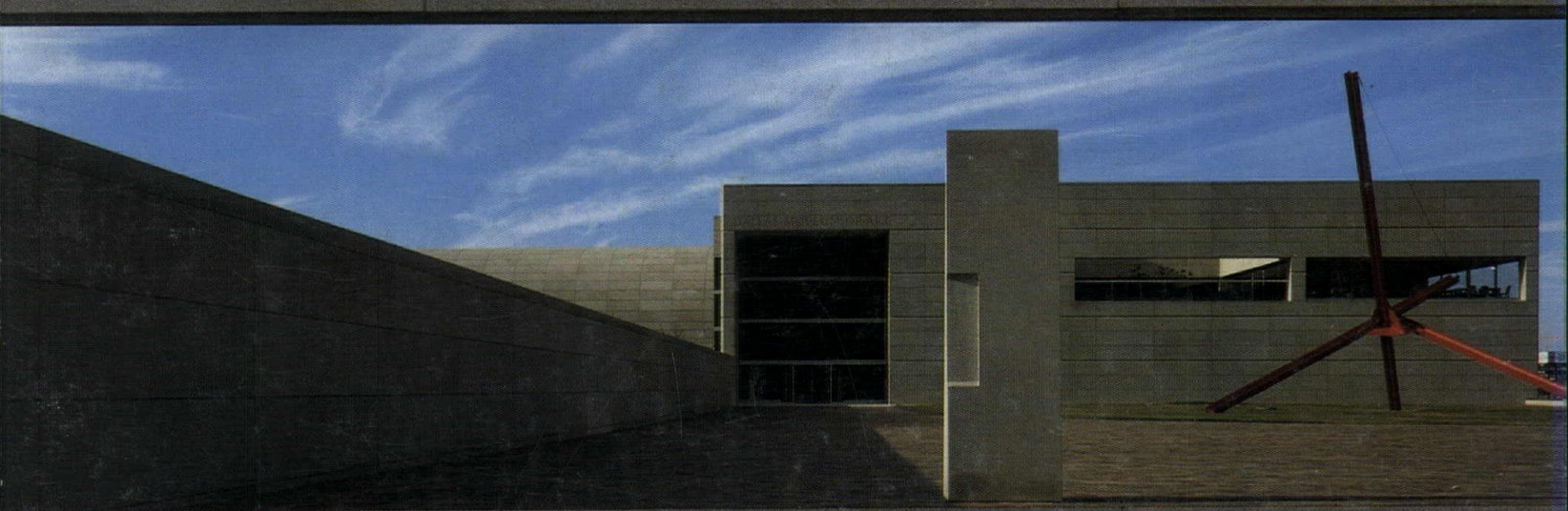
Progressive Architecture

April 1984



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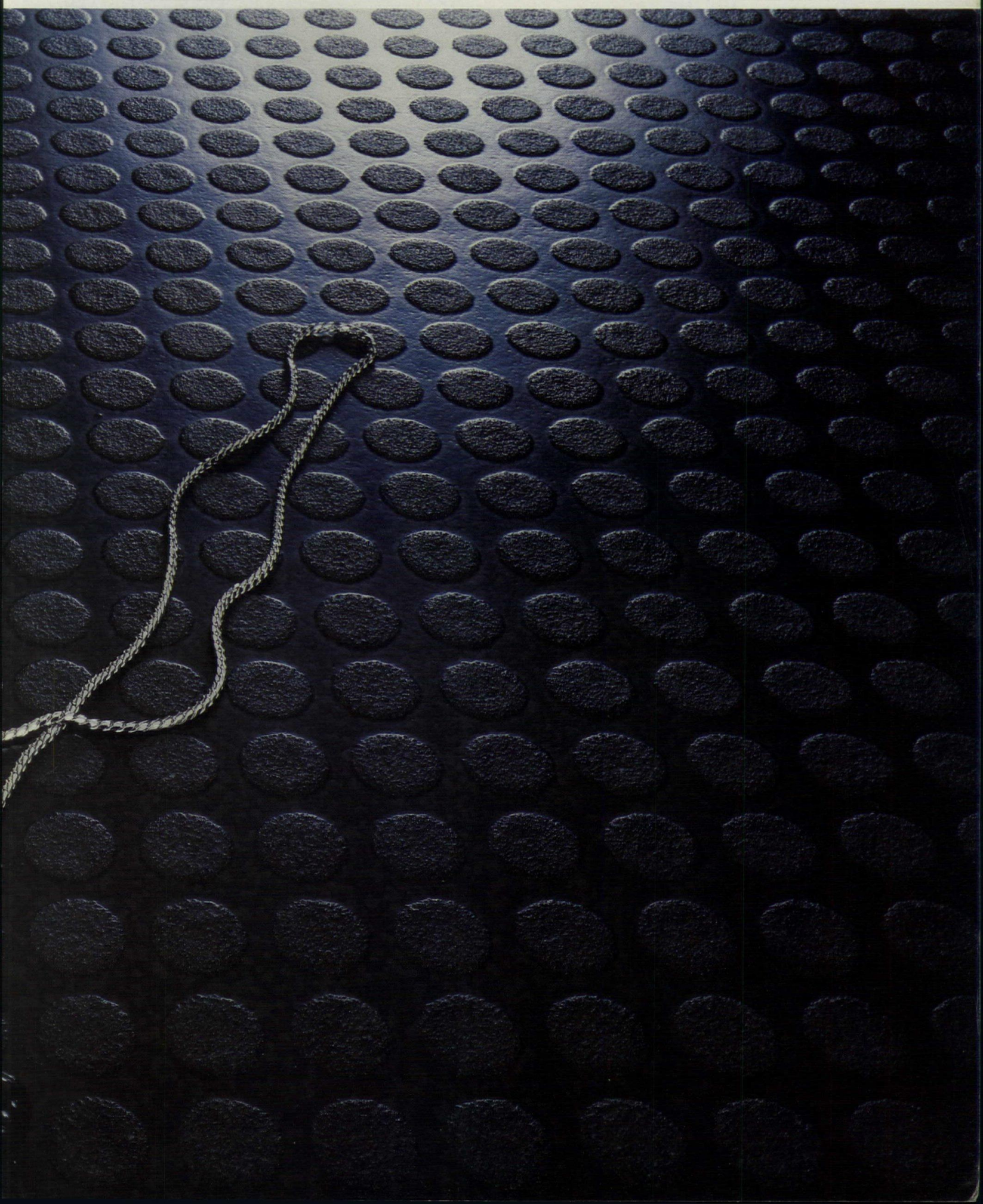

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Energy and design

Architectural design

Cover:
Dallas Museum of Art (p. 127), view from south superimposed on close-up of east wall.
Photos:
Roberto Schezen.
Design:
Ken Windsor.

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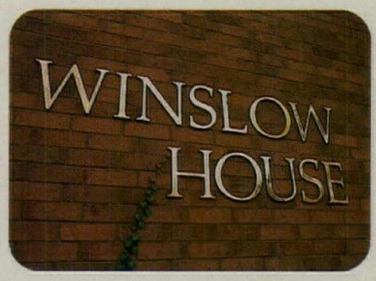
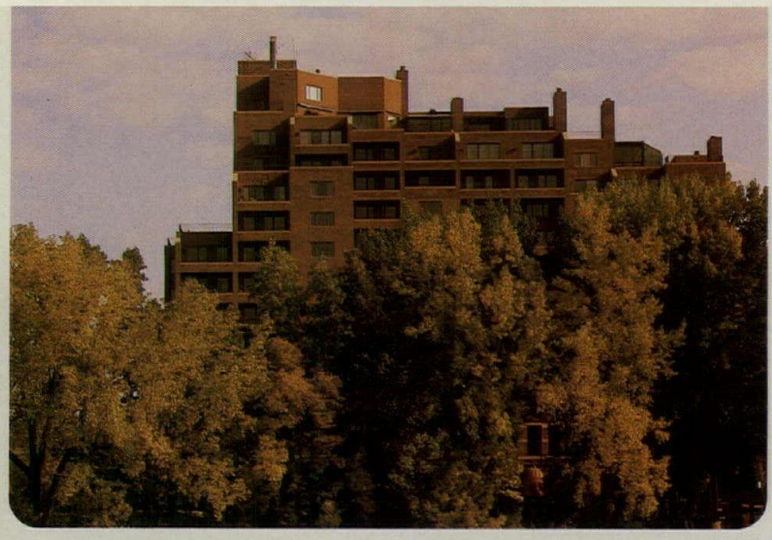
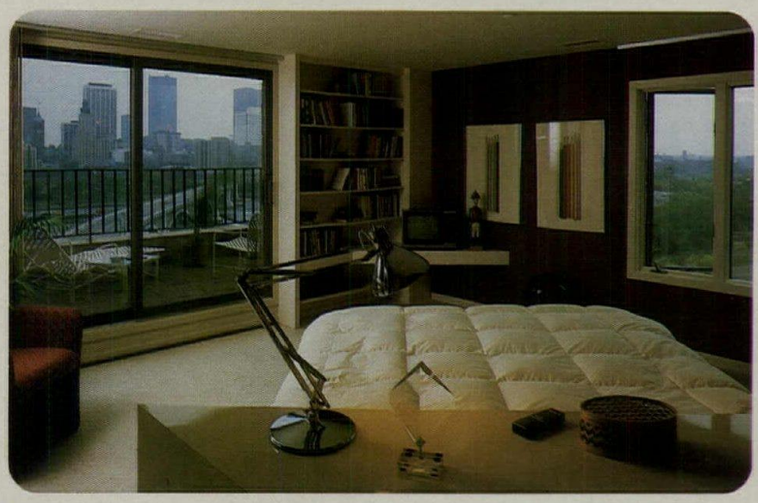
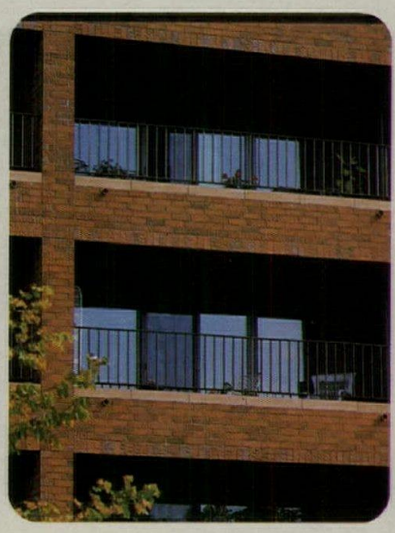
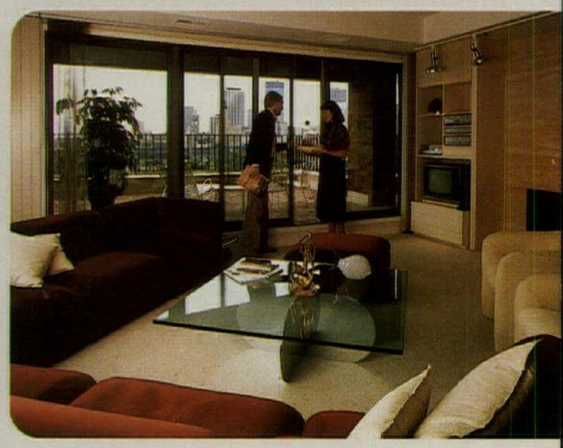

WINSLOW
HOUSE









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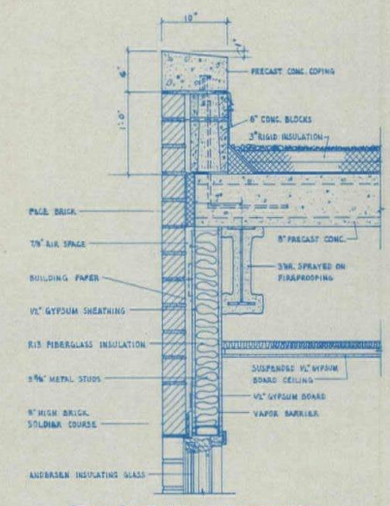
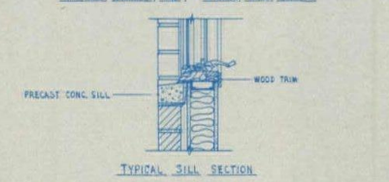
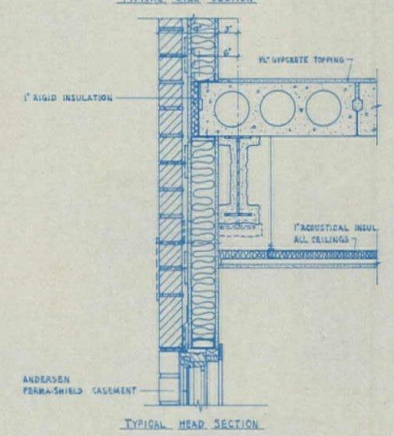
*N.W.M.A. 2-80 and 2-73.



TYPICAL PARAPET, ROOF, & WINDOW HEAD SECTION



TYPICAL SILL SECTION



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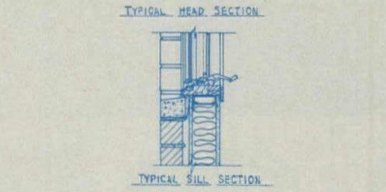

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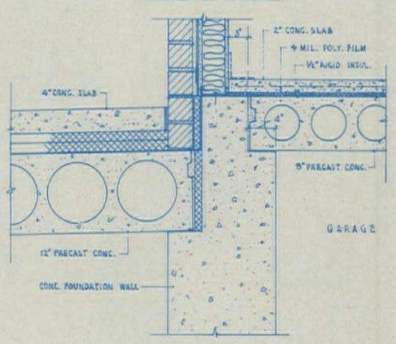

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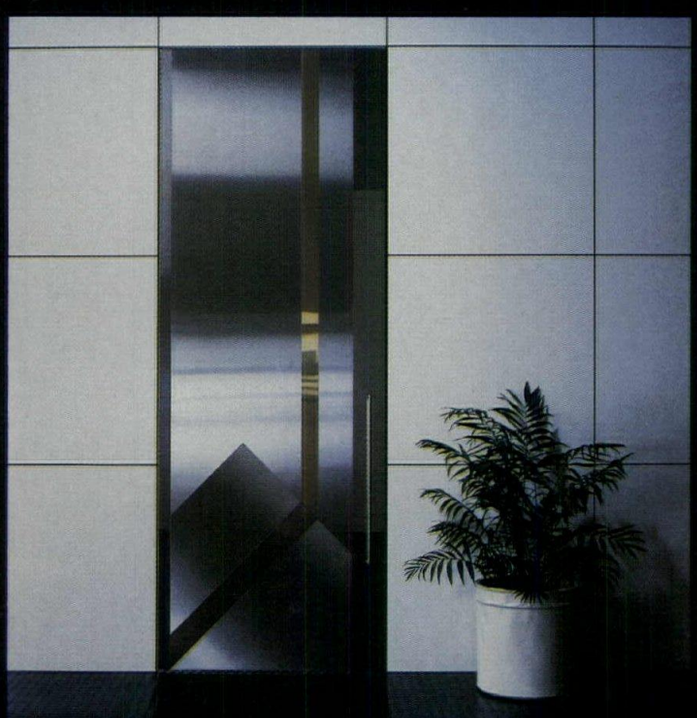
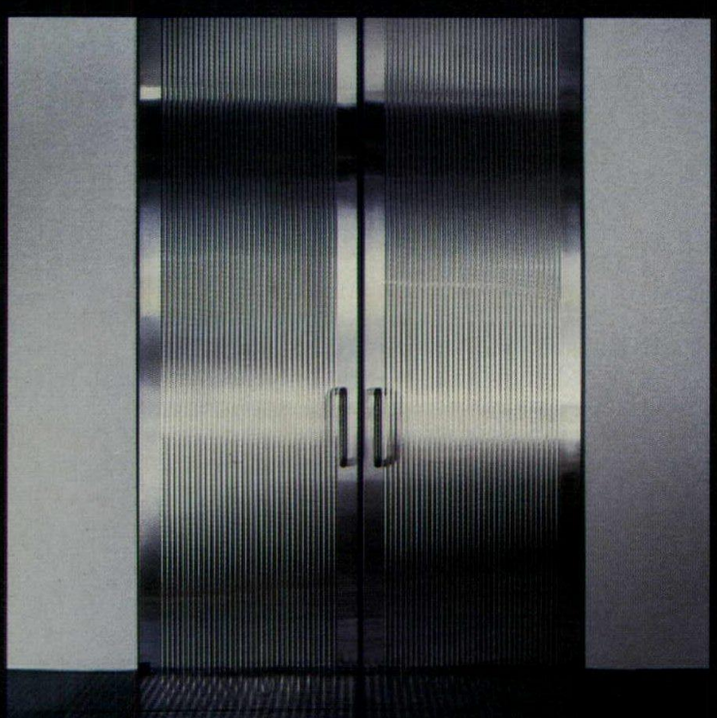
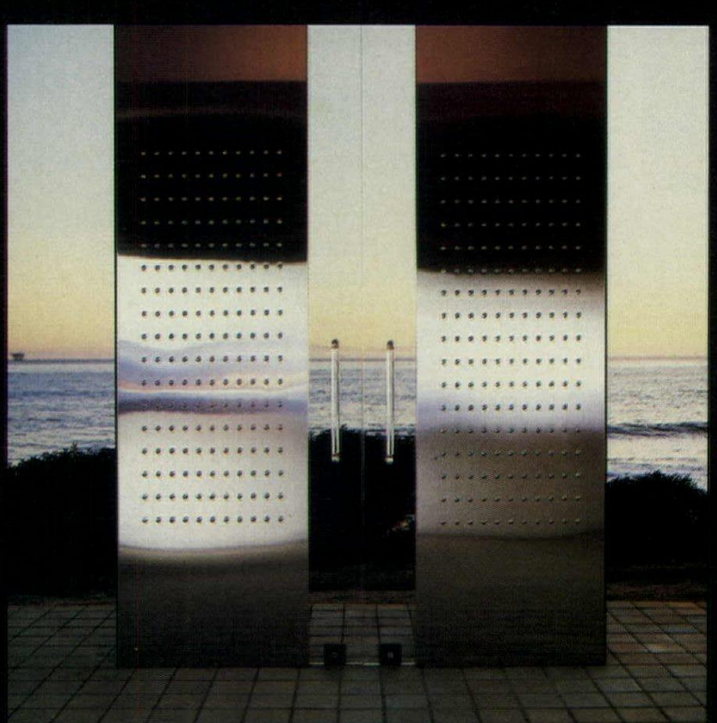






Educated taste

The place of architects in society—and the quality of what they produce—depend on public understanding of their full potential.

