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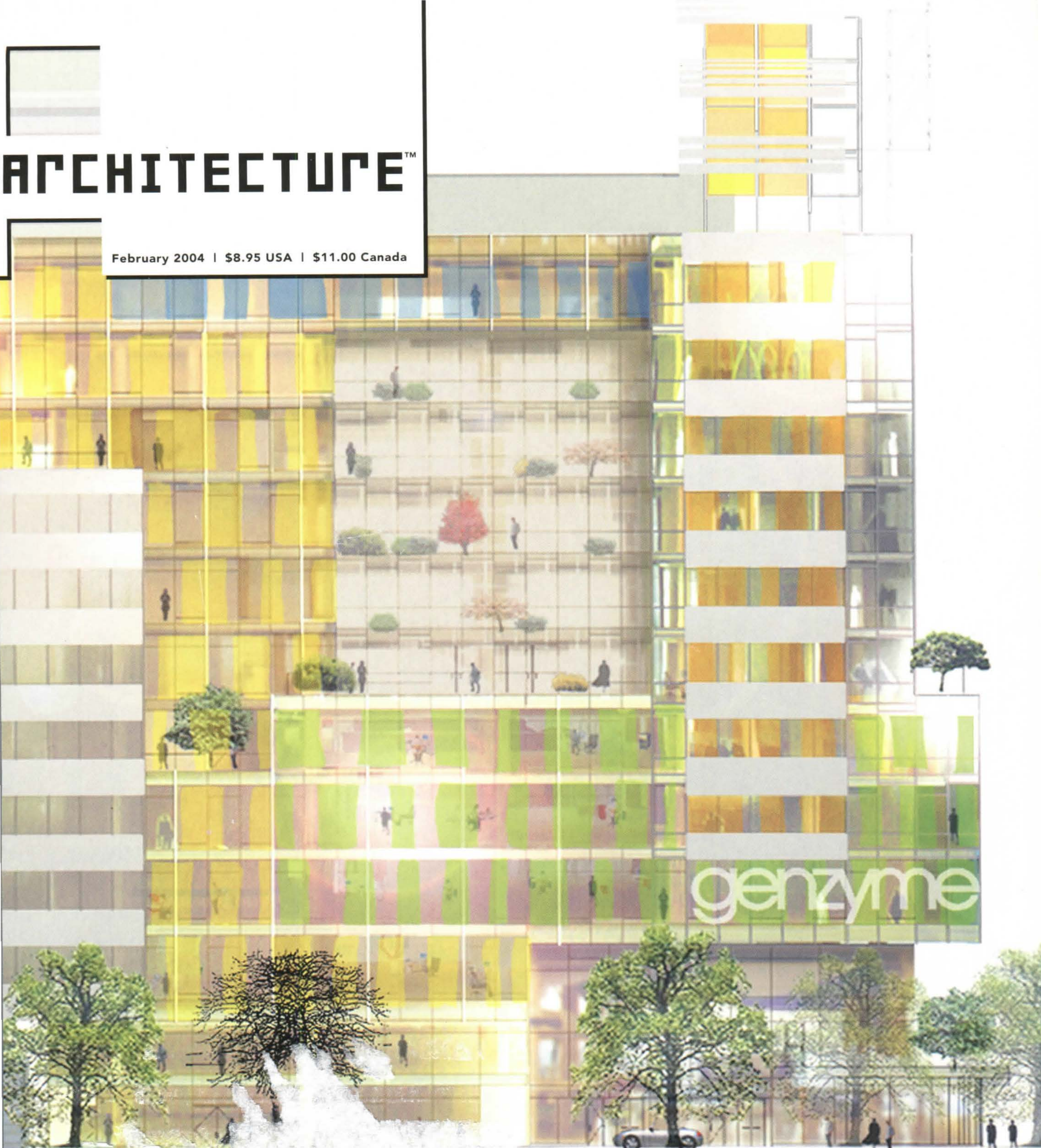

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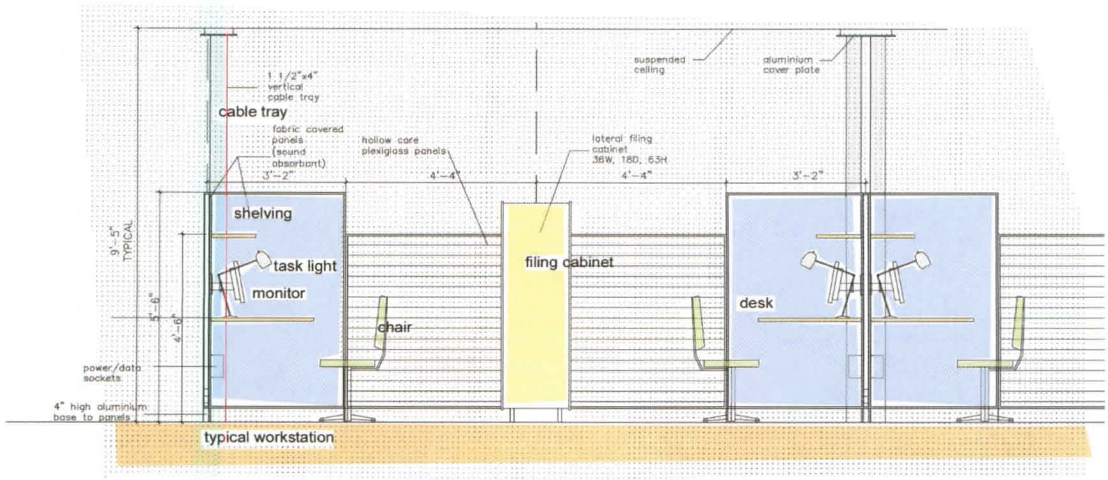
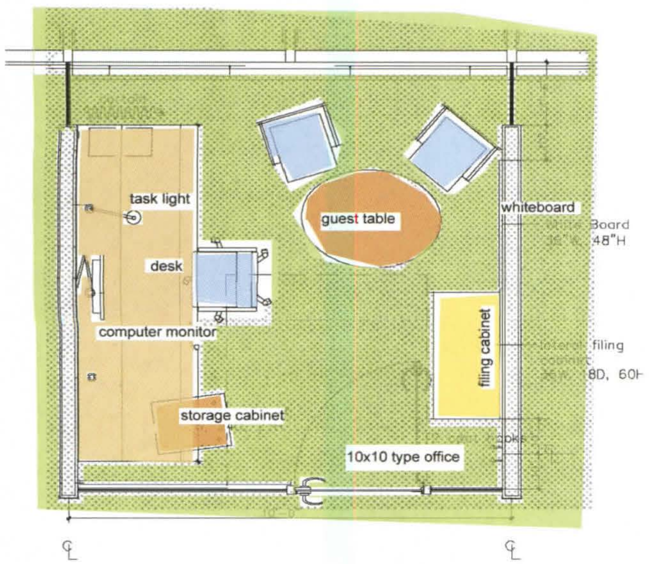
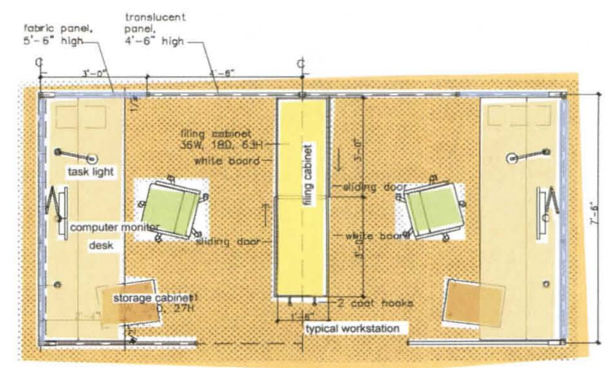


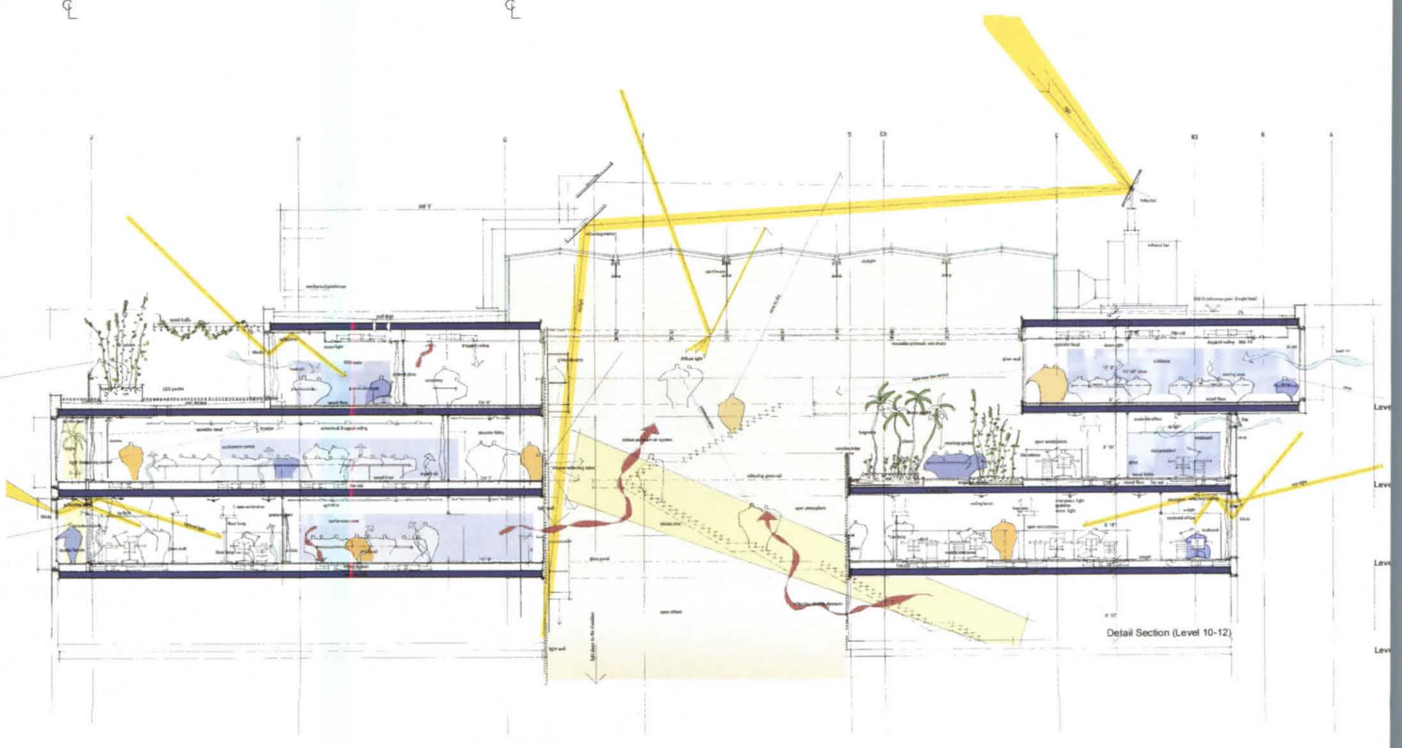
1 1/2"x4"
vertical
cable tray
cable tray
fabric covered
panels
(sound
absorbant)
hollow core
plexiglass panels
lateral filing
cabinet
36W, 18D, 63H
suspended
ceiling
aluminium
cover plate
3'-2"
4'-4"
4'-4"
3'-2"
9'-5"
TYPICAL
5'-6"
4'-6"
shelving
task light
monitor
chair
filing cabinet
desk
power/data
sockets
4" high aluminium
base to panels
typical workstation



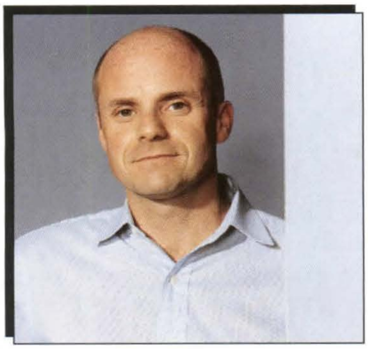
task light
desk
computer monitor
storage cabinet
guest table
whiteboard
filing cabinet
10x10 type office
48"H
filing
8D, 60H



fabric panel,
5'-6" high
translucent
panel,
4'-6" high
3'-0"
filing cabinet
36W, 18D, 63H
white board
task light
computer monitor
desk
sliding door
sliding door
white board
filing cabinet
storage cabinet
2 coat hooks
typical workstation
7'-6"



Detail Section (Level 10-12)



RESEARCH INTENSIVE

BY C.C. SULLIVAN

Architects have enjoyed a voluntary relationship with the world of applied research since ancient times, when scientists and craftsmen collaborated on practical ways to build. Today, the highly specialized and complex nature of structures, materials, and manufacturing technology might dissuade the generalist architect from trying to take on the role of research protagonist. Yet that hasn't been the case. In fact, the architect's participation in applied research has attained hot-button status recently, and in certain circles it's almost a rite of passage: In order to truly innovate in design, you need to do cutting-edge research.

Two new books suggest the wide range of roles that practitioners can play in fomenting technical breakthroughs—and how the results advance one's work. The books, like the architects' approaches they document, couldn't be more different. From one—Matilda McQuaid's elegant monograph, *Shigeru Ban*—the reader deduces the architect's mind-set through images of built works and reports on the underlying research. From the other—*Refabricating Architecture* by Stephen Kieran and James Timberlake—one is left to infer research projects and building methods from the architect's general philosophy.

Ban's story is exemplary. In a short decade, he has leveraged a close partnership with materials researchers in government and academia to produce truly radical experiments in architecture. His work with laminated bamboo, for example, has helped make the product practically a household word, and he has developed pragmatic ways to build with cardboard tubes or cabinet sideboards as structural framing. One project even showed the world how to use exposed wood veneer as fireproofing.

Kieran and Timberlake share Ban's interest in modularity and industrial prefabrication to control built quality, but where Ban wants to solve project-specific problems, the Philadelphia team is ready to save the world. Their book, a proclamation that calls to mind Le Corbusier's 1927 *Towards a New Architecture*, describes "transfer technologies" and "transfer processes" from the automotive and aerospace industries that could integrate the design and assembly of buildings. The liberating technology is not mass production, however, but "mass customization," a concept coined in the early 1990s. In addition to theoretical projects (a component assembly scheme for the Farnsworth House, for example), the architects have worked with several manufacturers on short-range research and marketing projects that explore the potential of industrial goods to respond to end-user choice.

In their architectural work, both Ban and KieranTimberlake Associates aim high. Ban expands his materials library as his projects demand; Kieran and Timberlake pursue a new mode of delivery to serve society better. While their methods differ, they are linked by one critical facet: the belief that significant architecture in our time cannot be achieved without deep research. They're not alone, but their chronicles inspire us all.

READINGS ON PROCESS

Speaking of books that explore architectural approaches, I'll recommend a few titles for further inspiration.

Many of the best process-focused reads are dedicated to the works of the maestros; some are autobiographical. A personal favorite is Gunnar Birkerts's quirky *Process and Expression in Architectural Form*, in which he describes how context informs the design method he terms "organic synthesis." Set against a human backdrop—the importance of self-confidence, for example, or why designers need to be aware of how Zeitgeist influences one's design impulses—this weekend read is like a surrogate design mentor, offering comfort and direction. Two more recent books are equally instructive but a bit more daunting: Mildred Friedman's *Gehry Talks: Architecture & Process*, and *Santiago Calatrava's Creative Process*, edited by our editor-at-large Liane Lefaivre and Alexander Tzonis. These two books represent singular minds—geniuses committed to exploring the outer reaches of design.

Last, a volume that should be required reading for partners and owners of design-focused practices: Dana Cuff's *Architecture: The Story of Practice*, a seminal discussion of how and why we organize our work lives. By drawing from history and profiles of firms, Cuff effectively dissects how the design process actually happens—and draws an explicit roadmap to excellence in architecture.

WE WANT TO HEAR FROM YOU. Send letters to my attention at *Architecture*, 770 Broadway, New York, New York 10003, or by e-mail to csullivan@architecturemag.com. Make sure to include your name, address, and daytime phone number.

MICHELE ASSELIN

On the streets of Philadelphia

Your comments about Philadelphia's design community are perceptive and accurately optimistic, I believe [December 2003, page 9]. Your duo of design defenders, however—the Center City District and the Design Advocacy Group—share equal strength and influence with the Preservation Alliance for Greater Philadelphia. The leaders of these three organizations—Paul Levy, Bill Becker, and John Gallery, respectively—are militant negotiators who are protecting and improving the urban landscape one streetlight at a time.

Rosemarie Fabien
Philadelphia

It was a pleasure to read your critique of our local culture, architectural and otherwise. You referenced only obliquely one of the most interesting outgrowths of our conscientiousness: the Community Design Collaborative. This nonprofit, currently associated with the local AIA, fields requests for predesign services from local community-based nonprofits and teams them up with volunteer design professionals from a roster of 350-plus participants. Most beneficiary groups get a professional, coherent predesign study within three months, providing them with the tools to seek further funding, with which they can hire a professional team to move their projects along. Last year we delivered over 40 projects—services that otherwise would not have been available, and value that was ploughed right back into our neighborhoods.

Daniel K. Garofalo
Senior Facilities Planner, University of Pennsylvania
Philadelphia

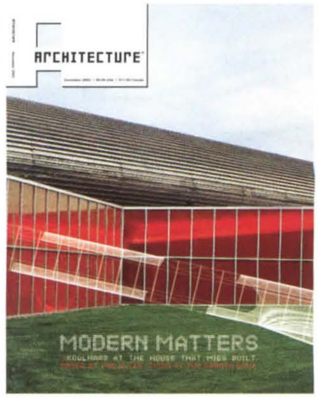
I can't agree with you more about both the "disengaged" nature of most of the architectural community in Philadelphia, and also that there are a few who are taking on the "place" of Philadelphia seriously. Another current surging through the tired veins of this city—one that capitalizes on its lack of vision, its blighted urban fabric, its strong local communities, and the stirrings of an ever-growing, impatient, and talented cadre of young architects—is a group called the "Contingent," a loose affiliation of architects, craftsmen, artists, and entrepreneurs. While the professional relationships among our constituent groups are often adversarial and litigious, the Contingent seeks to explore collaborative and alternative modes of thinking and constructing and to create a space for intellectual, business, and social dialogue.

Tim McDonald
Philadelphia

Accessible? Yes. Universal? Maybe.

In "The Carrot and Stick of Universal Design" [December 2003, page 144], I was struck by the interchangeable use of the terms "universal design" and "accessibility"; I would like to clarify the distinction. After years of education, designers are conversant in the requirements of accessibility through the Americans with Disabilities Act, which focuses on the physical environment, such as building circulation and physical affordances. Concurrently, universal design is a strategy that works toward "the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design," as the late architect Ron Mace said in 1997. In a sense, universal design is focused on making the built environment accessible by accommodating not only physical needs but also psychological and behavioral needs of people over the life of a facility. Physical accessibility is only one element of universal design.

Jon Weiss
Cary, North Carolina



12 | 2003

Design-build in Alaska, and errata

The lack of understanding and the open hostility that develops between architects and construction professionals has always harmed all involved, but most of all the consumers and end-users, who get a product that is completed neither as designed nor with the skill intended. "The Untheoretical Joys of Design-Build" [November 2003, page 32] was fascinating and reminded me how justified my decision was to become the first design-build practitioner in Alaska. Since 1972, I have operated a firm with an in-house design staff and eight payroll carpenters performing predominantly residential work. Your article on how design-build delivery is practiced by a cross-section of the profession was truly delightful. Keep up the great articles.

N. Claiborne Porter
Anchorage, Alaska

Thank you for the coverage of design-build in general and for the Yestermorrow Design/Build School in particular [November 2003, page 32], which has been dedicated to integrating the design-build arts at the craft, architectural, and community scales since 1980. However, the nonprofit school is not run by me, but by its very able executive director, Pat Pinkston, and her wonderful staff. I have the pleasure and responsibility of being president of the board of directors—which usually results in worries about fundraising—in addition to teaching there part-time. The school runs year 'round and is accredited for college credits and AIA continuing-education credits.

John Ringel
Jersey Devil Design/Build
Stockton, New Jersey

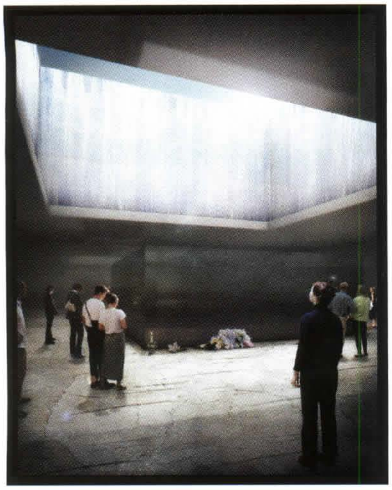
***Editor's note**: As many readers pointed out, Ringel's name was misspelled in the article. For information on Yestermorrow's varied curriculum and two-week community project, visit www.yestermorrow.org.*

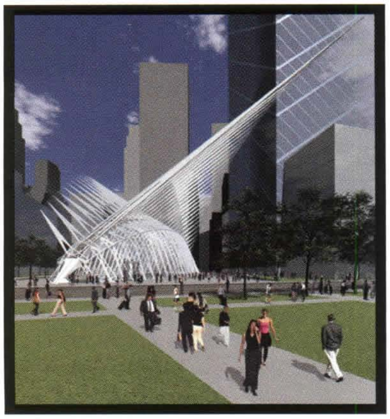
Empty nester

The cover of your "Home of the Year Awards" issue [November 2003] promises "new works that could transform how we live." Apparently, we'll have to live without almost everything—no paintings on the walls, no books, no children, no toys, no comfortable furniture, no people, and no cherished objects—nothing that interferes with the architectural statement. How dull our lives will be, living in these award winners.

William H. Grover
Centerbrook, Connecticut

WTC MEMORIAL AND TRANSIT HUB DESIGNS UNVEILED





Officials overseeing redevelopment of the World Trade Center site in Lower Manhattan have released plans for two critical components of the master plan: the memorial and the permanent transportation hub, which will replace the temporary one completed last November (see "Fast Track," page 60).

Michael Arad, a young architect with the New York City Housing Authority, has won the two-stage international competition to honor the victims of the 2001 and 1993 terrorist attacks. His "Reflecting Absence" transforms each tower footprint into a pool of water with a central void that drops light into subterranean spaces. Peter Walker, a landscape architect with experience working on large-scale public projects, has joined Arad's team; together they have remade the original proposal's ground plane of spare white pines into a dense landscape of deciduous trees and added an underground space for tower artifacts recovered from the site.

Where the memorial burrows deep into the earth, Santiago Calatrava's scheme for an intermodal transit hub reaches skyward: Intersecting wings of steel and glass rise 150 feet above a pavilion of ribbed arches; natural light flows down to the concourse level and train platforms. The Port Authority of New York and New Jersey expects the station to be operational by the end of 2006, with project completion two years later. **Abby Bussel**

CALIFORNIA WILDFIRES COULD FUEL CODE CHANGES

Following last autumn's wildfires in Southern California—which destroyed roughly 750,000 acres and thousands of homes, and left 24 people dead—a variety of groups are re-examining the building codes and procedures for areas at risk in that state.

The nonprofit International Code Council (ICC), for example, is offering its version of the Urban-Wildlife Interface Code—which recommends, among other things, placing wood piles away from residences and using only fire-retardant materials for roofing—to architects for free. (The group normally sells its codes, but ICC spokesman Steve Daggers says the council is giving away the regulations "because the wildfires presented a situation in which we could help.") And at a recent fire chiefs' convention in San Diego, firefighters made their own recommendations, which include having urban planners and builders ride along with firefighters during blazes to help establish safer town plans and construction standards for the future

In California, implementing new residential fire regulations is ultimately the joint responsibility of the state fire marshall and the department of housing. Although last year's fires have caused the government bodies to review the codes and changes are planned, according to Judy Nevis, chief deputy director of the agency, "So far, we've not seen a product yet." **Jamie Reynolds**

TOP: COURTESY LOWER MANHATTAN DEVELOPMENT CORPORATION; MIDDLE: COURTESY PORT AUTHORITY OF NEW YORK AND NEW JERSEY; BOTTOM: AP WIDEWORLD

→ The British government has adopted a new set of housing standards based on the Canadian R-2000 system. Under the program, an independent third party evaluates newly built homes for energy efficiency and environmental impact; the system was recently imported to the United Kingdom in response to the 1998 publication of the Eagan Report, a government study criticizing the homebuilding industry there.

→ The Museum of Contemporary Art in Denver has chosen a shortlist of six architects for the design of its new downtown building: Adjaye/Associates of London; Rick Joy Architects of Tucson; New York City's Gluckman Mayner Architects; Predock Frane Architects of Santa Monica, California; Snøhetta of Oslo; and TEN Arquitectos of Colonia Condesa, Mexico.

