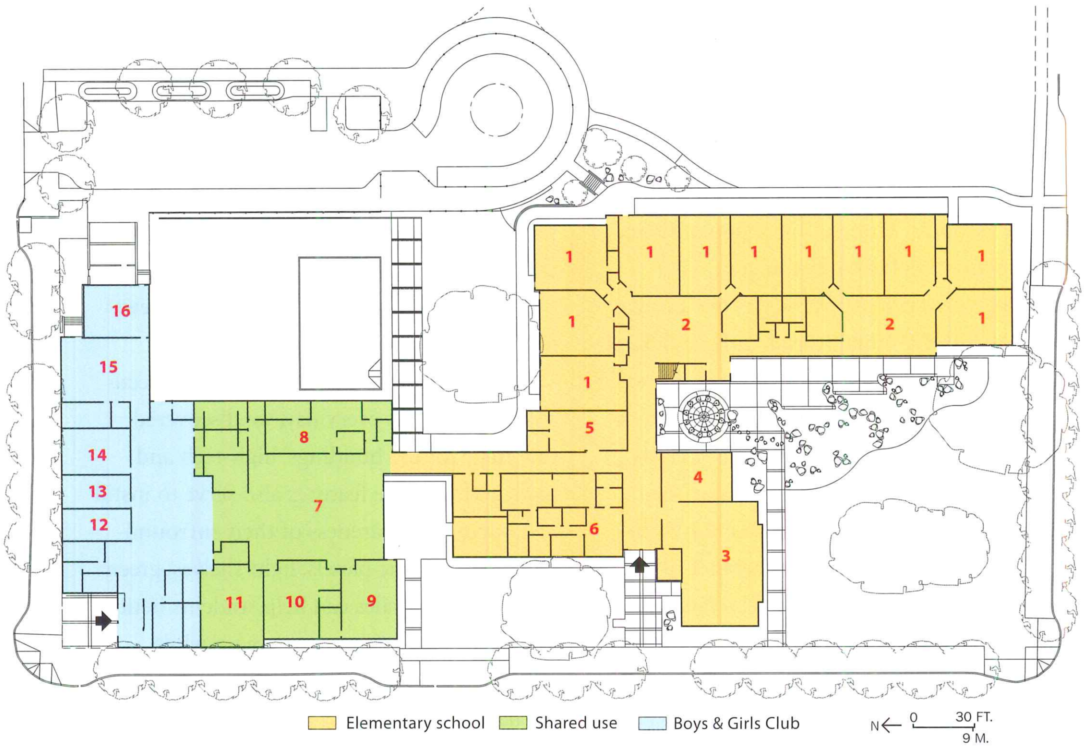
Multiple players work together to create an environmentally sustainable school with a strong community focus.

BY B.J. NOVITSKI

A team of architects and educators in Portland, Oregon tackled an ambitious set of academic, social, and sustainable goals with limited resources and have reaffirmed that the whole can be greater than the sum of the parts. By combining the programmatic needs of several institutions and cooperatively sharing spaces and financing, they have produced a gem of a school for 550 kindergarten through 6th grade students living in the recently redeveloped New Columbia subsidized housing complex. A collaborative team, led by Dull Olson Weekes Architects (DOWA), along with the Portland Public School District, the city's housing authority, and the local Boys & Girls Club, designed the $13-million Rosa Parks School.

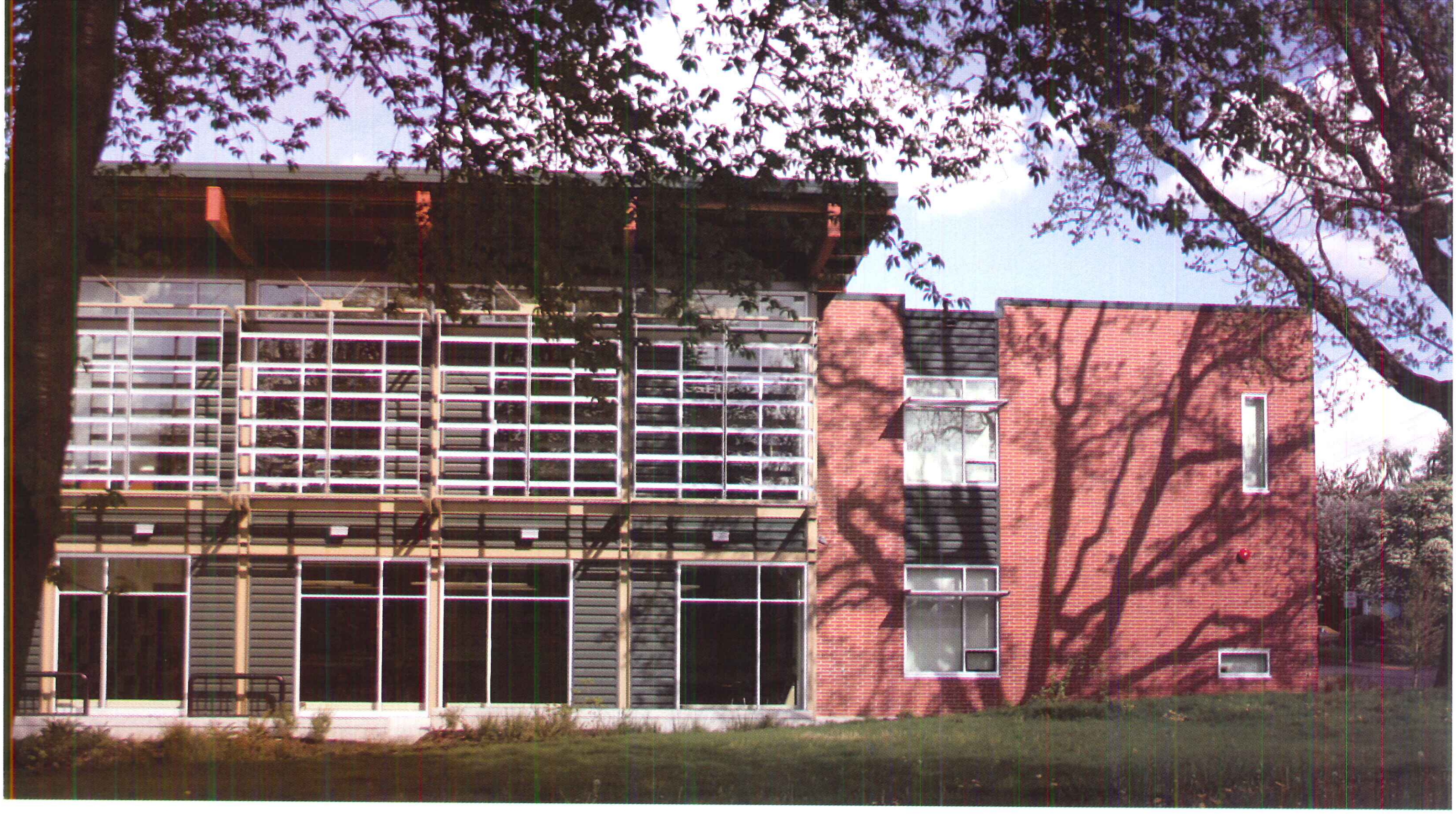
The school is unusual in its configuration of four multigrade "learning neighborhoods," each including five classrooms clustered around a commons area. This configuration supports educational collaboration, according to Tamala Newsome, the school's principal. Teachers use the common space for group activities and presentations by visiting specialists. "As creative as teachers can be, that's what we use it for," she says.

Perhaps more unusual is the degree of collaboration between school and community. John Weekes,



First Floor

1 General classroom **2** Collaborative classroom **3** Media center **4** Literacy center **5** Family resource center **6** Administration **7** Commons **8** Kitchen **9** Art **10** Technology **11** Music **12** Multipurpose **13** Media **14** Learning center **15** Teen lounge **16** Weight room



AIA, DOWA principal, and Karina Ruiz, AIA, project architect, worked with the client team to figure out how to share costs by sharing spaces. "It was an interesting challenge," recalls Weekes, "because there wasn't an institutional history of approaching projects this way." Newsome agrees: "At first, everyone was protecting their turf, reluctant to share. But then we realized we had a lot in common."

The result is a pair of connected buildings, totaling 67,000 square feet, with the school to the south. To the north is the Boys & Girls Club, where activities continue after school and during the summer. Art, music, computer, and food-service rooms are housed in the club building but shared by the school. Prominently anchoring the school's entry lobby is a family resource center that offers technical and educational support to parents. All the project collaborators recognized the center's importance, says Ruiz. "In order for this project to succeed at the desired level, we knew we needed to provide support services for the child, the family, and the community."

The school/club site is part of the New Columbia Community Campus, with a new

On the west facade (above), direct sunlight is blocked by sunscreens that are offset from and parallel to the plane of the windows. A sundial is incorporated into the paving pattern of a courtyard (below) to help students better understand the role that orientation plays in building performance.

Anchoring the school's entry lobby (right) is a family resource center. The grounds include a stormwater detention feature (foreground, below), as well as three 30-foot-deep dry wells. Retained runoff gradually leaches into the water table rather than flowing into the municipal stormwater system.

gym shared by school, club, and the city's Parks and Recreation department. An existing gym is currently under renovation and will serve as a community center for all groups. By eliminating redundant spaces, the cooperating institutions nearly halved construction costs. An umbrella nonprofit corporation manages the partners' agreements and responsibilities.

The collaborative planning and design process produced an environmentally friendly building, one that earned a Gold rating, the second highest possible under the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) program. LEED provides a benchmark for evaluating a building's performance in areas such as site development, energy efficiency, and indoor air quality.

The most visibly "green" aspect of Rosa Parks School is its celebration of daylight. Site constraints mandated a less-than-ideal north-south configuration, but window treatments maximize usable daylight while minimizing unwanted heat gain and glare. On the east facade, horizontal, exterior sunscreens, along with interior light shelves reflect daylight deep into the spaces. On the west, direct sunlight is blocked by sunscreens that are offset from and parallel to the plane of the windows. Interior glazing between classrooms and collaborative spaces enable daylight sharing. The system includes sensors that switch off electric lights under the right conditions. Principal Newsome enthuses about the effect:

"Even in the winter, the school feels bright, open, and airy."

The building's "displacement ventilation" mechanical system is energy-efficient and provides good indoor air quality. It introduces high volumes of 65-to-68-degree air at floor level. The air rises on warming and is expelled, minimizing redistribution of pollutants. For heating, a high-efficiency condensing boiler feeds perimeter radiators. Rosa Parks needs no connection to the city's stormwater grid since runoff collects in dry wells and gradually leaches into the water table. These features and a demonstration photovoltaic system play a role in the school's environmental curriculum.

To crown the school's other measures of success, it received the Richard Riley Award through a joint program of the American Architectural Foundation and Knowledge-Works Foundation that recognizes design and educational excellence in schools that serve as centers of their communities. ■

B.J. Novitski, the former managing editor of *Architecture Week*, is a freelance writer based in Eugene, Oregon.

Interior glazing allows daylight sharing between a general classroom (above) and an adjacent collaborative area. The Boys & Girls Club (right) connected to Rosa Parks, offers after-school and summer programs. Club facilities such as spaces for art, music, and computer instruction are used by the student body during regular school hours.

CASE STUDY *Tarkington School of Excellence*

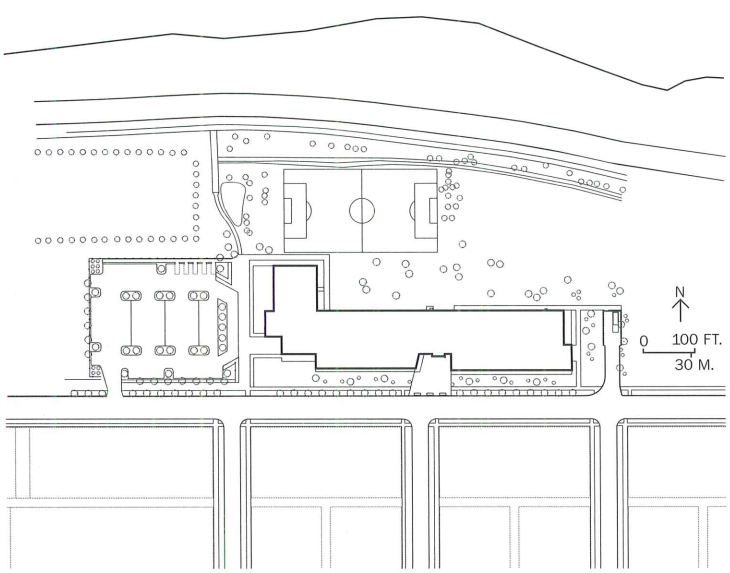
Standout Student

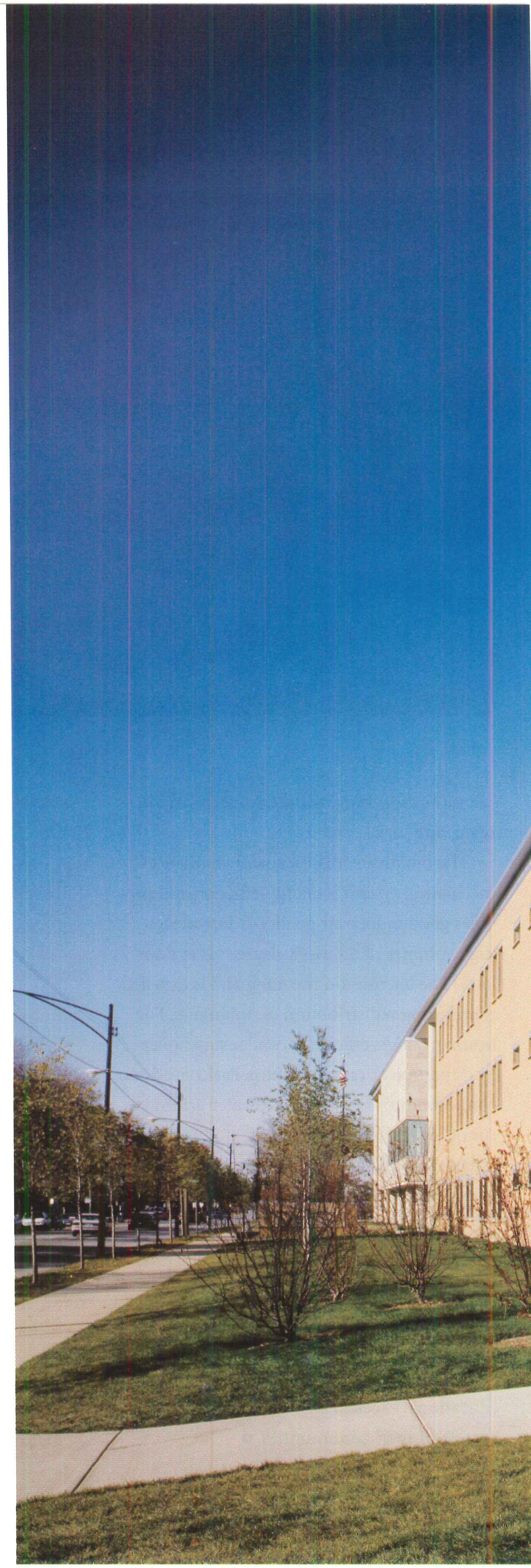
In an ethnically diverse neighborhood, Chicago builds a school that sets the standard for those that follow.

