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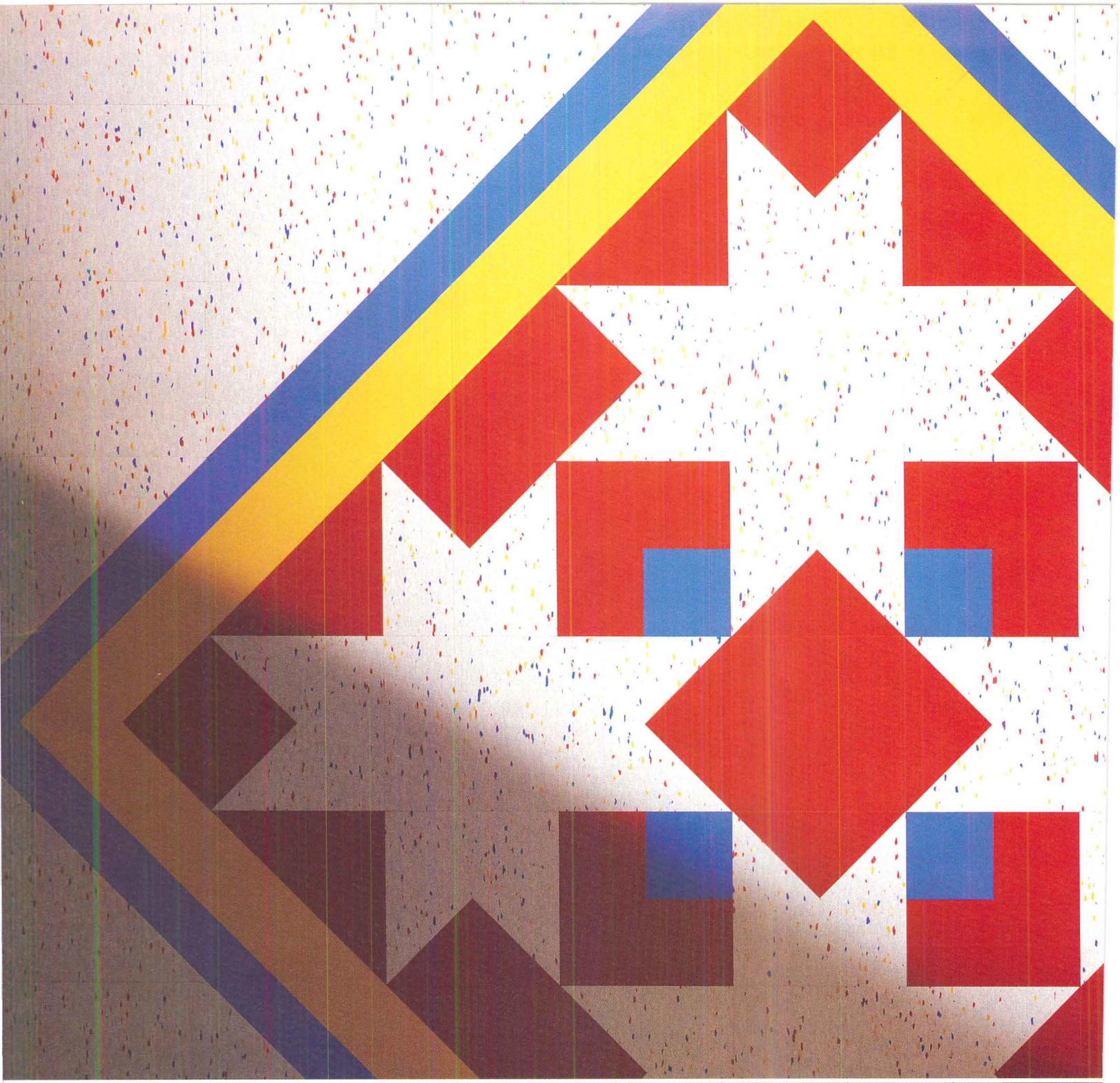

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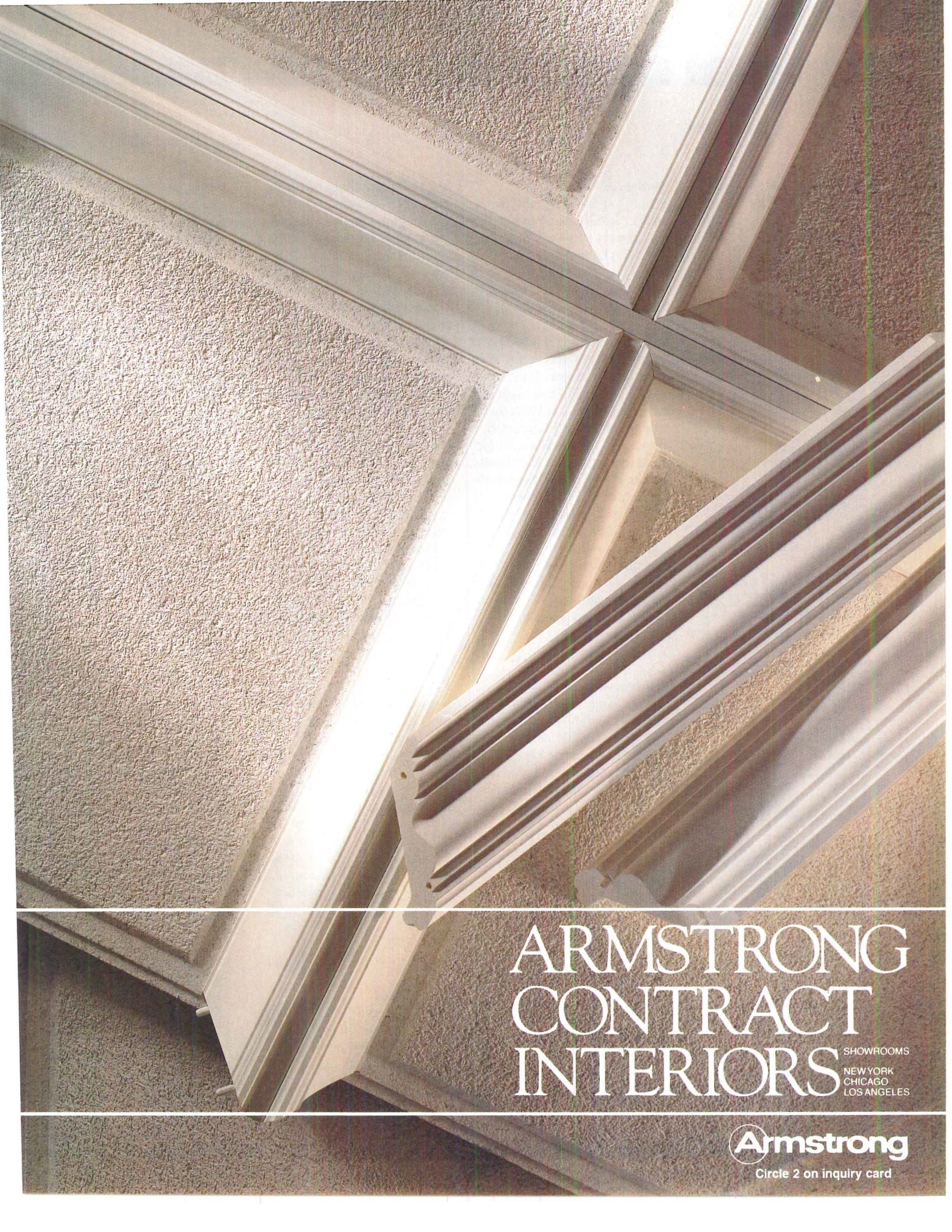

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Letters

Wall eyed

Thank you for the quality of your article on the Pierpont Morgan Library ["Bound Volumes," RECORD, January 1992 pages 98-105]. I was disappointed in your comments on the "failure" of the garden wall on Madison Avenue. I am not sure it is understood that it is intended as a wall that will be covered with ivy and be a support for a landscape piece and not as minimal architecture. It should really be thought of not architecturally but as a landscape piece. Unfortunately, because of the climate, the time of year and its immediate installation, there was no vegetation apparent. In 18 months or so I would be delighted to walk everyone through to show them that the wall is much more sympathetic than portrayed.

Bartholomew Voorsanger, Architect
New York City

October surprises

I found "Kahn Reconsidered" by Roger Kimball [RECORD, October 1991, pages 94-103] most fascinating in one aspect. He begins by expressing a desire to break down the adulation for Kahn but ends by adding to it. It was a very good piece. Your article on Venturi's addition to the National Gallery ["To Mannerism Born," RECORD, October 1991, pages 72-79] was excellent, except I believe you were too kind. Venturi's buildings have never had the ability to "move" people and it's time we asked "why?".

James Oleg Kruhly, Architect
Philadelphia

Managua's cathedral

The piece on Ricardo Legorreta's design for a new cathedral in Managua, Nicaragua [RECORD, Design News, December 1991, page 13] shows an appalling ignorance of the history of the project and of Nicaragua. Far from unifying people, the cathedral has created enormous anger. Many Nicaraguans are angry because the Cardinal and the Mayor, without public review, chose to locate the new national cathedral on the outskirts of the city center, rather than build near the original earthquake-devastated cathedral in the old urban center. The siting decision contradicts the urban master plan developed over several years by Nicaraguan and European planners. It will seal the coffin on Managua's old city center, which is in desperate need of rebuilding. The new location is between a few shops and two truck roads—definitely an inappropriate place to try to create a new center for this capital city. The decision to hire an architect from outside the country, when local professionals need work, didn't win too much applause either. After the U.S.-sponsored contra war against the Sandinista government, Managua is now home to 1 million of the country's 3 million people. Hundreds of thousands of people immigrated from the countryside to escape the war, adding to the hundreds of thousands of poor people already trying to eke out a living in the capital. A design to reflect the community of Managua should prioritize housing and community facilities for the city's residents.

Gail Sullivan, Architect
Jamaica Plain, Massachusetts

Corrections

The house credited to architect Melanie Taylor on page 116 of the October 1991 issue ["Our Towns," RECORD, pages 110-119] should have been credited to the firm of Orr & Taylor Architecture and Gardens.

Calendar

March 9-May 4
"The International Style: Exhibition 15 and the Museum of Modern Art," Arthur Ross Gallery, Buell Hall, Columbia University, New York City.

March 18
"ADA: Accessible Design," Program II of "Opening all Doors," a videoconference series at over 200 locations nationwide sponsored by the AIA and PBS. Contact AIA chapters for registration, or call 800/343-4146.

March 23-27
"Airport Planning and Design," conference sponsored by Georgia Institute of Technology, Continuing Education, Atlanta. 404/894-8925.

March 27
"A/E Mergers and Acquisitions," a seminar sponsored by the American Consulting Engineers Council, in Washington, D. C. 202/347-7474.

March 27-April 10
"Without Reservations," restaurant design by Adam Tihany. School of Visual Arts, 209 East 23rd St., New York City. 212/481-5591.

April 2-3
"Dwelling," annual symposium sponsored by Center for American Architecture and Design, University of Texas/Austin. 512/471-0154.

Through April 19
"An English Arcadia 1600-1990: Designs for Gardens and Garden Buildings in the Care of the National Trust," Canadian Centre for Architecture, 1920 rue Baile, Montreal. (Travels to The Octagon, Washington, D. C., May 5-July 5.) 514/939-7000.

June 8-11
"A/E/C Systems '92," annual conference and exhibition, Dallas Convention Center. For registration materials: A/E/C Systems '92, P. O. Box 310318, Newington, Conn. 06111; 800/451-1196.

Repositioning the Architect: From Recession to a New Diversity

It is depressing to read that an out-of-work architect has invested in a butcher's shop and another now works as a nurse (see the report by Nancy Levinson on page 34.) It is in fact a somewhat perverse interpretation of Darwinism to think that survival of the fittest has come down to this.

But the truth is that the shakeout presently hitting the architectural profession, at such tragic personal cost to many of its members and hardship to so many firms, is forcing, or will soon force, many overdue short- and long-term changes that will hatch a stronger architect, with a more robust image with clients and a clearer perception by the general public of what architects actually do.

The present picture is indeed bleak. The Levinson story talks about radical layoffs, vanished bonuses, four-day weeks, employment agency in-boxes bloated with three times the usual volume of resumés. But a pattern of countersteps is emerging, not only among practitioners but also in the world of finance and industry that triggered the downturn, which will set the stage for a more stable and viable profession less at the mercy of economic cycles.

Here are signs:

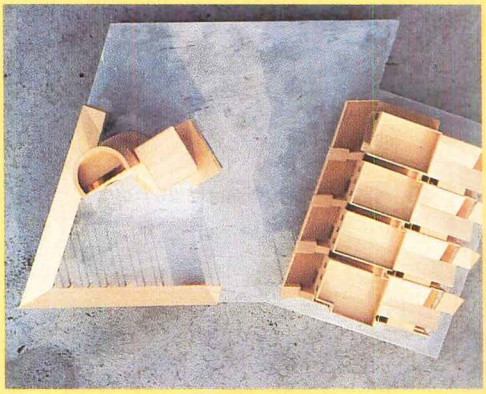
- The office tools and techniques used to provide the client with the service needed to design a building and get it built are evolving to the point of requiring fewer staff to do the job (see the firm profile on page 38). And if the likely pattern of mergers and acquisitions picks up and the number of firms shrinks, job attrition will be further aggravated.
- But at the same time there are more and more new and profitable ways to serve the client. As I wrote on this page last April, the real value of the architect to the public is the talent to serve in a tremendous range of roles that drive the built environment—energy consulting, computer software and building product development, facilities management, specialized consulting in such areas as town and community planning, accessible facilities planning and retrofit, environment and ecology, interiors and landscape architecture, stage design, design for needs of the inner cities, plus existing careers in government, industry, and education.
- Just as important is the responsibility of the worlds of finance and industry to get their houses in order, so as to forestall repetition of the nation's current woes. A February 9, 1992, article in *The New York Times* titled "Attention America: Snap Out of It" listed a whole spectrum of essential measures, from retraining workers to adapting to new technologies to spending more on R&D to keep business from leaking overseas.
- The school of architecture, too, with a realistic eye to the broad range of future employment categories, but keeping its focus on design education, must do much more to prepare graduates mentally and through its curriculum for the new world of diversified careers.

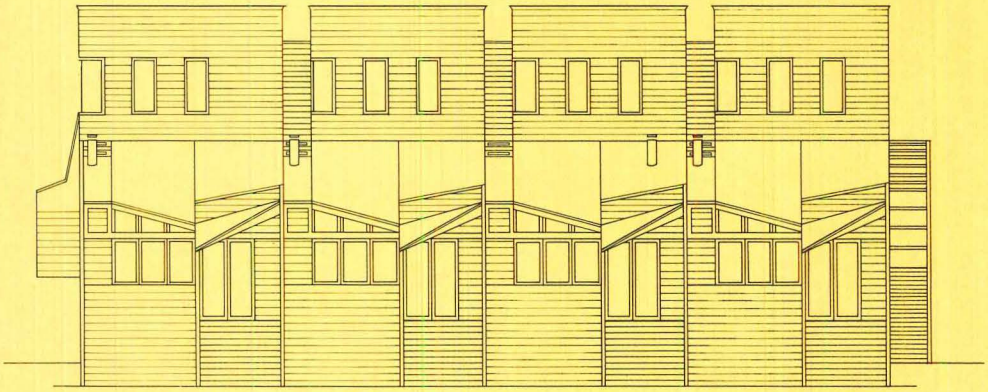
A different profession of architecture will emerge as this century nears its end. There will be a far greater diversity of jobs, roles, services, involvement. The opportunity is now, with the extra time afforded by the downturn, for every architect and every firm to brainstorm these scenarios. RECORD will do its part by expanding its coverage of the issues and the opportunities. Because once the volume of work picks up again later this year, the time to think will be pushed aside by the need to get the work out. *Stephen A. Kliment*

Breaking the shackles of iron.

Washington State

Steven Holl Designs New Town Square for Expanding Port Town

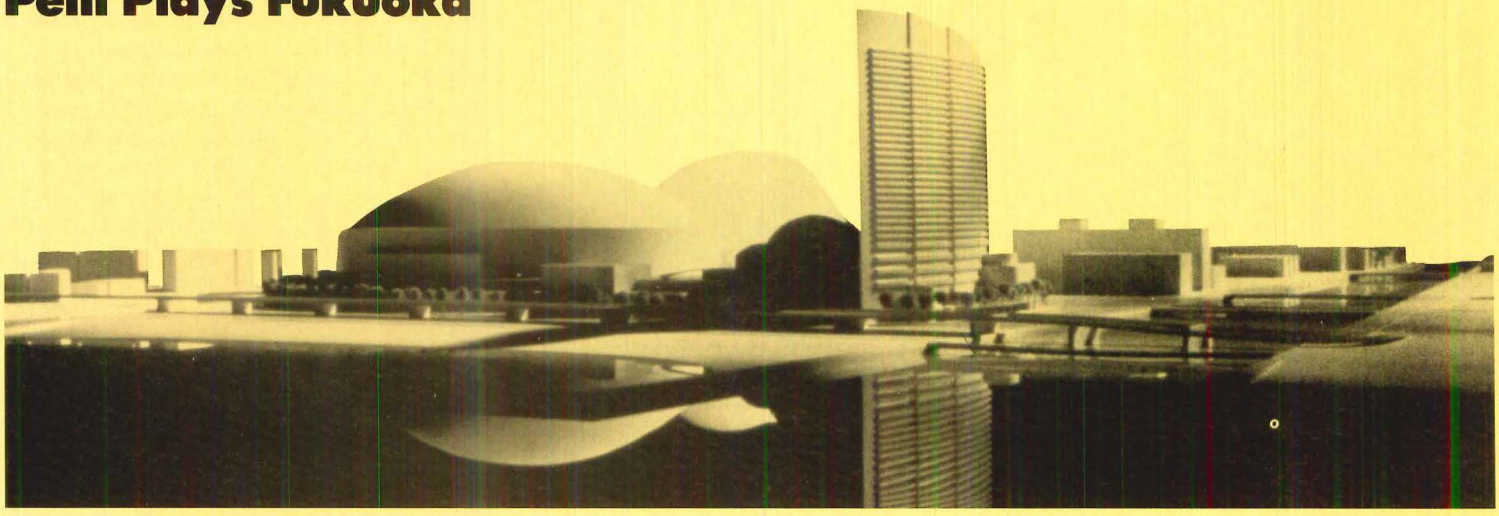




Awaiting completion of an Environmental Impact Statement in Port Ludlow, Washington, is Stephen Holl's design for a twin-towered meeting house and town square, flanked by four houses. Set between Admiralty Bay and the Cascades, the scheme is part of a larger development plan that also hopes to return much of the waterfront from its current golf-course state to dunes and beach grasses. In the meeting house, Holl employs round and square towers, united at the base, and draws the building's forms from the sawmills that burned the bark from the Northwest's huge Douglas firs and trimmed them into usable timber. The steel structure, with stucco interior, is clad in lead-coated copper; an observation deck overlooks the bay. *P. D. S.*

Japan

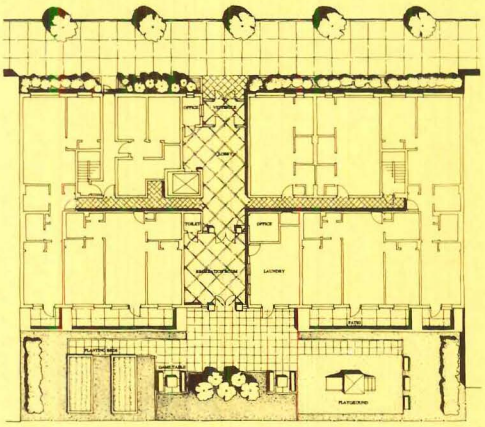
Pelli Plays Fukuoka



With the choice of Cesar Pelli & Associates as winners of two related competitions, the resort city of Fukuoka continues to assert its commitment to architectural cross-pollination. Sponsored by Fukuoka Daiei Real Estate, the complex is sited only a few blocks from buildings by Stanley Tigerman and Michael Graves. Pelli first won a master plan competition for Twin-Dome City, a 40-acre sports and entertainment complex on Hakata Bay, where a 40,000-seat, domed baseball stadium is already well under construction. Pelli next won a competition for a 34-story, 1,000-room hotel next to the stadium. Still waiting approval is Pelli's proposal for the Fantasy Dome (the second dome in Twin-Dome City), housing entertainment and retail facilities. ■

New York City

New Lower East Side Building Houses the Disadvantaged



Christopher Levi

Instead of the usual gut renovation, this six-story, 51-unit complex for the disadvantaged on Manhattan's derelict Lower East Side is all new construction. The $6.5-million project, by Amie Gross Architects, is funded by New York State and Community Access, a local nonprofit group. Designed around a large rear garden, the building opens in a year for homeless families and graduates of an Access program for the mentally ill. ■

San Francisco

Zoning Directs Grand-Boulevard Vision for Van Ness Avenue

Skillful zoning drives Simon Martin-Vegue Winkelstein Moris's scheme for a 13-story, 163-unit condominium along San Francisco's Van Ness Avenue as it approaches the Golden Gate Bridge. The apartment building is part of former Mayor Dianne Feinstein's plan to transform the two-mile commercial strip—currently lined with numerous car dealerships—into a grand boulevard such as the Champs-Elysées. Feinstein's scheme, which developers have been slowly implementing, offers a combination of mixed-income, high-density housing with retail close to the city's financial and entertainment districts. Zoning adopted in 1987 requires three square feet of residential space for each square foot of commercial (the area had been a commercial zone since the 1950s) and also mandates 20 percent of each new building's apartments be set aside for affordable housing. The SMWM project has a common outdoor garden and swimming pool, and includes three levels of parking. The rambling 250,000-sq-ft structure has to maintain a low profile in keeping with San Francisco's height restrictions. *P. D. S.*

Design

Briefs

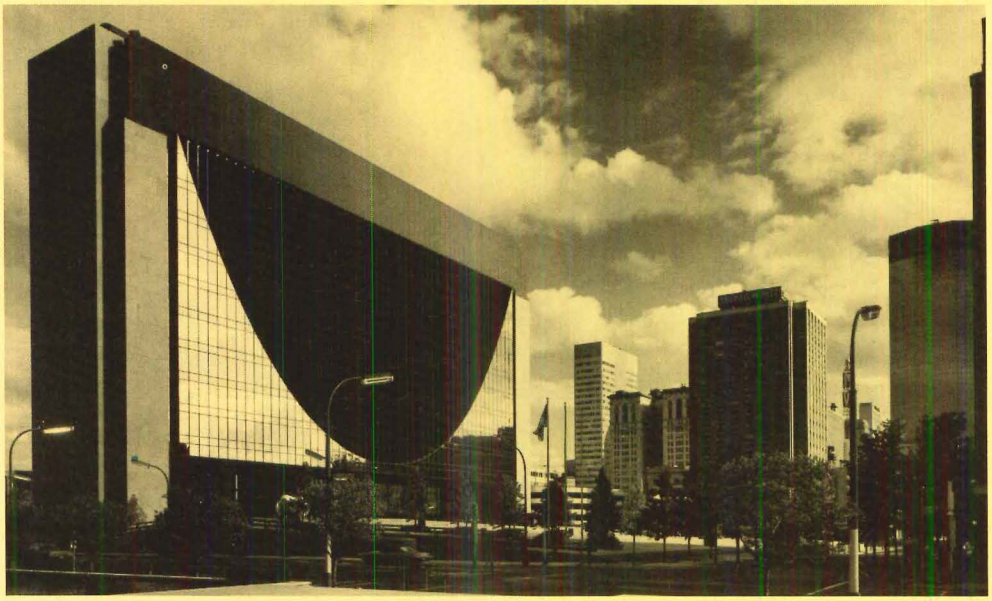
International Style exhibit marks 60th
New York's Museum of Modern Art celebrated the 60th anniversary of its landmark "International Style" exhibit with a standing-room-only lecture by Columbia architecture professor Kenneth Frampton. The 1932 exhibit, organized by Henry-Russell Hitchcock and the 26-year-old Philip Johnson, was the Modern's first foray in the field of architecture, introducing Americans to the work of European Modernists such as Mies van der Rohe, Le Corbusier, and Walter Gropius. Although studded with insights on individual buildings and gallant attempts to resurrect some neglected names—e. g., William Wurster and Harwell Hamilton Harris—Frampton's 100-mile-an-hour lecture lacked a clearly stated thesis, and failed to convincingly link its survey of works built in the decades since 1932 to the show itself. (The talk's concluding slide pair was a project by Columbia Graduate School of Architecture Dean Bernard Tschumi.) A "reprise" of the original exhibit opens at Columbia University's Arthur Ross Gallery in March. Perhaps the Columbia show, curated by Terence Riley, now curator of architecture at MoMA, will shed more light on the impact and legacy of Hitchcock and Johnson's pioneering exhibit. *C. A. P.*

Projects
Zimmer Gunsul Frasca has been asked to design a new building for the California Museum of Science and Industry in Los Angeles. The Portland-based firm's Newport Beach, California, office has recently been working on a master plan for the museum and a large adjacent "exposition park." Portions of the existing museum building closed for earthquake safety reasons will be replaced; it is unclear what will be saved other than Frank Gehry's Air and Space Museum. Building design will begin when the master plan is completed.

Closing
The Whitney Museum of American Art will close its downtown Manhattan branch, designed by Tod Williams and Billie Tsien and open since 1988. Federal Tower Associates, a partnership that includes IBM and Park Tower Realty, backers of London's Paternoster Square plan [RECORD, Design News, January 1992, page 21], plans to replace it with an IBM marketing and training center, but will seek a new branch site. ■

Minneapolis

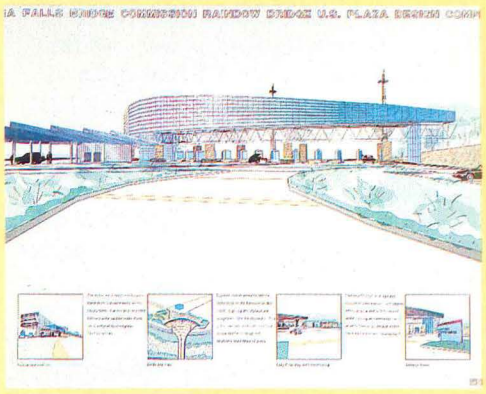
Will the Fed Demolish Birkerts Landmark?



Is the Federal Reserve so intent on spurring the economy that it is undertaking unnecessary new construction at taxpayers' expense? The Fed has retained HOK to draw up a proposal that would replace Gunnar Birkerts's 1973 landmark Minneapolis bank with a new building. Tom Gainor, a Fed executive, cites asbestos leakage, curtain-wall deficiencies, and poor space configurations, although Minneapolis architect James Stageberg, who led a symposium on the building's fate in 1990, feels the Fed's "justifications were predetermined." Gainor says studies show the cost of a new building—"a good investment"—versus that of a retrofit is "real close," but declines to be specific, and he adds that a budget depends in part on the as-yet unselected site. The Fed claims it will do its best to sell the existing building, leaving demolition as a last resort. *P. D. S.*

Niagara Falls / Charlottesville

International and Pro Bono Bridges for Heavy Traffic



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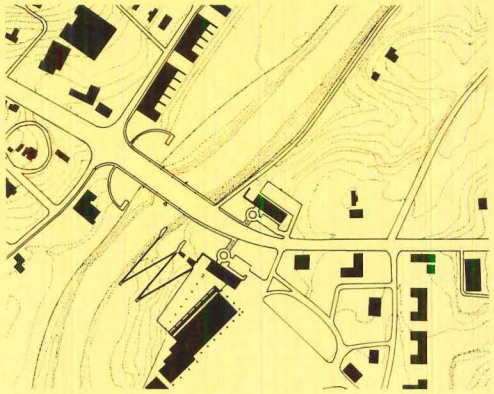

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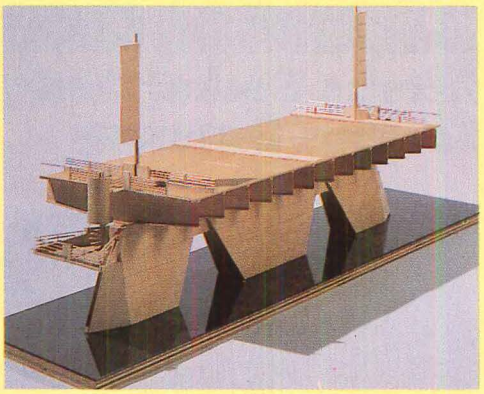

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Bridges must bear metaphoric tonnage as well as heavy truck freight. As one of the busiest northern border crossings, the Rainbow Bridge, linking Niagara Falls, New York, and Niagara Falls, Ontario, has carried its share of both, not to mention honeymooners and draft dodgers. Following an invited competition sponsored by the Niagara Falls Bridge Commission, Hardy Holzman Pfeiffer, in conjunction with URS Consultants of Buffalo, has designed an expanded toll plaza *(1),* doubling capacity to over 2,000 vehicles an hour. Signage and lighting are incorporated above a curving row of faceted-glass customs booths in open trusses that recall those of the bridge itself. This trusswork also supports the new main building, a long glass crescent. The first part of an extensive, $29.7-million program, construction at the bridge is expected to begin this spring, and will be completed in two years. The work is getting a boost from the Surface Transportation Act.

At a much-reduced scale, construction is well under way on a new bridge in Charlottesville, Virginia, designed by Dunham-Jones and LeBlanc Architects *(2,3),* who donated their services to the Virginia Department of Transportation. As at the Rainbow Bridge, the scheme responds to rapid growth. The Free Bridge moves from a densely built-up commercial strip on the county side of the Rivanna River to an area of light industry in town. The bridge is a gateway to the city of 45,000, and links three riverfront parks and jogging trails on both river banks. Pedestrians can reach these by twin ramps hidden from traffic. ■

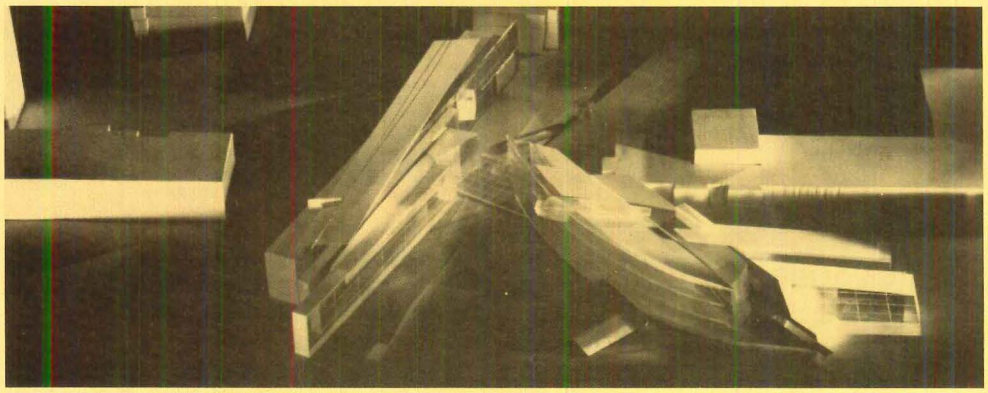
Affordable Housing

Architect's Crate House Squeezes Into 7'-6" Cube

By squeezing the functions of a house into his "Crate House," a 7-foot, 6-inch cube, architect and sculptor Allan Wexler hopes to "monumentalize" the everyday activities that occur in the structure's four tiny rooms. (The house was commissioned for "Home Rooms," an exhibit at the University of Massachusetts/Amherst and shown in February at Manhattan's Ronald Feldman Fine Arts. "Home Rooms" also included work by Frederick Schwartz and by Billie Tsien and Tod Williams.) The living room, bedroom, kitchen, and bathroom sit outside a plywood shell, and can be rolled one at a time back inside for private use. "It's like a film with every other frame removed," says Wexler. "That concentration exaggerates the essences of a house." *P. D. S.*

New York

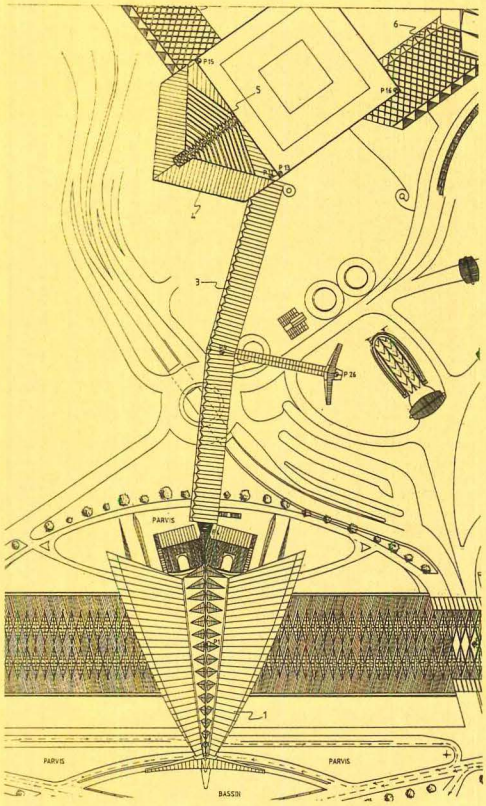
Ellerbe Becket Designs Campus Gateway



Peter Pran and Carlos Zapata of Ellerbe Becket have designed a 130,000-sq-ft catch-all academic building for the State University of New York at Binghamton, one of SUNY's four central campuses. The two-building scheme, which functions as a pedestrian entrance to the campus, houses administrative services and classrooms for the schools of management, education, and nursing, as well as an admissions office. Despite SUNY budget constraints, the architects hope to break ground this fall. ■

France

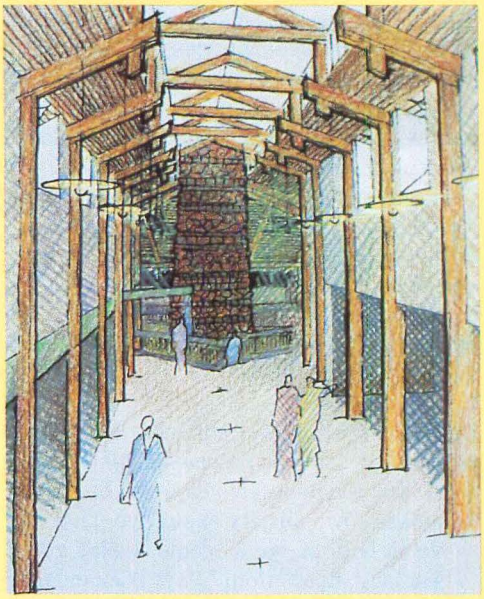
Trains Take Flight at Calatrava Station



For now, only four trains a day stop at Satolas, the new station Spanish architect Santiago Calatrava is building near Lyon. But when the complex is in full swing next year, it will be a hub for commuter trains as well as for the "Train à Grande Vitesse" (TGV), bringing travelers to walking distance of the adjacent airport. The TGV will also provide an efficient train connection between the Lyon airport and the Roissy airport of Paris. "Travelators" (people movers) will transport passengers to the airport through a steel gallery supported by concrete columns at three points. The first phase of the project consists of a two-story-high concrete base supporting a glass and steel superstructure and connecting it to the gallery. The 10,000-sq-ft central hall contains both railway ticket offices and airport check-in. On two butterfly-shaped balconies are a restaurant and bar, with office space beneath for both the railroad and airport. The balconies cantilever out 70 feet, with additional support from two arches each. Steel and glass elements, especially a huge aluminum roof, plus landscaping and interiors, are yet to be completed. *Tracy Metz*

Grand Canyon

Airport Grounded by Bankrupt Airline



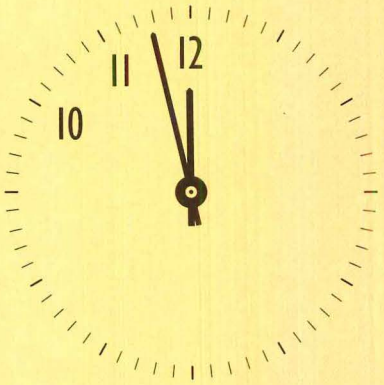
Construction of a $6-million terminal for Grand Canyon National Park's airport has been on hold since its primary airline, America West, filed for bankruptcy protection and halted service to the site. Eighty percent of the national park's 4 million annual visitors come from Europe, Asia, and Australia, and the park has long needed to expand its small airport in Tusayan, Arizona. (The canyon is one of the West's three largest tourist draws, along with Las Vegas and Disneyland.) When land became available recently, the park tapped Seattle-based architects TRA Ltd. At the Grand Canyon terminal, the architects took cues not only from the rough nature of the canyon but also from Anasazi Indian masonry and national park architecture. A central spine supported by heavy timbers and paved in cleft stone is flanked along the airfield by a 30-foot stone chimney, and by a clocktower toward the parking area. Circulation is planned to ease the flow of heavy bus traffic that ferries people from and to the canyon, six miles away. Despite the fall-off from America West, officials hope that a new airline will step in to fill the gap. ■

2001

Millennium's Edge Blunted at Manhattan Conferences

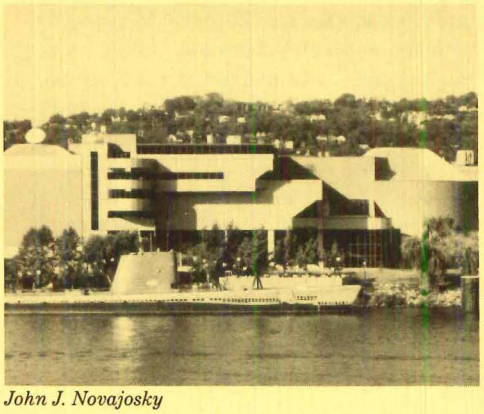
Two January symposiums in Manhattan took their best shots at the future, and both proved that it's tough to hit a moving target. At one session of "Planning and Zoning New York City: Yesterday, Today, and Tomorrow," a packed-house one-day event sponsored by the city's Planning Commission, historians Carol Willis and Richard Plunz, planner Roy Strickland, and attorney Norman Marcus waxed nostalgic as they searched the zoning thicket for the now-overgrown path of carefully planned, mass-transit-oriented growth defeated by rampant development and the automobile. Other speakers—architect Michael Kwartler, planner John Shapiro, businessman Peter Salins, and community developer Susan Motley—offered proposals aimed at rescuing the city's current Zoning Resolution from its bloated, ineffectual self and turning it into a useful tool for addressing New York's many ills.