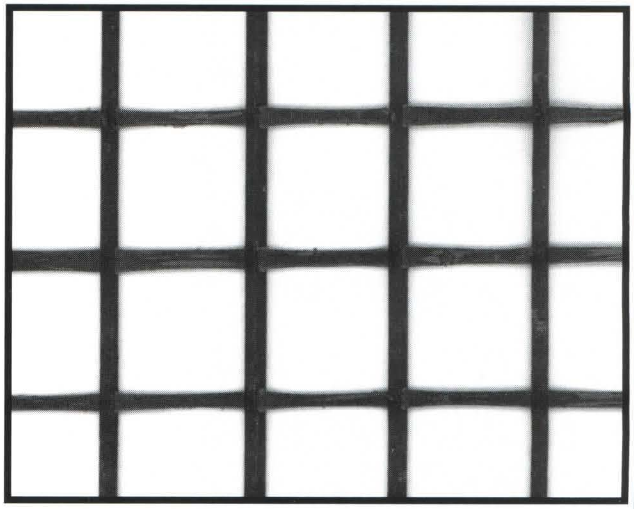
→ As stipulated by section 106 of the National Historic Preservation Act, an independent federal review will be launched into the plans to develop the World Trade Center site. The act requires that the historical significance of the site be evaluated before federal funds can be allocated for the rebuilding projects. In related news, Larry Silverstein, the leaseholder for the site, has selected Tishman Construction as the general contractor for the Freedom Tower.

→ The National Association of Home Builders (NAHB) Research Center has released a revised ANSI Z765-2203 standard for measuring the square footage of single-family dwellings. The new procedure recognizes certain kinds of enclosed spaces and accommodates physical barriers in the measuring process.

→ Michael Graves has been selected to design a $67 million expansion of Temple University's Fox School of Business and Management. Graves's other university commissions have included work for the University of Virginia and Rice University.

→ Maxwell Starkman, the Los Angeles–area architect who designed the Museum of Tolerance and Sony Pictures Plaza, has died. He was 82. Julian Neski, a New York City architect who, with his partner, Barbara Neski, helped to define the modernist residential aesthetic on Eastern Long Island in the 1960s and 1970s, passed away in January. He was 76.

OF CARBON TOWERS AND STRUCTURAL WALLPAPER



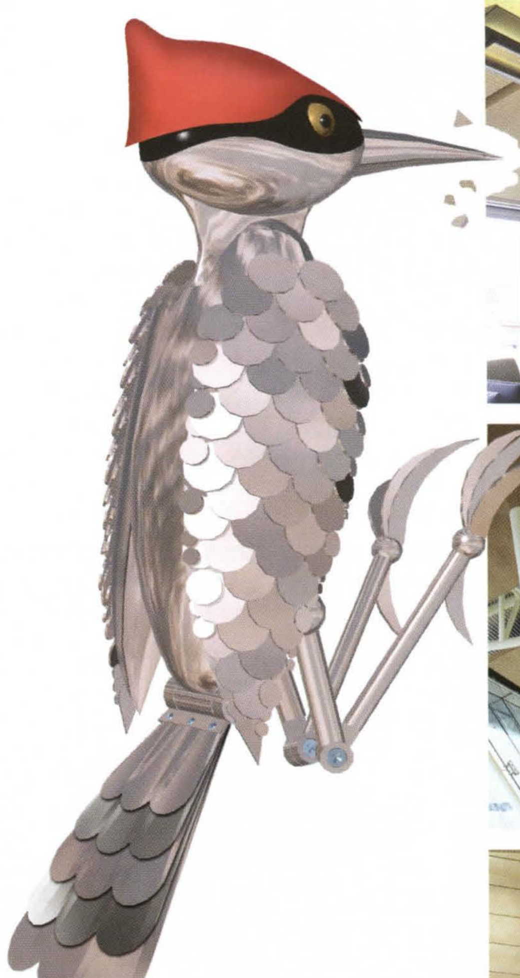
With a futuristic tower concept by Peter Testa and high-end furnishings like Giovanni Pagnotta's Z Chair pushing the design frontier, architects are looking more closely at advanced composites—mainly carbon-fiber-reinforced polymers (FRPs)—for use in building projects. Its legendary lightness and strength made it ideal for spacecraft, Formula 1 cars, and tennis rackets, so why not architecture?

Yet on the tenth anniversary of FRPs applied to building construction, only a tiny fraction of projects use the materials. And when they do, the FRPs aren't exposed as in Testa's building but rather are given prosaic, hidden support roles, notes Doug Gremel, a director with FRP maker Hughes Brothers of Seward, Nebraska. "We see it in MRI rooms because it's magnetically neutral, and in ornamental applications due to its noncorrosive nature," he explains. "Also, it's good for strengthening concrete structures with minimal disruption, for seismic retrofits or new elevator shafts. It's like gluing rebar to the structure."

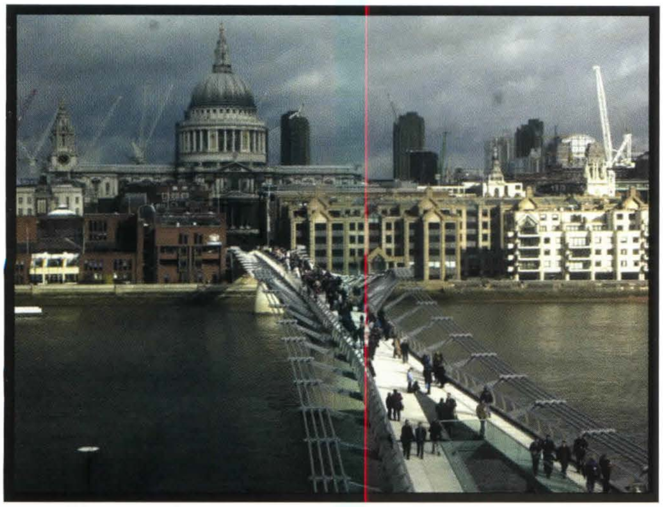
Even these so-called "structural wallpaper" applications are restricted. (The American Concrete Institute publishes strict limits for increased live loading.) "Epoxy resins soften at high temperatures, and we need more cost-effective fire insulations," says Gregg C. Blaszak, a Riderwood, Maryland–based consultant who develops FRP applications. "Overcoming fire issues is the holy grail."

Experts are sanguine about the prospects for FRPs in buildings, however: The fastest growing area is in complex molded shapes, where it competes with the less-expensive EIFS. There's high awareness of FRPs among engineers and architects, and a dozen companies promote them—in 2002, there were only two. The latest development is a national alliance of concrete precasters marketing "CarbonCast" wall panels and double tees with a carbon-fiber grid for secondary reinforcing.

"I think the alliance has some potential," says Blaszak, but, like Testa, he sees bigger things coming. "These materials lend themselves to very complex forms, like the things that Frank Gehry and Santiago Calatrava do." **C.C. Sullivan**



LONDON'S SKYLINE SCUFFLE



AP WIDEWORLD

London's skyline seems set to be transformed by a wave of tall building projects following the British government's decision to allow plans to go ahead for what may be Europe's tallest skyscraper.

In November, despite vocal opposition, deputy prime minister John Prescott granted planning permission for the Renzo Piano–designed, 1,000-foot-tall London Bridge Tower on the south bank of the Thames River (June 2003, page 12). In an open letter, Prescott lauded the 66-story structure, often likened to a shard of glass, as being "of the highest architectural quality." He added: "Had this not been the case, I might have reached a different decision."

Heritage campaigners responded with disappointment to the decision, saying the project would wreck London's historic skyline by ruining views of Christopher Wren's St Paul's Cathedral, completed in 1710 (pictured). But Prescott's statement claims the scheme would not "devalue or diminish [St Paul's] status or significance."

In what may be a ripple effect, Stirling Prize–winner Nicholas Grimshaw won permission last week from local planners for a 43-story tower that, if built, will be the tallest in London's medieval city center. (The government has yet to adjudicate on the scheme.) Meanwhile, London mayor Ken Livingstone has launched a feasibility study into proposals to build twin 660-foot towers above Waterloo train station. Livingstone has also backed plans for the 31-story Pioneer Point residential tower project, designed by London architecture firm Haskoll, in the outer London suburb of Ilford, even though the scheme was opposed by the mayor's own architectural adviser, Richard Rogers. These designs could still risk the public criticism that has befallen the near-complete Swiss Re tower—widely dubbed "the gherkin"—by Foster and Associates. **David Blackman**

THE MYSTERY OF CASE STUDY HOUSE NO. 13

Evidence suggests that Richard Neutra's unrealized design is actually built, leading a quiet family life in Southern California. by Barbara Lamprecht

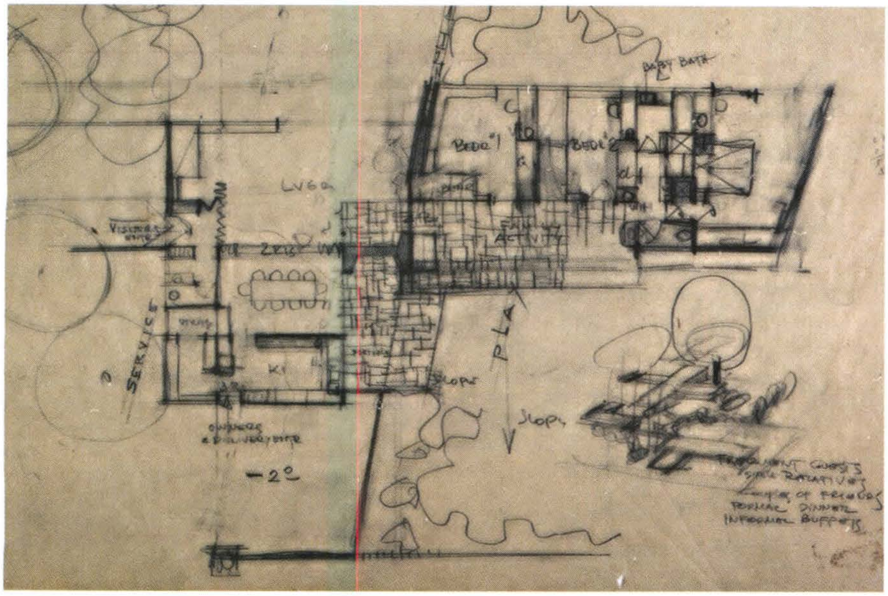
Famed Case Study House photographer Julius Shulman documented Richard Neutra's Wilkins House in 1950 (above). A half-century later, he was invited back (with photographer David Glomb) to reshoot the residence (below) after it was restored and discovered to be Case Study House No. 13, long thought to be among several unrealized designs commissioned by *Arts & Architecture* magazine for its midcentury housing program.

TOP: JULIUS SHULMAN; BOTTOM: DAVID GLOMB AND JULIUS SHULMAN

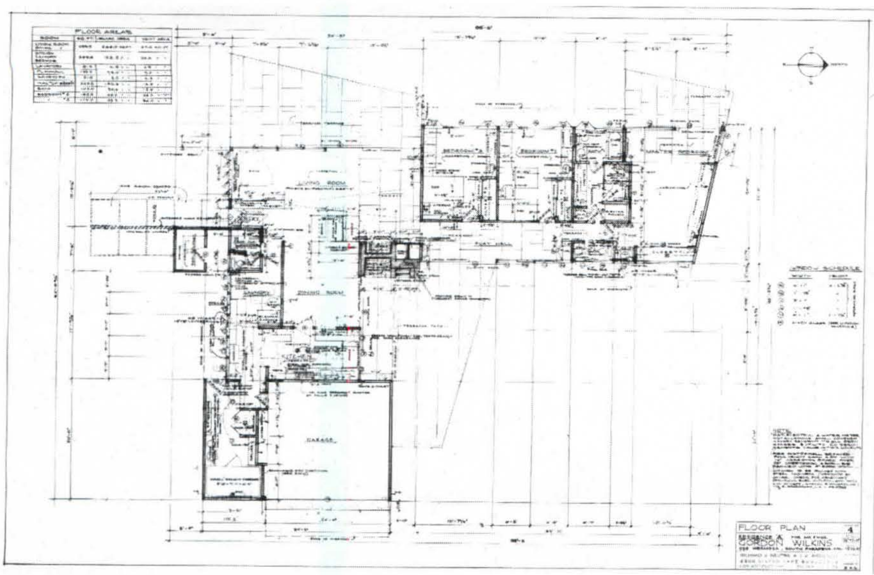
Working at a feverish production pace, *Arts & Architecture* magazine published the first eight of its 36 experimental Case Study Houses in 1945. The explosive premiere immediately established the schemes as a powerful influence in residential design. It advanced the ambitious goal of editor-in-chief John Entenza to subvert "the lethargy of western civilization," according to one of the program's best-known architects, Pierre Koenig. "If you're going to negate something—take it away—you also have to give something back. And John did." The avant-garde, graphically brilliant magazine became a global voice for modernism and for how to live, design, and think modern in the postwar years.

The Case Study House (CSH) program ended in 1966, but its progressive design and urban values live on in various settings, from architecture schools to firms "dissatisfied with the status quo," as the still-practicing Koenig puts it. Given that the CSH program was privately funded and launched during wartime when "critical materials" were restricted, it is remarkable that any of the residences were built at all. Indeed, eight of the designs were not. Richard Neutra designed three of these. Only his 1948 Bailey House, CSH No. 20, was built according to his wishes. CSH No. 19 was so botched in its execution that the architect and Entenza disavowed it. Neutra's CSH No. 6 and CSH No. 13 were both relegated to history's "never realized" folder. Or so it was believed.

Neutra conceived CSH No. 13 (for the "Alpha" family) and CSH No. 6 (for the "Omega" family) as a pair on adjacent lots, their inhabitants' names a conceit for an architecture that could accommodate humanity from A to Z. Number 13 was a one-story, L-shaped house; a large covered flagstone breezeway both bisected and



A comparison of Neutra's floor plan for Case Study House No. 13 (above) and the working drawings for his Wilkins House (below) reveal an uncanny resemblance. In fact, they line up almost to the inch.



joined the two legs of the L before running outside to form linked angled terraces.

Neutra used to say that he had to "fall in love a little" with all his clients, even the fictitious ones. These imaginary families (two sisters with husbands and children) were no exception. He composed their elaborate biographies because he knew that the more human they became, the tighter his architectural response would be. The Alphas and Omegas, sparkling with quirkiness, debuted in the October 1945 issue of *Arts & Architecture*, chatting about Le Corbusier's house for dadaist Amédée Ozenfant. They asked Neutra the kinds of questions he loved to answer, such as how the pueblo dwellings of the Shoshone Indians were related to flat modernist roofs and how flat roofs are superior to pitched ones. They also requested solutions he had long advanced. For example, the Omegas requested an "articulated house" rather than a simple box. The couples wanted him to use identical architectural elements in varied ways for both houses in order to confer a larger neighborhood identity. This, of course, suited the architect perfectly. Neutra advocated a universal architecture "harmoniously sited" to conserve land, provide views, and maintain privacy, all of these tailored to the individual. ("No one says trees are too similar and boring," he would argue.) He detailed the models and drawings for CSH No. 6 and CSH No. 13 so carefully—down to the tangent of the front door's peephole—that in the archival setting of the Department of Special Collections at the University of California, Los Angeles, they look as real as those for a built project would.

For all their suburban correctness, the two fictitious couples cast a slightly bohemian shadow. "They are over their first matrimonial decade, but they have weathered it well," Neutra observed, sounding like a therapist, a role he believed every architect assumed sooner or later. "Evidently their mutual fitting has not loosened but neatly tightened." They required that their living quarters be "able to accommodate a guest but as far removed from the family quarters as possible. Amongst themselves, they are not very prudish but they think that their negligé behavior might be bothersome and embarrassing to an adult guest." Not a problem for Neutra: "A monogamist can be happy too if he has the right kind of architect." The request led to a multifunction, all-weather breezeway, separating public and private areas. Mrs. Alpha requested flagstone, because "on the occasion of picnic parties, with youngsters about, there would probably be continuous traffic from one open-air terrace to the other, root beer to spill and greasy sandwiches to drip."

FACT AND FICTION

Coincidentally, a Mrs. Gordon Wilkins (a real client) voiced word-for-word the same concerns Mrs. Alpha raised about root beer and greasy sandwiches. (This real client, who, with her husband, purchased a wooded double lot in South Pasadena in the mid-1940s, is documented in Neutra's project description.) She, too, wanted her new home sited "in harmonious relationship" with another Neutra-designed house; the only difference was that the Wilkins's neighbors were to be real in-laws, not the virtual family of the Omega's brother-in-law. Like Mrs. Alpha, it was also Mrs. Wilkins's "specific wish," according to the architect's project description, that there be a "psychological connection"—classic Neutra-speak—between the two terraces. The architect responded with a breezeway identical to that for CSH No. 13. Neutra's Wilkins drawings are dated November 14, 1947, just two years later than the November 1945 dates for the CSH No. 13 plans, which were published in *Arts & Architecture* in March 1946. (CSH No. 6 remained unbuilt, and the companion house for the Wilkins family was nothing like it, though it did "avoid mutual visual nuisances.")

NEUTRA, CONVERTED—FROM STEEL TO WOOD

In their experiments for *Arts & Architecture's* Case Study House (CSH) program, younger CSH practitioners such as Pierre Koenig, Charles and Ray Eames, and Craig Ellwood were poised to torch "stick" construction, as fellow CSH architect Rafael Soriano sarcastically referred to conventional wood-stud framing. But Neutra had long abandoned the belief that steel was a necessary component in defining what was modern.

In the 1920s, the Vienna-born architect embarked on his own personal case-study house program that not only embraced technological innovation but also social issues and urban planning. The results ranged from unbuilt migrant worker housing made of wood fruit crates and low-cost housing systems that employed diatomaceous earth to the steel-paneled, radiant-heated 1934 Beard House in Altadena, California. Harnessing local architect Vincent Palmer's low-tech system of corrugated floor decking sandwiched between thin steel panels, Neutra made small holes at the base of the exterior panels to admit cool air which exhausted through holes in the parapets, so that the walls "breathed" like the shell of a beetle. In addition, adds Manhattan Beach–based John Blanton, one of Neutra's leading project/design architects, after World War Two, Neutra knew that steel afforded poor protection against the area's salt air and earthquakes and, at least in his office, added 25 percent to the cost of a house.

Confounded by the inertia of American residential construction, Neutra refined a unique post-and-beam system of wood and steel suited to shifting lines and planes in asymmetric compositions. He continued to champion industrial building methods in print and in lectures, but experience with clients and government agencies led him to believe that new methods would succeed only if they won over popular taste rather than dismissed it. His later, relaxed floor plans didn't overthrow middle-class paradigms, so much as nudge them a little, delivering smooth spatial solutions firmly wedded to nature. The only real innovation at the Bailey House, for example, was nonstructural: a prefabricated utility core that "still works fine, thank you," according to Dr. Stuart Bailey, who has lived there for 56 years. **Barbara Lamprecht**

ON THE TRAIL OF CSH NO. 13

Two years ago, the new owners of the Wilkins House, Stacey and Jeff Mann, called me with a request, excitement in their voices. I recalled their house as a sad thing, virtually unrecognizable as a Neutra, having weathered many owners and hack renovations. The Manns had bought it in 2000 and hired Los Angeles–based architect John Bertram, who as a consultant to local firm Studio Bau:ton had been project architect for a renovation of Neutra's 1949 Freedman House. The Manns were interested in tracking down period fixtures and products for the house, and so for a while Bertram's studio was filled with magazines and Neutra books, among them old copies of *Arts & Architecture*. Scouring the issues, the architect found an ad for Square D electrical components that featured a plan for CSH No. 13. Fresh from a site visit that included review of the original Wilkins plans, he was struck by the resemblance between the two designs.

Asked to confirm Bertram's hunch, I was wary: After all, a pulled-apart L footprint was a common Neutra device. And who wouldn't want to align their house with the famous program, even as an unpedigreed relation? But I was intrigued, too. In any case, the evidence would speak for itself. At UCLA's Neutra archives, I laid one piece of trace of one plan over the other. (Conveniently, both were drawn at the nice fat scale of one quarter inch, so that any differences would easily show.) The plans lined up almost perfectly, with only one inch discrepancy on a wall almost 23 feet long. The odd angles on the terraces also matched. I then compared the model photographs of "House W-I-S" published in Neutra's 1956 *Life and Human Habitat* with those of the CSH No. 13 model in Esther McCoy's *Case Study Houses 1945–1962*. (In his book, Neutra devised a rather transparent way to conceal identities, using letters in the client's name, e.g., W-I-S for Wilkins, to denote a house.) Though the photos were taken from different perspectives, it was obviously the same model. Thus, the text, plans, and models all confirmed Bertram's thesis.

It is important to note that Neutra never claimed the Wilkins House as part of the CSH canon. Perhaps he didn't tell the Wilkinses that he was recycling the design, sensing that they might not want to be involved in the hoopla surrounding the program or even that they simply didn't run in the fashionable CSH circles; perhaps he did tell them and they refused to be aligned with the program. (I vote for the former: the Wilkinses secured building permits that reined in the Neutra strategy of indoor-outdoor integration, e.g., enclosing the open patio, as early as 1954.) In any case, Neutra clearly did not want this carefully crafted design to die. He saw a chance to use it appropriately and ran with it successfully.

When searching for a new home, the Manns weren't looking for a Neutra, a Case Study House, or even a modern design. They were hunting for a scenario with room for offices and family, and found it in the Wilkins House, which was listed for sale as a Neutra design. The house found its saviors, who have restored all of Neutra's original elements almost completely. It suffered "not so much butchery, more like bakery, with more and more stuff layered on," says Jeff Mann. The brick fireplace's role as the home's freestanding lynchpin had been smothered when the patio was enclosed and the living room cut off from

The new owners have filled Neutra's Wilkins House with period furnishings (above), and enhanced some elements, such as wider openings for the original screened panels (below), which bring more cool air inside thanks to a new lever that allows more space between wall and panel.

the breezeway by built-in cabinetry. The redwood tongue-and-groove ceiling had been painted white. In a dismissal of Neutra's insistence on the homemaker's access to nature, even the wide-open pass-through from the kitchen to the back garden had been walled off. So had an elegant ventilation device—a bank of screened birch panels below casement windows—employed in both the living room and master bedroom. Hinged at floor level, the panels opened to a slight angle into the room, permitting fresh air inside and eliminating the need for window screens, which Neutra generally avoided.

The Manns began their work with a "three-day rampage" of demolition, dumpsters, and laborers. Hours poring over Neutra's drawings and photographs taken by Julius Shulman in August 1950 informed their design decisions, with Bertram suggesting and facilitating details. His self-effacing expertise complemented the clients' tenacious attitude toward restoration and knowledge gleaned from their work as movie art directors and production designers. Together they invented replacements for missing hardware and furniture when the details weren't available. For example, the Manns devised a lever for the birch panels that allows a greater range of movement than the original. Jeff Mann used aerodynamic spun-aluminum hubcaps, originally designed for land speed-racing trials, for recessed lighting trim in ceiling openings whose idiosyncratic diameter defied available products. Bringing back the terrazzo floor, ruined by hundreds of carpet nails, however, exceeded the budget, so cork was installed instead. The north patio remains enclosed, but the Manns removed the heavy-handed trim and hid the ersatz brickwork under drywall so that its effect is far less invasive.

A little reluctantly at first, the Manns even restored the eccentric bathroom layout near the entry, identical in both the hypothetical and real versions of Neutra's design. Like a telltale birthmark, a small wall sink is mounted in front of coats hanging in the doorless hall closet, while the toilet (for Mr. Alpha, a "chronic horticulturist who promised to use it Saturdays," Neutra wrote) had its own separate door. The arrangement clearly strained the proprieties of one interim owner, who added a closet door and painted the walls all one color, slurring two formerly distinct planes. Door removed, repainted in a contrasting tone, the closet again reads as a crisp volume against the birch plywood wall, happily articulating space in its suburban identity.

Case closed.

Barbara Lamprecht lives in Pasadena, where she practices architecture and teaches architectural history; her second book on Neutra will be published by Taschen this spring.