BY DAVID SOKOL

Since 1995, OWP/P has served as managing architect of the Chicago Public Schools (CPS). The role obliges the firm to conceive designs for new construction and renovation projects in the sprawling district, and to shepherd the project through the first half of construction documentation. At that point, the city's Public Building Commission takes over, commissioning the remaining drawings and subsequent project management to an architect of record. Trung Le, AIA, design director of OWP/P's education group, explains that this unique protocol allows Chicago to hire smaller design firms while maintaining the consistent quality and speed that comes from a longstanding client-architect relationship.

In this role, OWP/P has been involved in several new-build projects, including the Tarkington School of Excellence, which opened in the fall of 2005 in an ethnically diverse neighborhood in Chicago's





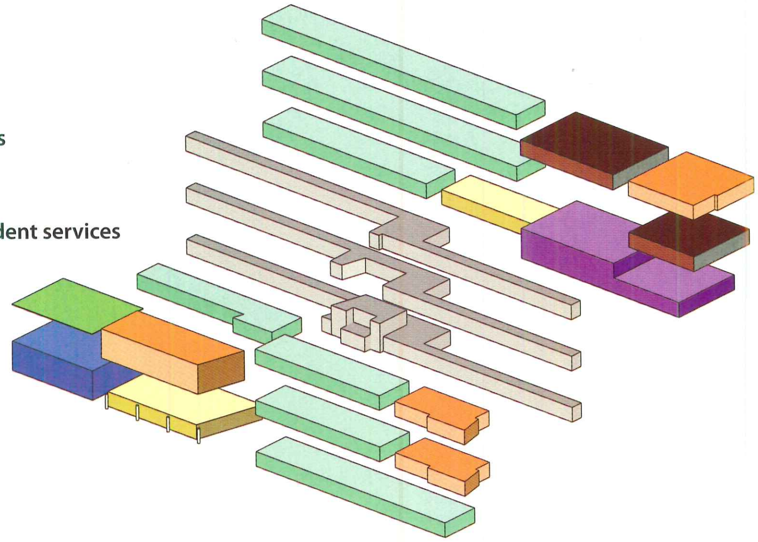
PHOTOGRAPHY: © JAMES STEINKAMP

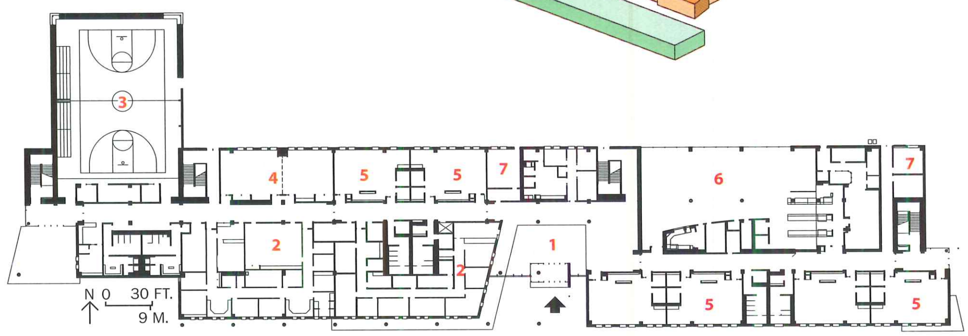
The result of a collaboration between Chicago Public Schools and the city's Park District, Tarkington sits on a generous 10-acre parcel in Marquette Park.

CASE STUDY *Tarkington School of Excellence*

Kit of Parts

- Core academic areas
- Building services
- Library/media
- Administration/student services
- Food services
- Circulation
- Green roof
- Physical education





First Floor

1 Entry lobby **2** Administration **3** Gymnasium **4** Multipurpose room **5** Science classroom **6** Cafeteria **7** Building services

Second Floor

1 Library **2** General classroom **3** Multipurpose room **4** Science classroom **5** Building services

Third Floor

1 Green roof **2** General classroom **3** Student services **4** Arts **5** Building services

CREDITS

OWNER: Chicago Public Schools

ARCHITECT: OWP/P *(managing design architect)*—**Richard H. Dewar**, *AIA, principal-in-charge;* **Helen Fantini**, *AIA, project manager;* **Trung Le**, *AIA, design director;* **Elias Vavaroutsos**, *AIA, project designer.* **Warman Olsen Warman** *(architect-of-record)*

CONSULTANTS: Rubinos Mesia *(structural);* **Soodan & Associates** *(civil);* **George Sollitt Construction** *(general contractor)*

SOURCES

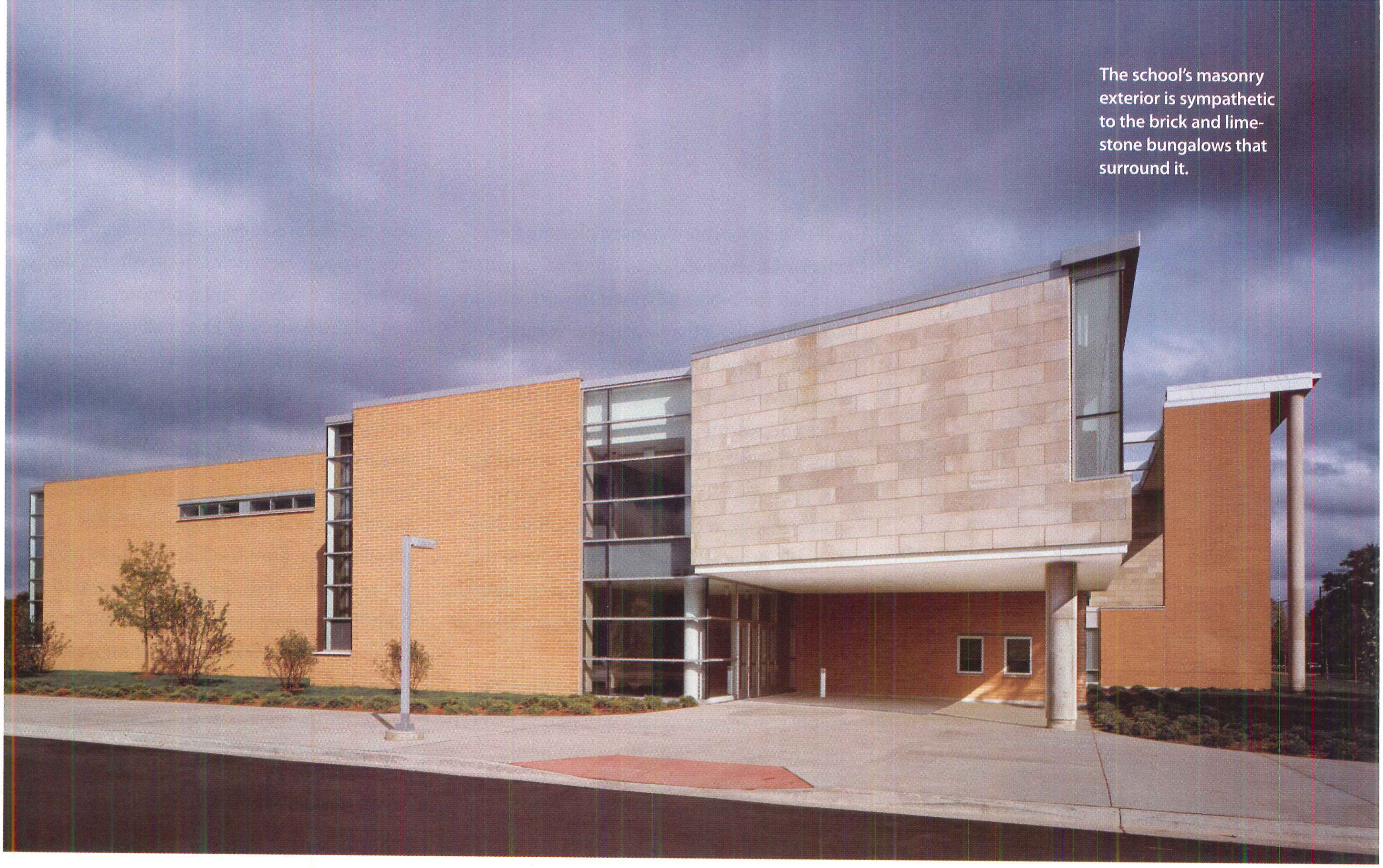
STONE: Indiana Limestone

BUILT-UP ROOFING: Johns Manville

GREEN ROOF: American Hydrotech

DOORS AND DOOR FRAMES: Ceco

CABINETWORK AND MILLWORK: TMI Systems



The school's masonry exterior is sympathetic to the brick and limestone bungalows that surround it.

"We want to make sure these buildings are significant and add something to the fabric of the neighborhood," says Trung Le of OWP/P about the firm's prototype designs for Chicago Public Schools.

southwest quadrant. Indeed, the managing architect has helped the district cope with a growing student population in an efficient way: With Tarkington and similar K-8 schools, Le and his team start with a group of standard components, including common spaces like a gymnasium, dining facilities, library and administrative areas, and a number of classrooms that correspond with a locality's demographics. Then these components are arranged, typically linearly or in a L-shape, so that the school best suits its site.

"We want to make sure the buildings are significant and add something to the fabric of the neighborhood," Le says of the kits of parts, which the CPS dubs "prototypes." But, "the opportunity for creating a building with an intimate connection to the community is limited," he adds candidly. "The timeline is fast, and maintaining equity from one community to the next is important politically in a city where cultural and racial division is still visible."

Although OWP/P has found its creative hands tied somewhat by the universality of the prototype, that model has grown increasingly sophisticated in recent years. Most significantly, just as Tarkington was under development, Mayor Richard Daley ordered CPS to collaborate with the Chicago Park District on building new schools on parkland to ensure that the facilities would be located more centrally within existing neighborhoods. Moreover, in his ongoing effort to make Chicago one of the most ecologically responsible cities in the nation, Daley required that Tarkington be the first school in the district to be certified under the Leadership in Energy and Environmental Design (LEED) rating system. Created by the U.S. Green Building Council, LEED provides standards for evaluating a building's environmental performance. Certification is pending, and all subsequent new Chicago schools must surmount this bar.

To erect Tarkington School of Excellence, the district acquired 9.82 acres of Marquette Park, replacing a mid-century administrative building on site with the 134,000-square-foot school for 1,000 students. Warman Olsen Warman is the architect of record.