In a few weeks, the AIA at its annual convention in Phoenix will address this year's theme, "American Architecture and its Public." I heartily endorse this subject as a focus of AIA's attention. The gulf between architecture and its public is a threatening one.

This rift stems in part from the traditionally episodic nature of architectural practice, which all too rarely brings sustained professional judgment to the process of providing and maintaining facilities. Sometimes a staff architect or knowledgeable facilities manager provides the desired continuity; in other cases, architectural advisers or competition jurors temporarily bridge the communication gap between clients and architects. With no intermediaries, architects are too likely to be chosen for their public relations, their personal rapport with clients, or their willingness to work for low fees.

The prevalence of haphazard, uninformed architect selection, compounded by the insecurities brought on by sporadic workloads, tends to keep professional revenues low. Architects' receipts lag behind even the lackluster growth of the building industry within the national economy (P/A, Dec. 1982, pp. 58–61). One result is a low level of individual income in the profession, considering the education required and the entrepreneurial risks usually involved.

Society as a whole loses out by not fully using the skills of architects—or any design professionals, for that matter. Because superior work is not widely recognized, the prevailing standard is set by the minimum-fee, minimum-creativity firms—some playing little more than token roles in predetermined processes.

How can the public—beyond a few stalwart patrons—learn the benefits attainable if architects are chosen discriminately, given adequate scope to perform, and fairly compensated? Example alone cannot do it: Look what gets built among the landmarks of New York or London—or just beyond the central sanctuary of Paris. Much education is required, and some kind of closer involvement with the culture as a whole.

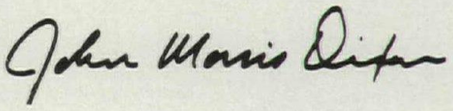
Public awareness should start in school. There have been some brave efforts, with and without AIA involvement, at giving architecture a place, along with art and music, in elementary and secondary education. Now that there is a mood for cutting "frills" in even the most affluent school districts, the slow progress on this front may stop.

University and adult education may raise awareness of architectural quality, but their typically historical approach tends to set architecture—like painting and poetry—apart from real life. Exhibitions, tours, lectures, and seminars are very effective, for those whose interest has already been engaged. More directly productive might be intensive orientation courses for clients-to-be, as proposed by James Nagle, recent past chairman of AIA's Design Committee. Special programs in graduate schools of, say, business and law have also been discussed at AIA.

The public media have enormous potential for interpreting architecture and making it real for the public. Newspapers, however, typically give more attention to the most incidental book or movie than to substantial works of architecture. At latest count, only 16 major U.S. dailies had full-time architecture critics; AIA is making a concerted effort to assure at least one such writer in each major metropolitan area. Architectural coverage by art critics is a mixed blessing at best; many of them give it very low priority and misjudge it by art-for-art's-sake criteria.

On television, architecture is rarely more than a backdrop for highbrow fiction. When it is seriously discussed, it is usually taken up in programs developed by historians of art or culture, for whom architecture is a vaguely understood branch of art. An effective series on architecture has yet to be shown.

For making productive contact with the public, the AIA is obviously the appropriate vehicle. AIA President George Notter is leading the effort to establish a "public members" program, drawing interested nonprofessionals into architectural causes much as organizations in various cities have done. If handled well, this could be a great device for putting a broader public in touch with architecture.



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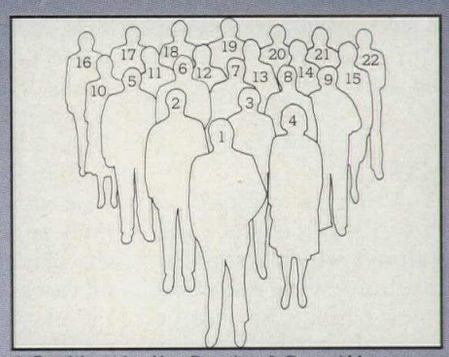

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Views

Johnson takes us full circle

Somewhere up there, William Van Alen, Shreve, Lamb, Harmon, Raymond Hood and a few other departed architects all are looking down on Johnson/Burgee and the present day "style wars." They smile knowingly to one another as they survey the scene. It has taken fifty years to get back to where we were fifty years ago.

As Hood put it so well in 1932 at a Museum of Modern Art Symposium on the International Style: "I am sorry that there grows around modern architecture these rules such as Palladio and Vignola made for the Renaissance. I wish we could all work with our own sense of discipline and be free as the devil. For the moment we put a cast-iron frame on this International Style that we're all working at, this fine, marvelous movement will turn into a tight, hard, unimaginative formula, just as did colonial architecture. We should keep away from 'style' and for once we will make of this style a freedom of the spirit."

Jeremy Scott Wood, AIA
Weston, Mass.

Redeeming EPCOT

While Thomas Vonier's critique of EPCOT (Feb. P/A, p. 42) is correct, still, there are a few things which a sophisticated tourist can admire. One is the 360° film of old and new China; this masterpiece of filming is itself worth the rather high admission cost to EPCOT. The other is the large greenhouse in The Land exhibition where Kraft Co. together with the Environmental Research Lab of the U. of Arizona have created a working example of new agricultural technologies. Multi-use greenhouses (like The Land) located on roofs of future residential hi-rises would furnish, on a year-round basis, produce to the residents. This exhibit is a unique inspiration for future-oriented architects and urbanists.

Jan Reiner, Architect
St. Petersburg, Fla.

P/A Awards examined

Much as I hate to ally myself with the grouches in the annual "What's with the awards?" compilation, I do have a complaint about the January issue.

As a design instructor, I sometimes must critique twenty or more different student designs in a day's time. The *least* I demand of my students is that the descriptive drawings, that is plans, sections, elevations, *communicate* well. In this regard many of the projects in the architectural design category set a very bad example. Whatever their merits, the Knee Residence, Healy House, Hermosa Center, Taylor Residence and Portland Center for the Performing Arts were poorly presented as architecture. Sometimes a reference was made in the text to a space of which we could only guess the location.

Your limited space dictates that only a few drawings can be shown of each project and these must be reduced to a tiny size—all the more reason to ask for room titles and poché from designers.

David R. Weaver
Assistant Professor
Department of Architecture
California State Polytechnic University
Pomona, Calif.

[Where things were not clear enough, the blame must rest with P/A. In almost all cases, entries included full documentation.—Editors]

I only partly agree with Mr. Kirkland's closing comment regarding the town of Seaside Master Plan (Jan. P/A, pp. 158–159), which received a citation in your latest awards issue. The vehicular network is indeed a very unconvincing proposition, but I would hardly call it a "detail."

A quick count reveals eleven horrendous intersections from a traffic safety point of view. There are three-way intersections, five-way intersections, traffic circles, and intersections with all kinds of oblique and acute angles. These might be marginally acceptable in very low-speed traffic, or once in a while as leftovers from a bygone era—but for a brand new community?

Although the plan shows pleasant sensitivity to the picturesque, I hardly think that common elementary knowledge of the requirements of a good, safe vehicular network should be abandoned in such a "grand manner." As the article states, the vehicular network should be the backbone of the Master Plan. If the backbone is "unconvincing," "overworked," and "ineffectual," how can anyone rightly say that the plan is "handled masterfully"?

P.S. The Music Center at Pacific Lutheran University was very exciting! It was a great selection for an award.

Mark Ranyak, Architect
New Bremen, Ohio

Credit extended

Innocenti & Webel were landscape consultants to Vollmer Associates, landscape architects, for the design of Rector Park in Battery Park City (P/A, Jan. 1984, p. 137).

Data correction

Figures for the Boscom facility on Commonwealth Pier 5 in Boston, Mass., designed by Jung/Brannen Associates, Dyer/Brown Associates (P/A, Jan. 1984, p. 40) should read $100 million and 1.3 million square feet.

Exhibition location correction

"The House That Art Built" (News report, Feb. P/A, p. 27) was organized, designed, and curated by Dextra Frankel, gallery director at California State University, Fullerton.

Credit correction

R. Scott Johnson was the associate in charge of RepublicBank Center (Feb. P/A, pp. 86–93).

Photo credits

Photographs of the Old Post Office, Washington (Feb. P/A, p. 41) were by Maxwell MacKenzie, Washington, D.C.

Credits for the photos illustrating the essay about Philip Johnson (Feb. P/A, pp. 98–100) are: The Glass House, Boston Public Library, and IDS Center, Richard Payne; Seagram Building, Amon Carter Museum, New York State Theater, and Munson-Williams-Proctor Institute, ESTO Photographics; Pre-Columbian Art Museum, Sheldon Memorial, and New Canaan Pavilion, Ezra Stoller Associates.

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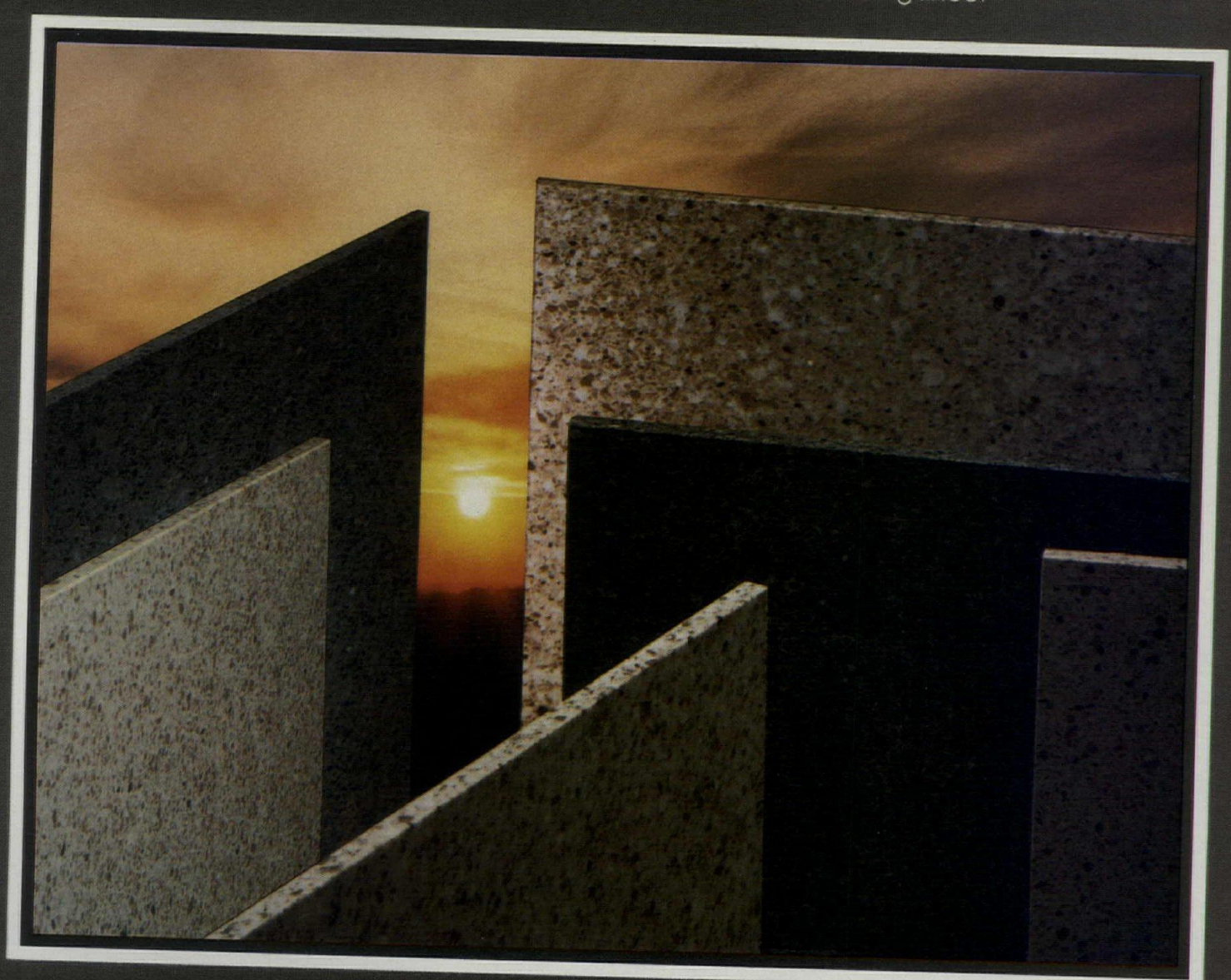

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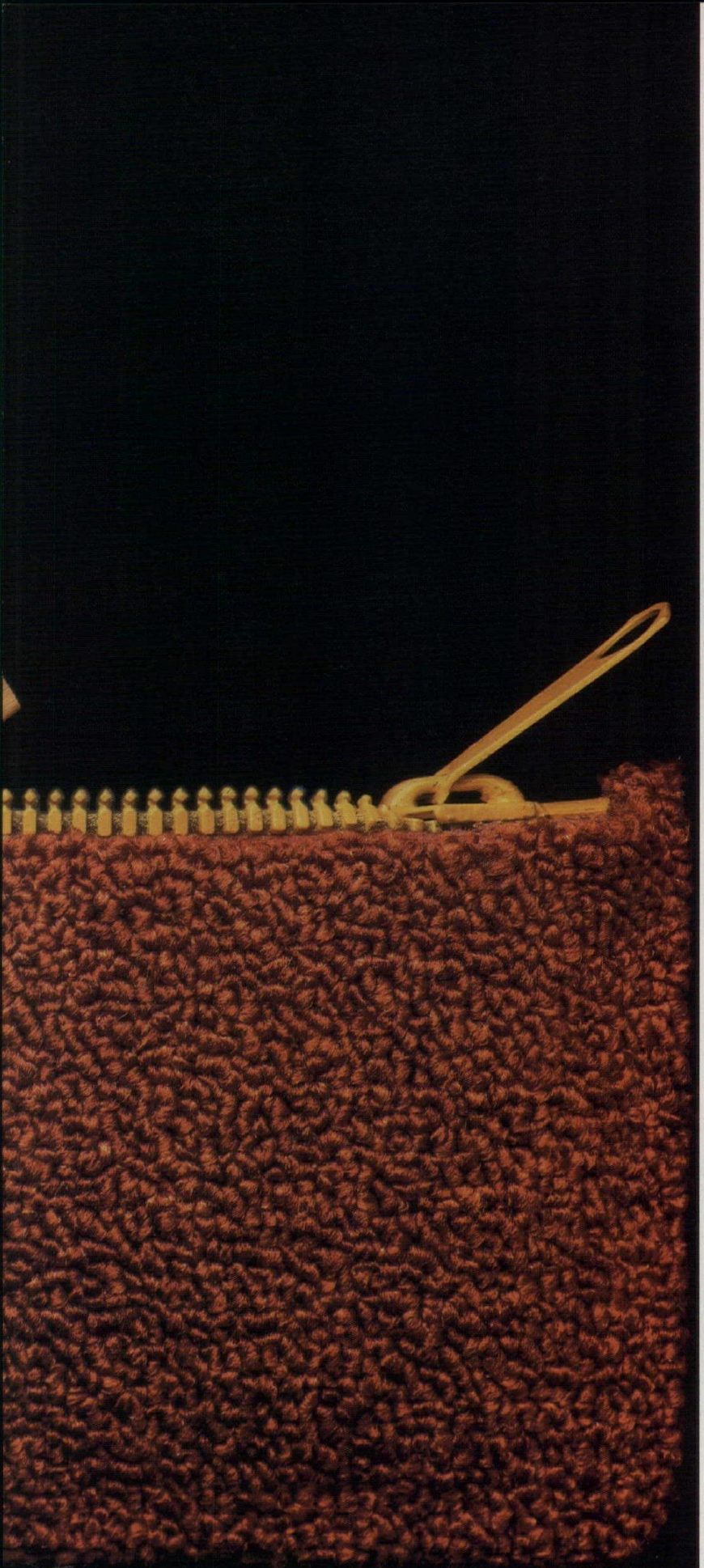