DAVID GLOMB AND JULIUS SHULMAN

DRIVEN TO PERFORM

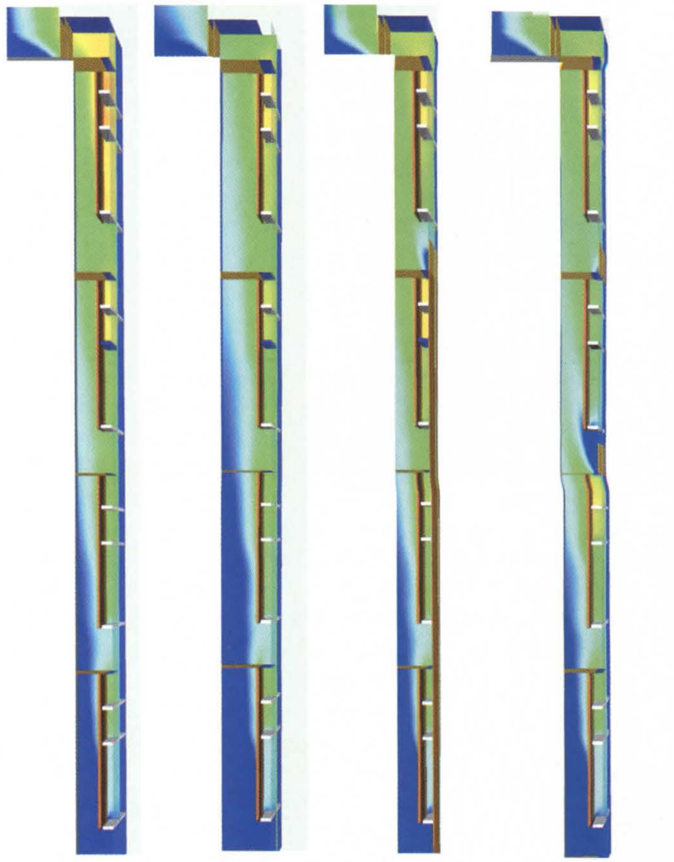
High-technology buildings with sophisticated environmental systems are becoming more common—and changing the way architects and engineers work together. by Julia Mandell

From Joseph Paxton's 1851 Crystal Palace to Norman Foster's pioneering work in the 1970s and 1980s, architects have been inspired by technological advances and have made use of them in their buildings. As the 21st century proceeds, we're seeing a resurgence of interest in technology: Architects of all kinds are entranced by ideas rooted in scientific disciplines, from materials research to sophisticated design software to ecological and evolutionary theory.

One reason, of course, is an emphasis on creating environmentally attuned and responsive buildings that are being categorized as *performative architecture*, since the design focus is on what a building does rather than how it looks. These buildings are being shaped with the help of a new set of tools: sophisticated visualization and calculation software that can accurately assess environmental conditions and thereby improve building performance. To advance such work, a group of architects, engineers, and theorists met at the University of Pennsylvania last October to discuss the impact of the technologies—and a corresponding professional interest in intelligent buildings—on design and the evolution of the profession.

Entitled "Performative Architecture" and organized by Ali Malkawi and Branko Kolarevic, both associate professors of architecture at the host school, the conference provided a glimpse into buildings whose physical forms and building systems are shaped by environmental information, whether to do with heat, light, energy, movement, or sound. One theme was how to use simulation tools to produce buildings that are optimized very early in design development. Many of the engineers at the conference addressed this issue, showing work that did not necessarily contain overt formal aspects shaped by environmental information, but that was designed to high environmental standards. Craig Schwitter, a founding partner of Buro Happold's New York City office, discussed the use of computational fluid dynamics (CFD)—a method of approximating the behavior of fluids that can be used to investigate a variety of physical problems, from air flow to water pressure—in the design of a biomedical research building for the University of Michigan by Polshek Partnership (above, right). Jean-Francois Blassel, principal of the French engineering firm RFR, presented the Bercy-Tolbiac Footbridge in Paris, which was designed with the aid of a software program that analyzes vibration.

Another conference theme concerned digital form-finding using environmental information as a guide. For example, the Experimental Music and Performing Art Center (EMPAC) at Renssalaer Polytechnic Institute in Troy, New York, designed by Grimshaw Partners and scheduled for construction in 2007, is being shaped in a 3-D model to produce optimal acoustic conditions (see "Soundscapes Made Material," page 30). "We've striven to create optimum acoustics inside the concert hall that manifest themselves on the exterior form, so it reads almost as a musical instrument," says Andrew Whalley, a principal of Grimshaw. "The shape is entirely designed around the perfect acoustics for traditional symphonic work."



To optimize a double façade for a biomedical research building at the University of Michigan designed by the Polshek Partnership, Tony McLaughlin and Byron Stigge of Buro Happold used computational-fluid-dynamic analyses (above) to calculate thermal conditions on hot summer days.

PERFORMATIVE EQUALS COLLABORATIVE

In examining such buildings, it becomes clear that a large part of their revolutionary aspect is their influence on the architectural process. Much of the information employed by architects to design performative buildings comes from consultants like mechanical engineers and acousticians, who need to be involved in the design process very early on in order to assist in both formal and programmatic decisions. Schwitter, who has worked on many high-performance projects, attests that it is necessary in designing such buildings to have more consultant input in the design-development phase. "We have to be in communication about engineering issues earlier on," Schwitter argues. "It's no longer a case of architects bringing us a finished design and saying, 'Okay, put in the ducts.' We need to be involved in the design from the start."

In order to be more collaborative, architects and engineers need to change their relationships, Schwitter suggests. Part of this change is simply a matter of mind-set and behavior, but it can be facilitated and encouraged by the tools used to shape performative buildings. As the leader of the Building Simulation Group at the University of Pennsylvania, Malkawi creates software tools that are interoperable and streamlined, to integrate technical information from different consultants into design development. "Right now, you can do many different simulations, but every time you want to do one thing you have to start from basic data and get the results," he says. "So it has gotten much easier from a point of view of support, but among the tools themselves we still don't have any interoperability."

GOING PUBLIC

While a number of designers and engineers are involved with performative buildings, the application of environmental-simulation technology for building designs is still far from the mainstream, according to Malkawi. CFD, for example, has only recently been used to examine the physical environments of buildings. Malkawi, who works with CFD at the university and as a professional consultant, stresses that there is a general misconception that the technique is accurate and easy to use. "It is only an approximation," says Malkawi. "There is a lot of interpretation that goes into it, and it takes years of study to become skilled in CFD. Plus, it is expensive and time consuming, so it is still only available to an elite few."

The time and expense mean such analyses are a rarity. "There is very little calculation that actually goes into most mechanical engineering," says Byron Stigge, a mechanical engineer with Buro Happold. "And with CFD, you are actually doing analysis, which is fundamentally rare. You have to have a really unique problem that you don't understand, that's worth spending the time and, more importantly, spending the client's money."

Still, things are changing quickly. Advanced computer design tools are making their way into the general population, as is demonstrated by Gehry Technologies, a spin-off company founded by Frank Gehry that is developing a version of CATIA specifically for architectural use. And some building-simulation tools, like daylighting visualizations, are already used widely.

While still on the cutting edge, high-performance intelligent buildings are becoming more common. A recent study conducted by Norcross, Georgia–based Greenway Consulting and reported in the newsletter *DesignIntelligence* qualitatively surveyed 45 leading design, construction, and real-estate organizations and found that these professionals think a revolution is on the horizon, motivated by innovation, better management, and new technology. One of the points made by the respondents was that "intelligent and integrated buildings are becoming the norm, requiring increasingly sophisticated professional service delivery." Within five or 10 years, both Stigge and Malkawi believe, building simulation tools like CFD will be far more commonplace. As costs decrease and demand for optimum environmental performance increases, many more practitioners will leverage technology to produce performative architecture.

SOUNDSCAPES MADE MATERIAL

The Experimental Music and Performing Arts Center at Renssalaer Polytechnic Institute (RPI) in Troy, New York, by Grimshaw Partners, currently in design development, exemplifies performative architecture's pros and cons. Containing four different theater spaces with four different sets of acoustic requirements, the exterior form of each is shaped differently to respond to its interior condition. "This project posed the question of how to create permanence where much of the program is extremely transient and has to update itself on a regular basis," says Grimshaw principal Andrew Whalley. "Since RPI is all about science and research, we thought that the one permanent aspect to this project would be the physics of acoustics. A Stradivarius violin plays as beautifully today as it did 200 years ago, and we used that analogy to inform our architecture."

The classical concert hall, the centerpiece of the project, is a rounded, wooden-clad volume that expresses the acoustical requirements externally. The more experimental performance spaces are enclosed in simple rectangular volumes, says Grimshaw associate and project architect Bill Horgan.

To shape the main concert hall, the acousticians Kirkegaard Associates are using a nascent digital technique called "auralization" to create a sound model of the space. "It's a computer rendering of sound," says Kirkegaard senior consultant Carl Giegold. "The technique is to record music in a very dead room and then create a filter that approximates the acoustics of the space we are designing. The computer calculates the reflections, strength, and frequency content of each sound in a piece of music."

While Kirkegaard is using this technique as a design tool in this project, Giegold is honest about the software's limitations. "It can't really be used to completely simulate an experience," he says. "The computers we have do not have the strength to fully calculate every single reflection you get in a real space, so the richness is not there. But you can definitely get a sense of how the room is behaving. We think it is the most promising way to present acoustical data and analyze what one will actually hear."

In a sprawling city that is known for its love of automobiles, Houston's new MetroRail is meeting with great success.

COURTESY METROPOLITAN TRANSIT AUTHORITY OF HARRIS COUNTY, TEXAS

HOUSTON HITCHES A RIDE ON LIGHT RAIL

An automobile-centric city teaches a lesson in successful mass transit: serve inner-city neighborhoods first.
by Christof Spieler

Houston has long been a poster child for highway advocacy. During the 1990s the city actually managed to reduce traffic congestion—not just keep up with it—by building more freeway lanes. Work started last year on expanding 11 miles of Interstate 10 from 11 to 18 lanes, and the Harris County government is studying 15 new toll-road projects.

But roads aren't the only travel option anymore. Last month, Houston's first rail-transit system since the 1930s, a seven-and-a-half-mile-long light-rail line called MetroRail, began carrying passengers along Main Street. Back in November, voters had already approved a plan to add 65 more miles of light rail over the next 20 years.

Which isn't to say that Houston's antirail forces—a mix of suburban politicians and conservative activists—aren't adamant and powerful. In 1983, the Metropolitan Transit Authority of Harris County (known locally as Metro) got as far as ordering vehicles for a rapid-transit system before voters rejected the project. In 1991, contractors had already been chosen for a monorail system when incoming mayor Bob Lanier canceled the project. And even as the Main Street line was under construction, a November 2001 ballot initiative proposed tearing the newly laid tracks out of the streets. Meanwhile, other cities have been moving ahead with their own initiatives: 11 U.S. metropolitan areas had rail transit in 1983; today almost 30 do.

But Houston may be better off for having waited. The system proposed in 1983 would have been a heavy-rail system like those built in Washington, D.C., and San Francisco, with 10-car trains powered by an electric third rail running in tunnels or on concrete viaducts. The new system, like virtually all North American rail systems built during the past two decades, is light rail—less expensive and more flexible, with shorter trains powered by overhead wires able to run not only in segregated rights-of-way but also on city streets.

More important, its purpose is also unique. The heavy-rail system would have extended to the outer suburbs, connecting a series of park-and-ride lots to the central business district; despite the different technology, most light-rail systems have had the same aim. Houston's new line, by contrast, barely leaves the inner city. It follows the streets through some of Houston's oldest neighborhoods, serving 1920s residential areas, the historic north end of downtown, and old commercial districts now being redeveloped with apartments.

The choice of a street alignment is a compromise. Street running slows down trains; a system designed for suburbanites would avoid automotive traffic as much as possible. When Metro began expansion studies in 2001, it considered alignments along freeways and existing railroad tracks. But public meetings showed that inner-city residents, unlike suburban NIMBYs, wanted rail in their neighborhoods, not around them. In fact, neighborhood groups pushed for more urban lines. The studies also showed that the downtown neighborhoods—with walkable street grids, large numbers of existing transit users, and opportunity for redevelopment—had more potential rail patrons than the suburbs did. This made the project even more enticing, since lines serving already developed neighborhoods are shorter, and thus cheaper, than lines serving the outlying areas.

The expansion plan evolved into a tightly knit network of lines in the central city that will ultimately connect Houston's four largest employment centers, its biggest university, both convention centers, major hotel and tourist areas, two airports, and a variety of neighborhoods, some gentrified but many not. The largely minority east and near north sides will be particularly well served. But the plan still does not include tracks to the suburbs; those areas will be served by continuing to expand an existing and highly successful system of park-and-ride buses using 112 miles of high-occupancy-vehicle freeway lanes.

The fact that an ambitious rail-expansion proposal passed before the original line was open and despite a vocal and well-funded opposition is testament to a new prorail coalition in the city. Traditionally, rail systems have been championed by downtown business groups and sold as a way to reduce congestion. The same interests supported this plan as well, and were led not just by a desire to improve the downtown but also by Richard Florida's thesis in *Rise of the Creative Class* that the success of cities depends on attracting educated professionals looking for an appealing lifestyle. The business groups were joined by progressive voters who would support almost any rail plan and by growing ranks of white-collar professionals in revitalizing inner-city neighborhoods. But the key to victory was mobilizing urban minority voters with the promise of investments in their neighborhoods. In Houston, community-oriented urban rail lines made political as well as economic sense.

Other cities are coming to the same conclusion. Portland, for example, built two east-west light-rail lines extending to its outer suburbs and then began planning a north-south line. But when suburban voters rejected that proposal, the transit authority changed course and built only an inner segment to the north through neighborhoods that supported rail. San Francisco's light-rail system, which since the 1950s has served

MetroRail's existing route (thick black line) covers only seven-and-a-half miles, but will expand over the next 20 years, adding another 65 miles of tracks.

only relatively affluent areas, is being extended down Third Street into some of the city's poorest neighborhoods. Other new light lines—Salt Lake City's 2.3-mile university extension and Phoenix's 20-mile system—also almost exclusively use street alignments. Even in Washington, D.C., where a 103-mile commuter network is North America's most comprehensive modern rail-transit system, planners are now studying 33 miles of mostly street-running light rail to fill in the gaps, providing local service and reaching neighborhoods that the subway misses, such as Georgetown.

The key to MetroRail's victory was mobilizing urban minority voters with the promise of investments in their neighborhoods.

In one sense, rail transit is getting back to where it belongs. Suburban neighborhoods are car-oriented even when served by trains; park-and-ride lots still allow for single-occupant vehicles. But every American city has old neighborhoods that grew up around transit. These neighborhoods were built to be walkable and still have street patterns and lot sizes that support transit ridership. They also have the potential for high-density, mixed-use transit-oriented development. Across the country, the formerly neglected cores of cities—emptied out by "white flight" and the decline of industry—are filling in with lofts, townhouses, and apartments occupied by the children of the suburbs. Transit planners are recognizing the potential in these areas, and urban planners are realizing that rail transit, with fixed routes that inspire confidence in real estate investors, is a powerful tool for encouraging infill development.

The prospects for Houston's light-rail line look good. The first three days of operation had hour-long waits for trains as locals tried out the new system. Despite its short route, the initial line serves two major employment centers: Houston's downtown, with 140,000 employees, and the Texas Medical Center, with 60,000. Estimates are that rider volume will be more than on other systems three times its size. Developers are seeing the light: Transit-oriented projects are on the drawing boards, new restaurants and hotels are opening around downtown stations, and apartments are advertising their proximity to the line. Rail is finding a place in car-happy Houston.

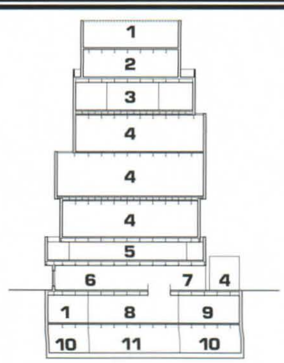
Christof Spieler is a senior associate at Matrix Structural Engineers in Houston and a member of the editorial board of *Cite* magazine.

SANAA | NEW MUSEUM OF CONTEMPORARY ART | NEW YORK CITY

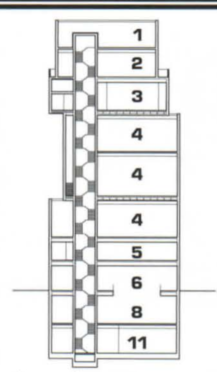
The New Museum of Contemporary Art in Manhattan is moving, eschewing its posh SoHo address for the site of a former parking lot on the Bowery (a once-notorious street in the East Village) and a new, ethereal-looking 60,000-square-foot building, clad in silvery zinc-plated steel and punctuated by skylights and windows. The seven-story structure, which will be double the size of the museum's current space, is designed by architects Kazuyo Sejima and Ryue Nishizawa of Tokyo-based SANAA, and will contribute to the revitalization already underway on what was once known as "Skid Row."

Configured as a stack of boxy, programmatic volumes set in different directions off a vertical axis, the building will house a bookstore, café, and reception area at the lobby level; a 200-seat auditorium, media lounge, and bar on one basement level; second-story administrative offices; flexible, column-free gallery spaces on the third through fifth levels; educational facilities on the sixth story; and, on the top floor, a 15-foot-high, 1,700-square-foot multipurpose area for exhibitions and public programs, surrounded by wraparound outdoor terraces.

The museum's selection committee, with local architects Richard Gluckman and James Stewart Polshek as advisors, chose the winner from an initial group of 30 invited firms. SANAA's built work includes two private museums in their home country, and the partnership is currently working on the 21st Century Museum of Contemporary Art in Kanazawa, Japan, as well as the Glass Pavilion at the Toledo Museum of Art in Ohio. Ground is set to break for the New Museum this October, and the institution plans to open its doors to the public in the spring of 2006. **Anna Holtzman**



east-west section

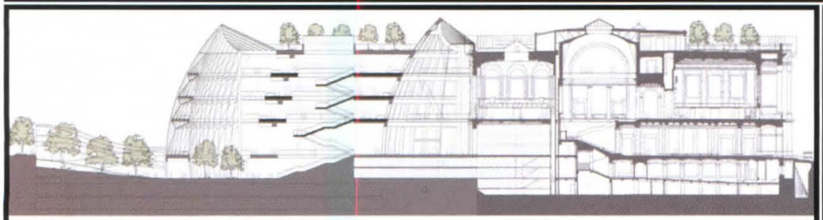


north-south section 42'

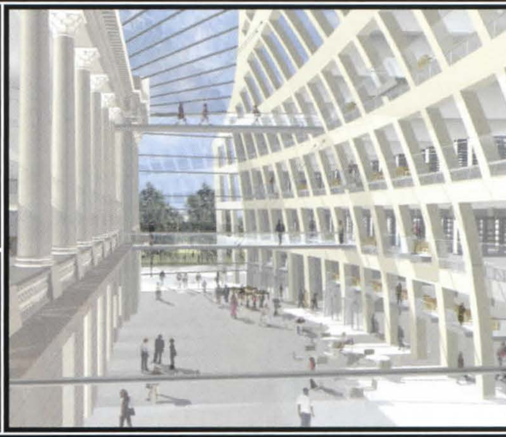
1 mechanical
2 multipurpose
3 education
4 gallery
5 office
6 lobby/shop
7 café
8 media lounge
9 theater
10 storage
11 support

MOSHE SAFDIE AND ASSOCIATES | FREE LIBRARY OF PHILADELPHIA | PHILADELPHIA

The Central Branch of the Free Library of Philadelphia is slated for a major overhaul that includes the restoration and expansion of its Horace Trumbauer–designed 1927 beaux-arts building. Boston-based architect Moshe Safdie won the commission in an invited competition, beating out finalists Cesar Pelli, Enrique Norten, and Norman Foster late last year (November 2003, page 19). Safdie's preliminary design calls for the integration of two monumentally scaled transparent volumes with the neoclassical formality of the existing library. With their massive skylights and stone-clad walls, these new curvilinear atriums—one connecting old to new, and the other at the north-facing edge of the 180,000-square-foot addition—will open Trumbauer's colonnaded spaces to the sky above and surrounding cityscape, including the Benjamin Franklin Parkway and Logan Square. To complete the $120-million project by 2009, Safdie's office has joined forces with associate architect Francis Cauffman Foley Hoffmann and historic preservation architects Feingold Alexander + Associates with Kelly/Maiello, all of Philadelphia. **Abby Bussel**



north-south section

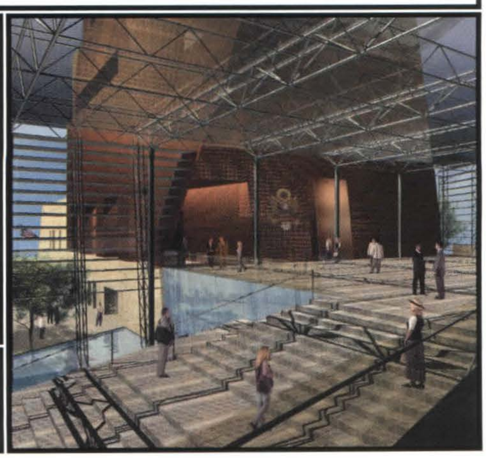


ANTOINE PREDOCK ARCHITECT | U.S. FEDERAL COURTHOUSE | EL PASO, TEXAS

Albuquerque-based architect Antoine Predock is known for his preoccupation with the desert and its monumental forms, which often inspire a mythical quality in his work. When the United States General Services Administration's Design Excellence Project selected Predock out of four competing firms to create a new federal courthouse in El Paso, Texas, the architect designed a building that evokes the weighty massing of the surrounding mountains, while framing the city's view of Mount Franklin between two volumes housing a special-proceedings court and main courthouse. Spanning these two forms and completing the frame is a bridge containing the court's law library.

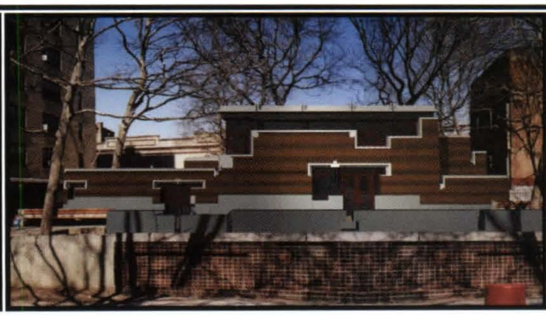
The building's principal masses are defined by their materials. The limestone-clad courthouse proper, comprising jury deliberation rooms, district clerks' and marshals' offices, and judges' chambers, wraps around a copper-sheathed core of courtrooms. The metal covering is echoed in the smaller volume of the special-proceedings court. Included in the project are two major outdoor spaces: a public plaza in front of the building's glass-enclosed entryway and a courtyard within the complex for staff and visitors.

By aligning the entry plaza with the path of the sun at winter solstice, the building takes advantage of midday shade in the summer and maximum light in the winter, contributing to energy savings. A heated solar chimney provides natural ventilation in the lobby by creating a thermal siphon that draws cool air in and heated air out. Additionally, photovoltaic cells laminated on the glass louvers of the lobby provide electricity and shade. **AH**



GEORGE RANALLI, ARCHITECT | SARATOGA COMMUNITY CENTER | BROOKLYN, NEW YORK

In projects ranging from doorknobs to residences to office buildings, George Ranalli experiments with a distinctive brand of ornamentation, a machine-cut, linear vocabulary that suggests computer-age manufacturing processes and geometries. For New York City's public housing agency, he uses glass-fiber-reinforced-concrete (GFRC) lintels and copestones, and buff-grey cement panels with routed joints indoors, to imbue a new community center with layers of meaning and visual interest. The 5,000-square-foot facility—set on the plaza of a typical 1960s superblock next to an 18-story mixed-income housing slab—expands the program of city-sponsored recreation by linking to an existing recreational center on the tower's first floor with a long hall, perforated by doors and windows. New facilities include a large multipurpose community room, a game room, reading room, offices, and kitchen and bathrooms. Ranalli's plan wisely connects new landscaped areas to existing socializing spaces, such as a small sitting area, but he encloses the plaza with the center's bulk and its new "community wall" and concrete movie screen. The result gives the largely Hispanic and African-American residents a safer and certainly more social open space. The new structure's overall effect is a unifying, layered gesture. The center's ochre iron-spot thin brick and limestone base blend with the neighborhood palette, and the engaging GFRC accents readily identify entries. Each façade is unique; steel and mahogany-framed clerestory rises above the variously stepped masonry. The idiosyncratic ornamentation offers a specific formal articulation, but the perceived effect is universal and timeless—a sort of visual Esperanto, and a suitably pluralist gesture for a lasting public presence among diverse local users. **C.C. Sullivan**



TRANSPARENT CITY

Transparent transactions seem few and far between today. When government shapes public policy behind closed doors and corporate bookkeeping obscures more than it reveals, transparency in architecture takes on greater meaning. The projects presented in this issue—two publicly funded, one built by private companies—suggest that all is not lost. Modernism's social program endures precisely because it is threatened. A Dutch city in economic decline converts an icon of its former wealth—a 1935 department store known as the Glass Palace—into a cultural center. A temporary commuter rail station—the first new public space on the World Trade Center site in Lower Manhattan—shows how an open-air, below-grade building can embolden civic aspirations. In Cambridge, Massachusetts, a biotechnology headquarters brings new meaning to equal-opportunity employment: Natural light from a central atrium and narrow floor plates is afforded to every staffer, and a significant investment in sustainable technologies is made for the benefit of all.

department of glass

A 1935 department store is remade as a cultural complex with a pivotal role in regenerating a struggling Dutch city.

BY AARON BETSKY | PHOTOGRAPHS BY CHRISTIAN RICHTERS

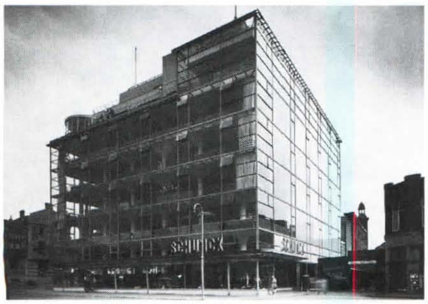
Turn into the market square of the grungy city of Heerlen, a former mining town in the far south of the Netherlands, and the shock of the new hits you full in the face. A block of glass floats over and around a grid of concrete mushroom columns. A trapezoid covered with shining green tiles hovers next to this transparent cube. Snatches of music and flashes of bright colors on the inside of both buildings cut through the clean lines. Culture is on display here in a complex that presents the symbolic and ameliorative power of architecture.