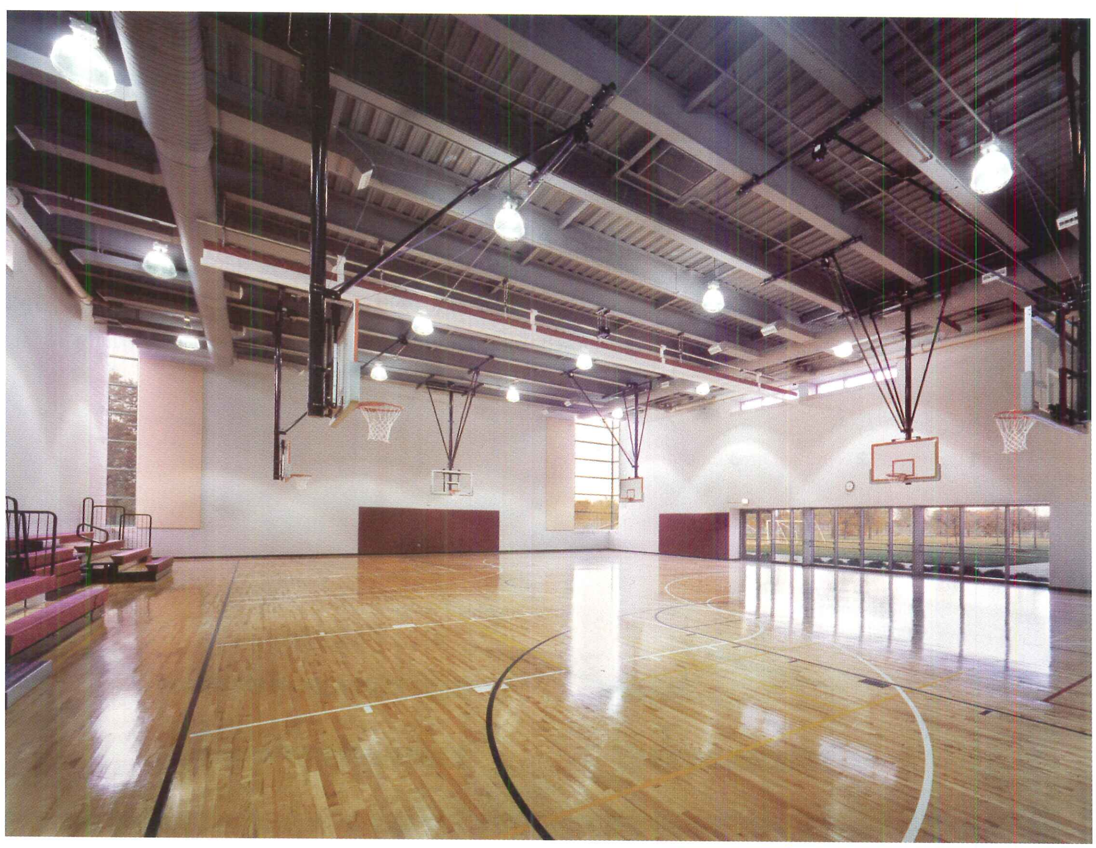
Ostensibly, Tarkington follows an established pattern. The building assumes a truncated L-shaped footprint, with community spaces radiating from a central two-story atrium. In a nod to neighborhood context, Tarkington's exterior is composed of an offset brick pattern to reflect the brick and limestone articulation of the bungalows that face it; the library, immediately adjacent to the entrance, stands out from the facade, announcing its importance and reaching out toward daylight. Le also notes that Tarkington includes a full competition gymnasium, unlike other K-8 athletic spaces, thanks to the new collaboration with the park district. In order to compensate the community for its loss of parkland, at night the school is open to the public, offering classes in yoga, fitness, and dance.

The obligation to embrace sustainability simply reinforced a values system that OWP/P had implemented from the outset of its tenure. Like previous schools, Tarkington runs along an east-west access to minimize hard-to-control morning and afternoon sunshine, and large expanses of glass replace traditional punched openings and increase diffuse interior daylight. Tarkington's terrazzo floors include recycled glass, and the wood used in its atrium lobby ceiling, library, and gym floor comes from sustainably managed forests. The mayor's mandate also allowed OWP/P to introduce a sedum roof. But "LEED's biggest impact was on how the general contractor built the building," says Le. "The contractor recycled a majority of construction waste instead of dumping it somewhere," he says.

Certainly, there is a sense that with Tarkington, CPS is catching up to principles

About a third of Tarkington's roof is covered with vegetation. This feature has a number of environmental benefits, including reduction of stormwater runoff. The planted roof absorbs and retains rain water, allowing much of it to evapotranspire.

Interior finishes in the daylight-filled, double-story lobby (above) include terrazzo floors with recycled glass and wood from sustainably managed forests. As part of Chicago Public Schools' arrangement with the Park District, the gymnasium (right) is open to the community after school hours. Here, classes in yoga, fitness, and dance are offered to the public.



long held by OWP/P. Despite its foresight, the firm is not resting on its laurels now. Le says that his design team continues to innovate within the managing-architect paradigm. And, while concurrent projects such as Albany Park Multicultural Elementary School and the forthcoming Miles Davis Elementary School will likely achieve LEED certification at the minimum level, he predicts that subsequent projects will aspire to higher ratings. ■

David Sokol is a New York–based design writer and frequent contributor to ARCHITECTURAL RECORD.

Letting the Sun Shine In

Neumann Monson Architects builds on its experience with daylighting and on a long-standing relationship with a client.

BY DAVID SOKOL

CREDITS

OWNER: Iowa City Community School District

ARCHITECT: Neumann Monson Architects—Kevin Monson, *AIA, principal-in-charge;* Chris DeGroot, *AIA, project architect;* Tim Schroeder, *AIA, design architect;* Emily Kellenberger, *interior designer*

CONSULTANTS: Farris Engineering *(mechanical/electrical);* M2B *(structural);* MMS Consultants *(civil/landscape);* The Weidt Group *(daylighting);* Conlon Construction *(general contractor)*

SOURCES

MASONRY: Glen-Gery Brick; Ochs Brick Co.

ALUMINUM WINDOWS: Moduline Window Systems

SUNSCREENS: ASCA Inc.

PAINTS AND STAINS: Pittsburgh Paints

PLASTIC LAMINATE: Nevamar

CARPET: J&J Commercial

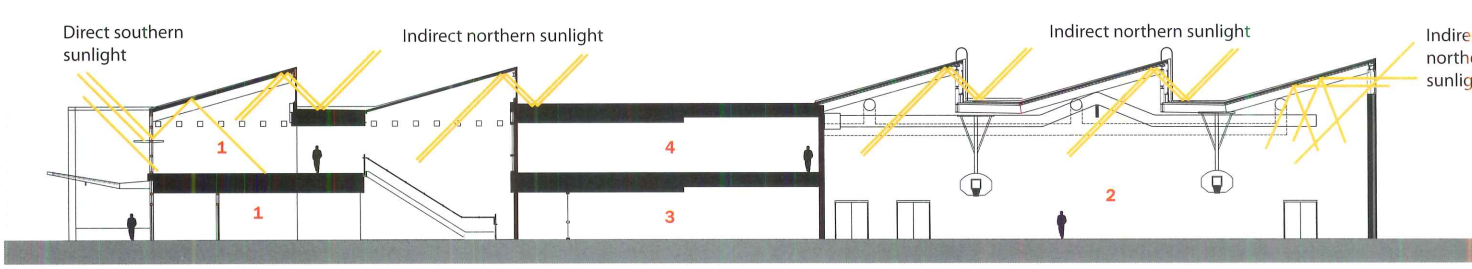
The Iowa City Community School District has a star pupil in Neumann Monson Architects. The local firm not only earned commissions to design a trio of schools funded by a $39 million bond issue approved in 2003, but it also initiated an effort to make the facilities exemplars of performance and sustainability. The most recently completed building, the 600-student North Central Junior High, best realizes that independent study.

Because of a conviction that sustainable design "improves people's performance through healthier environments," the design team took a particular interest in deploying the U.S. Department of Energy's (DOE) high-performance guidelines, according to Kevin Monson, AIA, Neumann Monson president. And when the architects presented the district and its facility advisory council with DOE statistics, as well as the results of a 1999 study by energy consultant Heschong Mahone Group linking classroom daylight levels with test scores, the clients quickly embraced the designers' sustainable agenda. As a result, Neumann Monson's Elizabeth Tate High School and Van Allen Elementary School, both opened in 2005, feature generous north-facing light monitors; Van Allen, which shares a 60-acre site with North Central, was also the first school in the state to earn certification, under the Leadership in Energy and Environmental Design (LEED) rating system. The program, administered by the U.S. Green Building Council, provides standards for evaluating performance in areas such as energy and water use, indoor air quality, and recycled content in building materials.

North Central Junior High, which opened for the 2006–2007 school year, refines the principles Neumann Monson had realized in the Tate and Van Allen projects. The 4 1/2-foot-tall light monitors that run the length of each classroom, for example, are placed in closer proximity to classroom walls than at Van Allen. By doing so, the architects were able to

Section A-A

1 Commons 2 Gymnasium 3 Cafeteria 4 Library



North Central's exterior walls incorporate so-called "B-grade" bricks found at local brickyards. The designers used the various hues of the bricks to create striated facades symbolic of the region's bedrock layers.

reduce structural reinforcement without sacrificing light penetration.

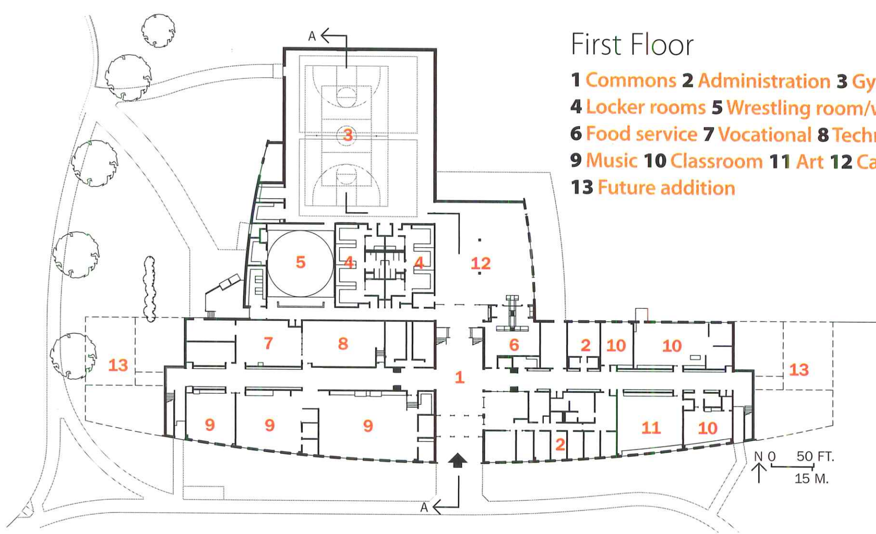
The 82,000-square-foot building's southern elevation also bolsters Neumann Monson's embrace of the sun. While aluminum canopies shade the windows, these elements also extend into the interior as light shelves, reflecting light streaming from the upper portion of the windows into rooms. Moreover, the building plan here extends in a broad arc. "Programmatically, it allowed us to have different-sized classrooms in a tight envelope," Monson says, "and it is representative of the [path of the] sun."

The building's reliance on daylighting reduced the heat gain associated with electric lighting, allowing designers to specify a smaller and less costly mechanical system. The strategy helped keep the construction budget at an economical $104 per square foot, and should also provide low operational costs, Monson says.

North Central reveals its sustainability mission at every turn. The building's signature is its southern elevation, featuring striations of bricks acquired from local production facilities' overruns; students similarly enjoy views of bioswales and natural wetlands as they move through the school everyday. Less apparent but equally important measures include 88 geothermal wells and, another Iowa first, pervious-concrete parking lots to reduce toxic stormwater runoff. Only an inquisitive student sleuth will find them all. ■

Shading devices and light shelves on south-facing windows bounce daylight deep into the interior.

Classrooms rely chiefly on daylight for illumination.



First Floor

1 Commons **2** Administration **3** Gymnasium
4 Locker rooms **5** Wrestling room/weight room
6 Food service **7** Vocational **8** Technology
9 Music **10** Classroom **11** Art **12** Cafeteria
13 Future addition

A Welcoming Environment

Designers create a cozy complex in tune with a school's educational philosophy and its bucolic site.

BY ALEX BOZIKOVIC

The independent Winchester Thurston School has roots in central Pittsburgh that go back to the 1880s. But by the 1980s, many potential students were living in the suburbs. The school's North Hills Campus was created to serve as a feeder school for its urban counterpart. Through a 20-year collaboration with the Pittsburgh office of architecture firm Bohlin Cywinski Jackson, the campus has developed its own architectural identity, bringing domestic forms and materials into the context of a small school.

Built on a former horse farm in the town of Allison Park, the 16,000-square-foot complex began in 1988 with a single classroom building and the adaptive reuse of two existing outbuildings. The most recent third phase of renovations, completed in fall 2005, reconfigured the original classroom structure and added a second major building to the site: known as the Campus Center, it contains a multipurpose room and specialized classrooms for art and music.

The buildings' exteriors employ a historicist vocabulary of materials and forms. The familiar gabled roofs, blue clapboard siding, and white trim fit their context and made the inexpensive project easier to build, says BCJ's Roxanne Sherbeck, AIA, the campus's lead designer for all three phases. But "there was also a philosophical interest," she says. "Because it was a sort of transition for kids from home to school in town, we tried to make it both familiar and workable as a school building."

Nancy Rogers, the director of the campus, says

CREDITS

OWNER: Winchester Thurston School

ARCHITECT: Bohlin Cywinski Jackson—Jon C. Jackson, *AIA, principal-in-charge;* C. Roxanne Sherbeck, *AIA, lead designer*

CONSULTANTS: Dotter Engineering, Structural Engineering Corporation, Konefal & Company *(structural);* P.L. Frank *(mechanical);* Caplan Engineering, Hornfeck Engineering *(electrical);* L.D. Astorino *(m/e/p);* Dodson Engineering *(mechanical/plumbing)*

SOURCES

VINYL SIDING: Mitten Inc.

ASPHALT ROOFING SHINGLES: Certainteed Corp.

ROOF DECK: Tectum Inc.

