ARCHITECTURE

JULY 1991

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DESIGN

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TECHNOLOGY & PRACTICE


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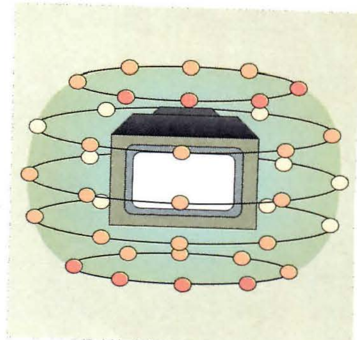
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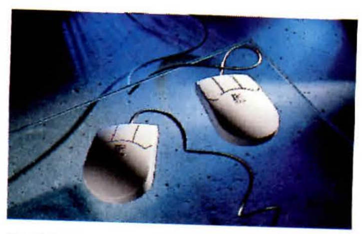
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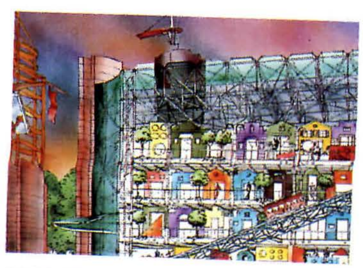
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DEPARTMENTS

COVER

St. Luke's Medical Tower, Houston, Texas, designed by Cesar Pelli & Associates (page 42). Photograph by Paul Hester

NEXT MONTH'S ISSUE

Architects of the Southwest
Seismic trends
Breaking into new markets
CADD holdouts

Hurd InSol-8.™ The biggest news ir

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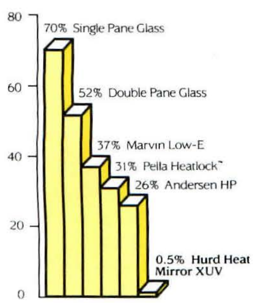

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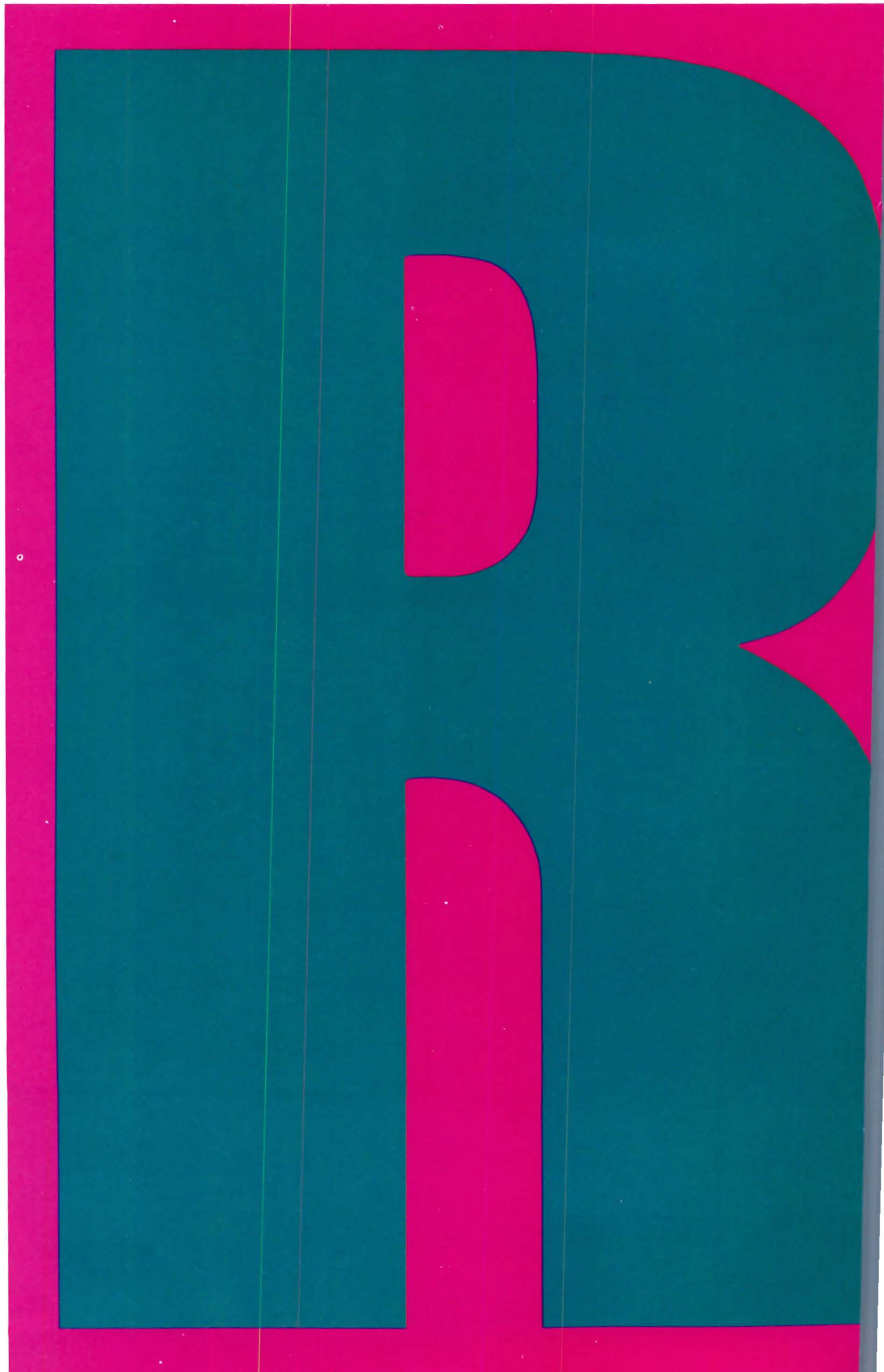

All calculations based on center of glass values for 1" Hurd InSol-8 windows with the Superglass System® with Heat Mirror™ Film. All data were calculated using WINDOW 3.1 Computer Program and standard ASHRAE winter conditions of 0° (F) outdoor and 70° (F) indoor temperatures with a 15 mph outside wind.

Presidential Precedent

THIS YEAR'S AIA CONVENTION MARKED AN HISTORIC turning point: the American Institute of Architects elected its first woman president. Susan A. Maxman, FAIA, will assume the office of first vice president/president-elect in December and will become the president in December 1992. Head of her own 12-person office in Philadelphia, Maxman advocates broadening the stature of the profession through expanding AIA membership and nontraditional careers for architects. "I'd love to see this organization become a place for all who make architecture happen," she says. "It must not only include architects in private practice, but developers, educators, facility managers, and others who shape the environment." Maxman also views education as a means of strengthening the architect's role. "We should not fear that we are producing too many architects in our schools," she asserts. "We should produce as many architects as possible and, if necessary, encourage them to enter alternative careers."

Maxman's inclusionary view of the profession stems from her own unconventional career in architecture. While in her 30s and raising six children, she decided to go back to school for a master of architecture degree at the University of Pennsylvania. After graduating in 1977 and working for several local firms, Maxman founded her own Philadelphia practice, Susan Maxman Architects, in 1980. The 52-year-old architect's offices are housed in an 1886 Frank Furness-designed townhouse, which she renovated in 1984.

Maxman's belief in a broad focus for the profession is underscored by her own diverse portfolio of institutional, corporate, and residential commissions. "Too much emphasis has been placed on the star designer," she claims. "We must make the public understand that architects do much more than design beautiful facades." Maxman, however, clearly values design within the collaborative process of architecture, as is apparent from her work. This year, she received a national AIA honor award for Camp Tweedale, a Girl Scout retreat in Lower Oxford Township, Pennsylvania, which has also won several awards from local AIA and industry associations over the past two years.

Maxman's experience also reveals her willingness to affect change within the architectural establishment. Since beginning her practice, she has taken an active role within the Pennsylvania Society of Architects, serving as its president in 1988. She has also participated on several key AIA committees, including the national Membership Futures Task Force, the Planning and Evaluation Committee, and the American Architectural Foundation's Board of Regents. In February, the Philadelphia architect spearheaded the AIA's 1991 Grassroots leadership training conference.

Most significantly, Maxman's election offers a role model for architects outside the male-dominated mainstream and symbolizes the increasing influence of women in the profession. "I am the first woman to run as AIA president and the first to win," she points out. "There are no limitations for women in this profession. My own experience proves that anything is possible, that it's never too late to try something new."

ED CASTLE

First Vice President/ President-elect Susan A. Maxman, FAIA.

Women currently make up 8.5 percent of the AIA's 1990 membership—4,714 out of 55,458—a small percentage, but a sizable increase since 1975, when only 1 percent of the AIA membership was female. This year, a record-breaking 13 women architects (including Maxman) were elevated to the AIA College of Fellows, compared to five awarded last year. In schools of architecture, women now constitute 26.5 percent of students enrolled in accredited bachelor's degree programs and 34.8 percent in master's degree programs.

Clearly, women in the field of architecture are still pioneers. But the election of Susan Maxman points to change within the profession. The AIA recognizes that it must fashion a more diverse profile to strengthen its membership and the influence of all architects. Maxman's leadership is certainly a good start. ■

—DEBORAH K. DIETSCH

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Rainbow Coalition

I found your article "Invisible Architects" (April 1991, pages 106-113) to be a refreshing stance taken by one of the leading magazines in the field. The occasional whisper murmured in the halls of architecture may confirm that racism exists in the classes, and I extend my congratulations to your staff, and those afforded interviews, for featuring a topic left unheard in print. Perhaps now your readers of influence can come to realize that it takes many colors to make a rainbow.

Janet F. Graves
Hillcrest, New York

Visible Reflection

The contradiction between the article on the 1980s decade of private commercial building, sans black prime architects in predominantly black Washington, D.C. (April 1991, pages 55-57), and the one on the paucity of such commissions available to black architects nationally (April, pages 106-113) calls for reflection.

We should be troubled by the latter article's implicit notion of the black architects' plight being measured against the success of the most visible and published white architects. No matter how much I marvel at the often breathtaking visual appearance of high-profile, published work, as a practicing black architect and educator, I must caution that we maintain perspective.

The current structure of American architectural practice—and its self-imposed separation from the real-estate/construction industries as well as the academy—holds little relevance to the solution of the socioeconomic problems of the increasingly non-white center cities of America. Black as well as white architects run the real danger of lusting after an illusion while en route to extinction. The same economic dagger that severed the jugular of Max Bond's former firm lies poised at the throat of his new firm, Davis, Brody & Associates.

Howard's School of Architecture (April, pages 52-53) would be a logical place for black practitioners and educators to meet and map the new structural paradigms that may be of relevance to everyone.

Melvin Mitchell
Associate Professor
University of the District of Columbia
Washington, D.C.

Save Salk's Space

Your news item "Salk Institute Addition Unveiled" (April 1991, page 23) states that the proposed addition to Kahn's Salk Institute would "...do away with the existing sensation of discovering Kahn's building after a mystical stroll through a eucalyptus grove."

I submit that the entire architectural event of Kahn's Salk Institute is the gradual revelation of a manmade "slot" in the horizon. After parking in a formal automobile "room," one slips through a very narrow opening in a hedge to a dark, cavernous wood, and proceeds toward the light. All at once, one arrives out of nature into man's realm. The slot now has walls, and a sliver of water points toward the Pacific Ocean far below. It's probably the most breathtaking spatial experience in all of American architecture.

To destroy the space in favor of not touching the buildings is exactly backwards. Architecture is not building—it is space. Save the space, add onto the buildings. We marvel at Kahn's sense of space and light; let's try to understand it.

Jerome Morley Larson, Sr., AIA
Red Bank, New Jersey

Resizing Steel

In response to your article "Sizing Up Steel" (March 1991, pages 149-151), we would like to point out that integrated space-frame structure and cladding is not a new technology. MERO Plus systems have permitted direct attachment of cladding to chords since the late 1970s.

The cost of space frames has virtually nothing to do with analysis costs (unless the particular supplier has poor hardware and software). It is far more a function of geometry, boundary conditions, and density. The City Place project in Chicago, for example, was value-engineered by MERO with Loebl, Schlossman and Hackl and utilized the MERO NK and KK systems. There was no product modification.

We are surprised to learn from the article that new powders, aluminized coatings, and polyester resins over steel are now superior in weathering to stainless or galvanized steel. Can we now assume that stainless and galvanized steel will become obsolete?

Ian Collins, President
MERO Structures
Germantown, Wisconsin

July 28-August 2: International Conference and Exhibition on Computer Graphics and Interactive Techniques in Las Vegas. Sponsored by the Association for Computing Machinery. Contact: (312) 644-6610.

August 15-17: Autocad user's group 1991 conference and exhibition in San Rafael, California. Contact: Stacey Nichol (415) 491-8447.

August 15-October 27: "Frank Lloyd Wright: Preserving an Architectural Heritage," at the American Craft Museum in New York City. Contact: Joan McDonald (212) 956-3535.

August 17-24: The International Solar Energy Society's Solar World Congress in Denver. Contact: ASES (303) 443-3130.

September 9-12: "Partnerships in Parks and Preservation" conference in Albany, New York, to examine cooperative strategies in preservation. Cosponsored by the National Park Service, the New York State Office of Parks, Recreation, and Historic Preservation, and the National Parks and Conservation Association. Contact: (202) 523-5280.

September 16-20: Planning and Designing Functional R&D Facilities, a course offered by the College of Engineering at University of Wisconsin-Madison, to be held in Palo Alto, California. Contact: 800-462-0876.

September 23-25: Museums and Historic Buildings in Cold Climates Conference in Helsinki, Finland, will discuss methods of protecting historic buildings and their collections. Contact: 061-275-2667.

September 24-26: Polyurethanes World Congress 1991 at the Acropolis Arts & Convention Center in Nice, France, focuses on global advances in rigid foam products for the construction industry. Contact: Fran Lichtenberg, Society of Plastics Industry (212) 351-5421.

September 28: Fourth Annual CAD Conference in Denver, Colorado, features the latest software and hardware in the CAD/CAM industry, with seminars for all levels. Contact: (303) 894-8610.

September 29-30: Second Annual University/Industry Cooperation Conference at Virginia Tech in Blacksburg, Virginia. Contact: (703) 231-9356.

NEWS

Sainsbury Wing Opens ▪ Paternoster Square Redeveloped ▪ Young Architects Forum ▪ Anyone in Los Angeles

AIA Convention: Economic Realities

THIS YEAR'S AIA CONVENTION, DUBBED "199ISSUES," TOOK ITS CUES FROM ready-made themes of the decade—the environment and the economy. During well-attended sessions on energy, international marketing, and productivity, architects sought ways to inject life into deflated practices. Between sold-out consultations and excursions around the nation's capital, the Washington Convention Center's corridors buzzed with discussions on how to find hope in a profession ravaged by the recession.

Despite the bleak economic forecast, the convention, held May 17-20, was not short on hopeful speakers nor participants. The lure of 1991 issues attracted over 70 foreign architects, 2,956 members, and 5,865 exhibitors, making it the third largest AIA convention.

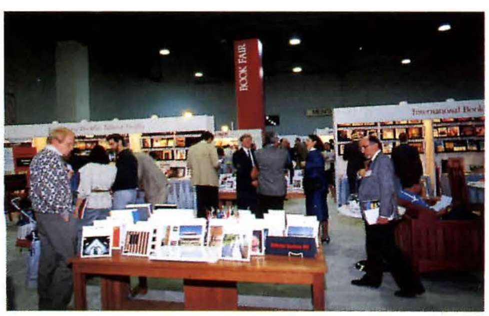
Kicking off the four-day event with his Gold Medal address, Charles Moore offered a vision of architecture that relies upon communication and collaboration. Touted by colleagues and coworkers as the ultimate environmental architect, Moore advocated the expression of individualism in architecture through the "collective memory" of time. He called for architects and students to "relax," so that they will not only be more attuned to their own dreams, but those of the client. "Buildings that are modest or winsome, or silly even, all have a place. If we had a kind of freedom of speech for buildings, then all these different voices could be heard."

Later in the welcoming session, San Antonio arts leader Amy Freeman Lee reinforced communication as a critical element in successful projects, while stressing the need for creativity and caring. "Don't hermetically seal me in a square [box] with no windows...I am not dead yet," she exhorted. Representing the public's voice, Lee pleaded with architects to let "architectonics of life" dictate design, and to avoid cavalier, overly complex buildings. Advocating subtlety and symbolism, the 78-year-old Lee pleaded with a full audience for romance: "...make me fall in love with you for the structure that you designed."

Throughout the weekend, "199Issues" challenged architects to push beyond the parameters of their respective contracts. Architect and U.S. Representative Dick Swett (D-N.H.) encouraged the audience to apply its knowledge in the political arena. By supporting the Transportation for Liveable Communities Act (ARCHITECTURE, June 1991, page 21), he maintained that architects can influence the quality of urban environments across the nation.

Pritzker Prize winner Robert Venturi provided a living example of an architect contin-

Charles Moore admires a Lego creation by a young conventioneer (above). Amy Freeman Lee (bottom left) and Andres Duany (bottom right) were among featured speakers. The second annual International Book Fair (bottom center) displayed over 600 books.



PHOTOGRAPHY BY ED CASTLE

AIA BRIEFS

This year's AIA business meeting addressed the vision of the institute beyond the 20th century. Concluding a one-year study, the AIA Membership Futures Task Force proposed changes to the association's bylaws to include a new category of "allied" members—non-voting members from professions related to architecture. Delegates voted to accept the first phase of Vision 2000, a 3-5 year plan designed to better serve AIA members and associates in the next century.

After significant debate, meeting attendees resolved that the AIA develop and promote the concept of a single model building code for the U.S. Delegates also approved a resolution that supports the role of American architects as leaders in worldwide environmental preservation.

Also at the convention, delegates elected the AIA's 1992 leaders. Once inaugurated in December, the new executive committee will take action in support of new resolutions. Front row, from left to right: Secretary Doug Engebretson of Springfield, Massachusetts; Treasurer Michael Bolinger of Baltimore; current President-elect Cecil Steward of Lincoln, Nebraska; First Vice President/President-elect Susan Maxman of Philadelphia. Second row: Vice Presidents Phillip Markwood of Columbus, Ohio; Thomas McKittrick of Houston, Texas; and Robert Woodhurst of Augusta, Georgia.

DETAILS

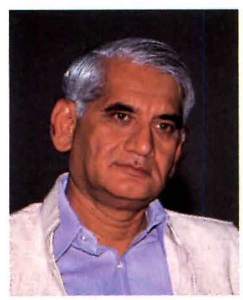
San Francisco architect Stanley Saitowitz won the competition for the Holocaust Memorial in Boston. The jury, led by Frank Gehry, reviewed more than 500 submissions for the project, which will be constructed at a site near Quincy Market. Gehry, in collaboration with Schwartz Silver Architects, is designing his own project in Boston, a $4 million addition to the Children's Museum. Total expansion to the Boston Harbor site will include a 1-acre waterfront park and a floating education and exhibition space. After completing programming and pre-design for the Henry R. Luce International Center at Yale University, Venturi, Scott Brown and Associates was relieved of the commission at Luce's insistence. The center will be designed by the office of Edward Larrabee Barnes. Venturi is now working on the design for a clinical sciences laboratory for Yale's medical school with Payette Associates. After 12 months of interviews, the selection committee for Chicago's new Museum of Contemporary Art awarded Josef Paul Kleihues of Berlin the commission to design the museum building and sculpture garden. The 2-acre development will replace the Chicago Avenue Armory, which sits between the Water Tower and Lake Michigan. One of five competition finalists, Arthur Golding & Associates of Los Angeles designed the winning scheme for a civic center in Rancho Mirage, California. Janet Abrams, a British architecture critic, was appointed Director of the Chicago institute for Architecture and Urbanism in early May. Her three-year term at the Institute begins this September. Benjamin Thompson & Associates of Cambridge, Massachusetts, is now planning the redevelopment of Spitalfields Market in London in conjunction with the British firm EPR Architects. Swanke Hayden Connell was pulled off the job three months ago after the firm's design failed to secure government approval.

AIA Convention News *continued from page 21*

ually looking beyond the scope of individual projects. In his keynote address, Venturi delivered an essay on complexity and contradiction in Japanese architecture. Venturi and his partner, Denise Scott Brown, explained the pair's awakening to an architecture that for centuries has gone undiscovered by Western architects. They found "astonishing geometric and esthetic violence" in the stacked roofs and large overhangs of the country's vernacular buildings. "The essential element of architecture is shelter—even more than space," Venturi asserted, lamenting America's habit of treating architecture as sculpture. With its neon signs and visual rhythms, urban Japan exhibits an "unabashed vitality." As Venturi asserted, "Deconstructivism looks better in Tokyo than it does here."

On the third day of the convention, discussion centered on establishing community identity. When it comes to revitalizing neighborhoods, British architect Rodney Hackney noted that "architects have hidden talents." He implored architects complaining of a lack of work to walk two blocks away from the Convention Center where derelict buildings contribute to broken homes and neighborhood disintegration. Understanding that successful community revitalization demands a high level of commitment from all project members, Hackney requires his architects to live in the housing that they are rehabilitating.

In a similar way, Indian architect Charles Correa called for a one-to-one correspondence between inhabitants and architects in low-income developments. "Unless we understand the lives of these people, we create ugly places for those who otherwise make such beautiful things for themselves." Correa's presentation on design and culture underscored the success of community revitalization in a third world country.



Closer to home, Andres Duany articulated a lack of sophistication in American urban planning due to the absence of middle class city-dwellers. In a seminar on "Opportunities in Affordable Housing," Denver architect Blake Chambliss cited homelessness as a direct result of the nation's continuing failure to commit to housing needs. Still, he maintained that "architects are more active in cities and neighborhoods" than in the recent past.

Coinciding with this year's convention was the second gathering of the newly formed AIA International Committee. Since last fall, the seven-member steering group has exploded into a 150-participant committee, with the goal of preparing American architects for work overseas. "Be careful about what jobs you accept," warned Eugene Kohn of Kohn Pedersen Fox Associates at a lunch session. Because of the different legal and tax structures abroad, it may be difficult to surpass construction barriers and stay on budget, Kohn explained. He cautioned American architects working outside the United States to place a premium on design, particularly when competition for jobs is stiff and foreign architects are not always welcome. "Americans do a better job of managing a project and moving it along. If we combine this with great design, we'll be unbeatable," he concluded.

A five-member panel of European Community experts, architects, and a developer also targeted growing markets and discussed opening overseas offices, with additional sessions devoted to the upcoming November International Committee conference in San Francisco. —KAREN SALMON

Speakers included Robert Venturi (top), who presented a paper written with Denise Scott Brown (second from top); Charles Correa (third from top); and Tadao Ando (bottom).

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National Gallery Wing Opens in London

NICK KANE / ARCAID

VENTURI, SCOTT BROWN AND ASSOCIATES' new Sainsbury Wing of London's National Gallery, the site of one of Britain's more sensational architectural controversies, opened to the public on July 10. The 120,000-square-foot addition to the 1838 William Wilkins building was designed to house one of the finest collections of Early Renaissance paintings, heretofore displayed in overcrowded, shabby spaces within the original gallery.

In the 1950s, a design competition was held for an addition at the gallery's west end, to occupy a parcel of land bombed during World War II. Nothing was built, however, until the 1970s, when a small addition was constructed at the gallery's north side. Then, in 1983, the gallery's trustees enlisted the aid of Environment Secretary Michael Heseltine, who promoted a developers' competition that would provide the winner with a large office block for a nominal rent, in return for providing rent-free gallery space.

Two schemes were chosen—one from London architects Ahrends Burton and Koralek (ABK), the other from Skidmore, Owings & Merrill—but Heseltine and the trustees could not agree on the final selection. In June 1984, the Prince of Wales referred to the ABK project while presenting the Royal Institute of British Architects' Gold Medal to Charles Correa at Hampton Court Palace. If built, the Prince protested, the addition would be "a carbuncle on the face of a much-loved friend." From then on, "carbuncle" entered the English language as a common architectural expletive; Heseltine's successor abandoned the project, and the gallery expansion seemed doomed.

But later that year, Sir John Sainsbury suddenly offered the National Gallery £20 million for a new building that would be free of commercial constraints. Another competition, limited to a list of well-known architects from the U.K. and the U.S. and judged by a committee comprising trustees, Sainsbury, and the gallery's director, was subsequently won by Venturi's firm in 1986. The American architects succeeded in meeting the requirements of the great British gift for compromise: the new wing is vaguely traditional, vaguely Modern, and vaguely polite to its more prestigious progenitor.

According to Robert Venturi, "The site was a challenge of context. External determinants ranged from the National Gallery and the huge space of Trafalgar Square to the strongly Classical Canada House immediately opposite, down to the narrow lanes at our building's sides and back." Hence, the architects applied different facades to fit the different facets of the site. Facing Trafalgar Square, they grouped a series of Classical, Portland stone pilasters, cornices, and other details based on Wilkins's original, that fade into a Regency-style elevation opposite Canada House. A glass-walled staircase, facing the 1838 building, makes a visual break between the Classical orders of the new wing and the older gallery. Brick comes into force for the elevations facing Whitcomb Street to the west and St. Martin's Street to the north.

Sainsbury Wing (bottom left) responds to Classicism of 1838 original (above). Buildings are joined at addition's top floor (bottom right) and eastern facade offers views from staircase (facing page, top). Galleries (facing page, bottom) are subservient to paintings.

The exterior has the effect of reflecting the fragmentation of the buildings that surround Trafalgar Square as it falls away to the south. However, harmony returns inside the new galleries with the solemnity of the museum occasion, where the main floor of the National Gallery carries through to become the top floor of the addition. The galleries, arranged as an enfilade along three north-south

PHIL STARLING / NATIONAL GALLERY PHOTOS

bays, thus continue uninterrupted from old to new along one floor of the entire building. The five-story addition contains two sub-grade levels that house seminar rooms, an auditorium, and space for temporary exhibitions. A gift shop and entrance foyer are located at ground level; a restaurant and conference room occupy the fitst floor. Surprisingly, in view of the architects' penchant for vivid color, the interior conveys total neutrality, rendered in a sliding scale of grays.

At the eastern end of the wing, all floors are reached from a grand, gray granite-covered staircase, its west wall engraved with names of Renaissance painters. Although it is the single dominant element in the entire scheme, the stair is invisible upon entry. Whether leading down to the basements or up to the Renaissance Collection, it is concealed behind an enormous, rusticated wall. A glass wall offers views from the stair of the original Wilkins building, Trafalgar Square, and the Church of St. Martin in the Fields.

Venturi and Scott Brown are to be congratulated for displaying the beautiful, unearthly paintings of the Early Renaissance in a way never before seen. They look superb, radiant with warmth in their quiet background under clerestories, inspired by those designed by John Soane for the 1814 Dulwich Picture Gallery. Above these clerestories, the double-glazed roof of the galleries contains louvers programmed for a delayed reaction to changes in daylight levels. The mechanism admits daylight while protecting the paintings from direct exposure.

Overall, the atmosphere of the new Sainsbury Wing projects an air of calm; the presence of the architects withdraws to allow the Early Renaissance paintings to occupy center stage. —STEPHEN GARDINER

Stephen Gardiner is the architecture critic for The Observer.

PHIL STARLING / NATIONAL GALLERY PHOTOS

TRUSSWALL

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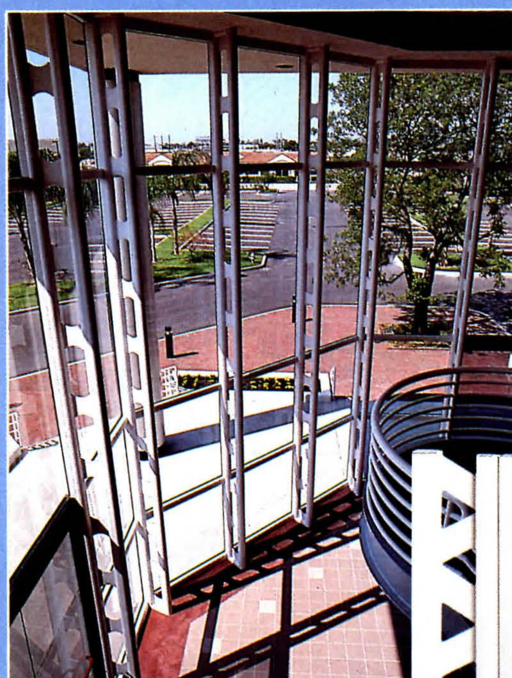

There are two sides to every story.

On the outside, Trusswall presents a number of faces. One is the innovative circular cover for the sculpted look. Another is the more austere approach, silicone glazing, for an uninterrupted line. And the rectangular cover presents a third more traditional light.

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But while the design options offer flexibility, the integrity of the structure remains inflexible. A thermal break, and the flexibility of either 1/4″ or 1″ glass attest to Trusswall being ready and willing to take on nature's harshest elements.

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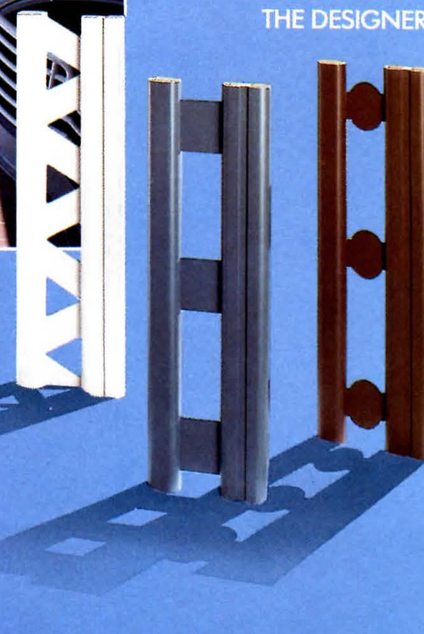

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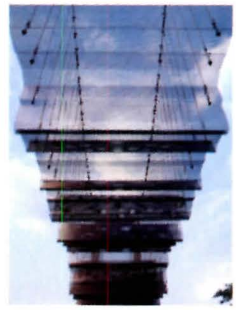
A Decade of Young Architects

YOUNG ARCHITECTS WHO OPEN THEIR OWN offices soon after graduation seldom find enough clients to keep going. Typically, they either give up and go to work for large established firms, or, if they have the financial resources, devote themselves to self-generated projects that tend to be abstract, theoretical, and visionary. Unfortunately, by choosing to apply their talents in ways that are peripheral to the art of building, these young architects remain marginal to the practice of architecture, unable to invigorate the built world with the fresh ideas of their generation.

Ten years ago, the Architectural League of New York launched the Young Architects Forum, an annual jury-selected exhibition and lecture series conceived to discover gifted architects—no one whose architectural degree is more than 10 years old qualifies to submit work. In the decade of its existence, the program has helped discover many talented designers, such as Steven Holl, Billie Tsien, and Frederic Schwartz. This year's exhibition and forum, labeled "Practice," examined and broadened the traditional definition of architectural practice to include work better described as sculpture, painting, performance art, poetry, criticism, history, and philosophy. This focus led to some curious winners. Uwe Drost of Washington, D.C., was chosen for his role of historian and critic, engaging in a reinvestigation of early Modernism in Germany. Craig Newick of New Haven, believing that what we know about architecture comes from looking at photographs, filled a little silver box with objects that purport to explore the simultaneous existence of both image and space.



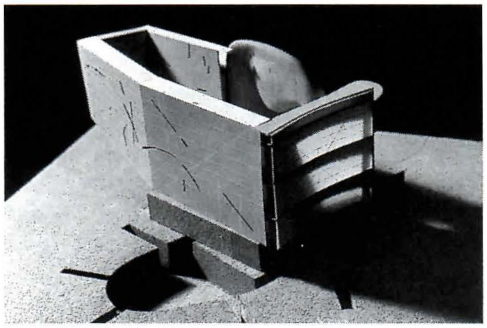
Constructed in 1987 for New York's Art on the Beach program, Craig Konyk's "Bridge..." (above) was cited at this year's Forum.

Thomas Bish and Henry Laessig of Newark took 16 sections through the topography of their city and invented 16 street collages, beautifully executed in wood and assembled to form a handsome three-dimensional work.

The members of this year's jury were League President Paul Byard, Sanford Kwinter, Jose Oubrerie, Billie Tsien, Mojgan Hariri, Anthony Pleskow, and Timothy Schollaert. They chose few completed buildings or projects with real clients, and those few that were selected were displayed to appear more abstract and theoretical than real, minimizing evidence of construction or completion.

This year's Forum was concluded by a panel, moderated by the League's vice-chairman for design, Susana Torre, and intended to be a critical overview of the program's last 10 years. Instead, it became a general discussion of why young, marginalized architects with so few real clients should get up in the morning and sharpen their pencils. Are they to continue to generate theoretical work, or should they hold out for the opportunity to design real buildings? Furthermore, which choice should the Young Architects Forum favor? Opting for the real world of clients was juror and panelist Billie Tsien. She confessed to regrets that two completed projects didn't make the Forum's final cut: a loft by Peter Moore and Kevin Kennon, and a sculpture studio by Baltimore architect Keith Mehner, the latter having received a national AIA honor award this year.

Architectural critic Herbert Muschamp was the only panelist to express the wish that the League could foster the work of young architects without labeling them as such. "I have a problem with the use of a formal structure based around age," he said. "It has nothing to do with creativity. It is really a sociological structure, based on the fact that the profession continues to operate as a guild system. I wish there were a mechanism that would allow the talent in this exhibition to be out in the streets building things."



Chicago architect Douglas Garofalo was honored for his scheme for the Moscow Experimental Theater (above).