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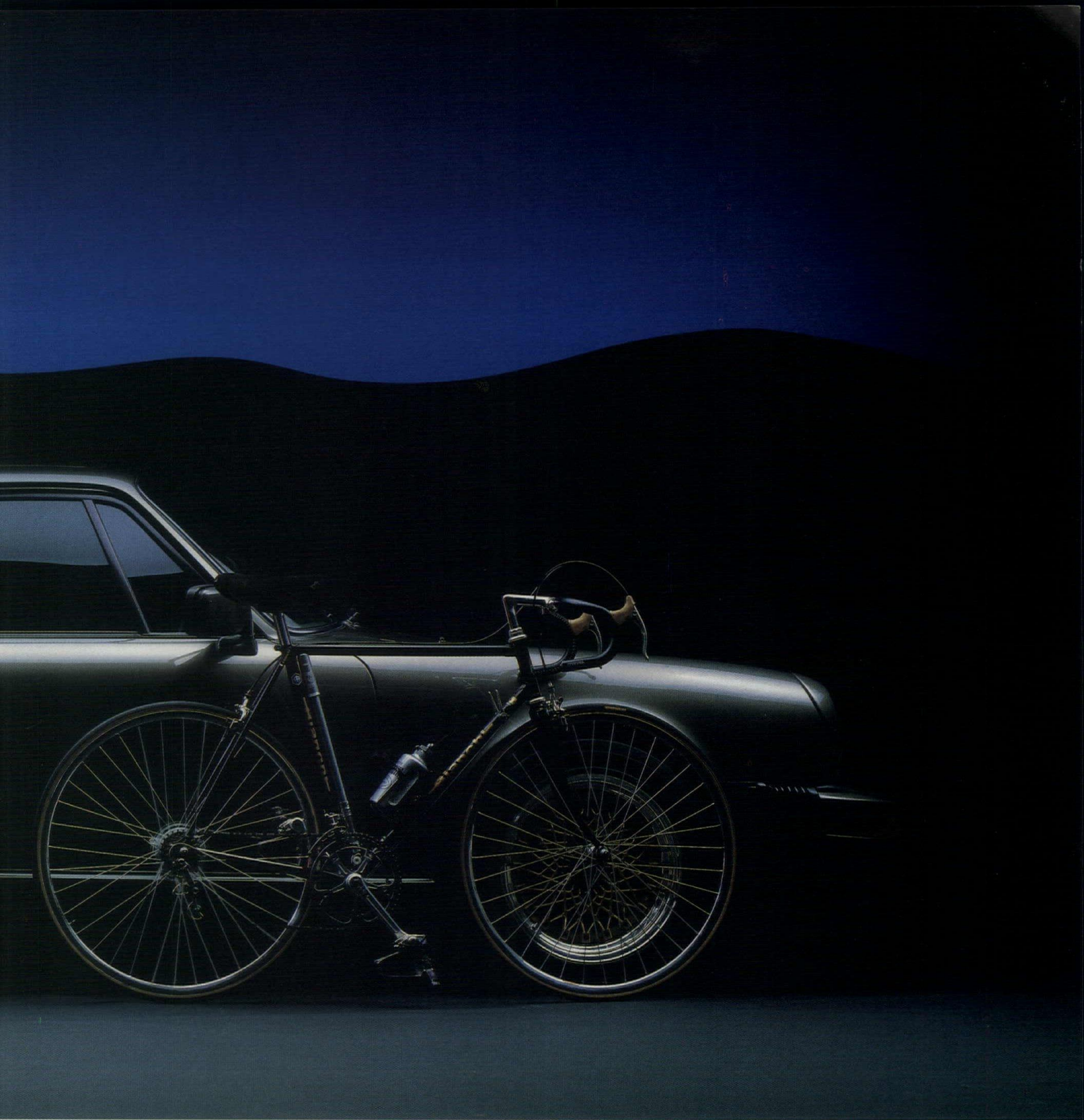

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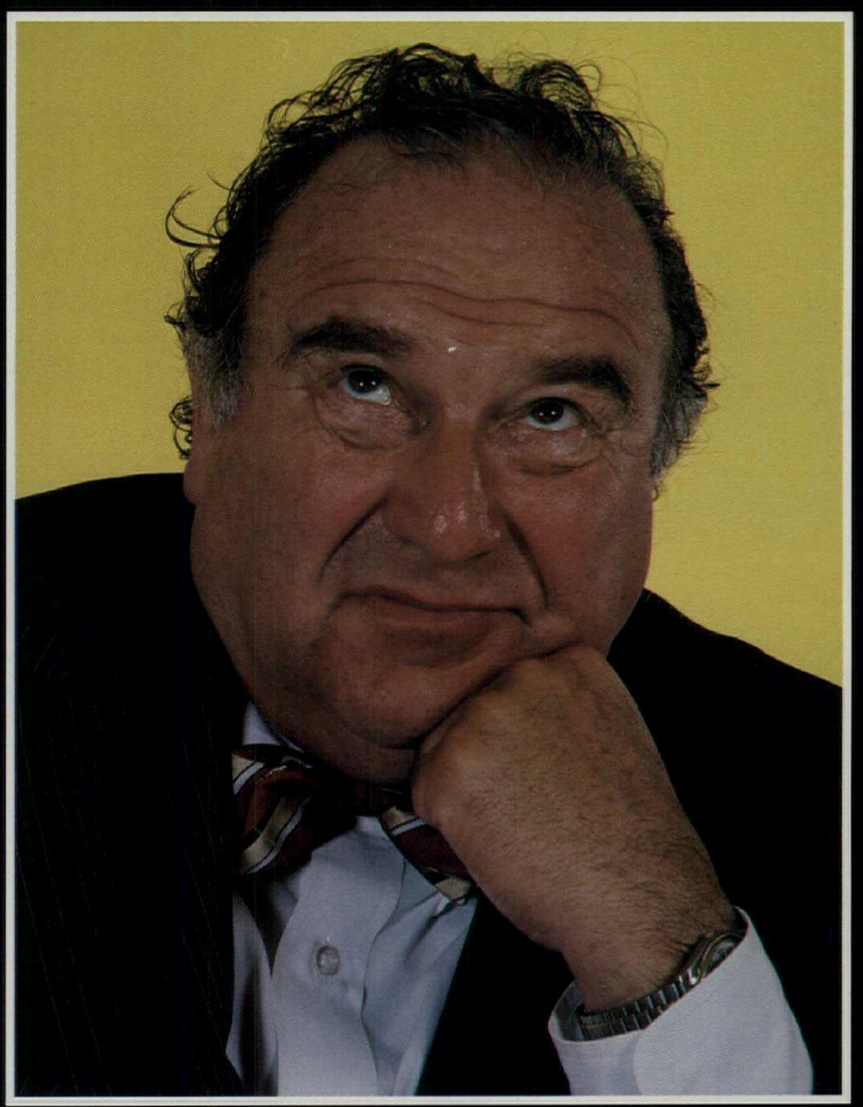

Actually, Charlie roasts every sunny afternoon. In fact, during July and August he's well done at about 5:00 P.M.

You see, Charlie's desk is next to a south facing window-wall in a nifty, new office building in Virginia. The architect's idea of collecting passive solar energy was great last winter. But this summer Charlie needs help and neither the building's air conditioning nor solar tint glazing are quite up to the task. Sure he could close the blinds. But Mildred over in accounting would complain that she couldn't see the Blue Ridge Mountains just over his left shoulder. And Agnes in sales service would say she can't work in the dark.

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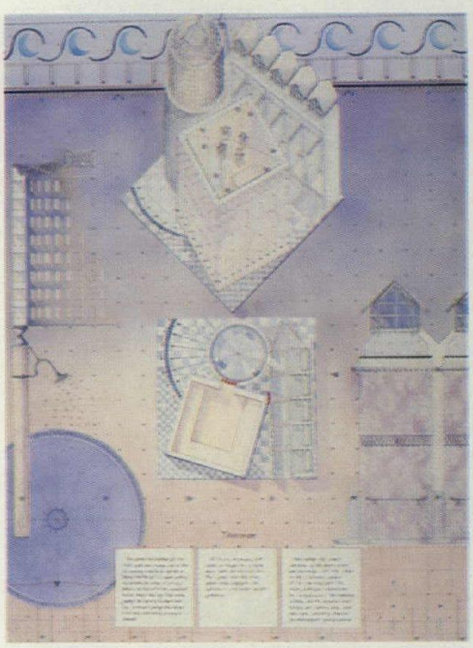
P/A News report

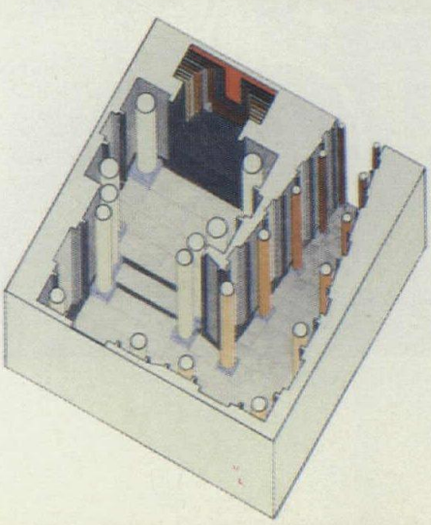
Coverage of the Cranbrook "revival" continues in this issue with new reproductions by ICF and Arkitektura, and a special show at Shaw-Walker. Also featured are a marble show in Milan, new plans for Dulles Terminal, and changes in French architecture policy.

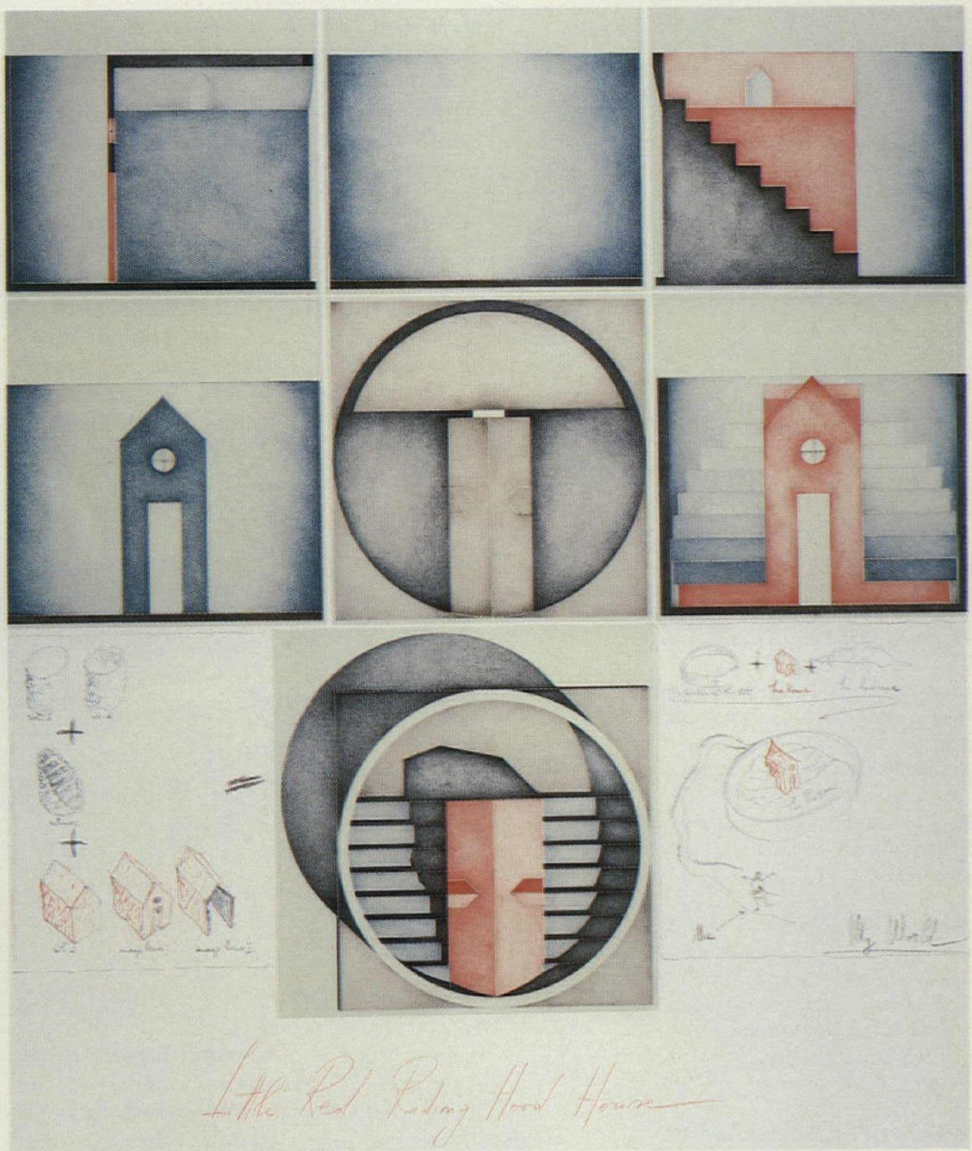
'Places'—a competition by Columbus Coated Fabrics

In the inaugural year of its "Places" design competition, Columbus Coated Fabrics, a division of Borden, chose a unique problem-making/judging format: Respected jurors were also the authors of the problem. Convening last May in New York, a panel comprising Peter Chermayeff, Charles Gwathmey, Robert A.M. Stern, and Stanley Tigerman arrived at a problem statement incorporating the few constraints recommended by the sponsor.

Emphasis, of course, was to be placed on the wall and/or surfaces within a space where wallcoverings would play a key role. Since the intent was to build the winners in three dimensions in a studio, limitations of dimensions were set at 20′ x 20′ x 15′ high.







Professional First Prize winner Livio Dimitriu (above) and Honorable Mention Bradford Angelini (top left). Student First Prize, Shawn Michael Johnson (bottom).

Within these parameters, entrants were asked to design Places—of anticipation, of transition, and of gathering—incorporating a change of level somewhere within the volume. No predetermined use or configuration was imposed in the program. Entries were invited from professionals and students, with first-place honors carrying a $1000 award in each category.

Professional entries from 17 states and student submittals representing 25 schools were received. As is reflected in the student work honored, Oklahoma State was the best represented, with 30 participants.