The planners' notion that the current building slowdown is an excellent time to rewrite the resolution could prove as pie-in-the-sky as the millennarian forecasts encountered at "Edge of the Millennium," a three-day conference organized by Susan Yelavich, education director of the Cooper-Hewitt Museum. At one session, four cities—London, Mexico City, Los Angeles, and Tokyo—were examined for clues they might have for the coming age. Community development architect John Kaliski of Los Angeles called for "bottom up" planning that would include citizens in as broad a way as possible. The phrase hung in the air: following an imperfectly translated lecture by Italian architect Andrea Branzi, which (presumably) called for a revival of Modernism in contemporary design, New York architect and critic Michael McDonough replied with a demand for "bottom up" design—American populist, not European esthete, in tone. McDonough made his stirring call to arms from inside a beautifully tailored Romeo Gigli suit. Michael Sorkin summoned the proceedings to a rousing close, finding a paradigm of the 21st-century person in the late Walter Hudson. This 1,200-pound man, unable to leave his bed, nonetheless had all his needs met, and even in death found his way electronically into all our homes—the immobilized traveler. *P. D. S.*



Pittsburgh

Science Center Overlooks City's Riverfront



John J. Novajosky

Tassos Katselas's new $37-million, 146,000-sq-ft Carnegie Science Center, built with a combination of state and city funding, is part of Pittsburgh's continuing effort to pull itself out of a steelbound past. Clad in metal panels and unfinished concrete with red accents, the complex's three windowless masses—OmniMax theater, health sciences theater, and planetarium—occupy a scenic riverside site throttled by parking. A too-small atrium is made up in part by views from semicircular overlooks and a south-facing dining area. *Charles Rosenblum*

Economy Update

Working Through the Recession

Hard-pressed by the long recession, architects are learning to make bad times work for them, a RECORD *survey shows.*

By Nancy Levinson

The long recession has thrown a chill into the profession that architects are working hard to throw off. In an effort to move from a generalized awareness of the downturn to a more specific understanding of its effects, RECORD spoke with architects and AIA administrators across the country, as well as with officials of those government departments that track labor and employment trends.

Hitting bottom

"The bottom-falling-out phase is behind us," says U. S. Department of Commerce economist Patrick MacAuley, whose 1991 figures show a decline of 18 percent in spending on private nonresidential construction, the largest building category. That figure is projected to decline a further 8 percent this year.

Employment figures are more difficult to come by. According to the Bureau of Labor Statistics, unemployment nationwide for architects was at just over 6 percent last year, up from 3.7 percent the year before. However, neither the national nor local AIA chapters have attempted to collect hard data on unemployment—on the percentage of unemployed (or underemployed) architects, for instance, or on the percentage of failed firms. In the major cities of the Northeast, AIA officials estimated a rate of 30 percent unemployment or more.

Principals of major offices in Boston, New York, Washington, Chicago, and Atlanta admit to having downsized by 40 percent or 50 percent from the peak levels of the late '80s; architects in the Midwest, Southwest, and parts of California cite comparable figures of 25 to 30 percent. And along with layoffs come wage cuts and four-day weeks, while unpaid "vacations" and early retirement are increasingly common. "This is by far the deepest decline I've seen," says John Portman, whose Atlanta office opened in 1953. To the retired founder of HOK, George Hellmuth, "things today look about as bad as anything I've seen since the Great Depression."

Familiar survival strategies

As recently as last spring, one could talk about regional hard times. Today, however, with the arguable exception of Hawaii, recession has taken hold nationwide, and the traditional survival strategy of migrating to find work no longer holds. The Southwest and the East, where the decline hit first, are in rougher shape than the Midwest or California, which are in turn worse off than the Pacific Northwest or Hawaii. Today Seattle has a Displaced Architects Support Network. For individual architects, the familiar catalog of survival strategies includes working for firms on a part-time or contract basis (usually without benefits and often for former employers); opening one's own office; moving into the public or corporate sector or into a related field like planning, preservation, product design, or engineering; and returning to school. Some have left the profession; we have heard of an architect who designs and manufactures toys, another who works as a nurse, one who bought a butcher shop.

"Some architects here have been unemployed for well over a year. The stress can be devastating," says Gloria Wise, executive director of the AIA's Dallas Chapter. Dallas and Boston are two chapters that sponsor counseling for members and their families. "Senior people, associates in their 40sand 50s, are more apt to be retained because they represent the future of a firm," notes Denis Kuhn, a partner at Ehrenkrantz & Eckstut Architects in New York City. Anne Sammis, a 1991 alumna of MIT, estimates that one-third of her class haven't found jobs. "A lot of them are really discouraged," says Sammis, who works in Alaska. "Some have just given up on architecture, and are applying to law or med school."

The climate has not only affected how architects and firms deal with one another, but also has given clients added leverage. Pressure to reduce fees is enormous, and selection processes have become impossibly arduous, almost marathonic, and costly. "We recently drew up multiple schemes for a project proposal," says James Alexander of Boston-based Notter Finegold + Alexander, telling a story that has become familiar to many firms scrambling for clients. "But wouldn't you know it—we lost to a firm that had built a model."

Last year's "cautious optimism" has been replaced by cautious pessimism, and the sense that the next few years will be a time to hunker down and try to survive. "I think we've hit bottom, but it seems like it's going to be a long, flat bottom," says Alexander. His intuition is confirmed by the Commerce Department's projections for building through 1996: "In 1996," says Patrick MacAuley, "we'll be where we're at right now." The implication: jobs lost recently will not soon return. Warns Thomas J. Eyerman, the now-retired partner-in-charge of finance at SOM, "the '90s will be a decade of compression."

Broadening opportunity

To avoid being crushed in that shrinkage, many firms are seeking to expand in new directions. Firms are exploring new services (e. g., computer consulting, facility management, environmental signage, disabled-accessible retrofits, and energy consulting), and new alliances (with foreign firms, consulting engineers, utility companies). Many offices are looking to streamline document production and to offer better service. "We've all got to look hard at the quality and value of what we offer much more now than in the fat years," says Sandy Ritter, a partner at RSP Architects in Minneapolis.

For change to take real hold, however, it has to involve the schools. "Typically, most of

our students have wanted to work in small design-oriented offices," says Elizabeth Reed, associate director of career services at MIT, who spends much of her time these days counseling students and out-of-work alumni. Reed encourages students and practitioners not only to develop diverse skills but also to consider a range of careers—within institutions and public agencies, for instance—not as fallbacks but as positive options. Many practitioners share her concerns. "The schools are offbase in turning out students with only design skills," says Denver architect Gary Adams, a principal at Davis Partnership, one of Colorado's biggest firms. "We need architects with technical, computer, and business skills as well."

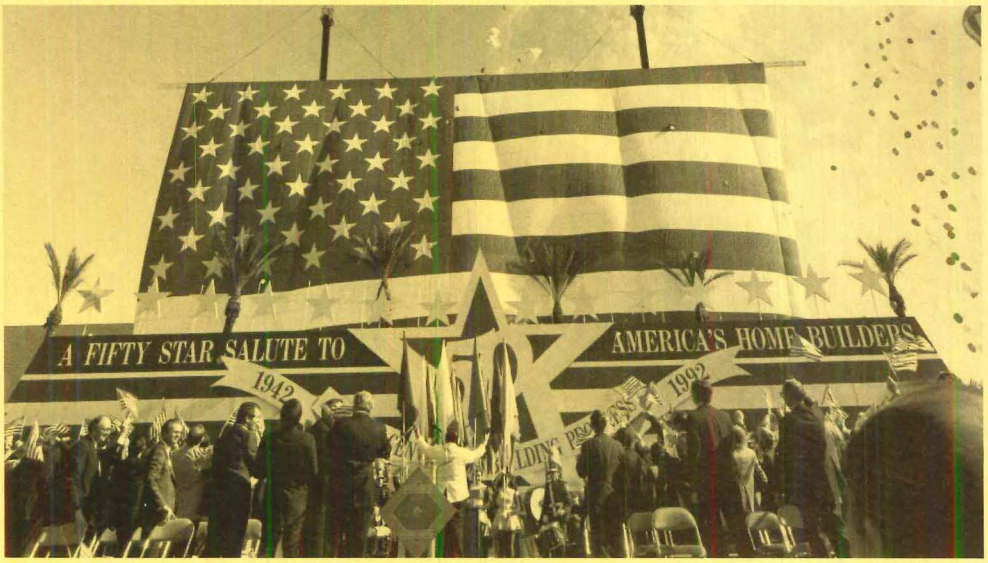
Rising community involvement

Increasingly, architects stress the need to integrate the profession into the network of policy makers and community groups who address issues such as housing, energy, infrastructure, planning, and zoning. "There's enough work to be done out there," says Eugene Kohn of Kohn Pedersen Fox, referring to New York City's many derelict buildings, streets, and parks, and to the role architects might play in their rehabilitation. "The challenge is to convince those with power and influence that this work is worth doing."

This resurgent activism is viewed by some as a healthy corrective to prevailing trends in the profession. "We can't blame our troubles entirely on the economy," says James Stewart Polshek (a founder of Architects, Designers & Planners for Social Responsibility). "The profession has become terribly smug. In the '80s architects retreated from the world, into high design or the corporate sector." Along with others, Polshek argues that architecture must become more broadly relevant. Echoing this sentiment, David Childs of Skidmore says of the recession, "It's a terrible shock to the system, but it's also a time to take advantage of." ■

Conventions

At Vegas Show, Strapped Home Builders Think Green



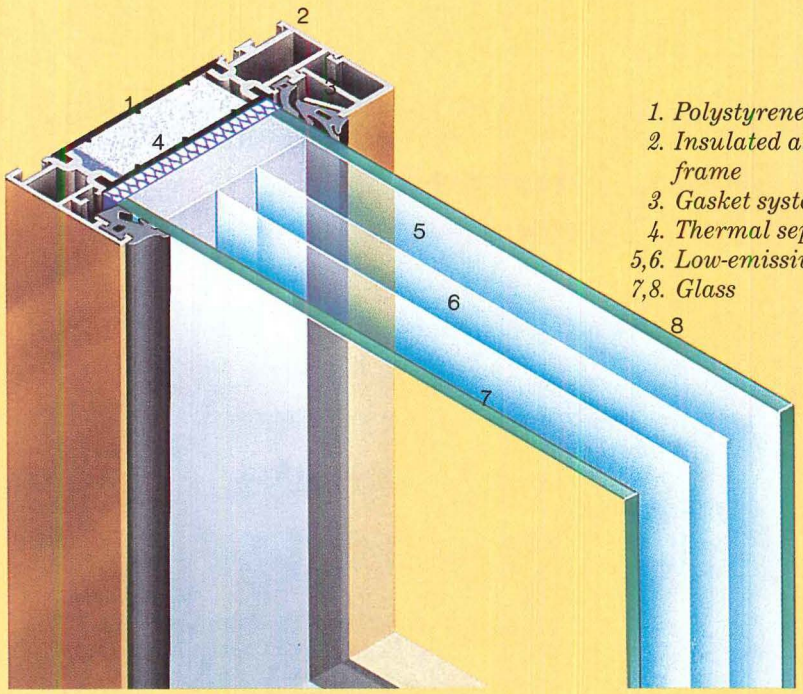
Home builders salute hopes for upturn.

The light at the end of the tunnel for the housing industry is still a year away, attendees at the National Association of Home Builders (NAHB) show in Las Vegas in January were told. Despite lower interest rates, the poor economy and housing production credit crunch will conspire to keep 1992 a "recovery year," according to NAHB executive vice president Kent Colton. Association economists expect around 1.2 million new housing starts, up from under 1 million last year, a level Mellon Bank economist Norman Robertson called the "industry's worst since 1946." Colton expects a rebound by 1993-94, with starts reaching the 1.4-to-1.6-million range. An apartment glut will likely keep multifamily housing starts sluggish.

Surprising at the convention this year was an environmental awareness, which carried through from new products to several educational sessions. These ran the gamut from how to build green to how to avoid running afoul of environmental laws. Growing pressure nationwide for greater attention to environmentally sound building products brought the industry's reliance on old-growth timber from the Pacific Northwest and other nonrenewable building materials under examination. Steven Loken, founder of the Center for Resource building Technology in Missoula, Montana, said he expects the timber companies to eventually give way to fiber farms that rely on wood-chip pressed products to create alternative home framing materials.

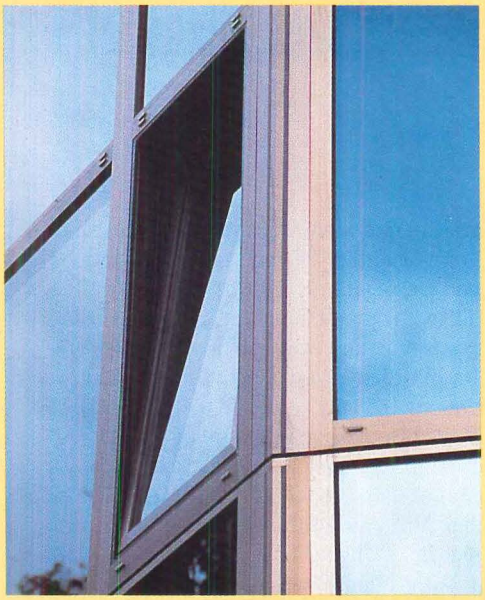
A session on indoor air pollution due to formaldehyde, carbon dioxide, and other volatile chemical compounds emitted by common building materials drew a large crowd. Several companies touted the same theme in products unveiled at the show. Honeywell, for example, displayed prototype infrared sensors designed to instruct a house to exhaust carbon dioxide when undesirable levels are reached in the kitchen, bath, and utility rooms. In other product news, Kohler introduced the "Precedence" line of whirlpools and bathtubs, outfitted with a swinging, watertight door for easy access by the active elderly and mildly disabled. A sensor-activated door seal inflates when the bath begins to fill. *Jane Lehman*

Glazing systems



1. Polystyrene insulation
2. Insulated aluminum frame
3. Gasket system
4. Thermal separation
5,6. Low-emissivity films
7,8. Glass

a



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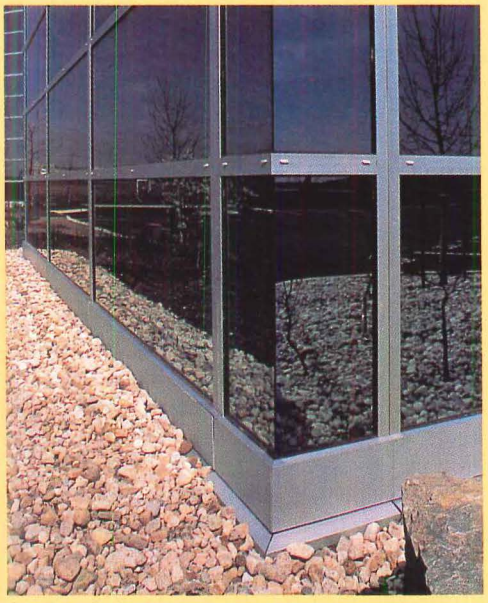
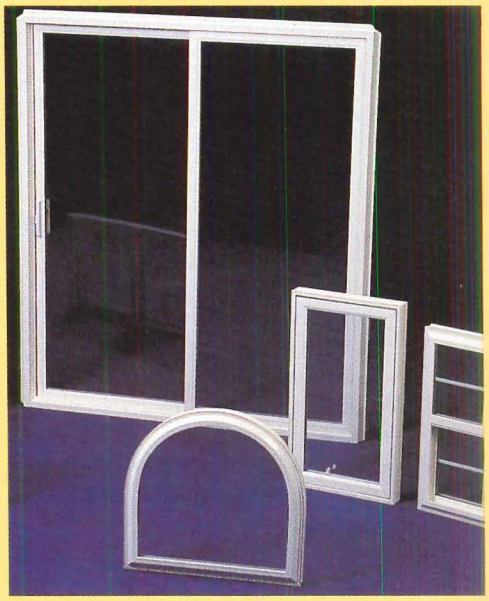


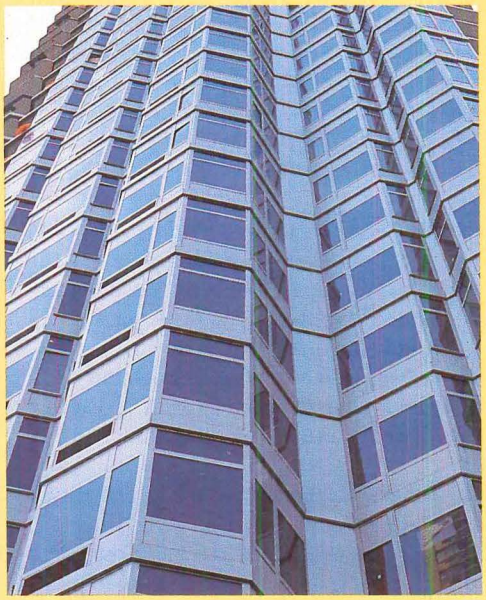
d

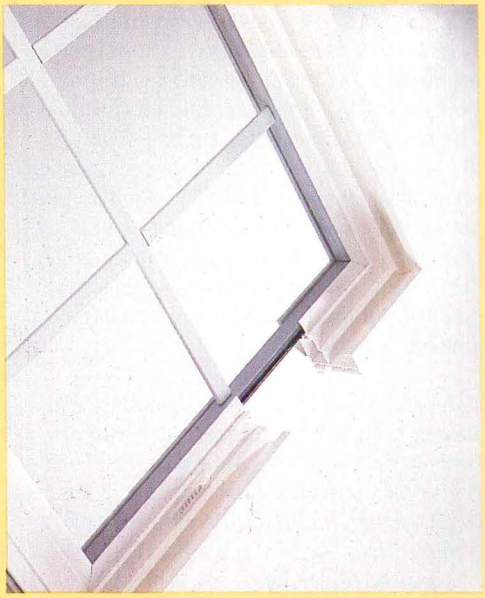
300. Northern exposure.
Working out of a brand-new plant in Edmonton, Alberta, land of -30F winters and scorching summers, Visionwall Technologies, Inc., makes a curtain wall with a total-window (frame and IG unit) performance of about R6.5. The system, developed in the '70s by Visionwall's Swiss parent, Geilinger AG, uses standard curtain-wall components in an efficient, very Swiss way *(a)*. The aluminum frame is packed with insulation; spacers are thermally inert reinforced nylon, and a proprietary spring-loaded edge holds the two clear Heat Mirror films evenly taut. Plain air, not low-conductivity gas, fills the 2 3/4 inches of between-glass space. While the standard, winter-climate film-and-clear glass system *(b)* has a Tvis of 0.60, the specifier can fine-tune shading coefficients and visible-light transmission values by selecting any combination of clear, tinted, and reflective glass. The system is incorporated into commercial curtain-wall, punched, and strip configurations with operable casements *(c)*, as well as a tilt-and-turn residential window. Designed with rain-screen technology to be an integral component of the building's thermal and weatherproofing envelope, a pressure-equilization gasket prevents distortion of the exterior glass light *(d)*. Visionwall claims a superior level of close-to-glass comfort, and a long-term thermal performance that allows substantial downsizing of both heating and cooling equipment, with many projects needing no perimeter heating. As the interior glass and frame is near ambient room temperature, condensation and cold-weather drafts are almost eliminated. Visionwall Technologies, Stow, Mass.

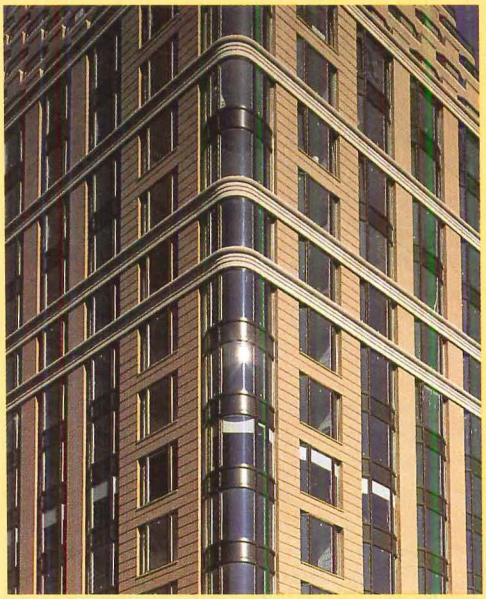
Innovative fenestration technologies meet a range of program requirements, including energy efficiency, maximum daylighting, unobtrusive appearance, and budget.

For more information, circle item numbers on Reader Service Cards.









301. Thermal values.
A source of custom commercial and residential wood windows since 1955, Weather Shield is grafting its construction expertise onto vinyl. The line, called Visions 2000 in anticipation of the coming surge of stringent energy-conservation legislation, includes round-top, single-hung casements and other windows as well as patio doors made of unplasticized polyvinyl. Units have an insulating hollow-core frame with welded corners and 1-in. low-E insulating glass. Weather Shield Mfg., Inc., Medford, Wis.

302. Lessons from the Big Apple.
Learning from the experience acquired building windows to meet the demands of big-city school districts and strict historic preservation boards, a New York firm is marketing commercial systems nationwide. Two proprietary designs are shown here: a window wall of segmented bays and equal sight lines (operable sash is not obvious), which creates a complete facade, and a curved-lintel curtain wall approved by the city's landmark commission. Mannix Industries, Inc., New York City.

303. Arch-top accent.
A new design option for Velux GGL roof windows stacks a rounded fixed-light unit on top of either the rectangular 410 (pictured) or the almost-square 808 ventilating window. The arch-top/operating combination is framed in wood with an exterior aluminum cladding; prefabricated flashing may be ordered in dimensions to fit either thick or thin roofing materials. Both window sections have high-performance insulating glass. Velux-America, Inc., Greenwood, S. C. ■

This Month

Project Delivery by Bridging

George Heery and Charles Thomsen see the traditional approach as inherently flawed, exposing clients to unnecessary risks and costs. They favor a process Heery dubs Bridging, a hybrid of design-build and the traditional approach. Here's how it works:

• **Project definition.** A client's consultant architect defines requirements, designs the project, and prepares contract documents similar to current design-development drawings plus extensive performance specifications. Based on them, a lump-sum contract is then negotiated or awarded to a low bidder in a two-stage process:

• **Construction documents.** The contractor is either a design-builder or willing to engage its own architects and engineers. The contractor's architects and engineers produce final construction documents and specifications. The owner's architect monitors this work until satisfied, meanwhile approving owner payments for it.

• **Construction.** The contractor is told to build (or, at the client's option, terminate work). The client's consultant monitors work for conformance to final documents, administers the contract, and approves payments.

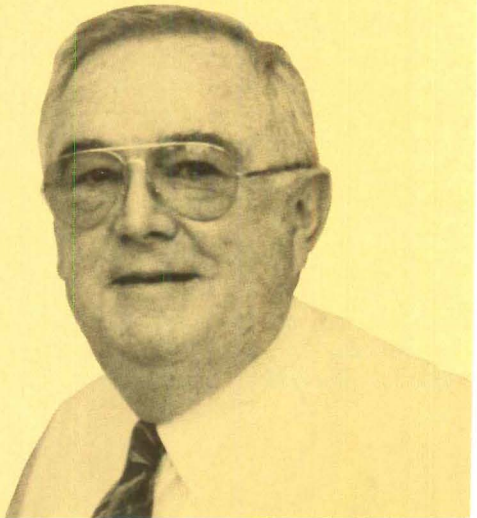
Here is why *bridging* might be the best way to deal with three typical problems:

1. Saves time and provides an early fixed price for a defined quantity
Problem: Today, it takes too long and costs too much to get an enforceable fixed price for construction. In the traditional process, the price isn't fixed until construction documents are finished and bids are taken. Too often the bid is over the budget and more time and money are lost. In design-build, the client can get an early fixed price, but the requirements are typically incomplete. The client has a defined price for an undefined product. Many clients use a cost-plus contract with a guaranteed maximum price to get an early handle on the final project cost. But, if a design is incomplete, it too is a defined price for an undefined product.

Solution: Bridging *gives clients an early fixed price, assigns the contractor responsibility to complete construction documents, and defines what clients are getting before they authorize construction. The contractor cannot claim omissions since the contractor's architects and engineers did the documents.*

2. Encourages builders and manufacturers to improve technology and find cost-effective methods
Problem: Building technology and cost-effective details are not adequately incorporated into traditional design methods, again raising costs—and inhibiting international competition. There is little economic motivation for contractors to invest in R&D to improve building technology. The traditional process was based on the idea that architects and engineers knew construction technology best and should specify and detail construction systems. Today, architects learn from industry. Buildings are fabricated with technology developed primarily by manufacturers and specialty subcontractors.

The best results come from collaboration among architects, engineers, contractors, subcontractors, and manufacturers. Design decisions and contract negotiations progress together. This collaboration works well in design-build. But in the traditional process, it is awkward. Dealings must be at arm's



Mr. Thomsen (far right) is president of 3D/International.

Mr. Heery (right) is former CEO of Heery International and current president of designers Brookwood Group, developers Satulah Properties, and consultants American Construction Investigations.

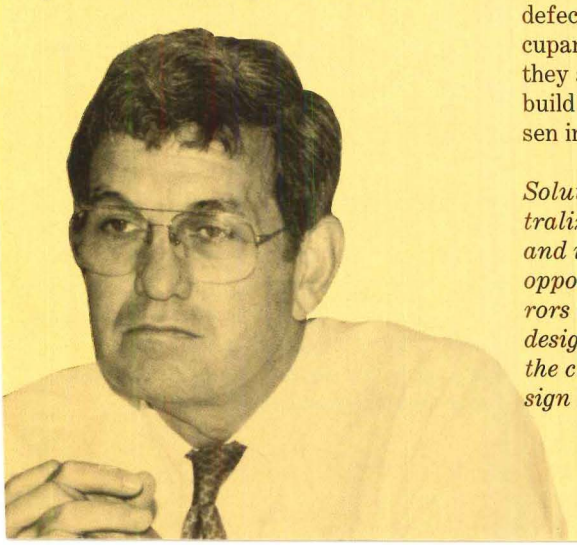
No strangers to controversy, two respected architects, formerly competitors, team up to champion a project-delivery system that will seem revolutionary to many U. S. practitioners.

length. Contractors and manufacturers keep detailed cost information confidential and may even understate costs for competitive advantage. And architects must omit manufacturers' proprietary technology from their designs to sustain competition in bidding.

In the U. S., building contractors have little say about what they build. Since technology is set by plans and specs, contractors are rarely able to win bids or improve profits with better ideas. Good contractors are frustrated. The process encourages them to find the cheapest subs, bid low, and improve profits with change orders.

Solution: In bridging, as in the traditional design process, architects and engineers, consulting with clients, produce the right design for the clients and, as in design-build, other architects and engineers consulting with contractors and manufacturers develop the best technology.

In Japan and parts of Europe, processes like *Bridging* are common and contractors invest in R&D to get jobs. *If U. S. building contractors could win jobs and improve profits with better technology, they would invest in R&D and gain international-market share for themselves, architects, engineers, and manufacturers alike.*



3. Centralizes responsibility and reduces legal costs

Problem: Everyone is exposed to more claims than necessary due to divided responsibilities. Legal costs add to budget overruns for clients and destroy profits for architects, engineers, and contractors. The traditional process is based on the flawed assumption that architects and engineers can prepare perfect plans and specifications. Clients talk more and more of holding architects liable for mistakes. Errors- and-omissions insurance is now often half of an architect's typical profit—a significant cost to pass back to clients as overhead. And errors-and-omissions insurance doesn't completely protect clients. American courts hold architects and engineers only to a standard of skill, knowledge, and judgement equivalent to that generally exhibited by members of other professions. Flawed design costs clients *and* architects money.

If U. S. building contractors could win jobs and improve profits by using better technology, they would invest in R&D.

Much of architects' and engineers' liability comes from contractors making claims of negligence or improper acts—decisions by architects and engineers during construction, mix-ups in shop drawings and product-submittal approvals, and delays in approvals or decisions by architects and engineers during construction. Other claims against architects and engineers come from latent defects in the building that show up after occupancy. While contractors may be at fault, they are frustrated because they must often build systems that they would not have chosen in the first place.

Solution: Bridging, as in design-build, centralizes responsibility for construction and its correction, and minimizes the opportunity for contractor claims of errors and omissions. As in the traditional design process, a professional represents the client's interest during and after design and construction.

What You Need to Know

Q. Can the contractor raise building costs while producing construction documents?
A. Not without an approved change order.

Q. Are there incentives for the contractor to save money?
A. The contractor keeps 100 percent of savings, if they stem from cost-effective technology that meets the requirements of the contract, and shares savings for suggestions that, while not meeting the requirements, are approved by the owner and the owner's consultant.

Q. Who guides the project through government and community approvals?
A. The client's architect goes before such organizations as zoning, community, and landmark boards. The builder's architect files plans and is the architect of record.

Q. How do clients' consultants assure that design and construction are carried out according to their preliminary designs and specifications?
A. By controlling the client's payments to the contractor.

Q. Will the client wind up talking to the contractor's architect, undermining the original consultant's role?
A. Not any more than to any other sub, says Heery.

Q. Who owns the construction documents after the client has paid for them?
A. The client.

Q. Will *bridging* mean asking an unlicensed entity to perform professional design services during design development?
A. Not so long as the architect of record makes sure that such design is performed by licensed individuals. (A special caution is raised by state licensing boards, such as New York's, which have recently cracked down on such borderline cases as steel connections designed on shop drawings.)

Q. Is *bridging* ethical?
A. "As long as there's full disclosure to the client," says the AIA's James Franklin.
Charles K. Hoyt

Gain From Pain

Six reasons that a turnaround for the economy—and most types of construction—is falling into place.

Despite a current dour outlook, the economy is systematically recasting itself. As it does, the stage is being set for robust real growth in 1993 and beyond.

This restructuring actually started sometime ago. Manufacturing began the process in the early 1980s when numerous inefficient plants were closed and others were modernized with new technology. But then, the boom in construction and service industries allowed laid-off production workers, and an ever-growing number of new entrants to the labor market, to find employment, masking the pain of transition—as did services and exports when investment construction turned down in the late 1980s.

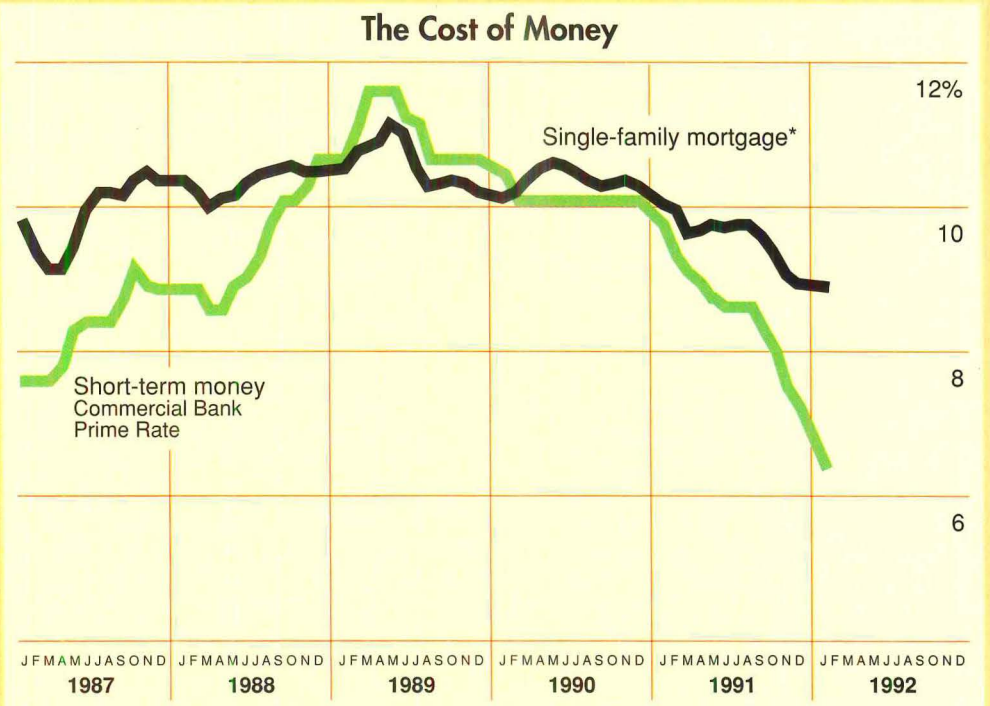
Since the middle of 1990, this broad-based economic reconstruction has resulted in the removal of over 1.5 million payroll jobs in all sectors of the economy. But several bright spots clearly shine:

1. Inflation is falling
Persistently uninspired consumer spending is pushing manufacturers and other businesses to improve quality and lower prices—as well as reduce their costs. Excess labor and plant capacity means that production can undergo an extended recovery without impeding the drop in prices. By year-end, inflation could be near 2 percent or less.

2. Interest rates are falling
Wilting inflation and floundering economic activity will encourage the Federal Reserve to reduce interest rates even more. As a result, the prime rate will be cut to 5.5 percent and 30-year, fixed-rate mortgages will fall toward 7.5 percent this spring (see chart).

3. Financial wherewithal is going up
Consumers and businesses have been shedding debt and increasing financial resources since the middle of 1990. This will gain greater and greater momentum. Businesses will issue more stock to pay down debt, while aggressively calling high-rate bonds and replacing them with lower-rate issues. Their cash flows will rise and they will use the additional dollars to invest in more efficient equipment. Households will pay down even more debt. Many homeowners will lower their interest costs by refinancing their mortgages, often rolling their consumer loans into the new mortgage amount.

Mr. Kidd is an economic consultant and former director of research for McGraw-Hill Information Services Company.



* Notes:
National average effective mortgage rate for all major lenders and all loans, regardless of whether mortgage financed the purchase of a new or existing home. Mortgages have a term exceeding 15 years.

December 1991 and January 1992 single family mortgage figures are PEK estimates.

Sources: Federal Reserve (short-term); Federal Housing Finance Board (mortgages)

4. Reasons for confidence are increasing
As their disposable income stabilizes and then increases because of reduced debt, working Americans will gain confidence. Initially, they will use most of their extra disposable income to restore their battered savings. During the second half, they will grudgingly raise expenditures.

5. Buying a house is more attractive
Increasingly, renters will take advantage of attractively priced housing and the lowest mortgage rates in 20 years to buy that first home. Existing homeowners will find it easier to move up to larger homes. Single-family-starts will expand. Other households will begin replacing aging or worn-out appliances, furniture, cars, clothes, etc., emphasizing quality and value, and adding some fuel to retail construction.

6. New jobs are in sight
As demand turns slowly around during the summer, manufacturers will boost production, but only gradually add employees. Similarly, retailers and other service companies will wait to hire until they are satisfied that the upswing in consumer buying is sustainable and expandable.

All of these actions require time. At first, the upturn in consumer spending will only serve to stop the hemorrhaging of job losses. Sometime in the second half of the year, employment will begin inching higher. As that happens, the improved financial condition of more and more households and businesses will support a vigorous revival of real economic growth in 1993. ■

Evaluating Owners' Selection Procedures

Getting work is the issue for most design professionals these days. Here's an assesment of selection procedures and how to handle them.

By Stephen M. Sessler

Owners have at their disposal a number of procedures when screening and selecting architects and engineers for larger projects. Here's an overview of their good points and limitations:

• Interview/presentation

When an owner has enough knowledge to prequalify a limited number of firms for a project, the interview process can be very effective; the client meets the design team, sees relevant experience, and evaluates other information. This process becomes less effective when more than a few firms are interviewed, or when technical strength and competence are overshadowed by presentation skills. Unsophisticated clients risk making a selection for the wrong reasons.

• Phased process

Many owners, including government agencies, use this. It is structured and selection is based on amply documented information. The process is also time-consuming, but fair to the extent that fee is not part of selection criteria—even though multipliers, hourly rates, and other financial information may be required before final selection.

• Request for proposal/bidding

A favorite method when an owner's adviser is managing the selection process of a design team, RFPs are typically issued to many firms. RFPs usually request a fee proposal. Unless personal contact can be made with the owner or consultant, knowledge about the project and the scope of services required is limited to the information in the RFP. This is dangerous. The nature of design services is such that competitive bidding is not feasible. Creativity, experience and exemplary service are not commodities that can be defined and reproduced like manufactured products. Yet, when a fee is requested, price is going to play a role in selection. RFPs typically request extensive and detailed information about your firm and experience. Some of this information is superfluous, dilutes the efficiency of the RFP process, and often seems to simply test your endurance for bureaucracy and mind-numbing data gathering.

• Design-build solicitations

The design team must develop firm fee proposals so that all project-related costs can be included in the developer's pro forma in which total project cost is such an important part. The design team produces essentially a schematic design package on a contingency basis. For a large complex facility, this effort can represent a large amount of nonbillable time (and hard costs).

• Design competitions

Boards or agencies with fiduciary responsibility for major public projects occasionally hold this architectural equivalent of an election. A design competition is the most esoteric form of selection because the candidates are generally prescreened and carefully chosen by one or more very specific criteria.

Interviews become less effective when technical strength and competence are overshadowed by presentation skills. Unsophisticated clients risk making a selection for the wrong reasons.