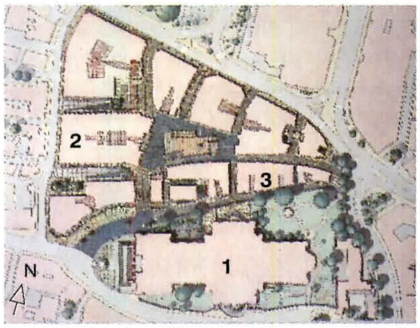
Are young architects inadvertently handicapped in the competition for clients by well-meaning exhibitions organized around their status? Is the best way to take them seriously to forget their age, measuring their work against the best there is, rather than against that of their peers? Muschamp gave the panel and its audience a lot to think about and a great subject for next year's debate.

—MILDRED F. SCHMERTZ

Mildred Schmertz is a New York-based journalist.

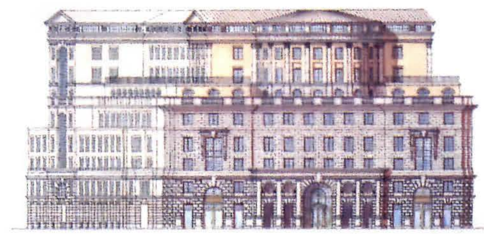
New Scheme for London Site

THE CLASSICAL ARCHITECTURE OF A PROposed 1.2 million-square-foot redevelopment next to St. Paul's Cathedral is planned to ease Londoners' fears that Paternoster Square would once again disrespect its historic surroundings. Late in May, three planners and five architects from both sides of the Atlantic unveiled a comprehensive scheme intended to restore the triangular site (right) of Paternoster Square to its prewar character. The participants include six British architects: Terry Farrell, John Simpson, Robert Adam, Paul Gibson, Demetri Porphyrios, and Quinlan Terry, with Chicagoan Thomas Beeby and Allan Greenberg of New Haven.



The existing Paternoster Square complex, conceived in the 1950s, follows a rigid matrix of Modern buildings and elevated walkways. To create a new business and shopping complex, the British and American architects reinstated historical curved street and storefront patterns on the 7-acre site. The new, four-story brick-clad buildings facing St. Paul's respect the cathedral's stone facade and adjacent structures. Buildings north of the square rise to nine stories, responding to office blocks across the street. The $1.4 billion complex, developed by Paternoster Associates, a partnership between the London-based Greycoat PLC and the Park Tower Group of New York, awaits planning approval. The developers hope to break ground by the end of the year. —K.S.

Allan Greenberg's block (above and 3 on site plan) faces St. Paul's Cathedral (1 on site plan). Hammond Beeby and Babka's building (below and 2 on plan) is sited to the west.



Los Angeles Forum Addresses Theory

IN 1967, PETER EISENMAN FOUNDED THE Institute for Architecture and Urban Studies in New York to address issues he believed had been neglected by the profession. Eisenman left in 1982 and the institute closed in 1983, but he's back with a new venture called Anyone, bent on elevating architecture to the status of disciplines such as philosophy, theology, and sociology.

Obscure verbiage clouded the air at Anyone's first forum in Los Angeles, held May 10-11, where Eisenman and Anyone brought together several of the world's most renowned thinkers. Economist and author Akira Asada, cyberpunk novelist William Gibson, critic Fredric Jameson, literary theorist Kojin Karatani, architecture critic and designer Jeff Kipnis, and Deconstructionist theologian Mark Taylor were panelists, as were architects Frank Gehry, Rem Koolhaas, Arata Isozaki, Rafael Moneo, and Ignasi de Sola-Morales Rubio. Even Jacques Derrida, the French philosopher whose literary theories have been misappropriated by Deconstructionist architects, was on hand.

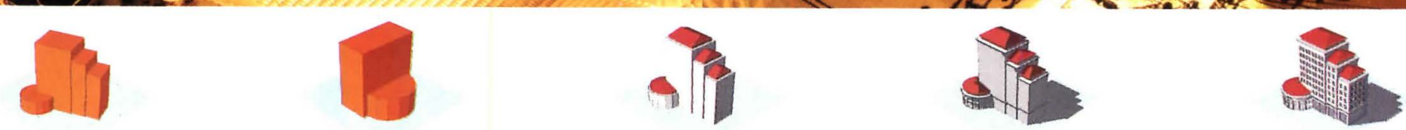
Presentations by Karatani and Derrida were almost unintelligible due to their accents and esoteric vocabularies. Harvard law and social theory professor Roberto Unger, on the other hand, gave a rousing, more accessible oration. He strolled the stage, deriding Postmodernism and calling for a new kind of architecture for a new world. "Don't take refuge in self-indulgent ornamentation, but express, in physical form, a shared universal vision," Unger counseled.

Architects, artists, and critics gave "Three Views of Anyone" on several panels. Isozaki and Asada teamed up to trace assorted ideas of the individual through history, citing several philosophers. Koolhaas railed against monstrous urban buildings, where great distances between core and shell preclude any possibility of a meaningful connection between the two, and showed his proposal for a national library in Paris as a new *prototype*. Clearly, however, the audience was often bored, or at the very least befuddled. By late on the second day, less than half of the original 600 attendees were on hand. After one forum, Frank Gehry confessed, "I didn't understand half of what was said."

Anyone's debut was cosponsored by the Getty Center in Los Angeles, with a majority of the funding coming from the Japanese construction firm Shimizu Corporation. Anyone plans to hold annual forums on architecture (to be documented in annual publications) through the year 2001. Isozaki will take a lead role in organizing next year's "Anywhere" themed conference in Japan. The question remains, will anyone show up? ■

—DIRK SUTRO

Dirk Sutro is the architecture critic with the San Diego edition of the Los Angeles Times.



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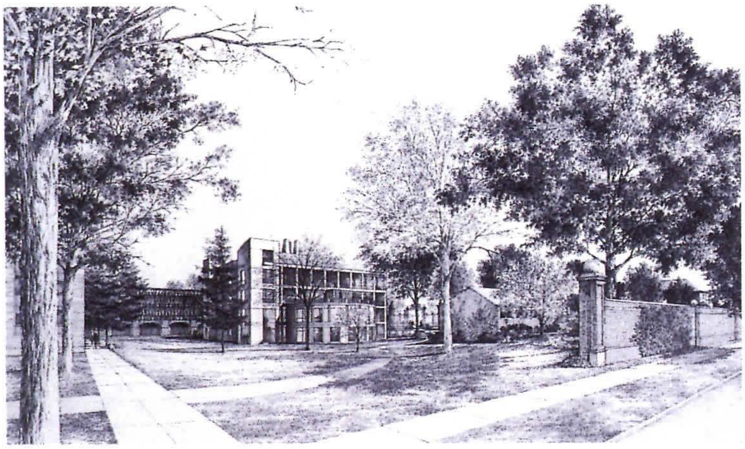
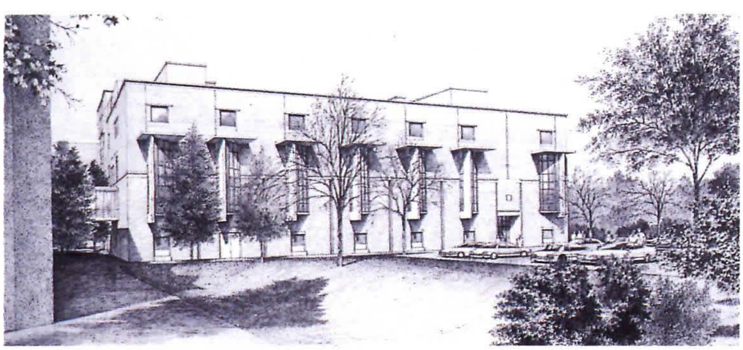
Princeton University Additions



MATERIALS SCIENCE BUILDING—NORTHWEST PERSPECTIVE

MATERIALS SCIENCE BUILDING—SOUTH ELEVATION



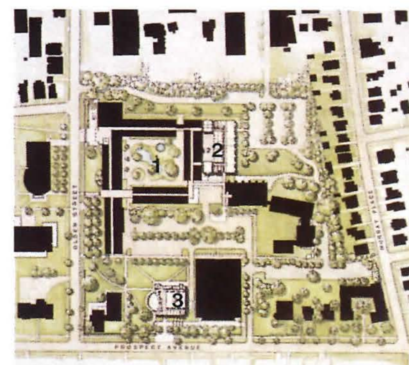
ENGINEERING QUADRANGLE EXPANSION—SOUTHEAST PERSPECTIVE

ENGINEERING QUADRANGLE EXPANSION—EAST ELEVATION

Materials Science Building
Engineering Quadrangle Expansion
The Hillier Group, Architects

WHEN PRINCETON UNIVERSITY INITIALLY INterviewed the Hillier Group to design a building adjacent to the existing engineering quadrangle, the client anticipated a single structure to house three science departments. But soon after Hillier was awarded the commission, the project split into an addition to accommodate the Photonics and Optoelectronic Materials Program and Department of Mechanical and Aerospace Engineering, and a structure to house the Materials Institute.

Designed by principal Alan Chimacoff, the resulting 60,000-square-foot engineering expansion and 40,000-square-foot materials science building subtly relate to their neighbors. Announced by two towers, the bulk of the engineering expansion matches the height of the adjacent, four-story building and materials of its neighbors. On the east elevation (bottom left), angled bay windows create a transition in scale from the campus to nearby residences.



SITE PLAN

1 EXISTING ENGINEERING QUADRANGLE
2 ENGINEERING QUADRANGLE EXPANSION
3 MATERIALS SCIENCE BUILDING

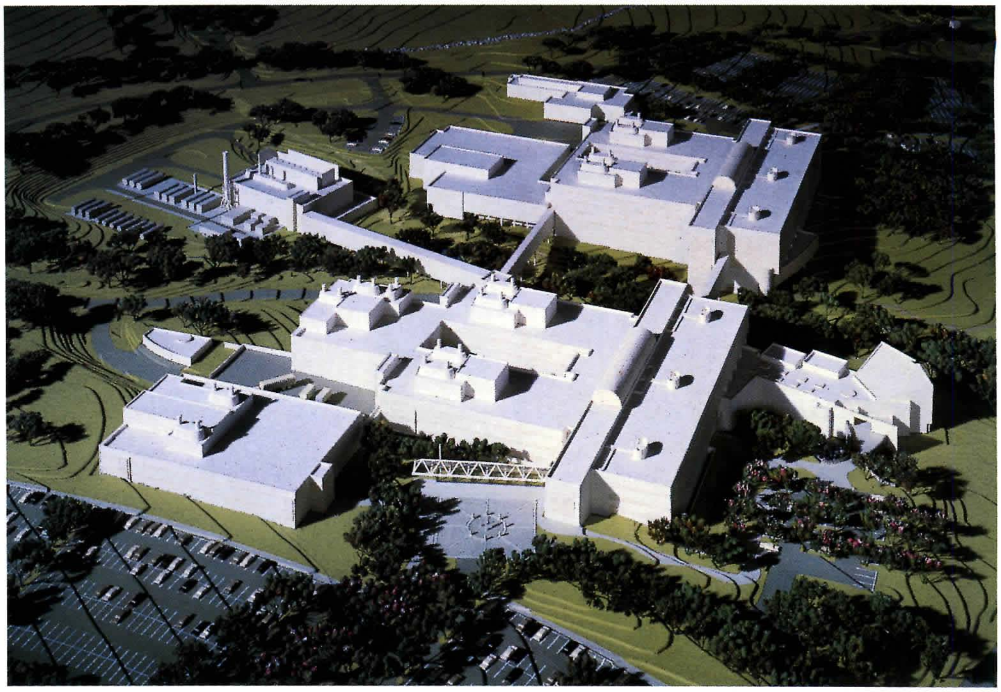
More abstract in its design, the materials science building also takes cues from its surroundings. A masonry wall and pair of iron gates designed by McKim Mead & White influenced the building's placement. The existing wall's clinker brick and an adjacent parking garage provided contextual justification for the new structure's red brick planes, green granite grids, and green-tinted aluminum panels. The institute, after all, is devoted to materials science—the exploration of molecular structures aimed at improving upon nature's products. As Chimacoff explains, "The grid represents a basic matrix onto which programmatic and contextual requirements are imbedded, scratched onto, or pulled from within."

The materials science building will be completed in fall 1992, and the engineering expansion in spring 1993. —N.B.S

Research Laboratories

Sterling Research Group
Upper Providence Township, Pennsylvania
The Kling-Lindquist Partnership, Architects

FACED WITH A SLOPED SITE DIVIDED IN HALF by wetlands, the architects organized the functions of the 1.5 million-square-foot research and development complex into separate quadrants (right). Research operations are arranged along the east-west axis: a biology and clinical research facility (foreground) and chemistry building (rear). The north-south axis includes service buildings such as an auditorium (far right), training center, and power plant (far left). To facilitate circulation, the architects provided an elevated walkway between the east and west blocks and a continuous spine along the north-south axis. Visitors enter the upper floor of a 3-level atrium, which houses a library and a cafeteria overlooking the wetlands. Currently under construction, the first phase of the 883,300-square-foot project will be completed in 1993.



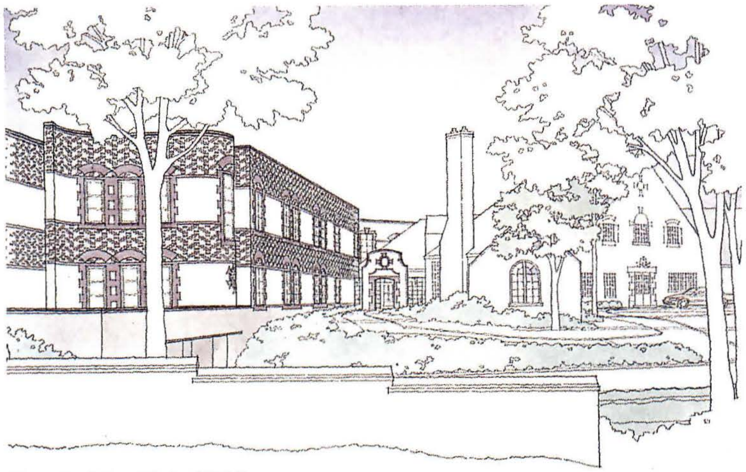
Merck Biological Support Laboratory
Rahway, New Jersey
The Kling-Lindquist Partnership, Architects

A 100,000-SQUARE-FOOT LABORATORY FOR biological research (left) maximizes interior work spaces while minimizing internal circulation. Located on the Merck & Company research campus, the four-story rectilinear volume with sloped mechanical penthouse roof is clad with red brick on the north, south, and east facades. Horizontal brick bands articulate floor and structural bays, while cast stone medallions indicate columns. Horizontal strip windows on the north elevation (above left) allow light to enter the circulation corridors.

Visitors enter the building at the southeast corner. This main entrance is accentuated by a curved, semi-detached stair, a metal canopy, and a raised sculptural feature on the east facade. Wrapped in a glass curtain wall, a second stair at the northeast corner provides views to the north.

Insulated panels covering the west facade will be removed to accommodate a 150,000-square-foot laboratory expansion; a roof of the loading dock (bottom left) will become part of the new floor slab. Construction of the first phase will begin this fall. —K.S.

Childrens' Hospitals

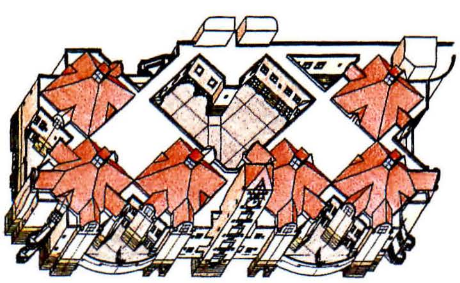


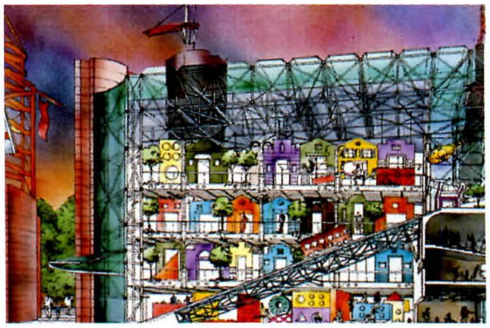
Hospital for Sick Children
Washington, D.C.
Herbert Cohen & Associates, Architects
Weinstein Associates, Architects

AFTER A 1929 NORMAN COTTAGE REVIVAL STRUCTURE WAS DESIGnated a historical landmark, Herbert Cohen & Associates revised its initial scheme for the long-term convalescent facility for children. The plan adds two wings totalling 68,000 square feet to the existing, 1968 structure. The cottage, which will become the main entrance lobby, inspired a brick-patterned facade designed by Weinstein Associates. The $13 million expansion, which includes below-grade parking, therapy rooms, and 80 beds, will be completed in 1992.

Children's Hospital and Health Center Expansion
San Diego, California
The NBBJ Group, Architects

RESTING ON TOP OF A HILL, THE 144,000-SQUARE-FOOT PATIENT WING addition overlooks the San Diego metropolitan area. The architects borrowed familiar elements to decrease the threatening nature of a medical environment, such as red metal roofs (top left) that echo the nearby Hotel Del Coronado. Alternating strips of textured and smooth concrete block are scaled to children's height. Beneath each red roof (bottom) are two levels of 10-bed clusters, with landscaped, internal playgrounds on the second level. A clock tower houses the main circulation stair offering views of the city from oversized landings. The scheme is part of a $56 million development that will break ground this September.

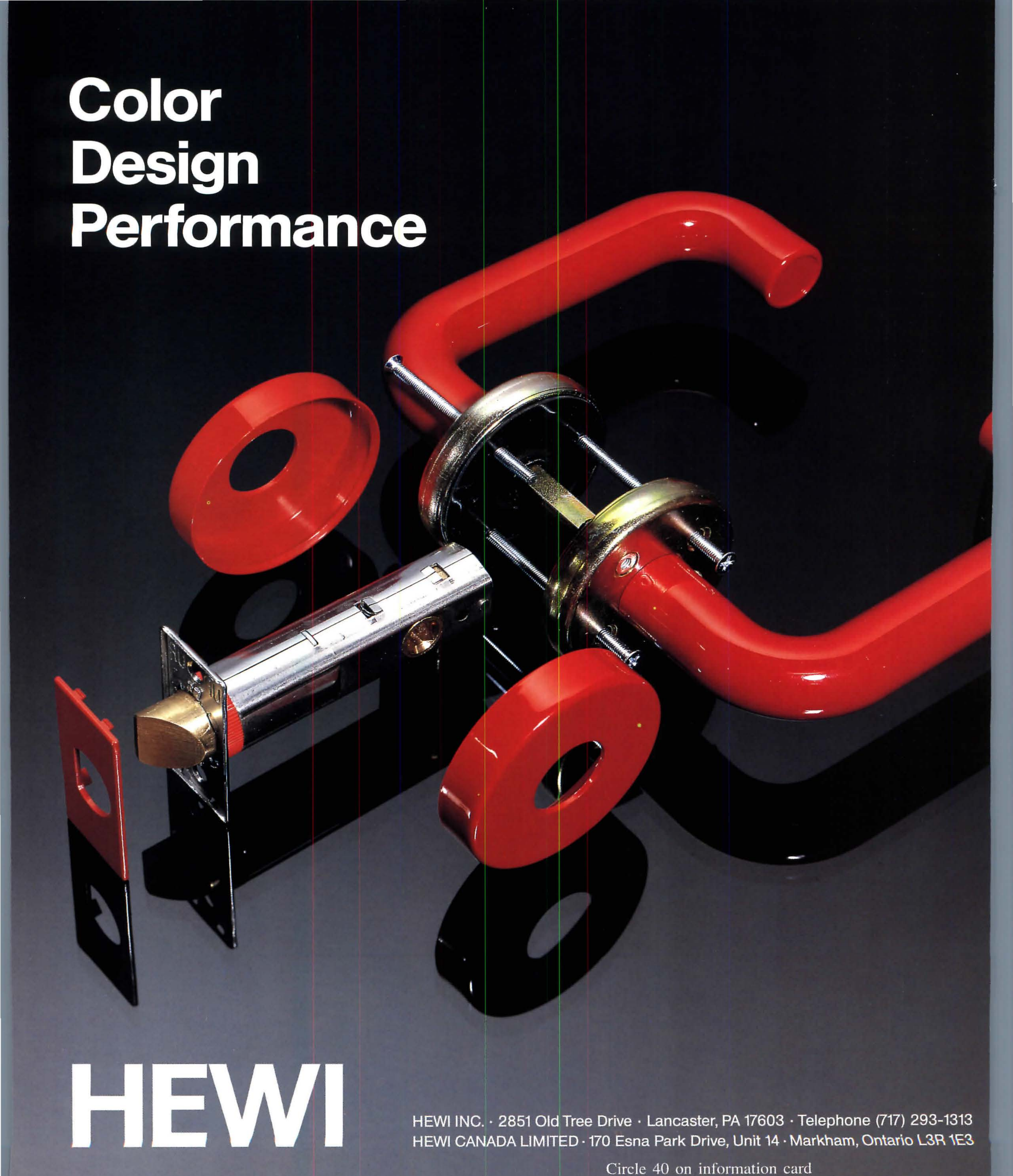




Starbright Pavilion
Los Angeles, California
Kaplan/McLaughlin/Diaz, Architects

DESIGNED TO SUPPORT AN INNOVATIVE method of treating seriously ill children, the 5-story pediatric facility (above) will offer entertainment and education to relieve the stress of intensive medical care. The 110,000-square-foot Starbright Pavilion will adjoin the new 1,000,000-square-foot Los Angeles County/University of Southern California Medical Center, which will begin construction in 1995. Sponsored by the Starlight Foundation, the pavilion will promote healing through activities that center around art, music, puppets, pets, and computers. Miniature facades (top), accessed by tramway, serve as gateways to treatment areas and consultation rooms. *Currently under negotiation,* the $50 million project is expected to break ground in 1992. ■

—K.S.



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The Art of Healing

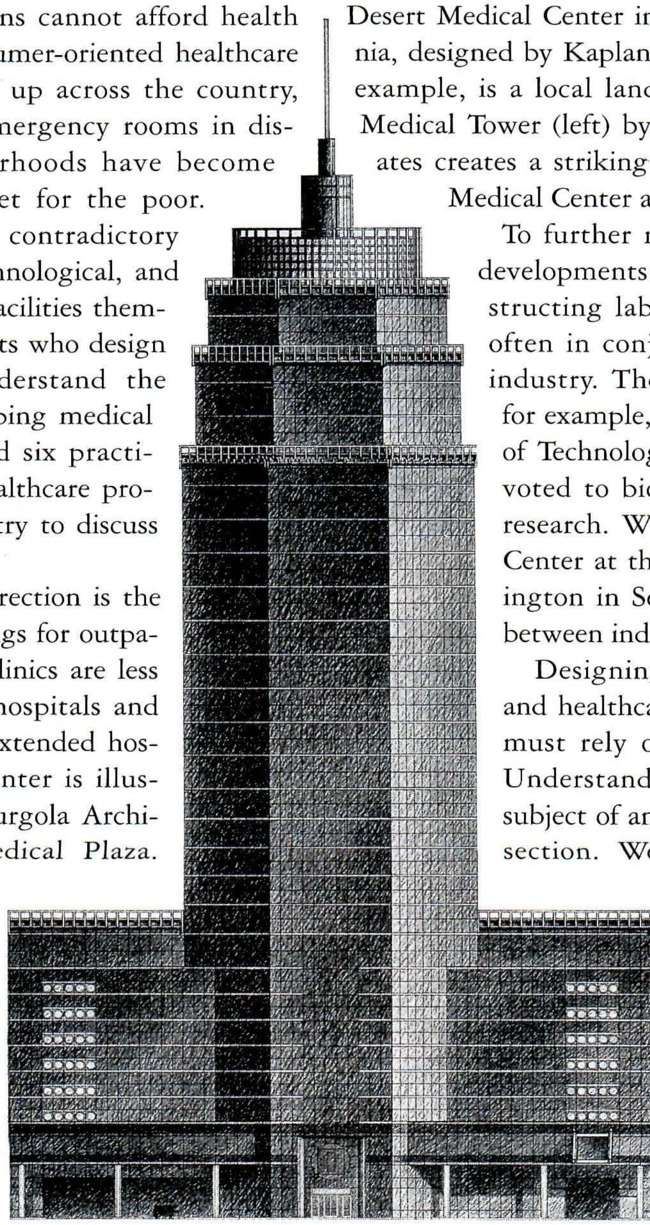
FOR THE HEALTHCARE INDUSTRY, IT IS BOTH the best and the worst of times. Medical advances have made once-miraculous organ transplants commonplace, yet the ability to extend people's lives has led to court battles over the right to die. Genetic engineering promises to cure diseases before their symptoms appear, but 30 million U.S. citizens cannot afford health insurance. Many consumer-oriented healthcare centers have cropped up across the country, while overcrowded emergency rooms in disadvantaged neighborhoods have become a makeshift safety net for the poor. Caught in this often contradictory web of economic, technological, and ethical issues are the facilities themselves and the architects who design them. To better understand the architect's role in shaping medical complexes, we invited six practitioners engaged in healthcare projects around the country to discuss industry trends.

One very visible direction is the proliferation of buildings for outpatient services. These clinics are less costly to build than hospitals and eliminate expensive, extended hospital stays. Such a center is illustrated by Mitchell/Giurgola Architects' 200 UCLA Medical Plaza. Meanwhile, advanced technology, increased specialization, and greater sensitivity to therapeutic needs has justified pulling other facilities out of the traditional hospital setting. Anshen + Allen's Shiley Eye Center at the University of California, San Diego and Richard Rauh & Associates' Shenandoah Regional Campus for head injury patients are examples in this issue.

As clients' interest in design grows, many new medical facilities are establishing notable presences within their communities. The Hi-Desert Medical Center in Joshua Tree, California, designed by Kaplan/McLaughlin/Diaz, for example, is a local landmark and St. Luke's Medical Tower (left) by Cesar Pelli & Associates creates a striking symbol for the Texas Medical Center and Houston.

To further medical and scientific developments, universities are constructing laboratories on campus, often in conjunction with private industry. The Beckman Institute, for example, at California Institute of Technology in Pasadena, is devoted to biological and chemical research. Washington Technology Center at the University of Washington in Seattle fosters dialogue between industry and academics.

Designing these laboratories and healthcare facilities, architects must rely on many consultants. Understanding their role is the subject of an article in our practice section. We also look at clean rooms, the debated health effects of electromagnetic radiation, and "universal" hardware for users with and without disabilities. ■



St. Luke's Medical Tower, Cesar Pelli & Associates, Architects.

St. Luke's Medical Tower
Houston, Texas
Cesar Pelli & Associates, Architects

urban vigor

ST. LUKE'S MEDICAL TOWER IS AN ATYPICAL project both for Cesar Pelli & Associates and the Texas Medical Center in Houston. Stockier and less intricately detailed than recent Pelli-designed towers such as Norwest Center in Minneapolis (1990), St. Luke's marks a radical departure for the medical center's dense, bland, and boxy campus in both image and urban design.

Conceived in a 1987 competition as the first phase of a three-phase, six-tower complex, St. Luke's reflects the architect's desire to create a new urban face for the medical center. To design such a memorable image, Pelli drew upon the city's "futuristic" tradition. "I have always felt that Houston is a city of glass buildings," he says, "which can be incredibly banal. But Houston's have flair and character, and they go together well." Pelli therefore ignored the immediate surroundings of the medical center in favor of the sleek office clusters downtown and at the city's periphery, creating a 492,000-square-foot structure topped by twin spires.

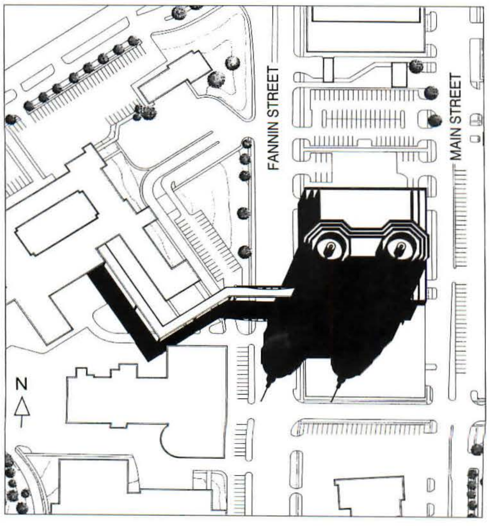
Straddling two paired boulevards, Main and Fannin, which extend from downtown to the city's edge, the complex redirects the streetscapes by offering a tower for each. In the past, garages were clustered along Main Street while their companion office towers lined Fannin. As a result, Main had become a mere service alley in recent years. Pelli sought to change that arrangement by incorporating nine floors of parking as part of the building, rather than housing it in a separate structure. "It was important to treat Main and Fannin equally," he observes. "The two octagonal towers mark two important avenues now."

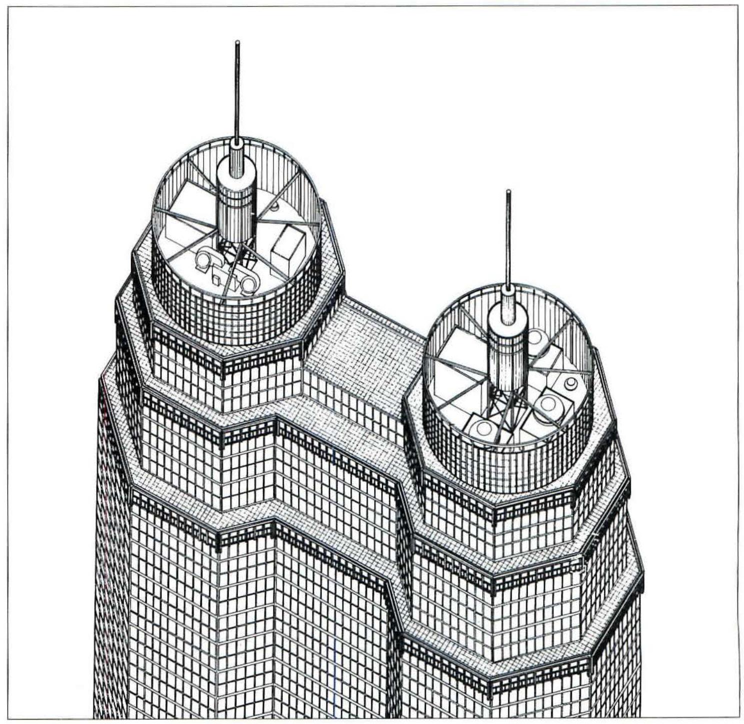
Behind its mirrored-glass skin, St. Luke's cast-in-place and precast concrete frame is divided into four sections: six floors of parking above a two-story lobby and three floors below; an ambulatory-care expansion on floors 9–11; doctors' offices on floors 12–27; and a circular roof armature that conceals mechanical equipment. Each section is subtly articulated. The second floor protrudes on both street faces to create a pedestrian-scale canopy that ties in to a 547-foot skybridge to the adjacent St. Luke's Episcopal Hospital. Each floor of the building is expressed by two glass spandrels edged with white-painted aluminum. Ambulatory-care floors (9–12) occupy three spandrels each. A circular roof armature and fiberglass spire bring each tower to a dynamic terminus.

Dubbed "twin syringes" by some local residents, the towers stand out in daylight as optimistic, glimmering jewels against their shorter, squared-off neighbors. The contrast is heightened when the towers are seen from afar, emerging above the trees of Hermann Park or the Rice University campus. At night, the roof armature is bathed in brilliant uplighting, with aircraft warning beacons pulsating atop each spire. St. Luke's approaches the confident swagger of Johnson/Burgee's Transco Tower (1985) a few miles to the west, although its tower measures less than half the height of its predecessor. Like Transco, it beckons from all directions.

The contrast between the towers' exterior

Mirrored glass, bold geometry, and twin spires (facing page) set St. Luke's Tower apart from the rest of the Texas Medical Center (above). More than just caprice, the twin towers gesture to both boulevards that border the site (site plan below), reestablishing lost urbanity in southwest Houston.



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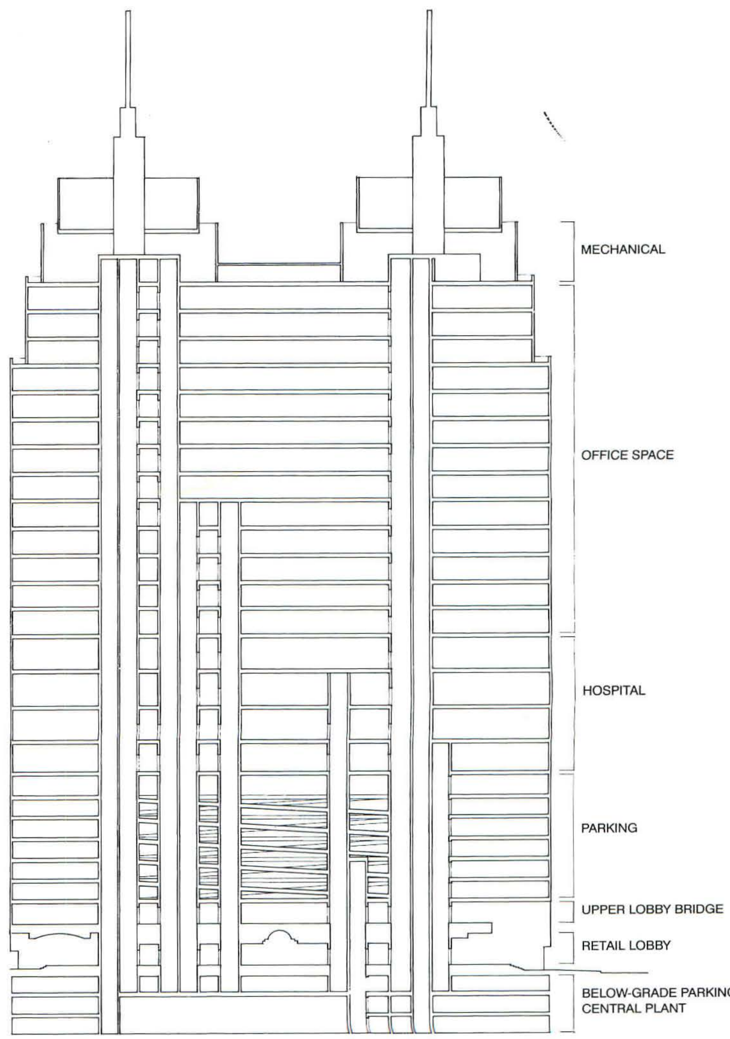

MECHANICAL
OFFICE SPACE
HOSPITAL
PARKING
UPPER LOBBY BRIDGE
RETAIL LOBBY
BELOW-GRADE PARKING
CENTRAL PLANT

Capped by roof armatures (facing page, top), the building is detailed with aluminum insets (facing page, center) and steel-framed entry (facing page, bottom). Vehicular (right) and street (bottom) lobbies are finished in marble.

and lobbies "is like a melon," says Pelli. "It has a hard skin, but is soft and beautiful inside." Paneled in wood and marble, the interiors exude uncharacteristic warmth, avoiding the sterility of most hospital settings.