Three levels of honors were selected in both student and professional categories, ranging from special recognition to honorable mention to first

Pencil points

We're still wondering *who will get the Getty. Short list for the $100 million-plus fine arts center in L.A. reads: Batey & Mack, Henry Cobb, Jr., of I.M. Pei & Partners (the reputed favorite), Romaldo Giurgola, Fumihiko Maki, Richard Meier, James Stirling, and Robert Venturi.*

- *Of these, three names will be passed on to the J. Paul Getty Trust by a screening committee that includes Ada Louise Huxtable and Reyner Banham.*

As for who got the Gold: *Canadian architect Arthur Erickson has been named Gold Medalist by the French Academie d'Architecture. (Last year's award went to German architect Gottfried Boehm.)*

- *We're still waiting for an announcement of the AIA Gold Medalist (if any), but the Boston firm Kallmann, McKinnell & Wood has been named 1984 recipient of the AIA Architectural Firm Award.*

Meanwhile, former Gold Medalist *I.M. Pei is taking some heat for his proposed addition to the Louvre Museum in Paris (P/A, Sept. 1983, p. 27).*

- *The controversy concerns a glazed entrance pyramid, 65 feet high and 105 feet wide, that Pei would place at the center of the Louvre courtyard.*
- *Pei's plan, most of which is underground, has been personally approved by President Mitterrand, who says his decision is final.*
- *More on the subject after the full scheme is made public in a press conference.*

Michael Pittas, *director, Design Arts Division of the National Endowment for the Arts, will leave the Endowment to take a position as Dean of Otis Art Institute, L.A. affiliate of the Parsons School of Design, New York.*

Architect Frank Gehry, *artist Bruce Nauman, and fashion designer Bob Mackie have been designated fellows of Otis/Parsons.*

Copley Square, Boston, *is once again the subject of a national design competition. Five finalists—Clark & Rapuano, New York; Cooper Eckstut, New York; Samuel R. Coplan & Harry L. Dodson, Cambridge, Mass.; The SWA Group, Boston; and Kristan Osterby-Benson, Peter Schaudt, Michael Van Valkenburgh, and John Whiteman of Harvard University's GSD—were selected from a field of 309 contestants to compete in phase two. The winner will be announced in May.*

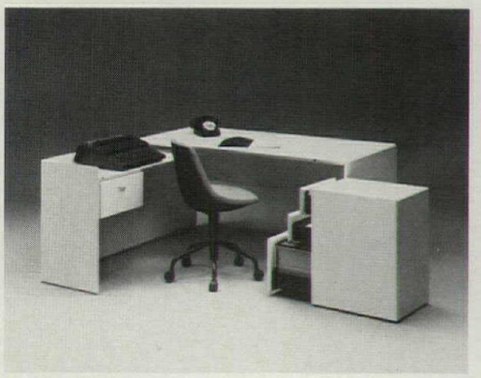
[Pencil points continued on page 34]

prize. Winners of the latter awards will see their designs built and photographed in a studio.

Special recognitions in the student category were awarded to Oklahoma State University entrants Saleh Al-Natsheh and Christakis Nicou Tofas, whose supervising professors were Robert Wright and Timothy John Lovett, respectively. Similar honors in the professional category went to: Don Killaby of Hafner Associates, Rochester, N.Y.; Robert M. Groth of Lloyd Jones Brewer, Houston, Texas; and Jenny W. Peng of Levin & Associates, New York, N.Y.

Honorable mentions in the student division recognized Kenneth J. Christian of the University of Wisconsin/Milwaukee, under supervising professor Bill Williams, and David Shing Kai Liauw, Oklahoma State, Professor Lovett. In the professional category, honorable mentions were conferred on Bradford L. Angelini, Holabird & Root Architects, Chicago, and Brad Anthony Erdy, Jack Trane Associates, Chicago.

First prize winners were student Shawn Michael Johnson of Oklahoma State (Professor Lovett), and professional Livio Dimitriu of the U.S.A. Group, New York, N.Y. [JM]



Fantoni's 45 Series.

Fantoni USA

One of Italy's oldest and largest furniture manufacturers has opened a contract furnishing showroom in New York. The company, whose factory near Udine was completely destroyed by an earthquake in 1976, has now grown to a total of 2.4 million square feet (P/A, Sept. 1980, pp. 170–173). Soon, the entire plant will operate on an energy-free basis by producing its own hydroelectric power and through converting dust and chip waste to energy. In the U.S., Fantoni will offer such lines as its DR Series (P/A, March 1984, p. 110), and its 45 Series (illustrated), which is included in MoMA's permanent design collection. [DM]

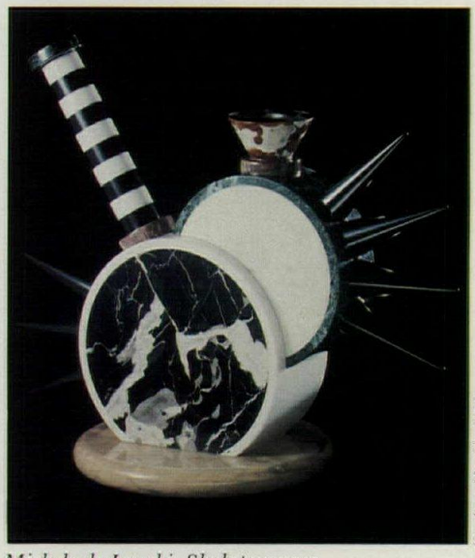
Marble gets a one man show

Generally poor in natural resources, Italy is exceptionally rich in marble. Hundreds of varieties of this material have been extracted from quarries since Roman times to give life to the Colosseum, to Michelangelo's Pieta, to Bernini's Columns, to Canova's Paolina, and to countless anonymous works. Always a good boost to national income, marble has been exported for centuries, mainly in finished form as Italian craftsmen are especially adept in cutting and working the stone.

Strangely enough, this great source of Italian pride has not enjoyed academic attention, and the history of the material has never been thoroughly researched. Until a few months ago, marble had never been considered an appropriate

Aldo Ballo

Marble installation, Arengario Palace.



Produced by Up & Up

Michele de Lucchi, Sholapur vase.

subject for a "one man show." Finally, however, Milan hosted "Marble: Technique and Culture," sponsored by Promorama with the patronage of Milan and the Lombard region.

In their panoramic introduction to the material, curators Giuliana Gramigna, Sergio Mazza, and Pier Carlo Santini exhibited over 200 varieties of marble and granite, samples from Italian as well as American and Asian quarries. The show's itinerary covered three major categories of marble works: sculpture, design, and architecture. The sculpture section demonstrated the medium of marble as used creatively throughout the centuries, concentrating on works from the early 20th Century by such artists as Gigi Guadagnucci and Pietro Cascella. The design section showed 20th-Century applications in furniture ranging from the functional tables of Angelo Mangiarotti and simple accessories of Enzo Mari to the imaginative *objets* of Michele De Lucchi and Carlo Forcolini. Works by Ettore Sottsass, Mario Bellini, Marcel Breuer, and Angelo Mangiarotti—many of recent vintage—were also featured.

Replicas of architectural details exemplified the different uses of marble as a structural or decorative item. Exact details such as the internal stair from Giuseppe Terragni's 1936 Casa del Fascio, Como, the balcony from Ignazio Gardella's 1957 Casa alle Zattere, Venice, a curtain wall section from Mario Zanuso's 1965 Casa di via Laveno, Milan, and a decorative wall detail from Carlo Scarpa's 1981 Nella Banca Popolare, Verona, were recreated for the exhibition. These reconstructed details were unfortunately not numerous, but nevertheless a good collection for the first marble show.

A pictorial history of marble in modern architecture accompanied the catalog essay by Pier Carlo Santini. Among the marble monuments cited were Mies van der Rohe's Barcelona Pavilion, 1929; W.M. Dudok's Town Hall in Hilversum, 1931; Louis Kahn's Salk Institute, 1965; and Mario Botta's Fribourg State Bank, 1982.

An interesting footnote to the exhibition: Giovanni Muzio's 1930s Arengario Palace, where the exhibition took place, is clad in Pink Baveno and Pink Candoglia marble. The Pink Candoglia quarry (this marble was used for Duomo, Milan's Late Gothic cathedral) is now defunct, and the Arengario Palace itself may soon be torn down as a "useless" Fascist monument, sad proof that even marble does not last forever. [Donatella Smetana]

Donatella Smetana *writes for P/A from Milan.*

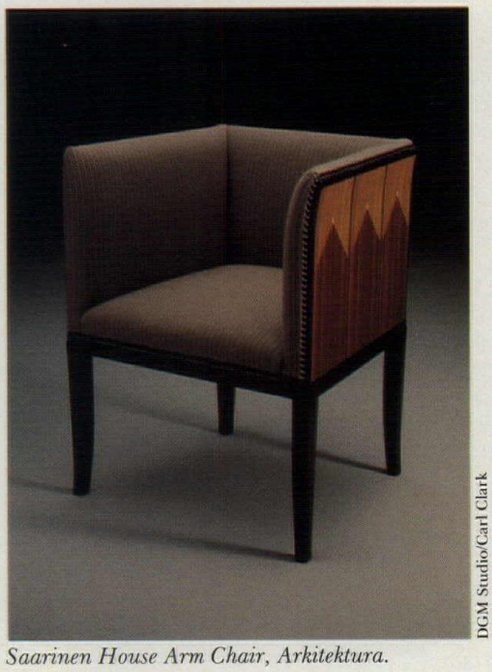
The Cranbrook connection, continued

At the time of this writing, a number of related events are scheduled to coincide with the showing of "Design in America: The Cranbrook Experience, 1925–1950," at the Metropolitan Museum of Art through June 17. The show, reviewed when it originally opened in Detroit (P/A, Jan. 1984, p. 49) covers a good number of contemporary American classics from the second quarter century, a period now very much in vogue.

The biggest of the related shows, "At Home with the Saarinens," opens April 24 in the Shaw-Walker showroom (Chrysler Building annex) before traveling to Chicago, D.C., and L.A. Eight new reproductions of furniture designed (1929–30) by Eliel Saarinen at Cranbrook will be "premiered"; the collection, produced by Arkitektura whose president Kenneth F. Smith, Jr., is a former Cranbrook student, includes the well-known dining room table and chairs, sideboard, coffee table, lounge, and armchairs from the Saarinen residence in Bloomfield Hills. Cranbrook aficionados say the workmanship of the Arkitektura reproductions surpasses that of the originals, a fact reflected in steep prices (for catalog, send $4 to Arkitektura, 71 E. Long Lake Road, Box 113, Bloomfield Hills, Mich. 48303).

John Boucher

Eliel Saarinen coffee set (1900–10).



DGM Studio/Carl Clark

Saarinen House Arm Chair, Arkitektura.

Brian Hagiwara

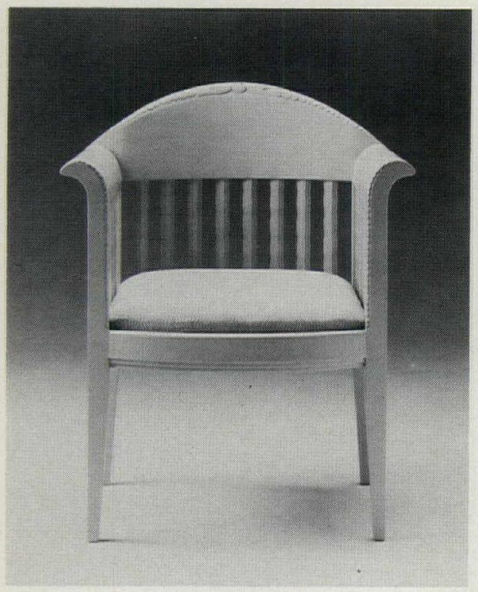
Installation of Saarinen and Eames furniture at Fifty-50.

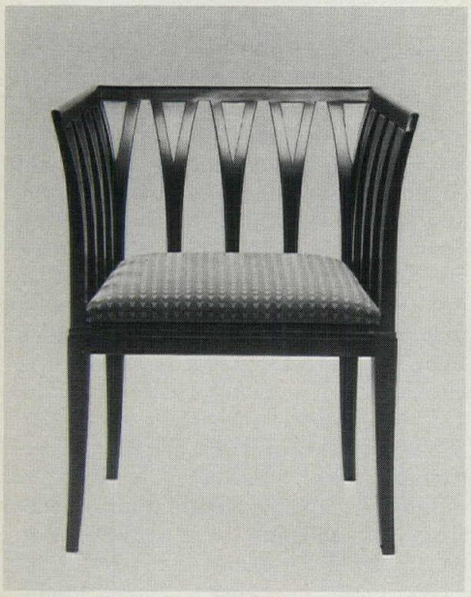
Shaw-Walker will also show prototype furniture and accessories designed by members of the Saarinen family, on loan from the collection of Ronald Swanson, Saarinen's great-grandson.

While the checklist is as yet unconfirmed, the Max Protetch Gallery plans to show original drawings and watercolors by Eliel Saarinen (some of which will be for sale), together with dress designs by Pipsan Saarinen Swanson and silver flatware by Eliel Saarinen.

The Cranbrook show should also raise attendance (and sales) at several galleries that specialize in furniture of the period. While Fifty/50 has planned no specific program, the gallery regularly features the furniture of Charles and Ray Eames, Harry Bertoia, and several other Cranbrook graduates whose works are in the Met exhibition.

Also, the Finnish Embassy in New York is reportedly planning several invitation-only events, and may show the Arkitektura reproductions. If all events come off as planned, the New York Cranbrook fest could rival the year-long celebration just completed in Bloomfield Hills, where present Cranbrook faculty and students celebrated the 25th birthday of Saarinen's school. [DDB]





Saarinen Re-Creations by ICF: top, White Chair, Hvitträsk, 1910; bottom: Blue Chair, Cranbrook, 1929.

Cranbrook and Hvitträsk

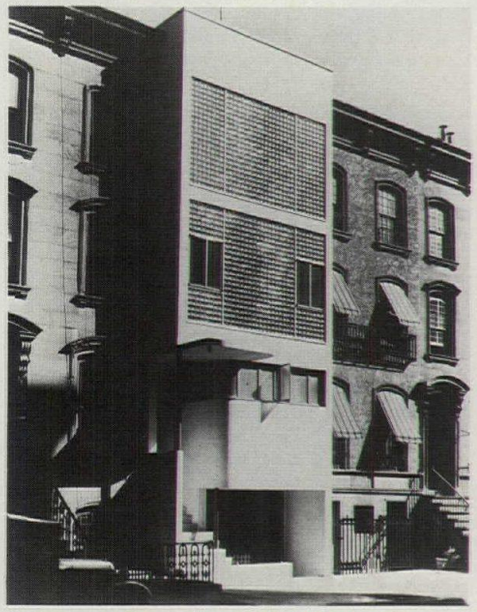
Saarinen is also the latest architect-designer to be featured by ICF. This month, the company will introduce new reproductions of two armchairs. The Blue Chair, designed in 1929 for Loja Saarinen's atelier at Cranbrook, is of lacquered blue beech with gold-leaf insets. The White Chair, designed around 1910 for the indoor garden room of Saarinen's home and studio, Hvitträsk, outside Helsinki, is hand carved of solid beech and lacquered warm white. The chairs represent the first of a series of planned reproductions resulting from a four-way project among ICF, the descendants of Saarinen, Cranbrook, and the Hvitträsk (house) Museum. Each year, new releases from both Cranbrook and Hvitträsk will be issued, continuing ICF's Re-Creation Program, which began in 1975 with the Josef Hoffmann collection. The next Saarinen installment is planned for this fall. [DM]

Lescaze at Syracuse

Given the trend towards critical reevaluation of Modern architecture, it is not surprising to see scholars and critics returning to the work of William Lescaze, an architect who helped introduce Modernism to the United States. A retrospective exhibition of Lescaze's work, sponsored by Syracuse University's School of Architecture, was recently shown at the Everson Museum in Syracuse, N.Y.

The exhibition, which was accompanied by a two-day symposium subtitled "The Rise of Modern Design in America," included some 200 drawings and documents from the Lescaze archives at Syracuse, together with architectural models, and furniture from the Philadelphia Savings Fund Society Building. Close to a third of the show was dedicated to PSFS, confirming its preeminent place in Lescaze's career. Curator Robert Dean of Syracuse was assisted by Dennis Doordan and Lindsay Shapiro; Christopher Gray acted as design consultant with the assistance of Brooks Rorke. Their installation design provided an effectively reinterpreted modern setting for the work.

The symposium was moderated by Professor Doordan, with lectures by industrial designer Arthur Pulos and historian William Jordy. Professors Dean, Doordan, and Shapiro, and Carol Willis, curator of the recent Raymond Hood exhibition at the Whitney Museum (P/A, March 1984, p. 21), presented papers to which architect/educators Stuart Cohen, Robert A.M. Stern, and Werner Seligmann responded.



Lescaze townhouse, New York, 1934.

Presentations by Professors Dean and Jordy ranked among the highlights of the symposium. Dean's paper explored Lescaze's transformation of European avant-garde ideals to suit the consumption-oriented culture of the United States, while Jordy's lecture closed the proceedings with a detailed analysis of several Lescaze works, and with further amplification of the decline of Lescaze's popularity after World War II, prompted by changing attitudes toward Modernism.

The three respondents were somewhat more reserved in their judgment of Lescaze's importance to American architecture. With surprising unanimity, they agreed that Lescaze's Modernism was not explicitly polemical but primarily stylistic in orientation. Stern pressed this point by contrasting Lescaze to other more polemically minded European-born architects such as Joseph Urban, while Seligmann cautioned against distorting Lescaze's contribution through superficial correlations to other currents of European Modernism.