How you can manage your selection:

1. Identify criteria. Government agencies will frequently publish their criteria and the weighting factors. Other clients may have more or less specific criteria. Most difficult to expose, and often most important, are hidden-agenda issues. During selection, politics sometimes take over. When this may happen, there is nothing you can do except to weigh the pros and cons of pursuing those projects.

2. Focus your efforts. Focused marketing does not preclude diversification, but it does require directing the type of your skills and goals. Concentrate on clients you want. Establish go/no-go criteria for each marketing opportunity.

3. Make the most of interviews and presentations. Concentrate on the specific project, what your approach to that project will be, how your services will benefit the client, and how you will minimize the client's risk. Do not dwell on experience and credentials. Your past record has probably been responsible for your being selected to be interviewed.

4. Market relationships, not projects. By the time a project gets to the selection phase, the competition is already forming battle plans. The ideal situation would be to prevent a project from getting to that stage by having an established client relationship. When the screening process has fielded several firms that have more-or-less equal technical capabilities, intangibles will dictate the final selection. Even when the location is inconvenient, meet with and visit a potential client often enough to establish comfort and familiarity.

5. If fee is a criterion, respond accordingly. Price exactly what is required in the RFP, and no more—even though it is obvious that more services will be required. Explain that, based on your knowledge of the project, the client, the schedule, and/or other factors, more services than described in the RFP are likely to be needed, and, that if the client is interested, you *can* offer a contract to include them for added fee. As one prominent Atlanta architect put it: "Let the client walk through a cafeteria line and pick and choose what he wants."

But, do you want to respond at all? That decision may be influenced by what other firms have been asked to submit proposals, your knowledge of those firms' capabilities and business practices, and whether you are comfortable competing on a fee basis. Could you spend time better in preparing a proposal for another client or project with a higher potential return?

Mr. Sessler is a partner in Newcomb & Boyd in Atlanta.

Specifications Series: Flush Wood Doors

Continued from previous page
If fee is a secondary selection criterion, demonstrate the value of your services and why they are worth a premium. Do not expect a client to automatically know why. Discuss this in detail.

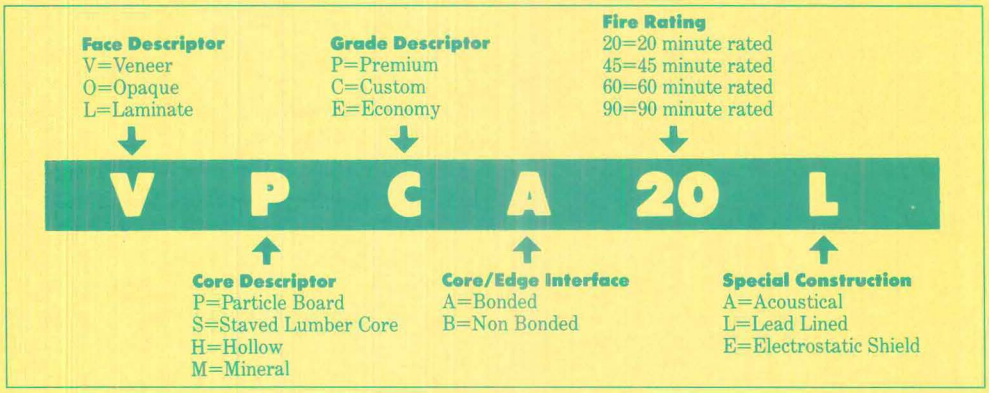
6. Love design-build or leave it. You will spend a lot of time if you participate in a design-build package. Be as candid and probing in evaluating the strengths of associated partners as you are in evaluating competing teams. Have an up-front agreement with the financial partner of your team that, if you do front-end planning and design work without compensation, you get premium fee if your team is selected.

7. Offer on-going services. Satisfied clients are the least costly to market. Investigate their businesses and develop services (i.e., facility mangement) that sustain your relationship.

8. Be the best in your market. Become known for value-added services by developing the most expertise in your target market.

9. Develop relationships with owners' consultant advisers. They filter communications to clients and increase the importance of thorough documentation and clear communications. If they are independent consultants, develop relationships that work both ways in finding marketing leads and opportunities to work together.

The selection process is competitive. But it can also be managed. Respond by turning problems into opportunities. ■



By William Dyer
The National Wood Window and Door Association (NWWDA) published a new standard for flush wood doors last year that introduces an Architectural Door Code to identify them by type. The old standard, I. S. 1-87, covered both architectural (i. e., commercial) and residential doors. It is being replaced by this standard (I. S. 1-A) and another for residential doors to be published later in 1992 (I. S. 1-R).

The Architectural Door Code categorizes doors by six characteristics: face descriptor, core descriptor, grade descriptor, core/edge interface, fire rating, and special construction (see example, right).

Face descriptor
This gives only the most basic description of the door face by designating it as veneer (suitable for a transparent finish), opaque, or laminate and illustrates in the most obvious way that the code by itself cannot be used to specify a door. If a veneer face has been selected, then the architect must still specify the species, the cut, the matching of adjacent veneer pieces, and the matching of the veneer pieces on the door panel.

I. S. 1-A does include illustrations that show the effect of the various cutting and matching techniques on single doors, pairs of doors, sets of pairs, and doors with transoms. Exterior ply of veneer face is limited to a minimum thickness of 1/50 of an inch in premium and custom grades and is a mill option in economy grade. No mention is made of the number of plys, so if you require five-ply doors, you must specify them. If you want a laminate face, you must specify manufacturers and select the laminates.

The NWWDA standard covers the finishes generally available from door manufacturers with brief descriptions of 13 kinds. These are numbered and the numbers are the same as in the Architectural Woodwork Institute's standard, *Architectural Woodwork Quality Standards, Guide Specifications and Quality Certification Program* Fifth Edition, and in the Woodwork Institute of California's standard, *Manual of Millwork.* The AWI/WIC standards are more definitive and should be referenced along with NWWDA's if factory finishing is required.

AWI/WIC uses two grades for finishes (custom and premium); NWWDA uses three (standard, select, and super). Since these systems do not equate, the only reasonable approach seems to be to use the AWI/WIC grades when referencing their finishing systems and use the NWWDA grades when specifing a finish from a manufacturer using that system.

Core descriptor
This indicates one of four common core types: particleboard, staved-lumber, hollow, and mineral. NWWDA has minimal specifications for core construction in its "Standards" section. There are eight blocking options available by code number for each type; blocking can be specified by number, size, and location. The standard allows for top and bottom horizontal rails to be either solid wood or medium-density fiberboard.

Mr. Dyer is an architect and specifications consultant in Atlanta and chairman of the AIA Masterspec review committee.

Here's what the National Wood Window and Door Association's new Architectural Door Code covers—and does not.

Grade descriptor
The NWWDA has changed its grading system for materials and workmanship to match the premium-custom-economy system used by the AWI and the WIC. (These grades are not to be confused with the grades for finishes). These grades apply to veneer faces and matching, vertical rails, lights, louvers, molding, and transoms.

Core/edge interface
There are only two choices: bonded or non-bonded. Bonding describes whether or not the horizontal and vertical rails are glued to the core. The minimum glueline is NWWDA Type II. Type I is recommended for high-humidity conditions. NWWDA testing shows no difference in performance between the two fabrication techniques. To glue or not glue is a function of the manufacturing process more than desired performance. Typically, five-ply doors are bonded and seven-ply not.

Fire rating
There are five fire ratings available for wood doors: 20-minute (smoke doors), 45-minute (C label), 60-minute (B label), and 90-minute (B label).

Special construction
There are three options: acoustic doors, lead-lined doors, and electrostatic-shielded doors. For acoustic doors, you must specify a STC rating and accessories that come with the door such as gaskets, special stops, and automatic bottom seals. For lead-lined doors, you must specify required lead thickness, which is usually determined by the radiation physicist. Electrostatic-shielded doors will require that the number and location of electrical leads be specified.

Conclusion
The NWWDA expects architects to use its code in their door schedules to indicate basic characteristics. While this code could save space on door schedules, it does not cover wood-panel doors, hollow-metal doors, entrance doors, and the many special types. Without equivalent codes for all door types, you will have difficulty working this code into the door schedules of most projects. The door industry needs to develop a code system for all door types. ■

Guide Specification: Flush Wood Doors

PART 1 GENERAL
1.01 Summary:
A. Section includes both solid-core and hollow-core flush-wood doors with transparent, opaque, and plastic-laminate finishes. Also includes fire-rated, acoustic, lead-lined, and electrostatic-shield doors.
B. Related sections are wood-door frames, metal-door frames, stile-and-rail wood doors, finish hardware, glazing, and painting.

1.02 References:
A. Architectural Woodwork Institute (AWI), Architectural Woodwork Quality Standards, Guide Specifications and Quality Certification Program, Fifth Edition.
B. National Wood Window and Door Association (NWWDA), Industry Standard I.S. 1-A, Architectural Wood Flush Doors.
C. Woodwork Institute of California (WIC), Manual of Millwork, January 1991 (The WIC is planning to release a new edition of its manual in February 1992).

1.03 Submittals:
A. Product data: Details of core and edge construction, details and trim for lights and louvers, and specifications on factory finishing.
B. Shop drawings: Location and size of each door, details of construction, location and extent of blocking for hardware, and fire ratings.
C. Samples: Corner sample to show core, horizontal and vertical edges, crossbanding, and face ply.
D. Quality-control submittals.
Certificates: Manufacturer's certification that oversize fire-rated doors conform to the construction requirements for tested and labeled fire-door assemblies, except for size.

1.04 Delivery, storage, and handling
A. Packaging and shipping: Identify each door with a removable or concealed marking that corresponds to the numbering system used on the shop drawings.
B. Acceptance at site: Have doors delivered only after the hvac system is in place and functioning.

1.05 Warranty
A. Special warranty: One, two, and five years are available for interior hollow-core doors. Life of the installation is standard for interior solid-core doors.

PART 2 PRODUCTS
2.01 Manufacturers:
A. List acceptable manufacturers.

2.02 Materials:
A. Core, horizontal and vertical edges, crossbanding, face ply.
B. Louvers, and wood and metal trim for frames for lights and louvers.
C. Refer to glazing section for glass lights and to painting section for field finishing materials.

2.03 Fabrication
A. Refer to reference standards for specifications for shop assembly; shop/factory fitting, machining, and finishing; and tolerances.

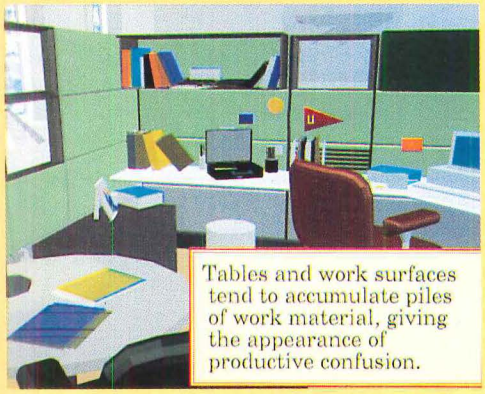
PART 3 EXECUTION
3.01 Installation
A. Refer to finish-hardware section for installation of hardware.
B. Refer to NFPA 80 for installation of fire-rated doors.

For technical literature on doors, see pages 36 and 37.

Addenda:
Specification Series, Waterproofing, *January 1992, pages 36-37.*
Popularly used acronyms for the chemical compounds listed under Materials are:
EPDM ethylene propylene diene monomer
PVC polyvinyl chloride
CPE chlorinated polyethylene
HDPE high-density polyethylene
CSPE chlorosulfonated polyethylene

Growing Up With Computers

This Catalyst work space is oriented towards people and possibilities.



Tables and work surfaces tend to accumulate piles of work material, giving the appearance of productive confusion.

By Kristine Fallon

At the very top of the Chicago Tribune Building, enter the only door. The offices are in a cloverleaf plan. Windows screened by Gothic tracery give breathtaking views. This is the home of the forward-looking young design firm, Eastlake Studio.

Knowing what you want

Founded in 1987 by three architects, Robert Young, David Johnson, and Thomas Zurowski, Eastlake Studio has grown and prospered while more firmly established practices have been badly battered by the economy. The partners held informal philosophy and planning sessions for over a year before founding the firm, and produced an intensely shared vision of what they wanted it to be—and not be. Each contributed his own part of that vision: Johnson is a computer enthusiast; Zurowski has uncommon insight into individual human behavior; Young is a former Peace Corps volunteer concerned with collaboration to the point of crediting the practice's creativity and successes not only to the principals, but to the 10 staff members as well.

Getting information

There are no drawing boards at Eastlake Studio; every member of the practice works at a networked Mac II computer, using it for project *and* day-to-day communications—timesheets, the sign-out board, telephone messages, and even signing up for the firm's Cubs season tickets. They use computer technology like few others, believing that design is an information-intensive activity and that design decisions are only as good as the information that supports them. That's why they have computers.

They buy hardware at the top of the performance curve and constantly upgrade older systems. Their method of choosing software is extremely unorthodox. Rather than looking for applications with many features, they choose intuitive software tools. They would rather stretch the tools than struggle with an abundance of features in an awkward program. Nevertheless, they are constantly adding software to their toolchest—in response to project needs and individual interests—resulting in an extensive software library (see box, opposite page).

Learning on the go

Does all this create a training problem? There is a standing Friday morning breakfast meeting, hosted by Johnson, in which computer-industry trends are discussed and specific skills developed. More important, according to all three partners, is their attention to recruiting. "We don't select people because of their computer skills," says Johnson. "We take the brightest people we can find and put them in front of a powerful, easy-to-use tool in a stimulating environment. We know we have to be a learning organization."

Staff members Mimi Hadawi, an industrial designer, and Catherine Baker, a 1990 architectural graduate, were recently experimenting with some new computer software, MacroMind 3D, working on a computer animation for furniture manufacturer Herman Miller to be used at its premiere of "A Guide to the Negotiable Environment" (a system that matches users with work-stations that suit them) at the 1991 Designers Saturday in New York. A Herman Miller chair and work surface were twirling around the screen of Hadawi's Mac II. "We have to do more work to get proper shadows," she explained. "We're just getting into the instructions chapter on light." Said Baker: "This is like a project at school—at the high end of the learning scale—but it is for a real client."

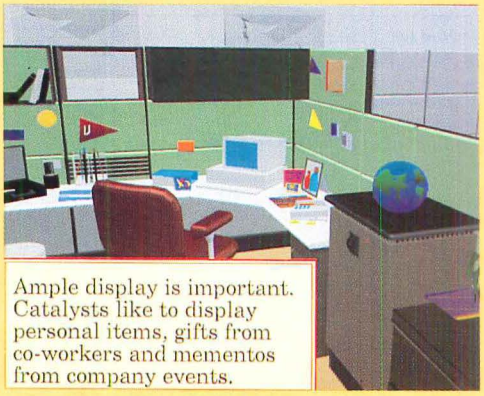
Giving information

Eastlake uses computers to improve the quality *and* speed of design decisions, including communications with clients by computer animation and small-sized colored drawings, frequently showing proposed interiors in 3-D. "The smaller the better," says Young. "People can take them home and study them on the train." Final documents are printed out-of-house. This includes both the color output and the high-resolution monochrome contract documents. These are sent to a Linotronic imagesetter and then photographically enlarged. Eastlake did not buy a large-format plotter. "We thought plotting technology was Stone Age," says Johnson, "that it would be obsolete within a year."

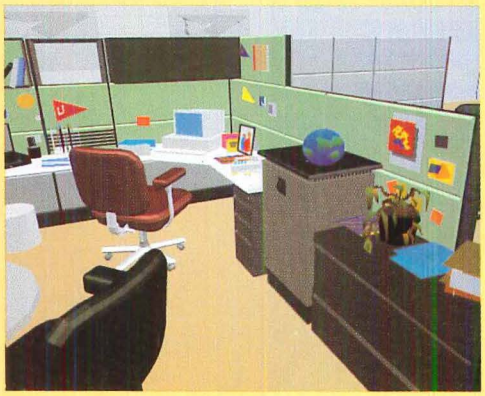
There are no secrets at Eastlake Studio, says Zurowski. Salaries, fees, contract terms, and project information are shared by all. The computer network, where the information resides, is wide open. There are no secret passwords or hidden files. The principals do not have private offices. Each sits surrounded by the staff members with whom he works. They learn about negotiating, budgeting, invoicing, and managing by observing and listening.

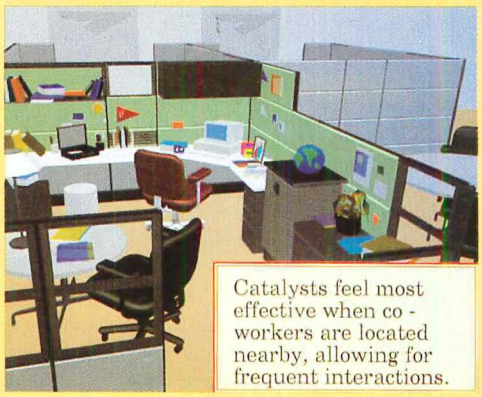
The "A Guide to the Negotiable Environment" project is a perfect fit for Eastlake

Young computer whizzes look beyond their machines to what kind of design firm they want theirs to be.



Ample display is important. Catalysts like to display personal items, gifts from co-workers and mementos from company events.





Catalysts feel most effective when co-workers are located nearby, allowing for frequent interactions.

Studio's philosophy. Its main premise: Diversity in personality types is a valid design criterion. Personality types and the environmental features appropriate for each are based on the Meyers-Briggs personality-classification system. Another firm, Insightguide, a joint-venture partner with Herman Miller, developed a Macintosh-based Meyers-Briggs test, which is self-administered, allowing people to figure out for themselves what personality type they are and see the office setting created by Eastlake that suits them (see photos for many viewpoints and levels of detail seen in a typical example.)

Knowing who you are

Eastlake Studio projects over $1 million in fees for 1992—quite a jump over the $67,000 collected in the first year of business. In retrospect, the partners concur that their problem that first year was chasing any work they heard about. They lacked a focused business plan. After analyzing their strengths, they agreed that their most marketable experience was corporate interiors. And they wanted to be recognized for strong design ideas. They asked themselves what services were not being provided in the corporate-interiors market by others, what they could do differently from them, and how they could avoid falling into the same traps.

That was in 1988. By 1989, the strategy was paying off. Eastlake Studio began adding staff. The founders continued to focus their market more narrowly: they found they worked best with young Fortune 250 companies with vision for their own businesses and having facilities groups made up of design professionals.

Skirting the traps

What pitfalls must this type of firm prepare to avoid? Here are a few:

1. *Issues of confidentiality.* What happens when a client demands that Eastlake keep shared computer information confidential? Converting a network of a dozen or more nodes from an open to a protected system is not easily done.

2. *Clients' technology preferences.* More and more clients are demanding that consultants use computer technology in prescribed ways. Both government and private clients are demanding the use of specific CAD systems and even application software and databases. Other organizations are demanding that all invoicing and payments be handled electronically. This trend counters progress in ease-of-use and makes the computer itself an issue.

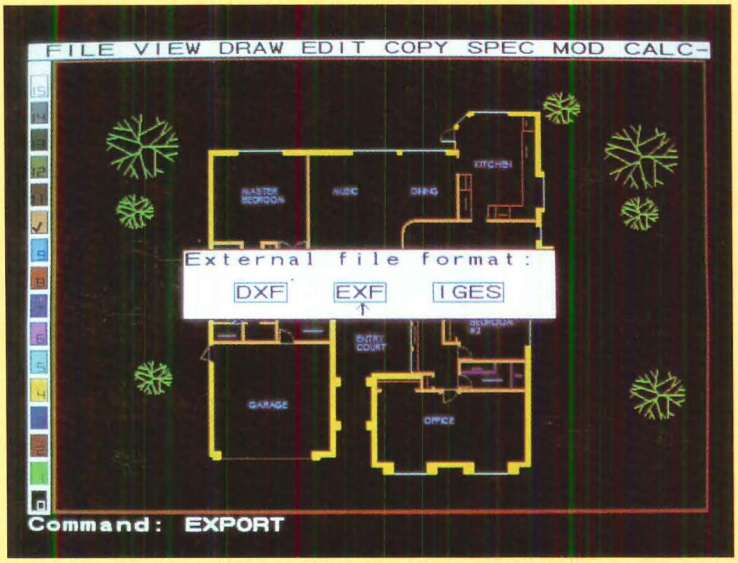
3. *Technological change.* Eastlake, with its one-person, one-computer approach, has expanded its computer system in tandem with its staff. It has yet to face a large, onetime technology purchase, but, to remain current, has been conscientious about upgrading old workstations. Sooner or later they will reach the end of the Macintosh product line— the new alliance between Apple and IBM makes that abundantly clear. The firm should be planning now for the expense and disruption.

4. *Handling growth.* If the practice continues to grow, the principals will need to either create layers of management hierarchy or add partners. They plan to do the latter. Will the young professionals coming up within Eastlake Studio be as aware of the strengths and weaknesses of this type of practice and as committed to a shared vision as the founding principals? ■

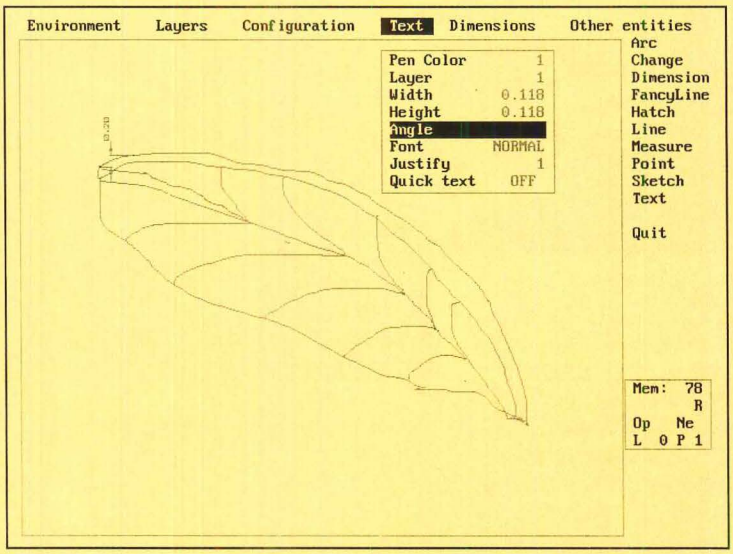
Programs in Eastlake Files

Application	Product	Company
2-D graphics	Dreams	Innovative Data Design
2-D graphics	Claris CAD	Claris Corporation
Animation	Director	MacroMind
3-D rendering	Three-D	MacroMind
3-D modeling	ModelShop	Paracomp, Inc.
Communications	White Knight	The FreeSoft Company
Communications	America Online	Quantum Computer Services
Database	FileMaker Pro	Claris Corporation
Networking	TOPS	Sun Microsystems
Networking	In/Out	CE Software Inc.
Networking	QuickMail	CE Software Inc.
Organizing	INtouch	Advanced Software, Inc.
Outlining	More	Symantec Corporation
Spread sheet	Excel	Microsoft
Word processing	WriteNow	T/Maker Company

Inexpensive Bill-of-Materials Processing



BMAT mates easily with EasyCAD2, thus reducing bill-of-materials processing costs. Above: exporting a file to EXF format.



TurboCAD comes with a simple dBase program and is a flexible drawing tool. It is especially easy to sketch with.

Remember those olden days—say, four years ago—when full-blown 2-D CAD software with bill-of-materials processing carried a list price of $3,000 or more? This month we look at two routes to nearly the same functionality for under $400.

The more sophisticated solution is offered by Technisoft Computer Services, which sells BMAT, a $189.95 program that mates with several CAD packages, including the $199 EasyCAD2 from Evolution Computing.

Recession really got you down? You can go even lower on price, with TurboCAD 2.0 from IMSI. It's not nearly as flexible right out of the box, the manual is incomplete, and you may need the help of someone who understands dBase or Lotus 1-2-3 to modify the bill-of-materials reports. But for $149.95, who's complaining?

Either system is ideal for the firm that has avoided CAD up 'til now, but needs to start exploring—or to use a CAD system for facilities-management chores. Our recommendation is not only based on price. It is also based on the ability of either of these packages to exchange files with other CAD software—particularly AutoCAD—via DXF. To use BMAT with EasyCAD2/FastCAD:

- Use the CAD software to create an EXF file. The EXF format is a text-only representation of the software's binary FCD file format—just as the DXF file is a text representation of an AutoCAD binary file. You create an EXF file by going to the file menu and choosing the export option.
- Quit the CAD software.
- Start BMAT by going to the directory where it is stored and typing "menu." Run the configuration utility, setting BMAT to

TurboCAD version 2.0 summary

Equipment required: IBM PC or compatible, 512K, fixed disk. Mouse or digitizer strongly recommended. Compatible with most plotters and printers.

Vendor: IMSI, 1938 Fourth St., San Rafael, CA 94901. Phone 415/454-7101; fax 415/454-8901. $149.95; upgrades from previous version, $49.95.

Manual: One paperback. The tutorial is not aimed at architects. The index is poor. Want to know about symbols? You find a little bit of information under "libraries." Some features, such as the bill-of-materials viewer program, are completely undocumented.

Ease-of-use: Once you learn how to move around TurboCAD—mainly by trial-and-error—you will find it amazingly easy to use. There are plenty of drawing tools, and the reaction time is fast, even on an old XT-style computer. Installation of the program itself and several symbol files is simple and just about foolproof. Zoom and pan are awkward; you use the + and – keys to zoom, and F10 (along with the mouse) to pan.

Error-trapping: Good. In general, you are prompted for confirmation before taking steps that will destroy information.

BMAT summary

Equipment required: IBM PC or compatible big enough to run the graphics software you want it to work with. EasyCAD2 will run on a minimal-size IBM PC with fixed disk, 640K, and a mouse. The same version of BMAT will also run with Evolution Computing's FastCAD and FastCAD 3-D; an 80386-equipped computer is recommended for 3-D work. There's also a BMAT version for AutoCAD; again, an 80386-equipped computer is mandatory for AutoCAD 11, and recommended for earlier versions.

Vendor: Technisoft Computer Services, Inc., 917 Lansdowne Ave., Toronto, Ontario, Canada M6H 3Z2, 416/535-0863, fax 416/535-

find the EXF files and EasyCAD2/FastCAD library files.
- Use BMAT to create library database files.
- Using BMAT, choose the EXF file and the library file you want to mesh with it.
- You can move BMATEDIT.EXE to another computer to work on the files and create library files. The other BMAT files can only work inside the same computer as EasyCAD2 or FastCAD.
- You can create a library-file database with up to 24 headings. Output can be sent to a printer or to other software.

TurboCAD also is set up to create a bill-of-materials file that can be used outside TurboCAD itself. The package comes with a simple dBase III program, BILLOFM.PRG, that extracts information from the drawing so that it can be used inside dBase III or similar software (FoxPro, for example). This program is set up to handle two fields—one 20 characters long for the name of the item, and the other up to 10 characters long for the cost. It can be modified, however, to handle almost any number of fields.

You label each item in the drawing. The manual recommends using letters of "zero" height and width, so that the resulting text does not show up on screen. The text can be almost anyplace near the shape it defines, but it makes sense to locate it near each shape's base point so that you can find it again. To get the data out of the drawing file, use the F3 (transfer) key and choose the option for writing an "interface file." The resulting file can be read by any software that can handle dBase files—including spreadsheets such as Lotus 1-2-3—but you will have to sort out some extraneous material in the file.

The process can be quite cumbersome if you try to insert all information about each shape in the on-drawing text. It is better to insert only the name of the item—DOOR1 for a specific door type, for instance—and then use the "outside" database or spreadsheet software to merge the resulting file with a larger file containing cost information, product availability, and so forth. Otherwise, you will have to do a lot of typing. And the resulting drawing files will react more sluggishly, too. That's because it takes TurboCAD (and almost all other CAD software, for that matter) an inordinate amount of time to handle text.

Merging files inside a database program such as dBase is not difficult, but does require some elementary programming skills not available in most small practices.

TurboCAD, by the way, is a rather flexible drawing tool. It is especially easy to sketch with it. EasyCAD2 is essentially the version of FastCAD 2-D that was distributed before the current version was developed. The latest version was reviewed in RECORD, November 1990, page 125. ■
Circle numbers **304, 305.**

5671. EasyCAD/FastCAD version, $189.95. For AutoCAD version, contact CAD Productivity Consultants, 552 Church St., P.O. Box 500-37, Toronto, Ontario, Canada M4Y 2H0. AutoCAD version $435. Prices quoted are in U. S. dollars.

Manual: 16 pages, but everything is there.

Ease-of-use: Good. The theory is that you use BMAT-generated files outside of the CAD program—on a separate machine, if you'd like. BMAT has a clever, nonobtrusive copy-protection scheme. Once you install it, it will work only with the specific copy of EasyCAD2 or FastCAD you bind it to.

Error-trapping: The danger is in modifying the bill-of-materials file without bringing up the original drawing upon which it is based, to insert changes (a different door or window type, for example), or in modifying the drawing while someone else is playing with a bill-of-materials file generated earlier. BMAT makes sure the symbol names in the FastCAD/EasyCAD2 working drawings (the EXF files) match the symbol names in the symbol library.

SF/X Release 2

SF/X provides an easy way to assemble Standard Forms 254 and 255 out of a database of your projects, resumés of your staff, and your firm's resources. The disadvantage is that SF 254 and SF 255 are all it does; there's not a great deal of flexibility for preparing custom brochures for proposals to private clients. The advantages are many—a simple fill-in-the-blanks interface, beautifully printed forms on any PostScript printer, and quick assembly of forms for new proposals.

This is a new release of the SF/X package we reviewed in RECORD, January 1990, page 181; it adds several new features. There's a better manual, room for more projects and resumes (up to 60 in one SF 255), and even more flexibility in printing.
Circle number **306.**

SF/X Release 2 summary

Equipment required: IBM PC or compatible, fixed disk with at least 5 MB of space, laser printer capable of running PostScript. Runs on a Macintosh with DOS emulation software.

Vendor: Parallel Resource, Inc., 703 E. Glenn Ave., P.O. Box 2488, Auburn, Ala. 36831. $795 Demo disk and sample output is $10.

Manual: Clear and precise.

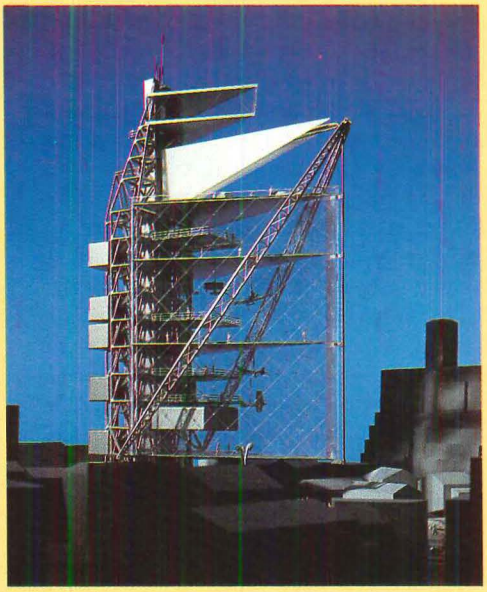
Ease-of-use: Extremely graphical and intuitive. Error messages sometimes show up as cryptic numbers; you'll need the manual to decode them. The data files are ASCII; easy to create and modify.

Error-trapping: Not designed (or licensed) for use on networks. There's no built-in file-locking, although advanced networks such as Novell Netware/386 seem to protect SF/X files well. ■

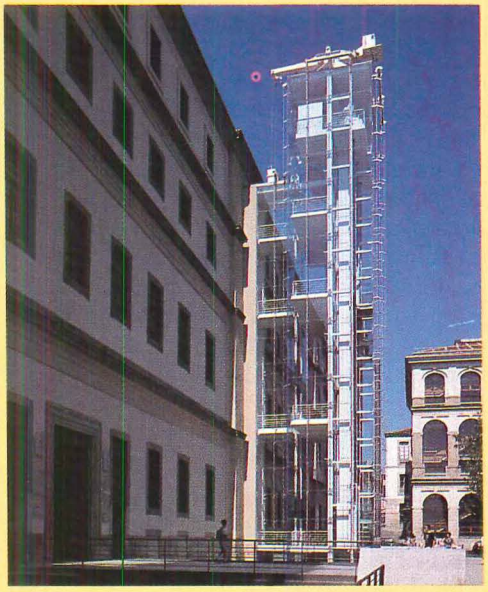
British High Tech Carries On

By Hugh Aldersey-Williams

Two of the most extraordinary buildings of the 1980s were Norman Foster's Hongkong Bank and Richard Rogers's headquarters for Lloyd's of London. Widely published and discussed, these structures at the time stood alone as the apparent apotheosis of High Tech—an architectural strain that seemed peculiarly British. Now, with the paling of Postmodernism and the apparent resurgence of a variety of Modernisms, High Tech marches on to new triumphs with the recent opening of Foster's acclaimed Stansted Airport (among several other of his projects this year), a Channel Tunnel rail terminal by Nicholas Grimshaw under construction at Waterloo Station, and the enormous European Court of Human Rights by Rogers being built in Strasbourg.



Richard Rogers's Tomigaya Building in Tokyo is an exercise in cantilevers.



Ian Ritchie added three glass towers to the Reina Sofia Museum in Madrid.

Architects traditionally conveyed their intentions by means of the plan. But as buildings have grown taller and proportionally more modest in their horizontal exposition, so the plan has lost ground. Today's Postmodern architects prefer the elevation. And the drawing of choice for High Tech architects must surely be the section, a technique that emphasizes the process of building and explains how the pieces come together.

Although the term High Tech was coined in the U. S., it is British architects who have taken this architecture to new heights—both literally and metaphorically. Norman Foster and Richard Rogers, who were both recently knighted by the Queen, are its best-known exponents. Now there is a generation of younger architects of like mind (many of whom came out of Rogers's and Foster's offices) who are building widely: Michael Hopkins, Nicholas Grimshaw, Eva Jiricna, Richard Horden, Ian Ritchie, and others.

The question is why has High Tech survived and even prospered? Why is it so strongly a British phenomenon? Some of its exponents were inspired by the 1960s theories and dramatic technologic images of Archigram. Others cite the British Victorian engineering tradition and American inspirations such as catalog buildings, the work of Craig Ellwood, the Eameses, and Buckminster Fuller. Ironically, American architects became bored with upgrading a practical way of building into an architectural esthetic. High Tech quickly came to be seen as a '70s style of interior design.

In Britain there were no catalogs, so architects began to design custom parts—structural steel components, glazing and cladding panels, standard modules containing services—for repeated use on each building. They explored the cost-cutting potential of shop fabrication and showed that prefabrication need not look cheap.

Stratospheric price tags

Despite pursuing this ideal, few High Tech buildings have been inexpensive. Because of the variety of shapes and sizes required for the aluminum cladding panels on Foster's Hongkong Bank, for example, specially built robotic presses were used to produce them. Tooling costs alone were stratospheric.

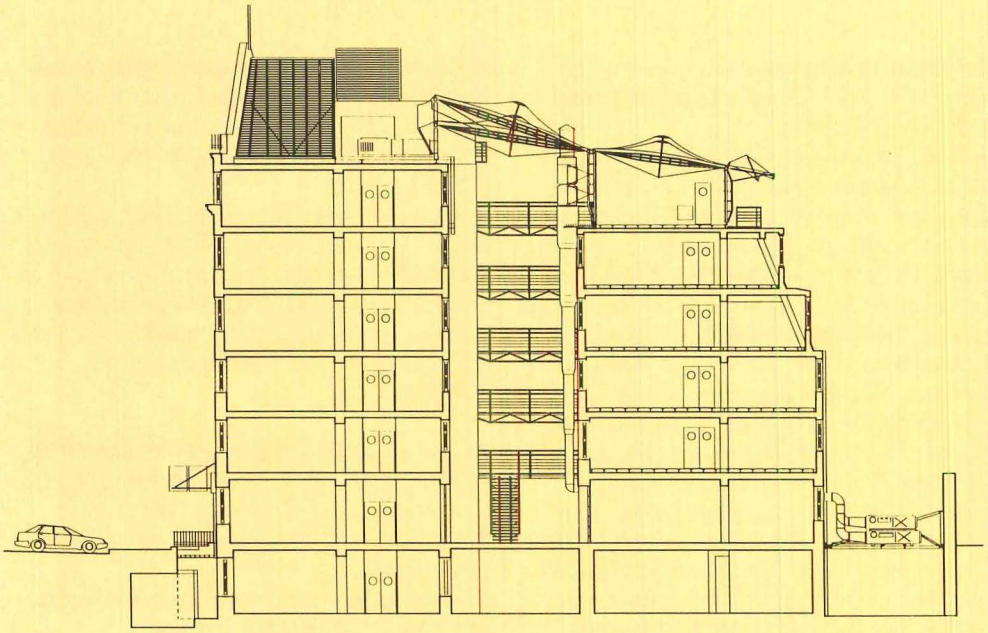
Just as historical reference gives a building a spatial or temporal link to the past, High Tech provides a connection to the future and reflects a faith in technological progress. But if the technology displayed is not for real or is perceived as a sham, then it erodes our belief in the benefits of technology. Similarly, thin-wall Postmodernism diminishes the worth of history. The dilemma that confronted the first generation of High Tech architects was that they really didn't want to exploit the economies of off-the-shelf components. They wanted to make one-off structures that *looked* as if they were assembled from catalogs.

Expressive structures bring their own benefits, however. Nicholas Grimshaw's Homebase store for Sainsbury's in Brentford and his clipper-shiplike ice-rink in Oxford succeed as commercial and community symbols. Richard Rogers's Inmos microchip factory in Newport was distinctive enough for use in advertising promotions by the Welsh Development Agency. Planners in Swindon judged Foster's Renault Centre so attractive they allowed it to occupy a greater portion of its site than the law allowed.