Although St. Luke's certainly has set a new standard for structures in the Medical Center, some elements of the design remain questionable. Pelli intended the twin towers to gain matching twins to the north and south. This six-pack of 28-story glass towers on a nicely detailed parking base would be preferable, if a bit overbearing, to the hodgepodge of buildings now on the prospective sites. Future phases are all but ruled out, however, according to St. Luke's head of development Michael Israel. The building's base will remain lopped-off on either end, presenting stark north and south facades.

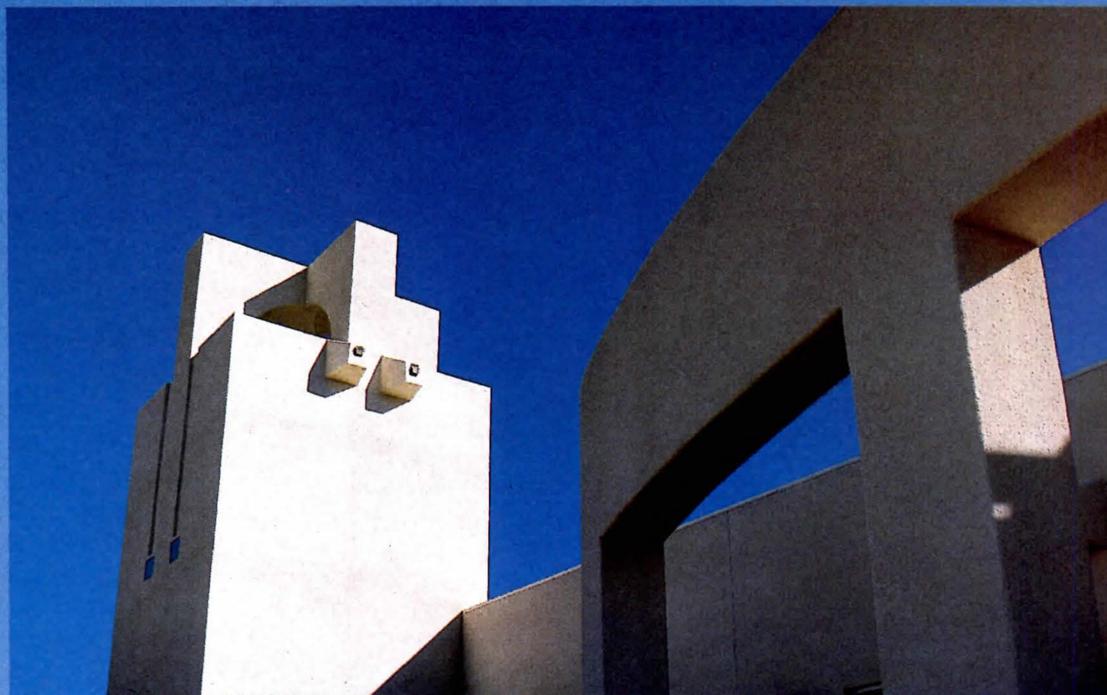
The proportions of Pelli's design suffer from a common problem of mid-rise towers. The collective floor plates, large enough to be leased profitably, overpower the 477-foot height. Viewed in elevation, St. Luke's reads as one giant block, and the roof armatures taper too quickly to be read as continuations of the building. St. Luke's additions to the medical center, however, outweigh these drawbacks. The center conveys a memorable and marketable image; Main Street has retrieved lost respect; and southwest Houston is identifiable not just by the expanse of the Astrodome, but by a pair of twinkling pinnacles in the night sky. ■

—Ray Don Tilley

ST. LUKE'S MEDICAL TOWER
HOUSTON, TEXAS

ARCHITECTS: Cesar Pelli & Associates, New Haven, Connecticut—Cesar Pelli (design principal); Fred W. Clarke III (project principal); Mark R. Shoemaker (design team leader); Mark Outman, Benjamin Schrier (designers)
ASSOCIATE ARCHITECTS: Kendall/Heaton Associates, Houston, Texas—Jim Heaton (principal-in-charge); Patrick N. Ankney (project architect)
LANDSCAPE ARCHITECT: The SWA Group
ENGINEERS: CBM Engineers (structural); I.A. Naman + Associates (mechanical/electrical); Walter P. Moore and Associates (civil)
CONSULTANTS: Howard Brandston & Partners Lighting (lighting)
GENERAL CONTRACTOR: Manhattan Construction Co.
PHOTOGRAPHER: Paul Hester

Hi-Desert Medical Center
Joshua Tree, California
Kaplan/McLaughlin/Diaz, Architects



oasis of healing

The medical center is organized around an internal courtyard (plan below) with public spaces arranged on the north side to offer views of the desert, and patient rooms to the south in the more private part of the site. The building's simple stuccoed volumes (facing page, top), deeply incised windows, and inset tiles recall architecture of the Southwestern desert regions. The entryway to the east (facing page, bottom left) and the terrace to the north (facing page, bottom right) are designed to shade exterior spaces. The tower houses a small chapel.

IN JOSHUA TREE AND THE NEARBY COMMUNITIES of Yucca Valley and Morongo Valley, public buildings are indistinguishable from mini-malls or anonymous, light industrial structures. An exception is the Hi-Desert Medical Center, a 38,000-square-foot skilled nursing facility designed by Kaplan/McLaughlin/Diaz (KMD). Derived from Southwestern missions, the stuccoed building is clearly defined as a communal landmark in contrast to local built form.

The design and construction of such a medical center seems like a paradox in the high desert of Southern California. Sited in an area with a large population of older people—individualists who have chosen to avoid a planned retirement development—the new nursing home was surprisingly financed with community taxes. In 1988, the Hi-Desert Memorial Hospital District asked KMD to design a master plan for expanding an existing acute-care hospital, a community education center, a psychiatric facility, and a 120-bed nursing facility, the only portion of the scheme yet to be completed. The new building is one of the first constructed by a California hospital district which, like a school district, can levy taxes to build and operate facilities. Because changes in Medicare payments often result in fixed coverage and shorter hospital stays, the Hi-Desert hospital district decided to build a facility to provide for both patients who require long-term supervised care and for those who need recuperation and rehabilitation before returning home.

The context for KMD's design is the landscape: the site is located near Joshua Tree National Monument and shares its dramatic setting, which forms the backdrop to the building. On a long slope descending to the north, the building defines the front edge of an artificial plateau, created to divert the violent water run-off caused by desert storms. The northern edge of the building, marked by a tower and wall-enclosed terrace, contains the public rooms of the facility and faces a sweeping view of the desert. Patient rooms are located at the rear of the building, sheltered by rock outcroppings. Rendered to nearly match the color of the earth beneath it, the building, anchored by the splayed base of its tower, appears to grow out of the ground. The surrounding pad and slope, much of it still raw, will be planted with desert vegetation, further enhancing the relationship between architecture and landscape.

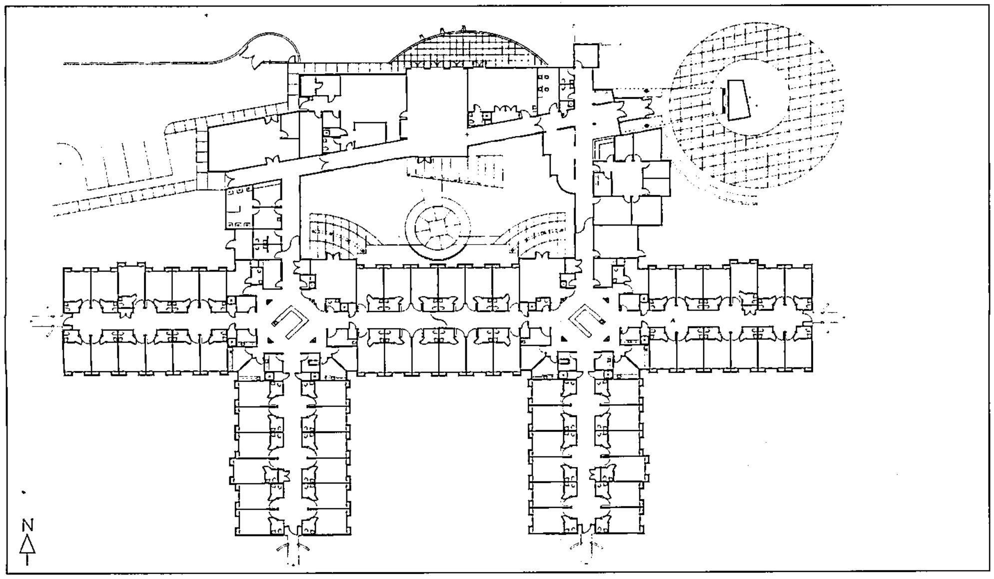
Inside the nursing facility, a courtyard visible from the entrance lobby provides a controlled outdoor environment, where both plant life and patients are protected from strong desert winds. As staffing is a large operating expense, the plan maximizes functional flexibility to minimize the number of staff required per patient. Two nursing stations are positioned at the intersections of the patient wings. The middle wing can be supervised by either station; when patient numbers are small, one station can be closed.

Both the design of the facility and its policies promote activity, both inside and outdoors, for mobile patients. A large dining/activity room is located on the north side of the building, purposely some distance from the patient rooms, and faces the courtyard and terrace. Interior spaces are light and airy, with deep windows and shading devices offering protection from desert glare.

The community is apparently more than pleased with the facility, which presents a striking image in its remarkable setting. In fact, the hospital district plans to build future facilities in a similar style. KMD is already working on the next phase of development, a community health education center to be sited across the road from the nursing facility. However, the center may be relocated because of recent concerns over protecting the habitat of the endangered desert tortoise. Such community action represents yet another change in Joshua Tree, from unencumbered individualism to communal efforts to protect the ill and endangered, a view which the Hi-Desert Medical Center aptly symbolizes. ■

—JUDITH SHEINE

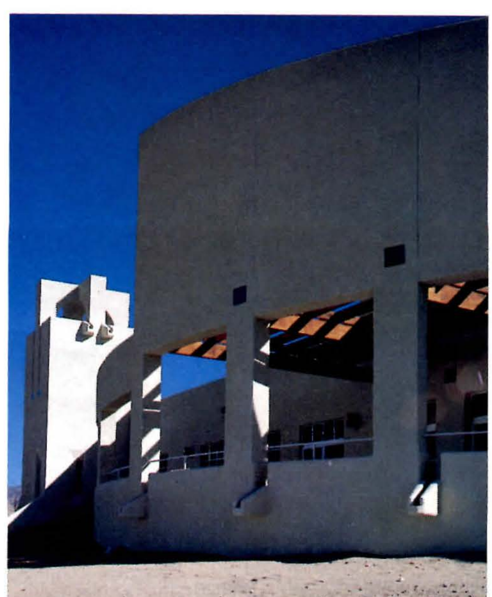
Judith Sheine is an architect who practices and teaches in Los Angeles.



PLAN

HI-DESERT MEDICAL CENTER
JOSHUA TREE, CALIFORNIA

ARCHITECT: Kaplan/McLaughlin/Diaz, San Francisco, California—James Diaz (principal-in-charge); Herbert McLaughlin (principal-in-charge of design); Sam D'Amico (project architect)
LANDSCAPE ARCHITECT: TDK Associates
ENGINEERS: Buehler & Buehler Associates (structural); Capital Engineering Consultants (mechanical); Koch, Chun, Knobloch & Associates (electrical); Warner Engineering (civil)
CONSULTANTS: Reno Heofler & Associates (kitchen)
GENERAL CONTRACTOR: McAlpine & Salyer
COST: $3.98 million
PHOTOGRAPHER: Alan Weintraub



Fluke Hall
Seattle, Washington
NBBJ Architects

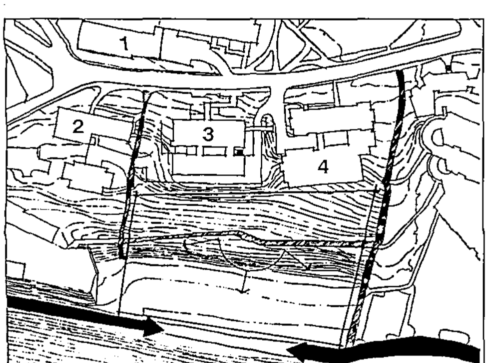
binary operation

SEATTLE, HOME TO SUCH CORPORATE GIANTS as Microsoft and Boeing, has largely escaped the economic travails of its Northeastern counterparts. Boosting this flow of technology-related capital is the objective of Fluke Hall, the new home of the Washington Technology Center, a business/academic consortium. Located on the campus of the University of Washington, the center's goal is to accelerate the spread of research and ideas from the laboratory to the marketplace by bringing together scientists from academia and industry. Designed by NBBJ of Seattle, the 60,000-square-foot structure is a visual metaphor of its mission, reflecting the duality of the city's business interests and the immediate campus surroundings.

The west facade of the center is oriented toward the campus, and the school's Collegiate Gothic architecture is echoed in brickwork and roof dormers. One of three clearly defined portions of the building, this western segment houses offices, meeting rooms, and locker rooms for professors and technology center staff. To the east, an industrial-style metal-walled wing of quite different character seems as temporary as the Gothic portion is permanent. It contains the laboratory portion of the facility on two floors of flexible open space. A concrete spine of circulation corridors and ductwork for mechanical systems joins the two wings. Extending the full three-story height of the building, this open slot is illuminated by clerestory lighting, which accents the enormous metal ducts that feed into the laboratory spaces. Small conversation nooks on the top floor provide seating and views for researchers taking a break from solving thorny problems.

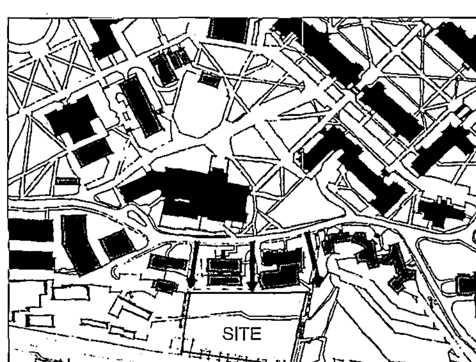
NBBJ helped select the site for the building, located on the school's sloping eastern edge. Although there was initial talk of building Fluke Hall off campus, that idea was quickly discarded. "The school felt that faculty wouldn't get in their cars in the middle of the day and drive elsewhere," explains David Hoedemaker, principal-in-charge of design. "Now they can use the building's facilities between classes, work for an hour, then teach a second class."

Hoedemaker and project designer Rick Buckley skillfully handled the tension between the technology center and the rest of the campus, and between the different parts of the building. One objective, says Buckley, was to duplicate in miniature the nature of the University of Washington campus, which is organized around a Beaux-Arts core and



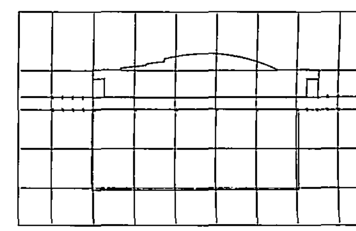
MICRO SITE PLAN

1 STUDENT UNION
2 FACILITIES PLANNING
3 FACULTY CLUB
4 HALL HEALTH CENTER

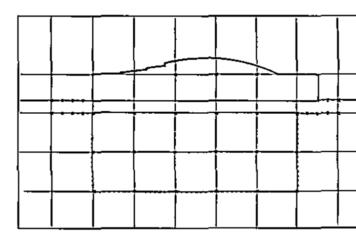


MACRO SITE PLAN

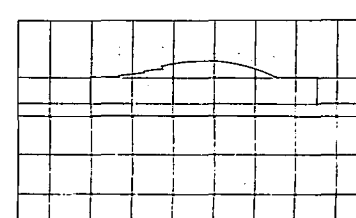
■ TRADITIONAL CAMPUS IMAGE (COLLEGIATE GOTHIC)
■ MIXED IMAGE (LATER ADDITIONS)
■ INDUSTRIAL IMAGE (SERVICE BUILDINGS)
➔ VIEW CORRIDOR



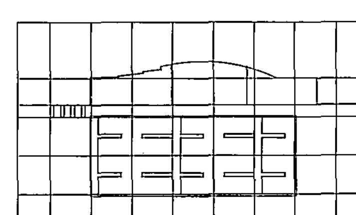
CIRCULATION



ENCLOSURE

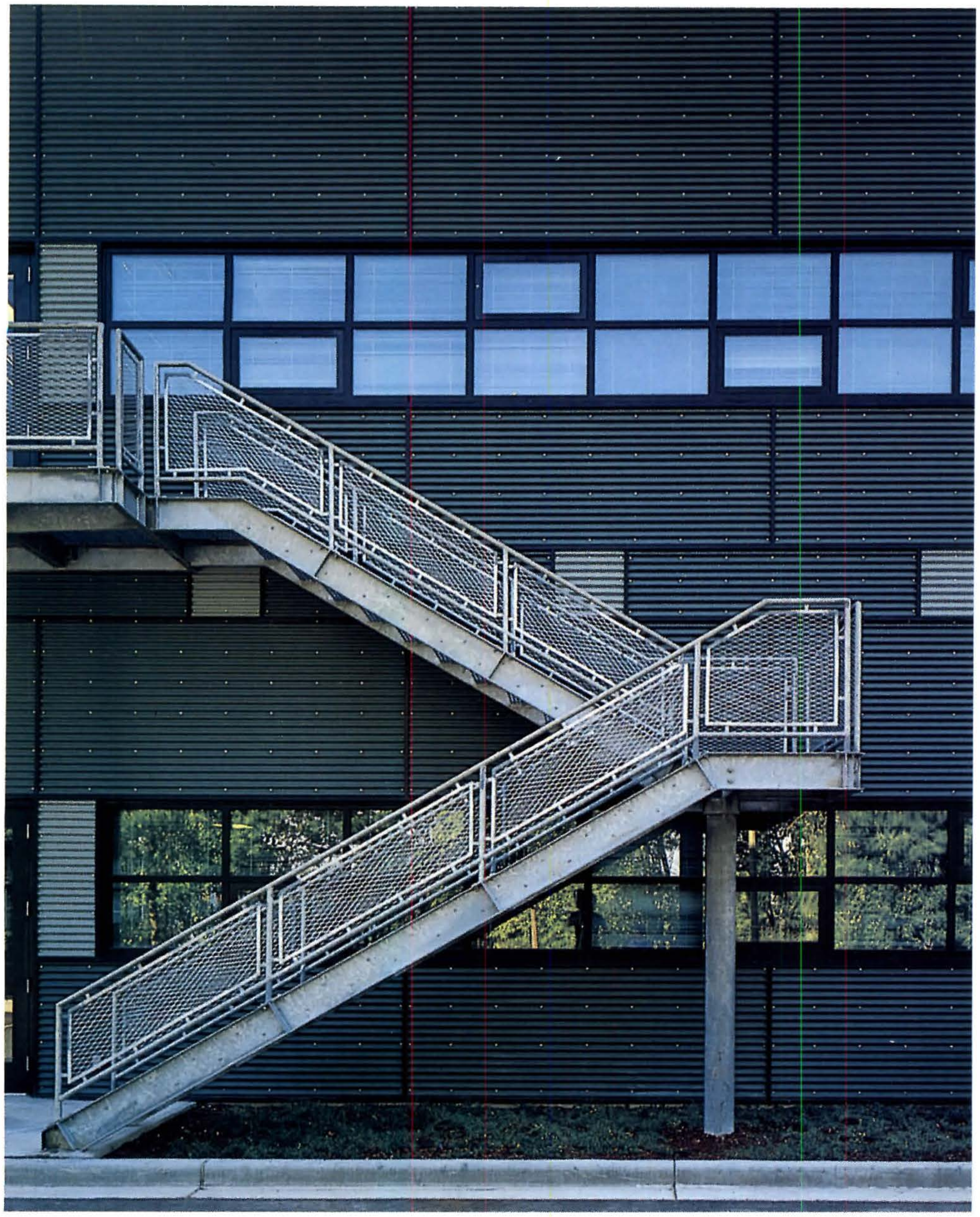


STRUCTURE

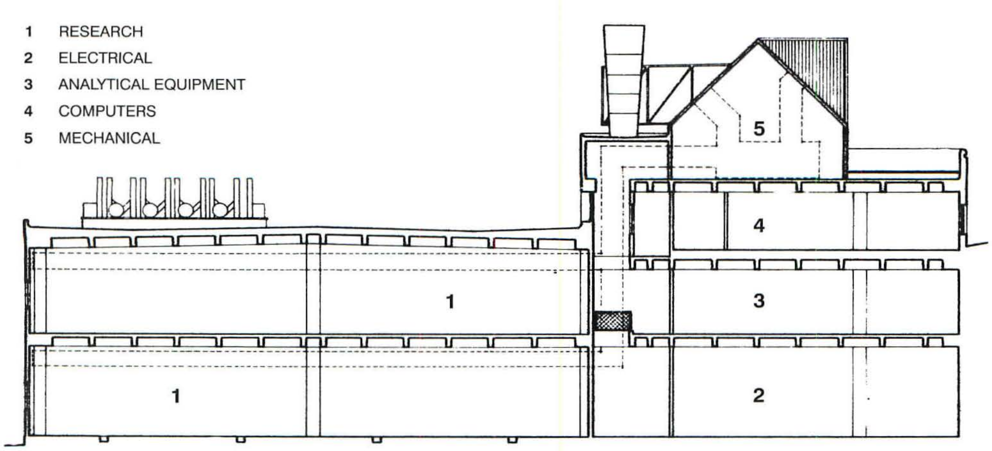


SERVICE

Site plans (facing page) reveal Fluke Hall's relationship to the University of Washington campus. Western facade's brick and precast concrete trim (left) reference the university's Collegiate Gothic architecture. Plan diagrams (facing page) reveal building's bipartite scheme. Circulation spine divides brick-clad office wing from metal-sheathed lab block (above).



The laboratory block is clad in corrugated metal panels (left) with bare stainless steel screws creating a stippled effect in sunlight. The side of the central circulation spine attached to the Gothic wing (facing page, top) features wood trim and vinyl flooring; the "industrial" side is simply finished in concrete and metal (below and bottom). In the labs (facing page, bottom) walls can be unbolted to allow expansion one bay to the east and two to three bays to the south.



EAST–WEST SECTION

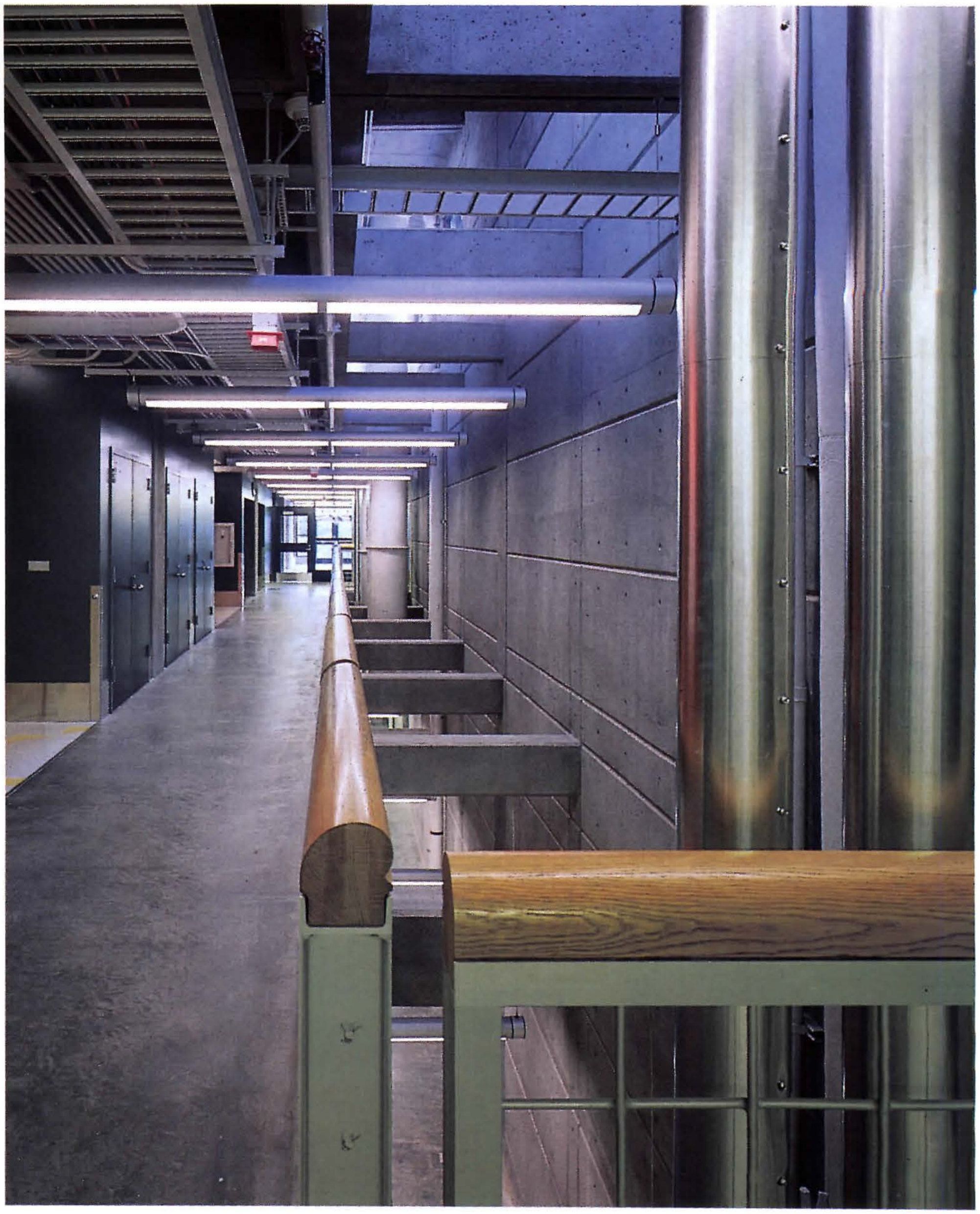
surrounded by an eclectic array of buildings. The center's Collegiate Gothic motif and decorative brickwork echo nearby structures but do not imitate them. Abstract roof dormers and metal roof cladding mark the transition to the industrial wing. A playful glass pavilion perched atop the Gothic wing can be used for meetings, lunches, or receptions, and offers stunning views across Lake Washington to Mt. Rainier and the Cascade range.

NBBJ kept Fluke Hall's western facade low, to create a garden-wall effect, and bowed and stepped the brick facade so that the building appears to recede away from the hillside, reducing its apparent bulk. The architects softened the metal exterior of the laboratory block by applying a two-tone green color scheme to relate to a nearby tree line. As a result, the building achieves unity not through the juxtaposition of similar materials or patterns, but through its sweep down the slope line and its thoughtful gestures toward nearby features.

Fluke Hall has raised a few eyebrows on campus with its forthright use of metal and concrete. But its design effectively spells out its program and relates to its site without gimmicks or contextual cliches. And it has won an enthusiastic reception with its intended audience. University faculty members are "fighting over space," maintains Washington Technology Center's director Peter Odabashian. "This is a research playground, where we can just keep changing things," Odabashian remarks. "It will capture the attention of companies not only here but around the nation." ■

—Douglas Gantenbein

Douglas Gantenbein is a Seattle, Washington-based freelance writer.

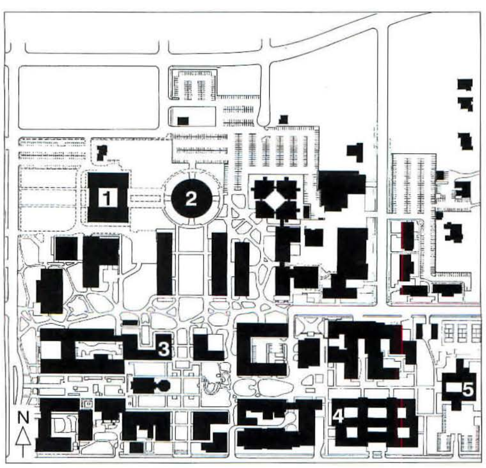


STEVE HALL/HEDRICH-BLESSING

WASHINGTON TECHNOLOGY CENTER
SEATTLE, WASHINGTON

ARCHITECT: NBBJ, Seattle, Washington—David C. Hoedemaker (principal-in-charge); Rick Buckley (project designer); N. Sue Alden (project manager); Kimball Bergerud, Ross Pouley (technical architects); Rysia Suchecka (interior design)
ENGINEERS/CONSULTANTS: Skilling Ward Magnusson Barkshire Inc. (structural); Bouillon Christofferson & Schairer Inc. (mechanical/electrical); Towne Richards & Chaudiere Inc. (acoustical and vibration); Jongejan Gerrard McNeal (landscape)
CONTRACTOR: Sellen Construction Co.
COST: $10 million—$147/square foot
PHOTOGRAPHER: Paul Warchol, except as noted

Beckman Institute
California Institute of Technology
Pasadena, California
Albert C. Martin & Associates, Architects



1 BECKMAN INSTITUTE
2 BECKMAN AUDITORIUM (EDWARD DURRELL STONE)
3 PARSONS-GATES (ELMER GREY/BERTRAM GOODHUE)
4 SOUTH STUDENT HOUSES (GORDON KAUFMANN)
5 ATHENAEUM *(GORDON KAUFMANN)*

ALBERT C. MARTIN & ASSOCIATES HAS DEsigned a sizable chunk of the Los Angeles skyline, but the 85-year-old firm never tackled a building in Pasadena before its new laboratory on the Cal Tech campus. Pasadena, home to the intricate Craftsman-style houses of Green and Green, is architecturally speaking Los Angeles' beautiful stepsister. Cal Tech, too, has a built legacy of which to be proud, albeit with a few 1960s-era anomalies. The school's formal, olive tree-lined campus was master-planned in 1917 by Bertram Goodhue who, with Los Angeles architect Gordon Kaufman, was responsible for designing the Spanish Renaissance buildings that set the tone for the small but prestigious science and engineering school.

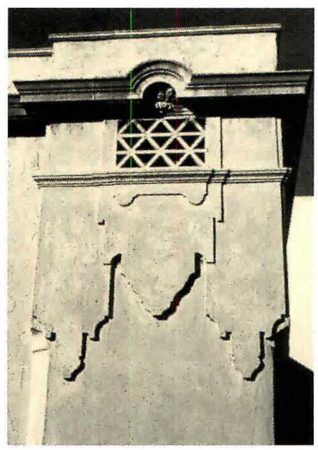
The architects' mandate for the Beckman Institute, a research and teaching facility for biology and chemistry, was to house large, high-tech laboratories in a building congenial to its Spanish-style surroundings. This task was made more difficult by its neighbor—the Edward Durrell Stone-designed Beckman Auditorium (a gift from the chemist Arthur Beckman, who also financed the institute)—a concrete, Modern structure with affinities to a Mongolian yurt. The architects acknowledged Stone's small, round auditorium by placing an elongated fountain along the axis between the two Beckman buildings, but they fortunately referenced Goodhue rather than Stone in designing the new laboratory.

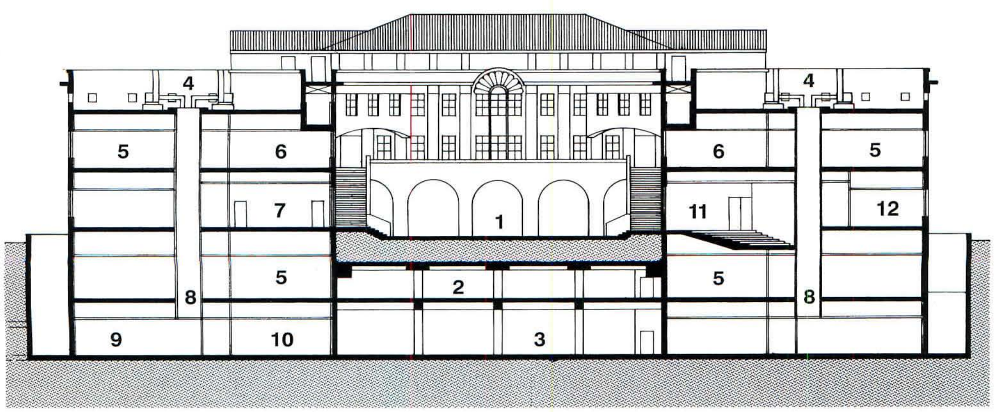
Senior designer Thomas Vreeland conducted a thorough study of the Goodhue and Kaufman buildings, particularly Kaufman's 1929 student quarters at Fleming House, which are organized around several courtyards. For the Beckman Institute, he similarly framed a courtyard with formal arcades that will one day support wisteria in true Spanish Renaissance fashion. Above the arcades on the east and west facades, the architects located scientists' offices, and they placed the laboratories perpendicular to them within the eastern and western wings, enclosing the courtyard in the center. The architects distinguished the offices from the labs through different window treatments: office windows reflect the much smaller scale of those spaces, achieving a true distinction between, Vreeland maintains, "where the scientist works

The Beckman Institute (these pages) is arranged as a rectangle—two sides of offices face two sides of labs—surrounding an open courtyard (top left). Windows decorated by precast concrete torches of knowledge (center left) light the building's stairwells. The laboratory sets the stage for future architecture on the northern campus (site plan).

back to the future

For the new building (below left, left to right) the architects adapted details from campus ornamentation by Kaufman and Goodhue (below center, left to right). Section (bottom) shows many laboratories located below grade, for extra-sensitive laser experiments.