The cube, which locals call the "Glass Palace," has amazed and inspired since it opened in 1935 as the Schunck Department Store following the design of eclectic local architect Fritz Peutz. Now, after an investment of about $37 million, the 85,000-square-foot structure has been reborn as a cultural center containing a public library, a municipal art gallery, a music school, and several restaurants. It is the centerpiece of a move to revitalize this once rich city of a little less than 100,000 inhabitants, and will be joined shortly by a renovated shopping area around it, as well as by two residential towers by native daughter Francine Houben of Mecanoo Architects.


GLASPALEIS
bart smit
bart smit

MINING THE PAST

By investing in the Glass Palace, a national landmark, local officials wanted to recapture what one of the librarians now at work in the building calls "the luxurious expansiveness" of the original structure. When Peter Schunck approached Peutz in 1933 to design a store in the heart of the then-thriving city, he wanted a building that would be transparent, open, and attractive. His model was not the department stores of Paris and London, but open market stalls, where all the goods are on display on low tables. Peutz, who was then beginning to make a name for himself with small, neoclassical buildings, took the opportunity to enthusiastically embrace "The New Building," as modernism was called in the Netherlands. Instead of adapting to a complex site partially facing two squares, he created an abstract veil over the wares inside. His one nod to the immediate context is a slightly taller façade along the main shopping street. On the building's roof, Peutz designed a duplex apartment for the Schunck family.



Located in the Dutch city of Heerlen, Fritz Peutz's 1935 Schunck Department Store (shown in historical photos), with its glass envelope and concrete mushroom columns, was a seminal work in "The New Building," then the moniker for modernism in the Netherlands. It suffered alterations and was threatened with worse before being designated a national landmark in 1995.

Despite the worldwide economic depression, the Glass Palace was an economic success and was admired by architecture critics. After the Second World War, however, both the store and Heerlen went into decline, and with them went Peutz's reputation. The building was eventually sold to a Swedish investment company and then sat empty for a decade. In 1997, the city of Heerlen approached architect Wiel Arets, a local son who was then becoming famous for his minimalist designs, to make a speculative proposal for a new cultural center in the palace. Unbeknownst to Arets, who had helped rediscover Peutz by organizing an exhibition on his work in 1980, the Swedes had asked yet another Heerlen native, architect Jo Coenen, currently the Dutch state architect, to propose ways to revitalize the site. Coenen and Arets decided to team up, founding a joint office, Arets Bureau Bouwkunde Coenen (ABBC), staffed by members of both firms. The city and the investors also came to an arrangement: Heerlen now owns the structure and surrounding properties.

The building was stripped down to its original concrete, steel, and glass; missing windowpanes and hardware were replaced and existing ones were cleaned, with all post-Schunck additions removed. Peutz had devised an innovative and effective cooling system—the glass is held several inches away from the concrete slabs with an open steel structure, allowing warm air to rise up past the floors and through the top of the building—but current environmental standards demanded the addition of a forced-air heating and cooling system to supplement the vertical ventilation. Long hidden behind a now dismantled neighbor, the rear façade has gained a thin, stucco-clad addition, minimal in its form, but decidedly different in appearance from the original building.

The main structure contains an art gallery in the partial basement, a library and information center on the first two floors, a music school and offices on the top two floors, and a restaurant and screening room in the former apartment. Despite the addition of 7,000 square feet to the Glass Palace, there was not enough room for the complex program the city had devised, so an 8,000-square-foot freestanding addition was necessary. Arets and Coenen designed this new object as a distinct entity clad in opaque green glass panels; its intense coloring suggests that it might be a precious object once housed in the glass wrapper next door. Crammed full with 27 practice rooms for musicians, the annex's interior is as dense as the Glass Palace's is expansive and airy.

RENOVATING THE PRESENT

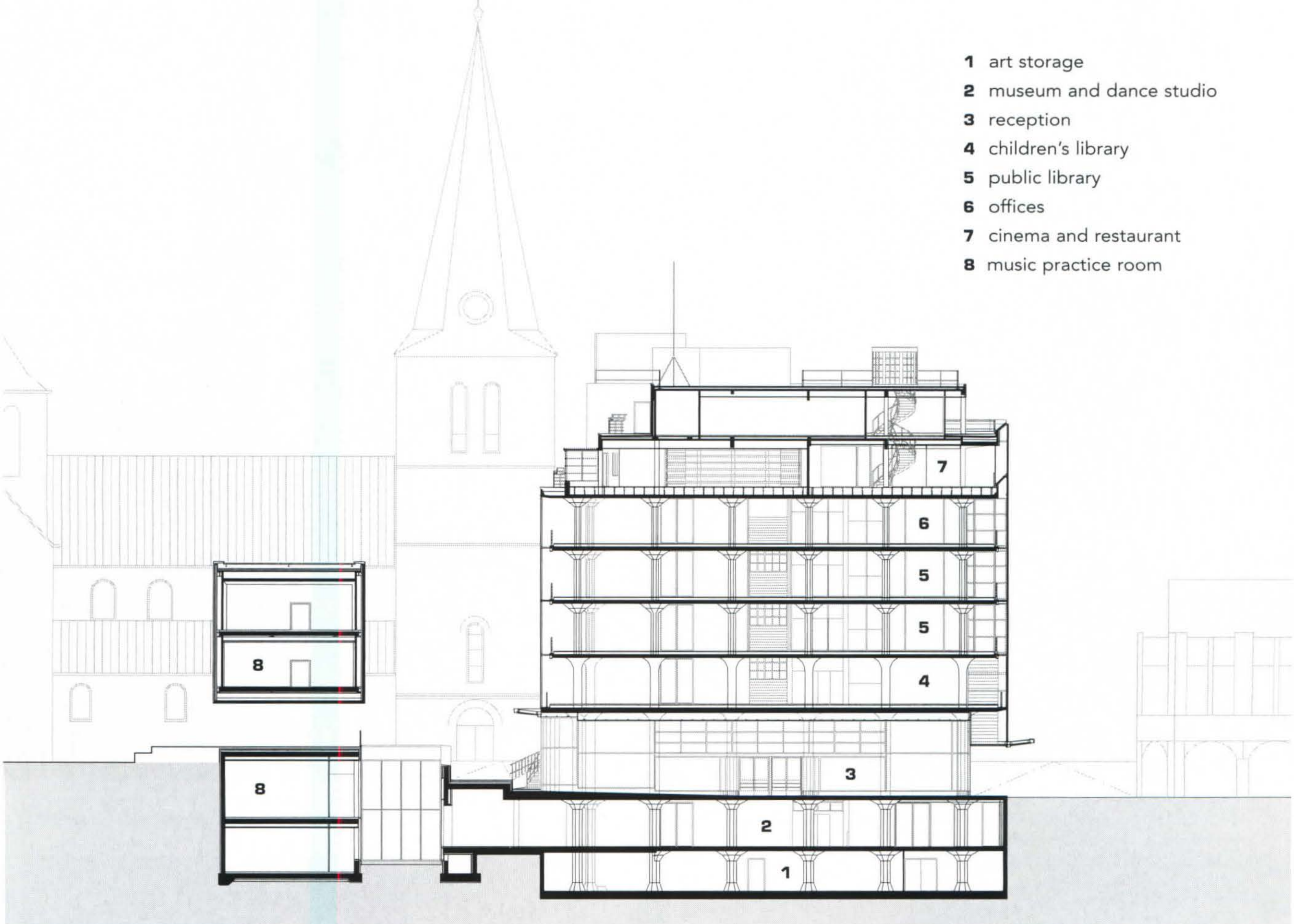
Even with all the functions installed, the Glass Palace still feels so open that it seems strangely and serenely empty. The architects designed new wood and metal furniture, including bookcases and office partitions, to both honor the low, market stall-like approach of the original department store displays and to appear as distinct, temporary additions that do not compete with the force of the building's poured-in-place concrete construction. Despite the many uses on the various floors, there is a sense of continuous space and visibility, from both outside and inside the building.

The effect is also to make the building itself into a kind of fetish. The fanaticism with which it has been restored, the way it now sits completely by itself in an otherwise rather confused urban setting, the stylishness of the insertions, and the abstraction of the new addition all emphasize the Glass Palace's alien quality in a context of brick buildings. For Wiel Arets, the new complex is not only "my youth and all the dreams of the future reborn," but also "the shock of pride reborn, a catalyst to make things happen, which is what architecture in general should be." It is a function that architecture, especially in its modernist variety, is being asked to carry more and more around the world: a simultaneous reminder of the optimism we once had about the future and a symbol of the way we want to use culture to reinvent ourselves. The palace's renovated forms are meant to shine forth from the dreary reality of contemporary life in a still struggling city, bridging past and future to renovate the present. In Heerlen, the strategy appears to be working.

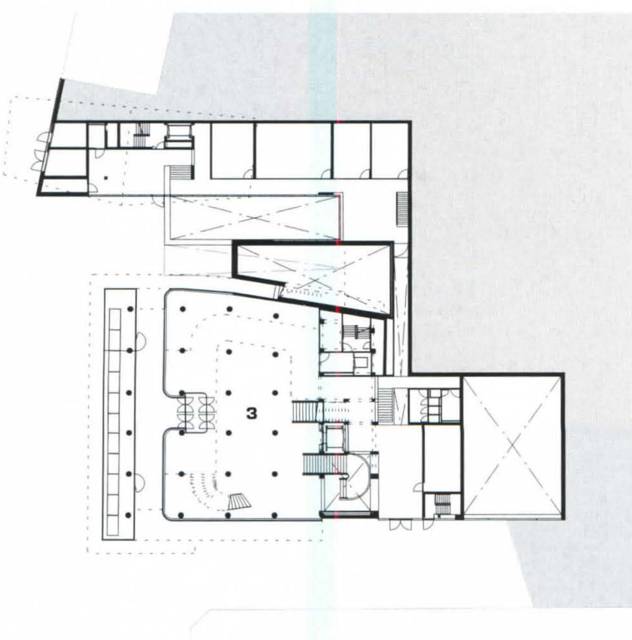
PHOTOS LEFT: COURTESY GLASPALEIS AND VITRUVIANUM

Now a cultural center, the renovated Glass Palace and its glass-clad annex look onto a barren plaza (above), awaiting retail and commercial development slated for the area. A sunken courtyard (below) links the two buildings below grade, maintaining the lane between the plaza and a church to the south.

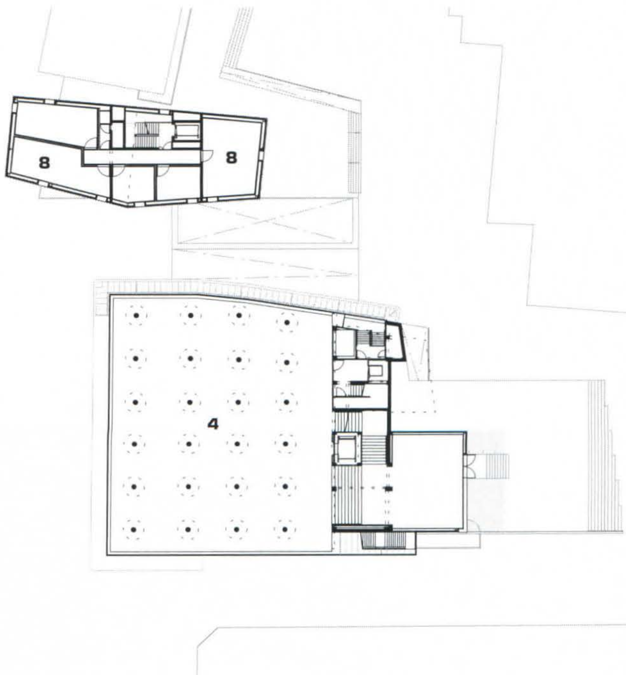
1 art storage
2 museum and dance studio
3 reception
4 children's library
5 public library
6 offices
7 cinema and restaurant
8 music practice room



east-west section 15'

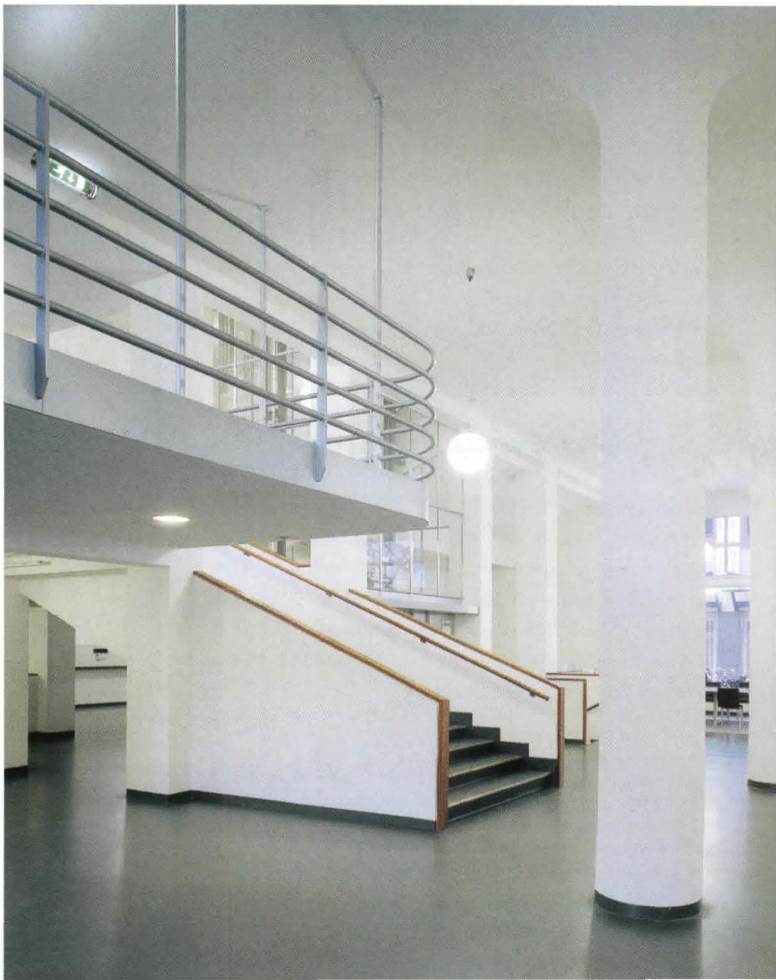


ground-floor plan



second-floor plan 20'

Enhanced in the renovation by the addition of a forced-air mechanical system, Peutz's original strategy for heating upper floors involved continuous steel vents between concrete floor slabs and curtain walls (above). Custom-designed library tables (below, left) recall the department store's display tables. Column capitals on the ground floor (below, right) are smooth, but they are faceted on upper levels.



Glass Palace, Heerlen, the Netherlands

client I City of Heerlen **architect** I ABBC Corporation of Wiel Arets Architect and Associates and Jo Coenen & Associates and Bureau Bouwadvies, Amsterdam and Maastricht, the Netherlands—Wiel Arets, Jo Coenen, Daniel Meier, Massimo Adario, Iwert Bernakiewicz, Raymond Heimbach, Petra Jaquet, Bettina Kraus, Bettina Sättele, Frederik Schijns, Hans Schoot, Chris Smith, Wil M. Ummels, Joost Vanderhoydonck (project team) **engineers** I ABT Adviesbureau voor Bouwtechniek (structural); Huygen Installatie Adviseurs (mechanical/electrical) **consultant** I Cauberg–Huygen–Raadgevende Ingenieurs **general contractor** I BLH Bouwcombinatie Laudy–Heijmans **construction managers** I Theo Goebbels, Chrit Nicolaes **area** I 104,000 square feet

Specifications

metal/glass curtain wall I Reynards **glazing (original building) and glass shingles (annex)** I Saint-Gobain **sliding and fire doors** I Bruynzeel **ceiling systems** I Rigips **flooring** I Akzo Nobel **interior ambient lighting** I Glashütte Limburg **uplights** I Ansorg **downlights** I Erco **specialty lighting** I Hato **elevators** I Schindler

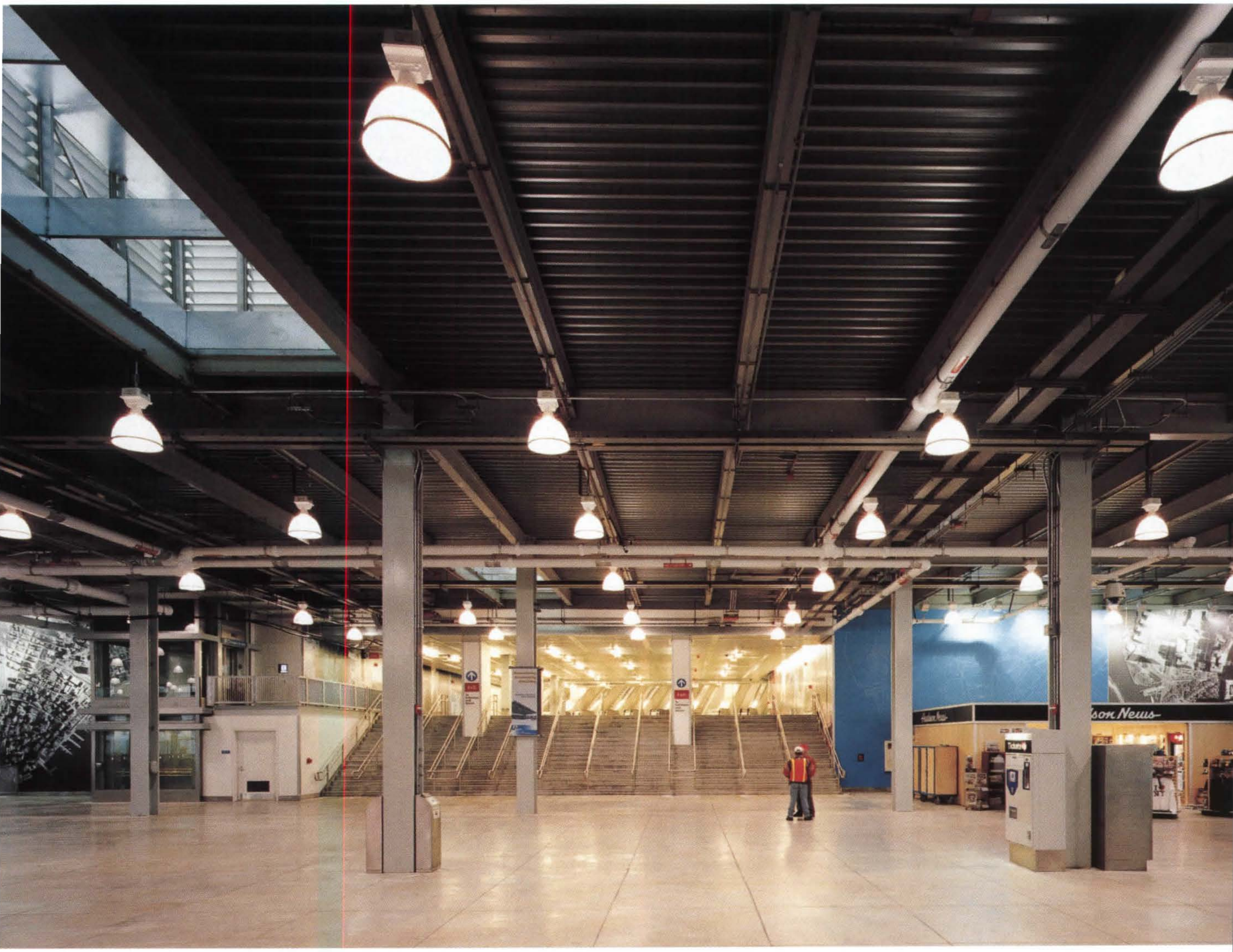
The annex, which houses practice rooms for student musicians, could have been brick or stone to make it subservient to Peutz's Glass Palace, but the far riskier and more successful solution was to clad it in green glass shingles, making it a giant billboard on which the palace and neighboring buildings are reflected.


Bavaria

FAST TRACK

A TEMPORARY COMMUTER RAIL STATION BRINGS EVERYDAY LIFE BACK TO THE WORLD TRADE CENTER SITE IN LOWER MANHATTAN. BY ABBY BUSSEL | PHOTOGRAPHS BY ADAM FRIEDBERG

Looking south, the temporary station's butterfly entrance canopy opens its larger wing to Church Street, with its smaller one acknowledging the otherwise empty World Trade Center site to the west. A viewing wall, also designed by the Port Authority of New York and New Jersey, is echoed in the scrim enclosures of the station's concourse level. By the end of 2006, the station will be replaced by Santiago Calatrava's permanent intermodal transit hub.


son News

Much of the station is exposed to the elements, and what appear to be skylights are actually air vents. A palette of standard industrial-strength materials and finishes was chosen both to endure heavy traffic and withstand the city's harsh summer and winter climates. One exception is the customized system of fiber-glass wall panels that support floor-to-ceiling photographs.

When the Port Authority of New York and New Jersey moved into its offices in Minoru Yamasaki's then brand-new World Trade Center in 1973, Robert Davidson walked through the door a junior designer. On September 14, 2001, as the authority's chief architect, Davidson and his team began to discuss rebuilding the regional commuter station beneath the Twin Towers that had been destroyed in the terrorist attacks. Late last year, the first trains arrived at a temporary station on the trade center site.

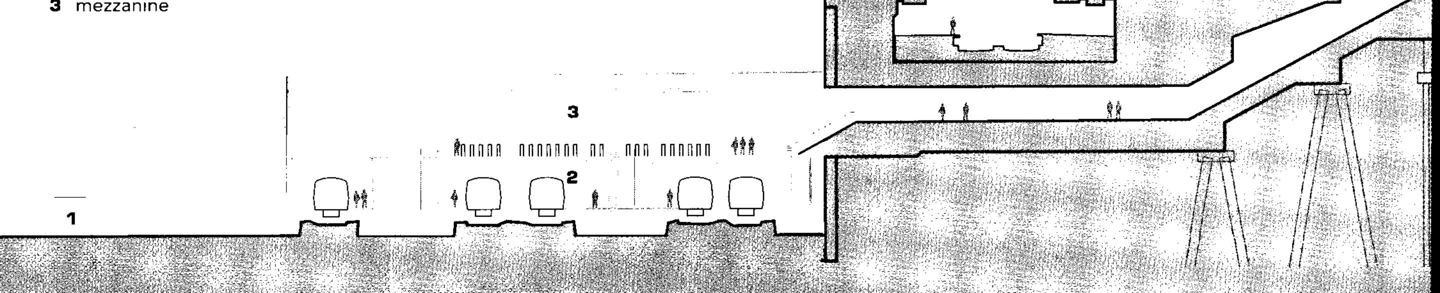
Against a backdrop of hand-to-hand political combat that has characterized the master-planning process for the 16-acre site, Davidson has not only rapidly restored PATH (Port Authority Trans-Hudson) service between Lower Manhattan and New Jersey, but in doing so he has reconciled fiscal restraint with civic aspirations, industrial-strength materials with monumental spaces. Signaled by a remarkably lithe street-level steel canopy, the open-air station pulls commuters through a procession of below-grade, concrete and steel spaces before depositing them onto train platforms. From city street to platform, it is a transformative spatial experience long absent from decades of dull public works.

"We looked at what was there before the attacks—we kept platform configurations, track geometries, and the column grid—but otherwise went to a clean slate," explains Davidson. (His team also had to rebuild flooded Hudson River tunnels, including new tracks and electrical infrastructure.) The organization of new spaces around these predetermined conditions was another challenge altogether, but one met with a simple solution. By building a long concourse a level below the street, the Port Authority team retained the original location of the station's escalators (and their adjacency to the platforms), connected the PATH to several subway lines, and allowed the entrance stairs to be oriented on a diagonal to Church Street, which defines the east edge of the site, ensuring flexibility in the imminent staging and phasing of Santiago Calatrava's permanent transit hub, which will sit just south of the temporary station.

The Port Authority team also saw in its charge an opportunity to learn from what hadn't worked well in the original subterranean retail concourse and mass transit portal, where "cross-flow" of commuters and office workers obscured street exits and subway and PATH entrances. Low ceilings and haphazard retail and directional signage made the old concourse claustrophobic and confusing. With the ground plane empty, says the chief architect, "we had room to make higher, [more] monumental spaces." A single newsstand aside, there are no retail tenants in sight, just clearly marked circulation routes. And with only one stairway and one elevator to the street, cross-flow is no longer an issue.