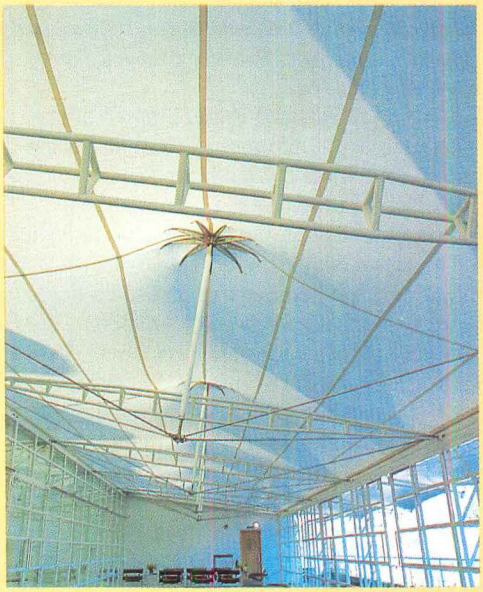
The structure is also the ornament. The Renault Centre has holes in its steel beams. The minor strength-for-weight benefits they offer are of secondary importance to their esthetic ones: they cast wonderful shadows. The Hongkong Bank expresses its structure clearly on its facade. The floors are suspended in groups from above by pairs of giant "coathangers" working in tension. It

Hugh Aldersey-Williams is a London-based writer whose latest book, World Design, *will be published in May.*

Critic Hugh Aldersey-Williams explains why High Tech has survived and why it has remained a mostly British affair.



Herron Associates transformed an Edwardian building in London into offices for Imagination Ltd., creating an atrium crisscrossed by 10 metal bridges.



Fabric roofs cover the atrium and a gallery at the Imagination Building.

would have been more efficient to support the structure with a conventional frame and would have required less steel. But it would have been far less thrilling.

High Tech turns "green"

Because of its willingness not merely to scavenge industrial parts but to work with manufacturers to produce them, High Tech can claim to be more than just a style. And with the new focus on the environment, architects are using these skills and technologies to develop buildings that exploit the energy-conserving aspects of dual skins and daylighting. Ove Arup and Partners, along with the architecture firm Future Systems, for example, have proposed what sounds like a contradiction in terms: a High Tech "green" building. The two firms have developed detailed drawings of a hypothetical office building whose kidney-shaped design maximizes natural light inside, while reducing wind loads and energy consumption. Such designs require a commitment to the unglamorous side of technology, not just a fascination with spacecraft and racing cars. In part, credit for the continuing vitality of British High Tech must go to a band of creative engineers, notably Anthony Hunt, Frank Newby at Felix Samuely and Partners, and Peter Rice at Ove Arup and Partners. Foster's seminal Willis Faber building of 1972 and Rogers's building for Lloyd's of London are unusual in that they are for clients in the financial sector. There has been a more understandable association between this architecture and industry. Rogers's Inmos factory, Michael Hopkins's Schlumberger building, near Cambridge, and Foster's Renault Centre continue a liaison that began in Britain with the Reliance Controls factory by Team 4, Rogers and Foster's one-time joint practice.

High Tech has contributed little to domestic architecture. A rare example is Hopkins's own 1977 home in Hampstead, which has been compared with the Eames house. Both were low-cost ventures made of readily available components. Both were low in energy efficiency. But only one—Hopkins's—was built in a cool country after an oil crisis. A more extreme house by Richard Horden uses mast sections from a yacht-spar manufacturer. This is not cheap, practical, or progressive, it's obsessional—a symbol of its architect's commitment to the transfer of technology from the more advanced work of yacht design. It takes a particular devotion to live in houses such as these.

Though these are recessionary times in London, there seems no dearth of work in building types in which High Tech embodies appropriate symbols. For a new line to the Docklands, the London Underground has commissioned subway stations from Foster, but also from many vital young firms, including William Alsop and Jan Störmer. Even Canary Wharf, bastion of middle-of-the-road American design, is likely in subsequent phases to see participation by British architects associated with High Tech.

Changing with the times

Some recent London projects show a softening of the High Tech vocabulary. Steel structure and plastic fabric roofs rise above traditional brickwork at Hopkins's Mount Stand at Lord's cricket ground, a building which, like much of Hopkins' recent work, reconciles modernity with tradition in a truly English way. Similarly, Herron Associates' transformation of an Edwardian building in London into the headquarters for Imagination Ltd. involved some preservation work and a tentlike fabric roof, as well as some more hard-edged insertions. Horden's Stag Place office development, Foster's Independent Television News headquarters, and an ambitious plan from Ian Ritchie for a 65-story tower in Whitechapel show the evolution from pristine glass-sheathed suburban sheds to convincingly urban expression. It looks as if High Tech will be with us for some time to come. ■

Briefly Noted

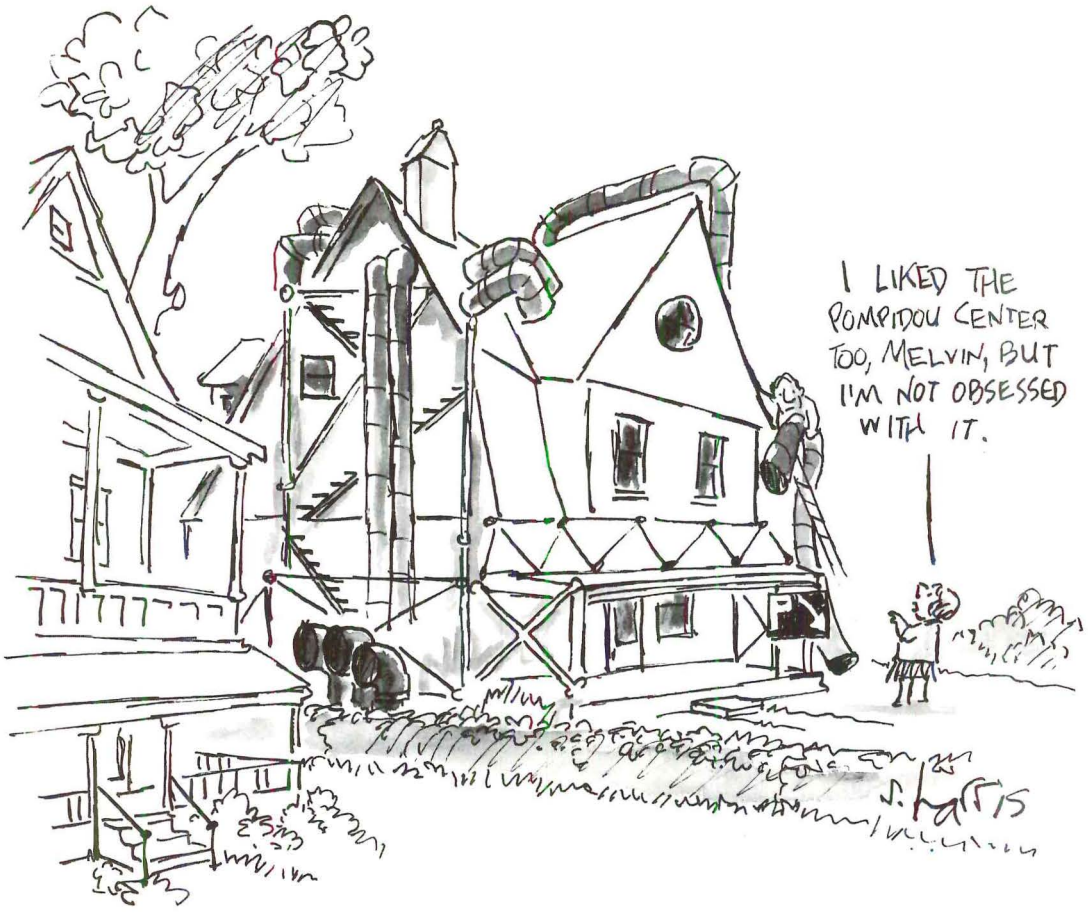
Architecture: A Modern View, *by Richard Rogers. New York: Thames and Hudson, 1991, 64 pages, $15.*
According to Richard Rogers, much of the poor design and inhuman scale that we see on the contemporary landscape came not from lack of talent or the failures of the Modern movement, but from a surrender to greed-based development. He advocates breaking away from design based on linear, static orders and developing "an open-ended architecture of overlapping systems." Based on Rogers's Walter Neurath Memorial lecture, this slender volume offers a balanced defense of Modernism. Supplemented with photographs of Rogers' own work, along with that of other practitioners, the book addresses issues such as the mistakes of Modernism, patronage and capitalism, and the future.

Envisioning Information, *by Edward R. Tufte. Cheshire, Conn.: Graphics Press, 1990, 128 pages, $48.*
A fascinating—and beautiful—book on the art and science of displaying the wonders of the world in two dimensions. Tufte, who teaches statistics, graphic design, and political economy at Yale and is the founder of Graphics Press, explains various ways of escaping "flatland," the domain of paper and video screen, without resorting to a third dimension. His goal is to show ways of increasing the number of dimensions that can be represented on planar surfaces and the amount of information per unit area (data density). Examples used include the manuscripts of Galileo, the Vietnam Veterans Memorial, and electrocardiograms. Six-color and even 12-color printing adds yet another layer of excellence to this book.

Mario Botta: Architectures 1980-1990, *with an introduction by Werner Oechslin and an interview with Pierluigi Nicolin. Barcelona: Editorial Gustavo Gili, 1991, 224 pages, $58.*
With its bright orange cover, clean design, and superb color reproductions, this book is a treat for the eyes. The introduction and interview are adequate, but the book's real purpose is to show Botta's projects from the '80s: furniture and objects, as well as buildings.

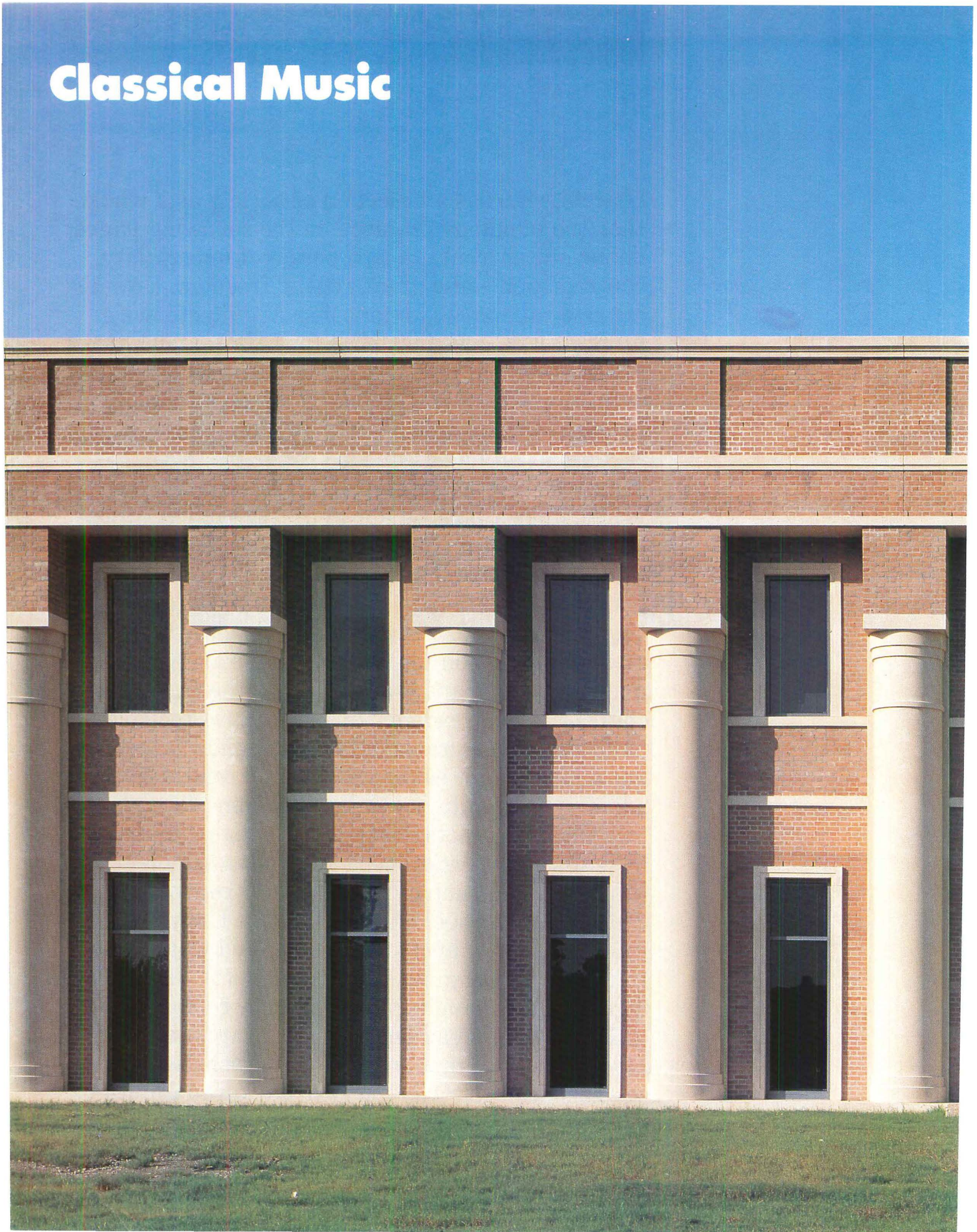
Arata Isozaki: Architecture 1960-1990, *preface by Richard Koshalek, essays by David Stewart and Hajime Yatsuka. New York: Rizzoli, 1991, 304 pages, $50 (cloth), $30 (paper).*
The standard monograph approach results in a decent, if formulaic, book. ■

Drawn for ARCHITECTURAL RECORD *by Sidney Harris*



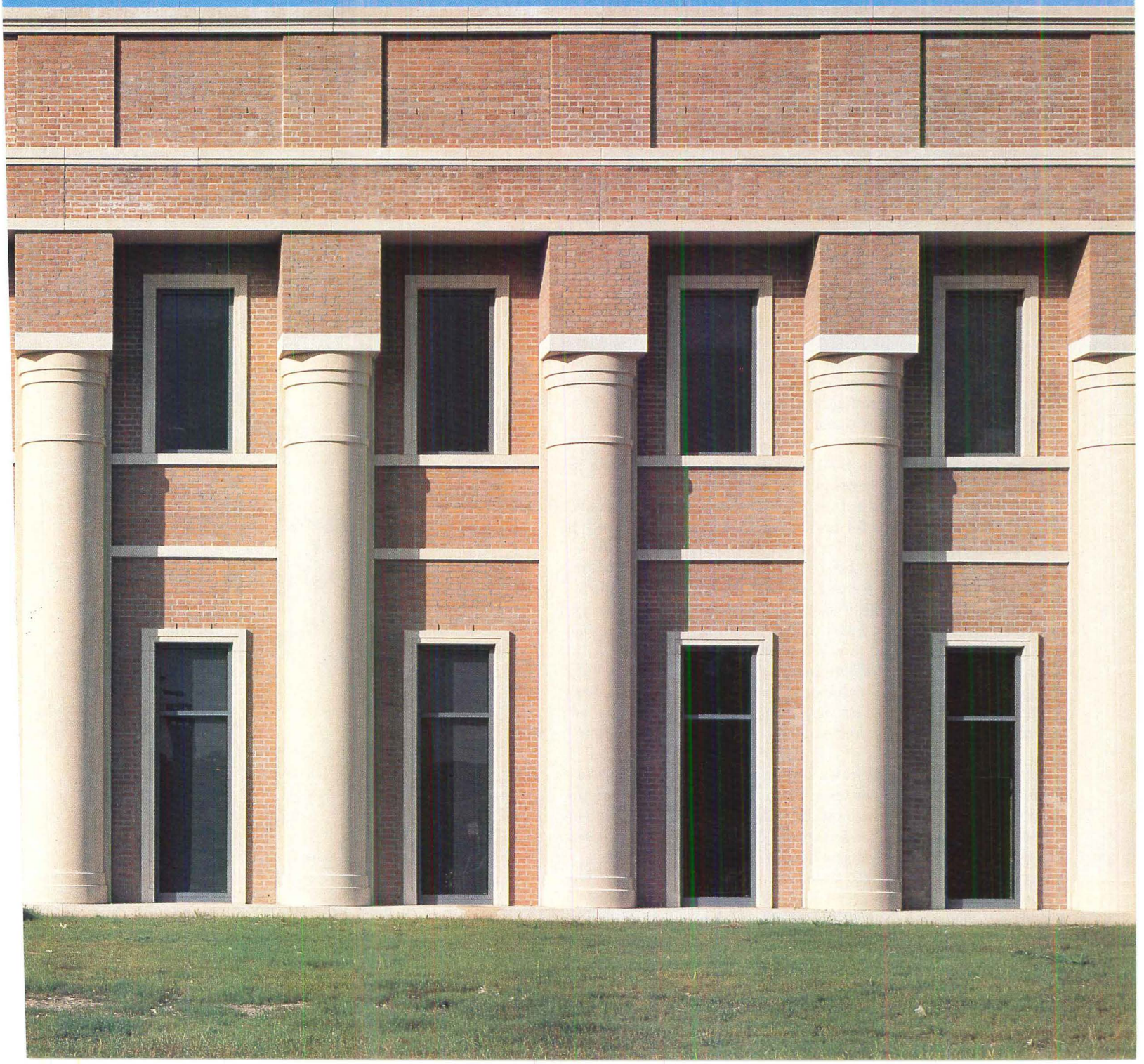
If architecture is a reflection of society as a whole, then the buildings featured on the following pages define our current era as a period of uncertainty, contradiction—and great artistic freedom. How else can one rationalize juxtaposing Arquitectonica's profit-driven Sawgrass Mills (page 84), a vast outlet mall swimming in a sea of South Florida suburbia, with James Kruhly's villagelike church complex in upstate New York (page 92)? In Minneapolis a consortium of architects divided that city's new convention center into three user-friendly parts which, unlike most buildings of this type, embrace the urban context (page 114); 7,500 miles away—in the Indian city of Jaipur—Charles Correa also took his cues from the city, though in a far different way (page 98). Correa used Jaipur's nine-square plan as inspiration for the Jawahar Kala Kendra, a museum of arts and crafts. Back in the U. S., the architects of two academic buildings have responded to dissimilar programs in highly original fashion. For a low-budget elementary-school renovation and addition in Atlanta, Lord Aeck Sargent developed a "warehouse esthetic," suggesting that the serious business of education need not preclude a playful learning environment (page 106). By contrast, Ricardo Bofill's school of music at Rice University—the Spanish architect's first completed work in the U. S.—is anything but playful (page 74). This imposing complex of auditoriums, practice rooms, and offices relies instead on the Spanish architect's signature brand of monumental Classicism, which the school's dean felt was the ideal backdrop for students seeking the essence of music. *P. M. S.*

Classical Music



Ricardo Bofill's first completed American project combines monastic, Mediterranean, and Wrightian imagery.

Alice Pratt Brown Hall
Shepherd School of Music,
Rice University, Houston, Texas
Kendall/Heaton Associates, Inc., Architect
Ricardo Bofill/Taller de Arquitectura,
Design Consultant

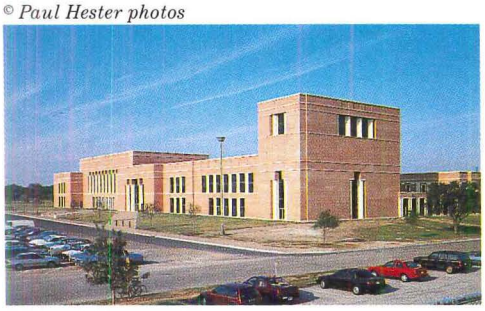


Dr. Michael Hammond, Dean of Rice University's Shepherd School of Music, equates the life of a musician with the life of a monk. Both spend long hours in solitary search of spiritual harmony: the monk through prayer, the musician through practice. The organization of the 465-foot-long Alice Pratt Brown Hall springs from this monastic metaphor. From practice to performance, the musician's progress through the building parallels the monk's procession from cloister to cathedral. The two-story east facade, with its concave colonnade serving as terminus for Ralph Adams Cram's axial campus plan, faces the university and contains teaching studios/offices and student practice rooms. The first phase of a proposed grand quadrangle, this cloister of introspective cells is where Rice students seek the essence of music. Two interior courtyards, like secret gardens, separate these private east-side spaces from the public west side and its four performance halls. Sharing a vast parking lot with the neighboring football stadium, the west side of Brown Hall marks a new interface between campus and town (a private university, Rice itself is walled off from Houston proper by a hedge).

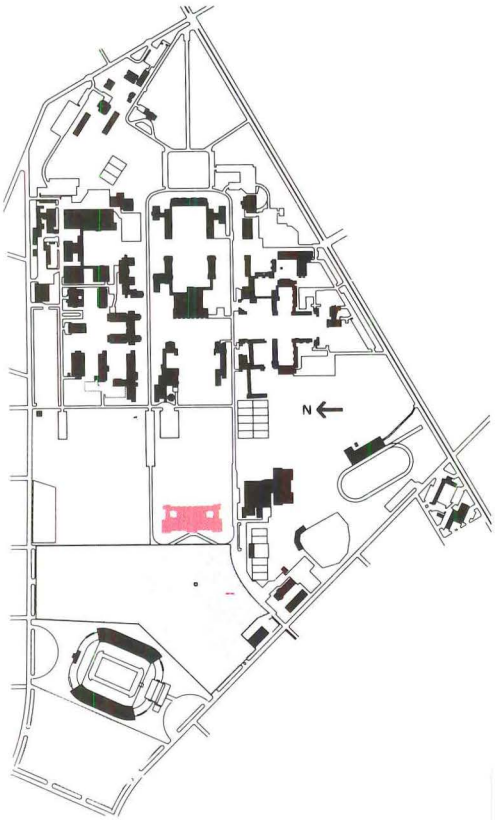
The complex program for the Shepherd School was conceived by Dean Hammond, who had considerable prior building experience as president of the State University of New York/Purchase during that campus's expansion in the 1970s. The Shepherd School project was an unusually intensive collaboration among Hammond and the other team members. Kendall/Heaton Associates, architect of record, Kirkegaard & Associates, acoustical consultant, and Miner-Dederick Construction Corporation, general contractor, were all involved in early planning and cost evaluations before Bofill and his Barcelona-based office, Taller de Arquitectura, were selected as design architects. In recommending Bofill, Hammond was convinced of the need for the "neutrality of Classicism." He felt that the "Classical attitude" provided a suitable background for renewal, for seeking the "first principles of art," both in architecture and in music. Bofill gave the complex program rational order, using the signature brand of monumental Classicism that he developed in his French social housing projects of the 1970s and '80s.

The Mediterranean roots of Bofill's work, although bolder and simpler than Cram's delicately detailed Byzantine/Near Eastern designs at Rice, complement the existing campus. American sources were also on Bofill's mind for his first completed design in the U. S. Studying the horizontality of Frank Lloyd Wright's work, Bofill used string courses, solid attics over colonnades, and asymmetrical massing along Brown Hall's west side, recalling Wright's Larkin Building and Unity Temple. The scale of the colossal colonnade on the building's curved east face is hardly sufficient, however, in facing the expanse of coastal prairie that separates it from other academic quadrangles. Bofill's site plan, yet to be approved, would correct this deficiency. If implemented, a hemicyclic reflecting basin would visually amplify the building's height. Future buildings defining this new quad will also relieve Brown Hall's current isolation.

The immediate acclaim of Brown Hall on campus is due in part to Dean Hammond's early insistence that no compromised "multipurpose" performance halls be built. Each of the four major spaces—a 1,000-seat concert hall, a 236-seat recital hall, an opera rehearsal studio, and an organ studio—is acoustically tuned to its intended purpose. Much of the budget was spent for acoustical control. Even the building's steel frame prevents sound transmission: the nine structural compartments are separated by neoprene connectors. If the austerity of the virtually all-white interiors has met with mixed reviews, the listening is world class. *Gerald Moorhead*



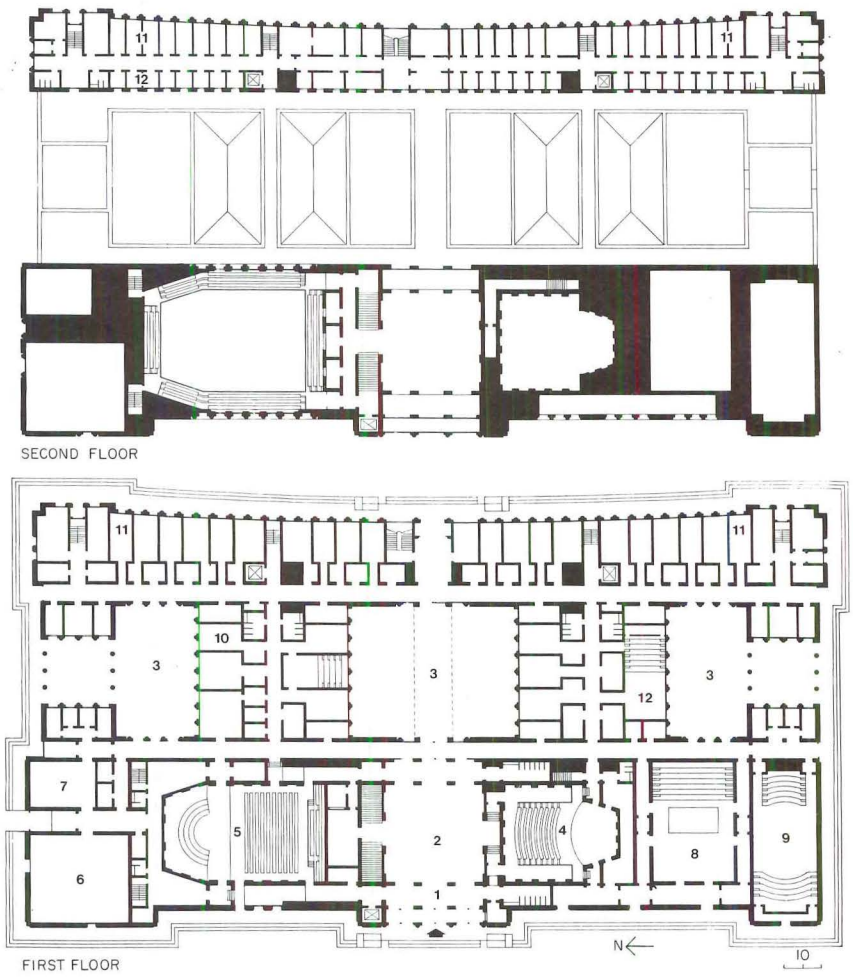
The new music building anchors the west end of Ralph Adams Cram's Beaux Arts campus plan (below). The asymmetrical massing of the west facade hints at the variety of performing halls within, including a 78-foot-high organ studio (top and opposite top). The colonnaded east front has a gentle curve that eventually will be mirrored in an adjacent reflecting pond (bottom and opposite bottom).



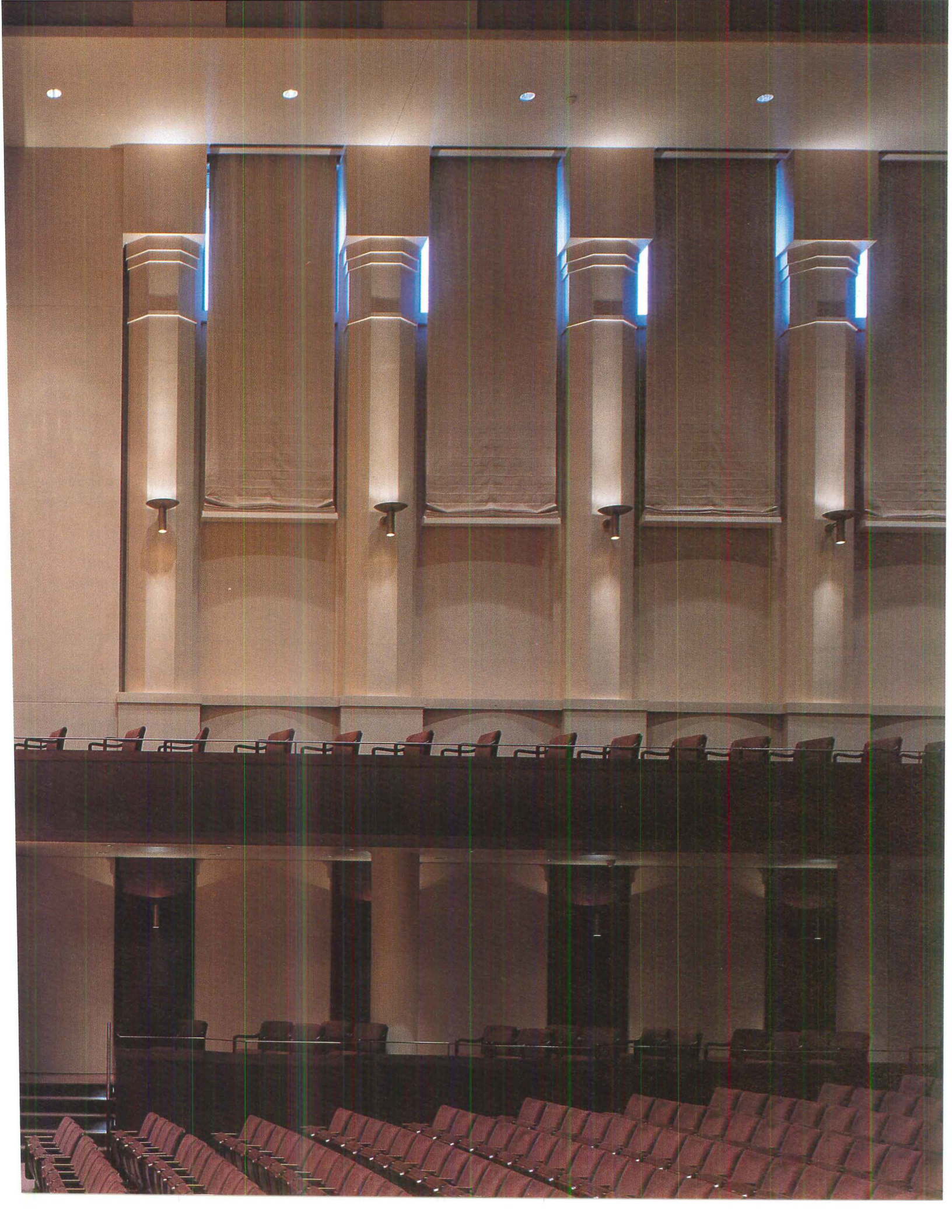
Existing buildings on the Rice campus are faced with the blended burnt-orange tones of St. Joe brick and gray (Texas or Indiana) limestone, giving an underlying harmony to 80 years of restrained architectural styles. Although he originally intended a monolithic precast-concrete exterior, Bofill adopted a similar palette, substituting a warm-toned precast concrete for the cool limestone. One of the two interior courtyards is reminiscent of a Moorish garden, with a fountain and geometric waterworks (opposite).

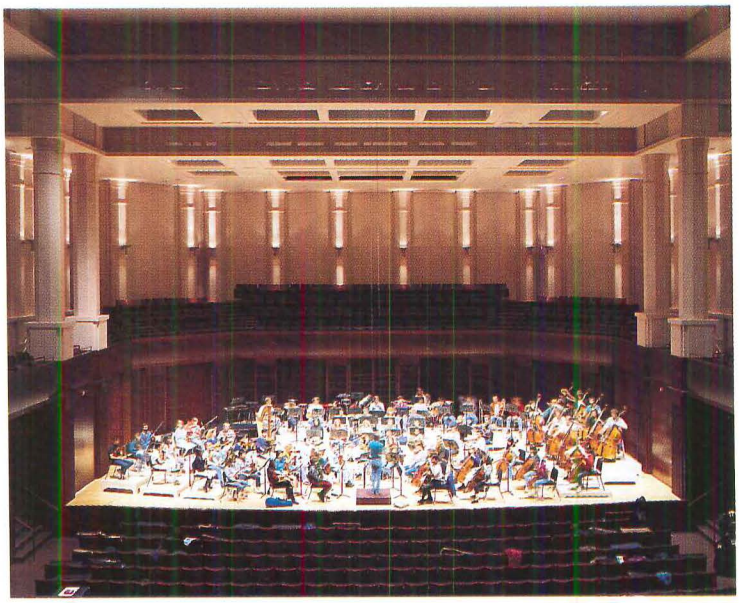
The rational plan is organized like a Roman city, divided into quarters by cross-axial streets, each containing large and small spaces (plans right). All offices and practice rooms have exterior views, either of the campus or a courtyard.

The largest performing space, Stude Concert Hall (overleaf), is modeled after the Musikverein in Vienna, a classic "shoebox" space. Stude Hall has no proscenium arch or fly loft, and is designed solely for orchestral preformances. Its 2.2-second reverberation time can be slightly adjusted using vertically retracting fabric "banners" on the upper side walls to tune the volume in a matter of minutes to a particular type of music. The surface rhythm of the walls, repeating the columnar order of the exterior, diffuses sound evenly throughout the hall. The acoustically transparent ceiling conceals a reflecting panel over the orchestra and adjusts the visual proportions of the hall to a pleasing balance, while using the entire structural volume to increase reverberation.



1. *Entry vestibule*
2. *Lobby*
3. *Courtyard*
4. *Recital hall*
5. *Concert hall*
6. *Orchestral rehearsal*
7. *Percussion studio*
8. *Opera rehearsal*
9. *Grand organ studio*
10. *Voice*
11. *Office/studio*
12. *Practice*





The front half of the stage in the Stude Concert Hall can be lowered into a pit, and the continuous balcony provides space for the choir (top left). The order of the exterior columns is repeated in the grand foyer, where town and gown formally meet (middle left). The more intimate Duncan Recital Hall is for chamber-music and solo performances (bottom left). Its 1.8-second reverberation time can be reduced to about 1.4 seconds with wall banners. Mechanical equipment slabs are floated above the structural slab and a 7-inch-thick concrete roof deck deflects outside noise intrusion. The air-conditioning system is low velocity throughout. The 40-foot-wide, 100-foot-long, 78-foot-high organ studio is the one space presently unused; an instrument has yet to be funded (opposite).

Credits
Alice Pratt Brown Hall
Shepherd School of Music, Rice University
Houston, Texas
Owner: *William Marsh Rice University*
Architect: *Kendall/Heaton Associates, Inc.—William D. Kendall, principal-in-charge; Rollie Childers, project architect*
Design Consultant: *Ricardo Bofill/Taller de Arquitectura*
Engineers: *CHP and Associates, Consulting Engineers, Inc. (mechanical, electrical); Haynes Whaley Associates, Inc. (structural)*
Consultants: *R. Lawrence Kirkegaard and Associates, Inc. (acoustical); S. Leonard Auerbach and Associates, Inc. (theater)*
General Contractor: *Miner-Dederick Constructors, Inc.*

Shop Till You Drop

Sprawled across 120 acres in South Florida, Arquitectonica's Sawgrass Mills mega mall draws crowds from Miami to Palm Beach.

Sawgrass Mills
Sunrise, Florida
Arquitectonica International Corporation, Architect

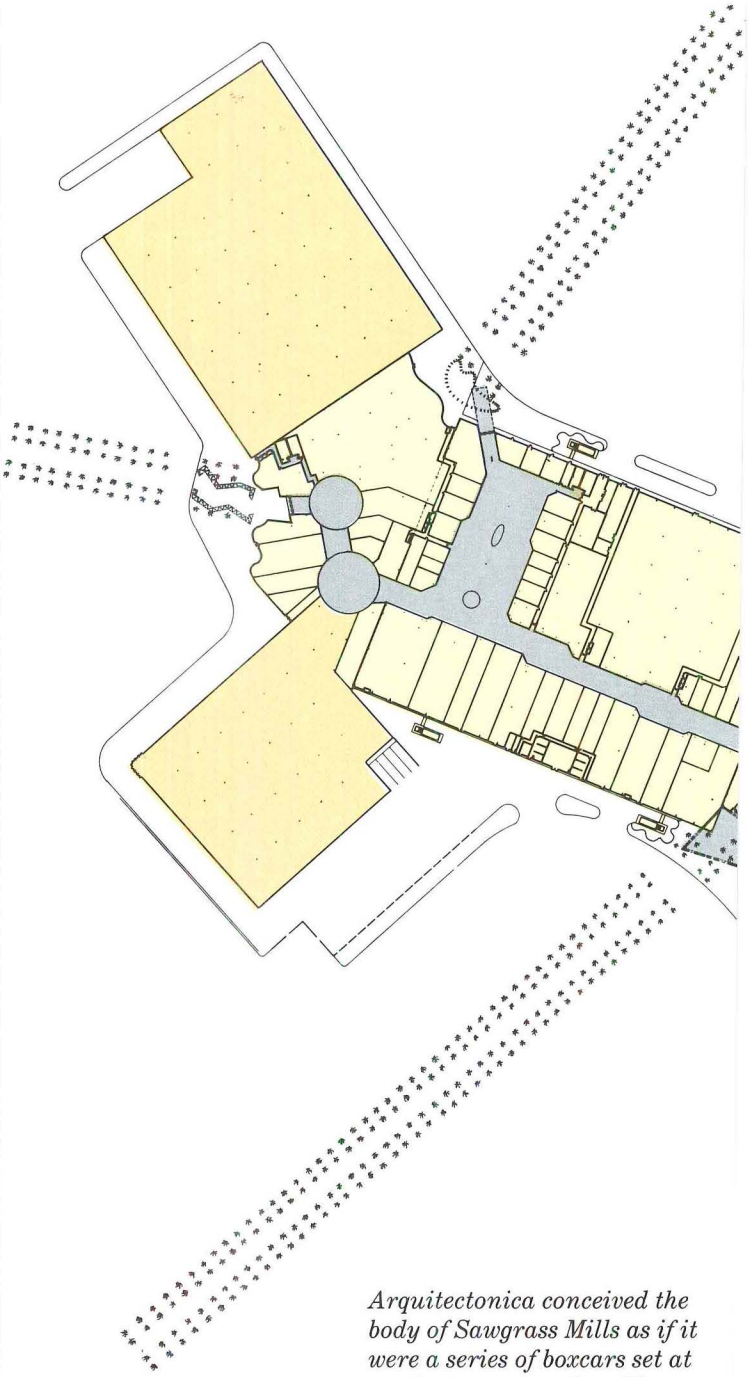
Out in the flat, faceless suburbs far west of Fort Lauderdale, Florida, Sawgrass Mills consumes a lot of land. It is billed as the world's largest outlet mall, and indeed it is enormous. The dimensions are daunting: the enclosed mall itself is 2.35 million square feet and there are 12,000 parking spaces to help devour the site's 120 acres. The ring road around the mall is 2.2 miles long. For its designers, Arquitectonica, the logistical problems were almost as immense as the mall itself, requiring rhyme as well as reason to keep shoppers both entertained and oriented. The design combines abstraction and invention, all within a highly ordered plan.