EAST–WEST SECTION THROUGH LABORATORY WINGS

1 COURTYARD/ARCADE
2 STORAGE
3 LIBRARY
4 ROOFTOP EXHAUST
5 LABORATORIES
6 GRADUATE STUDY/TECHNOLOGY
7 SEMINAR ROOM
8 ULITLTY CORES
9 MECHANICAL
10 SHOP
11 AUDITORIUM
12 DIRECTOR'S WORKROOM

and where he or she thinks." Stairwell windows are similarly differentiated, both in scale and decoration: the torch of knowledge, Cal Tech's symbol, surrounds the second-story stairwell windows, which are even larger than the windows of the labs, and screens the windows just above.

Above the cornice line, the architects inserted another set of windows whose dimensions reflect the loggia on Kaufman's Athenaeum, the grand faculty club that dominates the older section of the campus. These windows light the offices of the institute's director and administrative associates, situated above the entire complex "like the bridge of a ship," according to Vreeland. To either side of these windows, the architect erected an 11-foot-high parapet to effectively screen the countless exhaust pipes of laboratory hoods below, where experiments with noxious chemicals are conducted.

Architect Albert C. Martin, founder of the firm now run by second and third generation Martins, was a contemporary of Bertram Goodhue who borrowed Goodhue's signature churrigueresque style for the 1918 Million Dollar Theater in downtown Los Angeles. (It was the first Los Angeles building to use the ornate decoration, which is derived from 18th-century Spanish embellishment.) Even without Cal Tech's request for a building to fit its Spanish context, A.C. Martin & Associates would probably have incorporated the school's historical elements into the new design. However, the Beckman Institute is the largest building on campus—far larger than some of the older buildings. It doesn't lend itself to such subtle decoration, and today's craftsmanship with reinforced concrete rarely replicates the fine detail of cast stone. The contemporary, stylized version of Goodhue's scallop shell, scaled to match the enormity of the Beckman Institute, fails to reflect the delicacy and proportions of the 1917 originals that adorn the Parsons-Gates building. On the other hand, the pediments over the stairwell windows, emblazoned by torches of knowledge, lack the simplicity of the broken pediments on Kaufman's entrance to Fleming House. Vreeland was most successful with his abstraction of the lambrequins that "drip" down the corners of the institute in a

Exhaust from 18-foot-high laboratories (below center) is released through chimneys concealed behind a parapet (below right). Seating areas in courtyard (plan) are arranged in four geometric shapes: diamond, circle, hexagon, and square.

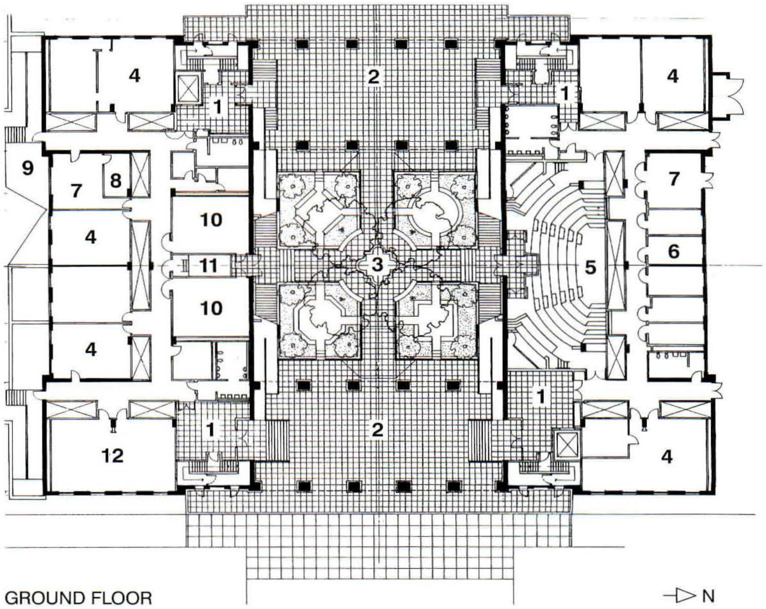
quirky, ironic retelling of Goodhue's original ornament. Sadly, the Beckman Institute's lambrequins are hidden away on the building's secondary north and south facades.

Although Cal Tech is a relatively small school, it has counted the likes of the Albert Einstein and Nils Bohr among its faculty, and claims 29 Nobel Prize-winners over its 75-year history. Since nine of those winners have worked in biology or chemistry, the architects wisely sought scientific advice when designing a workplace for cutting-edge research in those fields. Cal Tech scientists' design instincts yielded some clever results: a geometric mosaic on the floor of the rectangular fountain (tiled in blue, as Goodhue had recommended for a fountain on the original campus that was never built) became DNA's double helix, and the sculpture in the center of the courtyard resembles a ferratin molecule. William Schaefer, a biochemist who works in the building, insists that the sculpture is "only a representation, not a model," of the protein that is one of life's building blocks, but otherwise compliments the architects for conceiving an "ideal place to think." The architects offer quid pro quo: "I thought I was good at geometry," laughs Vreeland, " until I saw the scientists' molecular models." ■

—HEIDI LANDECKER

BECKMAN INSTITUTE
PASADENA, CALIFORNIA

CLIENT: California Institute of Technology
ARCHITECT/ENGINEER: Albert C. Martin & Associates, Los Angeles, California—Christopher C. Martin (partner-in-charge); Donald K. Toy (principal); Sam Moreno (project director); Tim Vreeland (project designer); Patric B. Dawe (planner); Nabih Youssef (structural engineer); Toshio Okajima (mechanical engineer); Clay Calhoun (electrical engineer)
CONSULTANTS: McLellan & Copenhagen (laboratory programming and planning); H.M. Scott and Associates (civil engineering); Land Images (landscape architecture); Purcel + Noppe + Associates (acoustics); Paul Alan Magil (audio/visual); Lerch Bates and Associates (vertical transportation)
GENERAL CONTRACTOR: Turner Construction Co.
COST: $37.4 million
PHOTOGRAPHER: Grant Mudford

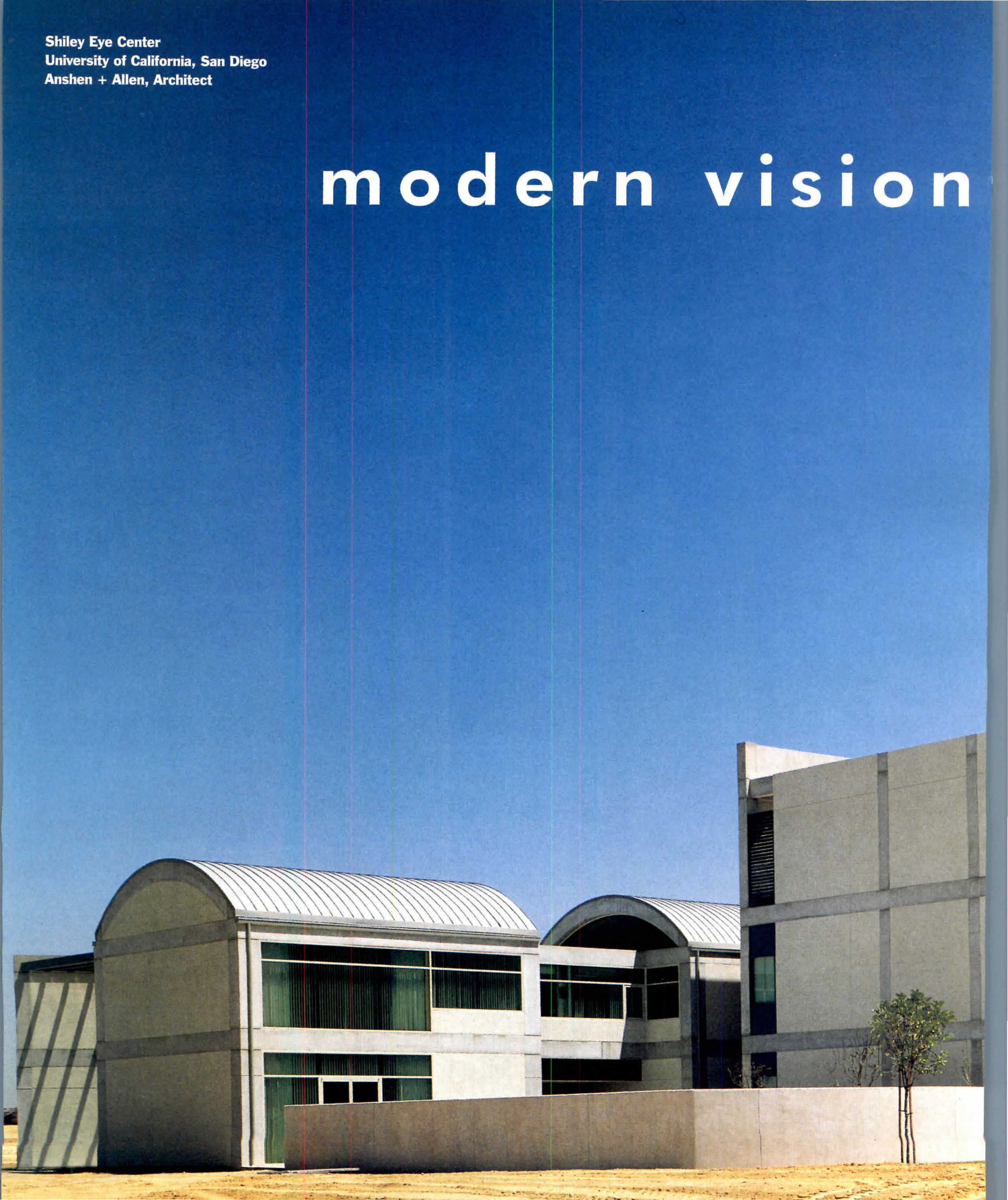


GROUND FLOOR

1 ENTRY
2 ARCADE
3 COURTYARD
4 LABORATORIES
5 AUDITORIUM
6 OFFICES
7 RECEIVING
8 HAZARDOUS WASTE
9 LOADING DOCK
10 SEMINAR ROOMS
11 PROJECTION BOOTH
12 EXHIBIT ROOM

Shiley Eye Center
University of California, San Diego
Anshen + Allen, Architect

modern vision



CALIFORNIA-BASED ANSHEN + ALLEN HAS built a reputation for its exacting design of laboratories, which constitute roughly half of the 120-person firm's commissions. But even for architects with years of experience on such projects, the decision by the University of California, San Diego's School of Ophthalmology to consolidate its many functions in one building presented some pencil-grinding challenges: how to unite a clinic, offices, laboratories, conference room/library, and surgery center, while providing separate access for each function.

Designed by principal David Rinehart, project architect Dennis McFadden, and the firm's Los Angeles office, the 34,473-square-foot building neatly divides public from private areas. A two-story volume on the north side of the building contains first-floor lobby and second-floor faculty offices on the east end, gracefully joined to the library/conference annex on the west end by a long, narrow, vaulted roof. A larger three-story volume behind this block contains first-floor examination rooms, second-floor labs, and a third-floor outpatient surgery center. These volumes are joined by a sunlit circulation spine that unites public and private realms.

The overall image of the concrete-framed, stucco-walled building recalls the tough-minded architecture of Louis Kahn, and it is impossible to discuss Anshen + Allen without referring to the work of the late master. Rinehart and coprincipal Jack MacAllister studied under Kahn at the University of Pennsylvania and worked with him during the early 1960s on such projects as the Salk Institute in La Jolla, California. In fact, MacAllister and Rinehart are currently spearheading the design of the proposed addition to the institute (ARCHITECTURE, April 1991, page 23). The Shiley Eye Center in La Jolla doesn't come close to capturing the monumentality of the Salk Institute or Kahn's Kimbell Art Museum in Fort Worth, Texas, but Anshen + Allen's new building does satisfy its program with Kahnian efficiency and formal austerity.

The north elevation, which includes the building's two primary entrances, most successfully reflects the architects' ties to Kahn. Exposed concrete beams and columns frame a sheltered colonnade that eases the transition from the outdoors into the main lobby, and the concrete frame, horizontal window bays, and vaulted roof form a well-proportioned whole. To the west, the building thrusts forward to signal a second entry; an opening in a blank, two-story wall leads to a breezeway that serves both the administration offices and library. A corresponding gap in the vaulted roof helps mark this point of access. The overall form of this entry mass is

Vaulted volume (below) contains lobby, offices, and conference/library annex (bottom); the larger volume to the south (center) includes clinical, research, and surgery facilities. A glazed circulation spine (facing page) joins these public and private zones.

reminiscent of the long, narrow vaulted gallery bays at the Kimbell Art Museum, but where Kahn topped his vaults with skylights that channeled natural light into the galleries, Rinehart, whose options were narrowed by the tight budget, opted for a simple raised-seam steel roof.

The center's real strength is its fine-tuned circulation system. Visitors and patients can reach any of the building's different functions without crossing through unrelated areas. First-floor examination rooms are strung along corridors perpendicular to the lobby; a more private hallway serving photography and electrical rooms at the back of the first floor has its own side entrance. Second-floor faculty offices are served by an open stairwell at the lobby's northwest corner, and the third-level surgery center can be reached via an entrance and elevator at the building's southeast corner. Second-story bridges at the ends of the skylit spine join the faculty offices in the vaulted front section of the building with the labs in back.

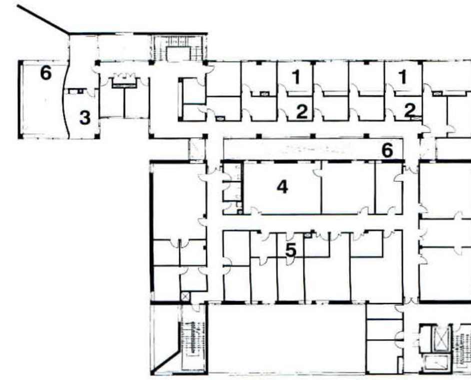
Despite a construction budget of $5.8 million (considered low for such a facility), the architects achieved surprisingly elegant interiors. The exposed concrete frame serves as elemental ornament inside and out, a straightforward expression of the structural system. Maple paneling, polished, composite stone floor tiles, and custom-crafted maple furniture by Los Angeles designer Roy McMakin add a silky sense of quality to the public spaces.

The Shiley Eye Center resonates with memories of Kahn—the subtle play of natural light over concrete forms, and the ascendant quality this light adds to the central skylit spine; the use of simple geometric forms as building blocks; the sensitive combination of basic materials to achieve a pristine grace. But the building's asymmetrical plan lacks the power inherent in Kahn's symmetry for the Kimbell Museum and the Salk Institute, and it doesn't approach the clear-cut organization of his Richards Medical Building at the University of Pennsylvania. And Kahn never would have incorporated nonessential aluminum panels to balance the compositions of his facades.

Nonetheless, Anshen + Allen's new building creates an uplifting environment for its users, and, together with a recent campus lab building designed by Moore Ruble Yudell (ARCHITECTURE, March 1991, pages 78-81), it sets a solid precedent for future labs—and architecture—on campus. ■

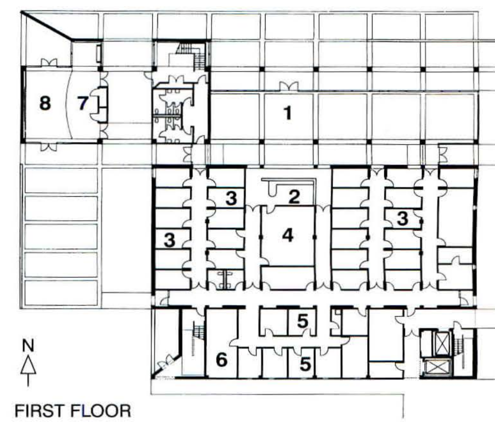
—DIRK SUTRO

The Eye Center's lobby (below) is accented by fine art, maple paneling, and natural light. West-facing radiused window in the faculty office waiting room (bottom) scoops in sunlight. Skylit, two-story hallway (facing page) joins public and private functions.



SECOND FLOOR

1	FACULTY OFFICE	4	LABORATORY
2	SECRETARY	5	LAB SUPPORT
3	DIRECTOR	6	OPEN TO BELOW



FIRST FLOOR

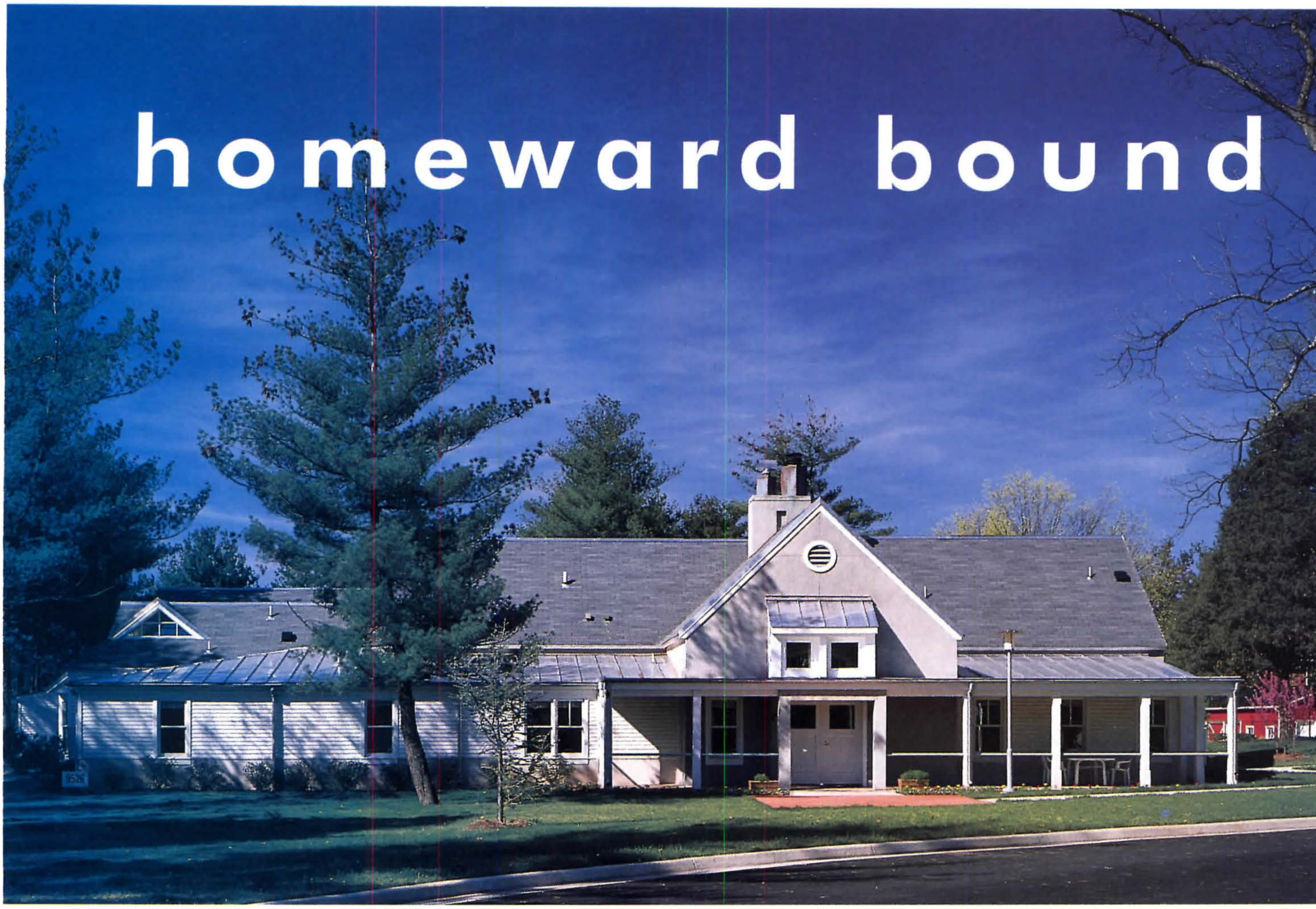
1	ENTRANCE / LOBBY	5	PHOTOGRAPHY
2	RECEPTION	6	ELECTRICAL ROOM
3	EXAM ROOM	7	LIBRARY
4	RECORDS	8	CONFERENCE ROOM

SHILEY EYE CENTER
SAN DIEGO, CALIFORNIA

CLIENT: University of California, San Diego—Stuart Brown (chairman, department of ophthalmology); M. Boone Hellmann (campus architect); John Millsap (director, healthcare design and construction); John Hail, Jeff Redlitz (project management)
ARCHITECT: Anshen + Allen, Los Angeles, California—Peter Stazicker (managing principal); David Rinehart (design principal); Dennis McFadden (project architect/senior designer); Kelly Locke, Tony Moretti, Alek Zarifian (project team)
ENGINEERS: Ove Arup & Partners (structural/mechanical/electrical); Rick Engineering (civil)
CONSULTANTS: RFD (laboratories); Carmen, Famum, Igonda Design (interiors); WYA (landscape); Adamson Associates (cost estimating)
CONTRACTOR: Ninteman Construction Company
PHOTOGRAPHER: David Hewitt/Anne Garrison

Shenandoah Regional Campus
Manassas, Virginia
Richard Rauh & Associates, Architects

homeward bound



MAXWELL MACKENZIE PHOTOS

AS NEW BUILDING TYPES EMERGE FOR TREATing disorders unheard of even a decade ago, the profile of healthcare architecture is continually changing. Centers for anorexia/bulimia, AIDS, and Alzheimer's patients have recently been built, often combining treatment spaces with living quarters. An example of such a specialized building type was commissioned by Londonderry, New Hampshire-based Learning Services Corporation, a six-year-old organization that provides convalescence and rehabilitation for victims of traumatic head injuries. The Shenandoah Regional Campus is the company's seventh facility, and the third complex designed by Atlanta architect Richard Rauh & Associates. Through this ongoing association, the clinicians and architects continue to refine a building type designed to treat and reintroduce head-injury patients back into their communities. Each new facility is more highly articulated, programmatically as well as architecturally, than the last.

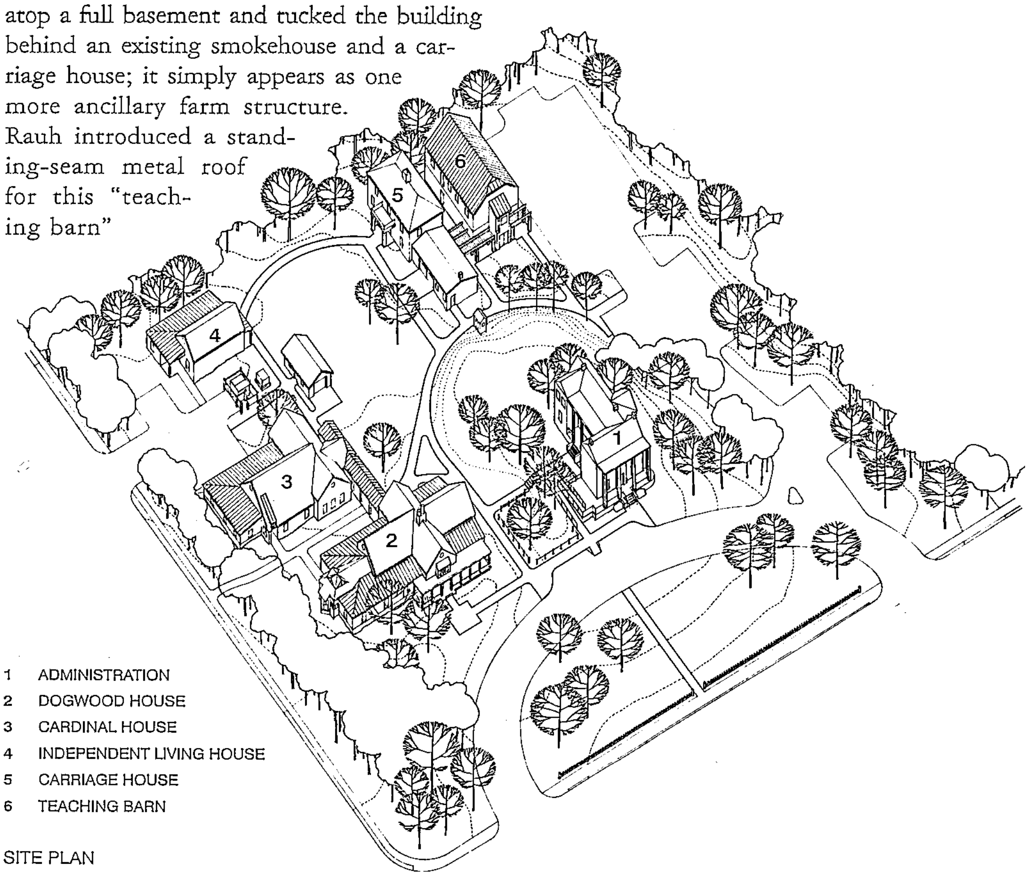
Before the recent advent of high-technology emergency medical care, many of the clients at Shenandoah would not have survived their injuries. After acute treatment in a hospital setting, the typical patient is admitted to Shenandoah for therapy and rehabilitation with a goal of returning to an independent living arrangement. Like any healthcare facility, Shenandoah Center was regulated by strict building codes and life-safety standards. However, as Learning Services President Daniel Donovan explains, "We deliberately disguised the features that would telegraph the message that this is an institution." The entire campus is wheelchair accessible, but the facility does not resemble a hospital environment that cushions its occupants. Many patients are cognitively as well as physically compromised, so a major part of their treatment is relearning how to function in traditional settings and deal with physical barriers.

Located on a 3.4-acre site within the downtown historic district of Manassas, Virginia, the Shenandoah complex is an assemblage of old and new construction. Rauh added four freestanding structures and renovated the main house, carriage house, and outbuildings of an abandoned late-19th-century estate. The context is an established residential neighborhood close to a variety of community services, including bus stops, a public library, and a folksy convenience store. (Rauh's earlier Learning Services facilities in suburban Atlanta and Durham, North Carolina, are also located in established neighborhoods and incorporate new construction with existing buildings.)

Rather than slavishly copying a particular style, Rauh derived a vocabulary based on bungalows, Gustav Stickley's Craftsman houses, and indigenous cement structures. Drawing from the proportions, massing, and shed roofs of vernacular farm buildings and an equally appropriate pallette of materials, the architect created a compound that might have gradually evolved on the edge of a Northern Virginia town at the turn of the century.

Masquerading as a barn is the facility's bulkiest new structure, which houses staff offices and therapeutic and educational spaces. To reduce the apparent mass, Rauh set two stories atop a full basement and tucked the building behind an existing smokehouse and a carriage house; it simply appears as one more ancillary farm structure. Rauh introduced a standing-seam metal roof for this "teaching barn"

Shenandoah's Dogwood House (facing page, top) is an unobtrusive addition to a residential neighborhood, and its new and old neighbors cloister a lawn for outdoor activities (facing page, bottom left). Teaching barn (facing page, bottom right) stands behind two renovated outbuildings anchoring the western corner of the campus (site plan).



1 ADMINISTRATION
2 DOGWOOD HOUSE
3 CARDINAL HOUSE
4 INDEPENDENT LIVING HOUSE
5 CARRIAGE HOUSE
6 TEACHING BARN

SITE PLAN

New buildings are wood frame construction with alternating clapboard and stucco exteriors (below left). Rauh enlivened the simple structures' windows and doors with finely crafted details in wood and sheet metal (bottom, left and right).

and repeated the metal roofs as ornamental accents for the covered walkways, porches, and canopies, while shingling the majority of newly constructed roofs.

Treatment functions are deliberately segregated from the residential areas. Shenandoah's 13 bedrooms (both private and shared) were dispersed into three individual "houses" to lessen their bulk and to blend with the scale of the residential neighborhood. Rauh arranged the new buildings around a central village green, with discreet back yards for recreational activities and a formal front yard facing Fairfield Avenue. Defining the southeast corner of the site, the largest unit, Dogwood House, is aligned with the renovated main house, which now serves as the administration building. Anchoring the southwest corner of the campus, the smallest house, with two bedrooms, provides the highest level of independence.

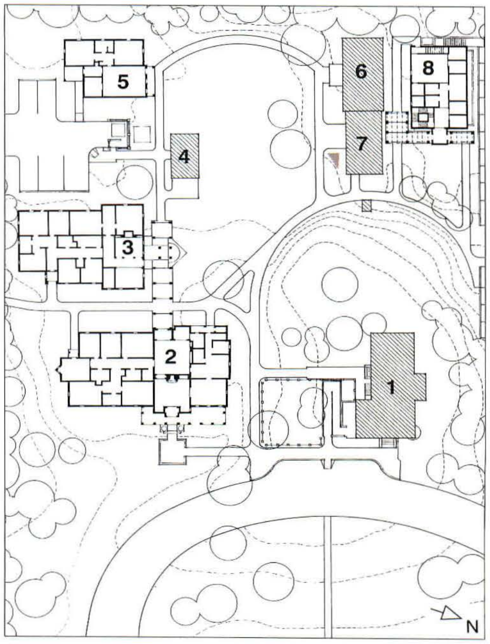
The three houses are designed to meet the varying levels of support required by the users, but the differences are very subtle to avoid stigmatizing the occupants. Each features a kitchen, modeled on a standard house, to allow clients to relearn skills such as cooking or how to get a drink of water. The residences are the places to relearn social interactions, while the slightly different physical environment of each house forces patients to adjust to different situations necessary to face the challenges of independent living.

"The facility was to have all the cues and all the symbolic aspects of a normal living situation so that the clients can relearn the appropriate behavior in response to those cues," explains Rauh. "But because the center is a supportive living arrangement, it's a simulation of a home environment, not an authentic home."

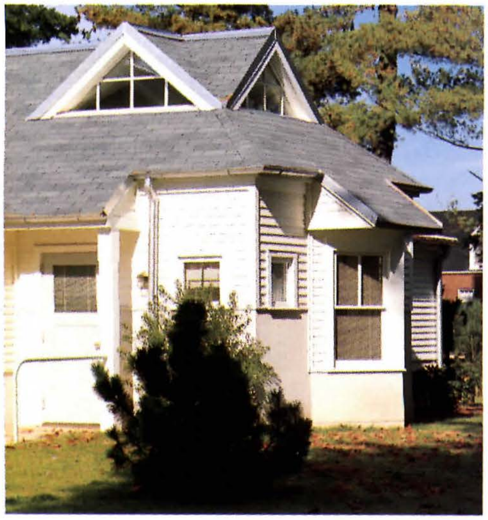
In evoking residential symbols, Rauh borrowed freely from various 20th-century American precedents and organized the gleanings into a fresh, quiet composition. However, Shenandoah's unapologetic recall of "home" conveys much more than nostalgic imagery. As therapeutic design, the complex encourages normal human activities to occur while nurturing camaraderie, dignity, and a sense of self-respect. ■

—Lynn Nesmith

Rauh connected the teaching barn (below) to existing outbuildings (site plan) with a pergola of concrete piers and log trellis. The gabled windows interrupt the roofline of Dogwood House (bottom left) and admit daylight into the sitting room (bottom right).