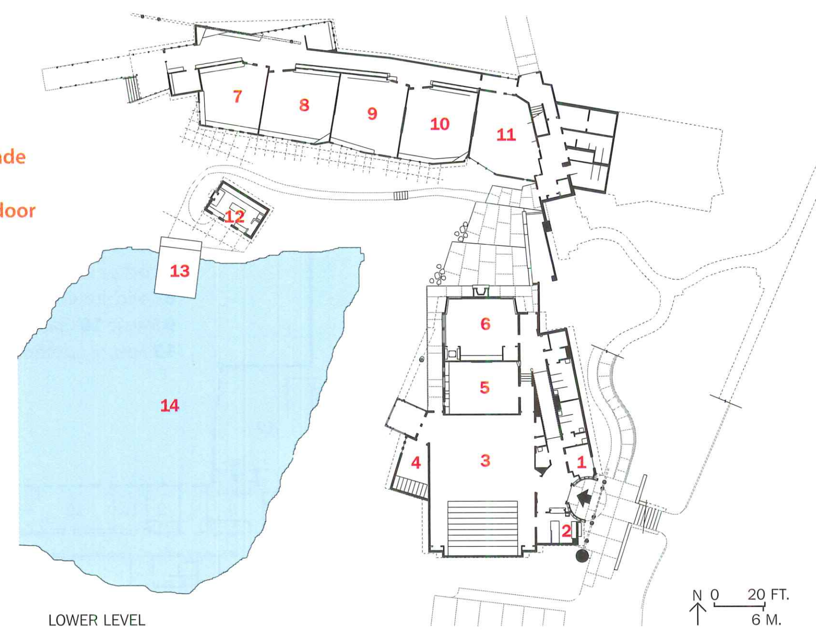
WINDOWS: Andersen

GYMNASIUM WOOD FLOOR: Horner Flooring Company

PLUMBING FIXTURES: American Standard; Sloan Valve; Chicago Faucets; Geberit

Floor Plan

1 Office **2** Catering **3** Multipurpose room **4** Storage **5** Music **6** Art **7** Fifth grade **8** Fourth grade **9** Third grade **10** Second grade **11** Science **12** Outdoor center **13** Dock **14** Pond



A slightly irregular geometry stimulates students' thinking, the designers say.

With gabled roofs and clapboard siding, the architects have created an almost domestic atmosphere.

the informal design matches the "learner-centered" teaching philosophy of North Hills, which serves students from pre-kindergarten to fifth grade. "It doesn't have an institutional feel," she says. "It's very welcoming." Rogers, who has been at the campus since it opened in 1988, says the 96 students are also well served by a "child-focused," contemporary interior with nooks ideal for reading and conversation and irregularly shaped classrooms. As Sherbeck explains, these elements are designed to add character and also to stimulate critical thinking, one of the school's core values. Exposed beams in one corridor of the main building remind students "not to take [the structure] for granted," she says.

As for the individual classrooms, Sherbeck says that the school and designers opted for less order than would be typical. "The geometry is less regular, and more flowing. We've shaved corners here or there and focused windows in unexpected ways."

In fact, daylighting and exterior views are a crucial part of the design. The original classroom building now accommodates six grade level classrooms, a science room, and the media center. Almost all of these spaces overlook a pond and have southern exposures, partly shaded by a strategic arrangement of trellises. Each classroom also has its own heat pump with separate controls for added energy efficiency.

Windows are often placed at children's eye level, and Rogers says this helps establish an ecological awareness, which the school takes seriously. The campus was intended to take full advantage of its semi-rural setting, and indeed one of the old outbuildings has been transformed into an environmental laboratory. "There's a lot of emphasis on being part of a real world," Sherbeck says, "as opposed to an abstract educational conception." ■

Toronto-based Alex Bozikovic is a design columnist at *The Globe and Mail* and a contributor to ARCHITECTURAL RECORD.

As part of the most recent phase of construction, the campus's original classroom building (below left) has been reconfigured, and now contains mostly grade level classrooms. The new Campus Center includes a multipurpose room and provides spaces for instruction in art (directly below) and music.

CREDITS

OWNER: Poudre School District

ARCHITECT: RB+B Architects—George A. Brelig, *AIA, design principal;* Corky Bradley, *AIA, project architect;* Matt Arabasz, *AIA, job captain*

CONSULTANTS: JVA Engineering *(structural);* CEI *(electrical);* MKK Engineering *(mechanical);* BHA Design *(landscape);* Nolte & Associates *(civil);* ATS&R *(programming);* ACODA/SM&W *(theater & acoustical);* EMC Engineers *(energy modeling);* ENSAR Group *(daylighting);* AEC *(commissioning);* Haselden Construction *(general contractor)*

SOURCES

MASONRY: Claylite; Interstate Brick

SKYLIGHTS: Solatube International

RESILIENT FLOORING: Armstrong

AUDITORIUM SEATING: Irwin Seating Company

LIGHTING CONTROLS: Watt Stopper/Legrand

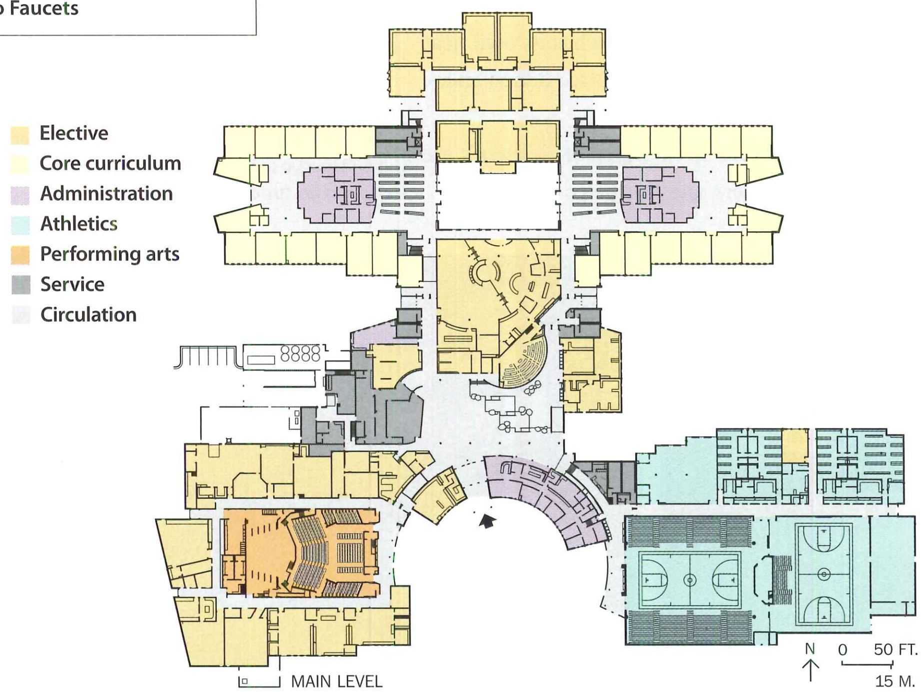
PLUMBING FIXTURES: Kohler; Elkay; Chicago Faucets

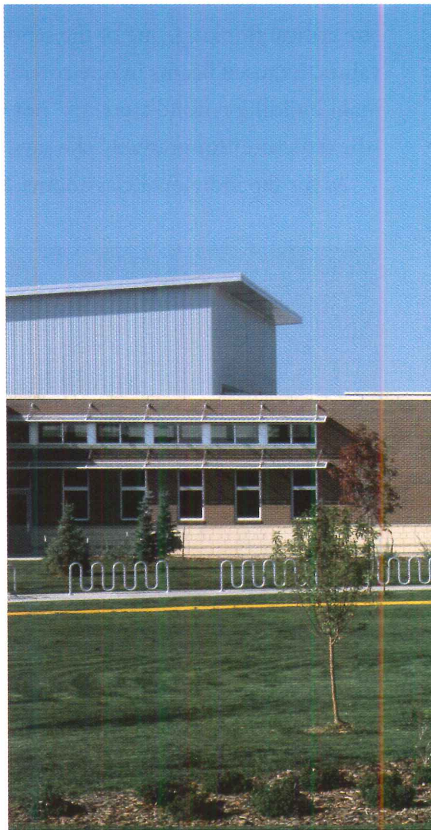
Building as Teaching Tool

Intimate and flexible learning environments within a larger footprint encourage creativity and collaboration, among both teachers and students. BY B.J. NOVITSKI

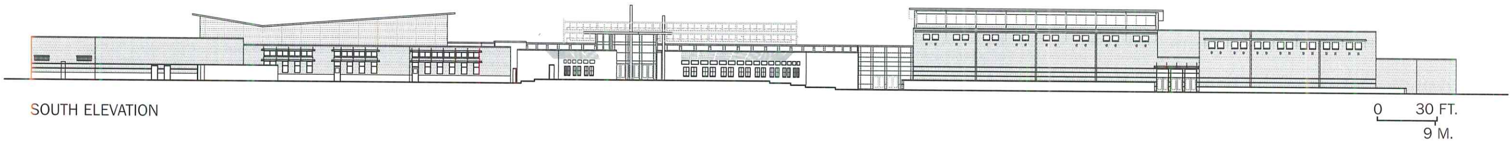
The Poudre School District in Fort Collins, Colorado, gave a tough assignment to RB+B Architects: build a 1,800-student high school, taking advantage of an economy of scale, but at the same time, design a facility that would allow faculty to provide students with the personalized education more common in smaller schools. District administrators also asked designers to integrate energy efficiency measures in order to significantly reduce utility bills, without adding to the initial construction cost. Now, three years after the completion of construction, the grades are in and, by all accounts, the architects get an A for Fossil Ridge High School.

RB+B and a committee of educators developed the idea of one 300,000-square-foot, $38.5 million building containing three separate "learning communities." Each of three wings in the north half of the school operates as a semi-autonomous institution for 600 students, with its own core curriculum, student work areas, and administration. Specialty courses, such as music, are taught outside the smaller communities. South of the three wings are a





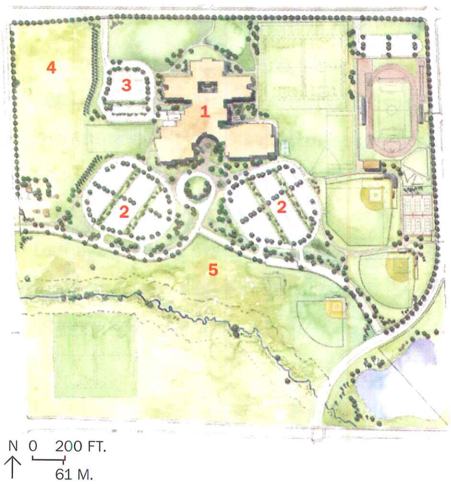
PHOTOGRAPHY: © DAVID PATTERSON



SOUTH ELEVATION

Site Plan

1 High school **2** Student parking **3** Faculty parking **4** Future expansion **5** Planned public park



large, daylight-filled media center; physical education facilities; and spaces for the visual and performing arts.

Social studies teacher Tara Rigby is delighted with how the unusual configuration is working. She reports a strong sense of community among the students. Teachers also benefit, she points out. Instead of being "pigeon-holed in a social studies wing," Rigby works as part of an interdisciplinary team that encourages creativity in teaching. In one example of collaboration, history and literature classes examine the same period in history at the same time.

Rigby is also the faculty sponsor of the school's environmental club. These students are passionate activists, she says, and their focus is their immediate surroundings. Fossil Ridge High School was one of the first schools to receive a Silver rating from the U.S. Green Building Council. This Leadership in Energy and Environmental Design (LEED) designation has become a coveted certification for sustainability. To qualify, the building must be energy efficient, conserve water, have good indoor air quality, and contain recycled materials. Club members are experts in the building's green features, and they give technical tours to visitors and their fellow students. On a typical tour, the students might explain the daylighting strategy, the east- and west-facing windows canted to the north to reduce solar

The 300,000-square-foot high school is broken down into a variety of interconnected volumes that are expressed on its exterior.

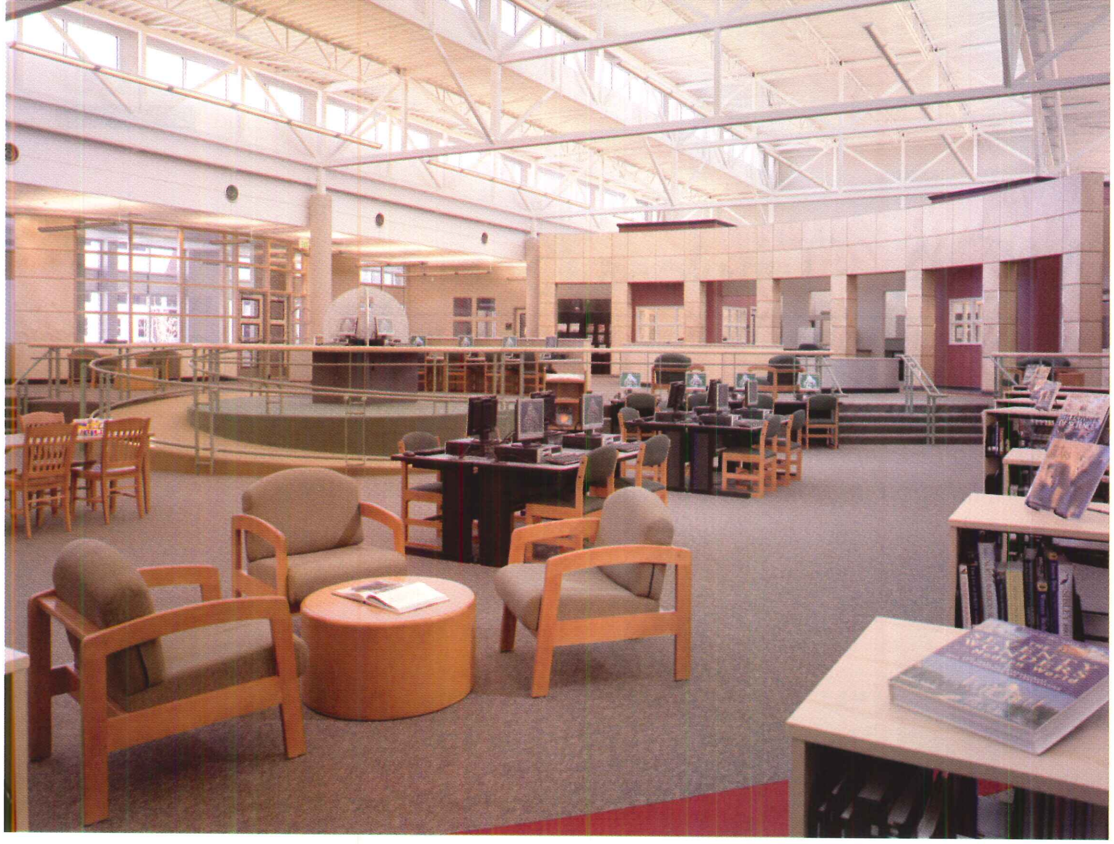
heat gain, the heat-recovery wheels, or the ice storage system that cools the building while shifting 40 percent of electrical demand to off-peak hours. They might point out the photovoltaic panels at the front entrance or the xeriscaping that helps to conserve water. During much of the daytime, electric lights are unnecessary, and students and teachers are learning to avoid turning them on as a matter of habit. Rigby reports that the club members are thrilled to have this opportunity for direct environmental involvement.