Thus, the "yellow toucan" parking sector leads by way of an allée of palm trees to an entrance in the form of a 50-foot-high bright yellow scaffold (overleaf). The "red snapper" section likewise leads shoppers down a palm-studded allée to a trussed entrance of red-painted I-beams bolted together (page 89 top). Each of the mall's five entrances is a different color and invokes another pared-down idea about construction: a freestanding bearing wall, a cube of netting, pylons protruding above ground, a grid with pipes slung through it like Tinker Toys. They are dramatic, but they need to be here; the mall is one of South Florida's new tourist destinations.

Inside, shoppers walk down "Main Streets" evoking regional architectural themes—Modern, Mediterranean, Art Deco, Caribbean—carried out with more analogy than authenticity. Arquitectonica paid particular attention to the tempo and scale of the shopping experience without trying to elevate it beyond its due. If there is a debt, it is to Disney, the acknowledged master of the manipulated environment. Storefronts, slightly scaled down, have varied roofs of turrets, parapets, and eaves. Green-painted palm fronds form a backdrop for these little mallscapes. From the ceiling hang banners and spoofy two-dimensional objects: airplanes, high-heeled shoes, binoculars, sea horses, robots. There's enough pageantry that the mall seems like a parade at standstill. It is playful, zany, and cheerfully ersatz, enough so that the live palms in the corridors come as a surprise.

Arquitectonica conceived the scheme as an allusion to the original outlet malls in abandoned New England mills: there are metal roofs and wood floors (better for walking the one-mile distance end-to-end). The overall form is a series of linked pre-engineered metal buildings, hardly a lofty architectural prototype but appropriate here. Four of these buildings turn at slight angles one from another to enclose courtyards, each with a different roof—a rotunda, a vault, a pyramid, a tent—and, of course, a different theme. They are big, airy rooms, brighter than the "Main Streets," with tile flooring. Two of these house the requisite mall food courts—an overproportioned "Sports Food Court" and a far more droll "Hurricane Food Court," where kiosks and signage are tilted to appear windblown.

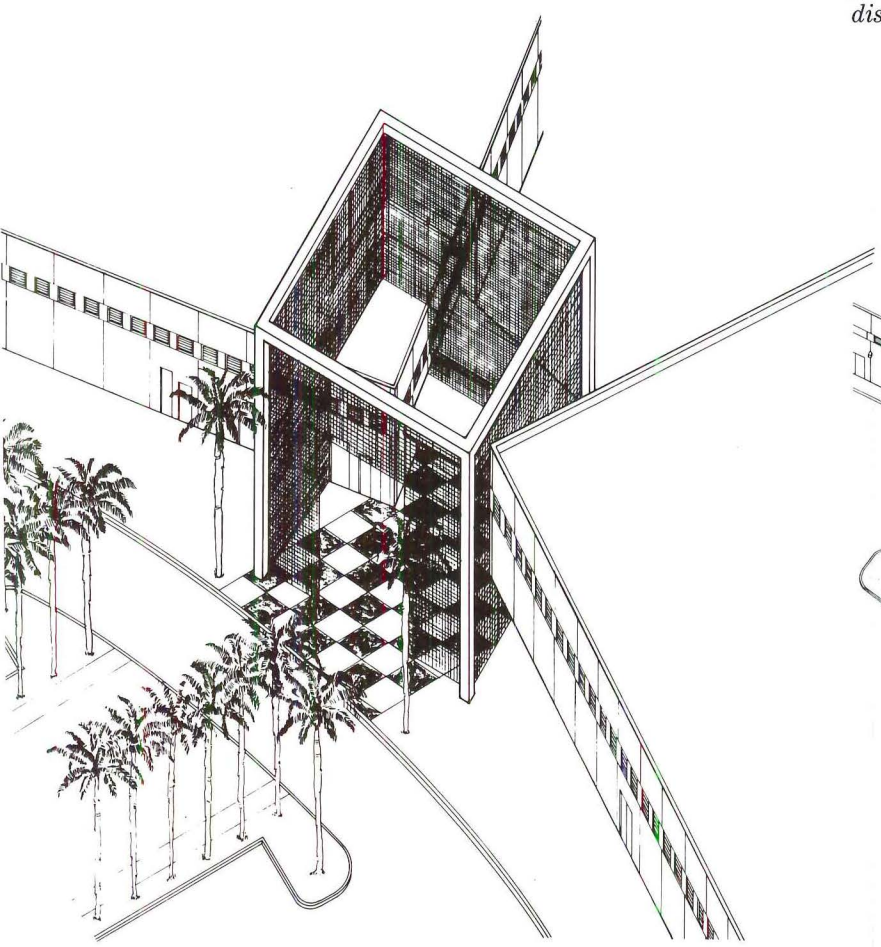
Of course, every mall must have its anchor stores, and Sawgrass Mills is no exception. There are seven now, and plans call for two more. The anchor stores, all discount or outlet operations, are appended to the central structure at hinge points. As is often the case, most of the anchors have adhered to their standard store design or hired their own architect, but because the landscape scheme is so strong and the entrances so powerful, the result is surprisingly coherent. Arquitectonica has long been willing to work within the constraints of the basic commercial building type, and none is baser than this—a factory for shopping, the pastime that has subsumed late-20th-century America. Sawgrass Mills is all about shopping, but its salvation is that it doesn't regard itself entirely seriously, but admits a little mischief, and even a little irony. *Beth Dunlop*

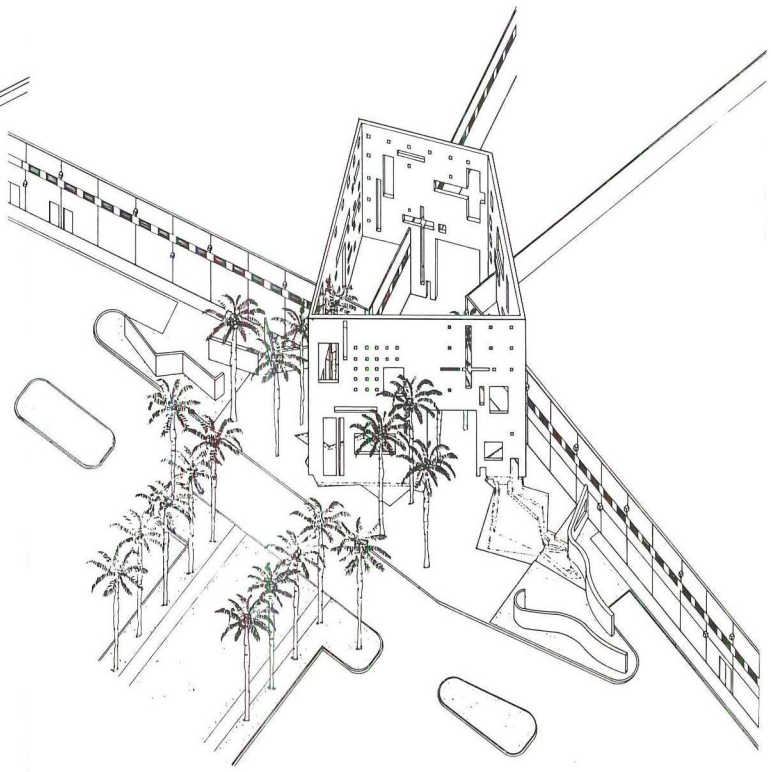


Arquitectonica conceived the body of Sawgrass Mills as if it were a series of boxcars set at angles to one another. The "boxcars" are actually shed-roof pre-engineered warehouse structures. They enclose the mall's four primary shopping "streets" and are linked to one another by a series of enclosed courts that function almost as hinges. The mall's major entrances feed into these courts. Anchor stores—in this case, discount outlets—are appended to the body of the mall. Although the anchor stores dominate the parking lots, each with its own design and outside entrance, the plan is such that they don't overwhelm the interior.

Aerial Visions

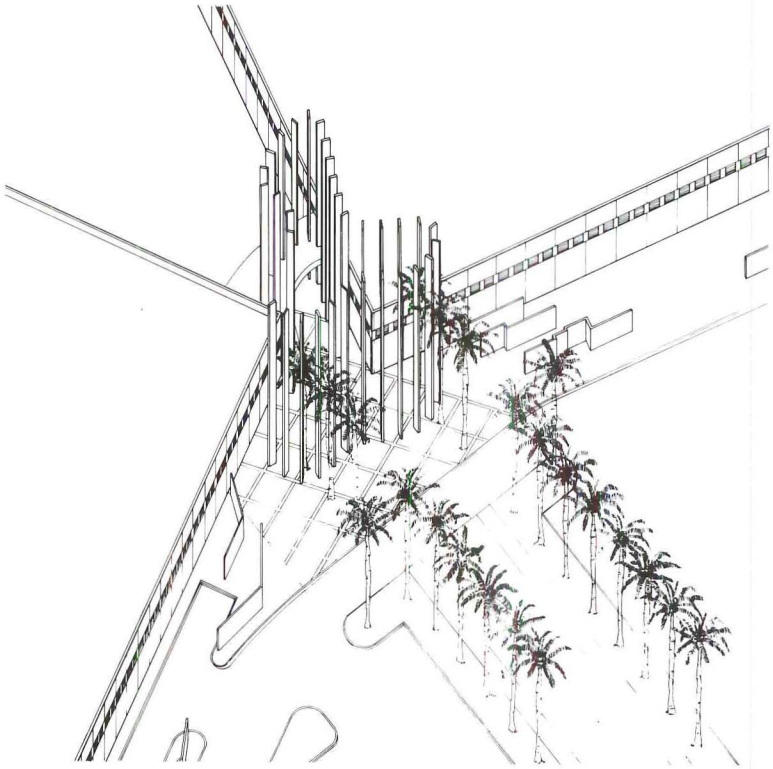
Each of the 50-foot-high entrances is a different form and color, each taking its form from the construction process. Thick white masonry walls punctured with variously sized openings frame one entrance (below right); this one, the most formal, is where the tour buses discharge passengers. The green and white pylons of another entrance stand alone, supporting nothing (opposite left). A funnel-shaped pink frame has pipes slung through it (opposite right). The pipes, although they seem randomly placed, actually serve as windbracers. In each case, the construction forms are overscaled and simplified, to





communicate a single "big idea" that can be easily remembered. Arquitectonica devised whimsical parking-lot "markers"—a blue dolphin, a pink flamingo, a red snapper, a yellow toucan, a green toad, and white seahorses—to coordinate with the entrances. Shoppers park in one of these lots and then proceed to the matching entrance, guided by an allée of palm trees. The palms penetrate the structures rather than terminate the vista. Arquitectonica placed the entryways slightly off-axis from the allées, intentionally turning the expected composition askew.

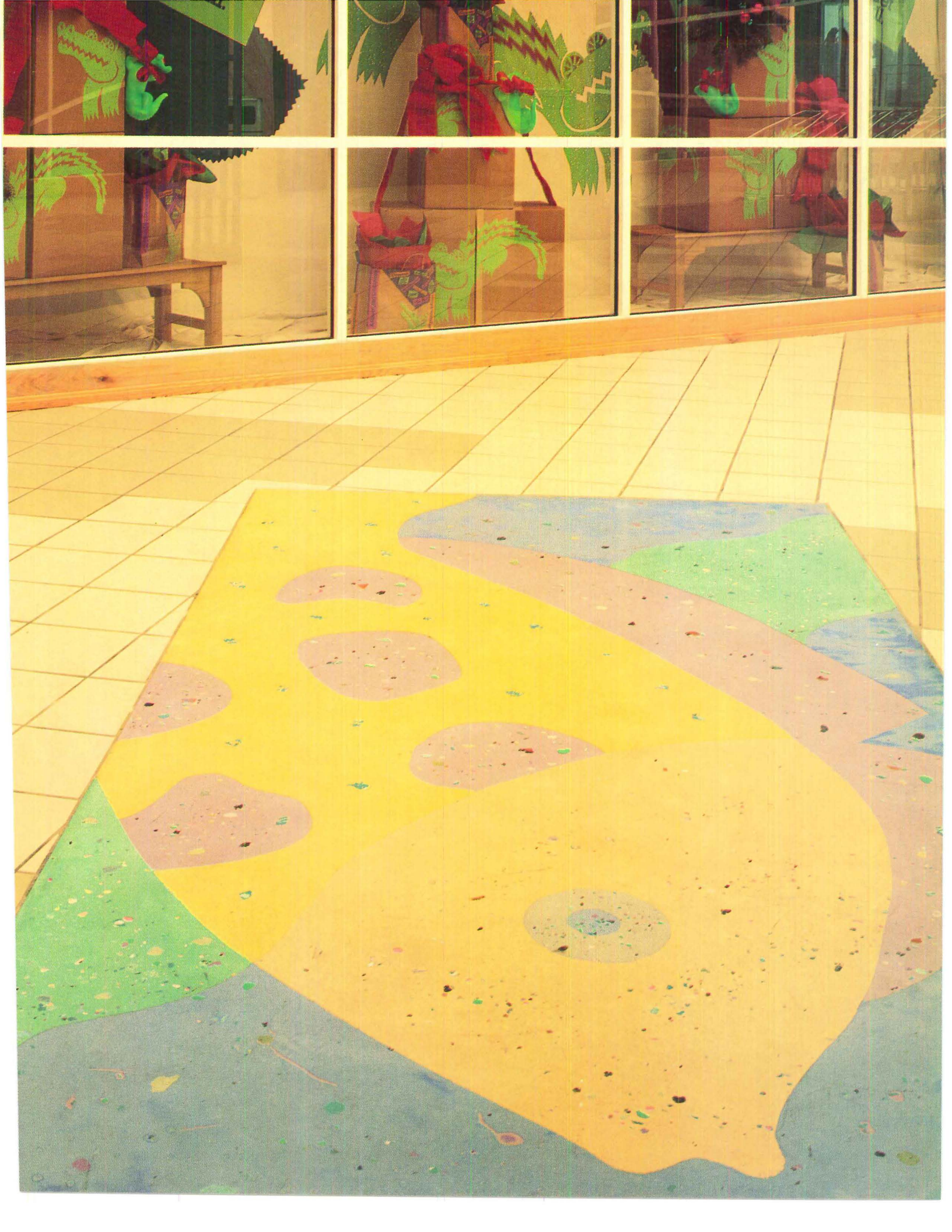
Patricia Fisher



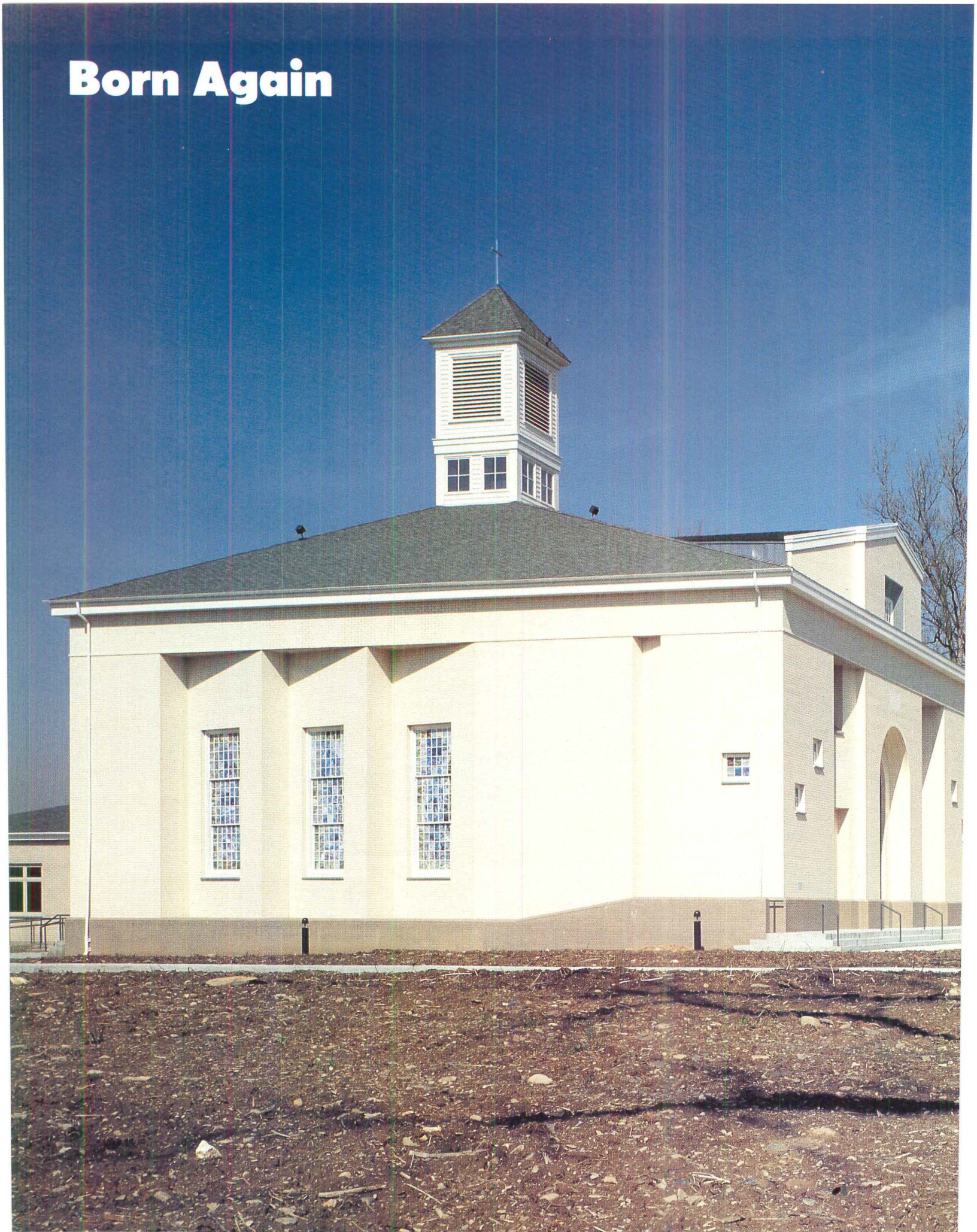
Steven Brooke photos, except as noted

Interior courts link the linear shopping "streets," each a different shape with a different roof. The New Ideas Court (top left) resembles an airplane hangar; it's used as an exhibition hall. The Sports Food Court (middle left) has a mock blimp over a bar. The Cabana Court is under a tensile roof. In the center, a touch of Disney: a pool with animated birds and alligators (bottom left). Beach allusions include terrazzo "towels" (opposite).

Credits
Sawgrass Mills
Sunrise, Florida
Owners: *Western Development Corp. and Kan Am Realty*
Architect: *Arquitectonica International Corp.—Bernardo Fort-Brescia and Laurinda Spear, principals-in-charge; Sergio Bakas, project manager; Carlos Prio Touzet, project architect; Jose Matute, job captain; Beatrice Bastidas, Stuart Bauer, Jenifer Briley, Ronald Cox, Juan Carlos David, Michael Dax, Deborah Desilets, Daphne Gurri, Shahrizan Amir Hamzah, Yehuda Inbar, Scott Kirk, Eduardo Llano, Douglas Mar, Antonio Moreno, Kris Petersen, Jaime Rouillon, Dan Zabowski, team*
Engineers: *Riva, Klein & Associates—Antonio Riva, principal-in-charge (structural); Lagomasino, Vital & Associates—Juan Lagomasino, principal-in-charge (mechanical, electrical, plumbing); Darby & Way—Greg Darby, principal-in-charge (civil)*
Consultants: *Energy Economics, Inc. (energy); Schirmer Engineering (fire/life safety); Fuller, Dyal & Stamper—Herman Dyal, principal-in-charge (graphics); Lehr Associates—Robert Rollman—principal-in-charge (site lighting)*
Landscape Architect: *The SWA Group—Joe Runco, principal*
General Contractor: *Centex Rooney*



Born Again



New church buildings weave older ones into a village for worship.

New Hackensack Reformed Church
Wappingers Falls, New York
James Oleg Kruhly + Associates, Architect

I told the church that I could not design a clone of the existing sanctuary," architect James Oleg Kruhly recalls. "But I could compose a church with a classical facade . . . ."

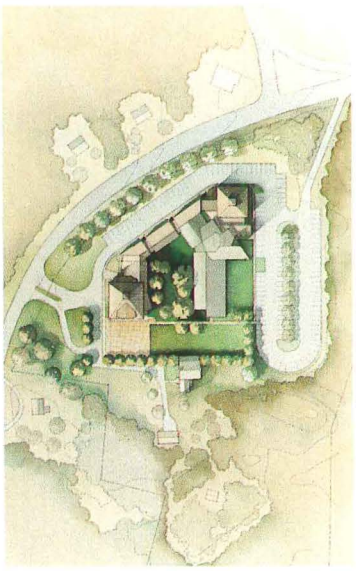
The question arose when the congregation of the New Hackensack Reformed Church in Wappingers Falls, New York—a town of 5,000 people some 75 miles and a world away from New York City—were ordered to vacate their 1853 white-brick Greek Revival church, which lay in the flight path of the local airport. Warned of the impending FAA action, the church had acquired in the late 1960s a 12-acre parcel of land just a mile down the road, where it planned to relocate. The handsome 1840s brick house on the property readily became a parsonage, but the one-story cinder-block education building plunked down on its sloping front lawn proved a less fortunate acquisition. Graceless in itself, it compromised the entire site. (And the roof leaked, too.)

By 1987, with the demise of the treasured sanctuary close at hand (and the earlier venture into "modernism" in mind), the congregation was inclined to model the new church as exactly as possible after the old one. Happily, reason, cost considerations—and Kruhly's assurances that the church would *look* like a church—prevailed. The dignified structure that wears the promised "classical facade" owes little to traditional churchly trappings, but its religious mission is unmistakable.

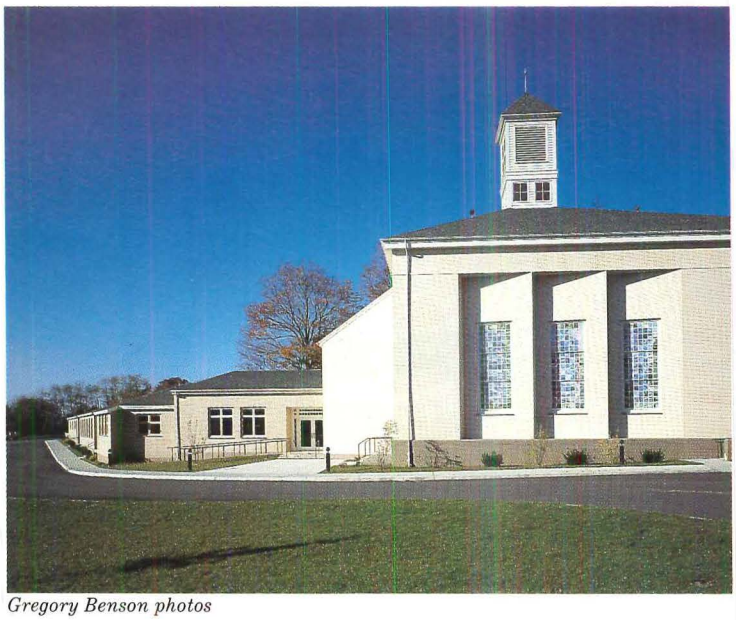
To Kruhly an equally important issue was the relationship of the sanctuary with other elements of the growing church complex, which would include new offices, music rooms, and gathering places in addition to the existing education center and parsonage. His solution creates a unified community with two forceful strokes. First, the sanctuary turns its side to the busy county road that loops around the property (site plan right), fronting instead on a green that generates a new axis with the parsonage. Secondly, it joins with the education building and new ancillary spaces—and large, carefully saved trees—to define a landscaped courtyard reminiscent of the New England town commons. (A fellowship hall, planned but not yet built, will connect with and further neutralize the old building.) The smaller buildings, sheds strung along a clerestory-lit corridor punctuated by three vestibules, turn a restrained public face to the road while opening wide windows to the private inner green.

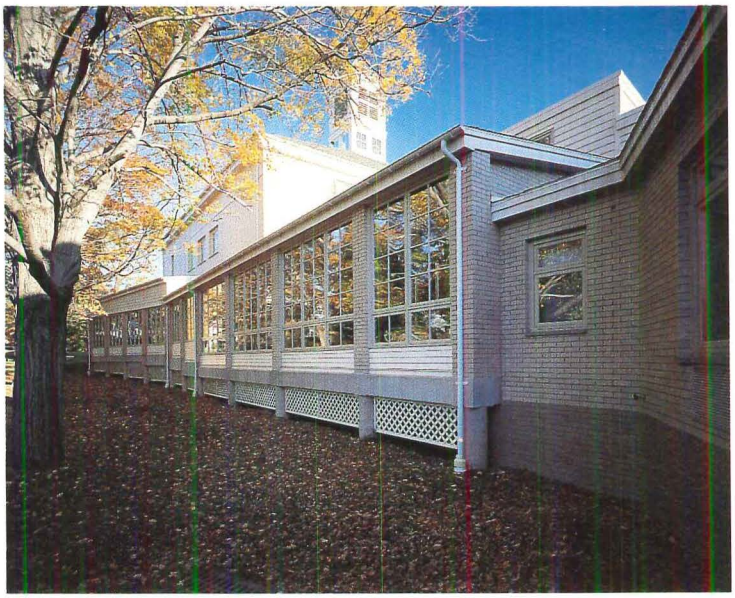
As the crux of the project's organization and character, the commons also establishes a strong framework for the sanctuary. Asked for "a simple [but churchlike] square meeting room" seating about 400, Kruhly provided a 70- by 70-foot square white-brick structure (see plan) that rises to a hipped roof broken by a dormer over the choir loft. A lanterned belfry brings daylight down to the nave. Each side of the square, however, finds its own outward expression as the space inside is modulated to improve circulation and acoustics. At the front, stair towers frame a trio of niched entries that suggest a "porch." But the canted walls on either side of the main entrance derive from the segmented geometry of the pews, which is repeated in the angles of a shallow glass-walled narthex and the choir loft above it. The angle appears again in window recesses on the south wall of the sanctuary and reverses at the shedlike narthex on the north, where sliding wood panels open to the nave when extra seating is needed. On the west the chancel projects to merge with a parlor and gathering room in the first of the chain of smaller buildings.

The congregation's verdict? More than 1,500 worshippers overflowed the three services held last Christmas Eve. *Margaret Gaskie*

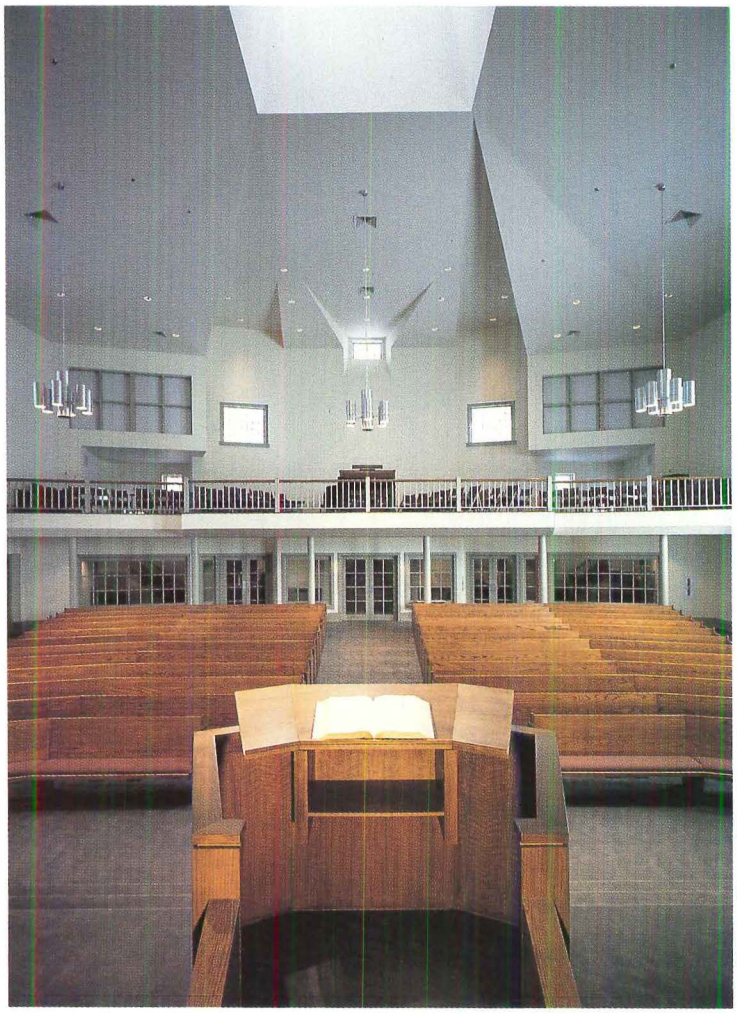


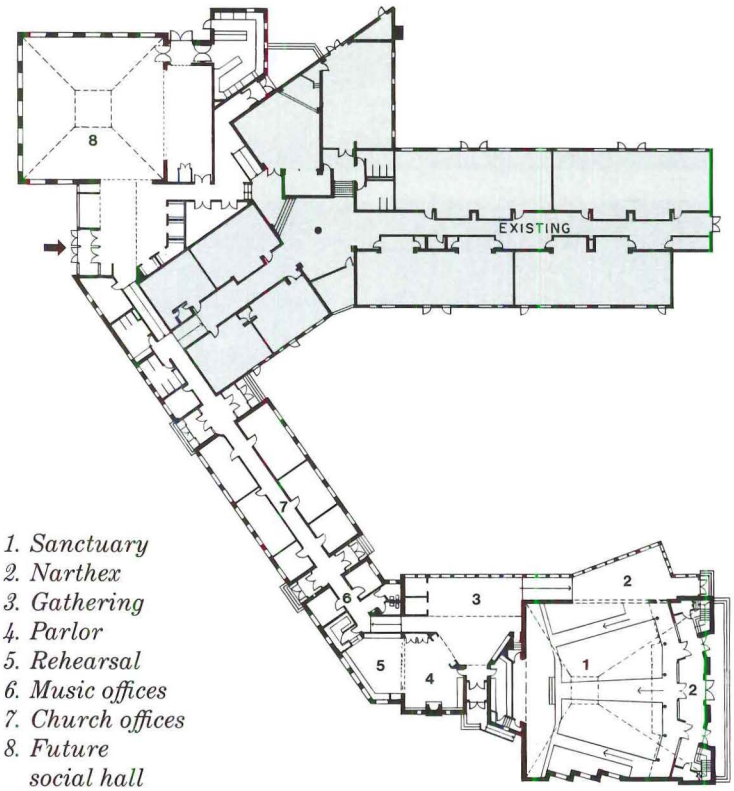
Organized around a "village green," the church complex gives the new sanctuary pride of place but weaves the 1969 education building into the composition with a connecting chain of smaller buildings. The crisply detailed white brick of the steel-framed sanctuary (opposite) complements facades modeled in response to interior space needs. Deep reveals and green slate sills emphasize windows glazed with stained glass from the original church. A watertable base of dark-gray brick unites the sanctuary with the subsidiary pavilions (lower left opposite). Cavity walls of concrete block and brick turn light-gray brick to their "public" sides but open to the courtyard more domestic faces of painted wood siding and broad wood-framed windows between brick piers (lower right opposite).





Gregory Benson photos

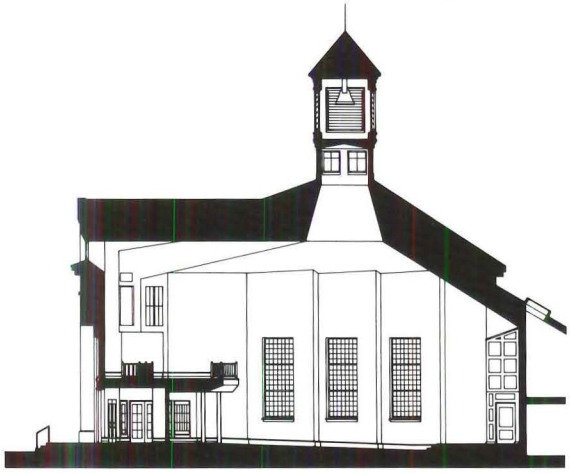




1. *Sanctuary*
2. *Narthex*
3. *Gathering*
4. *Parlor*
5. *Rehearsal*
6. *Music offices*
7. *Church offices*
8. *Future social hall*

Although the nave is square in plan, subtracting the space of the narthex and stacked choir balcony (left) foreshortens it, bringing its stained oak pews closer to the pulpit. (All furnishings and fittings were designed by the architect.) At the recessed chancel (opposite), a simple wooden grid evokes delicate plasterwork in the original church. Daylighting from windows and belfry lantern is supplemented by general illumination plus a constellation of spotlights over the chancel area. Faceted ceilings over the choir loft and chancel also aid acoustics by diffusing sound.