The exhibition, which is scheduled to travel in the United States and possibly in Europe, will open at the National Academy of Design in New York on May 31. [Kenneth A. Schwartz]

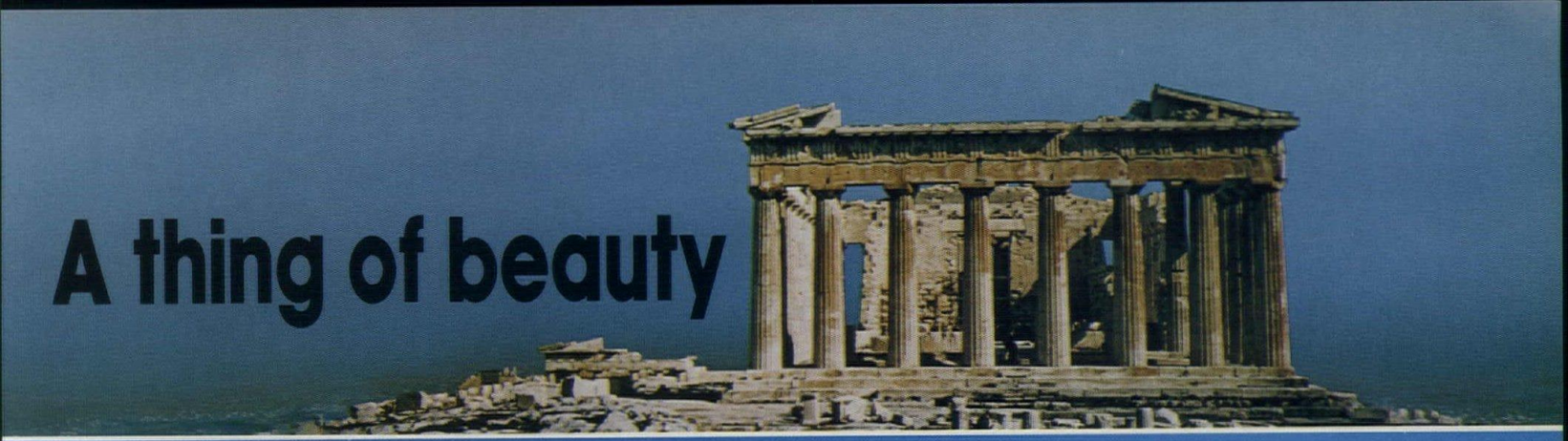
Kenneth A. Schwartz *of the firm Schwartz & Kinnard, is an Assistant Professor of architecture at Syracuse University.*

Redoing Dulles: three proposals

The Federal Aviation Administration is considering three proposals that could radically alter Dulles International Airport. The most far-reaching and potentially controversial of these calls for the erection of a new terminal on the field approximately 1200 feet from Eero Saarinen's 1962 building, a registered landmark.

Short haul and connecting flight passengers would board or deplane directly at the 12-22 gate terminal, to be designed by Hellmuth, Obata & Kassabaum, San Francisco. (HOK were also the architects of an earlier proposal, never adopted, to expand the existing terminal, P/A, March 1978, p. 28.) An underground rail or moving sidewalk linking new and old terminals would either supplement or replace altogether the mobile lounges, a crucial component of Saarinen's scheme, which now shuttle passengers between the main terminal and planes. These slow-moving, overcrowded vehicles, along with Dulles's distance from metropolitan D.C., have been blamed by airlines for limiting the airport's popularity and use.

A thing of beauty



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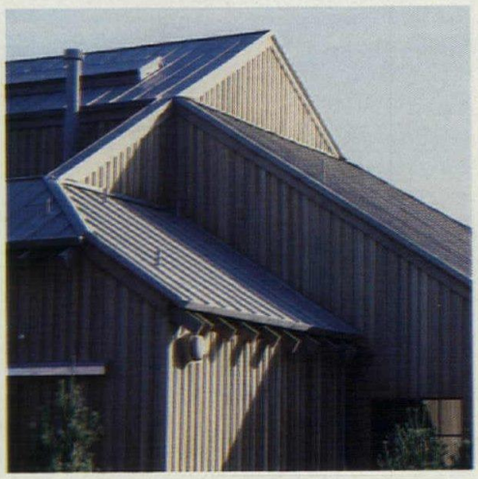

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In an unrelated move, the General Services Administration has proposed to the Department of Transportation, which oversees the FAA, that five parcels, or one-quarter of Dulles's property, be declared "excess." If DOT does not follow the GSA recommendation, the issue will go to the White House's Property Review Board for resolution. Once declared excess, these 2700 "buffer" acres situated along the airport boundaries could be purchased by another federal agency or, if no in-house bidder comes forth, declared surplus and offered for public sale.

Finally, efforts are underway to upgrade the existing terminal's energy efficiency. Booz-Allen & Hamilton with Lee Thorp, consulting engineers, and Cooper Lecky Architects, design consultants, has proposed installing revolving entrance doors and replacing 20-year-old parking lot lights with more efficient, sodium-vapor lamps.

William Lebovich

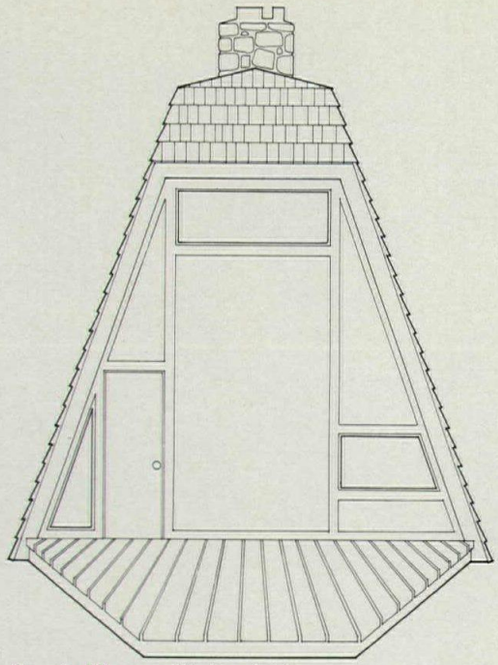
Eero Saarinen, Dulles Terminal, 1962.

These three proposals run the gamut from Booz-Allen & Hamilton's sensitive refurbishing plans to GSA's insensitive land-sale proposal. While it is too early to evaluate the new terminal concept, it is to be expected that Washington's Fine Arts Commission, National Capital Planning Commission, and Advisory Council on Historic Preservation will watch developments closely to ensure that any new structure does not compromise the aesthetic integrity of Saarinen's design. [William Lebovich]

William Lebovich *is an architectural historian with the National Park Service's Historic American Engineering Record.*

Surviving Armageddon: architectural preparedness

Faced with the current crisis in strategic arms negotiations, some pessimists are preparing for the worst. Since 1975, Joel Skousen, president and chief designer of Survival Homes Corporation, has been designing and constructing $500,000 custom "survival homes" from his office in Hood River, Ore. On the exterior, these houses differ little from standard suburban tract homes—a conscious move by Skousen, who believes that his buildings should keep a low profile.



Survival house with drawbridge.

Skousen's homes may not look exactly like fortresses, but they function as such. All survival homes are designed with a complete set of traditional family rooms and such not-so-traditional spaces as a pistol range and fallout shelter capable of resisting a 20-megaton blast. The homes are equipped with flexible power sources for complete self-sufficiency, utilizing fossil fuel, gas, solar energy, wood, or electricity.

Each house has a map with indicator lights and alarms triggered by infrared, microrange, and "listening" devices. The security system also controls fully automated, rolling-steel, bullet-proof shutters covering all windows (of which there are few). The total security package can add from $30,000 to $60,000 to a project's cost.

Skousen's outfit produces up to 19 homes a year, and his self-published book, which preaches survivalism and details specific strategies, is now in its second printing. [Claudia Hart]

Claudia Hart *is an associate editor at* Industrial Design.

In Paris: Kudos and new directions

Henri Ciriani and Bernard Huet were the recipients respectively of the Grand Prix National d'Architecture and the Grand Prix de la Critique Architecturale awarded by the French Minister of Urban Planning and Housing, Paul Quiles, at a ceremony held February 7, 1984, at the Institut Français d'Architecture in Paris. The simultaneous kudos—for one of the post-1968 champions of the continued validity of Modernism

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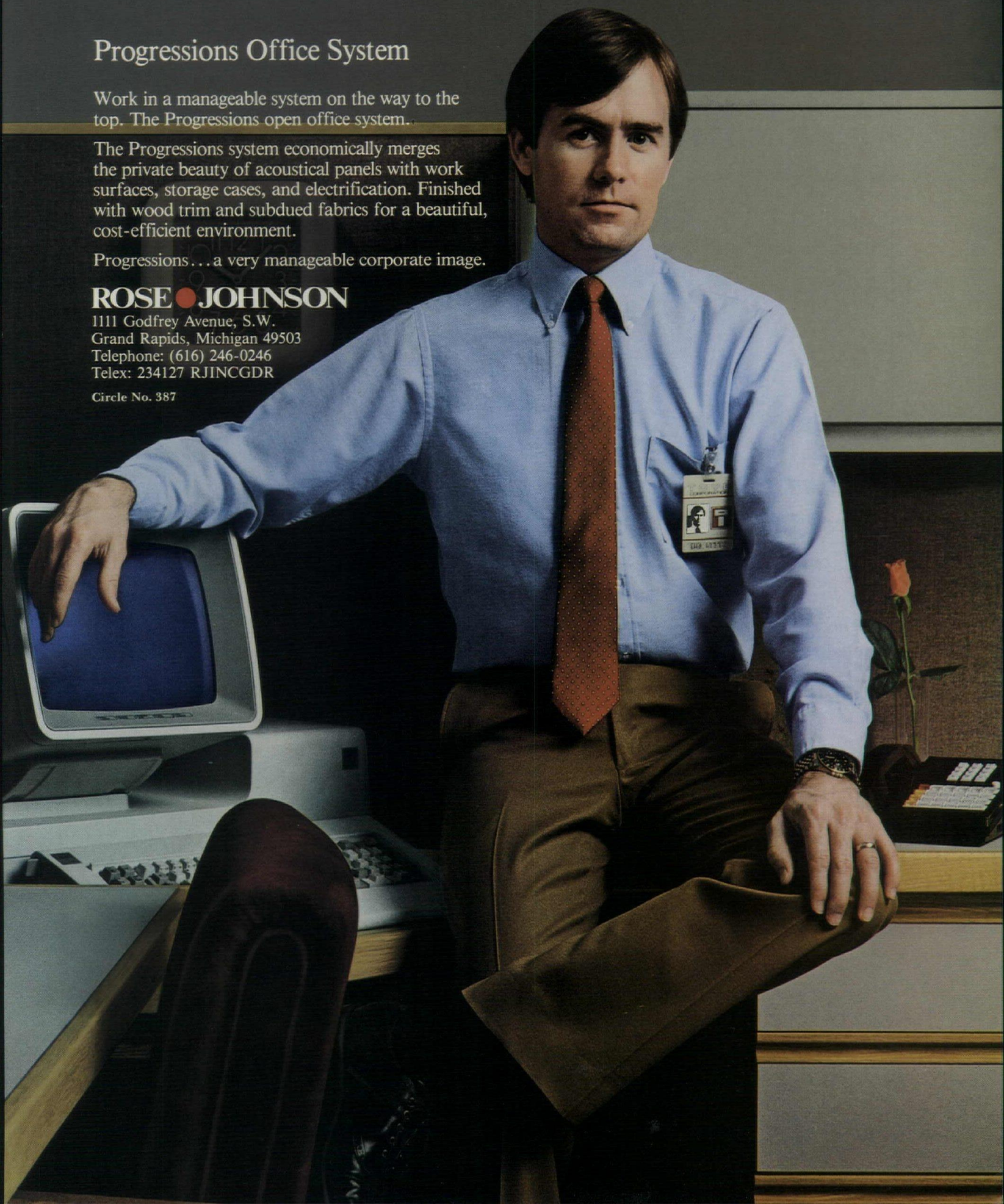


and for a critic who has been one of the most sensitive advocates of the role of history and cultural values in redefining architecture and urban form—reflects the Mitterrand administration's determination to stimulate architectural debate in France.

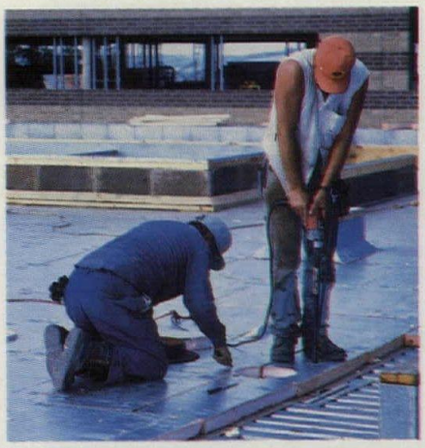
At the same ceremony Quiles made public a new national architectural policy aimed to counteract the diminishing role of architects in building enterprises. The major proposals are a reform of the university status and structure of architectural education, a restructuring of public commissions, and a major effort to export French architecture and technology to Third-World building markets.

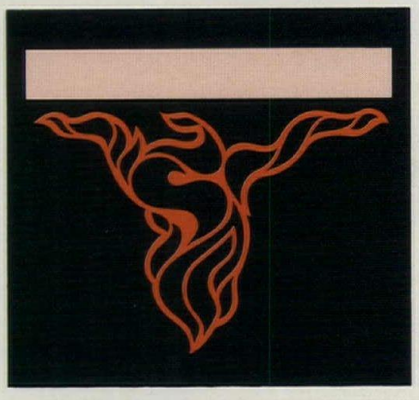
A concrete element of this plan is the so-called "Albums de la Jeune Architecture," a fourth selection of which was announced by Quiles and subsequently exhibited in the galleries of the Institut Français d'Architecture. These government-sponsored publications are intended to give wider exposure to young talent.

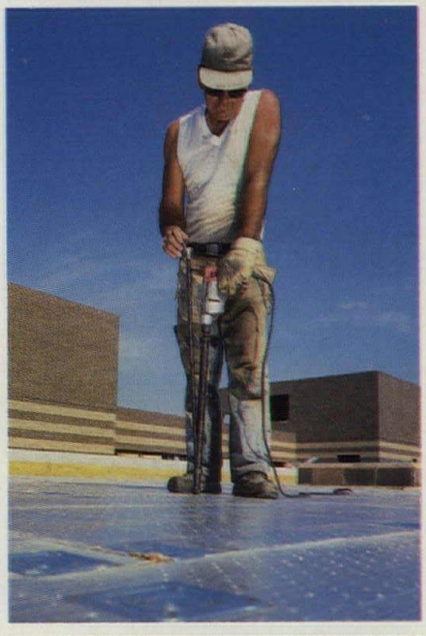
Ciriani, a native of Peru who established himself in France in 1964, is the self-proclaimed epitome of a younger generation of architects who have penetrated the architectural scene through the slow and complex mechanisms of public housing commissions, in such Villes Nouvelles as Evry and Marne-la-Vallée (P/A, Oct. 1982). Like his former associate in the Atelier d'Urbanisme et d'Architecture, Paul Chemetov (winner of the 1980 Grand Prix), Ciriani ardently believes that the industrial ethic and the social purpose of the Modern movement are the only valid bases for contemporary design.