Sustainable design is more than a list of features. How components and systems work with a building's configuration and orientation is key.

Some of these young enthusiasts may pursue architectural careers. If they do, they'll learn that sustainable design is more complex than a list of features. How components and systems work together with the shape and siting of the building is key. Indeed, it's generally understood that a commitment to LEED must precede any design work. But the owner did not formally adopt LEED guidelines until the architects were well into design development, according to Quinton "Corky" Bradley, RB+B project architect.

The relatively late decision to pursue LEED certification was not a drawback, however, because the district and the design team had already decided that the building's environmental performance would be a top priority. "We never shifted gears. We had always had our eyes on building the best building we could," Bradley recalls. "First get the exterior

The photovoltaic panels (left) form a canopy over the main entry and announce the school's environmental agenda. Horizontal shading devices over classroom windows (below) balance the need for views and daylight, and protect against heat gain.



Daylighting is an important aspect of the design of Fossil Ridge, both for its classrooms and its shared spaces, such as the media center (left) and the commons area (below).

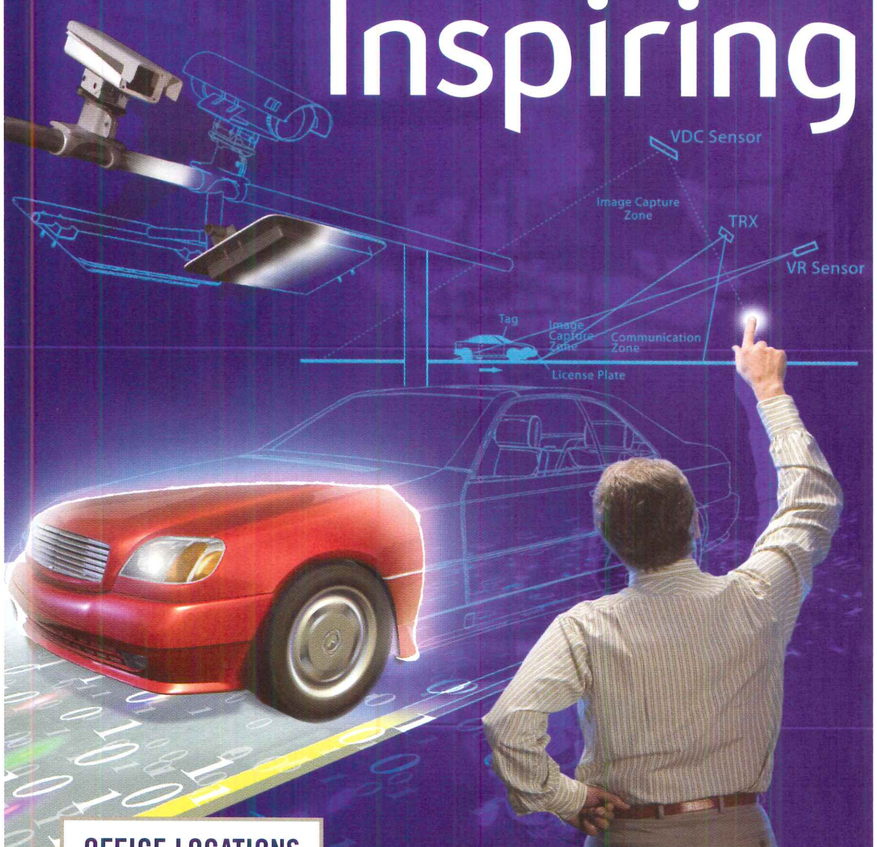
envelope right, then specify the best equipment and controls, and never forget it's all about delivering quality education," he advises.

Another Fort Collins high school of the same size, five years older, serves as an energy-consumption benchmark. In a recent five-month winter period, the cost of Fossil Ridge's natural gas and electricity was less than 60 percent that of the older school's. Despite this success, there's room for improvement. Both Rigby and Bradley comment that if they could do it over again, they would simplify the complex lighting system. The daylighting is beautiful, but some teachers have complained that they need more local control to darken rooms for presentations. Otherwise, Rigby wouldn't change a thing. Even the environmental club members who don't become architects, she predicts, will become influential: "The things they learn here will be beneficial when they enter the workforce," she says. "They will provide another voice advocating the importance of green design to their employers and people around them, now that they have seen firsthand what can be accomplished." ■

engineering | planning | construction management | architecture | science | technology

real vision

Inspiring reality



OFFICE LOCATIONS

Alexandria, Virginia
703.535.3008

Atlanta, Georgia
800.826.4284

Austin, Texas
800.880.5949

Beltsville, Maryland
800.697.7275

Charlotte, North Carolina
704.522.7275

Dallas, Texas
888.649.7275

Denver, Colorado
303.221.7275

Houston, Texas
888.658.7275

Las Vegas, Nevada
800.483.6244

Miami, Florida
800.597.7275

Missoula, Montana
406.532.7275

Orange, California
800.398.8660

Orlando, Florida
800.284.5182

Pittsburgh, Pennsylvania
412.269.7275

Sacramento, California
916.325.4800

San Diego, California
760.753.1120

San Juan, Puerto Rico
787.294.2010

Tampa, Florida
800.477.7275

75 LOCATIONS NATIONWIDE

Can you see it?

The better way...the next step to innovation...the small improvement that makes the big difference?

PBS&J is one of the nation's leading engineering and consulting firms, helping clients in the public and private sectors address the infrastructure and environmental challenges that make our world a better place to live.

In our 47 years of service, we've found that the best ideas come from effective partnership - talented people collaborating with respect and trust. This is how we work every day. And it's why more than 85 percent of our business comes from clients who have worked with us before.

PBS&J

www.pbsj.com

Visualize the future. Then call PBS&J.

Circle 38 on Reader Service Card or go to www.shoolsofthe21stcentury.com

OUR BRICK IS INSPIRING GREAT MINDS.

Carolina Ceramics Brick Company is proud to be a part of the education of tomorrow's leaders. We know a safe, pleasant classroom environment can certainly inspire a student. And it seems our brick is doing the same for architects and contractors lately. Carolina Ceramics brick keeps showing up in awe-inspiring, award-winning school projects— from the *Brick in Architecture* awards to the *Design Cost Data LEED® Gold* awards, Carolina Ceramics is becoming the brick of choice for great minds!

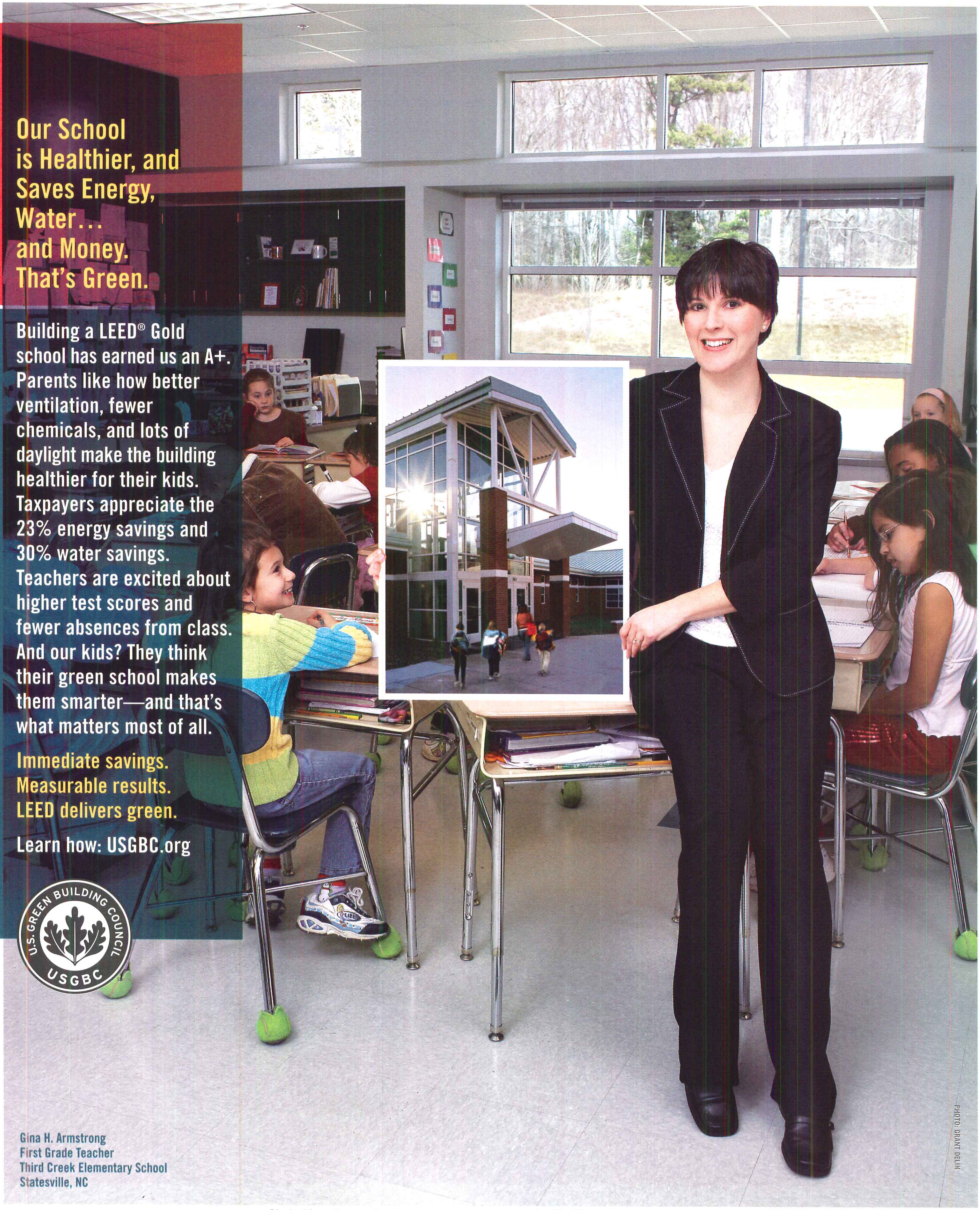
CAROLINA CERAMICS
BRICK COMPANY

CAROLINACERAMICS.COM

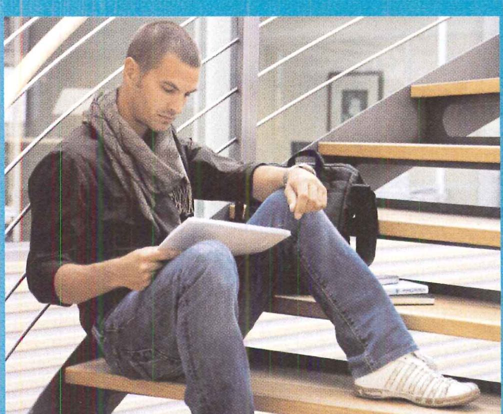
803.788.1916 866.788.1916

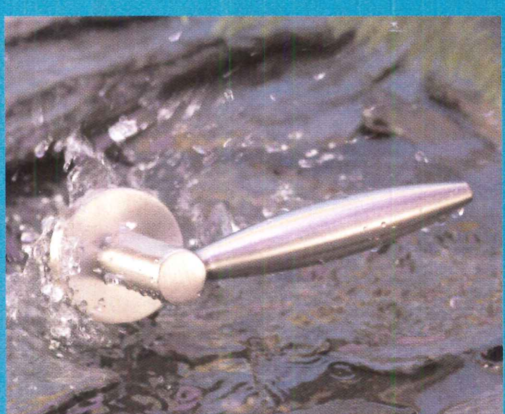
Circle 42 on Reader Service Card or go to www.shoolsofthe21stcentury.com


Wausau Tile Helping Build
America's Futu
More
Than Tile....
• Recycled Glass Products
• Proud sponsor of Dream
Flight USA educational program
• Terrazzo Tile
• Precast Terrazzo Products
• Concrete Pavers
• Precast Custom Products
• Metal Site Furnishings
• Concrete Site Furnishings
Part of America's Landscape
Circle 45 on Reader Service Card or go to
www.shoolsofthe21stcentury.com
P.O. Box 1520
Wausau, WI • 54402-1520
(800) 388-8728 • (715) 359-3121
FAX (715) 355-4627
Email: wtile@wausautile.com
www.wausautile.com
WAUSAU



Circle 46 on Reader Service Card or go to www.shoolsofthe21stcentury.com






Never settle for

Sunpower for Schoolkids

A PV system can supply some of the energy your school needs, but may be even better as a teacher of physics, energy, and sustainability concepts.