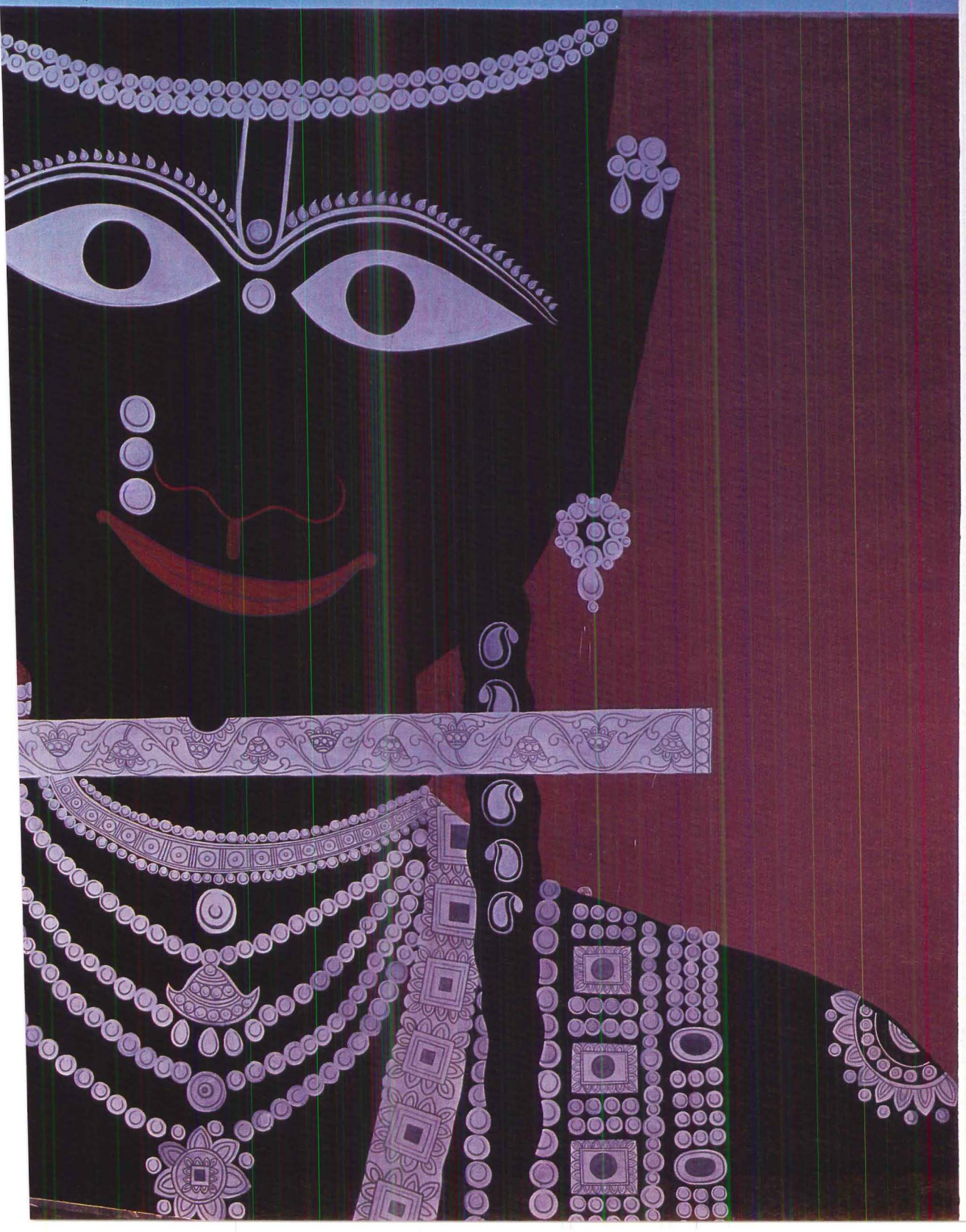
Credits
New Hackensack Reformed Church
Wappingers Falls, New York
Owner: *New Hackensack Reformed Church*
Architect: *James Oleg Kruhly + Associates—James Oleg Kruhly, project architect; Jean Farquhar McCoubrey, Kirby Mehrhof, project managers; Marshal Compton, Martha Anez-Spangler, Julie Gabrielli, Tom Purdy, Mary Dempsey, Steve Glascock, Martha Mohr, project team*
Engineers: *Wittes and Associates (structural); Basil Greene (mechanical); John G. Zafiropoulos (electrical); Milton Chazen Associates (site)*
Consultant: *Robert A. Hansen Associates (acoustics)*
General Contractor: *William Manfredi Construction*

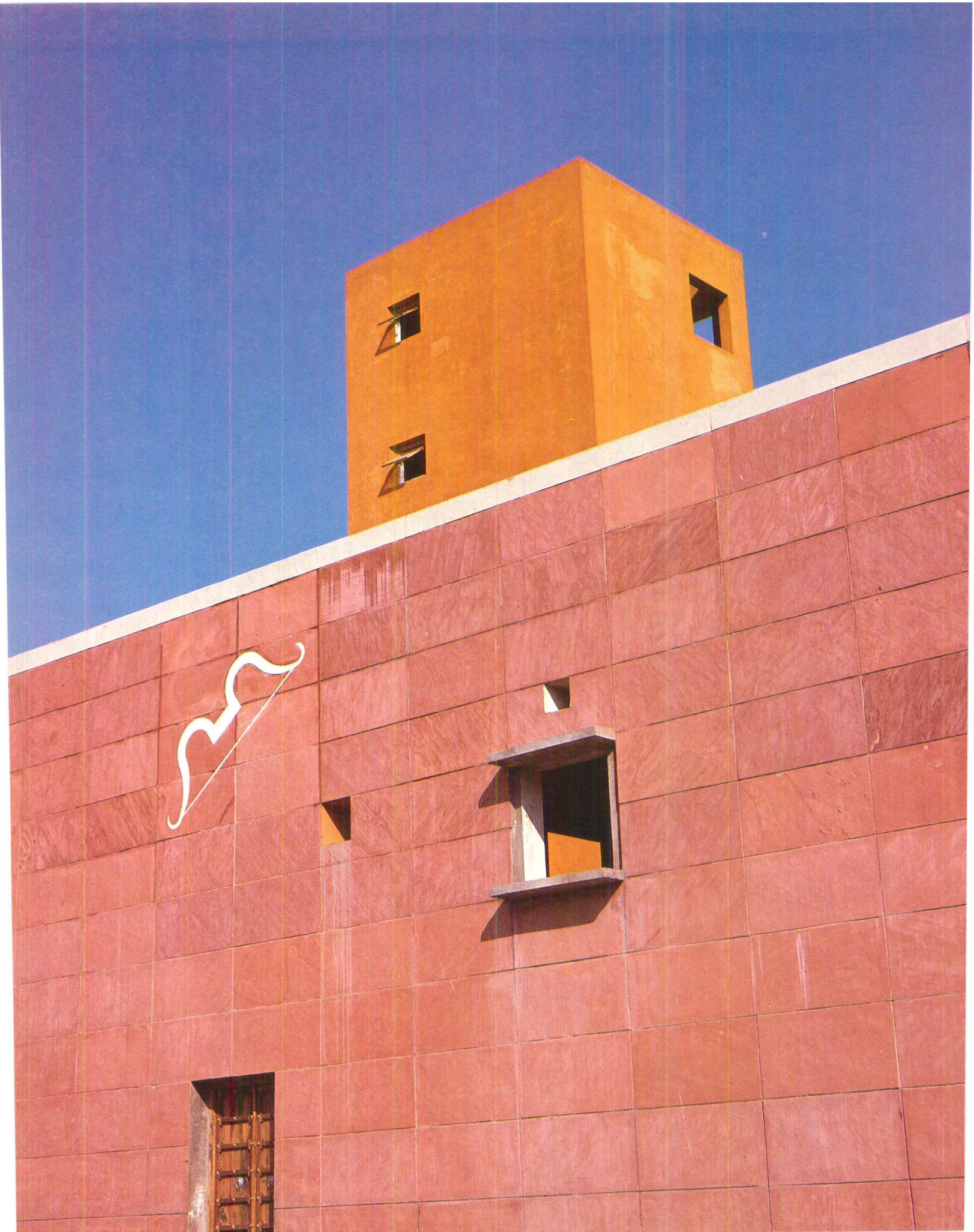


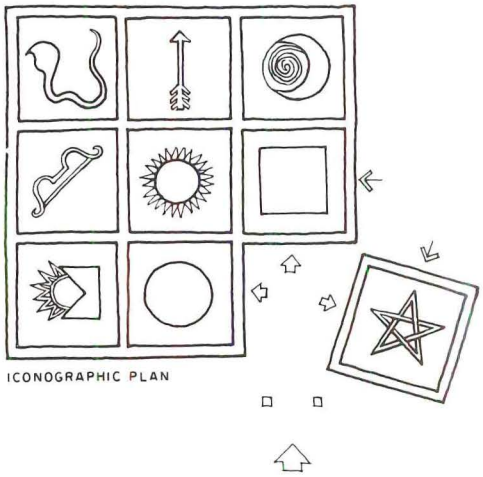
Jawahar Kala Kendra
Jaipur, Rajasthan, India
Charles Correa, Architect

Squaring the Circle

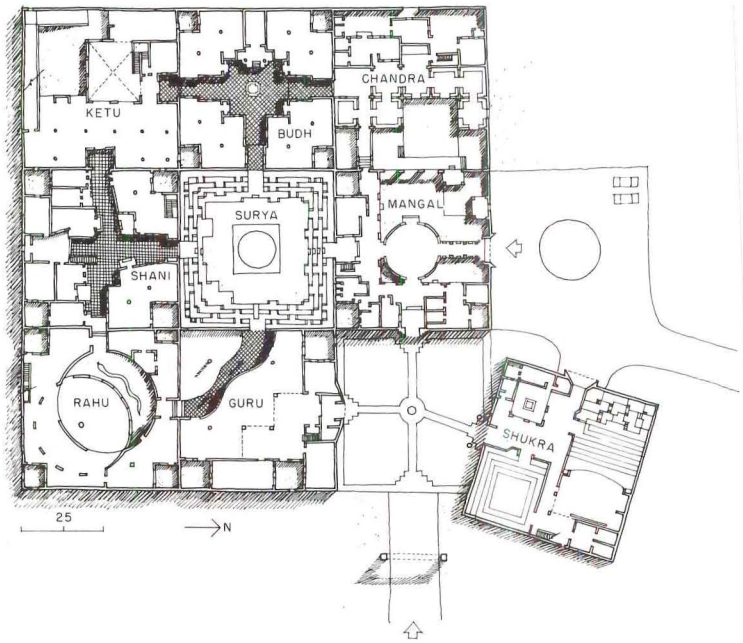
A new museum in India plots a modern course with ancient Hindu cosmology.
By Patricia C. Jones







Jawahar Kala Kendra, Jaipur's new museum of arts and crafts, was commissioned by the Department of Culture of the Indian state of Rajasthan and is dedicated to the memory of Jawaharlal Nehru, India's first Prime Minister. The building is contained by 90-foot-long exterior walls of red sandstone with a coping of beige Dholpur stone, the same material used for Jaipur's Jantar Mantar observatory, Fatehpur Sikri, and the Red Fort at Agra. Inlaid white marble and black granite are used to create the planetary symbols representing the nine houses (mahals) that constitute the building within.



A modern concrete-frame construction with brick and stone infill, Charles Correa's new museum of arts and crafts in Jaipur, India, is based on the same ancient *navagraha mandala* (a pattern symbolic of the universe) as the city itself: a plan consisting of nine squares, each containing an ideogram representing each of seven planets and two imaginary ones. Mirroring the plan of Jaipur—the capital of Rajasthan and a city planned in the 17th century by its ruler, an avid astronomer—the museum's northeast corner is displaced, creating a formal entrance and separating the performing arts complex from the rest of the building. At the museum's center, as at the mandala's, is an orb representing both sun and void. It is in this circle, a contemporary evocation of the black holes of the universe, that Correa sees the link between the Hindu cosmology behind the mandala and modern Indian (and global) culture. "The human mind hasn't changed," says Correa. "We find emptiness infinitely satisfying—that's why houses are still designed around courtyards. We're still trying to understand what's inside us by externalizing it."

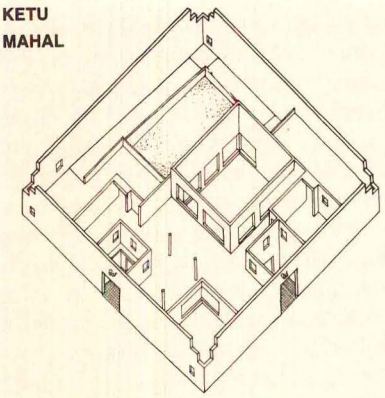
Correa's building is surrounded by government housing, and presents a fortresslike face to the public. Massive 90-foot-long exterior walls, sheathed in red sandstone to reflect the hue of Jaipur's existing architecture, contrast strikingly with the human, almost playful scale of the interior. Here, the plaster walls of each of the nine planetary "houses," or *mahals*, is painted a different pastel color, representative of each planet, and the walls are frescoed with images from early Hindu mythology. The one- and two-story buildings-within-a-building take full advantage of Rajasthan's desert climate with outdoor ramps, open-air passageways and "streets" of craftsmen, small balconies, and water-filled atriums. A three-story tower allows visitors an overall view of the complex. As in many of Correa's buildings, the plan, as it moves constantly from interior to open space, creates the feeling of a miniature city, with interconnecting streets and central plaza. "The spaces allow you to rest your eyes from what you've just seen," Correa explains.

Correa has used the concept of a modular structure composed of a series of interrelated but independent elements which together give a sense of movement and shifting light and shade in many other buildings, from the Gandhi Smarak Sangrahalaya in 1966 to the Madhya Pradesh State Assembly building in Bhopal, begun in 1983. This design solution has a practical advantage as well: it's an effective approach for Indian public structures, where construction funds are often allocated piecemeal, forcing construction to proceed in stages. The Jawahar Kala Kendra has had four different contractors working on different sections of the building for more than four years. While this has led to difficulties, it was feasible because each contractor was working on separate mahals. But the lack of continuity between building sections and an often-interrupted construction schedule have also resulted in poor attention to detailing, especially in painting, and to water damage.

Maintaining a building with such complex painting and design requirements remains a hurdle. Because the client for the museum is a government body and no museum professionals were involved during the design process, the building lacks a strong program and a careful analysis of space needs. There is, for example, limited storage space and no loading docks, and administrators are already beginning to rethink the use of the various "planets" and other design elements.

Patricia C. Jones is a writer and urban planner who has traveled extensively in India.

KETU MAHAL

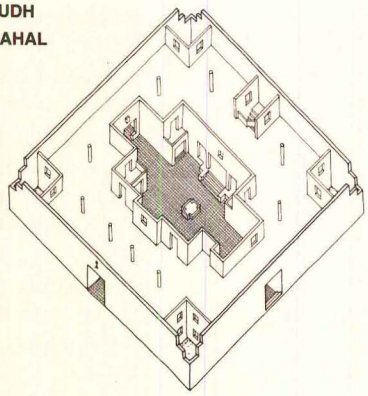


PLANET SYMBOL

COLOR: BROWN, BLACK
FUNCTION: TEXTILES & COSTUMES

1

BUDH MAHAL

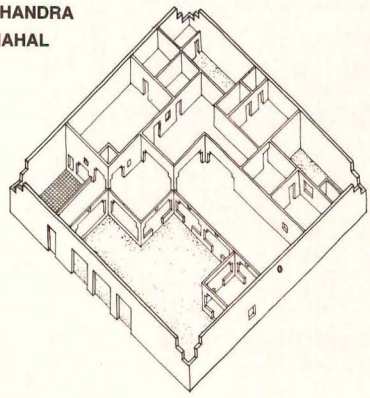


PLANET SYMBOL

COLOR: GOLDEN YELLOW
FUNCTION: EXHIBITIONS

2

CHANDRA MAHAL

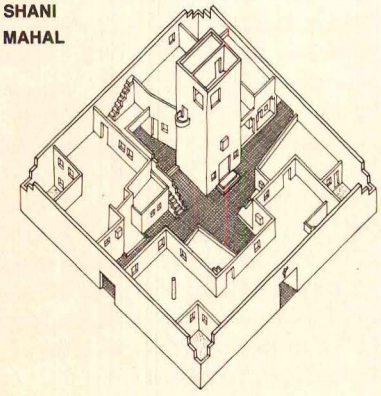


PLANET SYMBOL

COLOR: MILKY WHITE
FUNCTION: CAFETERIA

3

SHANI MAHAL

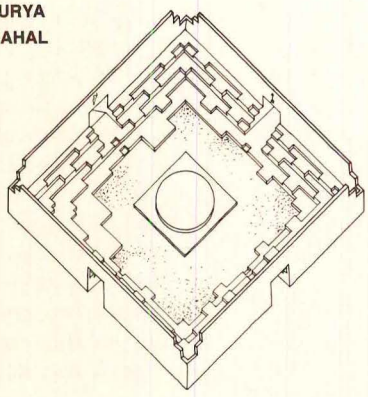


PLANET SYMBOL

COLOR: EARTH RED
FUNCTION: CRAFTSMEN

4

SURYA MAHAL

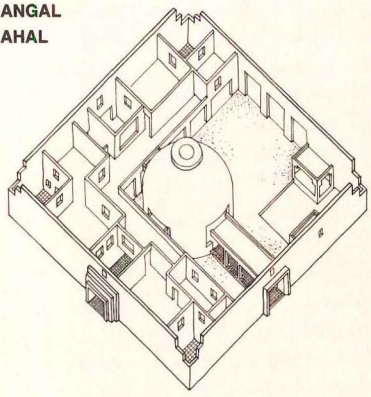


PLANET SYMBOL

COLOR: RED
FUNCTION: PUBLIC PLAZA

5

MANGAL MAHAL

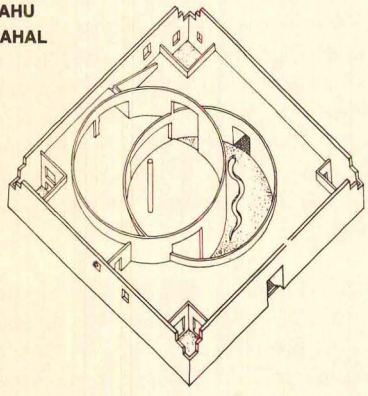


PLANET SYMBOL

COLOR: RED
FUNCTION: ADMINISTRATION

6

RAHU MAHAL

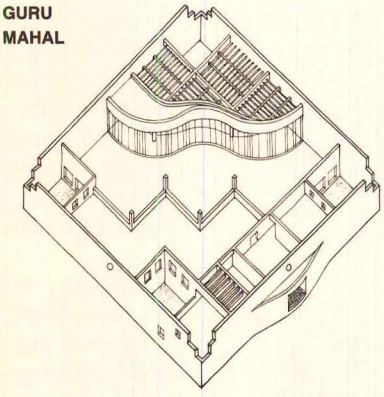


PLANET SYMBOL

COLOR: IRIDESCENT
FUNCTION: WEAPONRY

7

GURU MAHAL

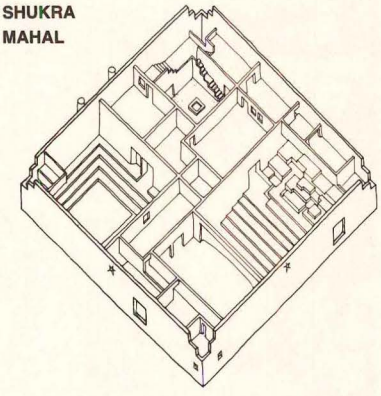


PLANET SYMBOL

COLOR: LEMON YELLOW
FUNCTION: LIBRARY

8

SHUKRA MAHAL

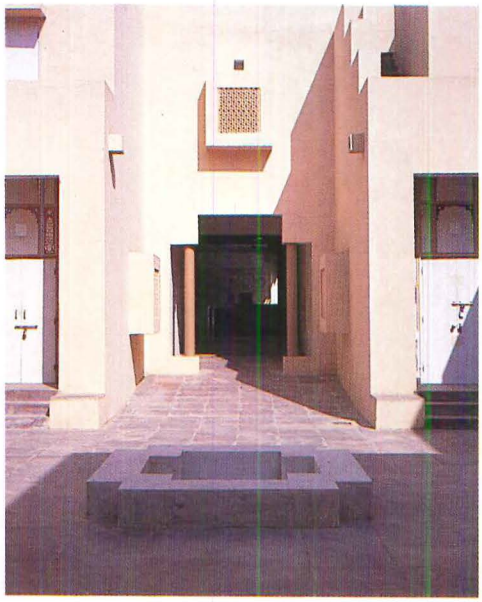


PLANET SYMBOL

COLOR: WHITE
FUNCTION: THEATER

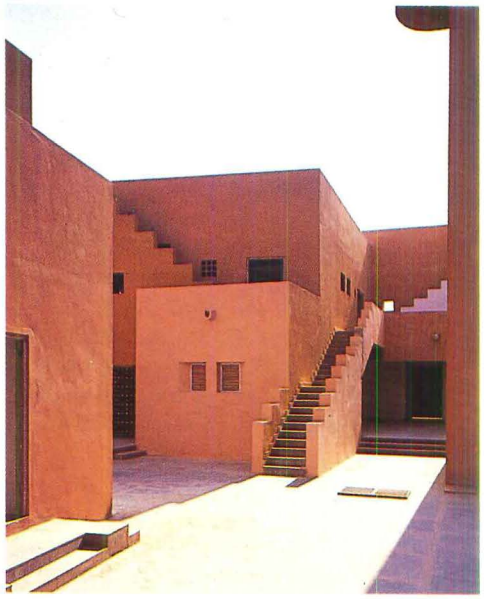
9

1



2

3



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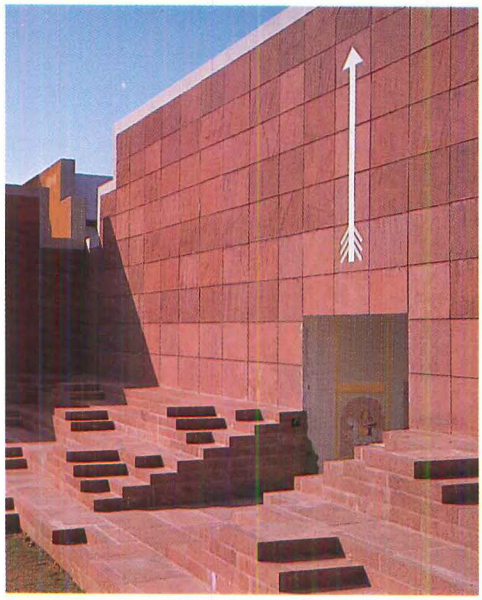

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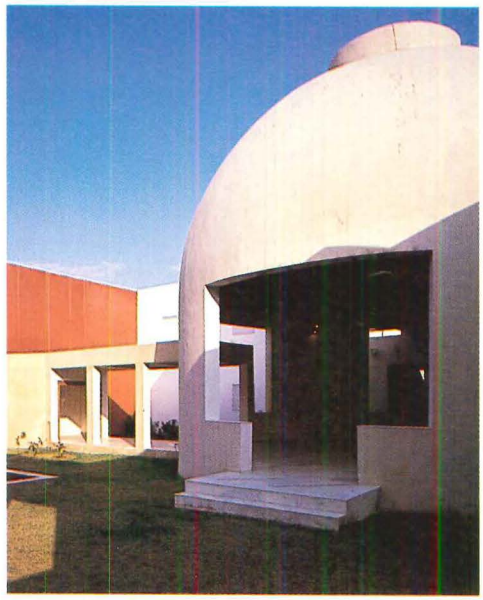
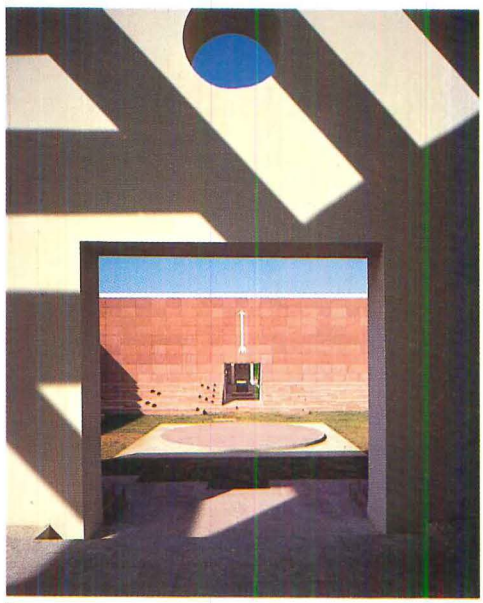


6

7



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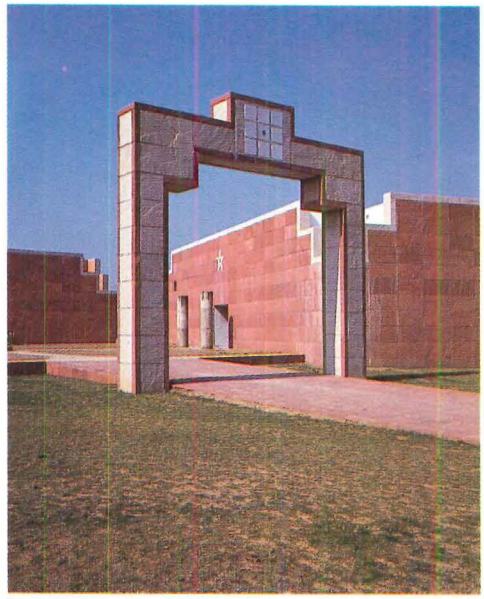

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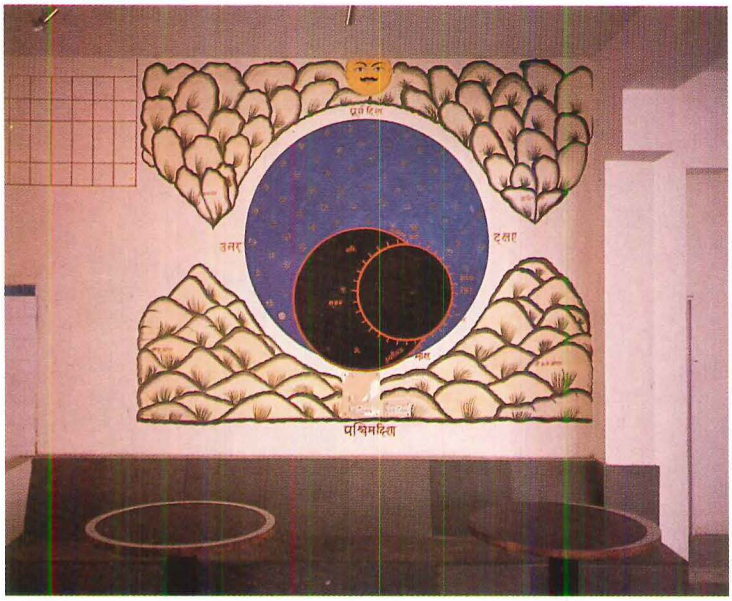
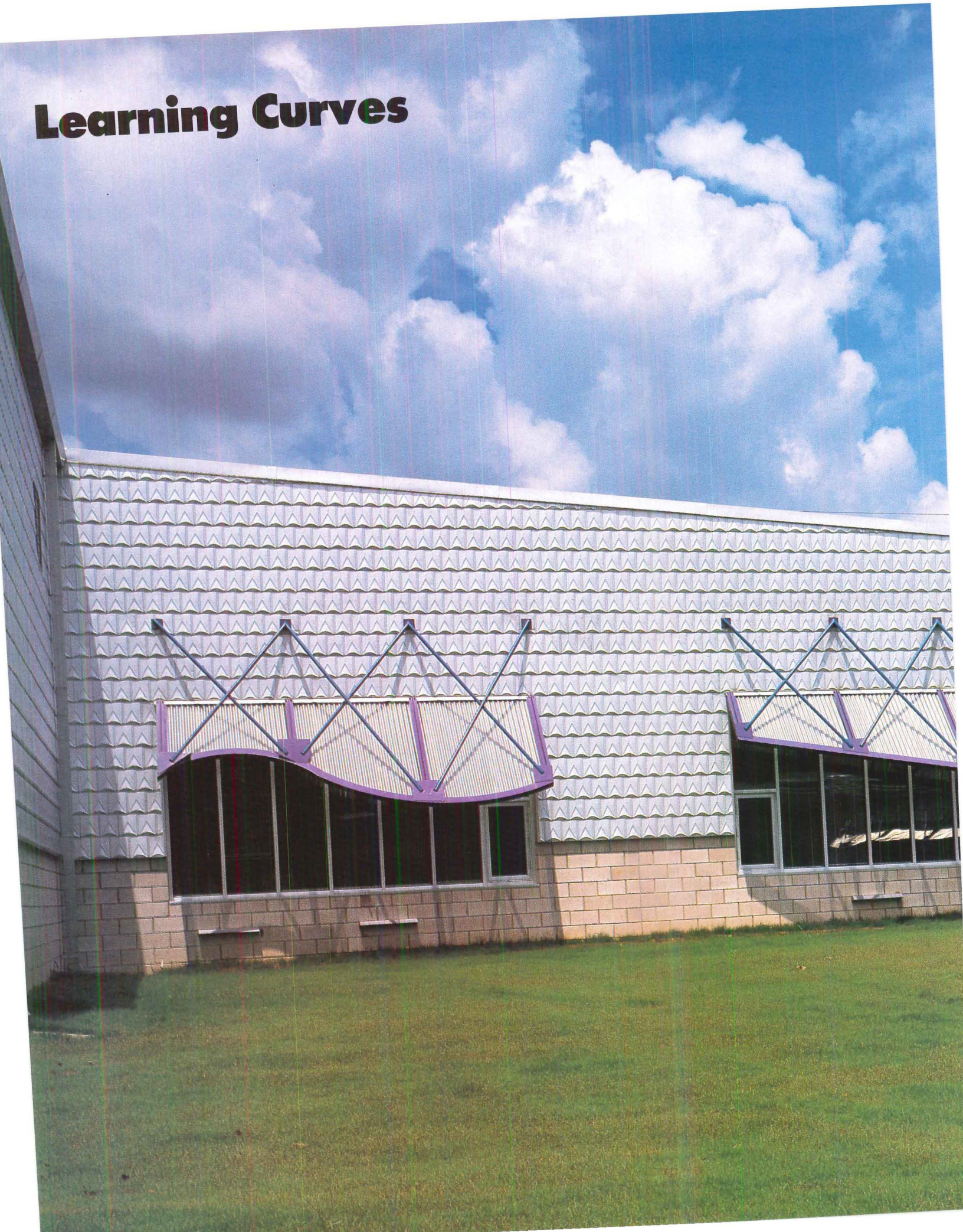


Plan and color express each mahal's correspondence with both its museum and cosmologic functions (previous pages). The fresco on the central dome in the Mangal Mahal, the administrative "planet," is a Jain cosmograph depicting the landscape of the middle world (opposite). Cosmographs usually represent the continents inhabited by man, with their animals, the encircling waters, and long rivers. The Rahu Mahal (top left) is equated with the eclipse of the sun, represented here by two intersecting circles, resulting in a crescent-shaped reflecting pool, a central, marble-floored public space, and an interior exhibition area. The planet Rahu is characterized as the devourer or the destroyer, and the space is used to display the weaponry of the Rajput warriors. Two frescoes in the Chandra Mahal (center and bottom left) represent the sun, the earth and the moon within the universe and the moon in relation to the movement of the earth. The Chandra Mahal, whose planet is the moon and represents the heart, serves as the museum's restaurant and cafeteria.

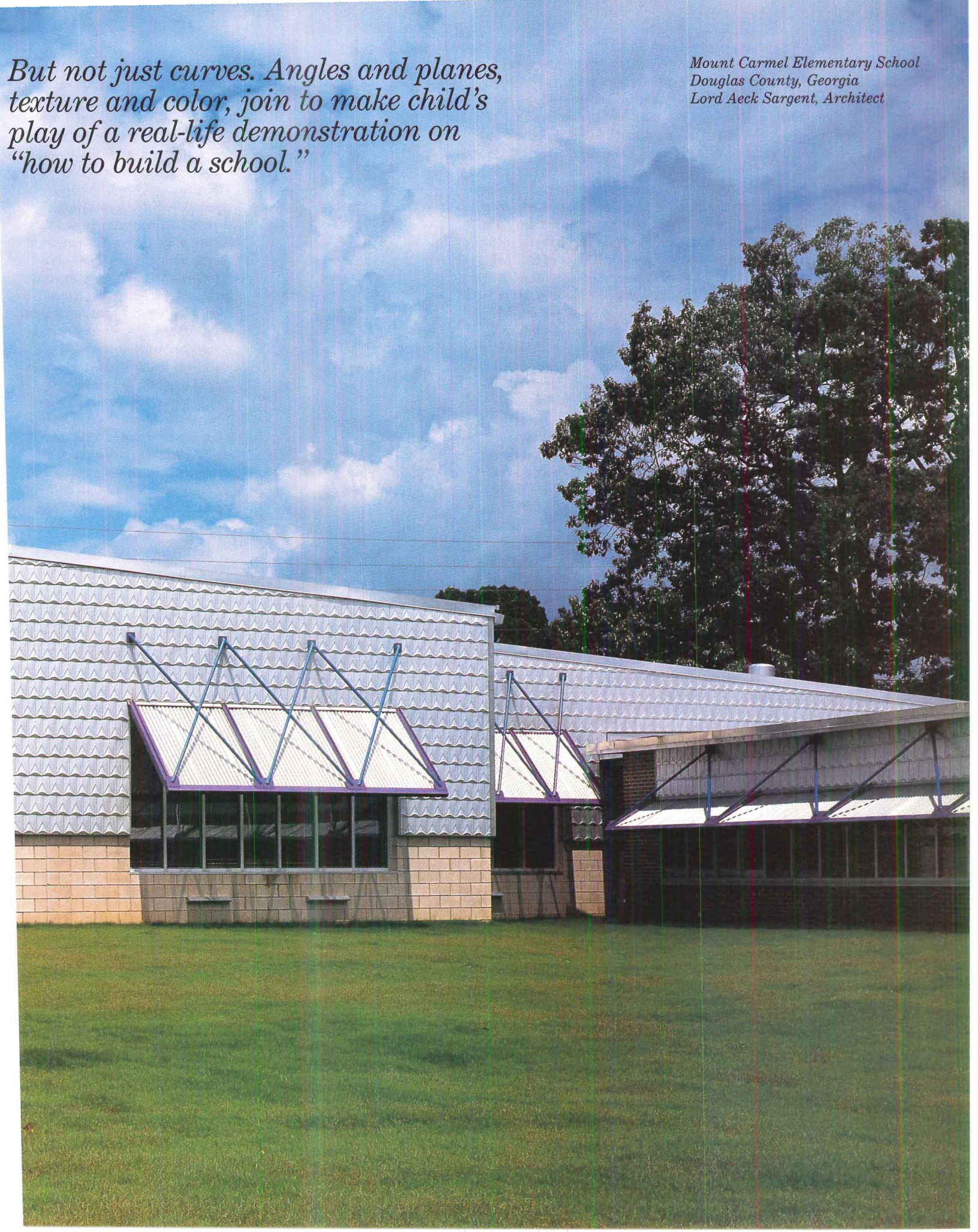
Credits
Jawahar Kala Kendra
Jaipur, Rajasthan, India
Owner: *Government of Rajasthan*
Architect: *Charles Correa; Viren Abuja, Kairav Mazmundar, Rahul Mehrotra, Sunneel Shelar, project team*
Engineers: *Kamal Hadkar (structural); Maneck Dastur (mechanical)*
Consultants: *Gautam Suri (acoustics); Manu Desai and Chelna Desai (graphics); Manu Desai and Jutta Jain (mythology)*
Landscape Architect: *Kishore Pradhan*
Construction Management: *Rajasthan State Public Works Department*


वसति : तीर्थ २
विनिता नगरी
रुचक २
रुचक ३
रुचक ४
रुचक ५
रुचक ६
रुचक ७
रुचक ८
रुचक १
कुमुदा
मध्य रुचक १
मध्य रुचक २
घात की रुचक ना पूर्व भरत क्षेत्र
मुख्य विस्तार
५६५४/१२९/२१२
कुमुदा विस्तार १८४३
मागध
१७५/२१२
घात की रुचक ना पूर्व भरत क्षेत्र
मुख्य विस्तार
५६१४/१२९/२१२
कुमुदा विस्तार १८४३
मागध
१७५/२१२
पुष्करवर द्वीपार्द्ध पश्चिमाभरत क्षेत्र ना मुख्य विस्तार
४१७७४
मागध १७३/२१२
मध्य विस्तार
५३५१२७८४१२
बहिर्विष्कंभ
५५ ४४५५/१३/२१२
पुष्करवरद्वीपार्द्ध पूर्व भरत क्षेत्र ना
मुख्यविस्तार
मागध १७३/२१२
मध्य विस्तार
५३५१२७८४१२
बहिर्विष्कंभ
५५४४५५/१३/२१२

Learning Curves



But not just curves. Angles and planes, texture and color, join to make child's play of a real-life demonstration on "how to build a school."



Mount Carmel Elementary School
Douglas County, Georgia
Lord Aeck Sargent, Architect

Should we take seriously a school that beaches a great silvery whale and its snaky sidekick in the front yard? Or greets arrivals with a sharkstooth canopy poised on rocker joints and counterpoised with big granite boulders? Indeed, yes. For the playfulness, like that of a child, is serious, the reflection of a commitment to cost effectiveness that places as much value on effectiveness as on cost.

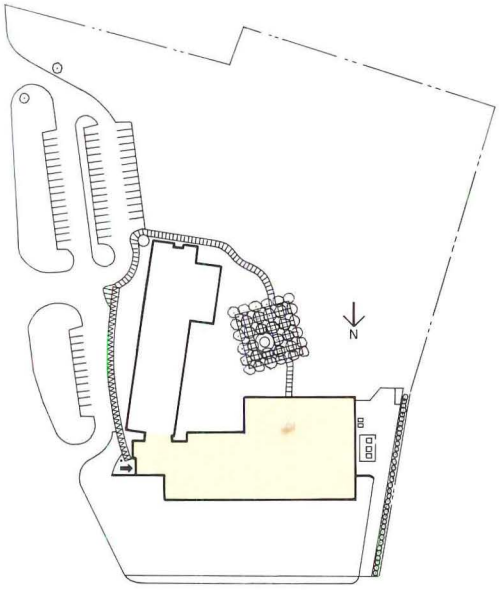
In 1989, when Lord Aeck Sargent was commissioned to upgrade the Mount Carmel elementary school, the local school board was guided by a director of construction who set out to improve the county's school buildings by creating a climate that would encourage innovation and by hiring architects who would provide it. Mount Carmel, which serves a semirural county on the fringe of Atlanta, was then a hodgepodge of accretions dating from the 1930s—a wood-framed one-room schoolhouse—to the late 1950s—additions in the nondescript style architect Terry Sargent calls "extruded ranch house." On the firm's recommendation the oldest buildings were to be razed, the most recent renovated. A brand-new building would add needed classrooms plus such specialized spaces as a gym, cafeteria/auditorium and kitchen, music and art rooms, and a media center.

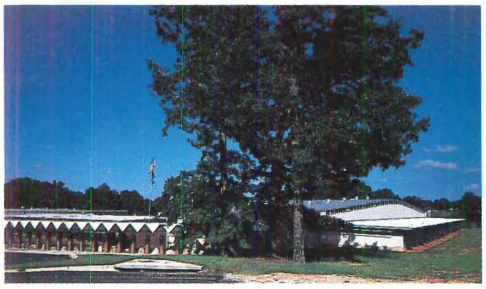
The 31,000-square-foot addition is divided naturally into a flat-roofed, one-story block of classrooms ranged against a much larger volume that contains the common facilities and a double-loaded corridor. The bigger element rolls wavelike from classroom height to crest over the gym before subsiding to merge with the existing wing in a shared entrance lobby. Both the budget and the structural requirements, especially the demands posed by the clear spans for the gym and cafetorium, suggested flexible, lightweight steel framing of exposed metal bar joists and steel deck combined with load-bearing concrete masonry. When the client urged a metal roof as well, the ingredients for what Sargent calls a "warehouse esthetic" were at hand. It remained only for the architects to weave in a lively sense of fun (rare among people over twelve years old), together with an appreciation of the school's architecture as a potential source for learning. "Building is what we know best," Sargent says, "so that's what we tried to show."

The "fish," for example, emerged serendipitously when a round lobby window added an "eye" to the addition's humped profile (elevation opposite). But once found, it was promptly reinforced. The metal roof, of low-cost, low-maintenance galvanized-aluminum shingles that also serve as cladding, became scales; the wide eave across the long row of classrooms became a sinuous series of S-curves. Waves? A fin? Yet here as elsewhere in the school, the imagery is never insistent, the playfulness never patronizes. Instead, both support a more studied intent to bare the workings of the building and open its compendium of materials and textures to a child's glance and touch.