While this philosophy has certainly come of age with the Socialist administration and its determined effort to leave its mark on the built environment of Paris, the choice of Huet as laureate for architectural criticism underscores government's refusal to support a single point of view exclusively. Dedicating his prize to his three intellectual mentors Georges Gromort, E.N. Rogers, and Louis Kahn, Huet urged the renewal of a particularly "French" tradition in architecture. His critique of Modernism integrates two-century-old academic principles of composition and urban form with the present-day analysis of urban values and cultural representation which has characterized the school of Léon Krier and Maurice Culot, a point of view that found one of its most provocative expressions in Huet's own polemical essay *Anachroniques d'Architecture*. [Barry Bergdoll]

Barry Bergdoll *is conducting research in Paris for his doctoral thesis from the Art History department at Columbia University.*







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Nineteen artists *and furniture makers, including Wendell Castle, Wendy Maruyama, and Edward Zucca, have designed furniture in Colorcore, Formica's new solid-color surfacing material. Their work, sponsored jointly by Formica Corporation and Workbench, will be on view through May 27 in the Gallery at Workbench, New York.*

'Understanding Cities,' *a film series by Edmund Bacon, was previewed in mid-February at the Art Institute of Chicago. The series was sponsored by the Urban Land Institute under a grant from the U.S. Department of Energy.*

- *Screened were condensed versions of* Rome: Impact of an Idea, Paris: Living Space, John Nash and London, *and* The American Experience, *and the full* City of the Future.
- *All had an admirably professional polish, but the last seemed a curious crossbreed of 1960s "down with the car, back to bicycles" philosophy and computer-generated utopianism.*
- *Musical scores were composed by Mr. Bacon's son.*

The Architectural League, *New York, has announced its spring lineup of Emerging Voices; Eric Moss, L.A., and Joseph Valerio of Chrysalis, Milwaukee, lead off on April 3, followed on successive Tuesdays by Bentley La Rosa Salasky, New York, and Frederick Fisher, L.A.; Henry Smith-Miller, New York, and Theodore Ceraldi, Nyack, N.Y.; and James Coote, Austin, Texas, and Stanley Saitowitz, San Francisco.*

- *The annual lecture series is sponsored by Krueger.*

Carlo Scarpa *is the subject of a major show curated by Francesco DalCo and Giuseppe Mazzarioli, and mounted by Mario Botta and Boris Podrecca, opening at the Accademia in Venice on June 29.*

The Rouse Co. *has shortlisted five firms for the design of an office tower in Philadelphia: Cope Linder; Ewing Cole Cherry Parsky with Environmental Design; and Mitchell Giurgola, all of Philadelphia; Murphy Jahn, Chicago; and Kohn Pedersen Fox, New York.*

A Designers' Software Exchange *has been organized by the Architectural Research Centers Consortium to act as a "user library" or clearinghouse for public-domain software related to the building process.*

- *Annual membership is $25 or free for those who contribute software.*
- *Contact DSE, Laboratory of Architecture and Planning, MIT, 77 Mass. Ave., Cambridge, Mass. 02139.*

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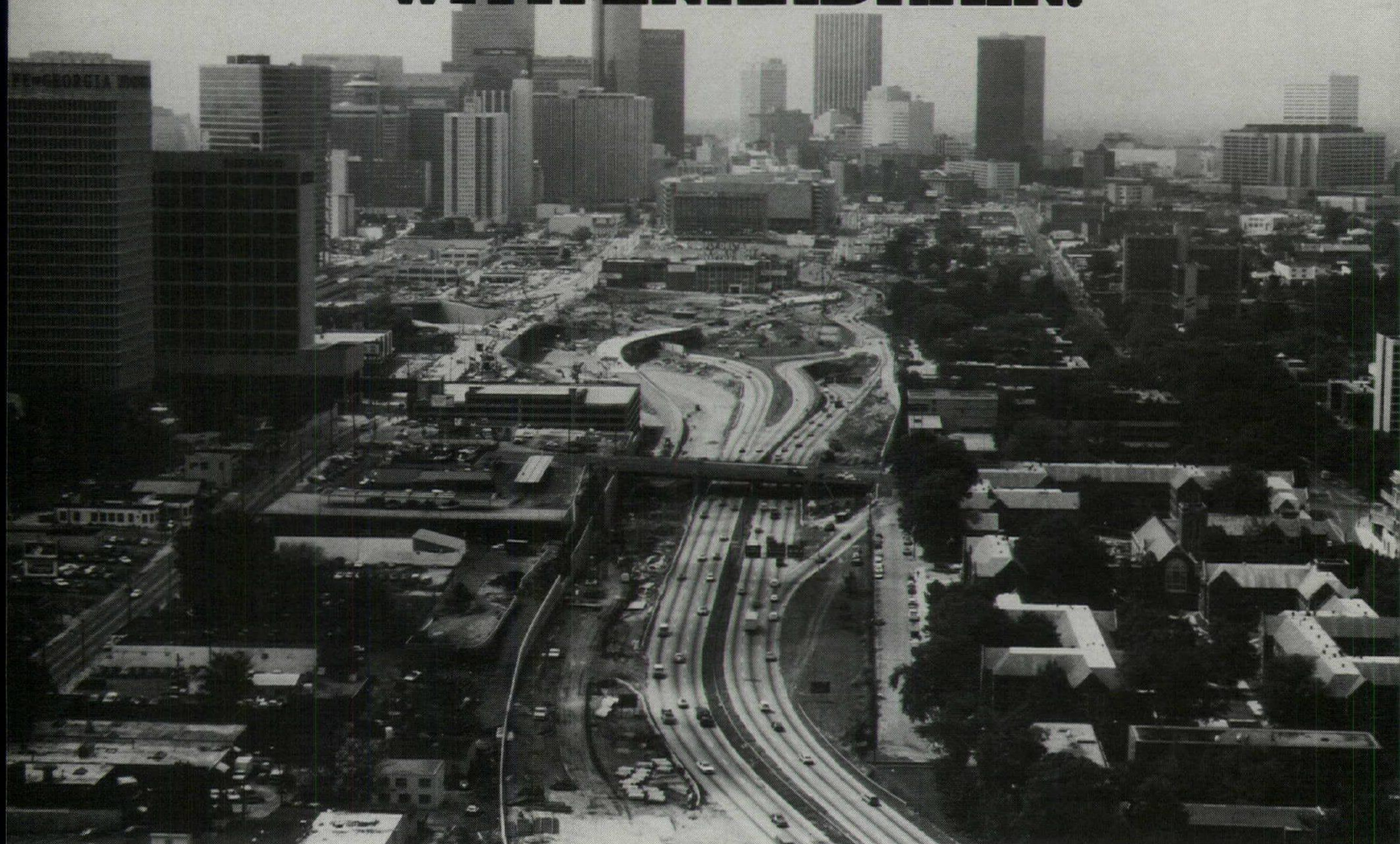
HIGHWAY ENGINEERS IN ATLANTA FOUND RELIEF FROM PRESSURE WITH ENKADRAIN.



PHOTOGRAPH COURTESY OF GEORGIA DEPARTMENT OF TRANSPORTATION.

In Atlanta, several years ago, A.G. Spanos Development Inc. erected a retaining wall for the Corporate Forum Project after cutting into a hill to create more parking. Enkadrain® was installed behind the wall to provide protection for the neighboring property. Within hours of completing the wall construction and backfilling, a major watermain burst on the property above the wall, giving the drainage a severe test. It held, thanks to Enkadrain.

Now Enkadrain has been selected by the Georgia DOT for a number of retaining walls at or near the intersection of Interstates 75 and 85 in Atlanta. This massive project includes retaining walls which protect portions of highway below ground level, so proper drainage is a must. Jasper Construction Company, the general contractor, has completed installation of Enkadrain on some walls, with others to be done in the near future.

Today, Enkadrain is successfully retaining Atlanta's retaining walls, making the highway system run efficiently.

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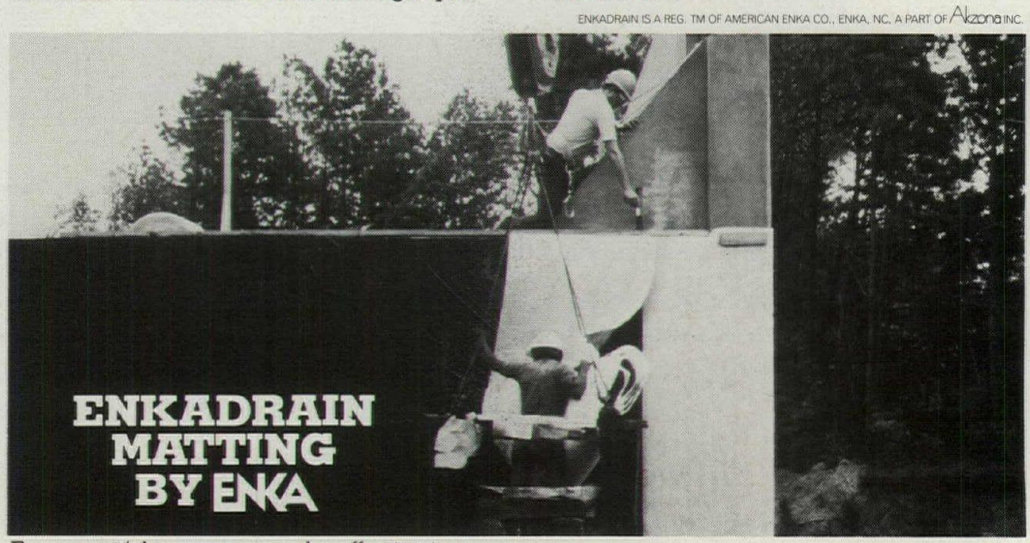

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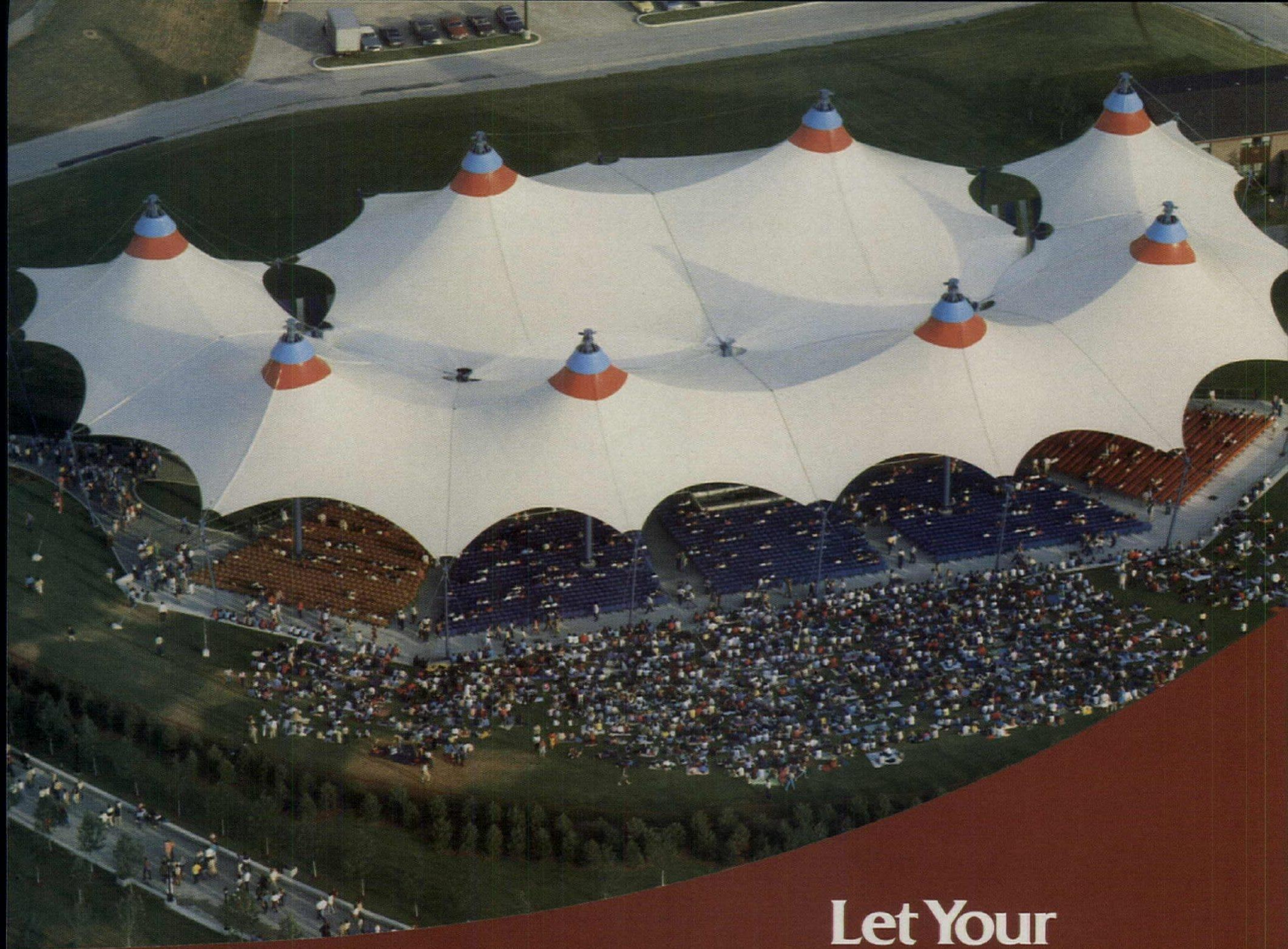

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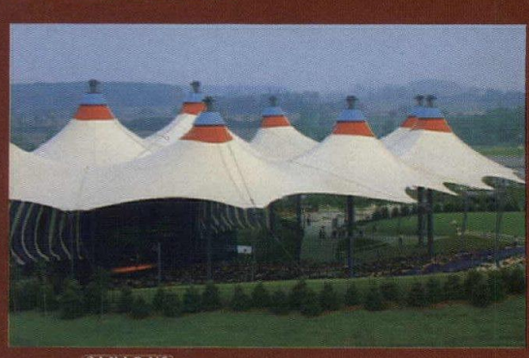

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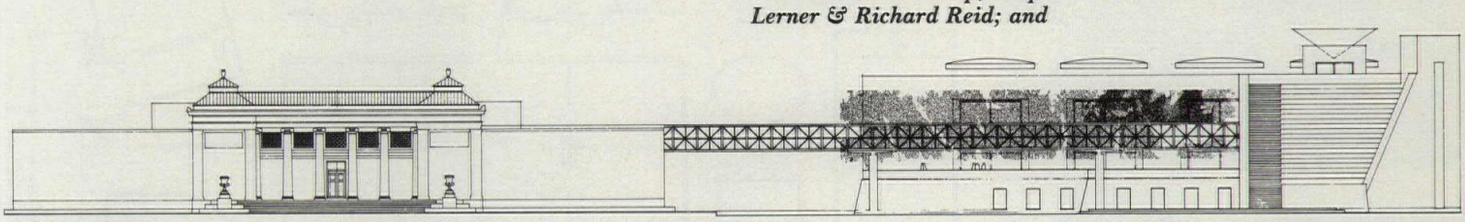
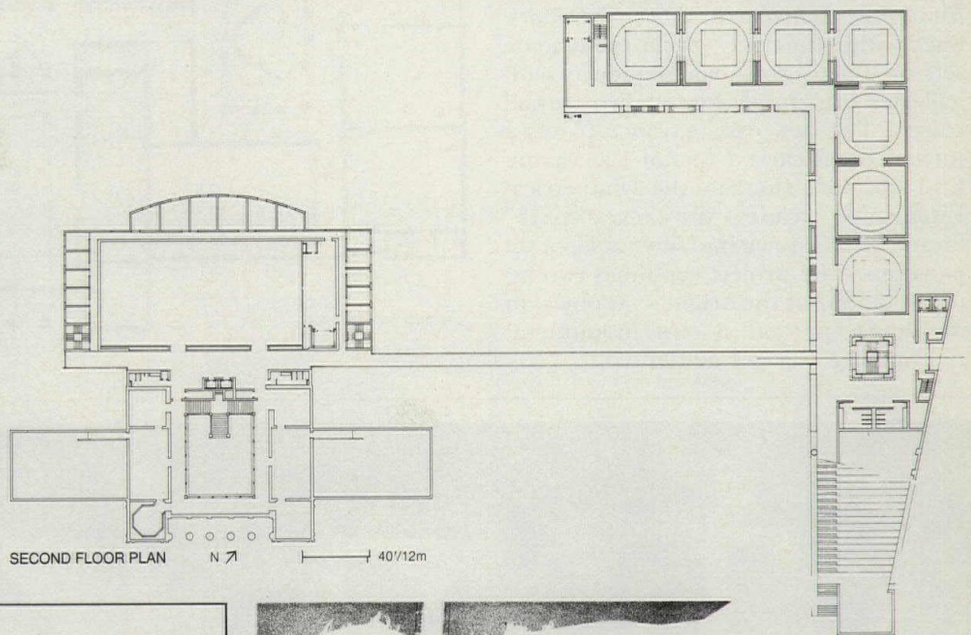
Competitions

Built in 1911 and expanded in 1971, the New Orleans Museum of Art is to be expanded and remodeled again. Six architects—Emilio Ambasz; Spillis Candela; Cass & Pinnell; W.G. Clark with The Charleston Group; Ralph Lerner & Richard Reid; and Barton Myers—competed in the second phase of a national design competition sponsored by the NEA. On this page is the winning scheme, and on the next page, a special honorable mention.