1 TILLET HALL / ADMINISTRATION (EXISTING)
2 DOGWOOD HOUSE
3 CARDINAL HOUSE
4 GROUNDSKEEPER (EXISTING)
5 INDEPENDENT LIVING HOUSE
6 CARRIAGE HOUSE (EXISTING)
7 SMOKEHOUSE (EXISTING)
8 TEACHING BARN / OFFICE



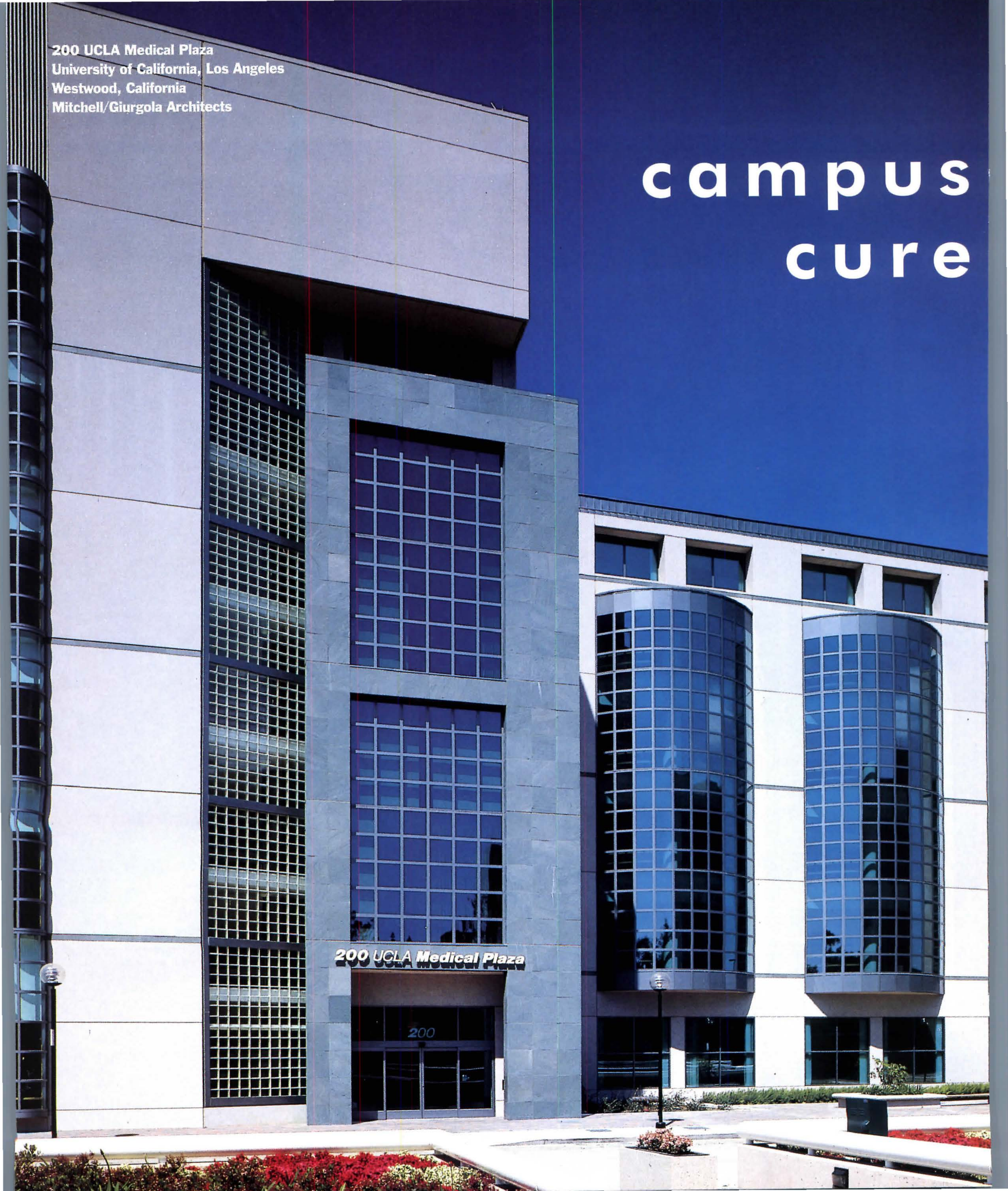
MAXWELL MACKENZIE

SHENANDOAH REGIONAL CAMPUS
MANASSAS, VIRGINIA

ARCHITECTS: Richard Rauh & Associates, Atlanta, Georgia—Richard Rauh (principal-in-charge); Ann Fitzgerald (project manager); Tanya Aramburo, Mike Connor, Tim Fish, Randall Miller, David Stephens (design team)
OWNER'S REPRESENTATIVE: Clarence Bradshaw
ENGINEERS: Jack Lynch & Associates (structural); Jones, Nall & Davis (mechanical/electrical); RBA Group, Kidde Consultants (civil)
GENERAL CONTRACTOR: BM&K Builders
COST: $1.45 million—$115/square foot (new construction)
PHOTOGRAPHER: Peter Mauss/Esto, except as noted

200 UCLA Medical Plaza
University of California, Los Angeles
Westwood, California
Mitchell/Giurgola Architects

campus cure

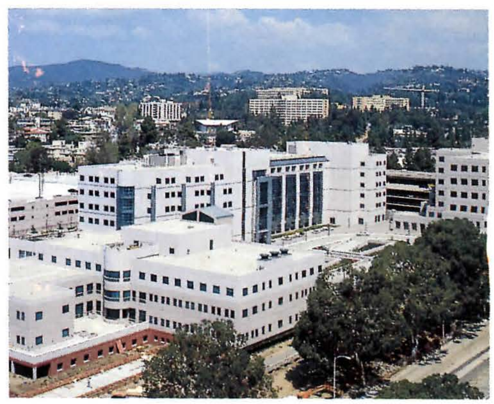


THE NEW OUTPATIENT CENTER AT THE UNIversity of California, Los Angeles seems at first glance an act of sheer community altruism. By erecting the clinic as part of a new three-building medical park with its own parking garage, UCLA corrected some of the longstanding problems suffered by outpatients, most of whom come from nearby Los Angeles neighborhoods. These patients, for whom the university's vast Medical Center is the main healthcare facility, had to search among the teaching hospital's hodgepodge of buildings, often going from floor to floor and building to building in search of labs, physicians, or radiology. The new building houses oncology, pediatrics, dermatology, family services, and outpatient surgery all under one roof, offering outpatients a priority not afforded them at the hospital.

Not incidentally, the new outpatient center, dubbed simply 200 Medical Plaza, is also a marketing strategy for UCLA. Many of the college's physicians have private practices, and the obstacle course at the Medical Center sent them running off-campus to establish offices. Since visits to off-campus physicians often led to off-campus hospital stays, the new outpatient facility was designed to keep the center from turning away its customers.

Ulterior motives aside, it was Mitchell/Giurgola Architects who kept the patient's interests at the forefront of design objectives. "Everyone starts with a strong concern for patient comfort and convenience," maintains Dart Sageser, partner-in-charge of the project. "But when you face the realities, a doctor's time is valuable, the equipment is expensive, they want to handle the maximum number of patients—in fact, there is no advocate for the patient, except everyone's good conscience." Mitchell/Giurgola successfully lobbied for polished stone floors, ash wainscoting, inset carpeting, and lots of daylight—elements that make the building seem more like a comfortable family physician's office than a state-of-the-art medical facility.

Reacting to the confusing, unplanned circulation at the original Medical Center, the architects created an accessible building of single-loaded corridors lined by bay windows, affording easy orientation with the outdoors. "A strong feeling developed on our part," Sageser explains, "that the ability to see outside keeps you in touch with a sense of control over your own destiny. That is something you lose when you go into a medical center, where suddenly the efficiency of the operation takes over your life." Lining each



The Medical Plaza includes the outpatient facility (above, center in photo), a medical office building (right in photo) and a mental health facility (left in photo). Mitchell/Giurgola distinguished the outpatient facility with slate-accented precast concrete paneling and projecting glass bays (facing page and top). Oriel window (facing page, far left) lights elevator core.

SCOTT FRANCES / ESTO

corridor, bay windows of solar-ban glass accommodate curved benches to offer additional seating across from the waiting areas for each department; these window seats are usually occupied by children.

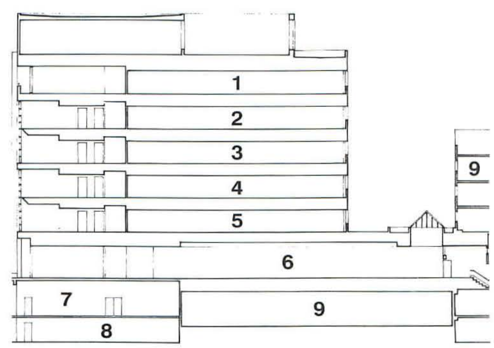
All six floors follow the same plan, making it easy to direct patients. To ease wear and tear on the hardwood floors and carpeting in the patient corridors, Mitchell/Giurgola designed service corridors and elevators for transporting medical equipment. The patient elevator core is lit by an oriel window, for orientation with the outdoors as soon as a visitor enters the floor. A second-floor pediatric clinic utilizes the landscaped roof of the parking garage for a playground. Oncology patients, who regularly spend the better part of a day receiving chemotherapy, have their own private garden on the building's north side.

Patients can either be dropped off at the building's front door or enter from the parking garage, where elevators align with the clinic's back doors. To mesh circulation and program, the architects actually toured the old facility as if they were obstetrical patients on a routine visit for check-ups and lab tests. They had to follow colored stripes on the floor, from the parking area through many departments to the proper clinic, and to the labs three buildings away.

In a truncated selection process that began with a competition among local developers, UCLA requested master plans for an outpatient facility, mental health center, and additional rental space for physicians that the developer would manage. UCLA chose a scheme by local medical park developers Held/Jones, who presented three buildings by a California joint venture. The school's board of trustees approved the master plan but rejected the idea of three buildings by the same designer. Charles ("Duke") Oakley, newly arrived as campus architect, saw this as an opportunity to deviate from the school's tradition of commissioning local talent. Mitchell/Giurgola was the first nationally known architect hired for the campus.

Oakley sees the outpatient facility, which, like the original center, is a teaching hospital for UCLA's medical school, as reflecting the motto of the University of California: teaching, research, and public service. As the trend in healthcare moves toward more treatment on an outpatient basis, Mitchell/Giurgola's facility should be viewed as a model project that emphasizes the service aspect of the university's goals. ■

—HEIDI LANDECKER



NORTH–SOUTH SECTION

1 SURGICENTER
2 OUTPATIENT DIALYSIS
3 DERMATOLOGY, OBSTETRICS/GYNECOLOGY
4 MEDICAL SPECIALITIES
5 PEDIATRICS, FAMILY HEALTH
6 ENTRY LEVEL—RADIOLOGY, ORTHOPEDICS, ONCOLOGY, SUPPORT SERVICES
7 MAGNETIC RESONANCE IMAGING
8 RADIATION ONCOLOGY
9 PARKING

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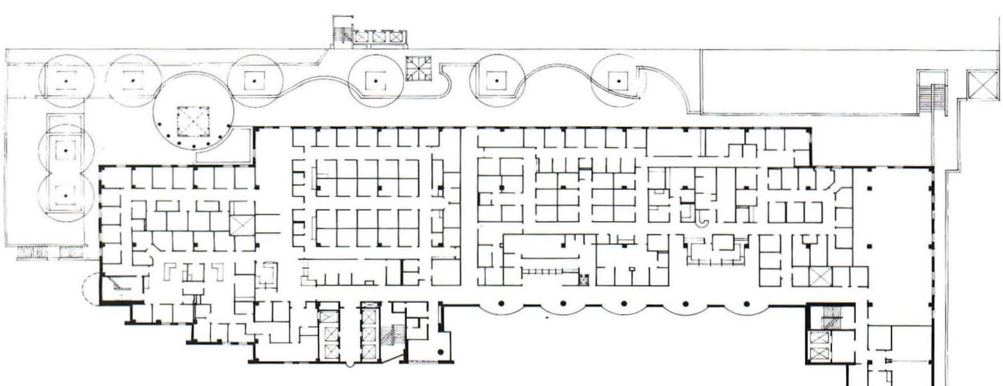
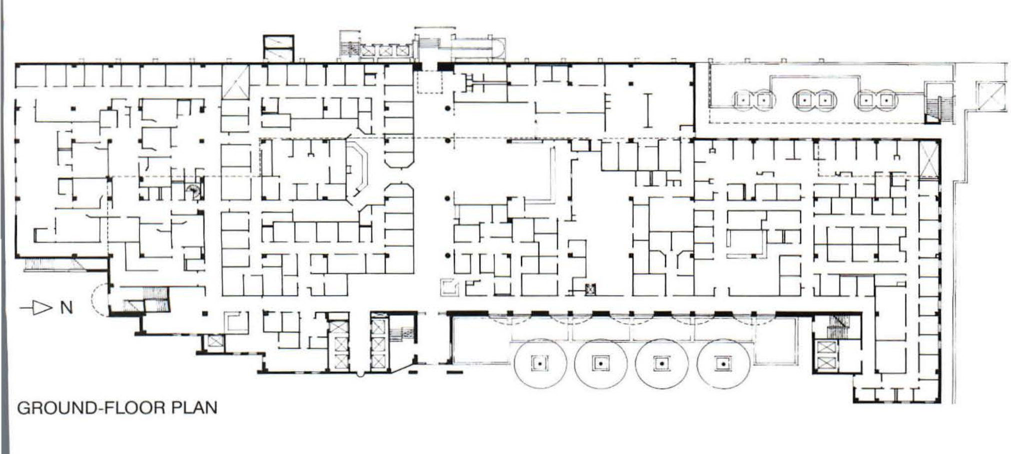


SECOND-FLOOR PLAN



GROUND-FLOOR PLAN

Glass block facade (facing page, left) differentiates staff meeting rooms (above) from the rest of the building. Southern stairwell is housed in a round bay (facing page, right). Curved seats along bay windows (above left) offer a place in the sun. First floor lobby and corridor (top) are tiled in polished Burlington stone.

200 UCLA MEDICAL PLAZA
WESTWOOD, CALIFORNIA

CLIENT: University of California, Los Angeles
DESIGN ARCHITECT: Mitchell/Giurgola Architects, New York City—Dart Sageser (partner-in-charge); Mark Markiewicz, Romaldo Giurgola (design partners); Susan Stando (project architect); Sergei Bischak, Jim Braddock, Michael Seldich, Alexandra Papageorgio, Brad Sick (project team)
ARCHITECT OF RECORD: Daniel, Mann, Johnson & Mendenhall, Los Angeles, California—Gerd H. Ernst (principle-in-charge); Ken Carswell (project manager); Bernard Jensen, Robert Gilley, Tom Brakefield, Anna Clark (project team)
ENGINEERS: Forrell/Elsesser (structural); James A. Knowles (mechanical); Cohen & Kanwar (electrical)
CONSULTANTS: *Medical Planning Associates* (program and space planning); LightSource (lighting design); Jere Hazlett (landscape)
COST: \$58.9 million
PHOTOGRAPHY: Tom Bonner, except as noted

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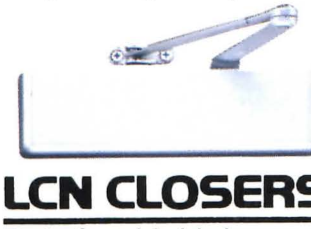

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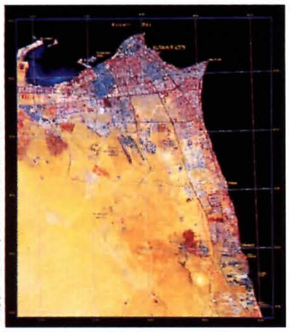
INFO

TECHNOLOGY & PRACTICE

A/E/C Systems: Increasing Compatibility

IF ATTENDANCE AT THE YEAR'S LARGEST architecture, engineering, and construction trade show is an indicator for the nation's economy, it's too early to celebrate a recovery. The 12th annual A/E/C Systems Show in Washington, D.C., May 8-10, was attended by 19,505 professionals, down 20 percent from last year. Nevertheless, more than 400 computer hardware and software vendors were there to welcome architects to the more than 1,200 booths set up across town.



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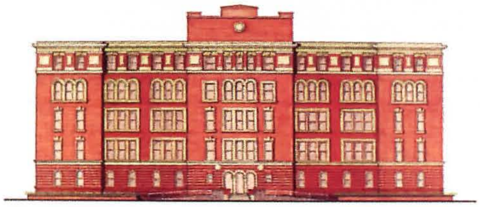
For architecture firms willing and able to spend in the five- and six-digit figures, high-end companies offered fast plotters, large-format fax machines, and real-time animated walk-throughs in fully rendered 3D models. For firms with smaller budgets, there were plenty of microcomputer-based programs. Also in evidence were new developments in the areas of computer-assisted specifying and networking, increasing compatibility between between different systems, and welcome signs of cooperation between competing companies that are developing shared formats.

One of the show's highlights was Intergraph's announcement of the distribution of the Kuwaiti Municipal Database, which was completed shortly before the Iraqi invasion. Covering 232 square miles, this digital map data set (below) is one of the most comprehensive ever created, containing information about topography, property boundaries, roads, utility systems, building and roof elevations. Architects and builders under contract with the Kuwaiti government can now use this electronic information to assess damage and aid reconstruction efforts.

A special event at the show was the second annual Autodesk Images Awards (the "Caddies"), with winners in eight categories. CADalyst magazine editor David Cohn, in comparing the video entries to those of last year, remarked that "the tools are more sophisticated now, but more importantly, architects are learning the advantages of using these presentation techniques." Next year's A/E/C Systems Show will be held in Dallas, June 8-11, with additional shows in Nashville, Tokyo, Toronto, and Berlin. For more information, call (800) 451-1196 or (203) 666-6097.

—B.J.N.



An 1898 New York City public school will be revived as a 241-bed AIDS facility (above) by Perkins & Will/Davis, Brody & Associates.

Design for AIDS Care

AS THE AIDS CRISIS GROWS, SO MUST THE number of facilities designed to treat and counsel those afflicted with the disease. Dedicated clinics have begun to spring up, but the bulk of construction for AIDS is still in the planning stages. "Evolving Models for AIDS Facilities," a panel discussion sponsored by the Health Care Committee of the New York Chapter AIA, was held in May to inform concerned architects about how AIDS facilities might better serve their users.

Healthcare facilities should be places in which healing occurs, but also places that themselves contribute to the healing process. How can good design help? Randy Wojack, of the New York Gay Men's Health Crisis (GMHC) board of directors, spoke firsthand: an AIDS patient must fight an overwhelming sense of loss. In struggling to combat the disease, Wojack maintains, every environmental detail becomes important.

Environmental psychologist Richard V. Olsen reported on two case studies he conducted in existing AIDS-care facilities in an attempt to answer two questions: What are AIDS patients' needs, and what are their priorities? He concluded that foremost is their sense of autonomy, which translates to accessibility. Unimpeded access to bathrooms is a major issue among AIDS patients; similarly, lighter-weight doors, better-controlled lighting, and uniform floor levels (for wheeled IV-rigs) can significantly bolster a patient's independence. Olsen's studies also concluded that space for private counseling and, increasingly, drug-treatment programs should be integral parts of any AIDS-care facility. ■

—STEVEN BODOW

HARRIET WISE

HARRIET WISE

Way Station for Health

A new Frederick, Maryland, facility for the mentally ill (above) consumes one-third the power of a conventionally constructed building. Designed by Denver architect Gregory Franta, the 30,000-square-foot Way Station is the first East Coast application of photocell-activated solar tracking panels, which maximize daylight in a garden court (left).

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Advice from Healthcare Experts

Top practitioners offer insights into designing for the ever-changing medical market.

ACCORDING TO THE U. S. DEPARTMENT OF Commerce, healthcare construction is expected to increase at an average annual rate of 2 percent over the next five years. This statistic may be alluring to architects who are tempted to enter one of the few growing markets during the current economic recession. But is it realistic for a general practitioner to venture into the healthcare arena? This question and many others were asked of six architects renowned in the healthcare field. They represent firms of different size, geographic regions, and degree of specialization. Their discussion paints a complex picture of the healthcare industry. Many factors—from technology and codes to social attitudes and reimbursement policies—are changing the way healthcare facilities are programmed and designed, generating a range of new building types to meet increasingly diverse and specialized client needs. This evolution promises to continue as medical treatment advances and clients become increasingly more attuned to the important role design plays in attracting future patients and staff. —NANCY B. SOLOMON

Roundtable Participants

GITTINGS STUDIO

James Falick
Falick/Klein Partnership

STAFF SIZE: 73
MAIN OFFICE: Houston
FIRM'S EXPERIENCE IN HEALTHCARE: 16 years
HEALTHCARE PROJECTS: 100 percent of total
DOLLAR VOLUME GENERATED BY HEALTHCARE WORK IN 1990: $9.9 million (100 percent of total fees earned that year)
GROSS SQUARE FOOTAGE OF HEALTHCARE FACILITIES BUILT IN 1990: 1,505,000 square feet (100 percent of total construction)

KOBY ANTUPIT

Kenneth E. Taylor
Hoskins Scott Taylor & Partners

STAFF SIZE: 36
MAIN OFFICE: Boston
FIRM'S EXPERIENCE IN HEALTHCARE: 14 years
HEALTHCARE PROJECTS: 75 percent of total
DOLLAR VOLUME GENERATED BY HEALTHCARE WORK IN 1990: $4.34 million (84 percent of total fees earned that year)
GROSS SQUARE FOOTAGE OF HEALTHCARE FACILITIES BUILT IN 1990: 475,042 square feet (82 percent of total construction)

James Diaz
Kaplan/McLaughlin/Diaz, Architects

STAFF SIZE: 210
MAIN OFFICES: San Francisco, Los Angeles, and Portland
FIRM'S EXPERIENCE IN HEALTHCARE: 28 years
HEALTHCARE PROJECTS: 50 percent of total
DOLLAR VOLUME GENERATED BY HEALTHCARE WORK IN 1990: $14.5 million (50 percent of total fees earned that year)
GROSS SQUARE FOOTAGE OF HEALTHCARE FACILITIES BUILT IN 1990: 970,000 square feet (40 percent of total construction)

Chien Chung Pei
Pei Cobb Freed & Partners

STAFF SIZE: 238
MAIN OFFICE: New York City
FIRM'S EXPERIENCE IN HEALTHCARE: 10 years
HEALTHCARE PROJECTS: 10 percent of total
DOLLAR VOLUME GENERATED BY HEALTHCARE WORK IN 1990: $3.0 million (7.6 percent of total fees earned that year)
GROSS SQUARE FOOTAGE OF HEALTHCARE FACILITIES BUILT IN 1990: 1,350,000 square feet (20 percent of total construction)

ARNOLD ZAHN

Jerry L. Quebe
Perkins & Will R+S Health Design Group

STAFF SIZE: 483
MAIN OFFICES: Chicago and New York City
FIRM'S EXPERIENCE IN HEALTHCARE: over 40 years
HEALTHCARE PROJECTS: 33 percent of total
DOLLAR VOLUME GENERATED BY HEALTHCARE WORK IN 1990: $14.1 million (31 percent of total fees earned that year)
GROSS SQUARE FOOTAGE OF HEALTHCARE FACILITIES BUILT IN 1990: 1,024,000 square feet (25 percent of total construction)

I. Lewis Nix
Nix Mann & Associates

STAFF SIZE: 85
MAIN OFFICE: Atlanta
FIRM'S EXPERIENCE IN HEALTHCARE: 14 years
HEALTHCARE PROJECTS: 100 percent of total
DOLLAR VOLUME GENERATED BY HEALTHCARE WORK IN 1990: $9.3 million (100 percent of total fees earned that year)
GROSS SQUARE FOOTAGE OF HEALTHCARE FACILITIES BUILT IN 1990: 843,000 square feet (100 percent of total construction)

What trends in healthcare over the past decade have had the greatest impact on planning and design of medical centers?

I. Lewis Nix: Government reimbursement policies and technological developments have had the greatest influence in healthcare construction. Medicare and Medicaid programs have caps on what the government will pay for certain procedures; many will only be reimbursed if done on an outpatient basis. Advances in diagnostic technology have revolutionized healthcare. Only 15 years ago, the only way to diagnose and treat many illnesses was through surgery. Now, with magnetic resonance, CAT scanners, lithotripsy, PET scanners, gamma knives, and advanced catheterization procedures, patients can be diagnosed with a minimum of invasive procedures. Such advanced technology means that recovery time is either nonexistent or reduced to a matter of hours. This allows most

SALLY PAINTER PHOTOS

Kaplan/McLaughlin/Diaz's addition to the California Medical Center in Los Angeles (above and left) absorbed functions originally located in a 1926 structure, illustrating that it is often less costly to replace antiquated hospital buildings than to repair them.

diagnostics to be conducted on an outpatient basis, thus eliminating the need for acute-care hospital beds.

Jerry L. Quebe: Changes in federal reimbursement methods in 1982 pushed competition among healthcare providers to a much higher level than seen prior to the 1980s. The result has been a reduction in volume and a lack of adequate reimbursement for many medical centers, particularly those in the inner city. Such economic pressures have fueled renovations of existing facilities. They also encouraged the reconfiguration of medical facilities to provide more convenient and cost-effective access for the outpatient. Shifts in population have created demands for new healthcare facilities in some areas of the country while contributing to excess capacities in others.

James Diaz: The demand for increased consumer convenience has led to "one stop shopping" in the form of the medical campus, medical mall, and medical office building on hospital sites.

Chien Chung Pei: Two important tendencies have been generally counterproductive to architects' ability to perform. First is the wild inconsistency in government and insurance reimbursement practices in the attempt to control costs. Second is the demand for extreme levels of flexibility required to cover all possible eventualities.

What types of healthcare facilities are on the rise? On the decline?

Diaz: The emergence of ambulatory care is clearly the predominant trend today. Such services must be accommodated both within hospitals as well as in newly conceived ambulatory-care centers and medical office buildings. Outpatient facilities provide architects with greater opportunities for sensitive, innovative design. Replacing and upgrading our existing, aging public hospitals will also present major design opportunities in the next decade. New facilities will be needed in areas of the country experiencing rapid growth and within expanding health maintenance organizations. Long-term-care facilities and housing for the elderly will grow, provided that sufficient capital financing and adequate reimbursement for care are available.

James Falick: Most of our work is unscrambling the operational and circulation problems caused by the additions and modifications that have occurred in trying to make the old, acute hospital serve ambulatory care and other new masters. New buildings are now being designed for ambulatory care, cancer therapy, hospices, decentralized referral labs, and other services. Older hospitals may become less intensive, short-stay facilities with lower code requirements in the future, with only the highest levels of acute- and critical-care areas being replaced.

Nix: Certain components of community medical centers are on the rise, namely outpatient surgery centers, outpatient diagnostic imaging centers, women's health centers, medical office buildings, oncology centers, and cardiac services. Construction of general acute-care facilities is definitely on the decline, but changes in patient acuity mean more intensive-care beds. The majority of our projects are at large regional health centers with 350 beds or more, as well as at teaching hospitals. Freestanding, private nonhospital-based centers are being constructed by physician groups or other investors. Those can be attractive investments, especially because they are generally not subject to the stringent regulations applied to hospitals.

Quebe: We continue to see a large amount of renovation, although in more recent years we have noticed an increase in new hospital construction. The building of ambulatory-care clinics on hospital campuses appears to be on the rise, reversing an earlier trend toward small, freestanding, hospital-owned clinics located off-campus. You might refer to this as the "rebundling" of the hospital. Facilities are being consolidated on fewer sites so that their different services are available as support for one another. Construction is now more prevalent in cities than rural areas.

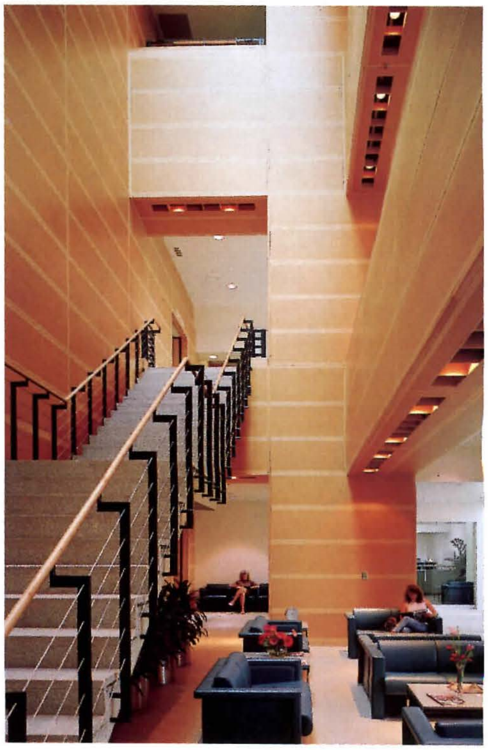
Is design more important to medical centers during these economically competitive times?

Falick: Competition, which hospitals barely acknowledged in the 1960s, has become a major force in the 1980s. As a result, every medical center now uses whatever tools it has to increase its share of the market. Design is a recognized tool. The image of the building and the design of public spaces are now major marketing statements. Centers perceived as more comfortable attract more clients.
Quebe: Over the last few years, we have been seeing design opportunities that never before existed in this market. Unfortunately, not all of this design has been good. Architecturally, there has been a lot of decorative "fad" applied. In addition, the recent phenomenon of looking to the hospitality industry as a role model for hospital interiors has produced designs that have not adequately withstood the harsher functions within.
Pei: We consider ourselves design, rather than healthcare, architects. The importance of good design, which includes both planning and esthetics, appears to be on the rise in all areas of healthcare. Good planning leads to greater efficiencies, greater flexibility, greater quality, as well as to satisfying programmatic space needs. Improved esthetics contributes to patient and staff well-being.

Should a medical center commission a local firm or look outside the city to a high-profile designer? Or combine both talents? What makes a successful team?

Quebe: Once the project has been defined and the owner's goals determined, I think the real issue becomes locating the needed talent. Healthcare design requires a lot of careful interaction with the owner and the departmental users of the facility. Though certainly not impossible, interaction becomes more difficult when the architect is some distance away. Significant commissions are being awarded, with greater frequency, to teams that combine high-profile design with healthcare planning and technical expertise. Today, it is quite unusual, though not impossible, to find both of these talents within the same firm.
Nix: In healthcare design, "team" is truly the watchword. A medical center is composed of so many disparate elements, serves so many different users, and must accommodate so many separate circulation systems that only a team of architects can digest and solve these multifaceted requirements. The successful team depends upon well-defined roles and the acceptance of the necessity of delegation.
Kenneth E. Taylor: The team needs to have the full spectrum of skills, from design to strong technical and healthcare planning ability. If this expertise is not available locally or in one firm, it is worth the effort to assemble a strong team from whatever location. Selecting a high-profile designer without the strong technical and medical experience is risky, as is selecting a technical firm with little design sensitivity.
Diaz: The combination of a strong healthcare planning design firm with a complementary local firm can be very successful. It combines a broad awareness of national trends and technical experiences in healthcare with the immediate availability of a member of the project team, especially during construction when the progress of the project stresses the

TIMOTHY HURSLEY PHOTOS



Nix Mann's Stella Maris Outpatient Clinic (above) is a cardiac-care center associated with Saint Joseph's Hospital in Atlanta, Georgia. Its oak-paneled lobby (right) illustrates current emphasis on hotel-like amenities in hospitals' public areas.

DAN CORNISH / ESTO PHOTOS

Pei Cobb Freed's new north pavilion (above) at Mount Sinai Medical Center will expand the New York City facility by one million square feet. A skylit lobby, an upper floor garden, and views of Central Park (left), will benefit patients, staff, and visitors alike.

bond between owner and architect.
Falick: Any joint venture, however, is risky. To ensure a winning situation, all parties must truly understand how the work will be done and fees will be divided. Both firms must have a clear idea of what they are putting together, why it is being put together, what the client is going to want from each firm, and if the team makes sense not only to the client but to the firms as well.

Is it realistic for a general practice architecture firm to consider entering today's healthcare market for the first time?

Diaz: No. Not without a great investment or the acquisition of another firm or a team of persons bringing a proven record. Small firms have a better long-term chance by beginning with very small projects.
Pei: It's not only realistic but imperative. But we also have to convince our clients to take that chance.
Quebe: Every firm in the healthcare market today entered it for the first time at one time or another. It is possible for firms to do the same thing today, but I would say the chances of doing it successfully, or in a significant way, are substantially less than in the 1950s and 1960s. A general practice architecture firm entering the healthcare market today must have the expertise on board in each of the planning, design, management, and technological areas to successfully design healthcare facilities. Firms must also recognize that the market is very competitive, with the top 20 firms designing about half of all healthcare facilities in this country. It is a very slow process and requires a lot of patience and investment, not the least of which is in the area of marketing.
Taylor: The general practice firm that enters the healthcare design market for the first time in today's economy will encounter stiff competition from those firms with a long and successful track record. This is particularly true in acute-care hospital design, which is a mature sector of healthcare. Those younger, less complex, growing segments of the market—including freestanding ambulatory centers, medical malls, and managed-care facilities—offer greater opportunities to the uninitiated.
Nix: Some healthcare clients are willing to take a chance with a general practice firm with little healthcare experience because its fee may be lower. I strongly advise that a general practice firm enter a joint venture or association with an established healthcare firm before entering this market. Otherwise, the complex technology, extended construction time, and user-group planning process could make the foray into healthcare design financially disappointing.

A healthcare facility is typically designed as a consensus between many different user groups. How do you balance the often conflicting demands?

Pei: We try to impress on our client that it is his or her job to effectively communicate his or her priorities to the design team and to maintain consistency throughout the design and construction phases.
Nix: It is necessary to achieve consensus before design begins. All of the major decision makers must be brought into the programming process. When all parties agree to the global goals and objectives, the details of spatial layout begin to flow.
Quebe: There are essentially two basic elements that assist in the resolution of conflicting demands: the first is real need, the second is budget. Requests made for the incorporation of elements into the design of a project

have to be substantiated by fact. Experienced healthcare facility designers understand how to weed out the difference between wants and needs.

Falick: Throughout the project, our firm involves the different user groups in such techniques as retreats, questionnaires, and work sessions to reach a consensus on issues. These methods are intended to establish a bond between ourselves and the client so that we are not perceived as outsiders.

How do you keep up with changing medical technologies and practices? How do they influence design?

Taylor: Rather than knowing all there is to know about all technology, our approach is to plan for new technology with research, site visits, and good, solid problem solving.

Quebe: A healthcare design practice that has sufficient volume to expose its staff to changing technologies and methods of practice is one of the primary ways to keep abreast. Not every project, however, involves exposure to new technologies, and certainly not all of our staff is exposed to every project. To solve this, we also have an ongoing program in our firm called the "healthcare focus group." This multidisciplinary group regularly participates in seminars presented by outside consultants, equipment vendors, and in-house staff.

Diaz: We keep up by sharing experiences within our office and with others by reading, attending seminars and trade shows, and learning from manufacturers.

Pei: We try to minimize trends and, instead, emphasize the more fundamental architectural concerns such as context, clarity of organization, economy of means, and quality of space. I think it is a mistake to put too much emphasis on medical technology and practices to generate or justify design decisions.