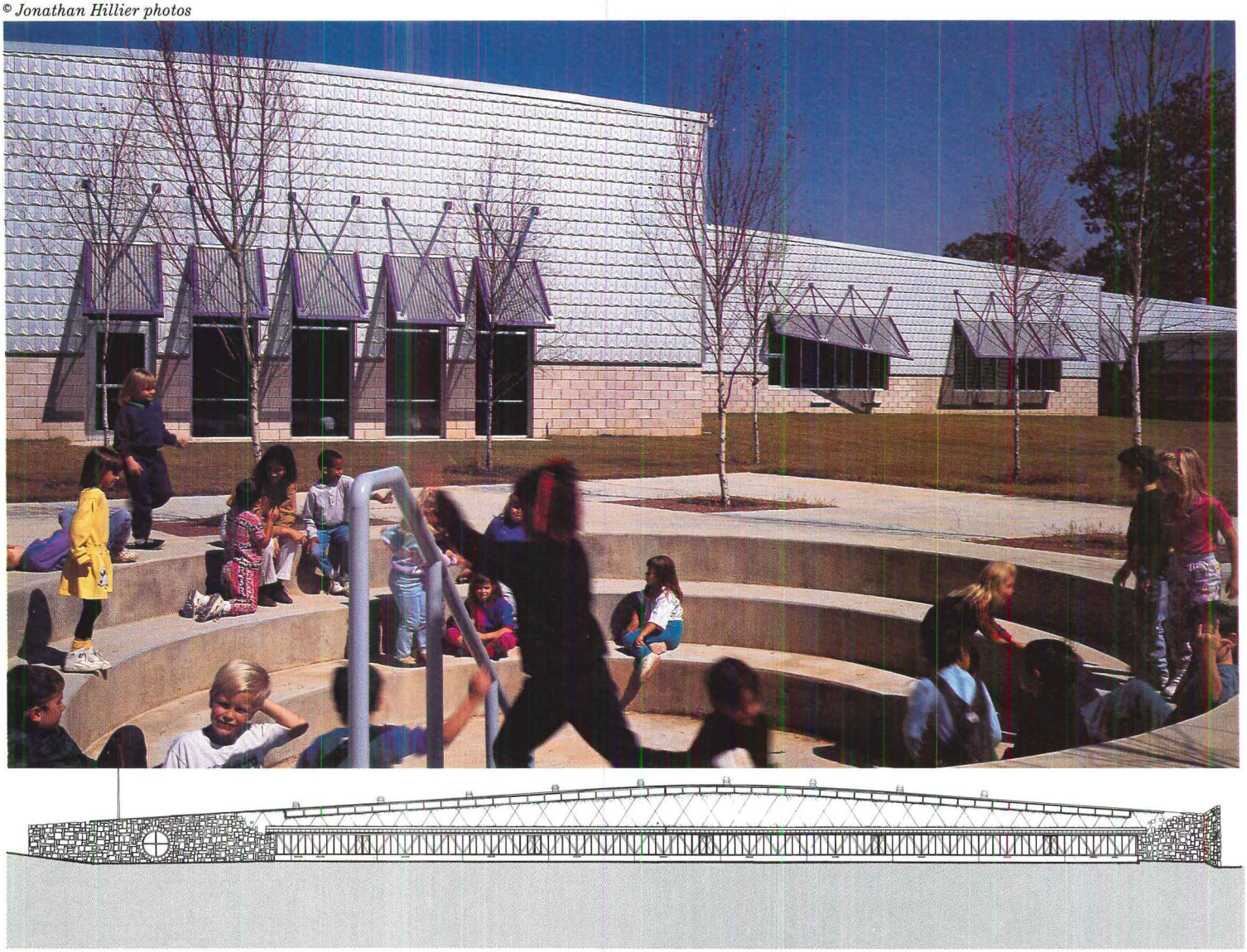
The mixture is richest in the two-story corridor, where a north clerestory spills daylight onto an animated street (page 113), balancing a soaring ceiling with familiar metaphors at child-scale. Licorice-black plastic sewer pipes filled with concrete form the trunks of a file of trees whose lavender branches (asymmetrical trusses) uphold a leafy canopy (green-painted steel deck). Between them, little houses at the entrances underscore the individuality of each room: gabled vestibules for the special common spaces, portals beneath recessed arches for the classrooms. The walls themselves are faced with touch-me materials ranging from textured stone to smooth porcelain panels meant to be drawn or written on. But the teaching aims underlying the architects' tectonic textbook are modest. "We hope the kids will notice and ask questions. We hope they'll think it's fun." *Margaret Gaskie*

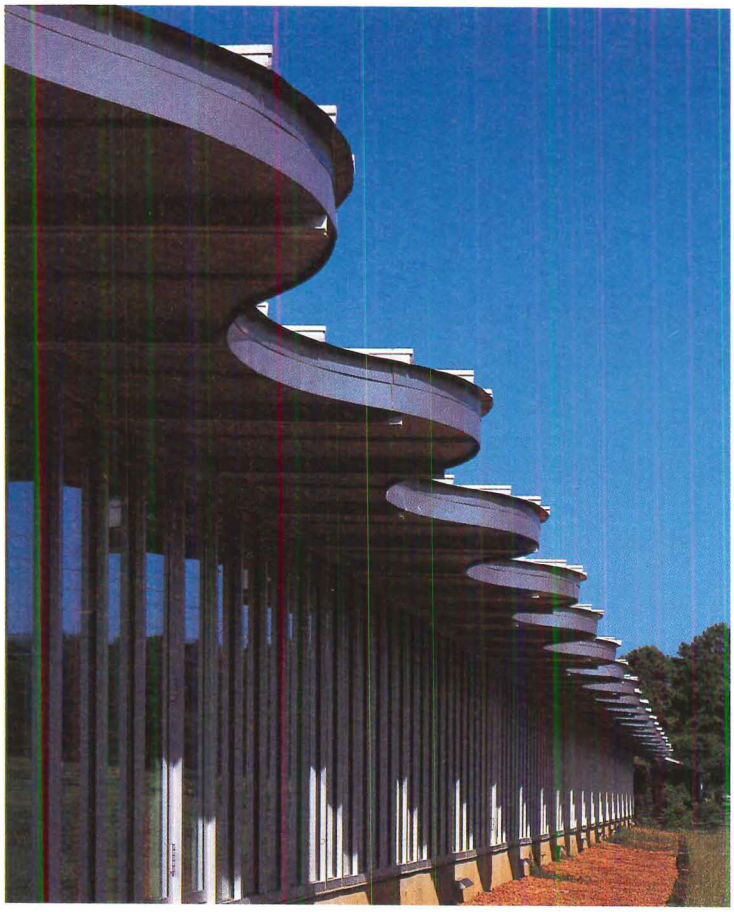
At the school's entry (bottom photo), massive oaks bridge the juncture between the addition and the older building, now transformed and veiled by the curving drop-off canopy. Facing south, the rear of the addition (photos opposite) sparkles with faceted galvanized-aluminum shingles above a base of tinted concrete block. Broad openings—windows in the media center and art and music rooms, glass doors in the tall facades of gym and cafetorium—sport corrugated perforated-metal awnings whose varied geometry is unified by lavender frames and bright-blue cross braces. Between the two buildings a paved plaza with an amphitheater (bottom opposite) for occasional classes and al fresco performances will become a shaded bosk when close-planted trees mature.

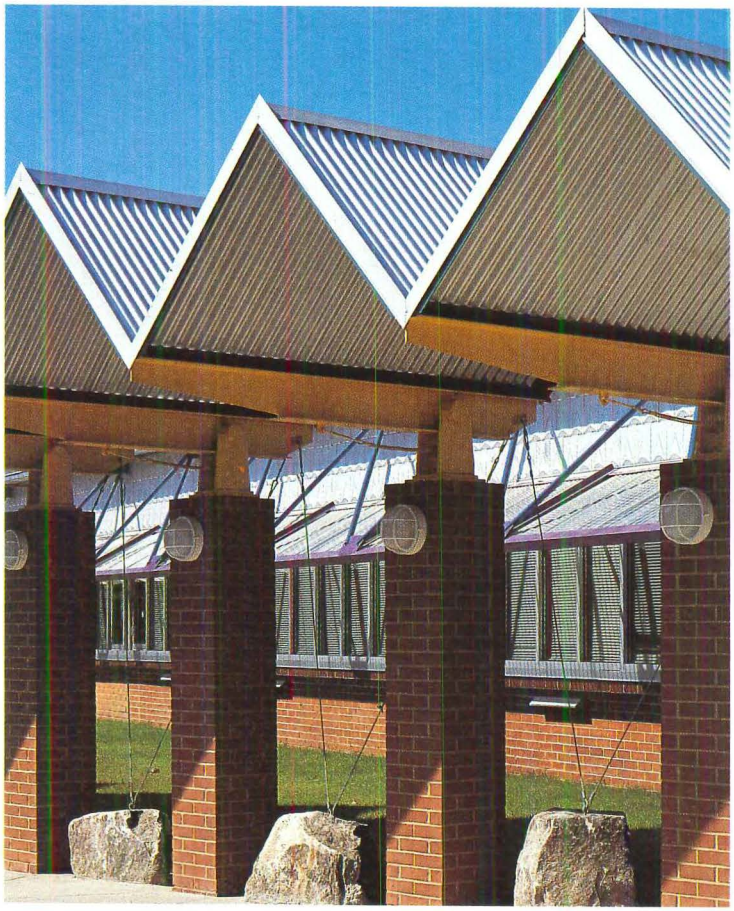




© *Jonathan Hillier photos*



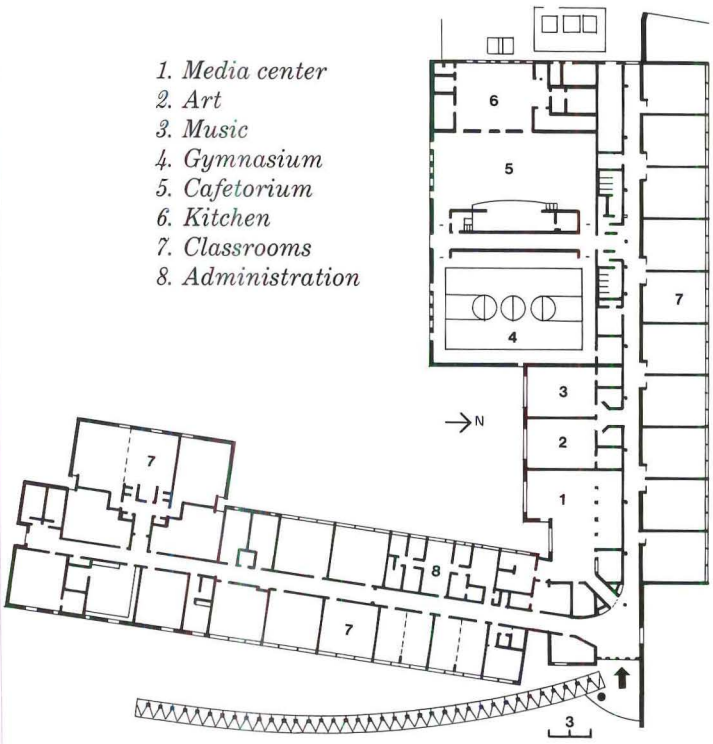


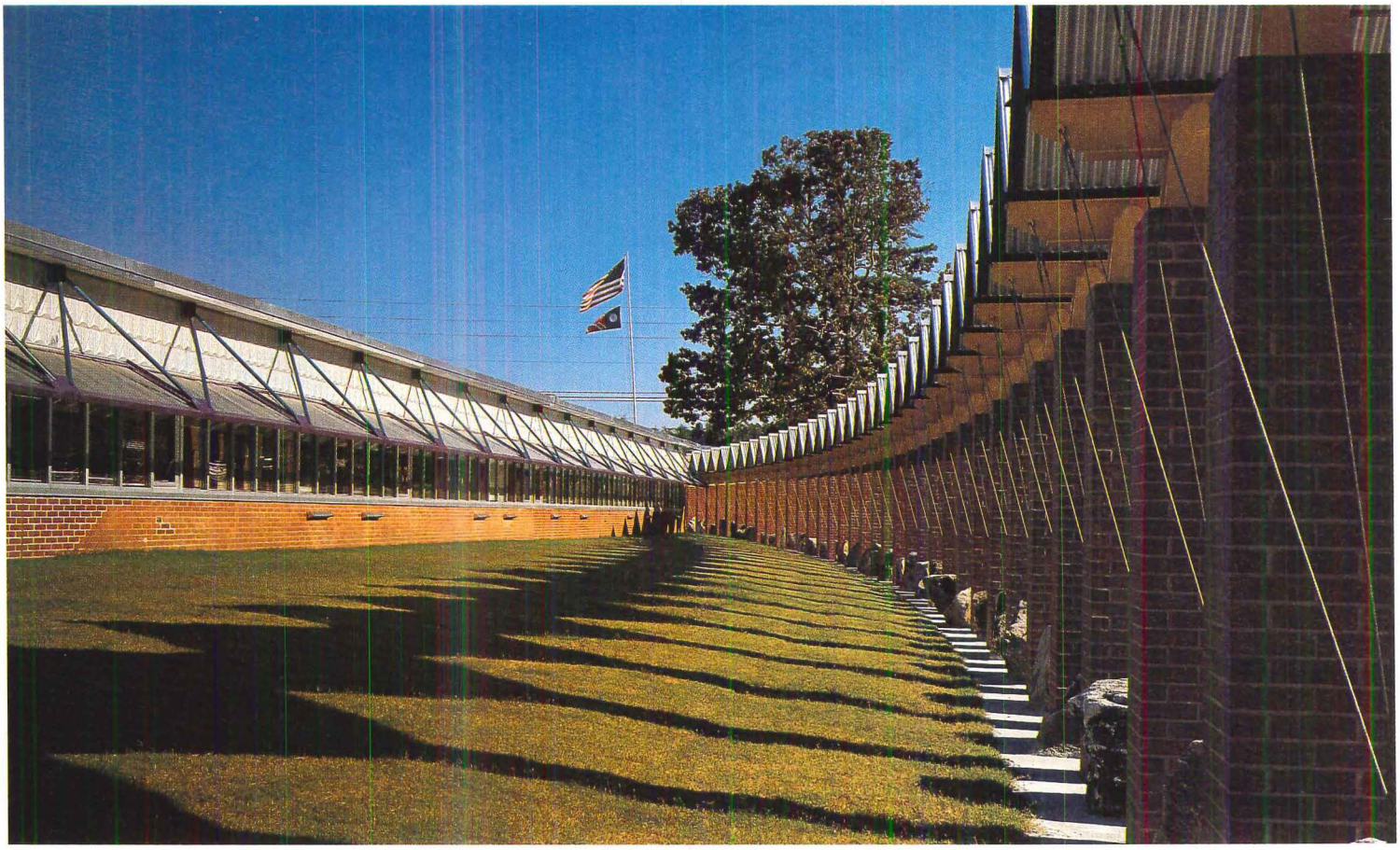


Shadows from the serpentine roof edge of the new classroom block (above left and opposite) define a plain-vanilla facade of room-wide panels of metal-framed windows on a bermed concrete-block base. The original classroom building was extensively modernized and upgraded, and included new mechanical and electrical systems. On the exterior the original brick facades are livened by generous new windows and their sun shades, and by the fish-scale shingles used for the addition.

The most outspoken flourish, however, is the long arc of the drop-off canopy (lower left and opposite), a simple sawtooth roof of corrugated metal supported on square brick piers. It would be a dull child who failed to note that the cantilevered roof perches tipsily on beams attached to the piers with rocker joints—or that its only visible counterweight is wires tied to big rocks.

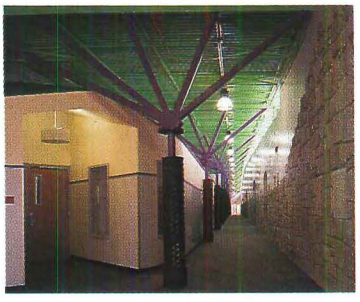
1. *Media center*
2. *Art*
3. *Music*
4. *Gymnasium*
5. *Cafetorium*
6. *Kitchen*
7. *Classrooms*
8. *Administration*





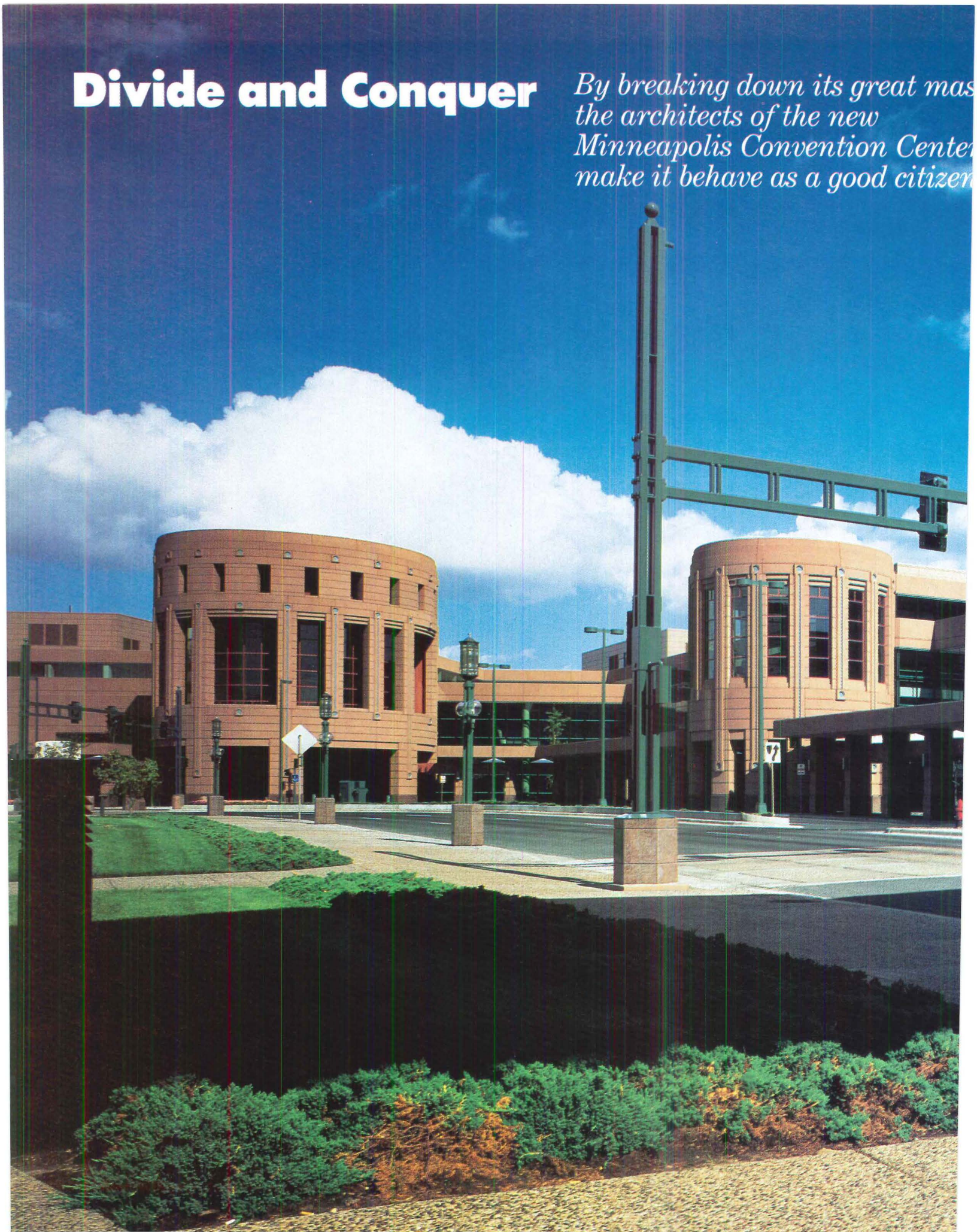
The architects' initial proposal for real tree trunks—carvable bark and all—to line the addition's main street (opposite) was overruled, but the metaphor is clear. In keeping with the steel-framed structure, walls are of sheetrock on steel studs above child height, faced with tougher and more interesting materials below. Little house forms temper the scale of the passage and introduce both classrooms (top left) and such specialized spaces as the combined auditorium and cafeteria (bottom left) and media center (bottom). In every room, the warm-air heating and electrical supply systems as well as the structure are open to curious eyes.

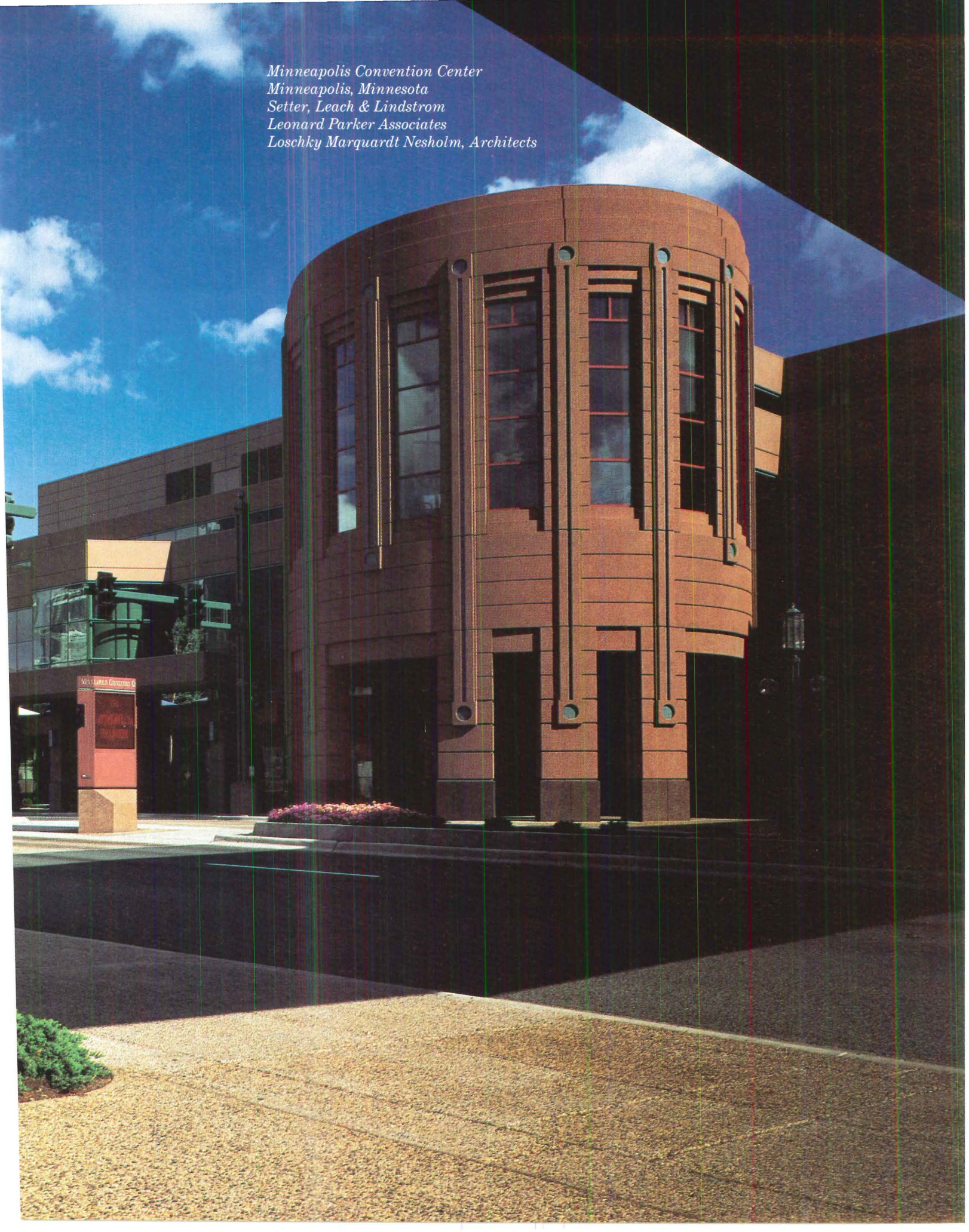
Credits
Mount Carmel Elementary School
Douglas County, Georgia
Owner: *Douglas County Board of Education*
Architect: *Lord Aeck Sargent—Jeff Burleson, project architect; Pam Crockett, Michael Few, Bert Lewars, Larry Lord, Tinsley Mathews, Terry Sargent*
Engineers: *Browder Leguizamon and Associates (structural); Jones, Nall & Davis (mechanical/electrical/plumbing); Tribble & Richardson (civil)*
General Contractor: *Swofford Construction, Inc.*



Divide and Conquer

By breaking down its great mas
the architects of the new
Minneapolis Convention Cente
make it behave as a good citizen





Minneapolis Convention Center
Minneapolis, Minnesota
Setter, Leach & Lindstrom
Leonard Parker Associates
Loschky Marquardt Nesholm, Architects

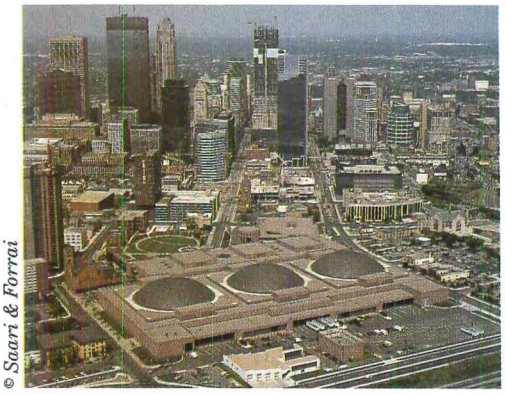
Not known for their good behavior on the urban scene, convention centers are the 800-pound gorillas of the architecture world. No matter how you dress them up, they're hard to hide and even harder to get around. Understanding this problem, The Convention Center Collaborative (consisting of two Minneapolis firms—Setter, Leach & Lindstrom and Leonard Parker Associates—and the Seattle firm of Loschky Marquardt Nesholm) developed a solution for the new Minneapolis Convention Center based on division. By breaking down the 800,000-square-foot megabuilding into three manageable parts—each with its own entry rotunda, registration lobby, and domed exhibit hall—the architects created a structure that sits comfortably within its surroundings. And because each of the three components can act either in conjunction with, or independent of, the others, the facility is remarkably flexible.

Located on the edge of the city's downtown, where two street grids collide, the convention center responds to the resulting 60-degree angle with a ballroom wing that flares off at a corresponding angle. On the other side of the site, the center jogs away from the Neo-Romanesque Wesley Church and echoes the church's red stone in the color of its own precast concrete. A landscaped plaza atop a 900-car garage eases the transition from downtown to convention center.

With a 900-foot-long north facade, the Minneapolis Convention Center might easily have presented a daunting front. The two-story entry rotundas, however, break up the elevation and make finding the front door an easy task for even the most disoriented visitors. Once inside, conventioneers can maintain their bearings through a straightforward plan that progresses from lobbies and circulation spine along the building's north perimeter to blocks of meeting rooms and then exhibit halls on the south. Happily, the trip from bus drop-off to convention floor involves no stairs or escalators. While older convention centers (such as those in Washington, D.C. and Atlanta) often turn their backs on their host cities, this one offers spectacular views of the downtown skyline. Whether visitors are waiting in one of the center's three registration lobbies, coming out of a meeting room, or emerging from the exhibit hall, they can enjoy the view and orient themselves. The curtain wall itself is a handsome composition of tinted glass flush with the building's exterior, interior muntins, and an interior space frame that acts as a wind brace.

While the building envelope is a basic steel frame with glazing and acid-etched precast panels, the architects got to flex their structural muscles in designing the three copper-clad domes covering the exhibit halls. Each 210-foot-wide dome rests on four treelike columns set 180 feet apart and sprouting struts of varying sizes. (The struts range in diameter from 3 to 10 inches, reflecting the loads they carry.) Rising 90 feet at their apex, the domes provide extra height for large exhibits and create the kind of visual excitement rarely found in the cavernous exhibit halls of today's convention centers. At the same time, the domes are efficient spanners of large spaces, requiring less steel than trusses would have, says Leonard Parker. "Without the domes we would have needed trusses 15 feet deep," adds Parker. Set in a steel space frame 30 feet above the convention floor, the three domes act as visual punctuation marks when the 277,000-square-foot exhibit hall is used as one giant space and give definition to the smaller halls when the space is subdivided.

The Minneapolis Convention Center is a gentle presence in the cityscape and an easy place to get into and around. With good reason then, it has already become a hit with local residents and conventiongoers alike. *Clifford A. Pearson*



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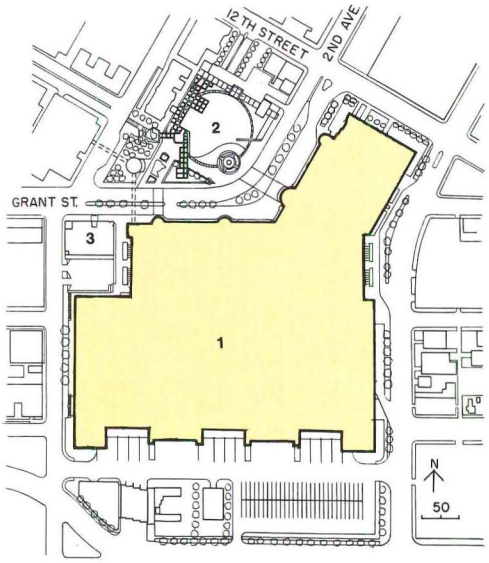
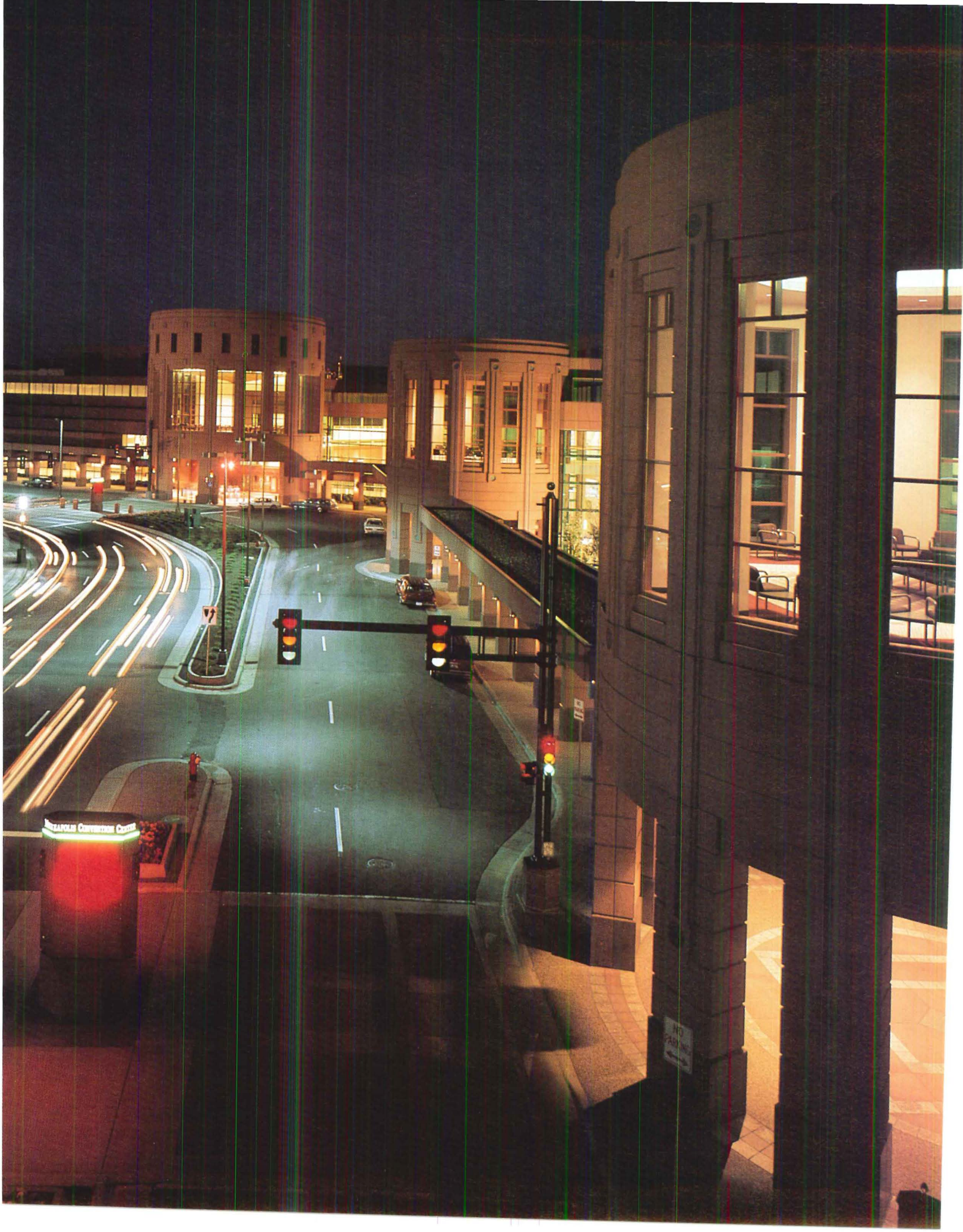
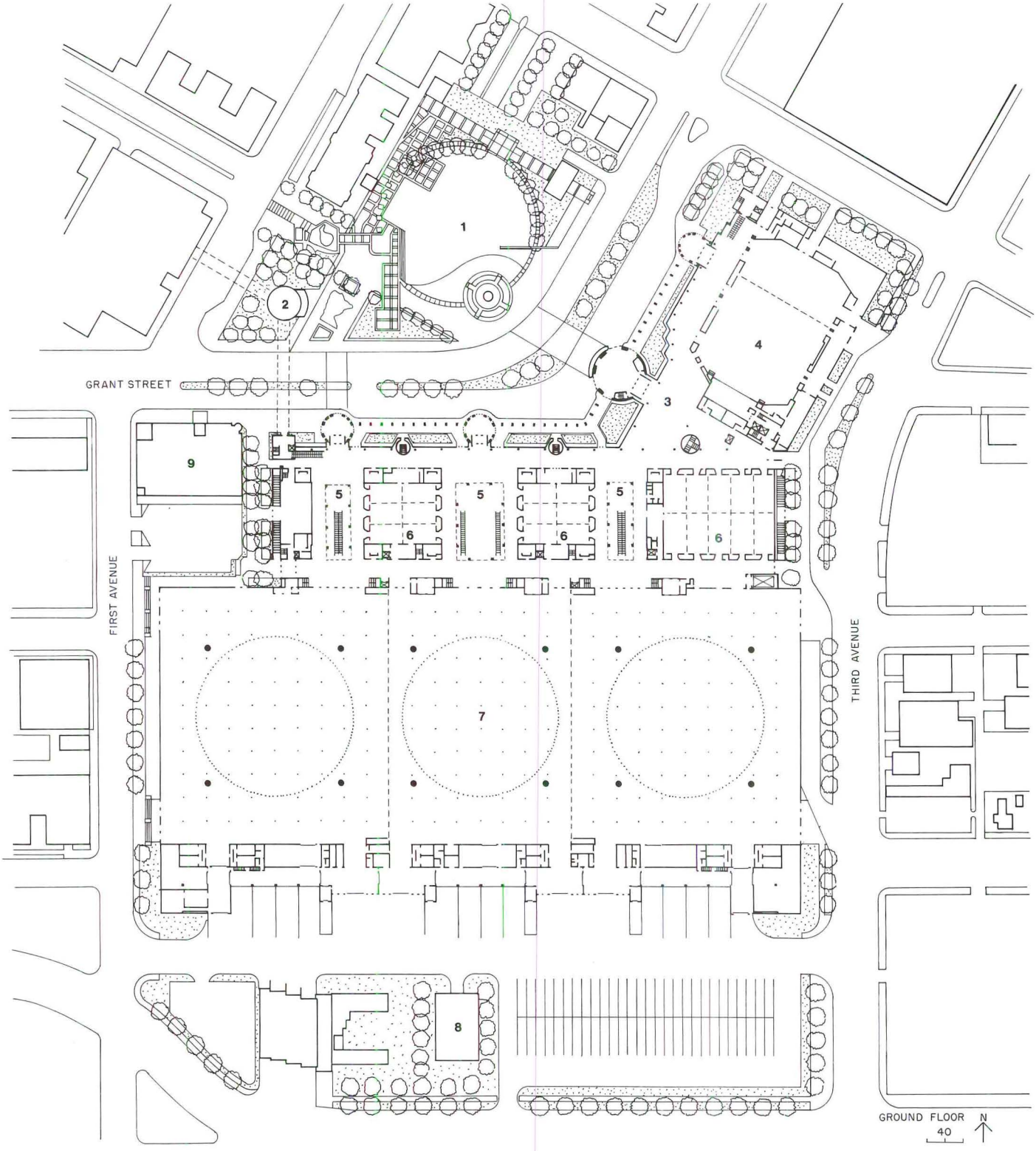
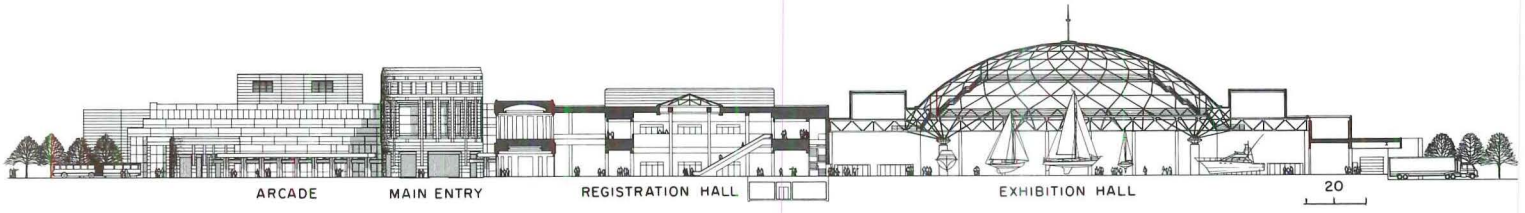


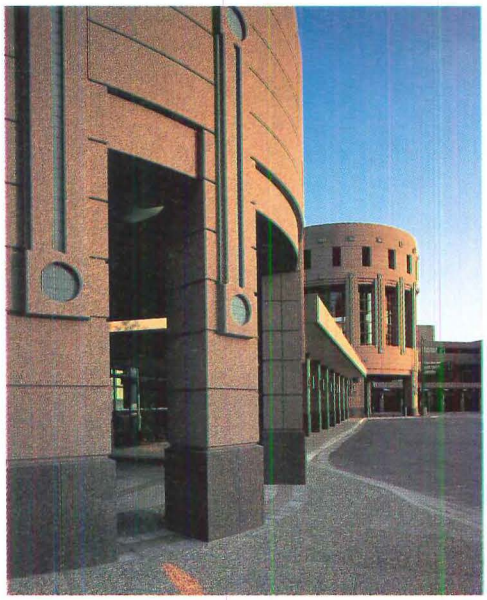
Just south of downtown, the convention center (top, 1 on site plan) backs up against I-94 and jogs around Wesley Church (3). Though scaled back from the architects' original designs, a plaza (middle, 2 on plan) sits atop an underground garage and helps open up views to the city. Three entry rotundas along the center's north facade provide second-story lounge space (opposite).