BY DEANE EVANS, FAIA

Every day, the sun bathes the earth with enormous amounts of free energy—enough in one minute to meet the world's current energy needs for an entire year! Schools are beginning to harness this limitless natural resource as a way to meet their energy needs—and provide educational opportunities for their students in the process.

Photovoltaics are one solution. PV systems convert sunlight into electricity—one of the most elegant and environmentally benign ways to produce power. This article explores how teachers, administrators and facility managers are beginning to look for ways to produce their own power.

WHAT ARE PHOTOVOLTAICS?

In 1839, French scientist Edmund Becquerel observed the photoelectric effect—when a current could be measured across an electrode suspended in a solution exposed to light. And, in 1921, Albert Einstein won the Nobel Prize for his theories explaining the photoelectric effect. The photoelectric effect was not put to work until 1954, when Bell Laboratories created the silicon photovoltaic cell—the first cell able to convert enough of the sun's energy to power electrical equipment. Given a large boost by the space program, development of PV cells has proceeded uninterrupted since they were first manufactured, with conversion efficiencies (how much solar energy is converted to electrical energy) increasing from 4 percent for Bell Labs' first prototype to more than 50 percent for the specialized prototypes of today. More common for building applications are overall PV system efficiencies of 12 to 17 percent depending on the type of solar cells and system technology used.

Architects who wish to read this article for AIA Continuing Education learning units can do so at construction.com/CE/.

DiNisco Design Partnership designed the Holten-Richmond Middle School in Danvers, Massachusetts, where the PV panels do double duty: They produce electricity while shading the windows from direct sunlight.

HOW DOES PV WORK?

When sunlight strikes a PV cell, electrons are dislodged and gathered by wires attached to the cell to form an electric current. This basic action—simple, quiet, non-polluting, and requiring no moving parts—is at the core of every PV system. Cells may be more effective in areas like the Southwest, with a lot of clear, sunny days, but they will still provide substantial amounts of power in areas like the Northwest, with more overcast days.

Since most cells are relatively small, typically from 1/2 inch to 4 inches on a side. They produce very little power, and need to be electrically connected to other cells to increase energy output to levels appropriate for building applications. These collections of PV cells, referred to as "modules," are what we typically see on the roofs of buildings. They are typically 2-to-4 feet by 4-to-6 feet in size. Modules are typically connected to each other to form PV "arrays," which can range in size from one or two modules to several thousand, depending on the power output desired. School projects in the U.S. have used various sizes, from small arrays—from 1 or 2 modules for demonstration purposes—up to the array on the three buildings that make up a high school in Bayonne, New Jersey, that has more than 5,000 modules and supplies a substantial portion of the school's electricity.

A functioning PV system also needs an inverter to convert the direct-current (DC) power generated by the modules into alternating current (AC) that can be used in the school. Wiring is needed to connect everything together, and some form of mounting system is necessary to attach the array to the roof, wall, or grounds of the school. The mounting system can be fixed at a set angle or track the sun throughout the day. This can substantially increase the energy output of the array, but at a considerable cost.

Ford, Fairwell, Mills & Gatch Architects designed the independent Willow School in Gladstone , New Jersey. Its PV panels are mounted unobtrusively atop the building's dormers.

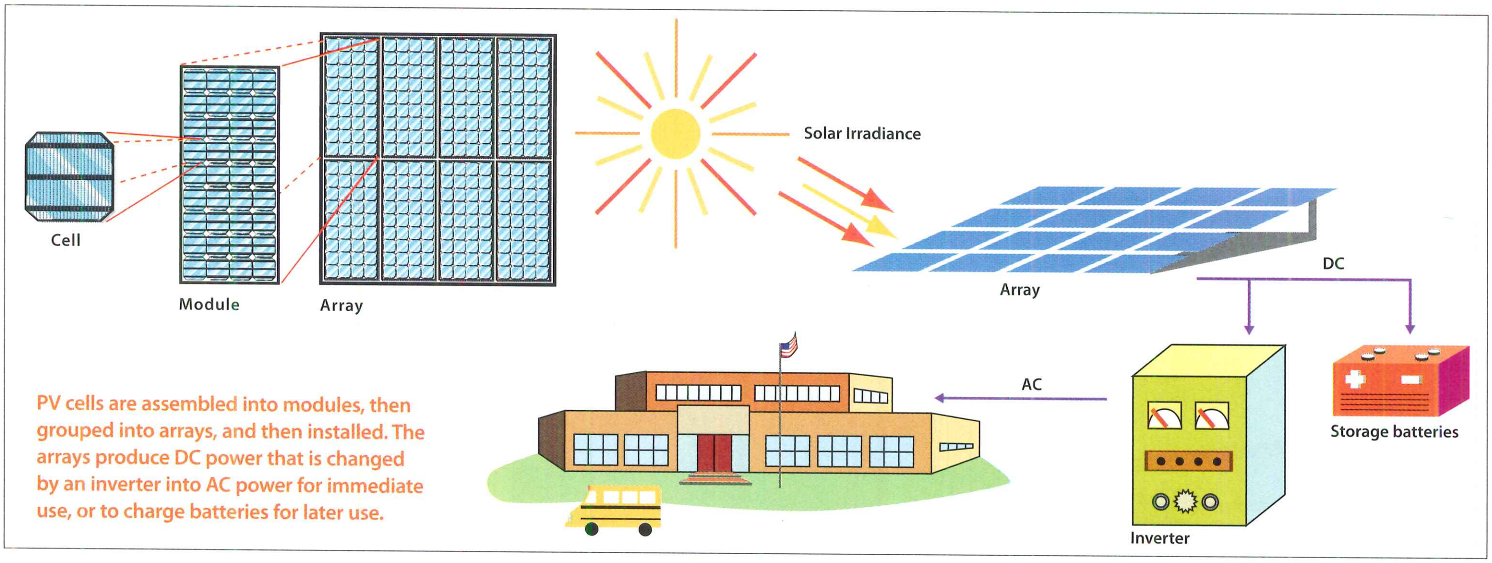
WHERE DOES THE ENERGY GO?

PV systems are either stand-alone or grid-connected. The electricity from a stand-alone system is either used as it is produced or stored in batteries. In grid-connected systems, power generated by the array is used to supplement power supplied by the electric utility. When the modules don't provide enough electricity, the utility supplements the array. When the modules provide more than is needed, the excess is fed back into the power grid and the school's electric meter runs backwards. In these situations—in the 35 states that allow it—the school sells electricity back to the utility. This can be particularly important during "peak" periods of energy demand, when the utilities charge higher rates. These periods often coincide with times when the output from the PV array is also at its highest. If the school is getting maximum energy from its array at these times, it is buying less of the expensive "peak" energy from the utility. For most schools, a grid-connected system makes the most sense, especially (as is usually the case) when the PV array is not large enough to meet all the electricity needs of the facility. In special circumstances—for example, when a school is a designated place of refuge during emergencies—batteries can be added to a grid-connected system to store electricity when the utility grid is down.

PV ON—AND IN—THE ARCHITECTURE

The most common application of photovoltaic systems in buildings is the one we're most familiar with: an array mounted on the roof of a facility, facing south and tilted to take maximum advantage of the sun. Because schools typically have large expanses of roof area, such systems make a lot of sense for both new and existing construction, especially for larger arrays.

To mount PV arrays on schools, a number of different approaches can be used. In facilities with sloped roofs that face south (or slightly east or west of south), modules can be attached directly to the sloped roof with rails or some other form of bracket system. In schools with flat roofs, some form of frame system is typically used to hold the modules at the correct angle to maximize sun exposure. Ballasted systems are relatively new. They allow a PV array to simply lie down on the flat roof without the need for mechanical fasteners between the roof and the ballasted modules. This makes installation much sim-



PV cells are assembled into modules, then grouped into arrays, and then installed. The arrays produce DC power that is changed by an inverter into AC power for immediate use, or to charge batteries for later use.

pler and avoids the multiple roof penetrations of a frame system.

In new construction, photovoltaic systems can actually be incorporated as substitutes for other building systems, such as roofs, atriums, canopies. Such an approach—referred to as "building integrated photovoltaics" (BIPV)—can result in first-cost savings, since the PV system isn't being added to an existing building component but is simply replacing it. The system can also be financed as part of the entire building, rather than as an "add-on."

While this sounds good in principle, BIPV systems are still relatively rare, especially in the schools market, and high-profile examples like the atrium glazing for the Tiger Woods Learning Center are exceptional.

THE UPSIDES OF PV IN SCHOOLS

There are three types of benefits to incorporating some form of PV into a school facility: environmental, educational, and economic. By using the sun's energy to create electricity, PV systems offset the need for electricity created by the burning of fossil fuels. As one of the most benign forms of energy production available, PV provides clear and compelling environmental benefits. From an educational perspective, the photoelectric effect is an elegant and scientifically compelling phenomenon. It is intriguing to children and adults alike and lends itself easily to being used as a teaching tool. It is for this reason that several states and/or local utilities have initiated demonstration programs to install small PV arrays on schools, primarily for educational purposes.

Madison Gas and Electric in Madison, Wisconsin, for example, has funded PV arrays on 10 high schools as part of its "Solar in Schools" program. The arrays are modestly sized—roughly eight modules each, producing 2.4 kilowatts (kW) of peak power, and are designed primarily as teaching tools. The utility installed monitoring equipment in each school so that students can keep track of the output, and it developed a comprehensive "solar curriculum" that students and teachers can use to optimize the learning experience offered by the system. Similar programs, such as New York State's "School Power Naturally" and Pacific Gas and Electric's "Solar Schools" program, have been or are being implemented across the country. Clearly, the educational benefits—scientific, environmental, and social—of PV systems are a compelling justification for incorporating them into schools.

PV AND LEED

The recently released LEED for Schools "On-Site Renewable Energy" credit awards up to three points for incorporating renewable energy technologies, including PV, into a school. One point is awarded for supplying 2.5 percent of the building's annual energy cost through renewables, two points for 7.5 percent, and three points for 12.5 percent.

GOOD BUILDINGS FIRST, PV SECOND

Installing photovoltaics should not be considered the only or even the first step a school takes to reduce its energy usage. Improving the building envelope, taking maximum advantage of daylighting, incorporating high performance (and "right-sized") HVAC systems will all have a far greater impact on reducing a school's energy costs than adding PV. The best approach is to drive the building's energy use down as far as possible first, then try to meet the energy "load" that remains with photovoltaics.

ECONOMIC BENEFITS

The economics of PV are a little more complex. PV power is still not cheap, especially relative to other sources of electricity in the U.S. Even though costs have come way down—from $80 per watt in 1973 to as low as $3 per watt today—amortized over a 20 year period, the cost of generating one kilowatt hour of power from photovoltaics is still as much as four times greater in some parts of the country than the cost of buying that kilowatt hour from the local utility. And while the price per watt for PV is expected to continue its downward trend, the fact remains that it is difficult to justify the cost of PV in schools based on energy economics alone. However, there are a variety of federal, state, and local incentive/rebate programs across the country that are helping to "buy down" the costs of PV installations for schools. Some of these are demonstration programs, such as the Wisconsin "Solar in Schools" initiative, that fund very modest PV arrays primarily for educational purposes. Others, like New York's Energy $mart program or the California Solar

Lick-Wilmerding High School in San Francisco (above) by Pfau Architecture has roof-mounted arrays. The Tiger Woods Learning Center (right) in Anaheim has building-integrated photovoltaics in its curtain wall, designed by Solar Design

Initiative, are more substantial and can help defray the costs of installing much larger systems. While the school district still needs to provide some of the funding through combinations of rebates and other incentives, they can often cover substantial portions of the upfront investment—as much as 70 percent in New York's case.

All the energy savings go to the school, and it can really add up over the minimum 25-year life of a PV system. As a consequence, it definitely pays to check out any and all locally available incentive programs that could help defray the cost of a PV installation. In addition to rebates, some states are exploring innovative ways of financing PV installations. New Jersey, for example, is looking at Solar Renewable Energy Certificates (SRECs) as an alternative to rebates. SRECs would be issued to PV system owners, such as school districts, for every kilowatt hour produced by one of their PV systems. The SRECs that a district or individual school receives can be sold to utilities, who are required by state regulations to either produce or purchase a specified amount of electricity from renewable sources each year. Usually a utility commission or similar body sets the prices and maintains the stability of the market. The revenue generated by the SREC sales can then be used to pay off the cost of the installation.

While new and still evolving, the SREC approach allows a school district to finance the entire cost of a PV system out of projected savings, rather than receive a rebate for only a portion of the system. This can be the difference between a go and a no-go decision on PV and is definitely worth investigating in jurisdictions that support SRECs. Third party financing may also be available.