With its location and configuration determined, the experiential quality of the station began to take shape, united by a continuous series of mural-sized photographs of the city and supergraphic quotes about the metropolis. The designers took their formal cues from a viewing wall they had installed along the eastern edge of the trade center site two summers ago. "We carried this notion underground," says Davidson, alluding to the wall's galvanized-steel grillage, a refined riff on the ubiquitous chain-link fence. With no environmental controls in the temporary station to worry about, he adds, "We could keep wall enclosures to a minimum." Vast stretches of white vinyl scrim are all that separate commuters from the empty trade center site and the surrounding cityscape. This veil provides passive ventilation, brings in natural light, and keeps out construction dust. What the scrim will not do is mitigate the sounds of Lower Manhattan, which will grow louder as the rebuilding process proceeds. In New York City, however, this signals nothing so much as life's normal rhythm.

1 egress stairs
2 platform level
3 mezzanine
4 concourse
5 entrance



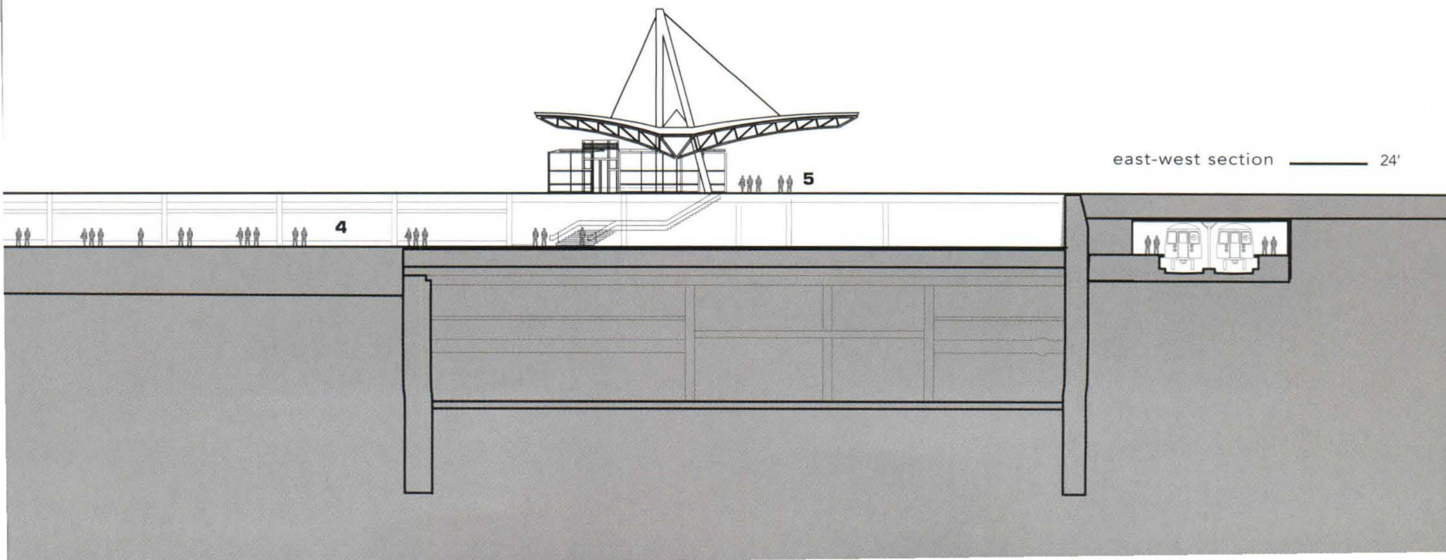
Aerial views show how the construction of the temporary PATH station transformed the trade center site. The station's emergency egress stairs sit out in the 70-foot-deep concrete "bathtub," leaving space for another platform to be constructed when the permanent transit hub is built. Plans for reuse of the temporary station after the new one is completed have not been determined.

World Trade Center Temporary PATH Station, New York City

client | The Port Authority of New York and New Jersey **architect** | The Port Authority of New York and New Jersey, Engineering Department, Engineering/Architecture Design Division, Architecture Unit, New York City—Robert I. Davidson (chief architect); Robert Eisenstat (principal architect); Russell Kriegel (project architect); Marek Zamdmer (design architect); Lev Braslavsky, Michael Chin, Rhonda Kearse, Melissa Miranda, Michael Newman, Izyaslav Plaskovsky, Arvind Somvanshi, Joseph Warner (project team) **associate architect** | The Ives Group, Fair Lawn, New Jersey **engineers** | The Port Authority of New York and New Jersey, Engineering Department, Engineering/Architecture Design Division (station superstructure/civil); Severud Associates (entrance canopy structure); Parsons Brinkerhoff (mechanical/plumbing); Parsons Transportation Group (electrical); HNTB Corporation (track) **consultants** | Pentagram Design (graphic design/wayfinding); Domingo Gonzalez Associates (lighting); Louis Berger Associates (architectural rendering); GraphicSense (architectural graphics); John Bartelstone Photography (photo murals) **general contractor** | Yonkers/Tully/Pegno **construction manager** | The Port Authority of New York and New Jersey **area** | 250,000 square feet **cost** | $260 million (including site/track work and electrical substation)

Specifications

polyester mesh/graphics printing | Duggal **EIFS** | Dryvit **roofing** | Johns Mansville **glazing skylights** | Naturalite **locksets** | Best **hinges** | Hager **closers** | Corbin **exit devices** | Yale **ceiling systems/wall panels** | Jacobson **cabinetwork** | Corian; Formica **paint** | Sherwin-Williams **wallcoverings** | 3M Scotchcal **flooring** | Armstrong **signage** | VGS **downlights** | Neoray; Lumark; Metalux; Mercury **elevators/escalators** | Schindler **plumbing fixtures** | American Standard



east-west section

ENLIGHTENED BEHAVIOR

The new headquarters for a U.S. biotech company pushes the boundaries of sustainability and corporate democracy.

BY BAY BROWN | PHOTOGRAPHS BY ROLAND HALBE

When Genzyme Center was conceived, the stars aligned to make it a significant project. The 350,000-square-foot headquarters for this 20-year-old biotechnology company was part of a thoughtfully master-planned, mixed-use development called Kendall Square on a 10-acre brownfield site adjacent to the Massachusetts Institute of Technology in Cambridge, Massachusetts. All six of the buildings were to be designed by different international architects chosen through invited competitions, and the complex's developer, Lyme Properties, was the ultimate enlightened client, a company led by a former city councilman with a degree in city planning from the school across the street from the site.

Master planners Urban Strategies of Toronto administered the competitions; the three hotel and residential buildings were awarded to Architect's Alliance of Toronto, Childs Bertman Tseckares of Boston, and MacCormac Jamieson Prichard of London. Steven Ehrlich Architects of Los Angeles and San Francisco's Anshen + Allen were chosen for one lab building each. Landscape design went to Michael Van Valkenburgh Associates of New York City. And internationally renowned Stuttgart, Germany–based Behnisch, Behnisch & Partner was selected as design architect for the Genzyme parcel, increasing the chances that this first project to finish would be a stellar building.

Behnisch, Behnisch & Partner's Los Angeles office took on the project, offering a progressive solution appropriate for an innovative company committed to developing "orphan drugs," a class of medications that treat rare diseases. The firm proposed a European model—an office building organized around a central atrium—and encouraged its client to strive for the most sustainable scheme possible. (Genzyme is currently applying for the U.S. Green Building Council's highest LEED certification, platinum. If the building is granted the status, it will become only the fifth to earn the rating and the first sizable office building with such a designation.)

COLOR CODING

Viewing Genzyme's main entrance from the north, one sees a 12-story box sheathed in alternately recessed squares of glass and mirrored-glass panels and alternating bands of glass and metal, which create a sculptural depth. The architects sought to design a building that could be read from the outside—a city within a city, as client and architect describe it. They used green paneling on the north and west façades to frame interior gardens, while brightly colored drapes—green, blue, yellow, and orange—that are visible on the exterior further suggest the variety of precincts within.

This permeability reflects Genzyme's desire for both real and symbolic transparency. Employee productivity was another key factor in design decisions, says Henri Termeer, Genzyme's CEO. "If you create an open environment that makes employees feel good, the measure of the increased productivity is incredible," he believes. "People feel more creative and there is less turnover; people lose time when they are uncomfortable. We can justify the capital

expense based on this." Employee self-determination was another concern, and Genzyme went as far as to allow employees to choose their own furniture from a list of approved options, and to regulate their own environments by means of operable windows. The top floor, with its commanding views of Cambridge and Boston, was not reserved for top executives, but instead for the employee cafeteria.

"Genzyme will eventually have buildings all around it, so it is more important to be alive inside than to be seen," says Termeer, referring to such high-profile projects as MIT's Stata Center, a new computer-science complex designed by Frank Gehry. The height and massing for the Genzyme building, as well as the other Kendall Square projects, were already prescribed by the master plan.

LIGHT SHAFT

What truly makes Genzyme a transparent environment is its 12-story atrium, the main organizing element of the building. By drawing natural light deep into the meeting rooms, offices, and workstations that spin off the vertical corridor on most floors, the architects solve the ubiquitous problem of ganging employees in the middle of a large floor plate. Atrium office buildings are not often seen in the United States, in part because of the speculative nature of the market and in part because of American fire codes, which tend to restrict the contiguous open area allowed between floors. Behnisch, Behnisch & Partner complies by incorporating shutters, windows, and doors on the periphery of the atrium that can be closed in case of fire.

Designed in collaboration with Austrian lighting consultants Bartenbach LichtLabor, the building's "light-enhancement system" manipulates daylight throughout this central core, making it possible for 75 percent of the workspaces to rely almost entirely on natural illumination (see "Light Redirection Turns the Corner," page 64). Seven heliostats—mirrors on movable mounts—on the north side of the atrium track the sun, capturing light and bouncing it onto fixed mirrors on the opposite side of the space. Skylights with prismatic louvers diffuse the light, diminishing glare and heat as they send the illumination down the well of the atrium to bounce off of lamellae—light walls composed of vertical louvers. Last, a mobile of reflective acrylic 1-foot-square panels suspended within the atrium functions as a kind of chandelier, further distributing light into work spaces. Individual rooms use the more pedestrian technology of occupancy sensors when additional illumination is needed.

Daylighting is enhanced on the perimeter of the building by computer-operated window blinds that reflect direct sunlight onto aluminum and other reflective ceiling tiles, bouncing direct illumination up to 35 feet into the building. Glass walls and dividers in the work areas extend the reach of natural light, meaning that some employees have less visual privacy while others have more audio privacy than they might have enjoyed in a more traditional office setting.

GOING PLATINUM

While the Genzyme building boasts the latest mechanical gadgets, such as waterless urinals and dual-flush toilets (they use just the right amount of water for the task at hand), much of its green methodology is borrowed from the ancients—passive solar heating and lighting, for example. And while the project's construction was by no means cheap, the designers did look to free or low-cost methods. The result is a building expected to use 25 percent less energy and 30 percent less water than a comparable facility.

Already given a head start with concrete slabs and columns that maintain thermal mass, the building's central heating and cooling system runs on steam, a low-cost byproduct from an adjacent electric plant. Additionally, the building's high-performance curtain-wall system has 800 operable windows that will be left open at night in the warmer months. When these are all opened simultaneously, the atrium becomes an enormous return duct: Air circulates upward, exiting through exhaust fans at the top. Heating and cooling is also regulated by a double façade that covers portions of each exposure, creating intermediary spaces that serve as terraces. In the summer, this thermal buffer space blocks solar gain by venting the heat away before it can enter the main portion of the structure. In winter, solar gain is again captured in this space, reducing heat loss from the façade.

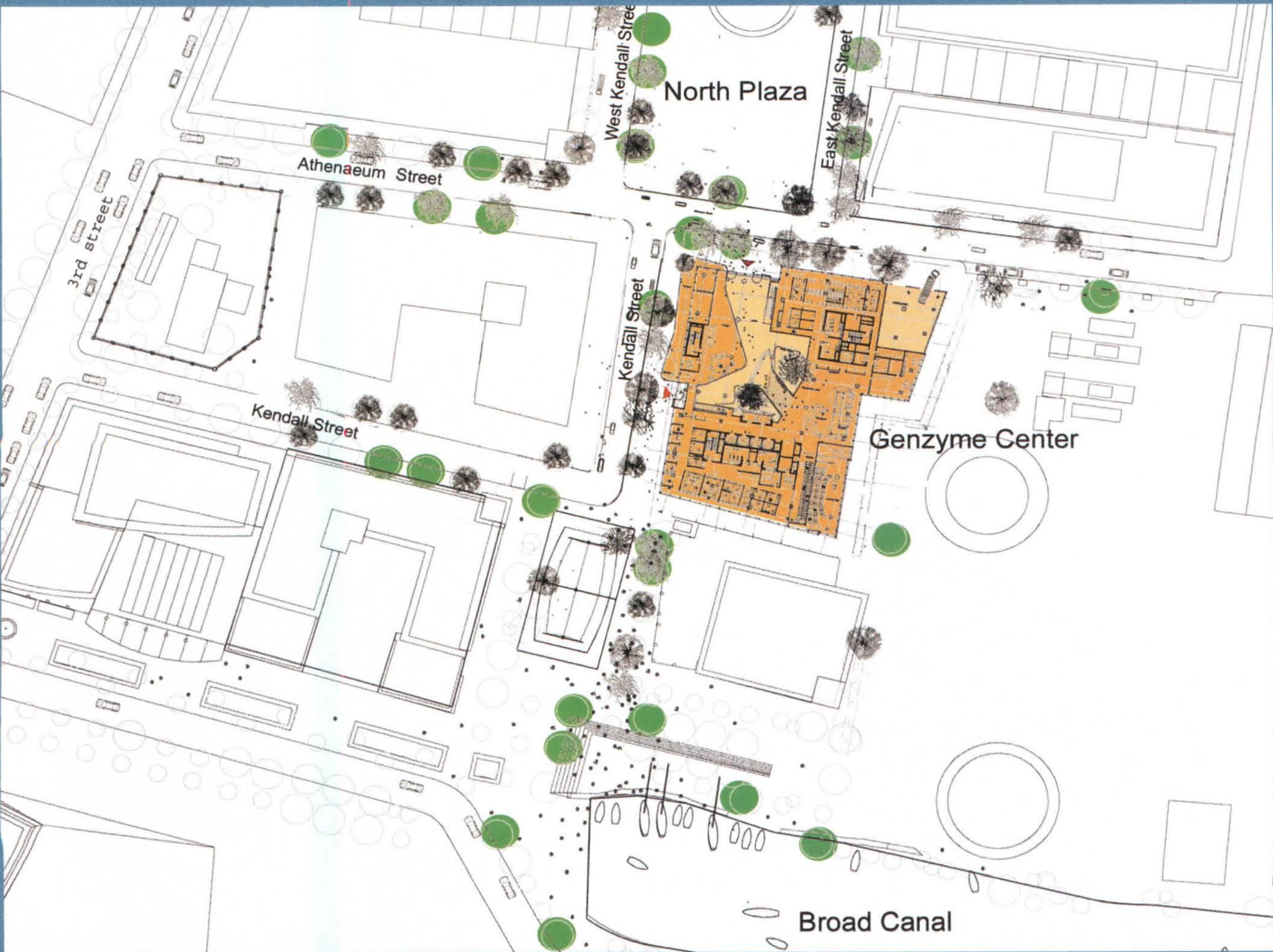
It takes more, though, to make it to the LEED program's elusive platinum status, and the architects employ several technologies and materials that are intended to help the building qualify. Photovoltaics on the roof garner free energy. A storm-water-collection system serves gardens on the roof and in the atrium. Fifty percent of the building materials have recycled content and all of the construction lumber and finished wood is from forests certified by the Forest Stewardship Council. Plus, more than 90 percent of all the construction waste was recycled.

A MODEL OF MODEST MEASURES

Beyond mere environmental motivations, Genzyme Center was inspired by a democratic notion of inclusiveness in more ways than one: Not only was the building's design intended to serve the little guy, but within its intricate systems the architects paid close attention to modest measures, like age-old nighttime cooling, that would add up to a high overall level of efficiency. "Our firm doesn't take things for granted. A little component can have a bigger task that gives overall advantages. We are not just interested in the big gesture," says Behnisch partner Christof Jantzen, who believes that the building's success should be attributed to the aggregate of its parts. And aesthetically, a potentially stark structure is humanized by this aversion to the big statement: Exotic sky gardens line the atrium, a reflecting pool in the lobby curves around the main entry, and a ceiling mural suggestive of a Matisse nude appears to swirl from one floor to another.

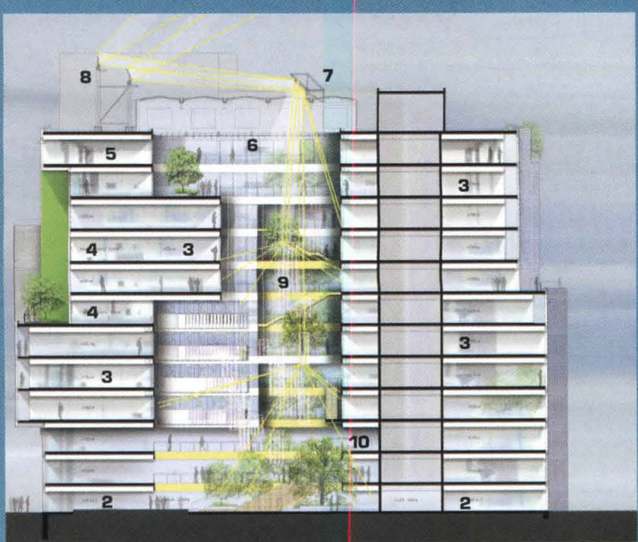
If all the bells and whistles work as billed after a year or two of heating and cooling seasons, the Genzyme Center will raise the bar for green design—and design in general. Sure, Genzyme's new headquarters was no bargain, but new paradigms rarely come without a substantial price. Within this model, designers—and their clients—should glean the value of looking to long-practiced green strategies from other countries (such as atriums) and times (such as thermal mass) that may be inexpensive today or when the figures are tallied 10 years down the line. Meanwhile, as a private venture, this project's creators and client should be lauded for their corporate responsibility and enlightened planning.

The centerpiece and first completed building of a brownfield mixed-use development in Cambridge, Massachusetts, the 12-story Genzyme Center features a skylit internal atrium, high-performance glazing, and automated daylighting systems. Built on a cast-concrete and precast filigree deck system, the building has a double curtain wall with an occupiable 4-foot air space over about a half of its exterior, and "sun-tracking" reflective louvers that distribute daylight. Computer-controlled louvers and operable windows ensure a high level of fresh-air ventilation.



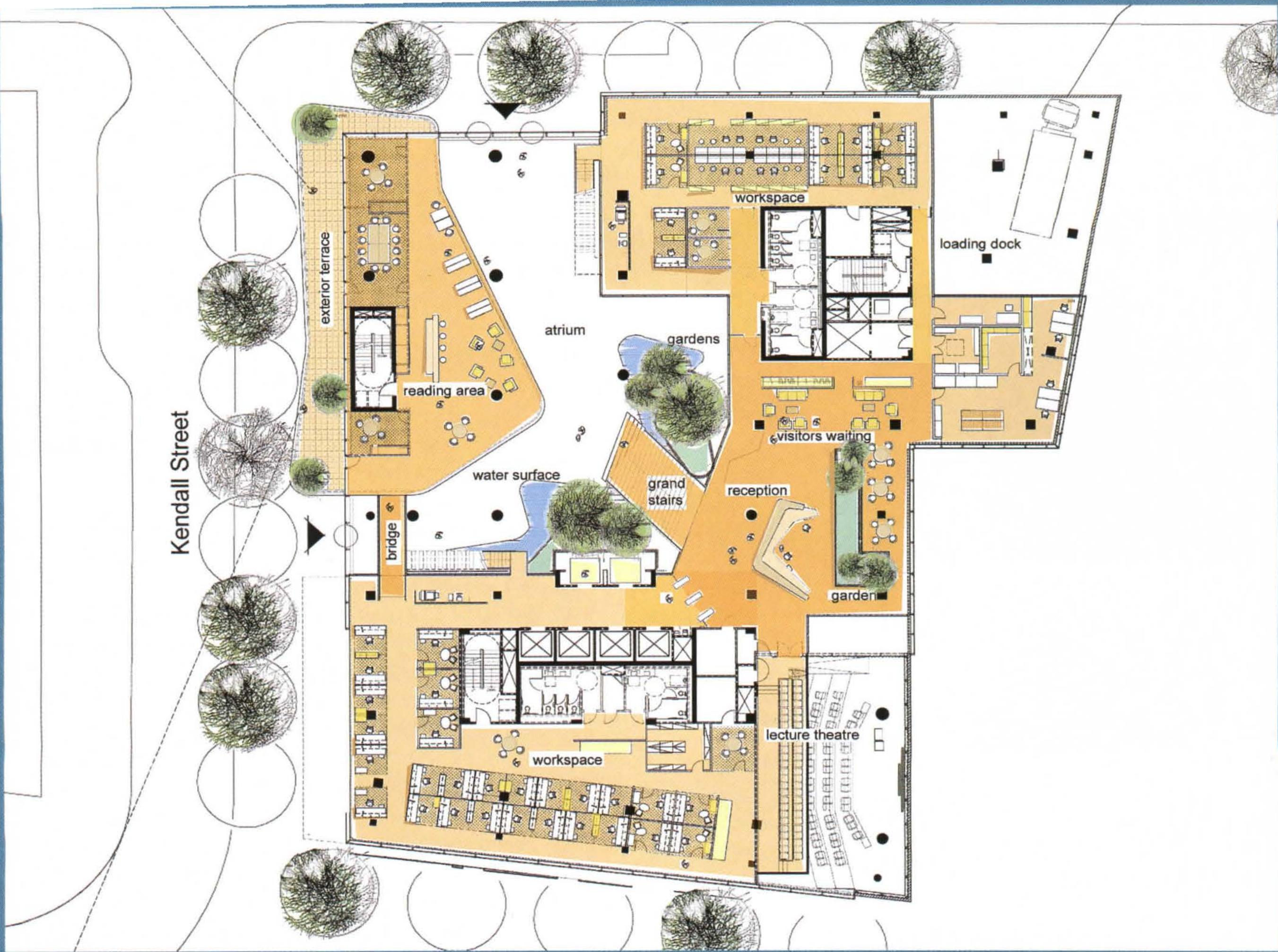
site plan 45'

1 lobby
2 retail
3 office
4 conference
5 cafeteria
6 louvered skylight
7 solar redirecting mirrors
8 heliostats
9 atrium
10 kitchenette
11 reception
12 business center
13 research
14 unconditioned terrace



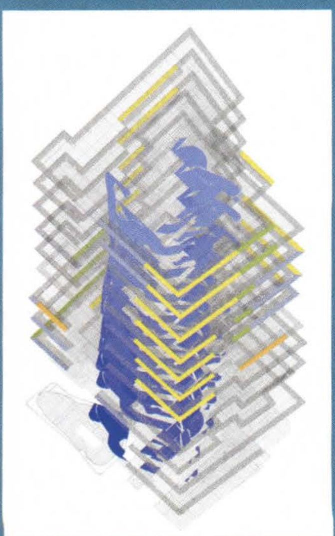
north-south section

east-west section 30'

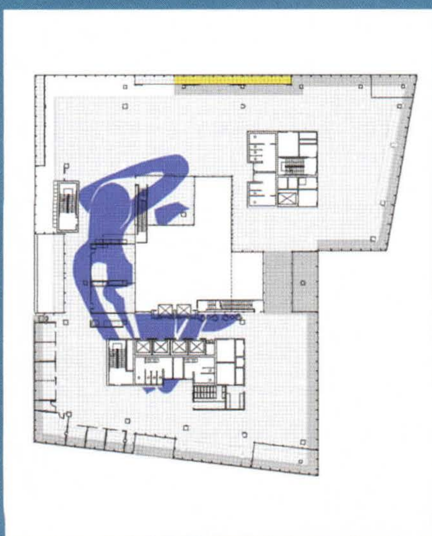


first-floor plan 14'

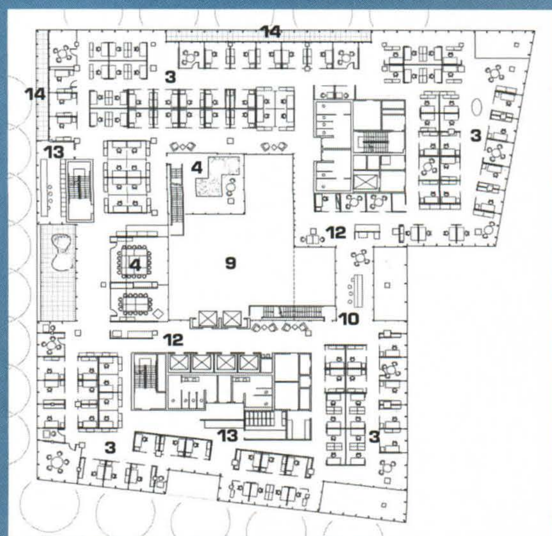
A varied building program and numerous design elements enliven both work areas and common spaces. The main entry features large plantings, a bridge, a water feature, a multistory mobile, and a grand staircase to the reception (above). Office areas are interspersed with shared research areas and kitchenettes (opposite, bottom). A design on the ceiling that is visible from the atrium and adjacent spaces recurs and metamorphoses throughout the tower (below).



layered reflected-ceiling plans

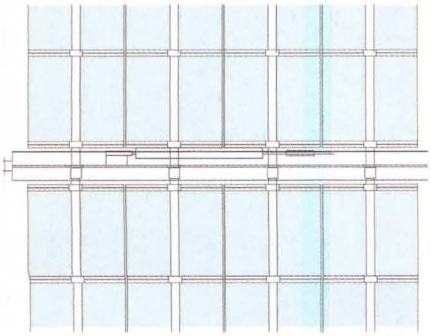


typical reflected-ceiling plan 30'

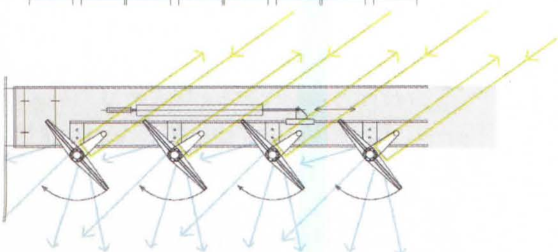


fifth-floor plan 22'

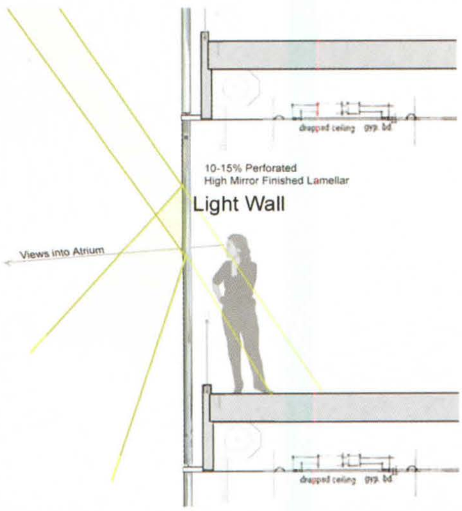
LIGHT REDIRECTION TURNS THE CORNER



The atrium skylight features automated louvered sunshades, made of a prismatic, refracting material, that track the sun's angle (above and left). To boost light dispersion in the atrium, the north wall is covered with a perforated, mirror-finish reflecting surface (below). The overall effect is a bright but glare-free space (opposite).



prismatic louvered sunshade 20"



section at atrium "light wall"

Einstein said that light can bend, but he never showed architects how to guide the sun's rays into a building's darkest corners. A class of nascent technologies, however, promises as much. Best described as "daylight-enhancement systems," these high-precision gadgets for blocking, diffusing, and redirecting the sun's rays have been applied in numerous European projects and a few U.S. buildings. Genzyme Center is a commercial proving ground for daylight enhancement, thanks to the technical know-how of a Tyrolean team of lighting gurus, Bartenbach LichtLabor of Innsbruck, Austria. Their challenge: draw as much daylight as possible as deep into the building as possible. Specifically, at least 75 percent of the building had to receive 2 percent daylight, and all workspaces had to have direct visual contact with the outdoors. Clearly, conventional shades and light shelves weren't going to cut it.