How are psychological issues related to recuperation incorporated into the interior design of healthcare facilities? What techniques are used to facilitate the healing process?

Taylor: Different kinds of care require different environments. The setting for surgical procedures, intensive care, and trauma care should focus on establishing and retaining the patient's confidence. Technological devices should be organized to eliminate any appearance of chaos and confusion. Patient rooms should be quiet, calm, comfortable, and efficient. Given the reduced length of stay in hospitals, patients have less time to become bored with the environment. The setting for maternity patients should relate to the positive experience of giving birth.

Diaz: Today's facilities compete in recruiting and retaining staff. Consequently, spaces for staff members, who are continually overstressed and emotionally wounded, must be uplifting, healing, and ample for them to undertake their work.

Falick: First and foremost, our aim is for the architecture to foster better communication between caregiver and patient, to make the patient an individual rather than "the gall bladder in 3B." The message of the mood should be that this is a normal part of life, that the patient is not in danger and has as much control as possible over his or her future, and that the center has all the necessary support to heal the patient.

Quebe: There has been a tendency in the last several years to introduce a "hospitality" environment into patient areas. We are currently seeing a backlash to this. Hotel-type finishes do not hold up well to abuse by hospital carts and harsh chemicals used in cleaning medical settings. And more interestingly,

PAUL HESTER PHOTOS

Replacing an older facility near a Houston freeway, Falick/Klein's Memorial Hospital Northwest (above) is a visible presence in its community. Its metal skin conveys a high-tech image; terraced gardens and skylit entrance (right) add public amenities.

NICK WHEELER

EDWARD JACOBY

SAM SWEEZY

Hoskins Scott Taylor's 24-story Ellison Building (above) at Massachusetts General is one of few hospital towers in the country. A typical room (left) offers views of Boston. A neonatal intensive-care unit (bottom left) accommodates advanced technology.

we are finding that patients, while wanting pleasant surroundings, are also comforted by the fact that they are in a hospital. They like a sense of the technology around them, knowing it is there for their security should they need it. I believe this concern is also enhanced by the increasing acuity of patients in hospital facilities.

Pei: Our concern is to eliminate the institutional look of most medical facilities. Materials and colors are only a small part of the equation—I'd like to extend the solution to staff appearance and behavior as well.

Nix: People do not respond predictably or universally to color, texture, and light. With this in mind, we know that the best approach will offer choices to patients and other user groups. We need to have a variety of spaces that alternate between active and passive stimuli. Patients requiring rest need quiet, while caregivers need contrasting environments for work and respite time. The healing process can be enhanced if we can satisfy each user's separate needs. I believe that patients do not expect, and probably do not want, a hospital to appear residential. The typical patient is anxious and needs assurance that help is nearby and that he or she is getting the benefits of the latest in medical technology. We feel that the appropriate mood is one that is cheerful, makes use of natural light where possible, and expresses current technology.

What are some commonly held misconceptions of healthcare design?

Quebe: The most common misconception is the belief that design influenced by function is necessarily inferior. This is driven by the fact that for decades, healthcare design was far more concerned with functional solutions rather than esthetic ones. The marketplace did not permit quality design. Today, competition is putting an increasing emphasis on the design of healthcare facilities, opening up opportunities for more sophisticated design, both inside and out.

Pei: The single largest misconception is that medical architecture is for specialists only. This is a great disservice to the client who deserves the care and attention that design architects are known for.

Falick: The most damaging one is not recognizing opportunities. Some clients and many architects think that, once they have a program of spaces, all that is then needed is to arrange these spaces. Since healthcare changes constantly, we have to use every opportunity to help our clients change their way of working.

Taylor: Some clients mistakenly believe that any architect can design complex healthcare facilities without an ongoing investment of time and energy into understanding this most complicated building type.

Nix: Another surprise for most architects is the amount of phasing required to get a project built. The construction period can be extended for several years, thus encouraging later design changes in response to technological developments.

What planning and scheduling difficulties are inherent to healthcare projects?

Quebe: Two difficulties stand out. The first is the length of the design and construction process. The second is the impact of construction on ongoing functions. Medical facilities cannot be shut down while renovation and new construction takes place. This influences the design process.

Falick: Our clients must continually react to changing government regulations without lead time to do the necessary planning. Conditions don't stay the same for very long in the health industry, and each change in regulations or codes can add months to the process.

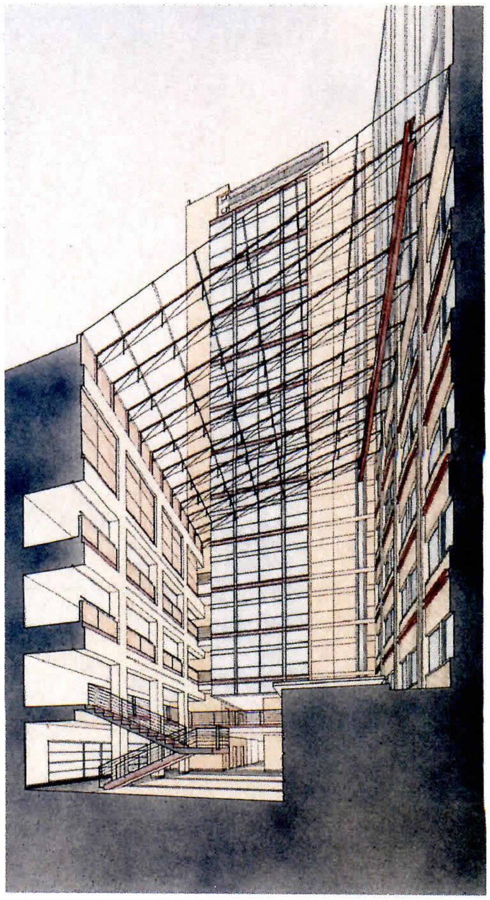
Nix: The design team should not be surprised if there is a 50 percent change in key hospital staff from the initial functional programming through the end of construction. That inevitably generates additional changes.

Should healthcare facilities be built to last 10 years or 100 years? Are they disposable or recyclable?

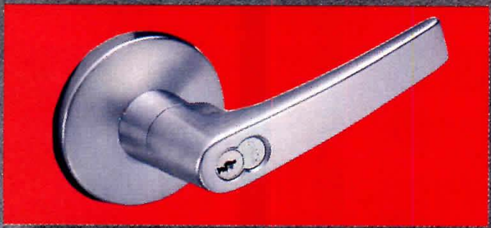
Quebe: Healthcare facilities should be designed to last the structural life of the building, or about 40 to 60 years. When considering building codes and systems applicable to healthcare facilities, the difference in cost between buildings designed to last 10 years and those designed to last 100 years is minimal. Therefore, some added expenditure and attention should be given to healthcare facilities to assure their flexibility, so that they can be adapted to the changing technologies and functions of the future.
Pei: In most cases, healthcare facilities today are also important public buildings. It is wrong to think they should be disposable or recyclable. I believe in realistic and reasonable planning for the future, but if costs are excessive, let our successors do the adapting.
Falick: There are relatively few 100-year-old healthcare facilities that are being used for their original purpose. However, despite the changes in building and medical technology, most healthcare facilities are recyclable. It is difficult to upgrade an existing facility to a higher technology, but it is easy to downgrade: outmoded nursing wings become offices, parts of an older building are used for storage; old high-tech diagnostic and treatment areas are turned into low-tech classroom and education spaces; and even whole hospitals are converted to nursing homes or congregate living.
Diaz: A hospital should be built like a village. A street system is basic and must lead both horizontally and vertically. Buildings at the center will last a long time and must be planned for change; others may be unplugged, torn down, and replaced. Expandability and flexibility to accommodate new needs are paramount. The village concept can create a more exciting visual environment than huge, undifferentiated buildings.

What is the single most important change that could be made to improve the planning and design of healthcare facilities?

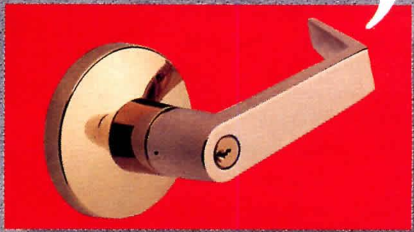
Falick: The client leadership and the design team all need an understanding of where and how they fit into the continuum of healthcare—of who they are, what they are good at, and where they can go with it. Otherwise, they will forever fumble with the pieces.
Diaz: Convincing owners that hospitals need a variety of spaces, rather than endless corridors, in which both planned and impromptu activities and meetings can occur. This diversity helps in way-finding and in human response to a building.
Taylor: Developing building and life-safety codes that are based more on performance and less on specific edicts would allow for more varied and more flexible healthcare facilities that respond to the needs of the individual owner.
Nix: We must achieve consensus building early on by way of a thorough and comprehensive programming process. So often the owner and the architect jump into design solutions before we understand what the users want to do in their spaces.
Pei: The single most important change would be to bring this building type back into the domain of qualified design architects. Medical architects will always be needed, but they should become more specialized so that they can recommend state-of-the-art solutions instead of simply doing what the doctors want. ■



Perkins & Will R+S's redesign of Wyckoff Heights Medical Center (above) in Brooklyn, New York, illustrates the trend toward adding separate outpatient services to hospitals. A lobby atrium (right) between old and new will provide light and air to existing rooms.



LOCK, STOCK



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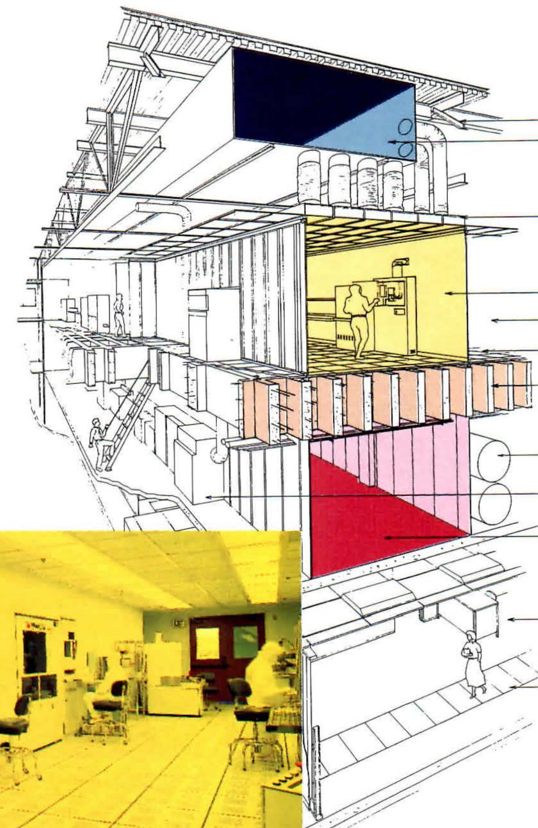
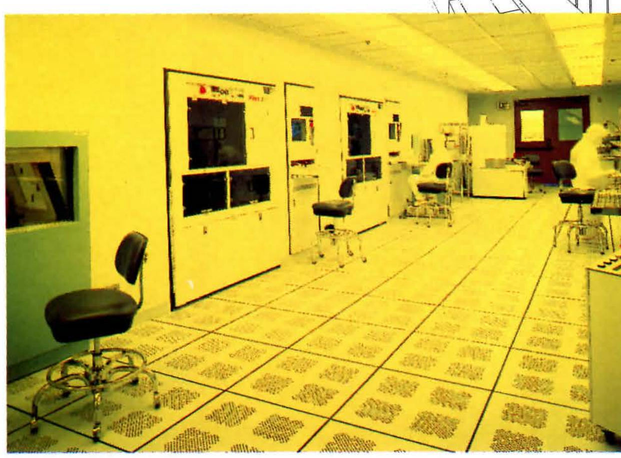
Clean Rooms

Contaminant-free workspaces require a design and mechanical synthesis.

MANUFACTURING MICROELECTRONICS, REsearching infectious viruses, and testing water samples, though seemingly unrelated activities, all require contaminant-free working environments. Such "clean rooms" are labeled and numbered by their level of air quality and restricted access. According to federal standards, air purity within a work area is classified by the number of half-micron particles (one micron equals a millionth of a meter) allowed in 1 cubic foot of air. The classification ranges from 100,000 particles to one. At one end of the spectrum, Class 10,000 to 1,000 is immaculate enough for a hospital surgical suite. More stringently controlled environments that meet Class 100 specifications are often confined to a single piece of self-contained workstation equipment, such as a sealed glovebox. At the "cleanest" end, Class 1 is the pinnacle of air purity, capable of limiting one half-micron (or smaller) particle to each cubic foot of air.

Rasmussen Ingle Anderson's mechanical and structural systems for a computer wafer manufacturing plant (right) provide a Class 1 clean room (below) in which microscopic photographic processes are conducted.





RUSSELL ABRAHAM

Designing an entire room to meet Class 1 requirements places extreme demands upon structural and mechanical support systems to provide the rapid and streamlined airflow necessary to eliminate impurities. Therefore, only a handful of such rooms, such as Rasmussen Ingle Anderson Architect's Western Digital plant (right and page 84), which fabricates delicate microelectronics, exist in the world.

Protecting the public from potentially hazardous agents makes the isolation of airborne contaminants a twofold concern. In addition to meeting standards for interior air quality, architects must comply with guidelines set by the United States Department of Health and Human Services that recommend built-in precautions to contain viruses within a laboratory. These guidelines classify such spaces according to degrees of separation from the public with a rating system ranging from Biosafety Level 1—equivalent to an open-air workbench in a high school lab—to Biosafety Level 4, which requires restricted entry and separate ventilation for isolating easily transmitted lethal diseases with no known cure. Lord, Aeck & Sargent applied such guidelines in designing an AIDS research facility in New York City (page 86).

Regardless of the reasons for isolating a contaminant-free space, a clean room must also be considered in the context of the larger facility in which it is contained. Support facilities for laboratories require separate access to avoid interfering with the operation of a contamination-sensitive area. To help employees meet safety protocols, architects must determine a hierarchical layering of rooms according to the level of restricted access.

Regulation of air contamination influences design decisions beyond providing separate mechanical systems, specifying high efficiency particle filters, and determining the frequency of air changes. As Perkins & Will's design for a water testing facility demonstrates, architects must not only consider schematic planning, but they should specify noncontaminating materials and smooth finishes with flush joints. Floors, walls, ceilings, and work surfaces of such materials will have fewer crevices for accumulating particles. A successful design formula for any contaminant-free environment also requires planning circulation for both people and air.

—MARC S. HARRIMAN

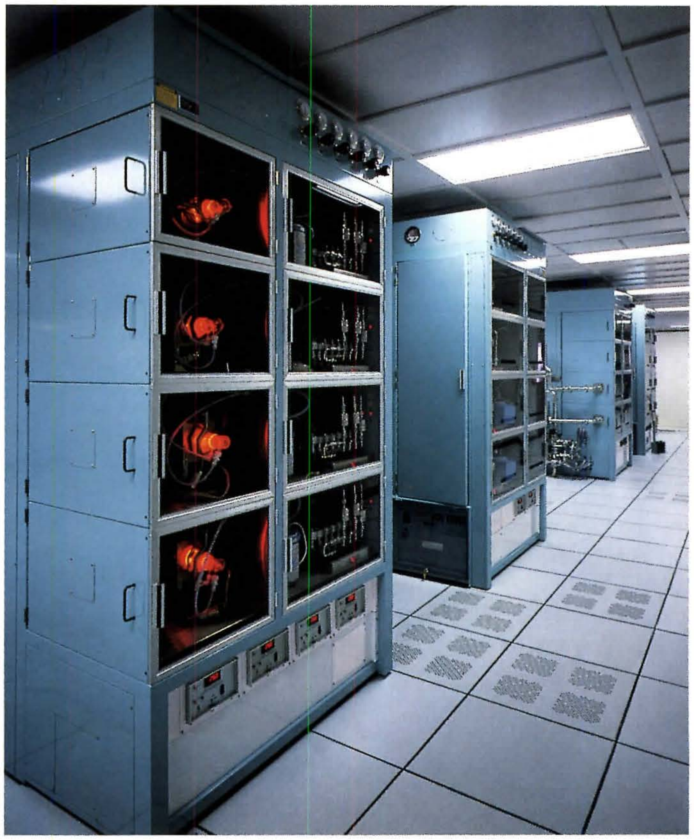
Western Digital Microelectronics
Irvine, California
Rasmussen Ingle Anderson
Architects and Engineers

WESTERN DIGITAL'S NEW 240,000-SQUARE-foot facility manufactures computer wafers with circuitry separated by less than one micron—approximately 1/100th the width of a human hair. The microelectronics company relies on a 16,000-square-foot Class 1 clean room within the structure, where 1.4 million cubic feet of air are recirculated every six seconds (compared with an average of two to three times an hour in conventional office buildings), to prevent minute dust particles from damaging wafers during fabrication.

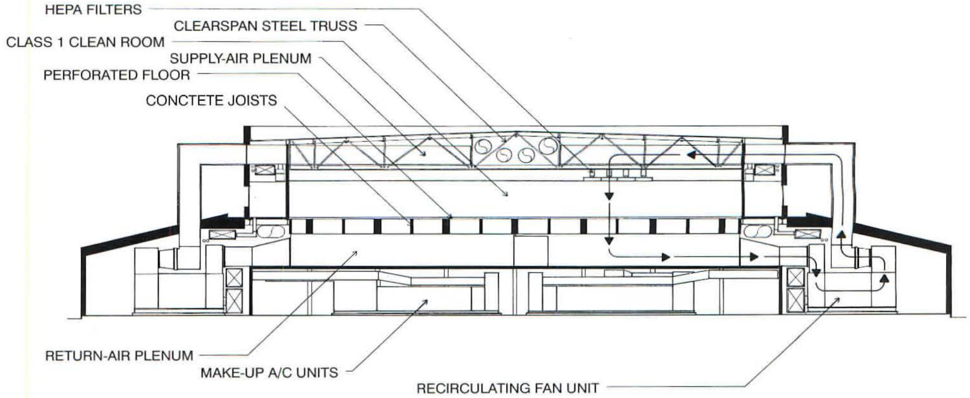
In addition to providing the rapid exchange of air, Rasmussen Ingle Anderson was required to allow unimpeded air circulation and control vibrations from mechanical equipment. To meet such stringent production specifications, a conventional Class 1 clean room is usually placed on a solid concrete slab on the ground floor, with air supplied from above and returned along the perimeter. While this method controls vibrations, it is not ideal for achieving streamlined ventilation, since air can only be returned along the slab's edges. Therefore, the architects devised an elevated joist-and-girder floor structure supported by columns. Spaced 2 feet on center, the joists conform to the width of a standard perforated tile to provide direct bearing support. This construction allows air to be pushed through ceiling-mounted, high-efficiency particle filters into the clean room and to travel straight down through the perforated floor, between joists, to the plenum below. Processing equipment built into the walls, with only control panels exposed to the clean room, further streamlines air flow and reduces the floor space that must meet such exacting specifications. This arrangement allows 95 percent of the equipment to be exposed in flanking corridors and an interstitial level (which doubles as the return-air plenum) where it can be serviced without entering the Class 1 clean room.

Although highly specialized, the microelectronics facility is designed to be adaptable for an industry subject to rapid changes in production methods and technologies. The column-free clean room can expand to 37,000 square feet if necessary. Half the columns (required for vibration control) can be removed to convert the massive, 8-foot-deep air plenum into conventional office space *should the facility become obsolete.*

RUSSELL ABRAHAM PHOTOS



Western Digital's manufacturing facility (above), where ultra-thin 6-inch-diameter computer wafers are produced, boasts one of the few Class 1 clean rooms in the world. Its elevated concrete structural system (bottom) and installation of wafer-circuitry fabricating equipment in a corridor adjacent to the clean room (left) allow for the optimal flow of air and control of vibrations, critical to exceed Class 1 specifications. Only one tenth of a micron particle for each cubic foot of air supplied to the 16,000-square-foot facility is allowed to enter.



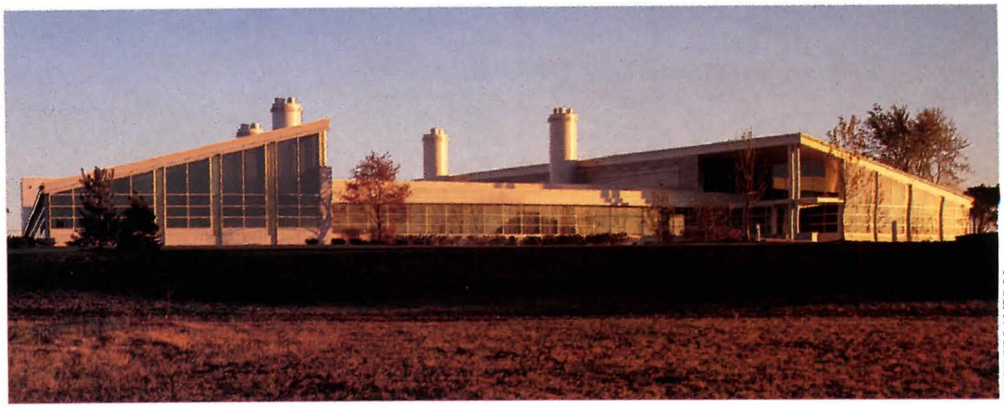
BUILDING SECTION

Waste Management Environmental Monitoring Laboratory
Geneva, Illinois
Perkins & Will, Architects

WASTE MANAGEMENT PROVIDES GROUND-water testing for 5,000 monitoring wells at 200 chemical treatment plants and municipal waste sites across the United States. The client requested that its lab outside Chicago not only consolidate and control the quality of its testing, but also serve as a showplace and educational facility for clients, visitors, and government officials to observe laboratory procedures without disrupting their daily operation. The 55,600-square-foot facility on a 14-acre site now provides 120 chemists, technicians, administrators, and clerical staff with 40 labs and support space tailored to suit those needs.

Tests requiring instruments sensitive enough to detect trace elements as low as one part per billion are performed on four types of samples ranging from inorganic to volatile and semi-volatile organic compounds. Such precision requires a design that eliminates cross-contamination between individual labs. Perkins & Will managing principal John Nunemaker explains that without adequate precautions, "someone opening a bottle of White-out within 150 feet of a lab sample would produce false results." The architects therefore arranged the building in a fan-shaped plan designed to distance laboratories with separate functions as far from one another as possible. Restricted-access service corridors isolate two wings of lab employees and samples from the central, wedge-shaped area of offices and visitor spaces.

Air for each department is supplied by separate mechanical systems and only passes through the labs once. To prevent air from being recirculated through intakes, it is expelled at a high velocity through one of four prominently articulated stacks to disperse it far above the roofline. Rising to a height of 23 feet, the roof is sloped over the two laboratory wings to limit the building's mass while still providing space for the mechanical systems, located above the ceiling. The mechanical systems can thus be serviced without interference with the operation of the labs. Since plastics and other artificial materials can emit trace amounts of chemicals, specified interior finishes were first tested for volatile emissions that could affect sample results. Gasketed-glass lenses in lighting fixtures seal in any off-gassing from wiring insulation heated by fluorescent lamps.


GEORGE LAMBROS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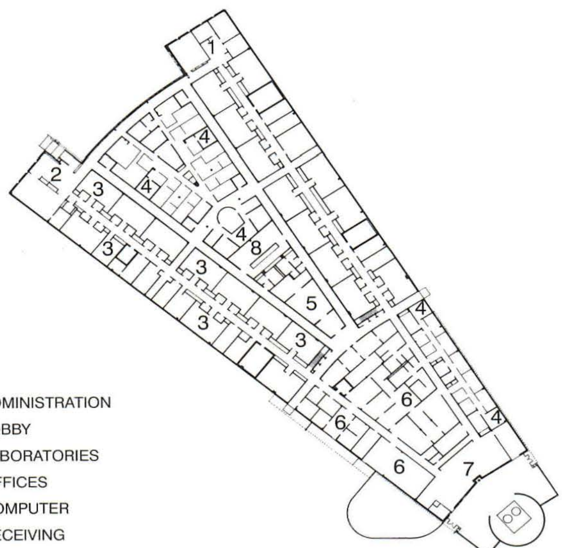
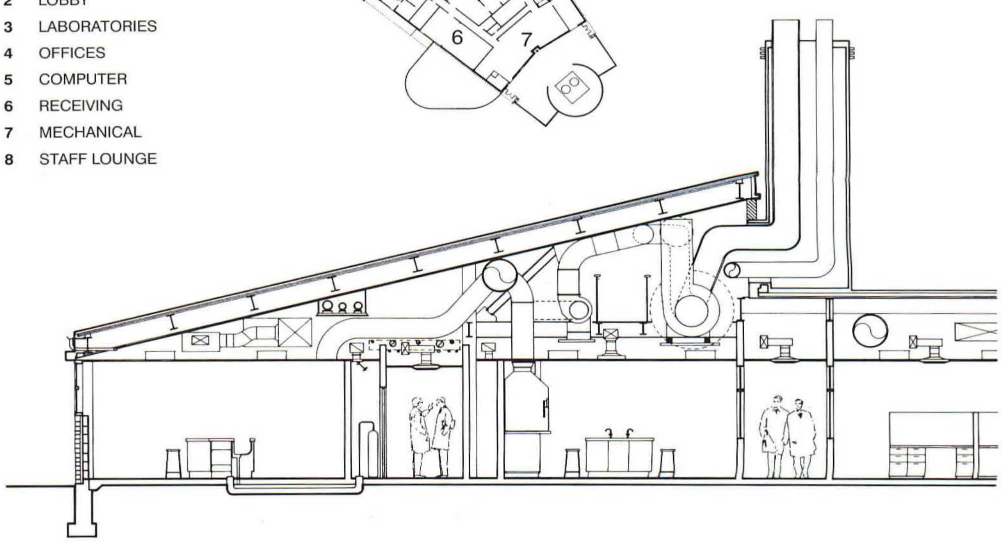
GEORGE LAMBROS

Exhaust stacks and sloped wings (top) indicate space required for lab's mechanical system, as compared with offices (bottom section). Offices and labs are entered through separate corridors (above right and plan). Labs with ceramic and baked-enamel finishes (above left) prevent contamination.



1 ADMINISTRATION
2 LOBBY
3 LABORATORIES
4 OFFICES
5 COMPUTER
6 RECEIVING
7 MECHANICAL
8 STAFF LOUNGE



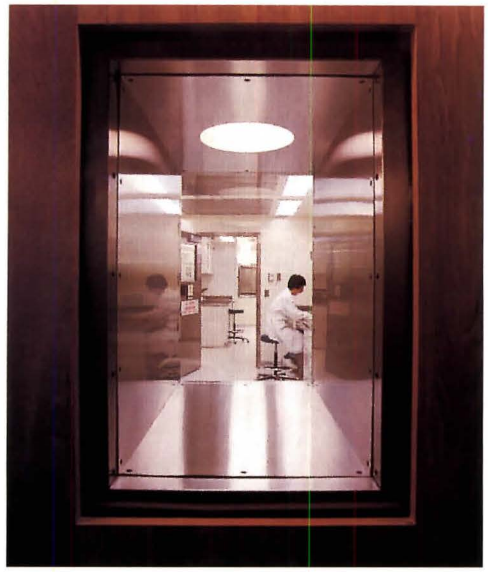
SECTION THROUGH LABORATORY WING

Aaron Diamond AIDS Research Center
New York City
Lord, Aeck & Sargent, Architects

Certain protocols must be met to provide precautions against real and perceived hazards in a facility devoted to research on the AIDS virus, especially when the facility is on the seventh floor of the Public Health Laboratory Building in the heart of Manhattan. Within this 21,000-square-foot interior, large concentrations of the lethal HIV virus are cultivated and manipulated in aerosol form. Safely containing such experiments from the public within restricted access labs, while providing an environment conducive to sharing resources and ideas and attracting 50 of the best medical researchers and support staff posed added complications for Lord, Aeck & Sargent. Project manager John Crane likens the process of meeting lab containment criteria and fitting programmatic constraints within a constricted space to "designing a submarine."

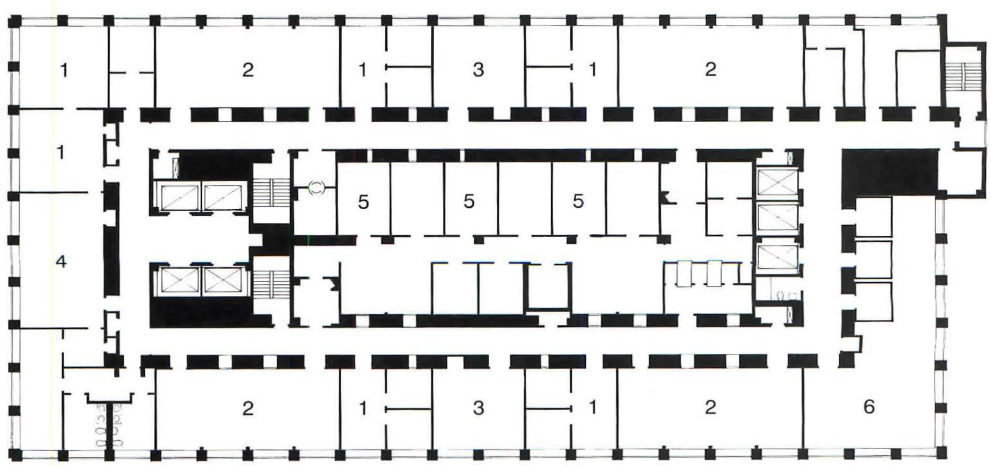
By clustering the labs at the core of the building, the architects physically isolated the six Biosafety-Level-3 labs for working with the AIDS virus from nearby public lobby, administrative offices, and conference rooms. Entry to the labs from a surrounding, restricted access loop corridor is limited to one of two airlocks. Interior windows reveal the 3-foot thick walls between the hall and central labs (necessary for duct chases but not for containment), increasing the sense of isolation. Aligned with interior and exterior windows in perimeter labs where low-risk research is performed, however, these windows also provide visual contact from the high-risk labs to the outside. Moreover, any complications within the labs can be observed from the surrounding hallway and labs.

Air circulation is directed along a path that leads to increasingly restricted areas, progressing from the lobby, hallway, airlocks, to biosafety cabinets that provide a Class 100 workstation in the Biosafety-Level-3 labs. Because containment of the AIDS virus is reliant on continual airflow in one direction, a separate chiller and air-handling unit, independent of the main building's, were provided on the seventh floor. The architects determined the location of the extensive duct runs with a three-dimensional CADD system to ensure they would fit within the existing beams and vertical chases. Disguised by sliding red birch panels, access to duct chases is located in the main corridor to avoid interference with laboratory activities. ■



ELLIOTT KAUFMAN PHOTOS

Aligned interior windows (top left) reveal a progressive layering of spaces from the lobby to the central Biosafety-Level-3 labs that ensure containment (plan below). Black rubber-tile floors, stainless steel ceilings, and cart bumper rails, combined with birch panels in the hallways (top right) reflect material finishes within the labs (bottom left).



SEVENTH-FLOOR PLAN

1 OFFICES
2 BIOSAFETY-LEVEL-2 LABS
3 EQUIPMENT ROOM
4 CONFERENCE ROOM
5 BIOSAFETY-LEVEL-3 LABS
6 MECHANICAL ROOM

Universal Hardware

Simplicity is the key to specifying hardware for the disabled.

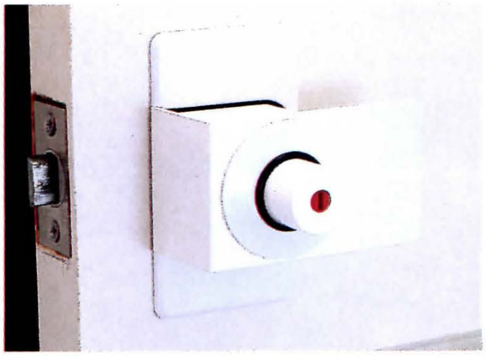
AS GREATER SENSITIVITY TO PEOPLE WITH disabilities grows, architects are honing their design sensibilities to accommodate the special needs of this population. While most practitioners are familiar with the need for ramps, wider doorways, and ample room for wheelchairs as stipulated in the American National Standards Institute guidelines (ANSI A117.1), they may be unaware of simple design elements more necessary for people with disabilities. One of the basic ways of achieving a truly accessible building is through the specification of hardware.

Choosing the right hardware for physically challenged individuals depends more upon an architect's raised consciousness than on time-consuming research to seek out fancy gadgets. "The idea is to design for all people, as opposed to designing special products and environments for those with disabilities," says Edward Steinfeld, architecture professor at the State University of New York at Buffalo and director of SUNY's Adaptive Environments Laboratory. This emphasis on "universal" design is echoed by Ron Mace, an architect who heads Barrier-Free Environments, an interdisciplinary firm in Raleigh, North Carolina, that researches and formulates guidelines for accessibility. "I don't have much faith or confidence in hardware designed for special populations," Mace observes. He suggests a simple test: "If you can close your fist and make the hardware do what it's supposed to do, and not exert more than 5 pounds of pressure, you have a good piece of hardware."

Jane Willeboordse, an architect with the National Association of Home Builders' National Research Center in Bowie, Maryland, adds that such "universal" design guided her selection of hardware for a fire-safe adaptable demonstration house constructed in NAHB's National Research Home Park, also in Bowie, where prototypes are being constructed on 25 lots in a 200-lot suburban development. The design and construction of the house was sponsored by the U.S. Fire Administration, which is seeking swifter methods of egress from burning buildings. People who are physically restricted require on average 2.5 times longer to exit a building in an emergency than those who are not disabled.