THE BOTTOM LINE

The bottom line on PV in schools is that where jurisdictions support demonstration programs, putting them in is a no-brainer. The installation won't meet much of the school's electrical load, but it will be a great—and inspirational—teaching tool. In jurisdictions that provide some form of subsidy for larger installations—those intended to significantly reduce energy use in the school—it will depend on the economics of the situation: the level and type of support provided, the amount of investment (if any) that the school is expected to provide, any regulatory restrictions that may apply, etc. In some areas, substantial PV arrays make a great deal of sense: The program in New Jersey, for example, is currently oversubscribed with a substantial waiting list. In others, even when the incentives are reasonably high, the installation may simply not "pencil out." In areas without any subsidy, the argument for PV is much harder to make. To the extent possible, a school should try to incorporate a demonstration scale array (2 kW or so) as a teaching tool, but from what school officials across the country seem to be saying, even this is an expensive "extra" to add to a school budget—for either modernization or new construction.

The best advice? If at all possible, go for it, at least at the demonstration scale. If some form of rebate, incentive, or financing is available, install the largest array you can afford—it will continue to provide energy and education benefits for a long time to come. In any case, don't think of PV as a substitute for good, basic, energy-efficient design and construction. Energy conservation should always precede on-site, renewable energy production. ■

Deane Evans, FAIA, is director of the Center for Architecture and Building Science Research at the New Jersey Institute of Technology.

Air Filtration

Plants absorb and remove substances from the air through tiny openings in their leaves. Supporting plants with greenscreen® technology can increase their ability to remove air pollutants by filtering and 'screening' air movement through the leaves.

Graffiti Control

A screen of leaves and flowering plants creates psychological comfort and an unreceptive surface for spray-bomb artists. Blank and accessible surfaces in public areas invite defacement and unwelcome decoration. A vegetated greenscreen® trellis over a glazed or solid wall frustrates would-be vandals by passive intervention. No available 'canvas' = no graffiti.

Privacy and Security

A screen of vegetation provides both a physical barrier and a visual block that defines security and privacy. A greenscreen® panel presents a 2" X 2" welded wire grid 3" thick as a deterrent to passage. When vegetated with plant material this screen offers shelter from public view as well as reduces light pollution by diffusing the spill of light.

Heat Gain and Cooling

Vegetated greenscreen® panels that shade exterior surfaces contribute significantly to the thermal stability of the building envelope. Heat gains are lower, cooling loads are reduced and indoor temperature fluctuation is less. Lower air conditioning loads translate to an improved perception of comfort and a healthier bottom line.

With a sleek profile, downward activations, overlapping faceplates and a fresh color palette, it's the perfect fit for any school. DS4000™ raceway is also a smart way to add cabling to new or existing classrooms, media centers, science rooms and more: 1/3 more capacity, dual covers to separate power and cabling, bend radius controls, obstacle avoidance and offset fittings, and more. DS4000 raceway: A sleeker, smarter way to shape the future for your school and your students. Visit www.wiremold.com/DS4000.

WIREMOLD

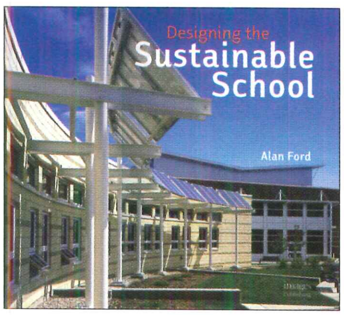
legrand

Circle 52 on Reader Service Card or go to www.shoolsofthe21stcentury.com

Architect's Homework

Read up on novel school designs that break through limitations of tradition and embrace the ever-changing needs of students in the 21st century.

BY REBECCA WARD



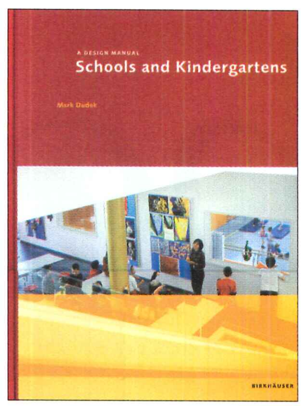
Designing the Sustainable School
By Alan Ford
Australia: The Images Publishing Group, 2007, 256 pages, $60

This compilation of more than 40 international case studies commemorates sustainable design that considers not only eco-friendly features, but also the quality of a child's academic experience. Ford has collected an intriguing array of green school designs that range from a three-room schoolhouse in Gando, Boulgou, Burkina Faso, to a 2,500-student high school in California. Each selected design embodies Ford's vision for the future of sustainable academic design: "Imagine a school where the indoor air quality reduced the risk of exposure to disease, where the acoustics were such that learning was enhanced, where the quality of the finishes and architecture made you feel welcomed, where test scores improved," he writes.

The selected case studies demonstrate how acoustics, visual comfort, light, and color perception have been incorporated into environmentally mindful designs for schools. Images, floor renderings, and elevations give the reader a spatial sense of each project.

In the foreword, S. Richard Fedrizzi, president, CEO & founding chairman of the U.S. Green Building Council states, "Every morning we send our children to school to learn, to explore, and to imagine—but we send them to buildings that are more like prisons than schools." This book is a celebration of the imaginative architects and educators across the globe who are breaking through the limitations of traditional school design to incorporate green innovation that harmonizes with principles of creative design for spaces of learning.

A Design Manual: Schools and Kindergartens
By Mark Dudek
Berlin: Birkhäuser, 2007, 255 pages, $129



Mark Dudek suggests that in order to respond to the ever-changing future and the needs of students, contemporary school design ought to be visionary. This "vision thing," he says, is vital to the development of educational theories, which, he argues, should be the shaping force behind the architecture of school design. He briefly expounds upon the evolving theories of education and design by exploring historical paradigms, educational systems, schools and their place in the community, and school typologies.

Experts in the academic design sphere have contributed brief chapters that follow Dudek's remarks. Specific elements that can enhance academic spaces, such as spatial configurations, acoustics, lighting, sustainability, outdoor spaces, and renovation, are illustrated. The book is then divided into five sections, each featuring international case studies that range from nurseries and kindergartens to academies and vocational schools. These case studies include a brief description of the design scheme, images, often in color, renderings of the floor plans and elevations, and charts containing information about the architect, students, and building details. With more than 80 case studies that range from a kindergarten in China to a charter school in the South Bronx to

Junior Achievement Finance Park, Los Angeles, CA

choices

from Virco, the leading manufacturer of education furniture and equipment in America!

Metaphor™	Telos™	ZUMA®	ZUMAfrd™	Sage™	I.Q.®	9000 Classic	Virtuoso®	3000	2000	3300
8 models	*8 models*	*17 models*	*3 models*	*9 models*	*11 models*	*18 models*	*2 models*	*12 models*	*15 models*	*4 models*

For more information, call us today at **800-448-4726**, or visit our website at www.virco.com. Registered customers can now **BUY ONLINE** at www.virco.com. Register today by calling 800-448-4726.

Circle 53 on Reader Service Card or go to www.shoolsofthe21stcentury.com

VIRCO® - equipment for educators™

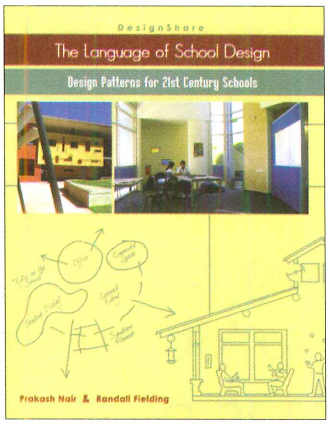
Visit Virco at www.virco.com to see dozens of related chairs, combo units, lab stools and task chairs, as well as hundreds of other furniture and equipment solutions for your campus. All models in the product families shown above, as well as hundreds of other Virco furniture models, are now certified according to the stringent GREENGUARD® indoor air quality standard for children and schools.

GREENGUARD Indoor Air Quality Certified

REF# 07156

a business academy in London, this book provides a comprehensive look into recent developments of what Mark Dudek terms "pedagogic visions."

The Language of School Design
By Prakash Nair & Randall Fielding
DesignShare, Inc: 2005, 118 pages, $35.



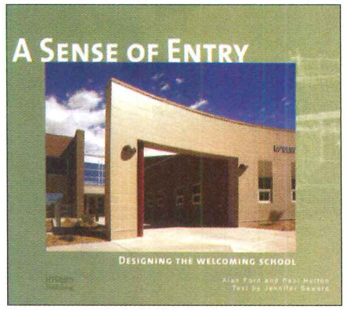
The authors have attempted to "dejargonize" school design for educators and architects by creating a new vocabulary. Inspired by Christopher Alexander's influential 1977 book, *A Pattern Language*, in which recurring elements of architecture are classified into patterns, the authors have created new terminology for academic design composed of 25 "patterns" that range from "Welcoming Entry" to "Flexible Spaces." The spatial, psychological, and physiological aspects of each pattern, and their relationship to spaces of learning, are demonstrated through case studies of contemporary school design.

Of particular interest is the authors' exploration of spaces encouraged by educator and author, David Thornburg. Thornburg identifies storytelling, peer learning, and independent study as a vital balance to education. Nair and Fielding propose that school design should support such teaching techniques. Photographs and text illustrate classrooms that support such spaces, examples of what the authors have termed "Campfire Space," "Watering Hole Space," and "Cave Space."

The authors conclude that they have "provided compelling evidence that there are certain healthy ways in which we can approach the design of school facilities." But this statement reads unfulfilled—the book lacks follow-up on the effect the featured schools has had on student performance. Yet the authors make a good point: There is a lack of novelty in incorporating best-practice principles into contemporary school design, and with this book, architects, academic administrators, and educators have a starting point to discuss solutions that can bridge this chasm.

A Sense of Entry: Designing the Welcoming School
By Alan Ford and Paul Hutton, text by Jennifer Seward
Australia: The Images Publishing Group, 2007, 160 pages, $45

In the introduction, authors and architects Alan Ford and Paul Hutton admit, "When designing schools we did not necessarily set



out to feature the entrances." However, they continue, 17 of their firm's academic projects demonstrate exemplary entryways that embody basic principles of design that have been influential over the centuries.

After providing a history of the entryways of iconic structures such as the Parthenon, the Taj Mahal, the 1958 Seagram Office Building, and the Walt Disney Concert Hall, the authors demonstrate their theory by looking at successful entryways of schools, including some of their own. A brief text introduces each of their projects, describing the elements of design they believe are vital to a welcoming entryway: "identity"—telling the building's story, "wayfinding"—helping users understand where the main entrance is, "influence of streets"—the school's relationship to the surrounding area, and "procession"—creating layers of entrance that transition users from exterior to interior spaces.

A plethora of photographs, many taken by the authors, illustrate each story. ■

Rebecca Ward is a freelance writer and teacher based in New York City.

FAVORITE ONLINE RESOURCES

The number of online resources available online free of charge to those who are interested in school design is truly astonishing. Here are some favorites we find ourselves referring to frequently. —The Editors

- **The American Architectural Foundation's Web site has a number of pamphlets that summarize the results gained during activities held as a part of its Great Schools By Design program. To see them, click on the "publications" tab at www.archfoundation.org.**
- **The Collaborative for High Performance Schools Web site presents a tremendous amount of information about the importance of water, energy, and natural resources conservation, and how to achieve it. Its six-volume Best Practices Manual and other publications are available at www.chps.net.**
- **The National Clearinghouse for Educational Facilities has nearly 50 free school-facilities publications available for download at its Web site. They cover everything from construction supervision to renovating facilities. These are available at www.edfacilities.org/pubs/.**
- **The resources section of the 21st Century School Fund focuses on urban public schools. Its Web site has many school design reports, transcripts of public testimony, and an archive of the Better Buildings Better Schools newsletter. To find them, click on the publications tab at www.21csf.org.**
- **The U.S. Department of Energy's Energysmart Schools Web site has resources that make a persuasive case for energy efficiency in schools. For information on planning, financing, design, and operations and maintenance, see "how to" guides at www.energysmartschools.gov.**

Build Better Learning Environments

Faithful+Gould

Whether it's modernizing a historic academy or finding innovative ways to fund a school's capital program, Faithful+Gould is helping build better learning environments for today's youth and for generations to come. With 60 years of global experience and 23 offices nationwide, Faithful+Gould is a positive addition to any project. Faithful+Gould delivers construction, program, cost and project management from conception to start-up and operation. Let their expertise be the key to your next successful creation. Visit their web site. www.fgould.com/usa

| Circle **150**

Touch Release Slides

Accuride International Inc.