Instead, two novel technologies are employed. The most exotic are *heliostats*, large mirrors that direct sunlight to stationary targets by mechanically compensating for the earth's rotation. The sunlight is reflected from the heliostats to a bridge of fixed mirrors that send the light downward through *prismatic louvers* into the building's central atrium. Like the seven heliostats, the louver system is also motorized and automated, tilting to deflect strong direct rays and refracting light that passes through. (A less scientifically generated mobile of prismatic panels resolves the light into its spectral components and reflects it throughout the atrium.) A similar class of devices is applied vertically behind the curtain wall: computer-controlled *sun-shading louver systems* automatically track the sun's position and open to desired angles to reflect light to the ceilings while blocking as much radiated solar heat as is seasonally required. Other high-tech contrivances include a *light wall* of moving aluminum louvers on the atrium's north side that reflects daylight from the skylight into floor spaces.

Electrical lighting systems complement the daylighting mechanisms. Perimeter areas have dimmable, asymmetrically emitting fixtures on occupancy sensors to supplement natural light. At night, the atrium's prismatic elements turn inward to distribute strong but glare-free illumination from halogen metal-vapor lamps, enhanced by spotlights aimed at the mobile.

While Genzyme's lighting showcase is impressive, questions remain. Heliostats and automated louvers are costly, delicate machines that require careful maintenance—and lots of energy. A few years ago, a study by Bartenbach LichtLabor concluded that heliostats available then were "suitable only for effect illumination" and that "appropriate system components [for] indoor lighting requirements" were not yet on the market. Genzyme Center will certainly shed light on whether or not things have changed. **C.C. Sullivan**

A view of the 12-story atrium and lobby area reveals several elements of the design, including cast-in-place concrete columns, lobby plantings, a fountain, internal stairs and terraces, glass partitions and guardrails, and the use of louvers for privacy and light redirection. The mobile in the foreground is both an artistic gesture and a mechanism for refracting daylight, as well as a composition suggestive of the altar screen by Harry Bertoia in Eero Saarinen's Kresge Chapel (1955) at the nearby Massachusetts Institute of Technology.

Genzyme Center, Cambridge, Massachusetts

client | Lyme Properties (base building); Genzyme Corporation (tenant improvements) **architect/planner** | Behnisch, Behnisch & Partner, Venice, California—Stefan Behnisch (principal/partner), Christof Jantzen (principal); Günther Schaller (partner) **design architect** | Behnisch, Behnisch & Partner, Stuttgart, Germany—Martin Werminghausen (partner), Maik Neumann (project architect) **executive architects** | House & Robertson, Los Angeles (base building); Next Phase Studios, Boston—Richard Ames, Scott Payette (project team, tenant improvements) **engineers** | Buro Happold (structural, M/E/P); Rolf Jensen & Associates (fire protection) **consultants** | Buro Happold (environmental issues); Bartenbach LichtLabor (lighting/daylighting); LOG ID (interior gardens); Techmark Security Integration (security); Colburn & Guyette (food service); Acentech, with McKay/Conant/Brook (acoustics/audiovisual); HKA (elevators) **construction manager and general contractor** | Turner Construction

Specifications/suppliers

concrete | Turner Concrete **filigree deck** | Mid-State Filigree Systems **exteriors and reflective panels** | Karas & Karas **glass curtain wall** | Sota Glazing **roofing** | Roofscapes **photovoltaic panels** | Powerlight **planters and water features** | Carbona Metal Fabricators **interior gardens** | Greenscape **heliostats, fixed mirror system, prismatic skylights, and chandelier** | Bomin Solar **chandelier** | Behnisch, Behnisch & Partner (design) **aluminum louvered light wall** | Contract Shading Systems **reflective perimeter blinds** | Warema **specialty lighting and light shelves** | Boston Window **heat-retention drapes** | Création Baumann; Bay State Blackboard **plumbing and steam absorption chillers** | J.C. Canistraro **interior pavers** | Hanover Architectural Products **glass elevators** | ThyssenKrupp; Custom Cabs **skylights** | Architectural Skylight Company **fire shutters** | Atlas; Bacon Industries **cabinetwork and custom woodwork** | Modern Industries **office furniture** | Steelcase **chairs** | Herman Miller; Fritz Hansen; VS **carpet** | Milliken **area** | 345,000 square feet **cost** | withheld

The tenant's desire was to create a highly democratic, collaborative work environment using elements of sustainable design. The amount of common space per employee, for example, is about four times that for an average U.S. office building. The cafeteria offers employees views to the city and the atrium (above), with its louvered skylight, glass partitions, and operable windows. To maximize daylight and outdoor views, the architects planned perimeter offices to have glass partitions and perimeter sunshades (below).

GYPSUM ASSOCIATION

Gypsum Association Presents

Using Gypsum for Fire Control

With their inherent fire-resistive properties, gypsum board area separation walls have become the wall systems of choice for an increasing number of townhouses and multifamily housing units.

Architecture Magazine Continuing Education

To take the quiz and earn 1 AIA/CES Learning Unit (LU) of health, safety, and welfare, go to www.architecturemag.com, click on "Continuing Ed," and proceed to "Using Gypsum for Fire Control"or turn to page 72. You must answer 70% of the questions correctly to receive credit for this course. This course requires online reading in addition to the following article in order to be able to take the quiz. See page 72 for details.

Is the wall used to separate adjacent townhouse units properly defined as a "party wall," an "area separation wall," or a "townhouse separation wall"?

The answer depends on which building code you follow. The International Building Code, for example, uses standard code nomenclature in defining the wall as a "fire wall." The International Residential Code identifies the wall using specific language that describes compliance criteria. Other model codes use one of the terms previously listed. Regardless of the term used, all model codes require the wall to satisfy two basic requirements:

- It must be continuous from the foundation to the underside of the protected roof sheathing or continue through the roof to form a parapet
- It must be designed to allow for collapse of the construction on the side of the wall exposed to fire without collapsing the separation wall.

FIRE-RESISTANCE TESTING

All model building codes require area separation wall systems, regardless of their composition, to be fire tested according to the primary fire resistance test method used throughout the U.S.: ASTM E 119, "Standard Test Methods for Fire Tests of Building Construction and Materials."

This test procedure, first published by ASTM in 1918, prescribes two tests for walls—a Fire Endurance Test and a Fire and Fire Stream Test (commonly referred to as the Hose Stream Test). Similar test methods, acceptable by the criteria of some model codes, are published by Underwriters Laboratories (UL) and by the National Fire Protection Association (NFPA).

The Fire Endurance Test subjects a specimen to a prescribed fire until certain conditions are met. This is known as the "resistance period" of the

Learning Objectives

This article addresses the design, functions, and installation of gypsum board area separation walls and roof underlayment in townhouse and apartment construction.

Key points include:

- Fire-resistive and sound-retarding qualities of gypsum board systems, and how the systems are rated and tested.
- How solid and cavity-type gypsum board area separation walls are installed in townhouses and apartments.
- Code-compliant methods of installing gypsum board as a roof underlayment, and guidelines for the use of gypsum board as a parapet.

Using Gypsum for Fire Control

For related information on the sound attenuating qualities and environmental benefits of gypsum, go to www.architecturemag.com, click on on "Continuing Ed," and proceed to "Using Gypsum for Fire Control."

test. All fire-rated systems, regardless of the materials from which they are made, are tested using this Fire Endurance Test. Model codes typically require the area separation walls to maintain a fire-resistance rating of not less than two hours.

The Hose Stream Test is divided into a "primary," or "standard," method and an "optional program" method. (The optional program is referred to as an "exception" in the NFPA version.) Under the standard method, "a duplicate specimen [identical to the original] is subjected to a fire exposure test for a period equal to one half of ... the resistance period of the Fire Endurance Test, but not for more than one hour." The duplicate specimen is then immediately subjected to the impact, cooling, and erosion effects of a stream of water from a fire hose. The water pressure and the duration of exposure to the hose stream are specified in the test method. If no significant amount of water passes through the test specimen, the "resistance period" of the original specimen becomes the fire rating for the system.

The duration of the hose stream exposure is determined by the fire endurance period of the original specimen and is keyed to the fire-resistance rating of the system being tested. Consequently, the longer the rating, the longer and more severe the hose stream exposure. Under the "optional" program, the hose stream is administered to the specimen used in the Fire Endurance Test without the need for, and added cost of, constructing and burning a duplicate specimen as required by the standard method. However, both the testing laboratory and test sponsor must first agree to pursue this approach.

A fire resistance rating is one of many tools used to assess relative fire risk. In addition to fire resistance, other properties of construction materials must be taken into account in assessing actual fire risk, including burning characteristics, the fuel load of the space, and the proposed use of the structure or occupancy. Additional factors such as building location, distance from fire services, and the presence or absence of other fire protection systems are also part of this complex assessment process.

GYPSUM BOARD AREA SEPARATION WALL COMPONENTS

With their inherent fire-resistive properties, gypsum board area separation walls have become the wall systems of choice for an increasing number of multifamily designers and builders. Moreover, they fully comply with the requirements of all model building codes currently enforced in the United States.

Gypsum board area separation walls are typically manufactured in either a solid (H-stud) or cavity-type design (see sidebar, at left, for more information on the charac-teristics of solid gypsum board area separation walls). Since they were first introduced in the townhouse and apartment construction market, gypsum board area separation walls have gained a reputation for being easy and convenient to install and secure. For example, liner panels and metal components can be easily stacked, allowing the separation wall to be inserted during the framing phase of construction.

Gypsum board area separation walls must be installed using the components and installation methods described in the applicable fire test or listing. The installation should not deviate from that described in the test report, nor should the system include materials that were not evaluated in the original fire test.

Solid Separation Walls

The solid variety of gypsum board area separation walls consists of three basic components:

- Gypsum liner panels that are one inch thick, 24 inches wide, and either 8, 10, 12 or 14 feet long. Panels are manufactured with a noncombustible core and are surfaced with a facing material on the front, back, and along the edges.
- Metal framing members consisting of 2 inch wide H-studs and U-shaped track.
- "Break away" L-shape aluminum clips that soften at relatively low temperatures.

GYPSUM ASSOCIATION

CONSTRUCTING AN AREA SEPARATION WALL SYSTEM

Both solid and cavity-type gypsum board area separation wall systems weigh no more than 10 pounds per square foot when erected—far less than comparable solid area separation walls made of masonry or concrete. In most construction, gypsum board's light weight eliminates the need for costly footers or foundation modifications, and it allows the systems to be erected directly onto a poured concrete slab.

Solid systems are erected vertically one floor at a time. Two layers of 1 inch thick liner panel are secured at the foundation by being inserted into 2 inch wide tracks. The panels are held in place by 2 inch H-studs, and are erected sequentially along the track. Gypsum board area separation walls can be erected up to four stories in height, but should never be used as structural elements of a building. Due to variations in limiting height between systems, architects should consult with the gypsum board manufacturer to determine the maximum height attainable with a specific system.

Each completed floor (story) of area separation wall is capped with an inverted piece of track. Following the erection of the adjacent structural building frame, new track is installed on the top of the completed floor of panels and the stacking process is repeated. Adjoining walls of framing members—typically referred to as "flanking walls"—are installed immediately adjacent and parallel to each side of the area separation wall system. The flanking walls may provide support for the individual floors or the roof structure of the dwelling and, when finished with gypsum board, are the visible surfaces of the area separation wall system.

Many contractors choose to erect the flanking wall framing and install the panels at the same time. These contractors will erect the flanking wall on one side of the liner panel portion of the area separation wall, install the liner panels, and then install the flanking wall framing on the opposite side of the wall. This process continues on a floor-by-floor basis until the entire unit is complete. Other installers prefer to erect the framing on both sides of the area separation wall and drop the liner panels into place from the floor above. Either method is acceptable.

Solid area separation wall systems must be disconnected from adjacent combustible framing members to be fully code compliant. The space requirement is easily met by setting the adjacent wood framing members at least 3/4 inch to 1 inch away from the liner panels; the specific distance is established by the applicable fire test. If the space requirement cannot be met, the visible faces of the H-studs must be covered with 6 inch wide gypsum board batten strips, full sheets of gypsum board, or mineral fiber insulation.

Building codes typically require the space between the area separation wall and the adjacent floor joists to be fireblocked to prevent fire from spreading vertically between floors. This can be achieved easily when building with gypsum board area separation walls by inserting continuous pieces of gypsum board liner panel, mineral fiber insulation, or other code-compliant material into the gap between the wall assembly and the adjacent floor joists. To ensure that it remains securely in place, fireblocking material should be firmly attached to adjacent construction.

USE OF L-SHAPED CLIPS

Gypsum board area separation wall systems are attached to the adjacent structure by L-shaped aluminum clips. The clips are fastened to both sides of each stud at each floor or roof/ceiling intersection and provide lateral support for the wall. The clips maintain their full integrity until exposed to temperatures in excess of 1,100°F. When one side of the system is exposed to a fire of that intensity, the clips will soften and break away, allowing the adjacent structure on that side of the system to collapse without pulling down the fire-resistive separation wall. The clips on the opposite side of the area separation wall remain intact, since temperatures on that side will be far below the point at which the clip will soften. Consequently, the fire-resistive wall system will remain standing, sparing the adjacent living space from significant damage. ■

Constructing a Cavity-Type Area Separation Wall

Cavity-type area separation walls are constructed with components typically incorporated into either steel stud partition systems, or gypsum board shaft wall enclosures, such as those used to enclose an elevator shaft or duct shaft in a multi-story building. As with solid systems, cavity-type area separation walls are erected vertically, beginning with the installation of track at the foundation.

L-Shaped Clips Requirements

L-shaped clips must be manufactured from aluminum in a thickness and shape conforming to the requirements established by the applicable fire test and the manufacturer of the area separation wall system. Use of a non-compliant clip, or elimination of the clips altogether, may result in the failure of the system to work as intended.

The following quiz includes questions derived from online material not included in this printed article. You are required to read the additional online material in order to take the quiz and complete this contunuing education unit. Please go to www.architecturemag.com, click on "Continuing Ed," and proceed to "Using Gypsum for Fire Control" for the additional information.

Test Questions

1. All model codes typically require a townhouse area separation wall to meet which one of the following?
   a. Be constructed off-site and transported intact to the project
   b. Have a fire rating of at least four hours
   c. Allow for the collapse of construction on the side of the wall exposed to fire without collapsing the separation wall itself
   d. Be at least a 1/2 inch thick
2. In the Hose Stream Test, if no significant amount of water passes through the test specimen, the "resistance period" of the original specimen becomes the wall system's fire rating.
   a. True
   b. False
3. Gypsum board area separation walls are available only in a solid, H-stud design.
   a. True
   b. False
4. How wide are gypsum board liner panels?
   a. 22 inches wide
   b. 24 inches wide
   c. 36 inches wide
   d. 54 inches wide
5. How high can gypsum board area separation walls generally be erected?
   a. 2 stories
   b. 4 stories
   c. 6 stories
   d. To any desired height
6. Which one of the following materials can be used to fireblock the space between the area separation wall and the adjacent floor joists?
   a. Newspaper
   b. Continuous pieces of one-inch gypsum board liner panel
   c. Polystyrene foam
   d. You don't have to fireblock the space
7. What do model codes generally require the minimum sound transmission class (STC) be maintained as for separating townhouse units?
   a. 10-20
   b. 25-40
   c. 45-50
   d. 70-75
8. Parapets can be constructed with protected gypsum board.
   a. True
   b. False
9. Which statement about the joints between individual sheets of gypsum board used as a roof underlayment is correct?:
   a. The joints must be treated with roofing mastic
   b. The joints may be left untreated provided the sheets of gypsum boar are in contact with each other
   c. Gaps of up to 2 inches are permitted between boards
   d. The joints must be treated with joint treatment
10. Approximately how many pounds of chemically combined water does 100 pounds of gypsum rock contain?
   a. 10
   b. 12
   c. 18
   d. 21

GYPSUM ASSOCIATION

Using Gypsum for Fire Control

Successful completion of this test (a score of 70% or higher) will earn 1 AIA/CES LU hour of health, safety, and welfare. Non-members will receive a certificate of completion (please provide email address).

To take the test, go to www.architecturemag.com and click on "Continuing Ed" to download a PDF of this unit or mark your answers to the test questions at right. Mail or fax the completed form to:

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test>									
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3.	a	b	c	d	8.	a	b	c	d
4.	a	b	c	d	9.	a	b	c	d
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Material resources used: Article addressing issues concerning health,safety, and welfare.

I hereby certify that the above information is true and accurate to the best of my knowledge and that I have complied with the AIA Continuing Education Guidelines for the reported period.

Signature ______ Date ______

VAULTING INTO THE PAST

Up-to-the-moment structural design undergirds a throwback arena in downtown Dallas by David M. Schwarz.

by C.C. Sullivan

The intricate façade cladding is supported by a back-up system that stacks all loads from the full exterior height to ground level. Brick areas are supported by grouted CMU, and window walls sit on structural steel tubes and wide flanges. Three concrete panels were cast on site to form each entrance arch, which are true arches.

Unrepentant classicist David M. Schwarz has brought his highly organized, highly ornate brand of neotraditional architecture to several large venues, including The Ballpark in Arlington, Texas (1994), Fort Worth's Bass Performance Hall (1998), and the Disney Wide World of Sports Complex (1997), in Orlando. Aside from Schwarz's overarching *goal of presenting* "a style of architecture in which everyone can find something they recognize," he blends historical detailing and modern building technology in unpredictable yet efficacious ways. In his past efforts, and more evidently in the 19,200-seat American Airlines Center in Dallas, which opened about 18 months ago, his interest in classical expression is truly only skin deep: Beneath the familiar forms and details lie up-to-the-moment construction assemblies that serve as armature, some more rationally than others, to support the look of the ages.

Of course, the home of the Dallas Mavericks basketball team and the Dallas Stars hockey franchise is no Coliseum, except perhaps in its Romanesque efficiency. Its pretty, arched façades of **brick**, limestone, and granite relate to some local precedents (although none specifically), and Schwarz adds clever if quirky flourishes like balcony supports fashioned with profiles of basketballs and hockey pucks. The highly articulated envelope is dimensionally distinct from the building's floor plates, however, so it rests on the ground—supported by a hidden system of structural steel, concrete masonry units, cast-in-place concrete, and **site-cast concrete arch panels**.

CLASSIC CROSS-VAULT

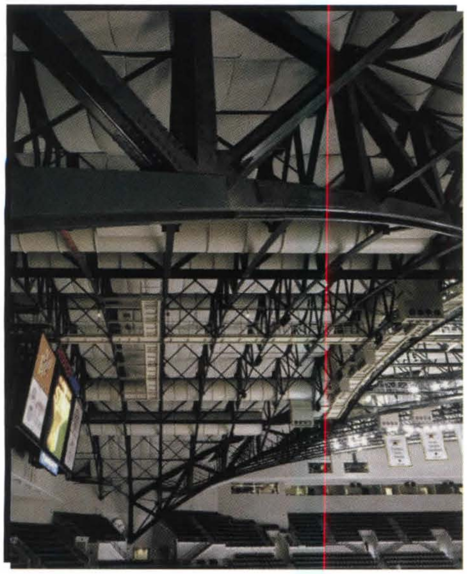
Behind the intricate façades rises an elegant arena volume, culminating in a serene yet relatively complex roof shape—a classic cross-vault. While such roofs were traditionally built using concrete shells, in this case the form finds support from a surprisingly economical and attractive **truss matrix**, which in some ways suggests a turn-of-the-century train shed. Yet this structure is not buttressed as one might expect time-honored barrel-vault construction to be; instead, it features an unusual **external tension tie** of post-tensioned concrete, which is concealed within the upper floor framing. Unlike the internal tension ties employed in many recent stadium designs, this structure allows a much lower roof height without compromising spectator sight lines.

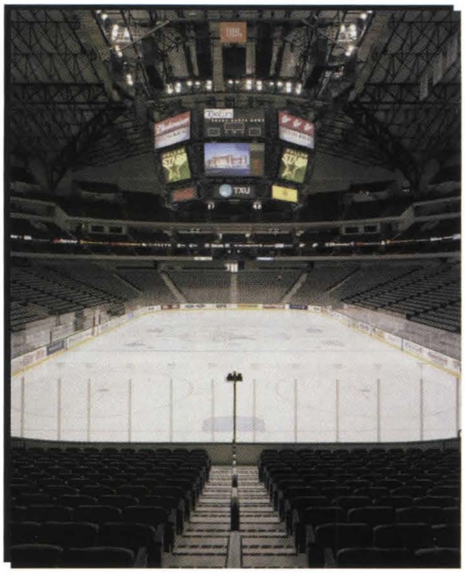
The approach effectively took 15 feet off the original height of the building, says David A. Platten, a principal in the Dallas office of engineering firm Walter P. Moore, which developed the idea. At a mere 13 feet deep and measuring 330 feet by 420 feet without a single column, the elegant two-way arched roof structure saved millions of dollars in steel framing and façade construction, and reduced M/E/P loads. And what is visible is handsome: dark green arcs of the trusswork standing out against a brightly painted off-white ceiling and matching acoustic drapes.

FUNCTIONALLY EFFICIENT

The design team ensured that the structure would not only look good but work well, too. For example, the trusses are spaced close enough together to serve as the **rigging supports**, rather than requiring the framing of a separate grid for hanging event lights and other equipment. Larger **steel angles** were designed for the bottom chords to resist the changing loads and to allow riggers to walk along them with relative ease. "We can adapt easily to what our loads will be because the chords are only 13 feet apart," says Bob Jordan, director of operations for the arena, adding that the bottom chords of the nearby Reunion Arena in Dallas are 26 feet apart. In other cases, the biaxially symmetric plan had to be tweaked to support the program. For example, when planned column grids and structural elements interfered with ideal concession layouts, Schwarz adjusted the vomitories and created "naves" and **side-aisle spaces** to open up and better demarcate the concession zones.