Willeboordse's idea that a residence should be adaptable—accommodating people with and without disabilities—prompted the design of a two-story residence, echoing nearby houses. Factory-built by Nanticoke Homes of Greenwood, Delaware, the house demonstrates that adaptable solutions can be produced with some minor changes to a standard unit. Willeboordse insisted that all doorways measure 36 inches wide, specified low-pile carpeting for ease in steering wheelchairs, and included an elevator for access to the second floor. She also stipulated blocking in all walls at grab-bar height should hardware be added later. For architects, a walk through the house provides instructive keys to specifying "universal" types of hardware.

NAHB house fits into its suburban neighborhood (above left), with interior hardware for the disabled, such as casement window lock opener (top left and bottom right), push-button door latches (top right), and double-swinging door hinges (center right).



Cabinet hardware

CABINETS SHOULD BE OPENED WITH DEEP, D-shaped pulls, like those offered by such manufacturers as Hewi, Epco, and Stanley, that allow one to slip an entire hand behind them. Pulls in a color that contrasts with the cabinet are also easier to find for the sight-impaired. Motor-driven devices are available for adjusting the height of cabinets and counters. Drawers with full-extension, ball-bearing slide hardware, available from manufacturers such as Stanley, Grant, and Knape + Vogt, allow easy opening and closing, and access to the entire drawer when opened.

Door hardware

NEARLY ALL THE DOORS IN THE NAHB demonstration house feature push-button latches, made by the British manufacturer Titon. While they are simple to manipulate from the side of the door that swings in the direction of travel, Willeboordse claims several users with disabilities have found the push-button latches difficult to manipulate when pushing the button and pulling the door simultaneously. "Several people suggested that conventional lever handles would have been a better choice," she explains.

Several manufacturers, such as Hewi, Arrow, TSM Tubular Specialties, and Schlage, produce lever hardware. Lindustries offers an attachment called Leveron that slips over a conventional doorknob to convert it into a lever handle. For its line of sliding glass doors, Andersen offers an oak threshold that makes high sills easier to negotiate.

Other companies, such as Besam, Dor-O-Matic, Stanley, Door-Aid, and Yale, offer automatic door openers and closers that operate with electric motors and activate the door either by push-button, floor-pad pressure, or a movement detector. Mechanical door openers and closers are also available from Arrow, Corbin, Dorma Door, LCN, and Sargent. They require less effort to open and feature a delay mechanism that holds the door open until a user has passed through.

Door keys can also be very difficult to manipulate. Attachments are now available for keys that allow for a better grip, and such companies as Presto-Matic Lock offer door locks that are operated with the touch of a numbered keypad. Hinges that allow doors to swing either out or in, providing wheelchair accessibility, are also available. "Swing clear" hinges, manufactured by Stanley, allow doors to swing clear of the door frame when fully opened, allowing wheelchair users to maneuver easily.

Window hardware

STANDARD CRANK HARDWARE FOUND ON most casement windows is the easiest to manipulate, but "most builders insist on double-hung windows," says Willeboordse. Even though double-hung windows are easy to install, they require considerable upper-body strength to operate, and are therefore ill-suited for the physically impaired. Casement windows should by placed lower to the floor so that the crank hardware is easily reached from a wheelchair. A tandem sash lock adaptor, available on Andersen Windows, for example, allows the casement's top and bottom locks to be operated with a single motion from wheelchair height. Motorized operation of casement windows is also available.

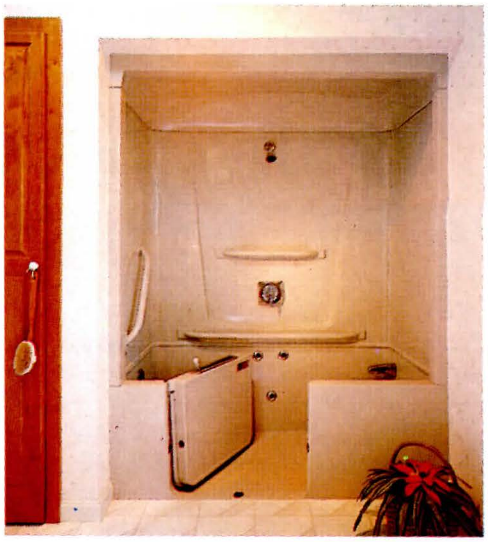
Bathroom hardware

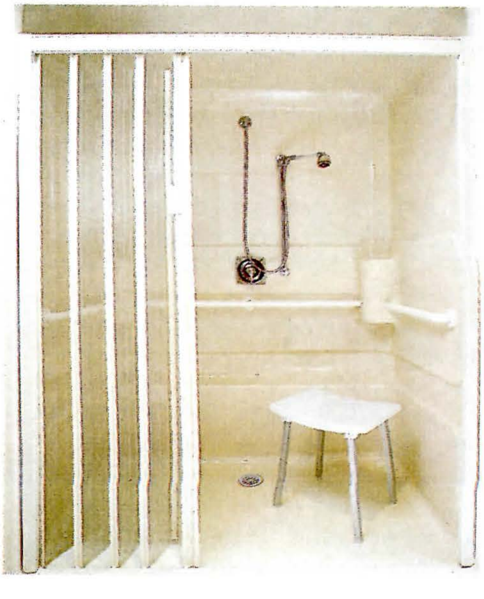
BATH EASE OFFERS A BATHTUB WITH A BUILT-in door that swings into the tub, allowing people to enter the tub without having to lift one leg while balancing on the other. The door is sealed with a gasket developed for submarine hatches, and the hydrostatic pressure of a half-filled tub will hold the door closed even if unlatched. Companies such as Kohler and Briggs offer integral shower units, complete with grab-bars, seating, and an adjustable shower head, with low thresholds to allow wheelchair access.

Lever-type hardware for faucets can be easily manipulated with a closed fist. They are available from a variety of manufacturers, such as Chicago Faucets, Moen, Grohe America, and Koehler. These designs are similar to those commonly found in hospitals, but are less institutional-looking. In addition, Bradley and Intersan offer fixtures with auto-sensing devices that turn water on and off automatically.

SUNY's Edward Steinfeld suggests additional measures that architects can take in designing for the disabled. Meeting code requirements is simple, he maintains, but architects should go beyond them, such as specifying rocker-type light switches in all buildings, although the code can be met with toggle switches. "Design beyond the codes," he advises, "and go back to your buildings to review what works." ■

—MICHAEL J. CROSBIE





At the NAHB demonstration house, a bathtub with a door eliminates climbing into tub (top right); sinks with concealed plumbing protect wheelchair users from hot pipes (center right); and a low-threshold shower unit is large enough to accept a wheelchair (right).

Working with Consultants

How to select building-systems experts to achieve state-of-the-art designs.

AS BUILDINGS AND THEIR TECHNOLOGIES become more complex and clients more sophisticated, it becomes increasingly important for architects to work effectively with an expanding cadre of consultants. State-of-the-art technologies for communications, security, fire-alarm, HVAC, and other systems require expert engineering skills, and for such complicated projects as healthcare facilities, it's not unusual to consult a virtual army of specialists. For an inpatient replacement facility for the Massachusetts General Hospital (page 80), for example, Hoskins Scott Taylor in Boston coordinated the work of as many as 20 consultants responsible for geotechnical surveys, environmental analyses, wind studies, traffic patterns, curtain walls, vibration, interior design, vertical transportation, lighting, acoustics, graphics, equipment, radiography, telecommunications, food handling, materials management, infectious biological waste handling, and helicopter noise.

"Systems are evolving so rapidly," points out Richard Cutter, project architect for Pei Cobb Freed's Mt. Sinai Hospital addition in New York City (page 78), "that we depend on consultants to bring us up to speed." Experienced clients often choose their own consultants, and a recent new addition to many *teams is the* "owner's consultant" who may choose all or part of the design team, including the architect. This consultant plays the same role for design as the construction manager plays for the building process.

More frequently, however, architects select consultants for a project, and their chances of winning a commission can be substantially improved if they collaborate with a team of experienced specialists. "Clients look at the whole package these days," contends New York-based curtain wall specialist Gordon H. Smith. James Franklin, AIA resident fellow, adds that even architects who are inexperienced in designing a particular building type may cinch the job if they can demonstrate that "they will bring not only a fresh approach but consultants who can customize the design to the client's needs."

Selecting consultants involves two basic issues: expertise, and compatibility with the design team. In virtually every case, an architect should look for consultants with a proven track record in grappling with problems of the building type in question. Most importantly, according to Stephen Orfield, an owner's consultant with Orfield Associates in Minneapolis, consultants should be familiar with the latest technological advances in their field. Orfield, whose firm manages design for public and private clients, only recommends consultants who employ "experimental methods, conduct some research, and can articulate the latest developments of their discipline." Drawing from such experience is the only way, he maintains, that architects can fill the multiyear gap between research on a new technology and its application, or the hiatus between a new system's initial use and its widespread acceptance.

Clients look at the whole package these days—adding consultants to the team illustrates that the architect can customize the design to the client's needs.

A prevailing mythology holds that, while the architect is a generalist who knows less and less about more and more, the consultant is a specialist who knows more and more about less and less. However, most architects stress how important it is for the consultant to "think like us, in terms of process rather than product," notes Ted Hammer, managing partner of Haines Lundberg Waehler. In other words, a consultant must conceptualize design problems and arrive at solutions that do more than recycle a remedy applied to a previous project. The specialist must also be familiar with local codes and know how to use CADD and telecommunications systems that are compatible with an architect's own. A further requirement in selecting lighting, graphics, and landscaping consultants is, of course, the unquantifiable ingredient of art. The consultant's esthetic sensibility should complement the architect's, and approach and working styles should be compatible. For this reason, architects with similar values are often good sources for suitable specialists.

Some architects prefer to hire an individual consultant rather than large consulting firms, believing that "it's the guy doing the job that counts," as Orfield notes. Other architects lean toward large consulting practices for the backup they can provide. Some designers feel that integrated structural, mechanical, and engineering firms can provide the best service in solving a spectrum of technical problems. Others prefer the best available specialist. Peter Piven, president of The Coxe Group, the largest management consulting firm for U.S. designers, points out that each claim has merit. "The advantage of an integrated firm is that it can coordinate work more easily. But unless a consulting firm is seen as the best in its discipline, it can have difficulty attracting the top experts."

Most consultants advise architects not to make selections on the basis of fees. Alan Locke, director of mechanical engineering for the Los Angeles office of Ove Arup & Partners/California, maintains that "even when we aren't the lowest bidder, if we integrate systems carefully we can save the owner and architect money." While Piven agrees that fees should not be the prime criterion for selection, he believes "there's no way for the fee not to be a consideration."

In all instances, the entire project team should be introduced to the client at the proposal stage, since consultants can help the architect define a project's unique aspects, differentiate its basic from its special services, recognize its coordination and scheduling problems, and thereby help negotiate the fee.

As leader of the design team, the architect is likened by consultants to a quarterback who calls the plays, keeping everyone in line and making sure each team member is undertaking neither more nor fewer tasks than are spelled out in the contract. Most consultants agree with Clark Bisel, a mechanical engineer with the San Francisco office of Flack & Kurtz, who says, "We really like to see a strong architect, one who's a good communicator, who is assertive, responsive, well organized, and experienced in the construction process." Attentive listening and straight talk are also important. According to Hammer, "If the architect listens in a flexible and innovative way, consultants can make amazing contributions and determine the difference between a project's success and failure."

Such creative give-and-take is especially important at the beginning of a project, which is one reason it is essential for consultants to be brought into the design process as early as possible. "The key to avoiding problems," says principal Kenneth Taylor of Hoskins Scott Taylor, "is to put all the information on the table at the outset, obtain the fullest input from consultants, and exchange information so that a design solution can be developed that meets all the requirements."

Bringing everyone together in early design stages also tends to create better team spirit to solve a range of project problems. It further allows the consultants to let the architect know in which part of the job specialized services will be effective, avoiding glitches that require later design changes. As John Germ, a mechanical engineer with Campbell & Associates in Chatanooga, Tennessee, points out, "Too many times, if architects make space allocations without the input of an engineer, they don't leave enough shaft and ceiling space, place equipment rooms improperly, and so forth." And, as Orfield points out, asking the client for changes once a design is agreed upon undermines the architect's credibility. He recommends spending ample time on schematics "to figure out every aspect of the project and prevent problems."

The team leader's two most important tasks are coordinating and communicating information. The architect should know enough about any consultant's specialty to ask the right questions, fight for esthetic approaches without compromising or interfering with needed technologies, and explain decisions to the owner. "If the architect is one of the 10 or 15 percent that likes technological and technical problem solving, that will improve the relationship with consultants and make for a better working team," claims Orfield. In many cases, though, the architect takes advantage of prompting from the experts in order to be able to propose the most effective solutions. Too often, Orfield points out, architects with insufficient understanding of technical challenges will deal with difficulties by specifying products rather than solving the problem. "As a result," he says, "you tend to see products specified that aren't better but cost more than necessary."

Some consultants may actually move into the architect's office for big jobs or share space with the firm on a permanent basis. As Franklin points out, this arrangement offers the advantage of making a small practice appear larger than it is and spreading out overhead costs. But since the majority of consultants work for multiple clients, they need to maintain their own quarters.

"Whether the architect is located four blocks or 4,000 miles away," contends Bisel of Flack & Kurtz, "we need to have an organized project schedule and to know exactly what's expected of us. Then we can deliver the needed information and move on." A very useful mechanism, he adds, is a dedicated period at the end of design for a coordination check. Enough time should be allowed at the end of a project for a burst of activity, especially by mechanical and electrical engineers, whose work usually cannot proceed until the architect's is completed.

Additionally, it is essential, especially during the schematic phase of design, to hold meetings with clear agendas to which team members come well prepared. Since most information is passed through the telephone, computers, modems, fax machines, and CADD, it is now more difficult than in the past for consultants to change architects' drawings when the base computer program is fixed. If and when the client requires changes, consultants must document the design process and the reasons behind their decisions in order to defend them.

Many consultants prefer to communicate directly with clients, while most project architects prefer to pass all information to clients themselves. Everyone agrees that it's detrimental for the client to receive information from too many sources. Piven believes that "since the architect's role is that of coordinator, it's most appropriate that the architect be involved in communications with the owner and always be informed about them." Concludes Hammer, "Coordination and integration is what gives designers and clients ulcers." Effective coordination and integration are also what make a project succeed. ■

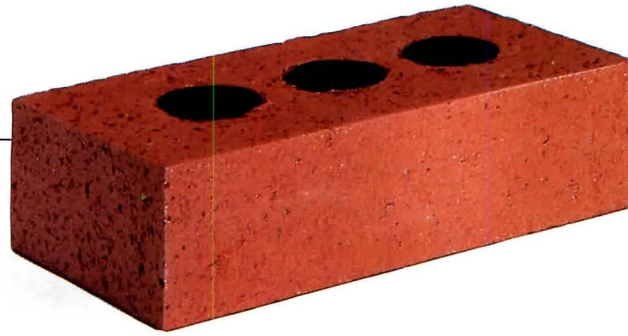
—ANDREA OPPENHEIMER DEAN

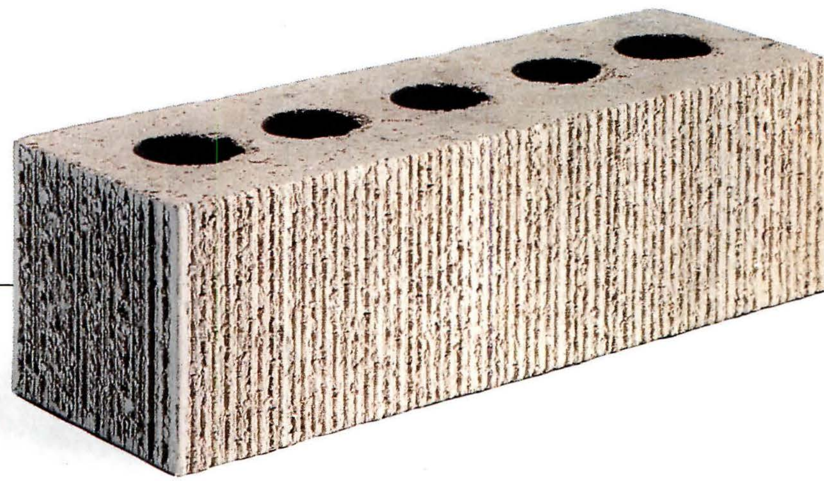
Negotiating Contracts

BUSINESS AND LEGAL ARRANGEMENTS between architect and consultant are as significant as those between architect and owner. Issues covered include the scope of consulting services, payment schedule, indemnification of the architect by consultants, types and amounts of insurance, ownership and use of design documents, and methods for recovering unpaid fees. The scope of the consultant's work should match the contractual commitment of the owner-architect agreement. Where the architect's services end and the consultant's begin should be clearly delineated. Provisions should be made for the consultant to disclose to both owner and architect any intentions to subcontract work, and for the architect to approve all subconsultants. It should be clear that the consultant will be responsible for all subconsultants' work. To obviate disputes over fees, the consultant agreement should state that the consultant is entitled to payment for work beyond basic services only after securing written approval of an estimated fee. It should be made clear that the consultant will be paid by the architect when and if the architect is paid by the owner, and that the architect and consultant will share the cost of efforts to collect outstanding fees. It is critical that the consultant sign an agreement that includes an indemnification provision as broad as that agreed to by the owner and architect, and that it not be limited to negligent acts. The insurance provisions of the owner-architect contract will often dictate the consultants' insurance requirements and will obligate the architect to retain consultants who hold the requisite coverage. Finally, the architect-consultant agreement should specify that the architect has copyright, ownership, and use of all drawings prepared by the consultant. This can prevent a terminated consultant from holding design documents hostage in return for payment.

—BARRY B. LEPATNER

Barry LePatner is a senior partner of LePatner, Block, Pawa & Rivelis, legal advisors to architects.





Magnetic Distractions

Advice on reducing electromagnetic fields outside and within buildings.

A 1974 STUDY OF DENVER AREA RESIDENTS BY epidemiologist Nancy Wertheimer and physicist Ed Leeper found a correlation between childhood leukemia and exposure to the magnetic fields emanating from secondary distribution lines. While such studies are controversial, subsequent laboratory investigations have recently begun to shed light on just how magnetic fields could influence cancer development. Further studies may even prove a causal relationship between electromagnetic fields and human health problems. In anticipation of such discoveries, architects should be prepared to counter these problems in building design, site orientation, and interior space planning.

Understanding magnetic fields

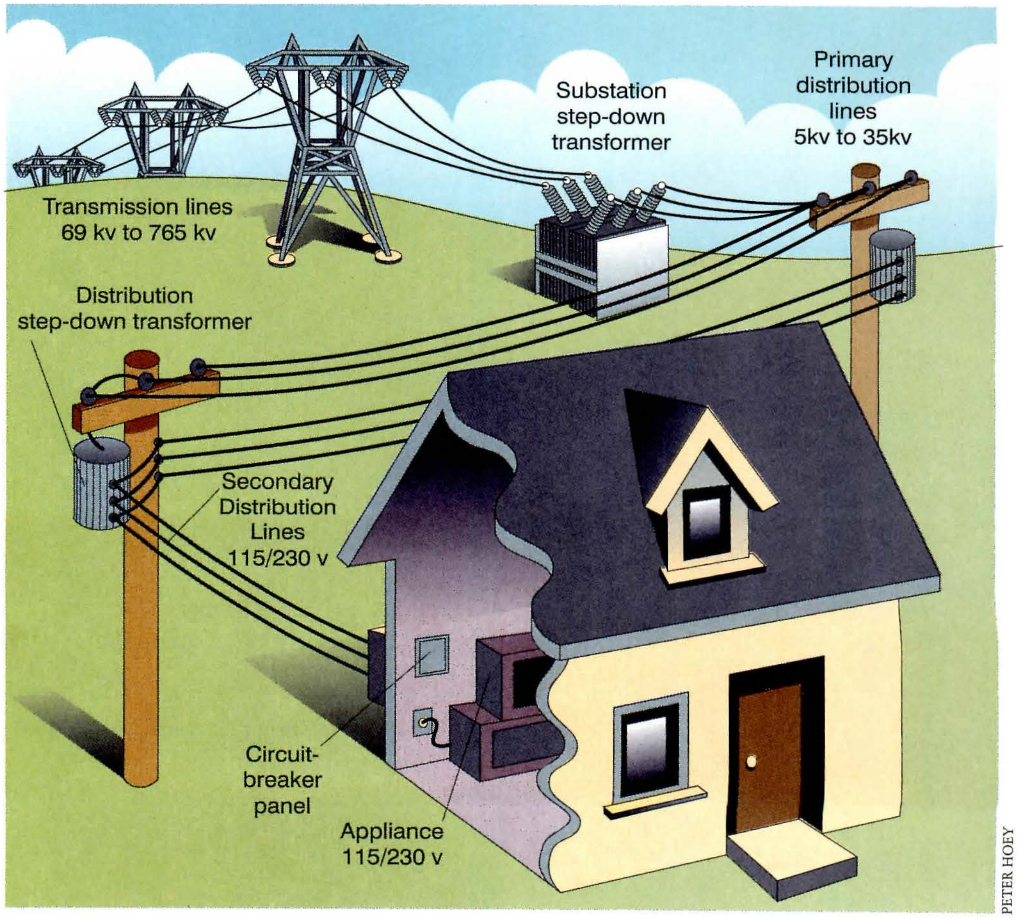
WHENEVER ELECTRIC CURRENT FLOWS through a wire, it generates both electric and magnetic fields, which in turn exert forces on objects nearby. These extremely low frequency fields were never considered harmful because they are so weak. Unlike X-rays and other types of high-energy ionizing radiation, radiation produced by common electric and magnetic fields cannot break chemical bonds and knock electrons off atoms. Nevertheless, the potential for producing biological defects is now fairly well established, although the mechanisms through which such effects are achieved remain in question.

While both electric and magnetic fields are produced by electricity, the fields are quite different. Electric fields are produced by electrical "pressure" (voltage), whereas magnetic fields are created by the flow of current (amperage). An electric blanket, for example, produces an electric field whenever it is plugged in, but produces a magnetic field only when it is turned on. Most health concerns currently focus on magnetic fields rather than electric fields, since the latter are relatively easy to block.

Magnetic fields are transmitted through almost all materials, so it is impossible to build a protective shield to screen them. However, the strength of the field decreases with distance, so the magnetic field can be reduced by creating more distance between sources and occupants. Circuitry can also be designed to reduce magnetic fields, based on the principle that the less distance between hot and neutral wires (conductors), the smaller the magnetic field. Modern Romex-type wiring, for example, in which the conductors are close together, produces much lower magnetic fields than the knob-and-tube wiring found in houses built before 1930.

In buildings, magnetic fields tend to be very complex and difficult to predict with any accuracy. Designing "safe" buildings is further complicated by the fact that it is not yet known how much exposure is safe and how much isn't. However, a general goal should be to minimize magnetic fields in those areas most heavily occupied. To accomplish this

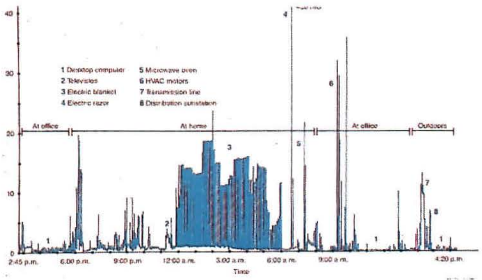
Electromagnetic fields occur around electrical transformers and power lines outside a building, and around wiring and appliances on the interior (below). Exposure levels are directly related to distance from the source.

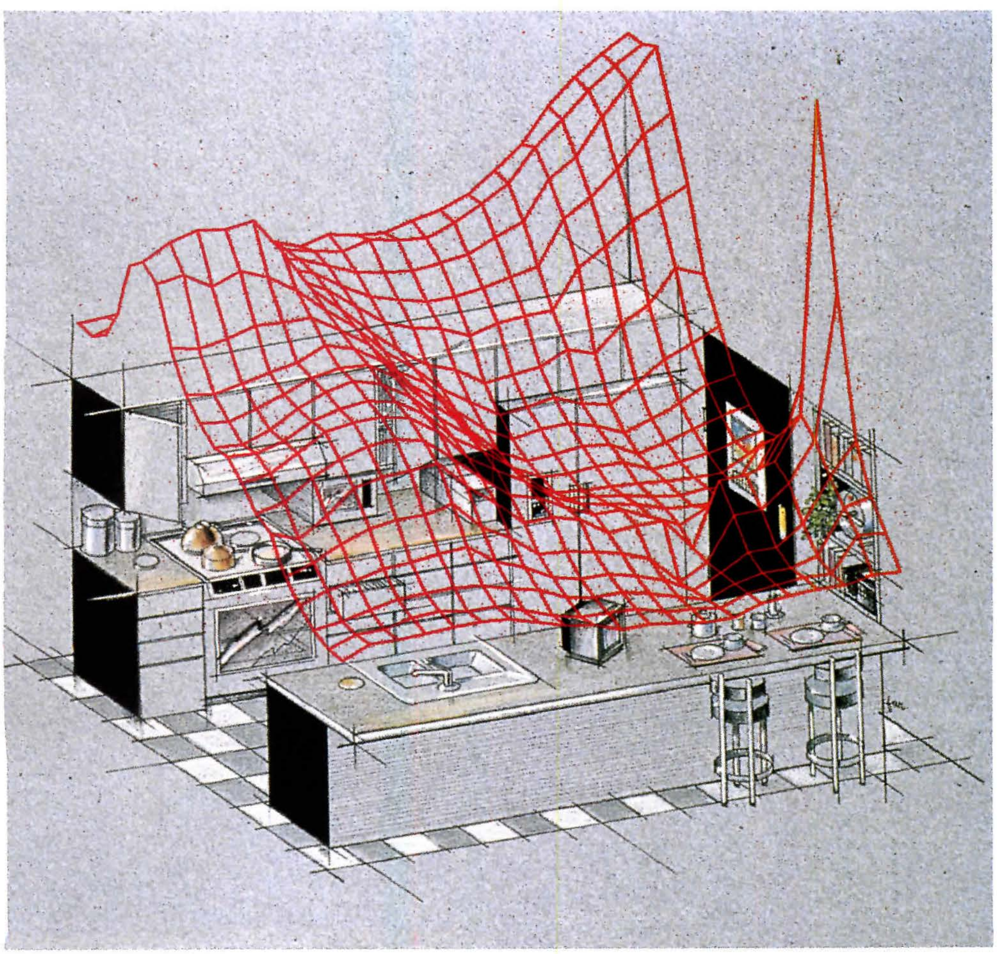


PETER HOEY

goal, both magnetic fields coming from sources outside the building and those originating inside must be considered.

Exposure to electromagnetic fields can vary widely through the course of a typical day (chart below) and within a single room, such as in kitchens where strengths are greatest around appliances (bottom). Magnetic field strength also varies according to the flow of current. Field diagrams for a typing room illustrate changes in the level and location of electromagnetic fields when office equipment is turned off (facing page, top) or on (facing page, bottom).





Exterior magnetic fields

MAGNETIC FIELD SOURCES OUTSIDE A BUILDING include high-voltage power transmission lines (69-765 kilovolts) located within 500 to 1,000 feet of the building, lower-voltage primary distribution lines (5-35 kilovolts) along the street, and secondary distribution lines (115 and 230 volts) that supply power to a building from a "step-down" transformer.

Because of their closer proximity to a building and higher amperage, secondary distribution lines produce more significant magnetic field sources than higher-voltage primary distribution and transmission lines. Designing transmission and distribution lines to minimize magnetic fields is within the purview of the utility company, not the architect. However, an architect can play an active role in reducing the impact of external magnetic field sources by determining the building's placement on a lot. Given a choice, the structure should be located as far as possible from both transmission and distribution lines—at least 500 feet from high-voltage transmission lines is recommended.

An architect can also arrange interior space to minimize exposure to external sources of magnetic fields. Even if an architect has no flexibility in determining placement of the building on the site, interior spaces can be designed to keep the most heavily occupied areas farthest away from power lines.

When designing the building, the primary strategy would be to locate the incoming power lines as far away as possible from occupied spaces. As a general rule, burying incoming lines underground may actually increase fields, because the cables—and thus the magnetic fields—are closer to ground level. An alternative might be overhead lines, but keep in mind that they might necessitate running conductors along the building's exterior next to heavily occupied spaces indoors. Because of these complexities, concerns and options about magnetic fields should be discussed with the project electrician, electrical engineer, or utility service representative well in advance of the design stage.

Interior magnetic fields

A MORE SIGNIFICANT CONSIDERATION FOR architects is dealing with magnetic fields produced within a building. The varying intensity of fields stems from a wide range of factors: proximity to electric wiring; structural steel or metal plumbing systems used for grounding; location of main distribution transformers and switching equipment; placement of large electric loads, such as elevator motors and HVAC equipment; use of industrial process equipment with heavy current draw; and location of office equipment, home appliances, and other electrical loads. These fields will vary from one minute to the next as electrical loads and current vary.

In new buildings, the best layout solution is to design a basement in which all incoming conductors are placed as close together as possible. Also, since magnetic fields readily pass through floors, architects should locate major electrical equipment, such as elevator and HVAC motors, as far as possible from occupied spaces and on the highest floors.

On a smaller scale, equipment and appliances create additional electromagnetic fields. Most computer monitors produce sizable fields not just in front of the screen but on all sides. By carefully arranging workstations, exposure of VDT users and nearby workers can be minimized (see page 96).

Selection of heating systems could also have an impact on magnetic fields. Radiant electric ceiling heating systems, for example, can produce strong magnetic fields over a large area. However, electric-resistance baseboard heaters can also generate substantial fields in their immediate vicinity. If magnetic fields are of primary importance in determining a heating system, the concerned architect may be well advised to chose an alternative system. If concerns about magnetic fields continue, such equipment will be redesigned to reduce the fields, as is the case with computer monitors and electric blankets, to meet the demands of the marketplace.

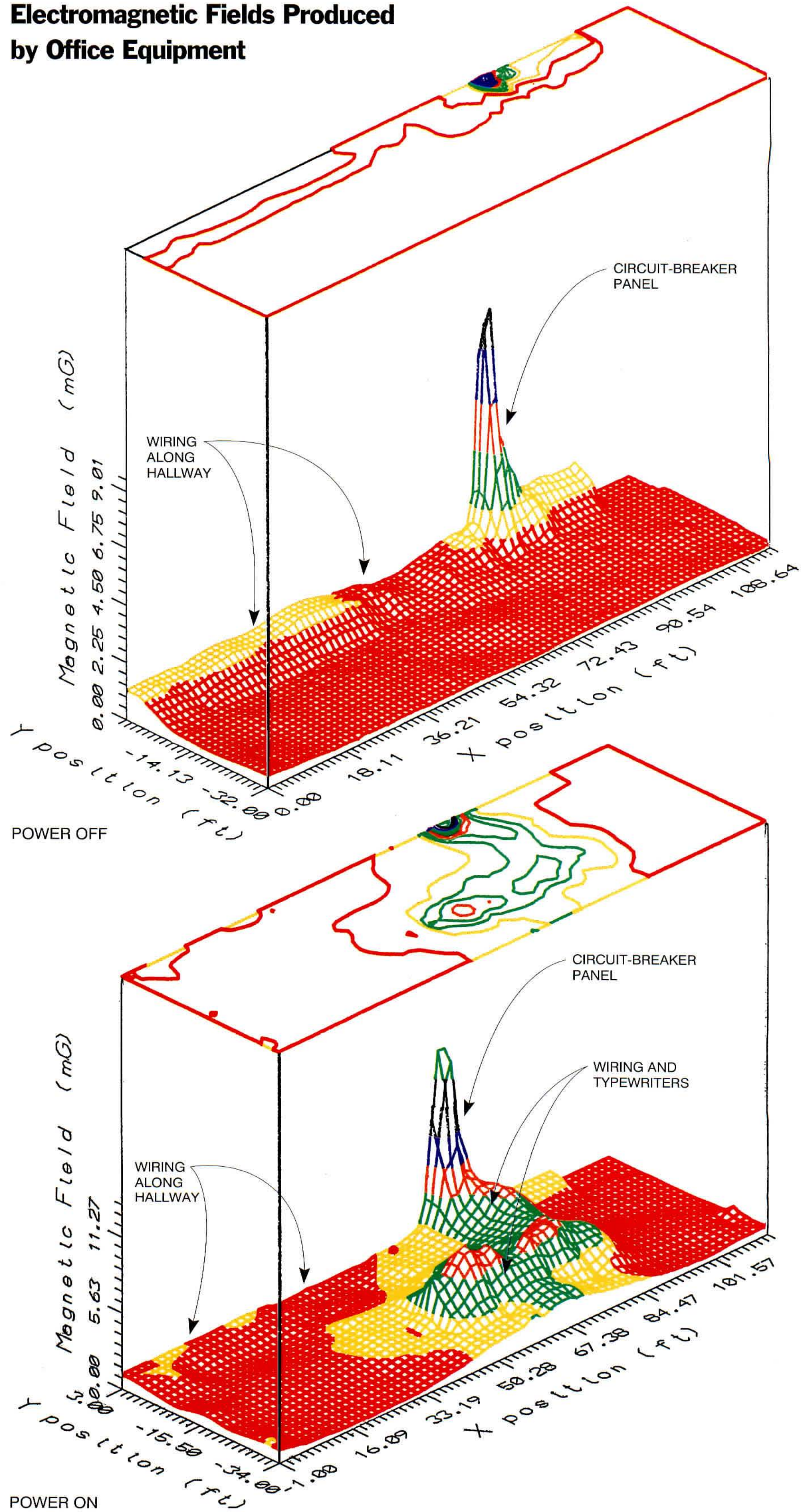
Greg Rauch, manager of magnetic field research for the Electric Power Research Institute (EPRI), the primary research arm of the U.S. electric utility industry, envisions the development of a computer program much like a CADD system to determine health concerns associated with magnetic fields. The program would help determine the interior layout of buildings, including arrangement of transformers and electrical switchgear. Information on the magnetic field of each piece of equipment would be entered into the program, and simulations of magnetic fields in the building could be produced. At its High Voltage Transmission Research Center in Lenox, Massachusetts, EPRI researchers are learning about magnetic fields so that such design tools could be developed.