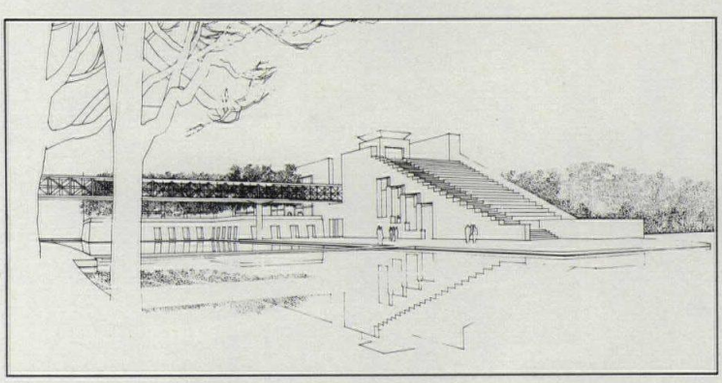


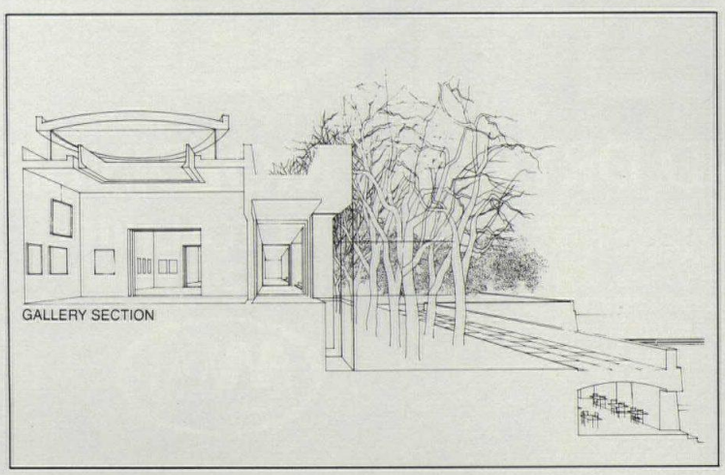
EAST ELEVATION

New Orleans Museum of Art Addition
First place: *W.G. Clark Architect in association with The Charleston Group, Charleston, S.C.* Sited on new land in the lagoon, Clark's addition contrasts with the original building. Although the new galleries are treated as discrete square "cabinets" capped by saucer domes and clerestory lighting, the sequence to and through the addition is more informal. Pedestrians strolling through City Park can cross the island and pass under the addition without ever entering the museum. Internal connections are made by a second-level bridge. The auditorium is roofed by an open-air amphitheater (not a part of the program).

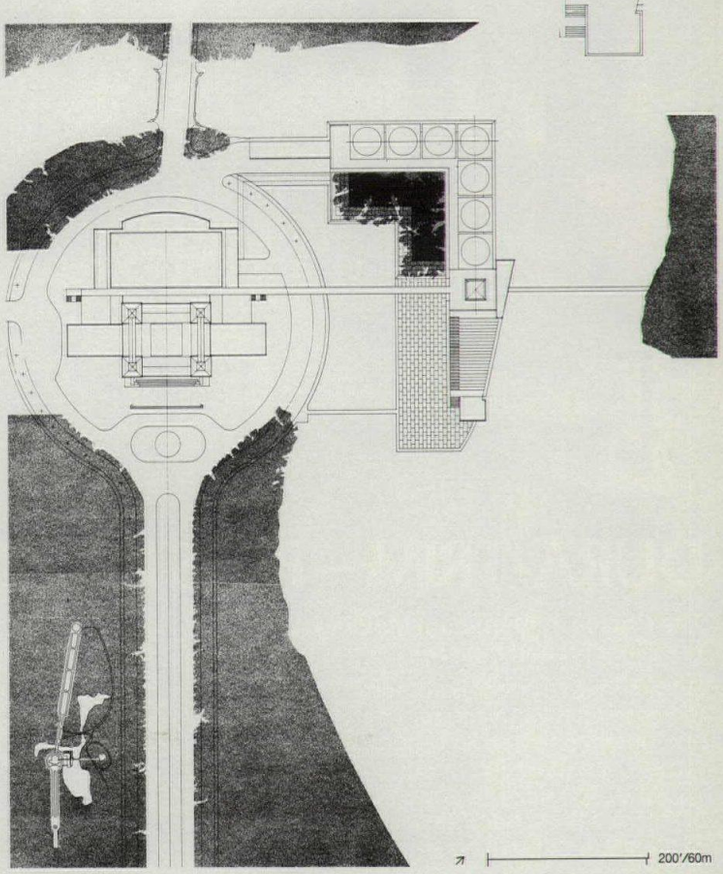


SECOND FLOOR PLAN N ↗ 40'/12m



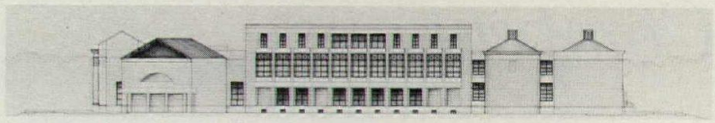


GALLERY SECTION



↗ 200'/60m

EAST ELEVATION



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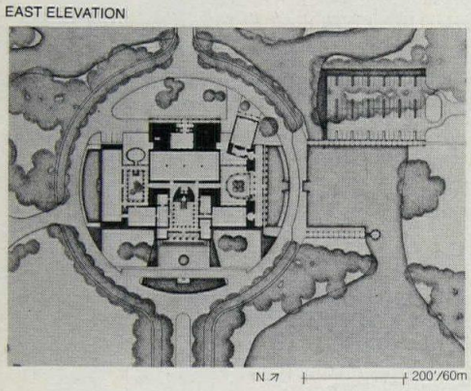
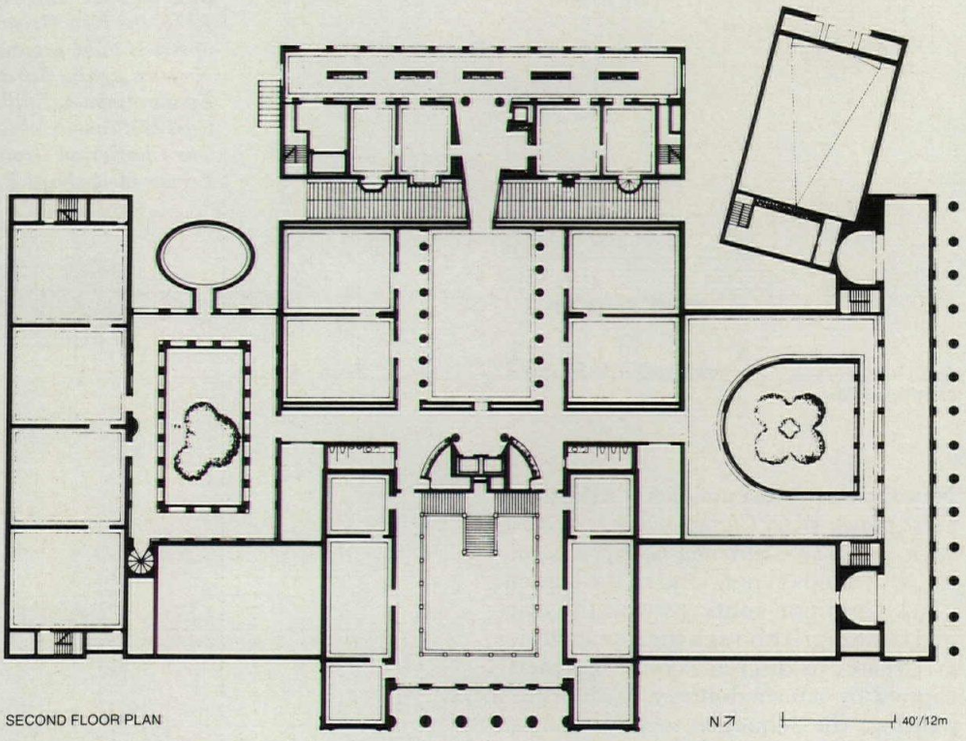


Honorable mention: *Ralph Lerner and Richard Reid, Architects, Cambridge, Mass.* Sited within the traffic circle, the scheme sets up a new cross-axial sequence, with galleries organized around two formal courts. The new east entrance fronts a formal basin carved out of the bayou. End additions elongate the symmetrical Esplanade façade; the rear "park" façade breaks down into several separate pavilions. The project combines two interpretations of the original: as object in the landscape and as civic monument, terminating a grand boulevard.



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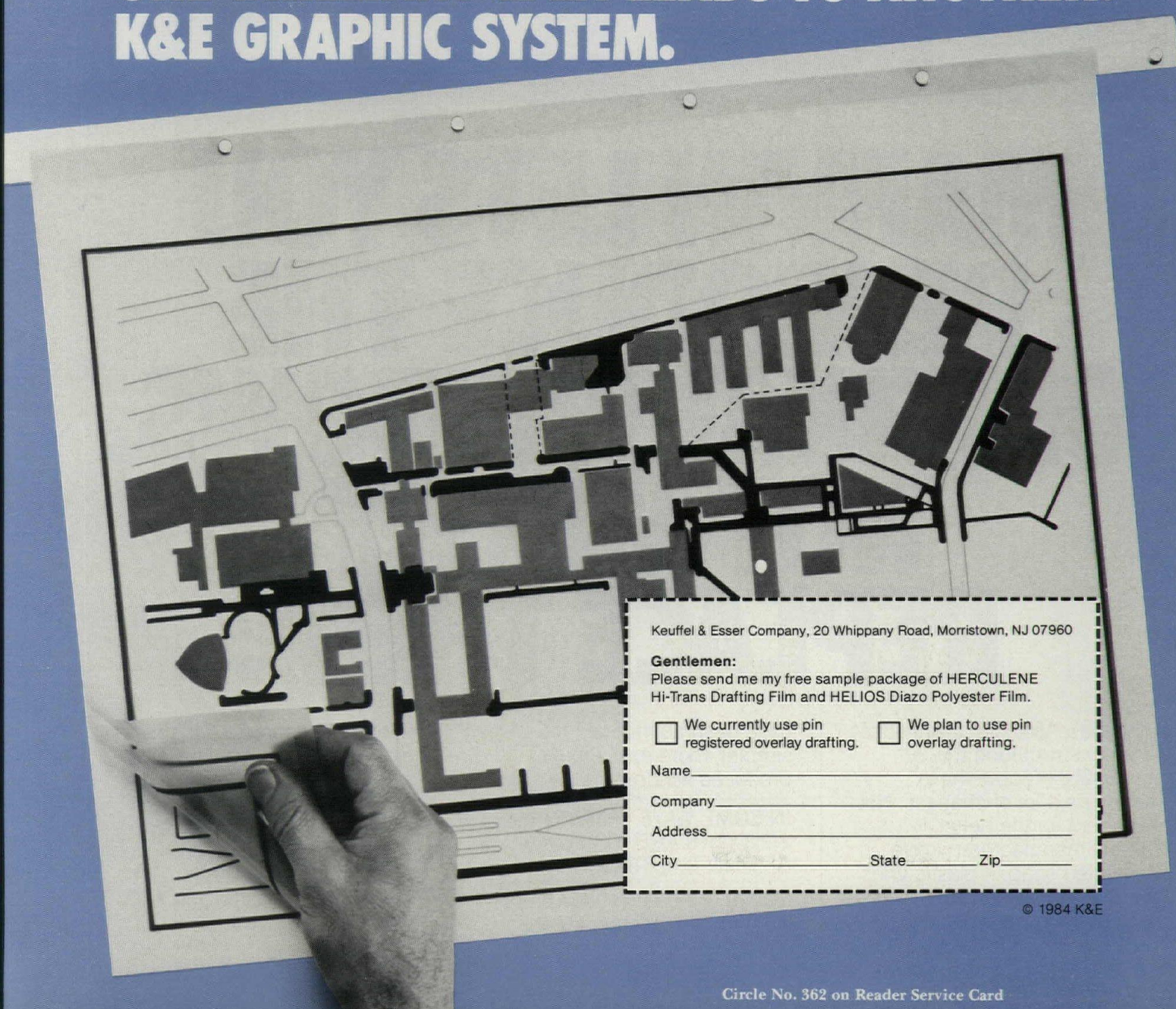

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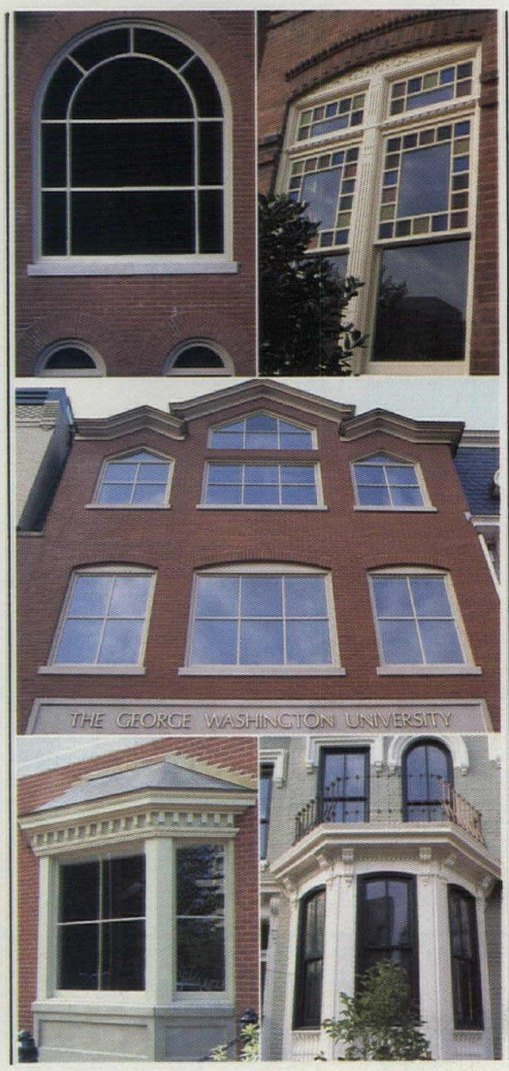

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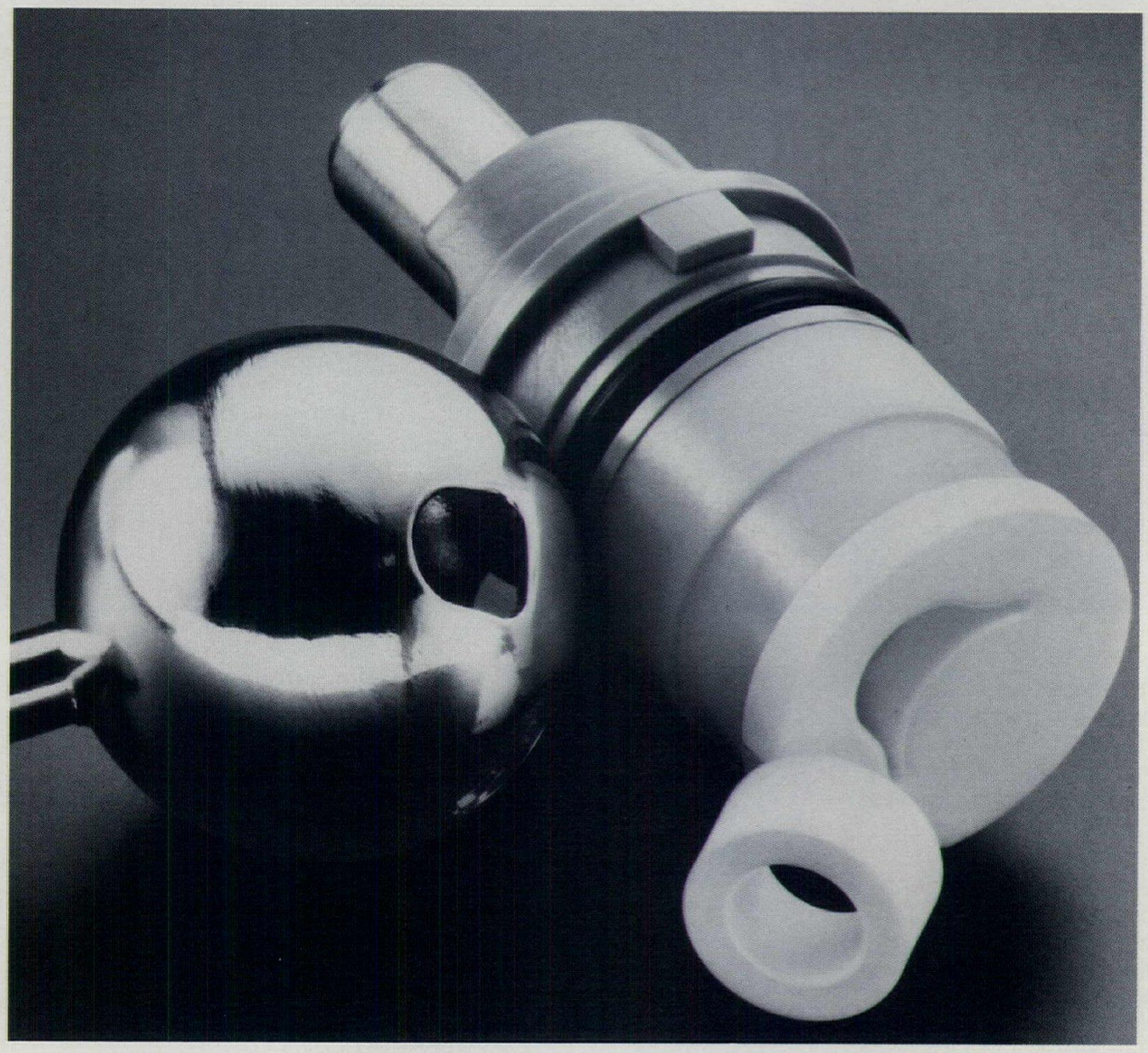