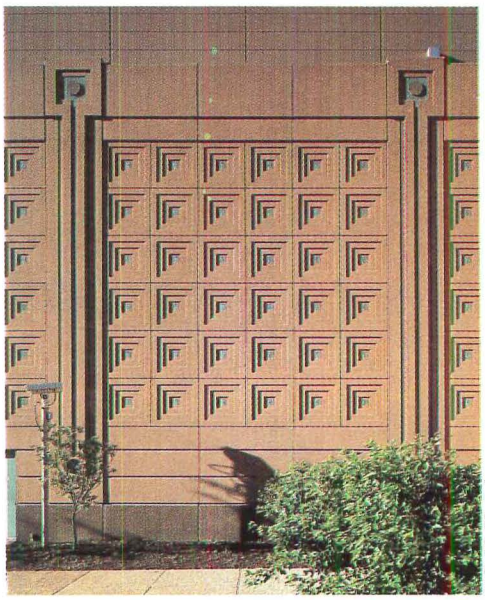


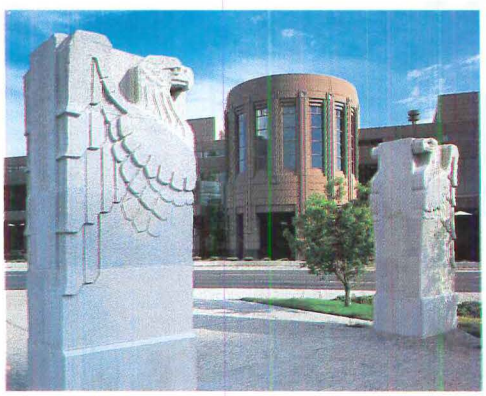

GRANT STREET
FIRST AVENUE
THIRD AVENUE
1
2
3
4
5
6
7
8
9
GROUND FLOOR
N
40


ARCADE
MAIN ENTRY
REGISTRATION HALL
EXHIBITION HALL
20

A pergola (top right) running the length of the center's north facade helps ease the transition from access road to entry. The three rotundas (center left) provide covered areas for visitors waiting for buses or cars. Their precast-concrete cladding comprises acid-etched sandwich panels with polystyrene insulation in the middle. The architects selected a brown hue for the precast to echo the color of the Neo-Romanesque Wesley Church nearby. Inlaid turquoise-colored tiles in certain places give the precast a vaguely Wrightian character (center right). Eagle carvings (bottom left) were saved from the old Auditorium and Convention Hall, which was torn down to make way for the new convention center. The west facade of the center features a glazed fire stair (bottom right).





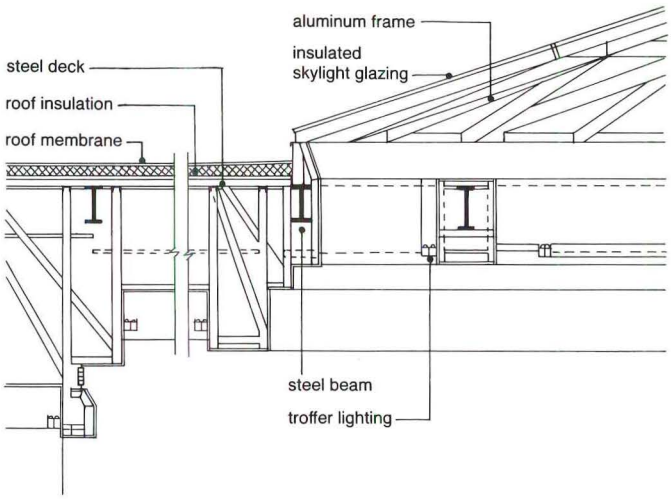


1. Plaza
2. Skywalk lobby
3. Lobby
4. Ballroom
5. Registration
6. Meeting rooms
7. Exhibit hall
8. Chiller plant
9. Wesley Church

© Philip Prowse

To accommodate both small and large conventions, the center is divided into three parts, each with its own entry rotunda, lobby, registration area, and domed exhibit hall. Each sector also has its own block of meeting rooms, restrooms, and phone booths. The largest of the three registration areas (opposite) is 100 feet wide, while the others are 75 feet wide. The terazzo floor and tiled ceiling of each lobby pick up the circle-in-a-square motif found throughout the center (top left).

A two-story circulation spine running along the northern edge of the center (middle left) offers views of downtown Minneapolis, a feature that helps orient visitors. The building's curtain wall consists of tinted glass, interior muntins, and an interior space frame for wind bracing. To reduce energy consumption the architects specified insulated low-E glass, designed a thermally broken curtain wall, weather-stripped doors, and computerized the mechanical system. The second floor of each rotunda holds a lounge area; the large-rotunda lounge (bottom left) can be set up for dining. Just as each exhibit hall is topped by a copper-clad dome, each registration hall is lit by a skylight (opposite and drawing below).



REGISTRATION HALL SKYLIGHT


HALL
2

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Each exhibit hall has a 210-foot-wide dome held up by four columns set 180 feet on-center (left). The domes were built on the ground, then hydraulically lifted 45 feet and set in place. Concentric catwalks (bottom left) facilitate repairs. Half of all light in the exhibit hall is reflected off the dome, providing diffuse illumination. Fresh air is blown into the hall from four 18-inch-wide nozzles tucked into the metal frame encircling each dome. Air is blown up into the dome, then tumbles down to the rest of the hall. Column struts of varying diameter reflect the different loads they carry (opposite).

Credits

Minneapolis Convention Center
Minneapolis, Minnesota
Owner: *City of Minneapolis*
Architect: *The Convention Center Collaborative, an association of Setter, Leach & Lindstrom; Leonard Parker Associates; and Loschky Marquardt Nesholm—A.J. Wilwerding and George Theodore, managing principals; Leonard S. Parker, design principal; George Loschky, program principal; Richard Speers, project manager; Chris Dietrich, Jim Fredeen, Kevin Flynn, Merle Hansen, Bob Kuebelbeck, Gary Mahaffey, design team*
Engineers: *Skilling Ward Magnusson Barkshire, Inc. (structural); Syska & Hennessy (mechanical/electrical)*
Consultants: *Wheeler Hildebrandt Design (interiors); Lightsource (lighting); Kirkegaard & Associates (acoustics)*
Landscape Architect: *Charles Wood Associates*
Construction Manager: *M. A. Mortenson/Barton-Malow*

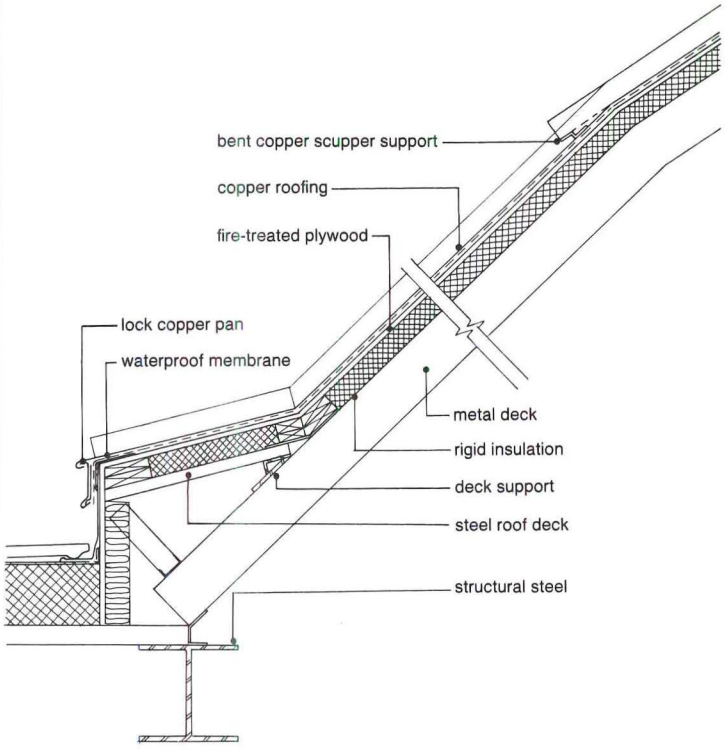

EXHIBIT HALL DOME


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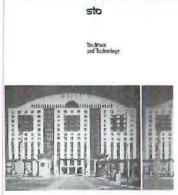
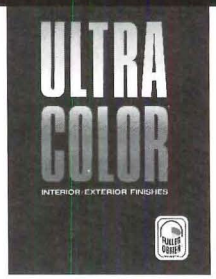
400. Laminated structurals
Construction-design guide provides connection details and load tables for laminated LVL beams and headers. Technical data includes allowable design stresses and sizing instructions for floor, roof, and window and door applications. Georgia-Pacific Corp., Atlanta.

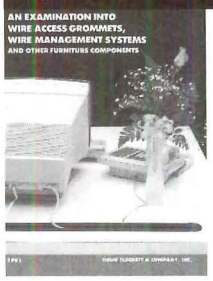
401. Decorative laminated glass
Explains how architects can use ContraVision glass, which incorporates an opaque dot matrix to produce an image or color that is visible on one side, but that optically disappears when viewed from the other. Graphics are fully encapsulated in the interlayer, and will not fade or delaminate. Cesar Color, Inc., Burlingame, Calif.



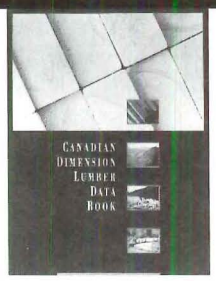
402. Insulating exterior finish
A lavishly illustrated booklet highlights the energy efficiencies and design potential of synthetic-stucco wall systems. Featured renovations such as Mies van der Rohe's Weissenhoff Colony and Frank Lloyd Wright's Pottery House show how the material can match the original appearance of historic structures. Sto Industries, Atlanta.



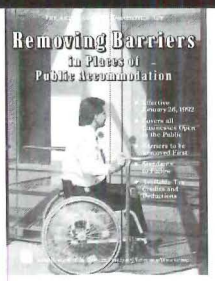
403. Paint-selection guide
Ultra Color deep and bright-toned architectural finishes for interior and exterior applications are shown on a color-sample chart. A compliance guide lists all of the manufacturers' professional coating systems with their VOC limits for California, New York, and states in between. The O'Brien Corp., South San Francisco, Calif.



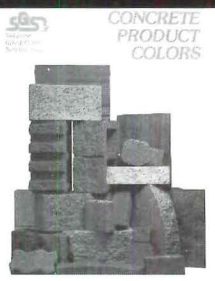
404. Power-cord access
Plastic grommets in many sizes, colors, and shapes can solve the problem of how best to feed telephone, computer, and business-machine cords through desks, work surfaces, and other office panels, according to a brochure. The smooth, rounded edges of the cords reduce friction on the cords. Doug Mockett & Co., Inc. Manhattan Beach, Calif.



405. Lumber-design values
The 65-page Canadian Dimension Lumber Data Book uses new values determined by testing full-sized graded lumber instead of smaller samples, producing more accurate information on bending, tension, compression, and modulus of elasticity for Canadian wood species, MSR, and fingerjoined lumber. $6 charge. Canadian Wood Council, Seattle.



406. Public access
A free guide explains the provisions of the Americans with Disabilities Act that apply to the removal of barriers in existing places of public accommodation. Photos illustrate readily achievable architectural and other modifications that ensure compliance; Title III regulations are prioritized. Eastern Paralyzed Veterans Assn., New York City.

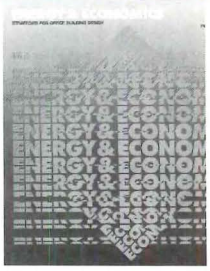


407. Concrete colorants
Color-chip folder holds all standard shades made using natural and synthetic iron oxide pigments. Primarily warm tones of brown, red, and ochre, greens, blues, and blacks are also shown. "X" series concentrated mortars included. A sample kit is available to professionals. Solomon Grind-Chem Service, Inc., Springfield, Ill.

408. Curtain wall
Catalog illustrates built projects that use an enclosure system developed in England. The glazing technique offers a variety of identifiable combinations of interchangable components that form a range of system assemblies, with infills retained and sealed by structural-silicone gaskets. Don Reynolds USA Inc., St. Louis.

409. Tile-setting materials
Mapei's 1992 catalog contains 16 pages on mortars, additives, adhesives, and grouts for ceramic tile, marble, granite, and natural stone. Drawings detail typical installations. Product-selection materials are color-coded to coordinate with actual product packaging. MAPEI, Elk Grove Village, Ill.

410. High-density filing
A four-page guide discusses the paper- and data-storage requirements of the smaller office or institution, such as medical clinics and law firms. A chart compares filing inches-per-square-foot capacity of mobile systems with conventional drawers and fixed shelving. The Spacesaver Group, Fort Atkinson, Wis.



411. Energy-efficient strategies
Energy & Economics: Strategies for Office Building Design is a comprehensive 100-page handbook examining dozens of design choices that make speculative projects anywhere in the country highly energy-efficient, without adding to their initial construction cost. Includes a useful bibliography. Northeast Utilities, Hartford, Conn.

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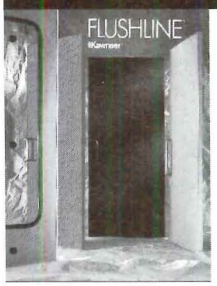
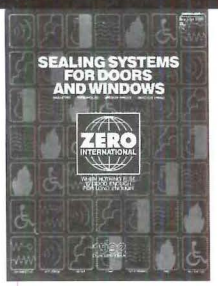
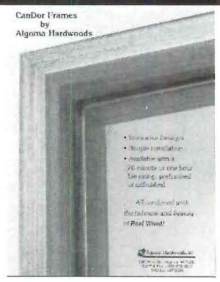


412. Flush doors
Catalog insert describes the construction features, glazing, and facing options of Flushline exterior/interior doors. Built with dual-moment corners to withstand high-traffic abuse, the foam-core doors can be specified with skins of FRP, laminate, and anodized or painted aluminum in any size up to 4 by 8 ft. Kawneer Co., Norcross, Ga.

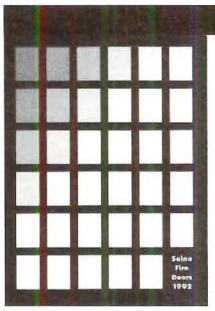
413. Architectural doors
Twelve-page color catalog illustrates Classic Line seven-ply doors made to resist warping and eliminate stile-and-rail show-through. Includes fire doors labeled for 3/4-, 1-, and 1 1/2-hour and acoustically rated doors. Hardwood-veneer faces offered in 10 standard species as well as custom woods. Fenestra, Oshkosh, Wis.



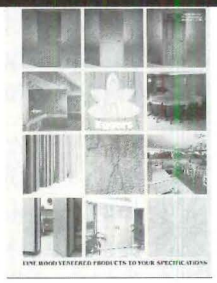
414. Sealing systems
Door components to stop sound, fire, smoke, light, and air infiltration/exfiltration explained in a 32-page catalog. Introduces new lead-lined automatic X-ray-door bottoms and an EMI/RFI sealing system. Detail drawings show devices full size. Zero International, New York City.



415. Wood frames
Brochure describes the installation of Can-Dor components, made of veneered medium-density fiberboard in systems that carry 20-minute and one-hour fire labels. Frames can match an architect's sample in any AWI #3 finish, and offer glazed transom, sidelight, and borrowed-light door-frame options. Algoma Hardwoods, Inc., Algoma, Wis.

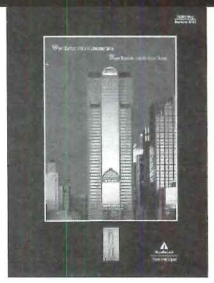


416. Fire doors
A 20-page color catalog covers sliding, folding, and swinging fire doors, including a new UL-rated four-hour sliding door made of stainless steel. Text explains innovations in fire-door testing and protection, automatic operators, and building-wide systems that close doors when the structure is unoccupied. F. L. Saino Mfg. Co., Memphis.



417. Architectural woodwork
Flush and stile-and-rail doors highlighted in a 16-page guide. Custom services include architectural- and blueprint-matched panels and doors of oak, walnut, teak, mahogany, and exotic-wood veneers. Door cores, jambs, and optional edge treatments are shown in detail drawings. Eggers Industries, Two Rivers, Wis.

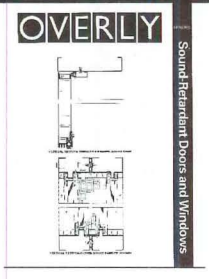
418. Glass entrances
One of a series of new product-specific brochures, a 12-page booklet highlights Designer Systems glass doors and entrances. Illustrates rail-, patch-, stile, and safety-clearance doors, stacking glass walls, frameless shower stalls, and ceramic frit and sandblasted decorative glass. Tempglass, Perrysburg, Ohio.



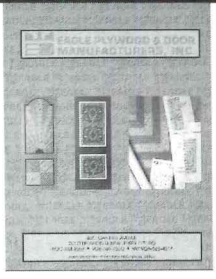
419. Commercial doors
Available in any wood species or veneer cut, Marshfield Series architectural doors offer a number of constructions, including mineral cores with a 90-minute label, staved-core doors, and X-ray and sound-retardant systems. An eight-page catalog lists product features. Weyerhaeuser, Architectural Door Division, Marshfield, Wis.

420. Rolling doors
Catalog covers the Kinnear and North American lines of upward-acting rolling doors, grilles, and sectional doors for industrial, commercial, and residential applications. An illustrated door-selection guide includes a photo and summary description of each design. Wayne-Dalton, Mt. Hope, Ohio.

421. Residential entries
Colorful catalogs on Mastermark exterior and interior doors made of vertical-grain Western woods highlight decorative options such as triple-glazed beveled-, leaded-, and etched-glass lights, carved lock rails, and raised-wood moldings. Simpson Door Co., McCleary, Wash.

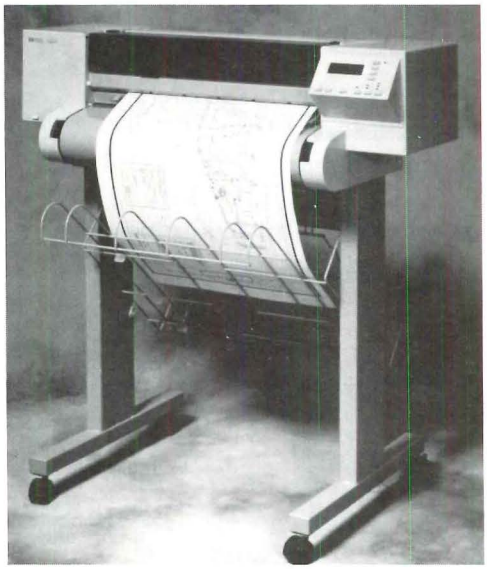


422. Sound-retardant doors
An eight-page catalog introduces doors and windows made to control noise and ensure voice privacy, describing revised test procedures and suggesting good design practices for an acoustically superior installation. Includes data on fire ratings for swinging doors. Overly Mfg. Co., Greensburg, Pa.

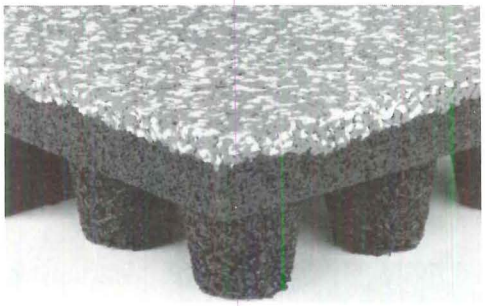


423. Custom doors
Sketch-face, stile-and-rail, and raised-panel doors made of domestic, exotic, precomposed, and dyed woods can be specified in custom designs using diamond matches, sunbursts, butt matches, marquetry, and trompe l'oeil effects. Eagle Plywood & Door Mfg., Inc., South Plainfield, N. J. ■

307. Corner-opening casement. A design by architect Stuart Cohen reflects the influence both of Frank Lloyd Wright, who created a frameless corner window by mitering glass lights in 1911, and Gerrit Rietveld, who used casements set at right angles to open up the corners of the Schroeder House. Available as part of the Architect Series, the new casement has operable sash that meet at the corner. When the windows are fully open, the corner disappears. Pella/Rolscreen Co., Pella, Iowa.



308. Large-format plotter. A monochrome inkjet plotter that accommodates all types of 24- and 36-in. roll media as well as standard and nonstandard sheets, the HP DesignJet uses an i960 processor for faster throughput (an E-size plot at 300 dpi in less than six minutes). Suggested as an upgrade for architectural offices currently using pen plotters. List price: $10,995.
Hewlett Packard, Palo Alto, Calif.



309. Playground surface. Supertop resilient safety tile comes in three multicolor options plus solid green, and is recommended for such high-visibility applications as the play areas of fast-food restaurants. Meeting all Consumer Product Safety standards, the surface has a integral polymeric top layer said to be extremely wear- and stain-resistant. Carlisle Tire & Rubber Co., Carlisle, Pa. ■

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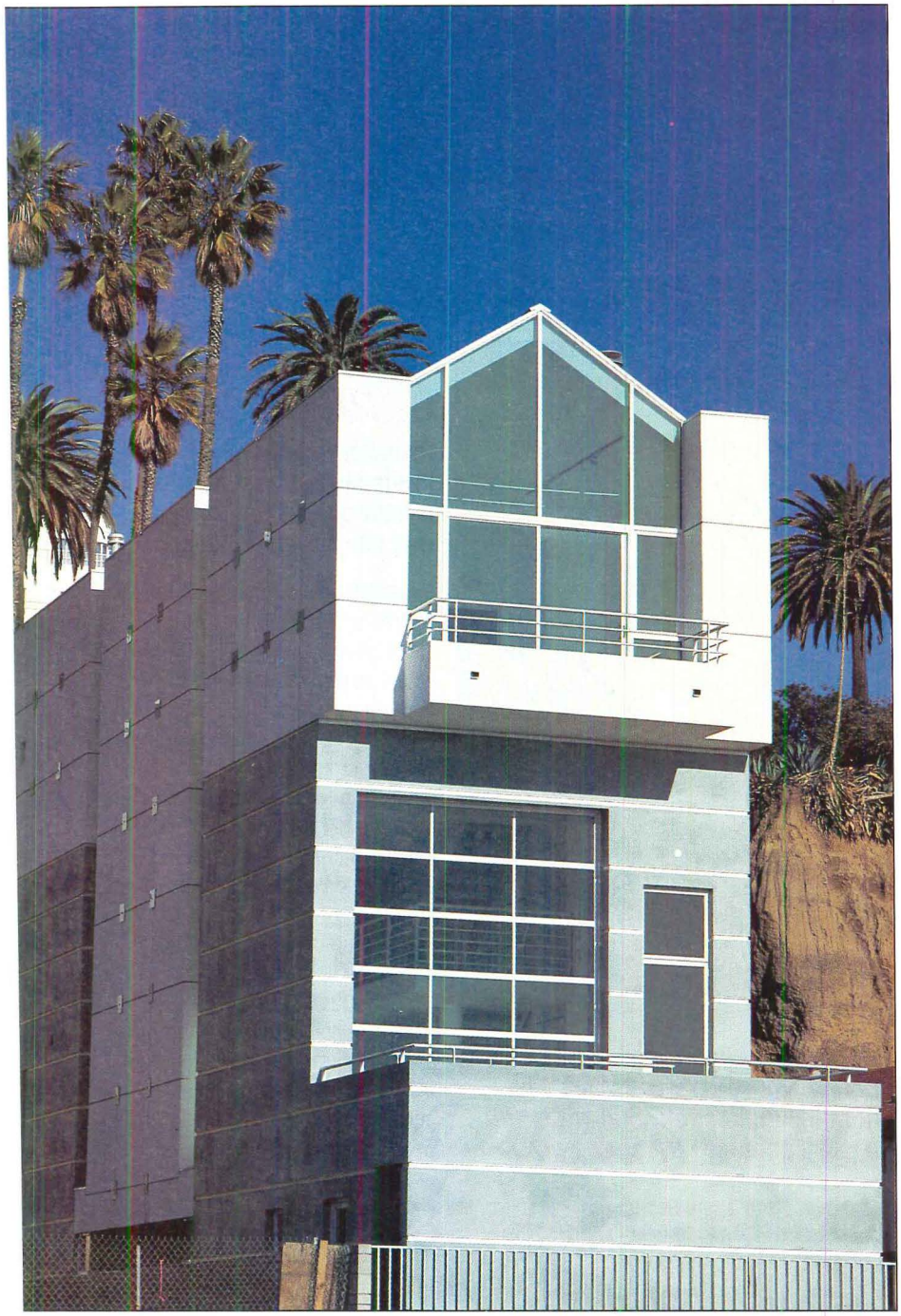

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Manufacturers Sources

Pages 74-83
Alice Pratt Brown Hall
Kendall/Heaton Associates, Inc., Architect
Ricardo Bofill/Taller de Arquitectura, Design Consultant
Pages 74-77—Brick: St. Joe. (Rose Blend). Acid-etched architectural precast: Redondo. Windows: Arrow Glass. Custom gray finish: PPG, Coatings & Resins Group (Duranar). Tinted glass: Tempglass. Coal-tar roofing: Owens-Corning Fiberglas. Entrances: Amarlite. Locksets, closers, exit devices: Sargent.
Page 78—Unglazed paving tiles: Seneca Tiles. Precast-concrete fountain: Pyramid.
Pages 80-81—Cotton-velour draperies: KM Fabrics. Seating and upholstery: Irwin Seating. Fabric wallcovering: Carnegie (Bosun). Carpeting: Bigelow. Fluorescent steplighting: Cole. Sconces: Shaper (custom design). PAR lamps: General Electric. Recessed downlights: Kurt Versen.
Pages 80-83—Enamel finishes: Sherwin-Williams. Epoxy floor coating: Tnemec. Recessed downlights: Kurt Versen. Flush doors: Eggers Industries. Pulls: Rockwood. Plaster ceiling: USG (Structo-gauge). Theatrical lights: Lee Colortran.

Pages 84-91
Sawgrass Mills Regional Mall
Arquitectonica International, Architect
Pages 84-85, 88-89—Pre-engineered structural system and roofing: Butler Industries. EIFS: STO Industries. Space frame: MERO Structures, Inc. Paints on metal surfaces: Glidden; Duron. Tile flooring: Crossville Ceramics. Area lighting: Lithonia; Stonco. Cylindrical downlights: Lithonia. Pyramid skylights: American Skylights.
Pages 90-91—Tensile roof structure: Birdair, Inc. Fabric: DuPont. Courtyard and pool-surround tile: Crossville Ceramics. Seating (Sports Food Court): Barrera. Pendant fixtures: Street Lighting. Banners: Shirley Raphael. Translucent roof panels (New Ideas Court): Kalwall.

Pages 92-97
New Hackensack Reformed Church
James Oleg Kruhly, Architect
Windows, glazed wood doors, and vestibule wall: Kolbe & Kolbe. Stained glass: existing. Wood doors: Willdon (paneled doors); Blount (flush doors). Pulls: Schlage; Baldwin. Closers: LCN. Brick: Taylor Clay Products (101W Smooth); Belden Brick (Sea-Gray Smooth, 661 Smooth). Sills: Vermont Sea Green Slate. Shingle roofing: GAF. Paints: Pittsburgh Paint. Bollards: Spaulding Lighting, Inc. Roof-mounted spotlights: General Electric.
Pages 96-97—Chancel Furniture: Matt Huprich Fine Woodworking. Stained-oak pews: J. P. Redington. Recessed downlights: Kurt Versen. Cylindrical pendant (incorporates speakers): R. A. Manning. Carpeting: Blue Ridge Carpets. Ceiling air diffusers: Titus. Under-pew diffusers: Knowles Mushroom Ventilator. Grille cloth for swell boxes: Acoustone.

Pages 106-113
Mt. Carmel Elementary School
Lord Aeck Sargent, Architect
Metal roofing and decorative metal cladding: Berridge Mfg. Paints: Glidden. Storefront and clerestory windows: PPG Industries, Inc., Glass Group. Ventilators: International Environmental. Wired wall-lights: Lightolier, Inc. Carpeting: Bigelow. HID high-bay lighting: Spero. Wood interior and glazed classroom doors: Eggers Industries. Lever handles: Best Lock. Operators: Von Duprin. Uplighting: Indalux. Cove base: Roppe Rubber. Resilient flooring: Armstrong World Industries. Cylindrical spots: Marco. Joist system: Vulcraft. Parabolic fluorescents: Day-Brite. Recessed downlights at classrooms: Omega Lighting.

Pages 114-123
Minneapolis Convention Center
Setter, Leach & Lindstrom; Leonard Parker Associates; Loschky Marquardt Nesholm, Collaborative Architects
Pages 114-119—Signage: A. G. I. Tinted glass: Viracon, Inc. Curtain wall, storefronts, and windows: Wausau Metals. Architectural precast and bollards: Gage Bros. Tile inserts and ceiling: Dal-Tile. Copper roof: C. V. Nielsen Fabricators. Skylights: Super Sky Products. Round area-light fixtures: Appleton Lamplighters. Entrances: Kawneer. Pulls: Hiawatha. Closers: LCN.
Pages 120-121—Pendants: Appleton Lamplighter. Linear ceilings: Alcan Building Products. Downlights: Accent Lighting. Lighting coves: Plastrglas. Escalators: Montgomery Elevator. Elevators: Dover. Acoustic ceiling tile: Celotex.
Pages 122-123—Column lighting: Neon by St. Elmo's. HID high-bay fixtures: Holophane. HID uplighting: Sterner. White-oak slat ceiling: Paul's Woodcraft. Downlights: Prescolite. Carpeting: Milliken.

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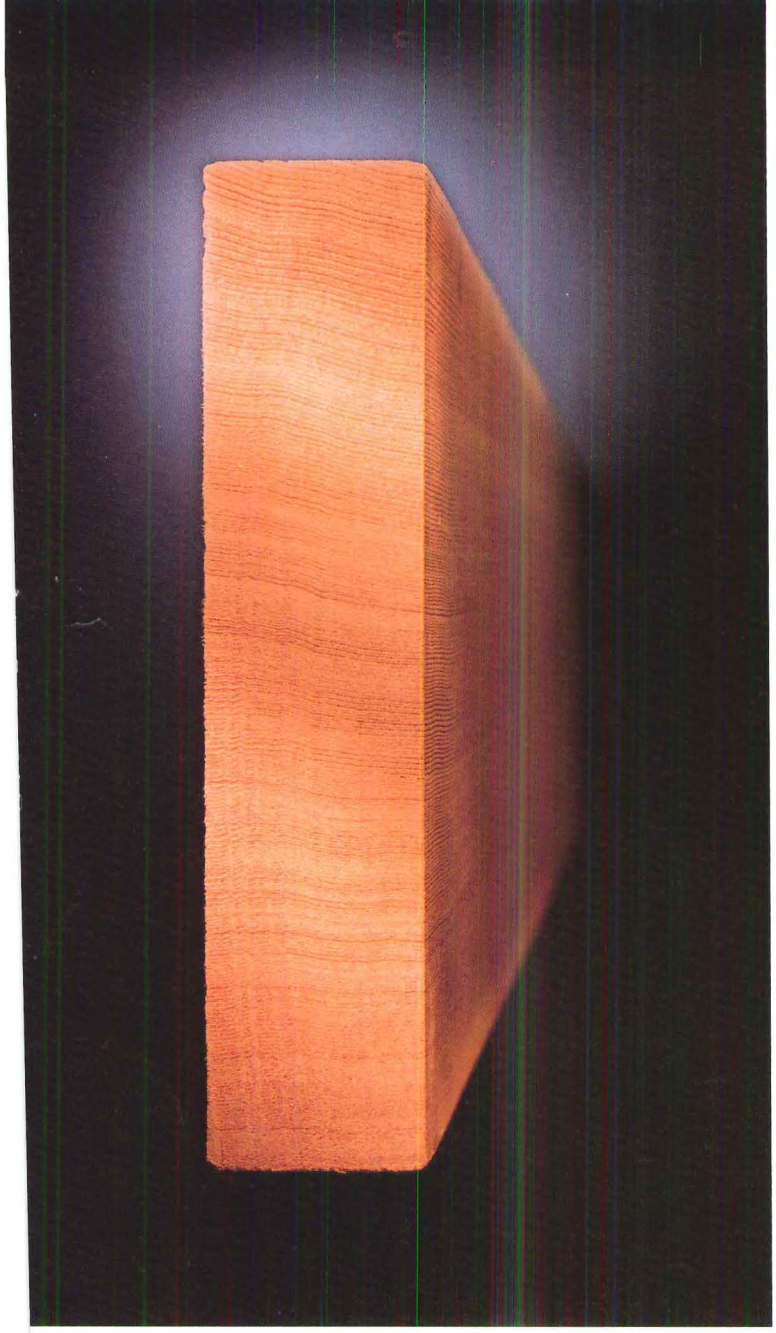

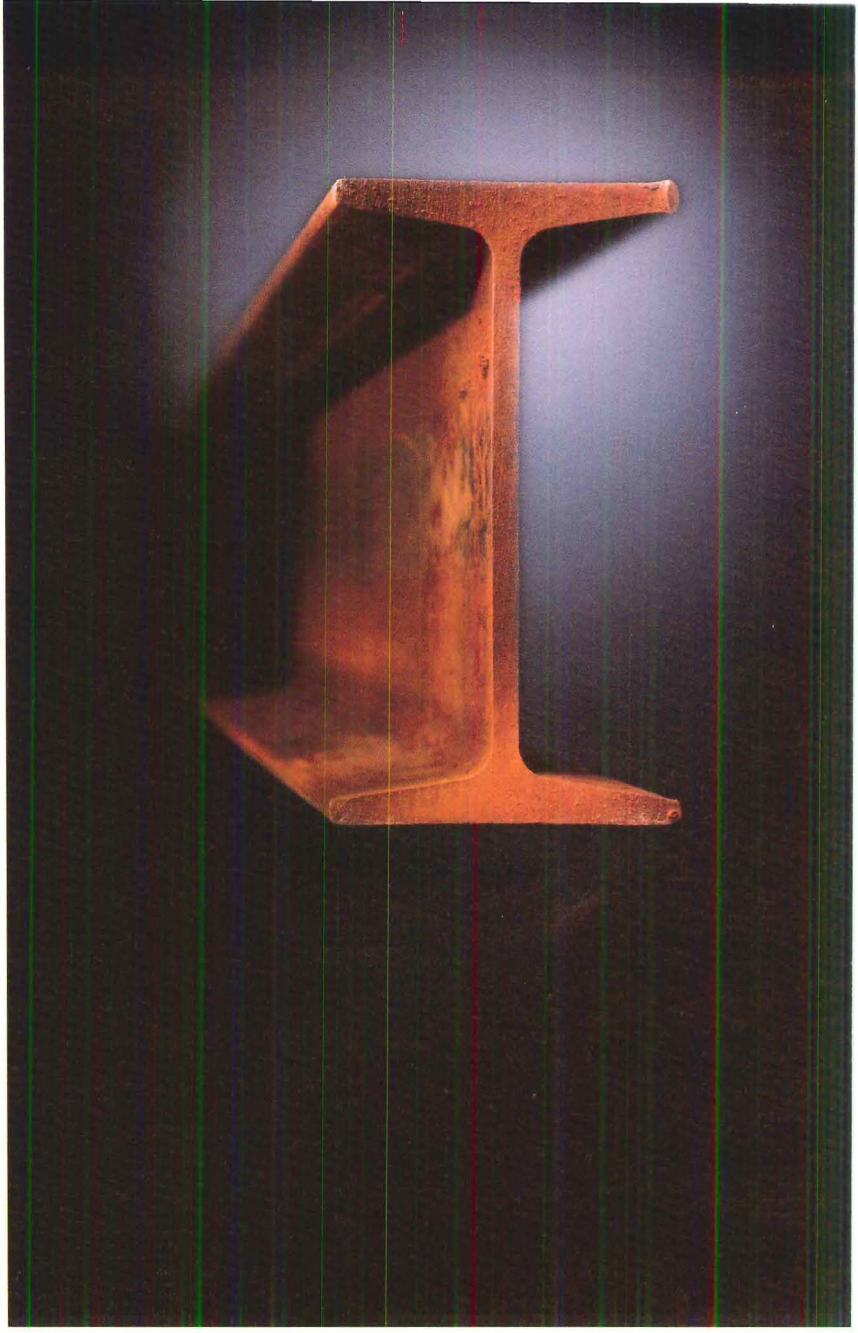

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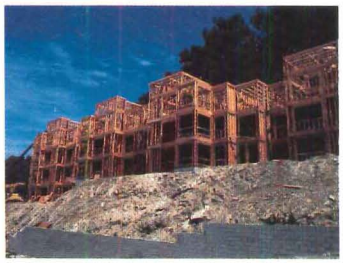

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