Even though very little is known about how magnetic fields affect human health, some steps can be taken by practitioners to minimize those fields in buildings. Until it is determined just how significant the risks are, some experts suggest taking what is called a "prudent avoidance strategy"—starting with modest effort and expense—at least until the risks are definitively established. "If you can do it for free, do it; if it costs a fair amount of money, don't," suggests Jack Adams of the Department of Engineering and Public Policy at Carnegie Mellon University, which has promoted the concept of prudent avoidance in its 1989 publication *Electric And Magnetic Fields From 60 Hertz Electric Power: What Do We Know About Possible Health Risks* by professor M. Granger Morgan.

In the meantime, magnetic field research—both epidemiological and laboratory studies—should be continued, and low-cost measures that can reduce magnetic fields and exposure to them should be implemented. As creators of structures that can either reduce or increase the risks associated with electromagnetic fields, architects have an important role to play in this effort. ■

—Alex Wilson

Electromagnetic Fields Produced by Office Equipment



Magnetic Fields in the Office

WHEN THE FEDERAL GOVERNMENT RE-leased a study on video display terminals (VDTs) in March, many breathed a sigh of relief. The research exonerates VDT radiation as a threat to pregnant women. But other experts warn that it is too soon to cozy up to computer terminals, pointing out that the study, conducted by the National Institute of Occupational Safety and Health, accounted for the effects of very low frequency (VLF), but not extremely low frequency (ELF), radiation. "ELF, the dominant radiation emitted by VDTs," explains Jerry Phillips, biologist at the Veterans Hospital in Loma Linda, California, "may affect cell growth and composition, possibly triggering tumors, hormonal changes, and a weakened immune system."

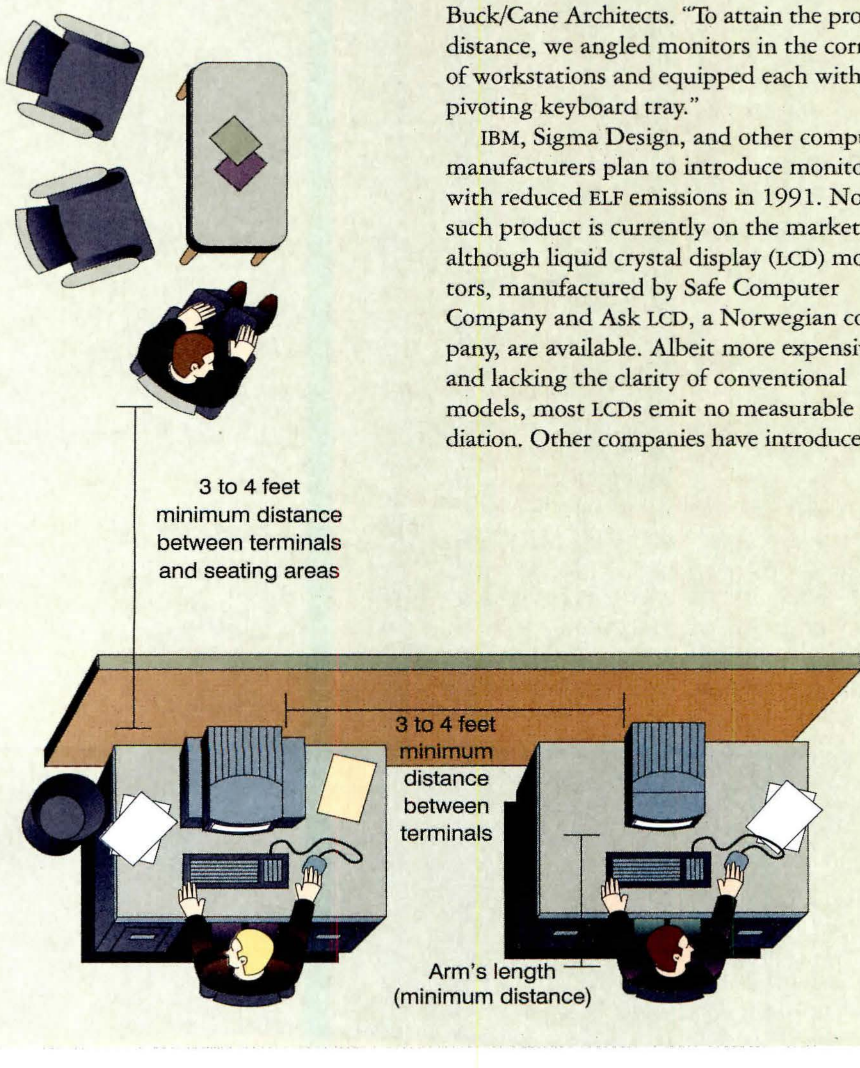
Most computer terminals emit electromagnetic fields in all directions, exposing an operator seated among a sea of terminals many times over. Controversy over the safety of VDTs began in the late 1970s, but more than 40 investigations since then have yet to settle the debate. Nonetheless, the Swedish government has established a stringent protocol for measuring VLF and ELF, as well as recommended emission guidelines. No such standards exist in this country, although some U.S. manufacturers have met the Swedish guidelines.

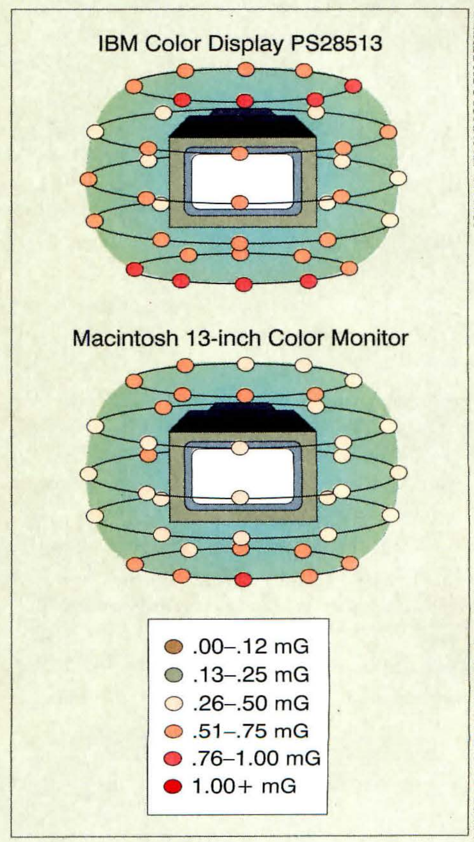
Despite the lack of a verdict on electromagnetic radiation, some employers have minimized exposure. In 1989, for instance, the Fund for the City of New York measured its computers' electromagnetic fields and determined that their employees must work at least 28 inches from their screens and 40 inches from a coworker's VDT to meet Swedish standards. "Our design solution relied on an L-shaped cluster," explains architect Paul Buck of New York-based Buck/Cane Architects. "To attain the proper distance, we angled monitors in the corners of workstations and equipped each with a pivoting keyboard tray."

IBM, Sigma Design, and other computer manufacturers plan to introduce monitors with reduced ELF emissions in 1991. No such product is currently on the market, although liquid crystal display (LCD) monitors, manufactured by Safe Computer Company and Ask LCD, a Norwegian company, are available. Albeit more expensive and lacking the clarity of conventional models, most LCDs emit no measurable radiation. Other companies have introduced ground cords that they claim will "drain away emissions," and glass or mesh screens as radiation barriers, but experts caution that external additions to computers cannot reduce electromagnetic fields.

New VDT regulations have garnered much publicity, but respond mostly to ergonomic concerns. A highly publicized 1991 ordinance in San Francisco requires that companies with more than 15 employees provide adjustable chairs, detachable keyboards, and proper lighting levels at a cost of up to $250 per worker. Although a clause requiring spacing of VDTs was struck down, an advisory committee will continue to investigate and develop policy recommendations on radiation hazards for the city. —ANN CLAIRE GREINER

Ann Claire Greiner is a New York-based freelance writer.





SOURCE: TECHNOLOGY REVIEW

PETER HOEY ILLUSTRATIONS

Swedish regulations limit VLF radiation to .25 mG and ELF to 2.5 mG at 20 inches from source. VLF levels at that distance vary between monitors (above), requiring minimum distances between users (left).

Of Mice and Pens

Two panels of architects review state-of-the-art computer input devices.

WHAT MAKES A PERSONAL COMPUTER REALLY "personal" is the large and growing number of devices with which to draw, write, and explore a 3D electronic model. Of course, every computer comes with a keyboard, and every Macintosh comes with a mouse, too. For some architects, that's enough. But many practitioners rely on at least one other means of entering information into the computer or moving an image around on screen—keyboards, mice, digitizers, trackballs, scanners, fax modems, joysticks, light pens, voice command systems, touchscreens, and touchpads. To assess the success of these input devices, ARCHITECTURE connected a wide variety of such devices to a collection of DOS-based and Macintosh computers, and organized two panels of reviewers.

Mary S. Maudlin, AIA, enters Autocad commands by voice with the Bug by Command Corporation (above). With the headset, commands can be issued softly to avoid disruption.

Edward J. Marcyn, AIA, and Lisa Addis of Logitech (above) scan a Polaroid photograph with the Logitech ScanMan and edit the image using Ansel editing software.

Using PC Paintbrush, Michael B. Hogan, AIA, (above) draws on a scanned-in photograph on an Arche computer. His drawing surface is the paper-thin GridMaster digitizer.

The first group of reviewers consisted of 18 architects who have assessed CADD programs for the magazine since 1984. They were interviewed in depth to understand the reasons for their preferences. The other panel comprised members of 100 architecture offices in the Chicago area. Seventy-two architects, plus a smattering of drafters, graphic artists, and computer specialists, accepted. This group filled out a questionnaire that indicated their preferences.

The panels met separately on successive days last winter in Chicago. They were asked to consider only the subjective aspects of the input devices: Which felt the most natural and intuitive? Which helped them practice architecture most effectively? Which offered the best value? Their answers revealed a lack of consensus—the choice of an input device is highly personal and depends on what an architect is accustomed to and the nature of his or her practice.

Still, it was possible to pick out clear winners and losers, albeit with vigorous dissent from some panelists. Every device was favored by at least one architect, and every device was ranked at the bottom by at least one other. The final question asked of the panelists was, "Which input devices offer the brightest future?"

The winners: Mice, voice command systems, most cordless devices, and scanners.

The losers: Joysticks and touch systems.

Split decisions: Light pens, trackballs, keyboards, and a pressure-sensitive stylus.

Mice and Macs

THE MOUSE EARNED THE HIGHEST OVERALL score of any of the 10 types of input devices. However, only seven of the 72 architects who expressed an opinion thought it had the brightest future; only one ranked it last. "The mouse has become the most widely supported input device across applications because of its simplicity and basic hand-eye relationship," said Steven L. Glenn, AIA.

A mouse is a relative pointing device. It moves the arrow or cursor on the computer screen relative to its last position on the screen. The two basic types of mice are mechanical and optical. A mechanical mouse has a ball on the bottom. As the ball rolls across the desk or any flat surface, it sends directions to the computer to move the pointer on the screen. Its disadvantage is that the ball and rollers must be cleaned. An optical mouse requires a special metallic pad that reflects light from the mouse. Light from an LED in the bottom of the mouse is reflected by the pad. A sensor measures the movement of the mouse over grid lines in the pad and tells the computer to move the pointer a proportionate distance and direction on the screen. Advantages of optical mice include high accuracy, no moving parts, and nothing to clean. Mechanical mice, on the other hand, do not require a pad that must be positioned squarely on the desk.

The Macintosh mouse, which is mechanical, has one button, which the user clicks to issue commands. The Microsoft mouse, also mechanical, has two buttons. Three-button technology for mice was pioneered by Mouse System, which also makes the only optical mice. There is currently no standard guiding the number of buttons on a mouse, although all Mac programs require at least one. In certain applications, the second and third buttons can be programmed to issue "shortcut" commands, such as enter, cut, copy, and paste. However, even these routine commands may be different in each application since it's up to the programmers to specify the functions for the buttons.

Panelists agreed that the mouse, a mature product, does a good job of picking commands from menus, setting points, connecting lines, and moving objects or text around the screen. But it is a poor freehand drawing tool, and attempts to create even a recognizable signature with a mouse usually fail. The reason is that most people draw with their fingers, and the traditional mouse fits in the palm of the hand like a bar of soap.

Mice for DOS-based computers got a boost last year when Microsoft released Windows 3.0, which uses a mouse, and Lotus released 1-2-3 Version 3.1, which contains internal support for the mouse as a means to select menu commands, change column width, split windows, and scroll.

To improve the feel of the mouse, some vendors are redesigning its traditional shape. The panelists' favorite design was a kind of anti-mouse called Felix by its vendor, Altra, even though it was the most expensive at $169. Occupying a fixed, 6-inch-square area, it features a small handle topped by a button that moves the cursor by using the fingers rather than the wrist and arm. Unlike a conventional mouse, it works in absolute mode, which means that every point within the 1-square-inch travel of its handle corresponds to an exact point on the screen.

Finishing a whisker behind Felix were two more traditionally designed mice, the best-selling Microsoft Mouse, renowned for its slick look, quick response, and broad support, and the Logitech mouse, with a high arching back that nestles naturally into the palm.

Although most mice are attached to the computer by cords, the Zen mouse sends its position to the computer by infrared light, eliminating the need for hook-ups, which the panelists praised for its convenience. But the mouse is most sensitive when pointed at the infrared receiving unit, limiting the user's freedom of movement. After two months, reviewer David J. Engelke, AIA, finally abandoned the Zen mouse in favor of a corded Logitech mouse. The most natural mouse, to some, was the MousePen by Appoint. It puts the ball at the bottom of a penlike device that is held and moved with the fingers.

If space is severely limited, the Icontroller by Suncom clips to either side of the keyboard. But controlling the pointer on the screen with the tiny handle on the Icontroller takes some practice. At $79.95, it was the least expensive mouse considered.

Voice command systems

THE BIGGEST SURPRISE OF THE EVALUATION was the success of voice command systems. Thirteen architects ranked this category as the leader for the future, a better showing than any other type of input device.

Voice systems can recognize and execute spoken commands, such as "file-open" or "draw circle 2 point." They do not eliminate the need for a keyboard or mouse, but do minimize their use. Nor do they respond to a large enough vocabulary to make it possible to dictate a letter or specifications into a word-processing program.

Charles R. Newman, AIA, liked the ability of voice systems to work as he thinks. To add a 3-foot door symbol, he doesn't need to think about how the computer wants to be instructed. He merely says, "Add 3-foot door." David J. Johnson, AIA, saw no drawbacks to the prospect of an open office full of drafters wearing headsets and issuing voice commands to their computers. "But it will be hard to get over inhibitions," noted Kris Stebbins Kelly of Designs Unlimited in Chicago.

Panelists liked all the voice systems under consideration, but their favorite was Voice Navigator, priced at $795, by Articulate Systems. The Bug by Command Corporation placed slightly behind, primarily because, with 200 commands, it was the most expensive at $1,195. A version that accepts 100 commands is available for $799. A $495 option allows Autocad users to leave voice messages, such as "check the flashing."

Voice Master II by Covox was the lowest-priced system at $219.95. It connects to the parallel port at the back of the computer, eliminating the need to install a controller board. Newman criticized the Voice Master, his favorite, for requiring 71 kilobytes of RAM and for making available only 16 of its 256 commands at a time. The Bug, by contrast, requires only five kilobytes of RAM. Voice Navigator operates on the Macintosh. The Bug and Voice Master II run on DOS.

Scanning the options

SCANNERS ALSO GENERATED A SURPRISING amount of enthusiasm, considering that software to manipulate scanned images was not very effective as recently as two years ago (ARCHITECTURE, October 1990, pages 101-104). Scanners work much like copiers. The document is illuminated, with light and dark areas translated into a dot pattern. With scanners, architects can enter existing paper drawings, artwork, or text into the computer, eliminating some redrafting or retyping.

The panelists considered the ScanJet, priced at $2,190 from Hewlett-Packard; ScanCad, for $2,995 from Houston Instrument; and two hand-held scanners, ScanMan for $499 from Logitech and the Typist for $595 from Caere. Logitech also has a $279 model that scans only black and white documents; ScanMan will reproduce shades of gray. All include image-editing software. The HP and HI scanners work only on DOS-based com-

The Logitech Trackman (above) was praised by the evaluators for the design of its hand-rest, the three buttons, and its trackball.

MicroSpeed puts the trackball of its PC-Trac in the center between two large buttons (above). The ball is moved with the fingers.

The colors, shape, and arrangement of controls for the Silhouette trackball (above) by Emac were designed for productivity.

puters. Logitech and Caere offer versions for both DOS and Macintosh.

Scan-Cad will scan D-size drawings for several thousand dollars less than competitive products, but an HI plotter is required. Its scanning head and penholder are interchangeable. The panelists rated Scan-Cad a splendid value. HP's ScanJet, a desktop unit, will scan legal-size pages. Hand-held scanners typically scan a swath about 4 inches wide.

Problems with scanning include a large number of incompatible file formats, huge file sizes, and difficulties in translating the dots produced by the scanner into lines or characters that a CADD or word-processing program can understand. We therefore evaluated three programs that address the CADD translation problem: Draftsman 4.0 by Arbor Image; CAD Overlay ESP 3.02 by Image Systems; and HiJaak by Inset Systems.

Draftsman, which converts raster lines to vector lines automatically, is priced at $395 to $1,695, depending on scanner size. CAD Overlay ESP, which costs $1,800, assumes that users will erase unwanted portions of the raster image on the screen, trace over other portions, and add to the original image—all from within Autocad, Drawbase, Versacad or Drafix. Terrill W. Janssen of Janssen Associates in Chicago remarked that he was surprised at how well both worked. HiJaak Version 2.0, priced at $199, performs a superior job of translating PC graphic file formats, including screen capture, vector, raster, and image processing.

Digitizing tablets

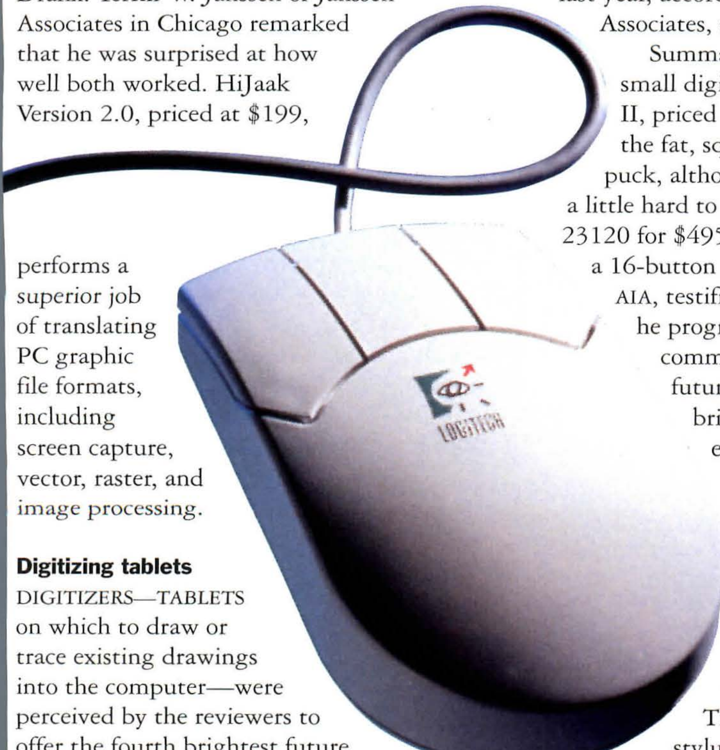
DIGITIZERS—TABLETS on which to draw or trace existing drawings into the computer—were perceived by the reviewers to offer the fourth brightest future overall. They ranked highest with 12 evaluators, only one fewer than those who advocated voice systems.

Templates containing commonly used commands and symbols are often placed over part of the tablet. The user points at the desired command or symbol with a puck or stylus and clicks to select it. The puck looks like a flat mouse with cross-hairs at one end. The stylus is much like a pencil with a retractable point. Pressing down on the point of the stylus performs the same function as clicking on a mouse button. But in contrast to a mouse, the digitizer is an absolute pointing device. This means that a specific point on the tablet corresponds with a specific point on the screen. Some digitizers can operate in either absolute or relative mode. In addition, there are a number of buttons ranging from one to 16 for additional commands.

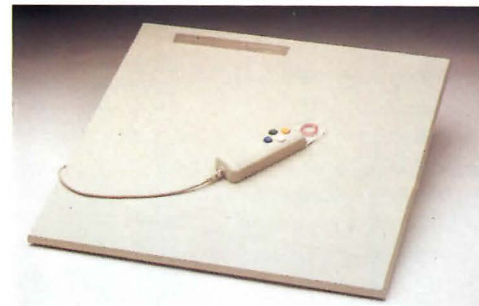
We asked the panelists whether they preferred a stylus or a puck. Of the 33 who answered, 21 preferred a puck. Asked how many buttons they preferred, they said four, on average. If the panelists had been asked which digitizer they prefer now, the winners probably would have been market leaders CalComp, Summagraphics, and Seiko. They shared 48 percent of the worldwide market last year, according to Pacific Technology Associates, a market research firm.

Summagraphics is the leader in small digitizers. The SummaSketch II, priced at $599, was praised for the fat, squat shape of its redesigned puck, although the buttons seemed a little hard to reach. The DrawingBoard 23120 for $495 from CalComp features a 16-button cursor. Robert C. Robicsek, AIA, testified to the ease with which he programmed them to execute commands he uses frequently. Its future was rated the second brightest of the seven digitizers accepted for evaluation.

The digitizer that captured the imagination of the panelists was the Wacom SD510C, a 6-by-9-inch tablet running PixelPaint Professional Version 2.0 by SuperMac on a Macintosh IIci. The $695 Wacom includes a stylus that controls line weight by sensing how hard the user is pressing down. "For the first time, I feel that I can really sketch on a computer with this device," according to evaluator Laurence E. Dieckmann, AIA.



The Logitech MouseMan (above) was praised for its arching back, which nestles naturally into the palm of the user's hand.



The SummaSketch II (above), shown with a four-button cursor, is by Summagraphics, the market leader in small digitizers.

WAYNE CABLE

CalComp's DrawingBoard 23120 (above) has 16 buttons that can be easily programmed to execute common commands.

The UnMouse (above) relies on the most intuitive pointing device—the finger—to move the pointer and issue computer commands.

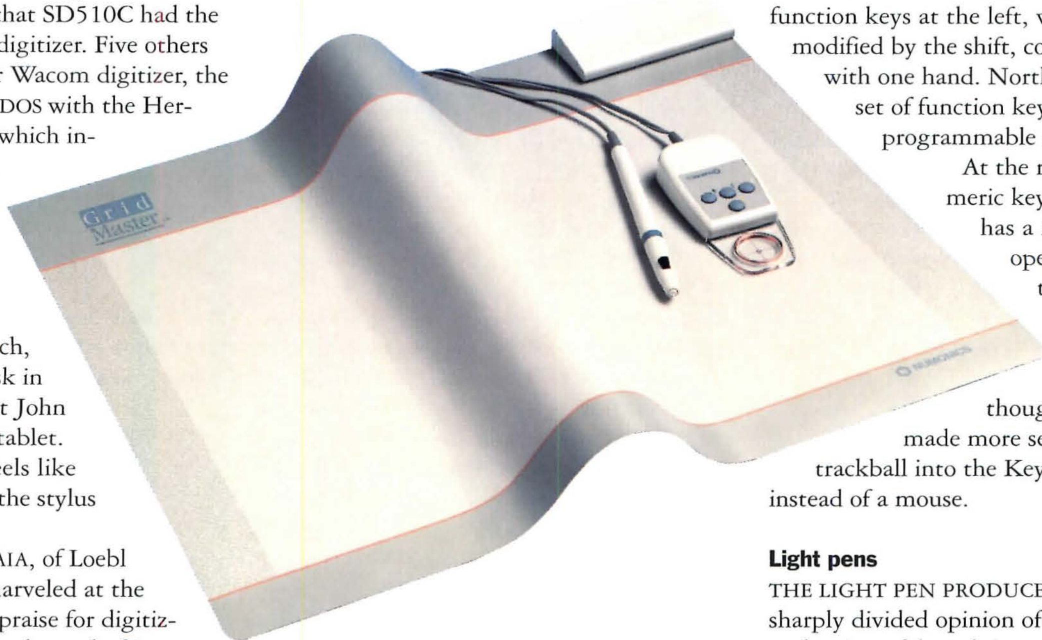
On the RollerMouse by CH Products (above), both large buttons flanking the trackball perform the same "mouse-down" functions.

Of the 57 architects who expressed an opinion, 19 concluded that SD510C had the brightest future of any digitizer. Five others gave the nod to another Wacom digitizer, the SD421, running under DOS with the Hercules Art Department, which includes a paint program and high-performance color graphics adapter. The 12-by-12-inch tablet is priced at $1,045. "If the Wacom tablet didn't cost so much, I'd put one on every desk in my office," said architect John C. Voosen of the larger tablet. "It works. The stylus feels like an old friend. But best, the stylus is wireless."

Michael B. Hogan, AIA, of Loebl Schlossman & Hackl, marveled at the panelists' simultaneous praise for digitizers and preference for heads-up drafting. He then posed the question: "Why not spend the price of the digitizer on a larger monitor and a mouse, unless the digitizer offered some clear advantage such as pressure sensitivity?" Robicsek replied that architects should be reducing the proliferation of computer devices, not adding to it. He characterized the digitizer as versatile and flexible.

Virtually tied as the digitizer with the third brightest future were the GP-9, a $2,305 sonic digitizer from Science Accessories (it locates the puck by sound waves), and the $469 GridMaster from Numonics. The GP-9 is small (26 by 7 inches) and sits on one end of any flat surface, including a drafting table, and permits E-size drawings to be digitized. When not in use, the GP-9 can be stored on a shelf.

The thin tablet of the GridMaster is so flexible that it's easy to roll it up and carry it away—it doesn't even have a transformer.



The ultra-thin Numonics Gridmaster digitizing tablet (above), with no transformer, can be rolled up for easy portability.

The GTCO SketchMaster, priced at $449, also draws its power from the computer, avoiding the need for a transformer.

All keyed up

THE REVIEWERS PROVED THAT IT'S STILL possible to work up some emotion over the design of a keyboard. The position of the function keys, size of commonly used keys such as the backslash, and unfortunate juxtapositions of keys (such as the escape key next to the backspace), still stir up praise or energetic denunciations.

We looked at designs by two manufacturers of replacement keyboards: the $129 OmniKey Ultra by Northgate and the $369 KB 5153 by Key Tronic. The OmniKey Ultra won because it costs less and places the function keys at the left, where they can be modified by the shift, control, or alt keys with one hand. Northgate puts a second set of function keys that are user-programmable at the top.

At the right of the numeric keypad, the KB 5153 has a mouse pad that operates in any of three modes: relative; absolute; or macro. However, panelists thought it would have made more sense to build a trackball into the Key Tronic keyboard instead of a mouse.

Light pens

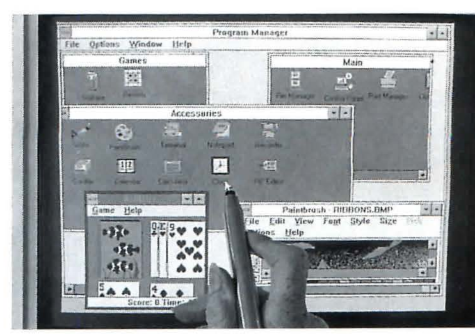
THE LIGHT PEN PRODUCED THE MOST sharply divided opinion of any device in this evaluation, although its average ranking wound up in the middle. Nine of the 72 architects on the panel of evaluators claimed this device had the brightest future, while five said it had the dimmest outlook. The pen senses light from the monitor and determines its position from its location on the scan lines. The position is reported to the light pen software, which turns the position into mouse-compatible coordinates. Pressing the pen against the glass trips a switch that corresponds to clicking the mouse button. Does drawing with the light pen seem more natural than with other devices? Panelists split down the middle: 15 yes; 15 no.

Two light pens were considered, the FT 256, priced at $189, by FTG for DOS-based computers, and a Macintosh light pen, priced at $295 from HEI. Architect Robert Babbin maintained the FTG pen was quicker.

To avoid the most common complaint about light pens—arm fatigue from holding

No transformer is required for the GTCO SketchMaster digitizers (above). They draw *power from the serial* port of the computer.

The PenMouse by Appoint (above) combines the versatility of the mouse with the intuitive feel of a stylus.



Architects liked the FTG light pen (above) because the drawing appears at the tip of the pen, not remotely as with most input devices

the pen up to a vertical screen—we commissioned custom tables from John Sindelar, a Michigan furniture manufacturer. The tables held the monitors at a 15-degree angle off the horizontal and featured a cushioned armrest. Most evaluators felt that the special tables were crucial to the success of the light pen for use in architectural applications. Objections focused on the inability to adjust the 15-degree angle and on the rough "prototype" look of the furniture. Sindelar has not decided whether to manufacture the tables commercially.

Trackballs

THE ONLY SIGNIFICANT DIFFERENCE OF opinion between the two panels occurred over trackballs, which are like upside-down mechanical mice—or "dead mice," in the view of critic Voosen. A trackball remains in one position and the user moves the ball with the thumb or fingers. At least two buttons are common on a trackball—one to set a point or make a menu selection and the other to simulate the effect of pressing and holding down the mouse button. Thus, when the second, "click-lock" button is pressed on a trackball, the menu on a Macintosh remains pulled down and a rectangle, circle, or drag command remains in effect until the button is pressed again. This arrangement can be a little disconcerting at first, especially with trackballs that do not provide a visual cue that the drag function is on. Architects on the panel that met on the first day unanimously dismissed them as stiff, uncomfortable, and difficult to control. For example the MVP Mouse, priced at $149.95 from Curtis, has three buttons with an optional fourth available as a foot pedal. But the second group, which included beginners and architects with no computer experience, found trackballs no more awkward than, say, mice. When asked if trackballs have a place in architecture, 16 respondents said yes and 13 said no.

Manufacturers are experimenting with the shape of the housing unit, size of the ball, and placement of the buttons. Kelly saw the need for different sizes for different hands, but she added she would not pay extra just to get the perfect fit. The favorite trackball was the Logitech Trackman, priced at $139. It has three buttons and a place to rest the hand while manipulating the ball. Close behind were the MVP Mouse and the MicroSpeed PC-Trac and MacTrac trackballs for DOS-based and Macintosh computers, each priced at $119. MicroSpeed sets its ball in the midst of three large buttons at the crest of a narrow, high arching and comfortable holder with good wrist support.

The Silhouette, priced at $99.95 from Emac, was designed for both the hand and the eye. A large ball is placed in the upper-right corner, where it can be controlled by the middle and ring fingers, and three buttons of different size and color are placed on the left where they can be selected by the thumb and index finger. Emac also supplies two balls in designer colors.

Optional devices

ARCHITECTS WHO FOUND A BRIGHT FUTURE in devices that recognize hand lettering were outnumbered 2 to 1 by those who saw little if any future in them. One admirer of the Proficient Autocad Enhancer ($449 from Communication Intelligence Corporation) is William L. Schertzinger, AIA. "I hate to type," he moaned. "Proficient allows the stylus to serve as an all-in-one input device that seems more productive." Devices that accept input by touch seemed more likely to be useful for purposes other than architecture, the panelists concluded.

With the coming need to maneuver through three-dimensional space in electronic models of proposed buildings, joysticks were approached with some anticipation, since they are the common devices for 3D simulators found in arcades. Unfortunately, the metaphors of games and flight had little to offer architects.

Five fax modems were examined but not evaluated. The category is new and the software is still rough. The Executive Fax, with its own disk drive and microprocessor, attaches to a Hewlett-Packard LaserJet printer. It can receive messages even when the computer and printer are off. When the printer is turned back on, faxes are printed on plain paper. The price is $695. Abaton's Interfax stores incoming faxes on a hard disk where they can be read and either printed on plain paper or deleted. The options are easily selected with a couple of mouse clicks. The Interfax, which runs only on a Macintosh, is priced at $595.

Panelists also noted with interest but did not evaluate the Space Ball by Spatial Systems. The Space Ball, which is sold by Intergraph with its new Design Review program, senses pressure by the hand or fingers and shifts the direction and point of view. Autodesk's Cyberspace, a virtual reality project that uses a headset, goggles, and glove to control movement through 3D space, offers a fascinating trip into the future, but it is not scheduled for release until next year.

The enthusiastic response by the evaluators to alternatives for the keyboard bear out a 1989 forecast by the research firm of Frost & Sullivan, which forecast that the market share of nonkeyboard data entry systems should nearly double by 1993. The firm said the fastest growing segment was voice recognition devices. With so many interesting options, it's not surprising that the evaluators most experienced in computers own more than one device for entering commands and data into the computer. ■

—OLIVER R. WITTE

Joysticks such as the FlightStick for CH Products (above) work better for games and flight simulation than for architecture.

The tiny Icontroller (above) is a cross between a mouse and a joystick. It works well in tight spaces, but the handle takes practice.

Felix (above) combines a handle like a joystick, a fixed position like a trackball, and an absolute mode like a digitizer.