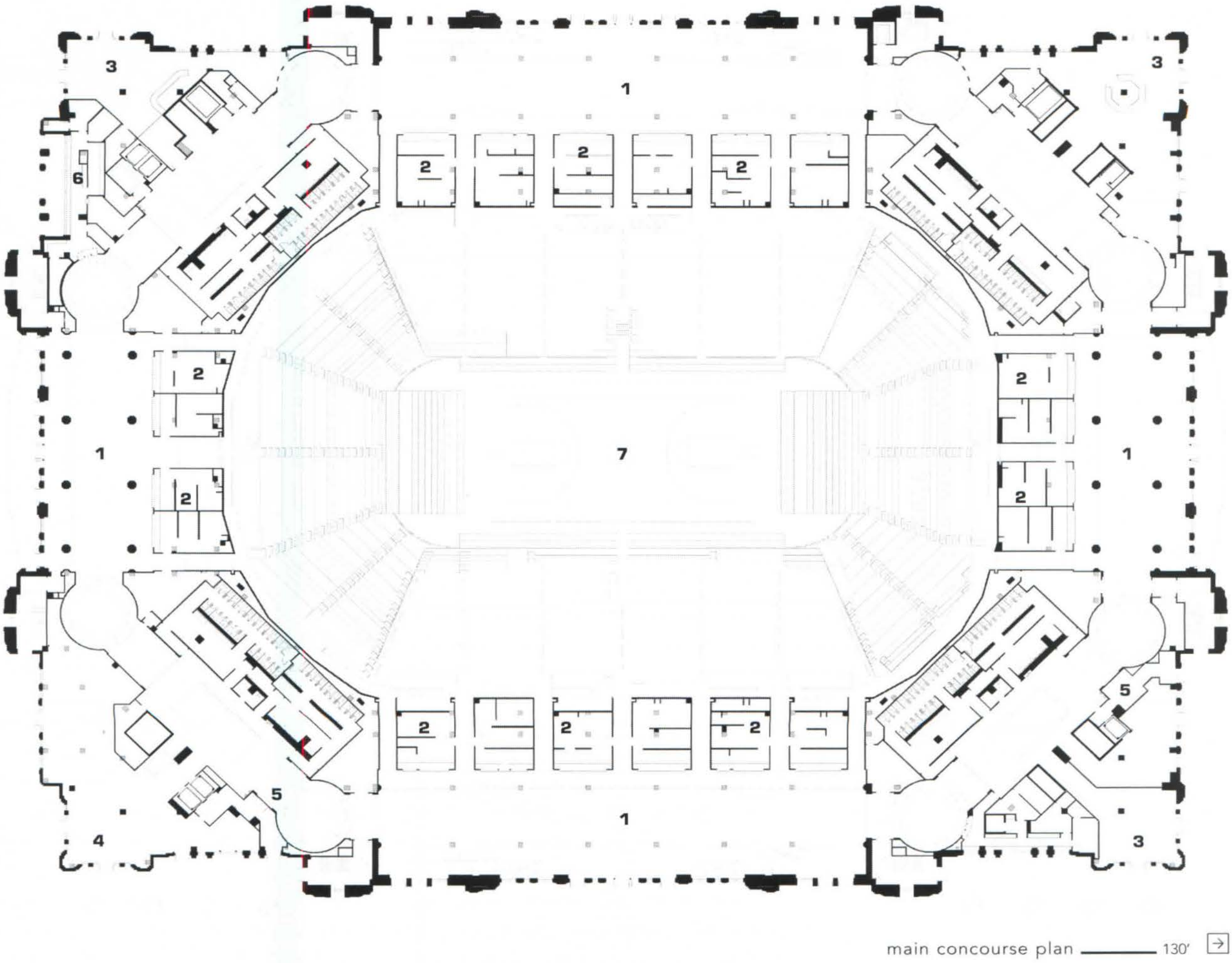
Schwarz combines Platonic solids and Socratic method to find efficiency and moments of beauty in the American Airlines Center. While many local architects and critics have dismissed the arena as easy historicism, its image resonates with many Dallas sports fans—and local muck-a-mucks like Ross Perot Jr., former owner of the Mavericks and a project developer. In fact, Schwarz earned the commission in a 1998 ideas competition with his arena concept and a preliminary masterplan for Victory, the surrounding 72-acre brownfield development that is expected to contain 8 million square feet of retail, entertainment, office, and residential space. Besting several high-profile firms, Schwarz brings Dallas the start of a throwback neighborhood where a vaguely recognizable image fronts for efficient, contemporary construction practices.



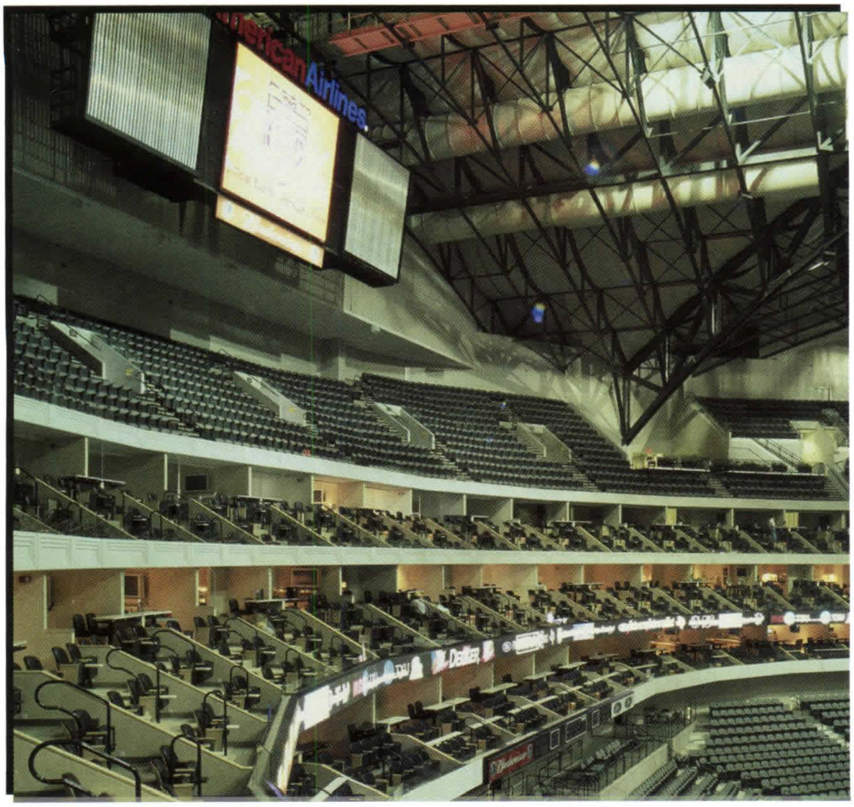


The steel trusses take only compression loads. An external tension tie built into the upper floor framing handles lateral loads. The reinforced-concrete floor framing was cast using pour strips bisecting each side of the building, so no expansion joints were required. The approach let the contractor build and sequence four separate building sections at once, which were then joined.

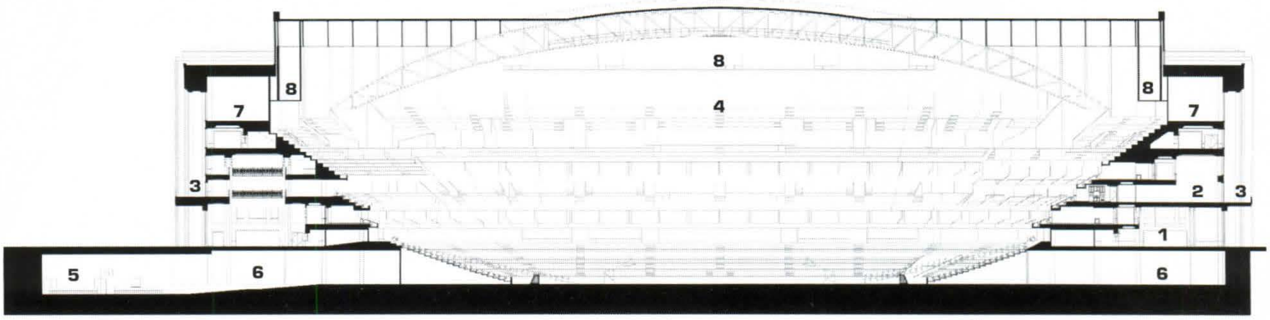
1 lobby
2 concessions
3 retail
4 club bar
5 premium entrance
6 box office
7 lower seating bowl (basketball)



main concourse plan 130'



1 lobby
2 restaurant
3 balconies
4 press box
5 basketball practice court
6 service level
7 mechanical
8 spotlight platforms and acoustical bass trap



north-south section 150'

To stand up to Texas-sized hail, the parabolic solid is topped with a relatively thick (80-mil) PVC membrane bonded to a 1/4-inch gypsum roof-protection board (above, right). Underneath are two layers of polyisocyanurate insulation over an acoustical deck. The interior ceiling is a corrugated acoustical deck with fiberglass insulation in the flutes and partly covered with acoustical drapes (above, left).

American Airlines Center, Dallas

client | Hillwood Development; City of Dallas **architect and interior designer** | David M. Schwarz/Architectural Services, Washington, D.C.—David M. Schwarz (design principal); Craig P. Williams, Gregory M. Hoss, Jeffrey P. Loman, Ramsay P. Fairburn (project team) **architect of record** | HKS, Dallas **landscape architect** | SWA Group **engineers** | Walter P. Moore (structural); Flack & Kurtz (M/E/P); Brockette/Davis/Drake (civil) **consultants** | PHA Lighting Design (lighting); WJHW (audiovisual); Cinni-Little (food service); 212 Harakawa (graphics); Schirmer Engineering (codes); CDC (cladding) **subcontractors/suppliers** | Con Real, Pioneer (concrete); North Texas Steel (structural steel); Precast Erectors (precast concrete); Jennings Glass (glass); Belden Brick (brick); King of Texas Roofing (roofing); Sarnafil (roof membrane); GP Gypsum (roof-protection boards) **construction manager** | Jack Hill, Hillwood Development **general contractor** | Austin Commercial **area** | 605,000 square feet **cost** | $144 million

photographs by Hedrich-Blessing

air barriers? codes are saying yes

Is the time ripe for a national code on air barriers? In 2001, Massachusetts took the somewhat controversial step of requiring in its energy code airtight envelopes with continuous, structurally supported barrier materials. Wisconsin followed suit in 2002, and last year as many as 20 states, including Florida, Texas, and Minnesota, entertained similar code revisions, according to the Walpole, Massachusetts–based Air Barrier Association of America (ABAA). And proponents are now angling to include air-barrier requirements in the next revision of the International Building Code and the energy-conservation standard ASHRAE 90.1.

The new codes are motivated by concerns about energy efficiency, moisture intrusion, steel-framing corrosion, and mold, especially in metal-stud construction with gypsum-board backup. But does it make sense to require air barriers for all projects across America's diverse climates? "Emphatically yes," contends Wagdy Anis, a principal of Boston's Shepley Bulfinch Richardson and Abbott and chairman of his state's Energy Advisory Committee. "Air barriers improve how the envelope and HVAC systems function. Our firm designs air barriers for projects in all climates."

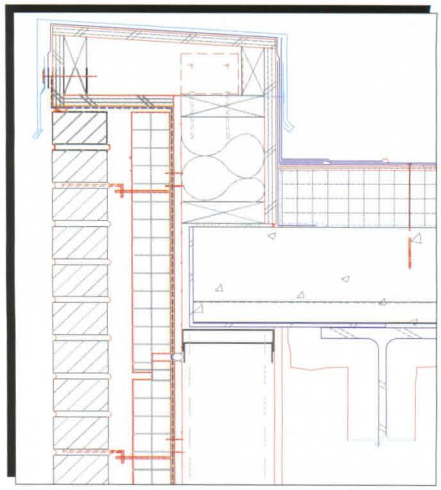
Not everyone agrees. Building owners have voiced concerns about the added costs, and masonry manufacturers and contractors say the air-barrier provisions rule out such common, cost-effective designs as the simple concrete-block walls used in big-box retail. "The Massachusetts code is very stringent, and we've undertaken testing of walls in Canada to see if it is appropriate for the single-wythe masonry market," says Dave Dimmick, executive director of the New England Concrete Masonry Association in Manchaug, Massachusetts, which has a newly formed air-barrier task group that convenes in Atlanta this month.

Meanwhile, manufacturers are aggressively marketing air-barrier solutions new and old to capitalize on the changing codes. For single-wythe concrete masonry, for example, **Tnemec** (www.tnemec.com) has introduced an elastomeric interior coating, Enviro-Crete Series 156, as a painted-on air barrier. Other promoters of "structural" air barriers include **Grace Construction Products** (www.na.graceconstruction.com), which makes the fluid-applied Procor line of rubber-based membranes, and **Henry** (www.henry-bes.com/airbarriers.asp), which offers Air-Bloc vapor-permeable and nonpermeable air barriers. Other products being employed as air and moisture barriers include water-based materials such as Sto Guard, a fluid-applied system from **Sto** (www.stocorp.com), and woven "house wraps" such as Tyvek from **DuPont** (http://construction.tyvek.com). While there is no consensus on which solutions work best, the technology is certainly available.

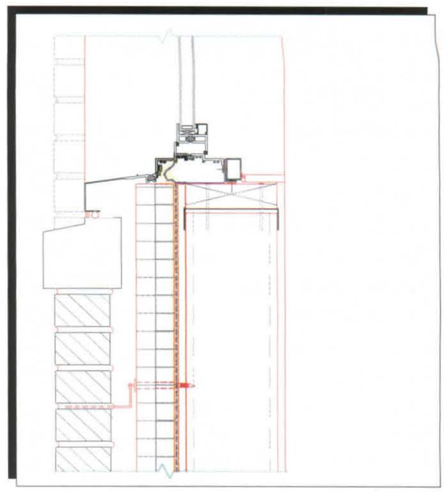
Yet if air barriers will cure such ills as mold, rust, and drafts, why aren't they used more often? "It's a new technology, so there's a learning curve going on," says Len Anastasi, president of the ABAA. "In Massachusetts, it was incorporated with a sink-or-swim approach, and there've been some mistakes." In Canada, on the other hand, where similar codes were written in the 1980s, the entire construction culture has adapted, says Mark Lawton, an engineer with Morrison Hershfield in Burnaby, British Columbia: "We build more tightly than in the United States, and contractors are used to building in this way—even electricians know to seal their penetrations. It's standard practice."

"It is a cultural change, but it is inevitable," believes Anis. "There will eventually be requirements for air barriers in other states—not in a year or two, but possibly in the next five to 10 years."

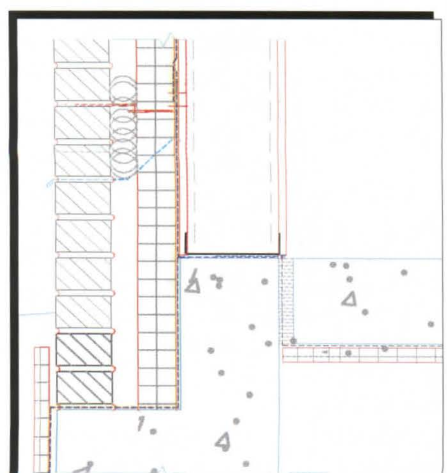
FOR INFORMATION ON AIR BARRIERS, CIRCLE 120 ON PAGE 97.



roof parapet



window sill



brick veneer details (foundation) 5"

TAKING TOOLS FOR A TEST DRIVE

By beta-testing software, architects can have input into new programs and insider's access to the cutting edge.

by Julia Mandell

Ever since architects started using CAD software, they've been involved in the development of computer programs for the A/E/C professions. This makes sense: How are software engineers to know what architects need if they do not ask them? One way is through "**beta testing**," a term for a second round of trials that follows in-house "alpha testing" and usually involves would-be users trying out the new program in order to give its developers feedback. Robert McCray, COO of GeoPraxis, a company that is in the final stages of development of an online energy-analysis service called "Green Building Studio" for users of Autodesk's Architectural Desktop and Graphisoft's ArchiCAD, says that beta testing is "just a part of good software development. Otherwise you are releasing something that feels cool to the engineers who built it, but who knows what the architectural community thinks."

What's in it for those who do beta testing? Certainly it's a labor of love. Many software companies are up-front about the limited benefits of beta-testing for volunteers. "They don't really get a lot out of it other than learning more about what goes into creating software," says Bryce Stout, a quality-assurance specialist at @Last Software, the company behind the drafting and modeling tool SketchUp. "Other than that, it's a pretty raw deal. They give us feedback and they spend lots of time, and that's about it."

For architects and designers who are very involved with sophisticated 3-D modeling, however, beta testing is a form of collaboration, a chance to have an impact on the development of influential tools. Marty Doscher, IT director for Los Angeles–based Morphosis and a collaborator with Dr. Robert Aish of Bentley Systems on a new

Morphosis's teapot for Alessi's City of Towers project was designed using a beta version of Bentley System's Generative Components (above). The parametric software allowed them to set up a series of rules for the design and then instantaneously generate 100 variations (top). The software is also being test-run with the Smart Geometry Group (www.smartgeometry.com), an occasional gathering of students and young graduates who receive tutorials in the program and help Dr. Robert Aish and his partners learn more about its possibilities. The next gathering, which is open to interested parties, will be held in Cambridge, Ontario, Canada, in the fall of 2004, preceding the annual conference of the Association for Computer Aided Design in Architecture (ACADIA).

software program called "Generative Components," values having a program custom-designed for him when it hits the market. "It's especially helpful to be able to tailor a tool to meet our idiosyncratic needs," he says. Doscher also notes the advantage for Morphosis to add its name to something innovative—in this case, a parametric 3-D modeling tool that allows designers to establish a set of criteria for an object's form that will remain intact through different manipulations. "It shows we are not just about flashy forms," he says, "but that there is an intelligence behind it."

MAKING THEIR OWN

Some architects become so involved with software that they develop their own. A recent example is the launch of Gehry Technologies, Gehry Partners' venture with Dassault Systèmes to produce an architectural version of CATIA, the aerospace software that Gehry's firm has used to design the Guggenheim Bilbao and other projects.

Unlike Morphosis and Generative Components, the architects in this case are interested in promoting a tool they have already mastered. Dennis Shelden, the chief technology officer at Gehry Technologies, cites the desire to be in control of the product—and the profits. "With traditional beta testing, architects are asked to give their input, but the perception is that often it doesn't have the impact on the software that architects wish it would. We want a program that will do what we want, and the best way to get that is to do it ourselves," he explains. "Plus, we want to benefit from the results."

GETTING INVOLVED

Short of starting a software company, how do architects get involved in such a process? Some companies publicize an open call for beta testers, as with GeoPraxis. This isn't the only way they gather testers, however; often architects cold-call them. Stout says his company doesn't issue public requests, because "you tend not to get any feedback from those types of things. We stick with people who come to us and ask us. They're usually **power-users**, people who really love our software, and want to learn more about it."

For this reason, most companies begin beta testing with **early adopters**, practitioners already involved in process innovation and new software programs. In addition to using an open call, GeoPraxis has also worked with people from Skidmore, Owings & Merrill and Hellmuth, Obata + Kassabaum. And Gehry Technologies uses an ever-growing number of collaborators as they develop their software. "We have a pretty substantial list of people who are checking this out," says Shelden. But they are seeking more. So there's a place to start: Why not beta-test Frank Gehry's new software and go right to the cutting edge?

Big Peripherals With Multiple Personalities

- product: **HP Designjet 815mfp**
- manufacturer: **Hewlett-Packard**
- web: **hp.com**

- product: **Starprint 2000**
- manufacturer: **KIP**
- web: **kipamerica.com**

Multifunction peripherals have become as common to the workplace as "multitasking" has to the office lexicon, conveniently combining scanning, printing, and often faxing and copying into one networkable unit. Most are designed for a desktop, restricting them to letter-size (8-1/2 by 11 inches) or at most tabloid-size (11 by 17 inches) output. Herewith are two of the big boys, capable of tackling blueprints and other large files.

With color print, scan, and copy capabilities, the 815mfp from Hewlett Packard occupies only a single footprint of valuable office space. Within its integrated frame, it easily handles CAD and GIS files, and prints at up to 2,400 by 1,200 dots per inch (dpi), even on rigid media up to 43 inches wide. It scans at 200 dpi on the same scale, with speeds of 1.5 inches per second in color and twice that in black and white. A graphical touchscreen display is meant for ease of use and short training time.

A customizable solution from KIP, Starprint 2000 can be ordered with a control terminal for scan-to-file jobs and a choice of four optional scanners. The double-footprint unit makes up for its monochrome output with speed: with scan rates of 2 to almost 13 inches per second and 200-dpi print outputs in the same range, it is promoted by its manufacturer as the fastest machine of its kind. Features include native "Real-Time Thresholding" software that automatically adjusts scan threshold levels for documents more than half a million times a second to ensure high-quality image capture.


Pilkington Profilit™
Freedom To Design In Glass
West End Boys & Girls Club — Allston, MA
Annealed Glass
Bellevue Art Museum — Seattle,
Photography © 2001 Paul War
Annealed G
Cranbrook Institute of Science Museum — Detroit
Photography © 2001 Paul Wa
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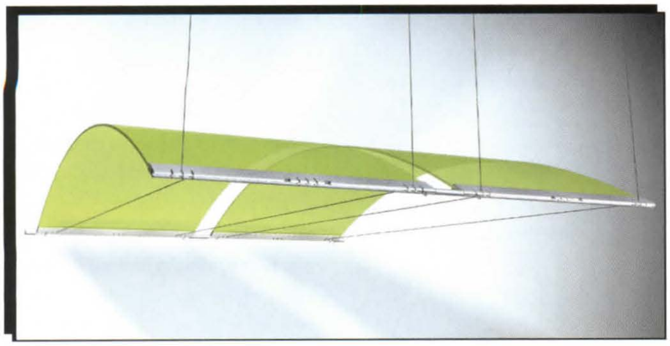
WESTCROWNS INC.
t: 910-579-4441
www.westcrowns.com
f: 910-575-3203
Circle 60 or www.architecturemag.com/productinfo

overhead options

product: **Squareline**
manufacturer: **illbruck Architectural Products**
web: **illbruck-archprod.com**

These galvanized, powder-coated mesh ceiling tiles are made of expanded metal prebonded to a Class 1 fire-rated wiltec foam, which absorbs up to 80 percent of the sound that reaches the tiles, making them a suitable choice for acoustical control. Available in two patterns and several color combinations.



product: **Infusions**
manufacturer: **Armstrong**
web: **armstrong.com**

To provide a wide range of customizable options for "spaces within spaces," Armstrong has introduced this collection of floating canopy ceilings. A large variety of colored, textured, and translucent and solid canopy materials can be hung at different heights and in varying formations using standard components. Available in 2-foot widths and 5-foot and 6-foot lengths, the canopies can be used individually or in combination and require no special tools for installation.

product: **Luxalon**
manufacturer: **Hunter Douglas**
web: **luxalon.com**

Made of 70-percent recycled content and much of it postconsumer, these aluminum ceiling systems are applicable for both interior and exterior uses. Also, according to the manufacturer, recycled aluminum uses only 5 percent of the energy that would be needed for the processing of virgin aluminum. Another benefit is that all of the scrap metal from the fabrication process is recycled, leaving virtually no waste. Available in a wide range of styles and colors, the systems contain no volatile organic compounds (VOCs) and are impermeable to mold, mildew, and rust.

product: **Arboreal**
manufacturer: **Ceilings Plus**
web: **ceilingsplus.com**

This wood-veneer ceiling panel line meets a number of needs. Made of paper-thin veneer over aluminum, it can be custom ordered with or without perforations for acoustical control and can be easily bent for curvilinear installations. A variety of exotic wood species and panel sizes are available.

product: **Halcyon Climaplus**
manufacturer: **USG**
web: **usg.com**

These acoustical fiber-glass ceiling panels have the highest possible noise-reduction rating, making them a good choice for applications like open-plan offices, lobbies, and libraries, where acoustical control is important. Designed for high light reflectance, the panels work well in areas with indirect lighting. The constituent materials were also developed to withstand high heat and humidity levels. Halcyon Climaplus is available in 2-foot-, 30-inch- and 4-foot-square dimensions and in 2-foot-by-4-foot panels.

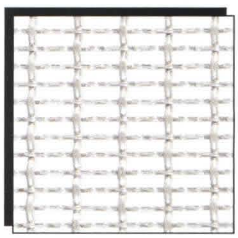
product: **Whispertone**
manufacturer: **Johns Manville**
web: **jm.com**

Part of a line of formaldehyde-free insulation products, this acoustical wallboard is made of fiber-glass fibers bonded with an acrylic resin. A rigid board-type insulation, it can be used for a variety of applications, including office partitions and ceiling panels. White with a smooth finish, Whispertone is available either plain or with a DuraGlass mat facing and is available for custom use or for manufacturers and fabricators to use in developing ceiling tiles or wallboard.