With a load rating of 100-lb., Accuride's 3832 Touch Release slides hold drawers closed until activated by touch. Ideal for medical or educational environments, eliminating drawer pulls provides the aesthetics of clean drawer fronts, aids users who have difficulty grasping drawer pulls, and increases the safety and cleanliness of installations. 888-459-8624 www.accuride.com

| Circle **153**

Natural Rock Veneers

Robinson Brick

Robinson Rock™ is a natural, lightweight alternative to full stone veneer. Quarried and cut thin, it is available in 26 colors and shapes, and can be used in interior and exterior applications. It weighs less than 15-lb. per square foot, so it requires less engineering than full size materials. 800-477-9002 Fax number 303-781-1818 Email BuildOn@RobinsonBrick.com www.RobinsonBrick.com

| Circle **151**

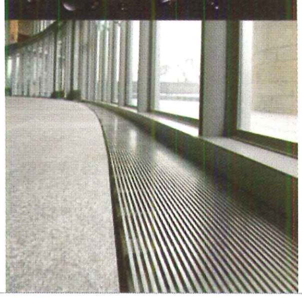
Paperless Interior Drywall

Georgia-Pacific Gypsum LLC

DensArmor Plus® Abuse Guard® paperless interior drywall delivers superior performance in the high traffic areas; with DensArmor Plus®, they protect your schools against mold growth from high humidity, incidental wettings,weather exposure during construction. Covered by a six month limited weather exposure warranty and GREENGUARD Children & Schools℠ IAQ Certified. Please call GP Gypsum for more information, or visit their web site. 800-225-6119 www.gpgypsum.com

| Circle **154**

Metal Grating



Hendrick Screen Company

Setting a new standard for metal grating, Hendrick offers unlimited applications including grating and ventilation grilles, facades, wall and ceiling cladding, columns covers, railing in-fill panels, fountain covers and aesthetic screening for building mechanicals and equipment. Available in curved or straight profile bar and wedge wire. 270-685-5138 www.perfscreen.com

| Circle **152**

Fire-Rated Aluminum Products

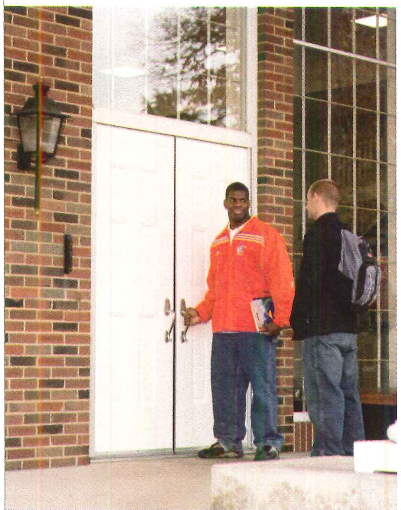
Aluflam North America

Imagine being able to specify a fire-rated system that looks so good you wouldn't know it's fire-rated. Imagine the clean, rich lines of clear glass. With ALUFLAM storefront and curtainwall systems, this is reality. Contact them for further information. 714-899-3990 www.aluflam-usa.com

| Circle **155**

Advertisement

Sustainable Commercial Entrance Products

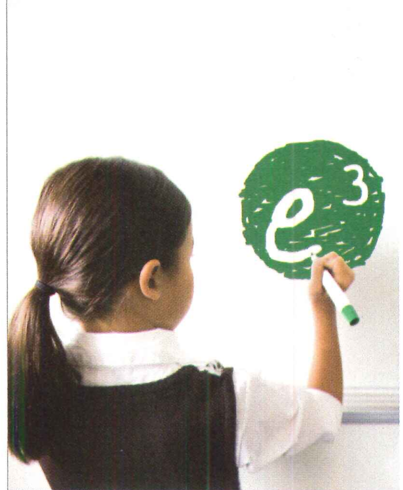


Special-Lite, Inc.

Special-Lite provides a single, sustainable solution to the multiple challenges of school and commercial entrances. Attractive entryways for all architectural styles; GREENGUARD Certification for Indoor Air Quality; superior thermal performance; no need to finish or refinish; cannot rust, crack, split, peel or rot; extends life of entire entrance; low maintenance requirements. To learn more, visit their website or request their Green and Educational Facilities brochures. 800-821-6531 www.special-lite.com

| Circle **156**

Environmentally Responsible Writing Surface

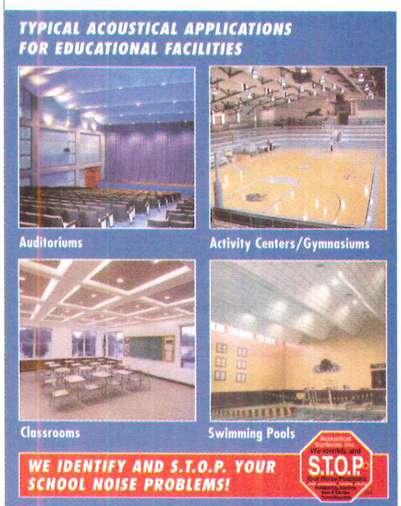


PolyVision® Corporation

Supporting sustainability in our classrooms, only PolyVision® offers writing surfaces featuring e3 environmental ceramicsteel™, the industry's premier, ecologically intelligent writing surface for whiteboards and chalkboards and the first visual communication product to receive global Cradle to CradleSM Silver, GREENGUARD for Children & SchoolsSM, and GREENGUARD Indoor Air Quality® certifications. 800-620-POLY Fax number 678-542-3200 Email info@polyvision.com www.polyvision.com

| Circle **159**

Better Acoustics = Better Schools

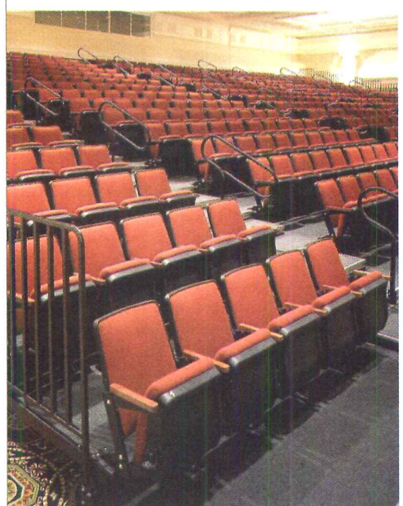


Acoustical Surfaces, Inc.

Acoustical Surfaces, Inc. is a company with over 25 years of experience and over 200 specialty soundproofing, noise control, vibration control and acoustical products for schools. Their products help schools meet the ANSI S12.60-2002 American National Standard Acoustical Performance Criteria, and are class A fire retardant. They have knowledgeable acoustical and soundproofing professionals ready to explain their cost effective solutions. Hundreds of products in stock, easy to use, large inventory fast shipments and friendly service. 800-626-7868 www.acousticalsurfaces.com

| Circle **157**

Retractable Chair Seating



Irwin Telescopic Seating Company

As the use of retractable chair seating continues to grow, Irwin Telescopic Seating Company continues to expand their seating and design options. This type of seating is being used in sporting venues, education facilities, theaters, churches and corporate training facilities. They offer blow molded plastic seating, with or without upholstery, or the very comfortable and attractive auditorium style chair (featured photograph). In addition, a large variety of fabrics, finishes and powder coat options are available. Call or visit their web site for complete product information. 877-597-1122 www.irwintelescopicseating.com

| Circle **160**

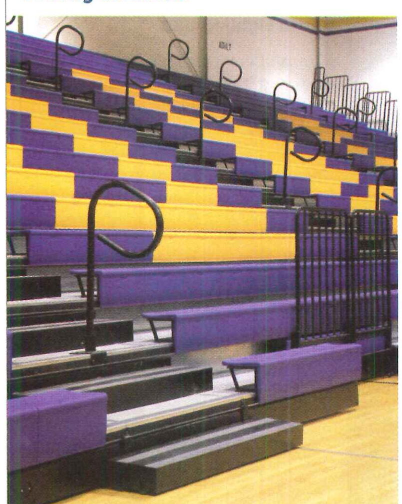
Safer Locker Room Flooring

Gerflor

Improve locker room safety for students, athletes and staff with Taraflex® Locker flooring. It helps prevent the spread of bacteria and chance of slipping. Taraflex® Locker is treated with Sanosol®, a permanent anti- bacterial and anti fungicidal treatment, to prevent the development of micro-organisms and reduce skin-related infection risk for the floor's lifetime. Its slip resistant raised dot surface makes locker rooms safer for walking barefoot and it cleans easily. 800-727-7505 www.gerflortaraflex.com

| Circle **158**

Seating Solutions

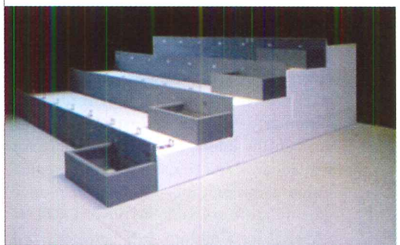


Irwin Telescopic Seating Company

Irwin Telescopic Seating manufactures a complete line of quality constructed seating solutions, from innovative seating accessories such as the Irwin Folding Back Support (featured photograph) for use on their gym seating product, to the most complex chair platform designs found in major university and NBA/NHL arenas. In addition to their standard telescopic systems, they offer complete custom designs. Call or visit their web site for complete product information. 877-597-1122 www.irwintelescopicseating.com

| Circle **161**

Riser System for Stadium Seating



Stadium Savers

Stadium Savers provides an economical and proven alternative for achieving stadium seating tiers in an existing or new building. Stacked Geofoam blocks and Stadium Savers metal risers provide stable formwork for concrete seating platforms. The system is lightweight, easy to install, and is custom cut at the factory to suit straight, curved, or segmented seating layouts. 616-785-5598 www.stadiumsavers.com

| Circle **162**

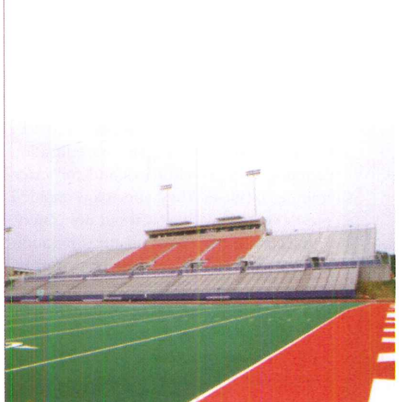
Fluorescent Lighting

Lam Lighting

Luxxtra FL can light a gymnasium, cafeteria or multipurpose room using 1 watt or less of energy per square foot. Fluorescent lamping offers better color rendering than HID lamping, instant on, multiple level switching, dimming, emergency battery capability and 20,000 hours of lamp life. For a typical gymnasium lighting layout go to their website and check out Luxxtra FL in the Pendant section. www.LamLighting.com

| Circle **165**

Grandstands, Bleachers & Stadium Seating

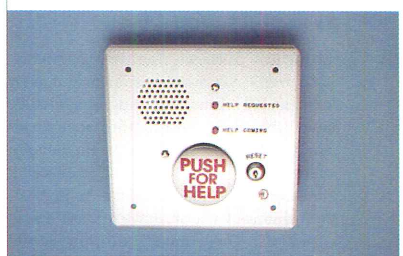


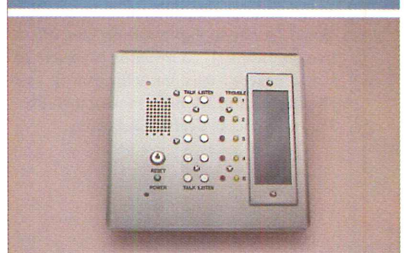
Sturdisteel

Imaginative design and dedicated customer service have made Sturdisteel one of the leading sources for stadium seating in the country. Quality is based on their commitment to research, design, engineer, fabricate and install the finest seating available. Sturdisteel Permanent Grandstands set the standard in outdoor seating. Designed and constructed to withstand daily use, regardless of weather conditions, size of crowds, or special uses. Sturdisteel provides top-quality features at a cost that will fit your budget. 254-857-3744 www.sturdisteel.com

| Circle **163**

Area of Rescue Communications



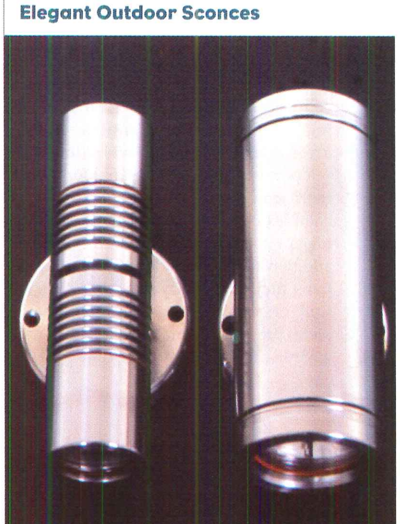


Housing Devices, Inc.

Compliant with all IBC/ADA and NFPA codes, their Area of Rescue systems provide two-way hands-free communication between remote stations on each floor and a central panel for anyone who needs assistance. Automatic-dialing to off-site monitoring is available for unattended systems. They offer the most ADA accessible activation from their 3-in. Diameter "Push for Help" ™ Button that protrudes -in. from their rugged 16 gauge, stainless- steel, vandal-proof plate. All lettering is engraved rather than stenciled to avoid inevitable wearing off. Systems are expandable. 800-392-5200 www.housingdevices.com

| Circle **166**

Elegant Outdoor Sconces

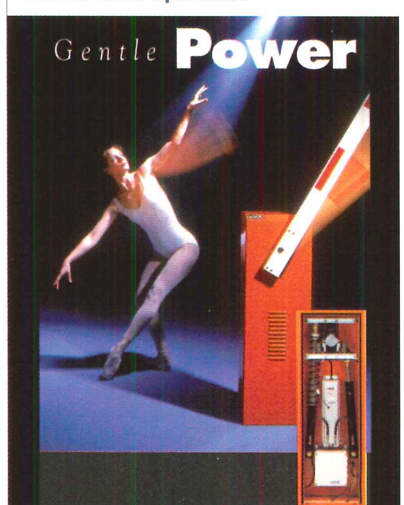


Hunza Lighting USA

Hunza offers a choice of two Pillar Lites designed to light both upwards and downwards on an exterior wall or pillar. The standard Pillar uses twin MR16 lamps while the Euro Pillar offers distinctive, machined styling and more compact dimensions with two MR11 lamps. 310-560-7310 www.hunzausa.com

| Circle **164**

Barrier Gate Operators



FAAC International, Inc.

FAAC is the world's largest specialized manufacturer of hydraulic operators for barrier, slide and swing gate systems. Barrier features include 100% continuous duty operation, the ability to raise beams up to 23-ft., and control panels with full system compatibility. High-speed and economy models available. Visit their web site for brochures and specs. 800-221-8278 www.faacusa.com

| Circle **167**

www.schoolsofthe21stcentury.com