FOR INFORMATION ON CEILINGS, CIRCLE 121 ON PAGE 97.

enmeshed

For a Continental Airlines-sponsored addition at Bush Intercontinental Airport in Houston, Texas, that opened last month, architecture firm Corgan Associates—a multi-branch partnership with offices in Dallas—specified scrims from **Cambridge Architectural Mesh** (www.architecturalmesh.com). The project features an elliptical atrium space on the terminal's spine situated at the termination point of two bridges spanning a roadway to a new ticketing building. A multilevel "presidents' club" and third-level international passenger corridor that *encircle the atrium* look down through a glass wall onto the circulation space below. To lend visual order to the space and shield the glass while retaining its transparency, project manager Greg Krebs hung stainless-steel, open-wire mesh panels in front of the glass. The panels, he says, "provide another layer of articulation and order" and hide the asymmetrical configuration of the atrium's glazing that results from the building's sloping, elliptical roof.



The mesh Krebs specified, an open weave called Millennium 897S, was attached to a rigid stainless-steel frame of 2 inches by 2 inches by 1/4 inches. Cambridge also provided a bracket system, as detailed by the architect, to attach each frame to the structural support system. When initially tested on site, the panels' edge members were not stiff enough, so Cambridge developed the stainless-steel angle frame to achieve a taut, flat surface. Individual panels can be easily removed in order to clean or replace windows.

Historically popular for use in elevator cabs, escalator walls, and other high-contact areas requiring a rugged surface material, architectural mesh is gaining popularity in a range of uses. Its industrial look makes it an appropriate choice for contemporary-looking decorative scrims, like those at Bush. In Europe, the material has been in use for many years but it has recently gained acceptance stateside. Cambridge's main competitors, **GKD Metal Fabrics** (www.gkdmetalfabrics.com) and **Haverboecker** (www.haverboecker.com) are both based in Germany.

COURTESY CAMBRIDGE ARCHITECTURAL MESH

FOR INFORMATION ON MESH AND CABLE, CIRCLE 122 ON PAGE 97.

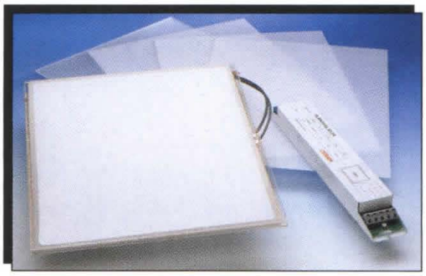
super-flats, sun-trackers, and spools

- product: **Tile**
- manufacturer: **IO**
- web: **iolighting.com**

Available in wall-mounted, rigid-pendant, or suspended-pendant versions and designed for interior application, the new Tile series of fixtures features strips of light-emitting diodes (LEDs) that edge-glow a sheet of two types of optical acrylic. The panels are less than three quarters of an inch thick and framed by an anodized-aluminum edge, and they can be used either as overhead lighting or to create rhythmic decorative wall patterns. Tile is available in 5-inch size increments and in five colors: red, green, blue, amber, and white. Custom color matching is also available using the Lee Color Filter System.

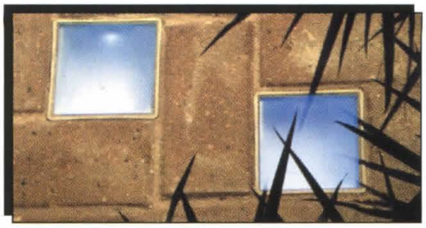
- product: **Planon**
- manufacturer: **Osram Sylvania**
- web: **sylvania.com**

Another recently-introduced flat-panel lamp is the Planon, a mercury-free lighting source less than half an inch thick that uses pulsed eximer discharge to produce luminescence. Originally designed as a backlighting source for monitors and liquid-crystal-display (LCD) televisions, it is a viable alternative to fluorescent or cathode fluorescent lamps or LED products for use in displays, signage, effects illumination, and task lighting. Planon comes in diagonal measurements from 10 to 21 inches with a life of up to 100,000 hours.



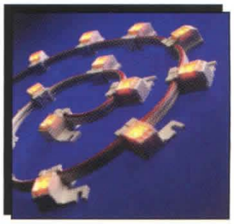
- product: **SVPAVER4X4**
- manufacturer: **Super Vision**
- web: **svision.com**

Made of ABS plastic and high-impact frosted polycarbonate, the paver fixture is a light casing designed for use in wall illumination and for pool patios, decks, driveways, and walkways, where it can be easily incorporated into brick and paving patterns. Measuring 4 inches square and 2-1/2 inches deep, it has a 25-strand fiber-optic capacity.



- product: **GE Tetra LED System**
- manufacturer: **Gelcore**
- web: **gelcore.com**

Billed as an inexpensive alternative to neon lighting, the GE Tetra LED strip fixture from Gelcore (a joint venture between General Electric and Emcore) is being increasingly used for lighting coves in retail and hospitality settings, including casinos such as Las Vegas's famous Venetian, where more than a mile of the system was recently installed. A forward-facing design cuts down on reflection loss and increases usable lumen output. Tetra comes in spools so that it can be cut to measure, is up to 90 percent more energy efficient than neon, and has a life of up to 100,000 hours. Available in yellow-amber, red, red-orange, blue, cyan, and green.



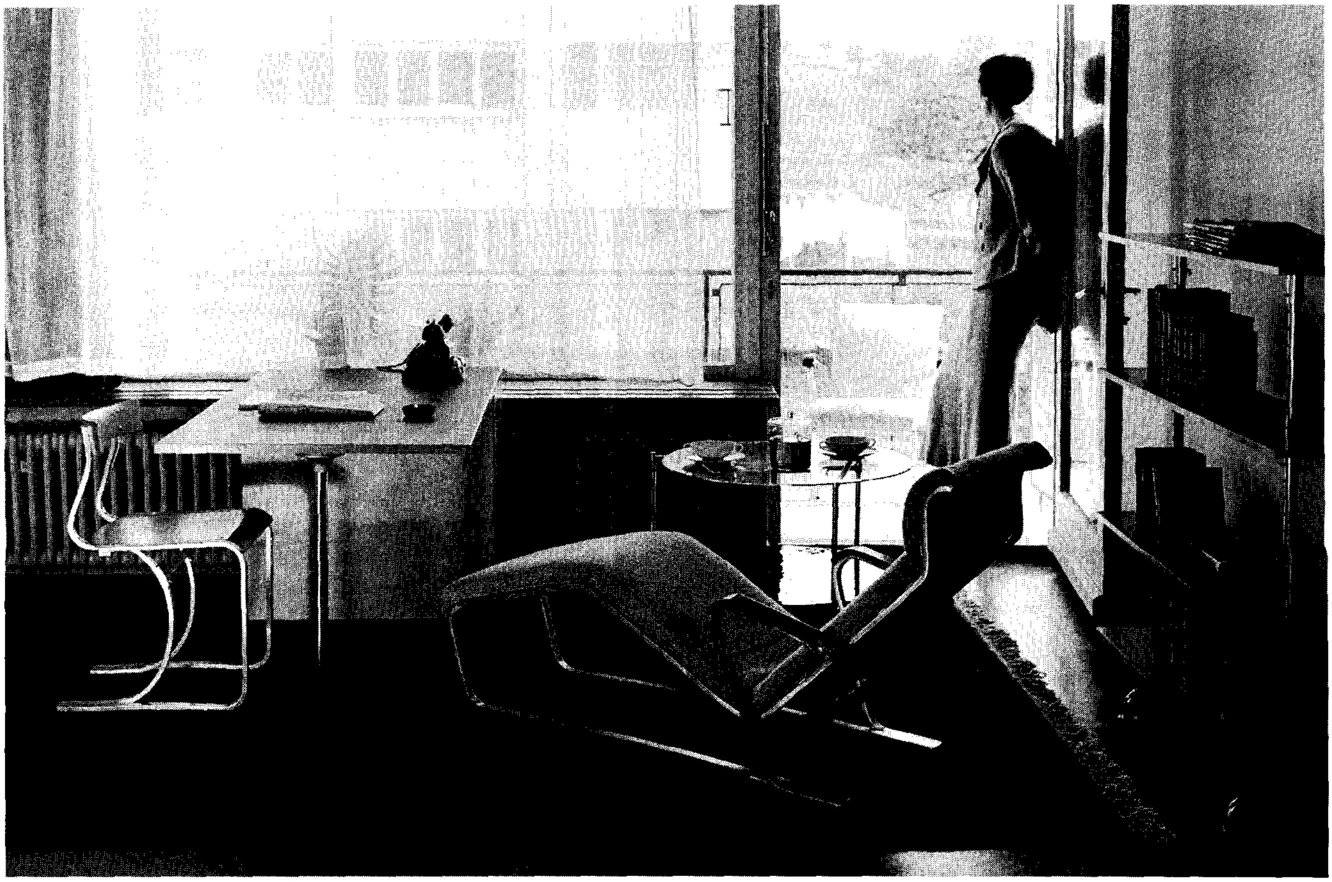
- product: **ADS 600**
- manufacturer: **So-Luminaire**
- web: **soluminaire.com**

A domed sun-tracking mirror system that mounts on either a 4-by-4-foot or 4-by-8-foot skylight, the ADS 600 provides daylighting for industrial, commercial, and educational buildings, reducing the need for ambient electric light sources for up to 10 hours a day by using a pivoting mirror array to reflect sunlight down into a structure. The patented tracking mechanism follows the light from sunrise to sunset before resetting to an east-facing position when darkness falls. The units are self-contained and self-sufficient—each is powered by a single photovoltaic cell.

FOR INFORMATION ON LIGHTING, CIRCLE 123 ON PAGE 97.

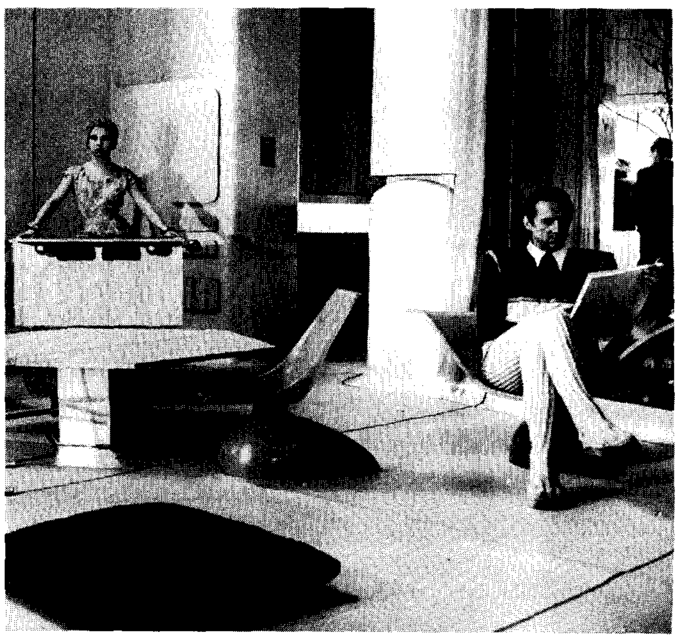
BOOK

***Marcel Breuer Design and Architecture* | Vitra Design Museum** This tome, published in conjunction with a retrospective exhibition at the Vitra Design Museum (through April 25), lavishly documents Breuer's complete works, from objects to buildings, proving that the Hungarian-born architect-designer was about more than just chairs—though it would belittle his iconic tubular-steel *creations to refer to* them as "just chairs." **Anna Holtzman**



EXHIBITION

***The Smithsons: The House of the Future to a House for Today* | Design Museum | London | Through February 29** "The art of habitation" is the theme of this small yet compelling exhibition culled from the archives of the late British architects and designers Alison and Peter Smithson. By excluding their major works—the Hunstanton School, the Economist Building, and the Robin Hood Gardens housing complex—the show looks in detail at the Smithsons' lesser known and often unrealized domestic commissions and proposals. Drawings, plans, diagrams, photographs, furniture, and scale models stationed chronologically around the exhibition space chart the evolution of the architects' work, from their space-age "House of the Future"—built for the Ideal Home Exhibition of 1956 and pioneering open floor planning and "mechanised" technology—to "Hexenhaus" (1986–2002), a "witch's house" with an attached pavilion on stilts situated in a German forest. The show locates the couple's practice historically, with an emphasis on their uncompromising ethics of production: The work develops from an early interest in organicism and the so-called "as found" ethic, combining existing structures with new construction, and moves to the materiality of New Brutalism, culminating in a rationalist architecture that incorporates the unwieldy glut of our commodity-driven lives. **David Bussel**

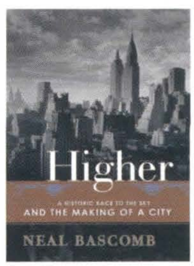


TOP: COURTESY VITRA DESIGN MUSEUM; BOTTOM: COURTESY DESIGN MUSEUM, LONDON

EXHIBITION **_Marjetica Potrc: Urgent Architecture_ | Palm Beach Institute of Contemporary Art | Lake Worth, Florida | Through February 29** Trained first as an architect, Slovenian-born artist Marjetica Potrc received the Hugo Boss Prize from the Guggenheim Museum in 2000 for a body of work fueled by her interest in such global issues as displacement, shantytowns, and other unplanned settlements. Her projects include studies of low-income and self-built housing in developing areas, from South Africa to Latin America, as well as active interventions, such a waterless composting toilet installed in a Caracas shantytown as a proposed solution to local sanitation problems.

Urgent Architecture comprises documentation and artifacts from a range of projects, but its central feature is Potrc's vividly colored "hybrid house," a structure made of concrete block, painted metal, stucco, plastic milk containers, and found objects such as metal doors and screens, and wooden dowels. Its rooftop is covered with antennas, satellite dishes, and a maze of electric wires. The project is drawn from Potrc's observations of the shanty housing of Caracas, squatter shacks in the West Bank, and the trailer parks of West Palm Beach, and reveals the extraordinary beauty and resourcefulness that she discovers in a world devastated by war, poverty, and homelessness. **Beth Dunlop**

BOOK **_Higher_ | Neal Bascomb | Doubleday** Subtitled *A Historic Race to the Sky and the Making of a City*, Neal Bascomb's lively narrative follows the intrigue, egos, and financial interests that propelled rival architects and one-time friends William Van Alen and Craig Severance to battle each other in their separate efforts to build Manhattan's tallest skyscraper—Van Alen with the now iconic Chrysler Building (1,046 feet), Severance with the Manhattan Company Building (927 feet). The story relies heavily on anecdotal material, but draws as effectively on well-researched historical fact and engineering details. The result feels like a mythology, but a credible one, with architects, patrons, officials, and a cast of sundry characters becoming as solid and real as their brick-and-steel legacies. Even though we know how the story will end—how the Empire State will trump both rivals' efforts—Bascomb's tale remains compelling throughout. A must-read for any fan of Gotham and its neck-straining heights. **Jamie Reynolds**



TOP: COURTESY PALM BEACH INSTITUTE OF CONTEMPORARY ART; BOTTOM: COURTESY DOUBLEDAY

EXHIBITIONS

COLUMBUS, OHIO
Tea and Coffee Towers
Tea and coffee services by internationally acclaimed architects, commissioned by the Italian tableware manufacturer Alessi.
WEXNER CENTER
www.wexarts.org
Through May 2

HAVERFORD, PENNSYLVANIA
Voith & Mactavish
A 50th-anniversary retrospective on the local architecture, planning, and design firm.
HAVERFORD COLLEGE
www.haverford.edu
Through February 22

HOUSTON
Houses x Artists
Houses designed by nine contemporary artists in collaboration with New York City architects OpenOffice.
UNIVERSITY OF HOUSTON
www.blaffergallery.com
Through March 14

LOS ANGELES
Picturing Domesticity
Works by artists from Diane Arbus to Jeff Koons to Gordon Matta-Clark that explore the idea of home.
MUSEUM OF CONTEMPORARY ART
www.moca.org
February 8–May 3

MIAMI
Tokyo: Imperial Capital
Japanese artist Kishio Koizumi's documentation of the rebuilding of Tokyo after the 1923 earthquake.
WOLFSONIAN
www.wolfsonian.fiu.edu
Through May 2

NEW YORK CITY
Louis I. Kahn
Drawings and sketches of both built and unbuilt projects, with images by architectural photographer Roberto Schezen.
MAX PROTETCH GALLERY
www.maxprotetch.com
February 12–28

NEW YORK CITY
Bill Henson
Nighttime images of architectural structures by Australian photographer Bill Henson.
ROBERT MILLER GALLERY
www.robertmillergallery.com
February 12–March 13

NEW YORK CITY
Petra: Lost City of Stone
The story of the ancient city that is carved into the red sandstone of the cliffs of southern Jordan.
AMERICAN MUSEUM OF NATURAL HISTORY
www.amnh.org
Through July 6

PARIS
Non-Standard Architecture
Work and research by 12 international firms on the implications of digital tools in architectural design.
CENTRE POMPIDOU
www.centrepompidou.fr
Through March 1

PARIS
Marc Newson
Exhibition on Kelvin 40, a concept jet by the London-based designer, commissioned by the Cartier Foundation.
FONDATION CARTIER
www.fondation.cartier.com
Through May 2

PHILADELPHIA
Gluckman Mayner
Architect Richard Gluckman's renovation in progress of this Philadelphia museum.
PHILADELPHIA MUSEUM OF ART
www.philamuseum.org
Through March 28

PHILADELPHIA
Philippe Cret
Original renderings by the late beaux-arts architect and former University of Pennsylvania professor.
UNIVERSITY OF PENNSYLVANIA
www.upenn.edu
Through May 4

ROTTERDAM
Neutelings Riedijk
Twelve buildings revealing the kitschy aesthetic of this Rotterdam-based architecture firm.
NETHERLANDS ARCHITECTURE INSTITUTE
www.nai.nl
Through February 29

WASHINGTON, D.C.
Itria, Italy
Black-and-white images by photographer Rajesh Nair depicting the buildings and landscape of the Itria Valley.
THE OCTAGON
www.theoctagon.org
Through April 2

WASHINGTON, D.C.
Affordable Housing
A survey of innovative American architecture practices as applied to low-cost housing.
NATIONAL BUILDING MUSEUM
www.nbm.org
February 28–August 8

EVENTS

CHICAGO
Senior Housing
Conference on senior housing for builders, developers, architects, and other professionals.
HYATT REGENCY CHICAGO
www.nahb.org
April 14–16

LOS ANGELES
Design Excursions
Art Center's inaugural design conference, with renowned speakers from a range of disciplines.
ART CENTER COLLEGE OF DESIGN
www.artcenter.edu
March 18–21

SAVANNAH, GEORGIA
Interiors '04
Annual conference from the American Society of Interior Designers.
SAVANNAH INTERNATIONAL TRADE AND CONVENTION CENTER
www.asid.org
March 4–7

TORONTO
CIB 2004
Annual conference of the International Council on Research and Innovation in Building and Construction.
WESTIN HARBOUR CASTLE HOTEL
www.cib2004.ca
May 2–7

COMPETITIONS

City Lights
New York City Department of Design and Construction's competition to design a new street light.
www.ci.nyc.ny.us/html/ddc/html/citylights
Registration deadline March 12

Reinventing Urbanism
Ideas competition for solutions to global "shrinking cities," sponsored by the Federal Cultural Foundation of Germany.
www.shrinkingcities.com
Registration deadline April 15

City Crossing
International design competition for the redevelopment of a four-block site in Winnipeg, Canada.
www.winnipeg-design-competition.org
Deadline April 21

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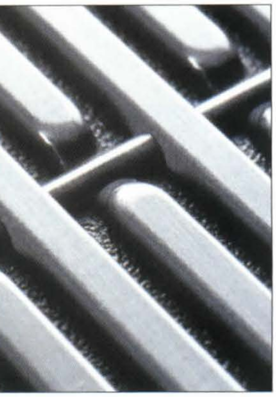

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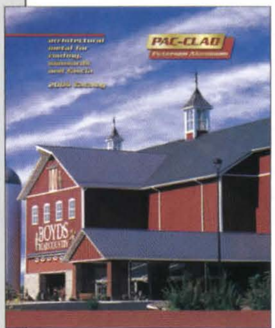

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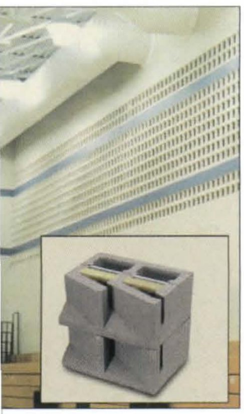

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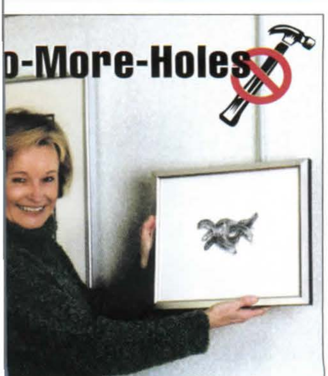

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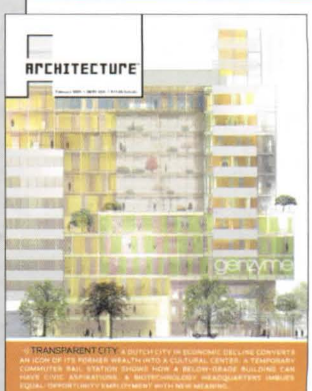

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LEARNING TO TEACH

When architecture makes headlines, architects should make beelines for public schools, where they can share their knowledge with the next generation of clients. by Damon Rich

AP/WIDE WORLD PHOTOS

Forget about the radar screen; in 2003, architecture was on the television screen. Never before have so many Americans confronted so much speculative architectural production. Sparked by the Bilbao effect of the late 1990s, spurred on by the redevelopment of Lower Manhattan, and reinforced by high-profile commissions in Cincinnati, Los Angeles, Chicago, and elsewhere, the morning papers and the nightly news featured formally challenging projects from Zaha Hadid, Frank Gehry, and Rem Koolhaas, among many others. This intersection of the architectural avant-garde and mass media presents an opportunity to make architecture a part of our national dialogue. And the place to start is in our schools. But the benefits of design's raised profile could be squandered—a loss to both the public and the profession—if architects fail to take advantage of this pivotal moment.

In my work creating educational exhibits and programs about the built environment under the auspices of a design education nonprofit, I use architecture to improve civic education for young people and adults. For example, my colleagues and I recently spent a semester at an alternative high school investigating the design and politics of public housing. This past year, my satchel was often filled with tabloids featuring front-page coverage of schemes for the World Trade Center master plan with full-color models and renderings. Whether for ninth-grade students or adult beginning readers, these images needed no introduction. No one lacked the vocabulary to express an opinion about what they were seeing. Without much background or preparation, students debated symbolism, structure, politics, and aesthetics.

Designing democratically does not mean that everyone goes to architecture school, but it could mean that architecture goes to everyone's school.

Because it can serve as a portal for such interdisciplinary exploration, architecture has a crucial contribution to make to a reinvigorated civics curriculum. Arguably, such programs have been on the architectural agenda since Vitruvius, but today it takes more than a base, a shaft, and a capital to convey the makeup and dynamics of our society. Civics education must link the places in which we spend our everyday lives to the complex and abstract systems that shape them—economies, ecosystems, and politics.

An integrated architectural curriculum, where the history, debates, and methodologies of the discipline are used in teaching everything from math to writing to history, would serve some of the same purposes as the existing architectural education for young people, which usually consists of special 4- to 8-week-long courses taught by architects or educators like myself. These programs increase awareness of the built environment, improve visual literacy, explore mathematics and physics, and enhance representational skills. To justify its inclusion as an integrated subject instead of a compartmentalized one, architecture must not be taught as a specialized craft, but ought to be introduced as a social process. Starting from the fact that the Egyptian pyramids were built by slaves, students need to examine the power dynamics of building and of property development. Instead of memorizing styles, students would benefit far more from understanding why the buildings in their own neighborhoods look and function the way that they do. Students should also be exposed to avant-garde visions, from the Walking City to Boullée's Newton Cenotaph. A photomontage of a futuristic building is a great conversation-starter; however, dialogue must not stop at formal imagining, but must address how such proposals would shape the public realm and how they might be achieved.

Architecture's educational potentials are threatened not by philistine educators or vanishing budgets, but by design culture itself. If we believe that politics sometimes ruins good design, we undercut architecture's role as a mediator between social values and built form, an inherently political process. If we insist too firmly on the division between "architecture" and "building," we discount broad access to the joys of the physical environment. Practitioners who grasp this disconnect between the civic realm and the professional high road will take every opportunity to energize, not dampen, the public's imagination.

Encouraging citizens to contribute to the making of our physical surroundings is a critical component of a free society. Granting a say to the widest population remains a political challenge: Despite the decentralization of planning authorities that swept the country in the 1960s, most people don't play an active role in shaping their physical environment. Designing democratically does not mean that everyone goes to architecture school, but it could mean that architecture goes to everyone's school.

Damon Rich teaches design and theory and is a cofounder of the Center for Urban Pedagogy (www.anothercupdevelopment.org), a New York City–based design education nonprofit whose exhibit *Urban Renewal: The City without a Ghetto* is touring nationally.


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