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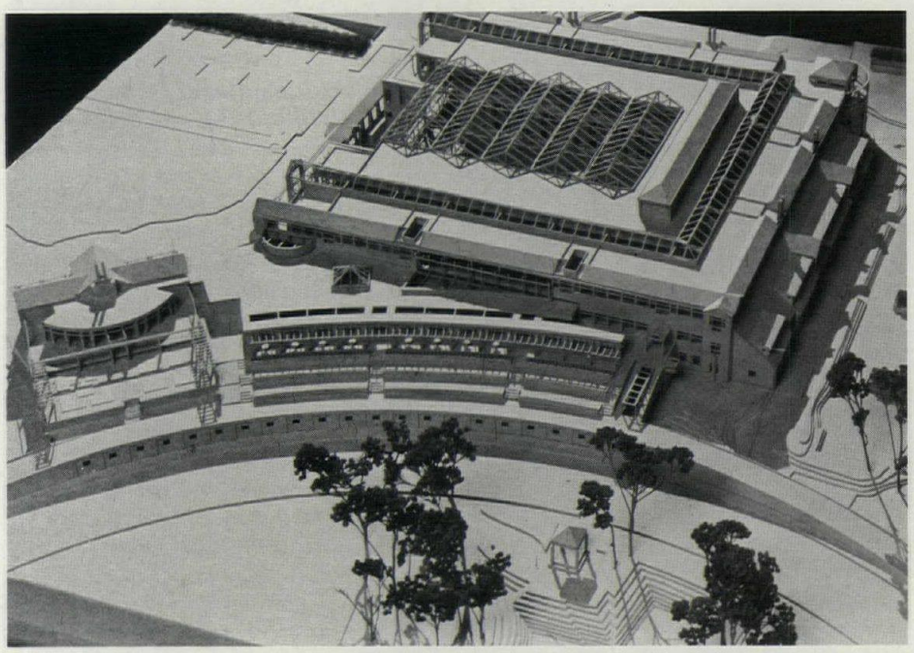
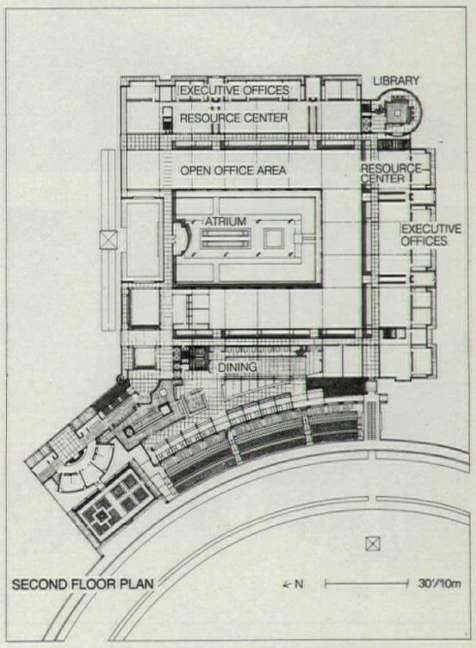
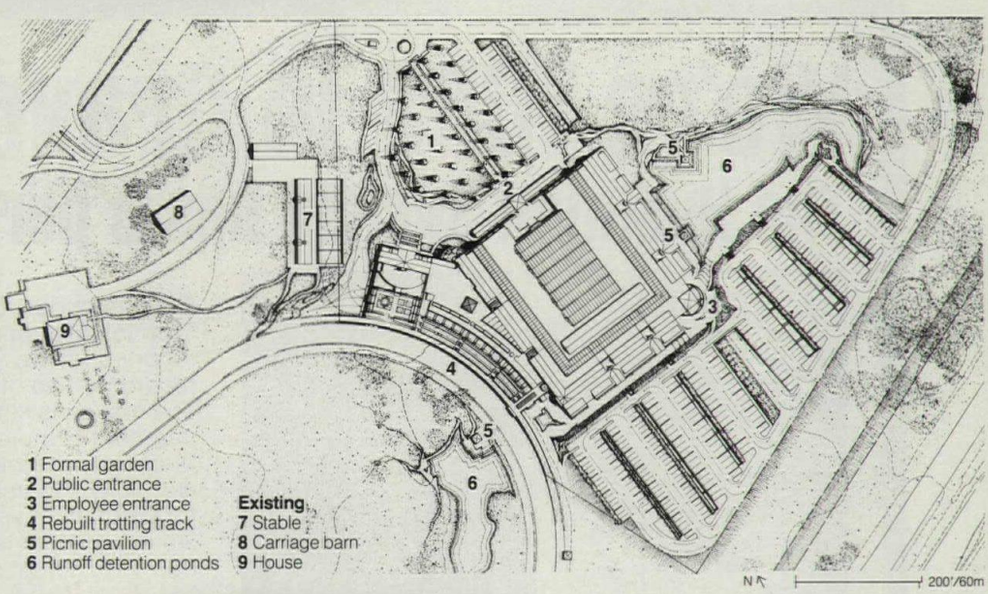
In progress

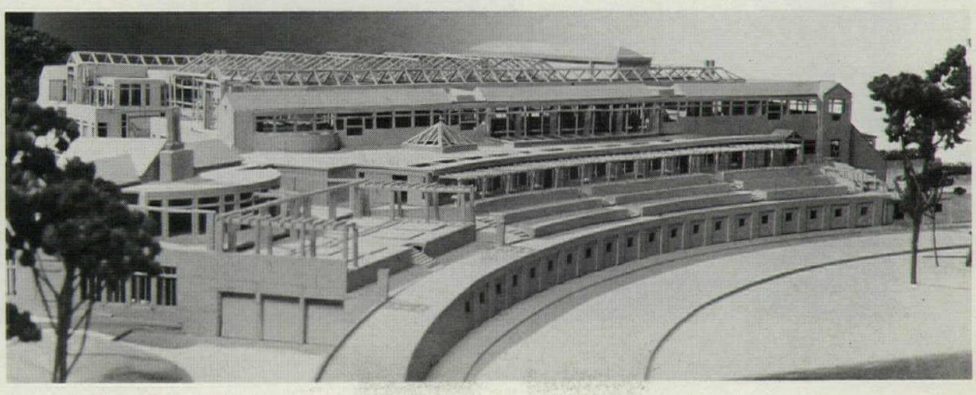
This competition-winning scheme for a corporate headquarters is followed by an airport terminal in San Antonio, a garden restaurant in D.C., and a government support center in Miami.

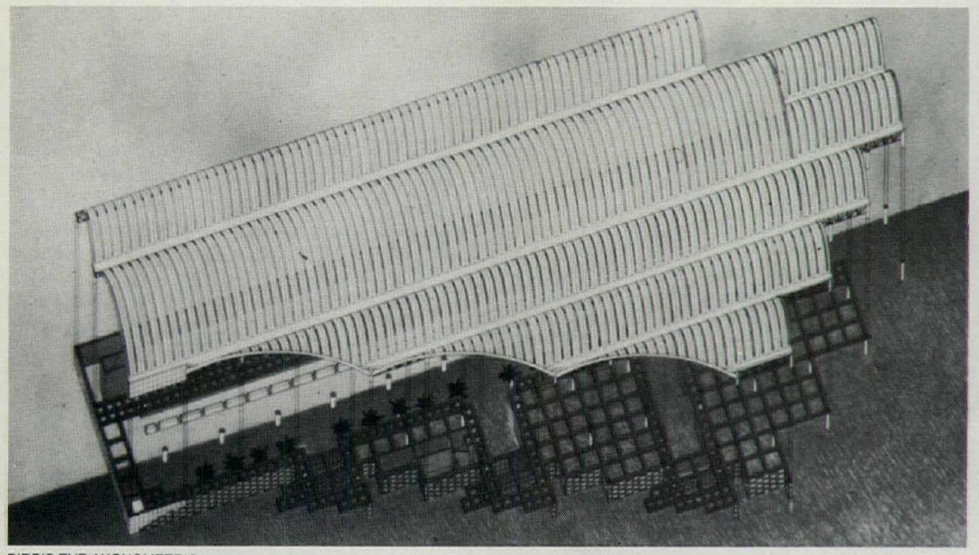




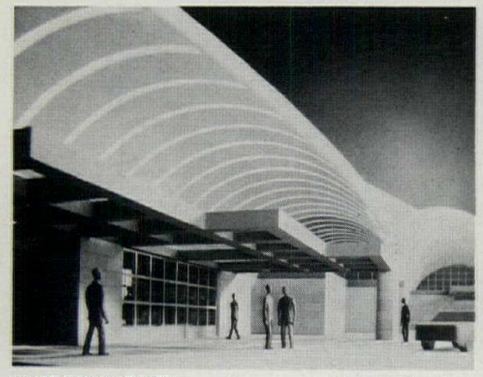
Codex Corporation Headquarters, Canton, Mass. *Architects: Fred Koetter & Associates, Boston, Mass.* The architects, winners of a limited competition for the Codex World Headquarters, reconcile the divergent requirements of a growing corporation and its pastoral site by means of a low, three-story structure organized roughly in "rings" around a central garden atrium. These rings proceed from an innermost band of generalized, open-office space to the outermost ring of specific, programmatic elements (reference center, dining, executive offices). The corresponding breakdown and particularization of exterior façades, clad in brick with granite trim, wood window frames, and slate roofs, is in scale with the surrounding features of Marsfield Farm. The central atrium acts as a giant, north-facing "storm window" for its glazed perimeter walls; these internal windows, together with continuous light "galleries," provide up to 75 percent of the building's daytime lighting requirements. All remaining farm buildings are to be retained, and a former horse track is to be rebuilt as part of the overall landscaping plan for the 55-acre farm.







BIRD'S EYE AXONOMETRIC



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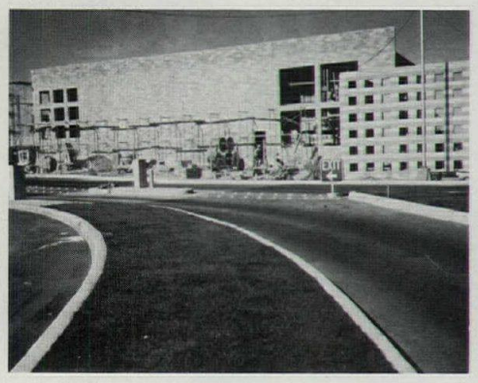

CONSTRUCTION VIEW

San Antonio International Airport expansion, San Antonio, Texas. *Architect: Heery & Heery, Atlanta, with Marmon Mok Partnership and W.E. Simpson Co., San Antonio.* For this gateway to San Antonio, to be completed this spring, the architects have incorporated details, materials, and coloration indigenous to the city. The expansion consists of a new 15-gate terminal east of the existing one, new roadways, airplane aprons, and parking. This design accommodates air traffic expansion projections through 1990, with options for more gates on the west end. To save energy, the new areas incorporate daylighting, a chilled water storage tank, and high pressure sodium lighting.

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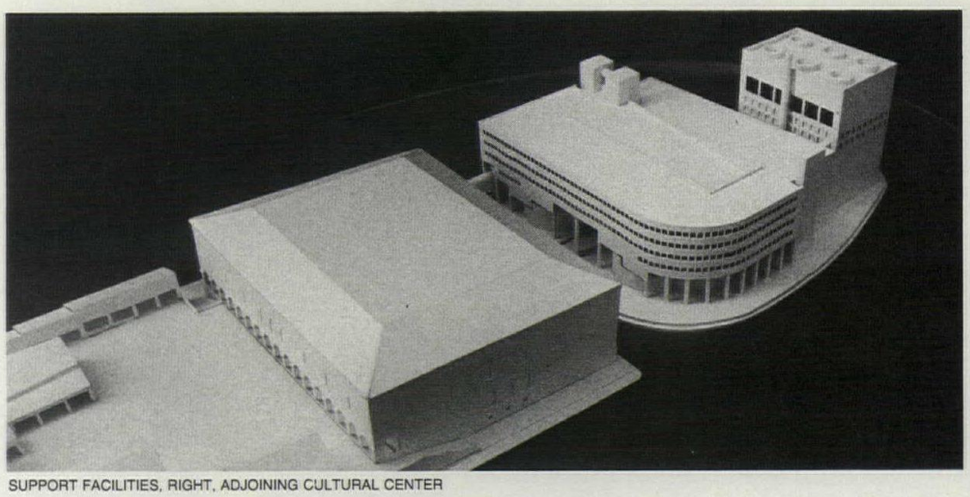
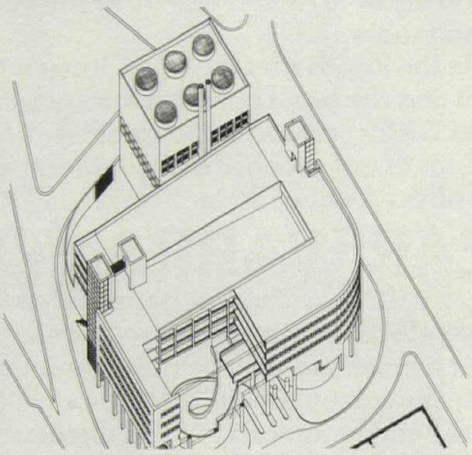
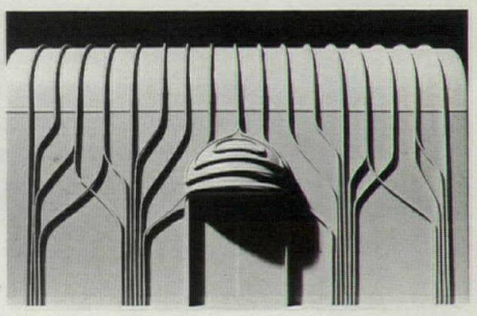


SUPPORT FACILITIES, RIGHT, ADJOINING CULTURAL CENTER

Central Support Facilities, Downtown Government Center, Miami, Fla. *Architects: Spillis Candela & Partners, Inc., Coral Gables.* Adjacent to the Johnson/Burgee Dade County Cultural Center (P/A, Feb. 1984, p. 25) on an irregularly shaped site, this structure complements the Downtown Government Center with parking, electrical and mechanical facilities, retail, maintenance, and security. The building is connected with the cultural center by a bridge across Second Avenue. Highly mechanized and energy efficient, these facilities will make the government center energy self-sufficient when complete.



The National Sculpture Garden Restaurant, Washington, D.C. *Architect: Skidmore, Owings & Merrill, San Francisco/Washington, D.C.* Designed in 1972 by E. Charles Bassett and Sidney Hoover of SOM San Francisco but never executed, this scheme for an Art Nouveau restaurant on the Mall has been recently revived. Sited in the National Sculpture Garden, the building will replace the rental house for an adjacent skating rink. The glass pavilion is enclosed in an armature of green-painted steel framing bent into treelike configurations, topped off by a dark green roof. Also planned is a series of landscaped outdoor dining rooms in the garden, which still awaits a collection of sculpture.



A 'Golden' Investment

Putting together an energy-savings "portfolio" can be more beneficial than stocks and bonds. A THERMACORE® door can be a definite asset to any building, old or new.

The precise combination of polyurethane foam and embossed galvanized sheet steel, using a unique patented lamination process that compresses the foam to 3.24 lbs./ft.^{3}, results in an insulated door panel that is more than the sum of its parts. The product is a tough, durable yet lightweight insulator with an R factor of 13.00 and a U value of .077 that can be easily cut to any length with ordinary hand tools.

The lamination that is the key to that strength, longevity and insulation is so uniform and the bond between foam and steel is so strong that THERMACORE® can do what no other doormaker can do. We're so confident in our process and our meticulous quality control that we offer an unbeatable...

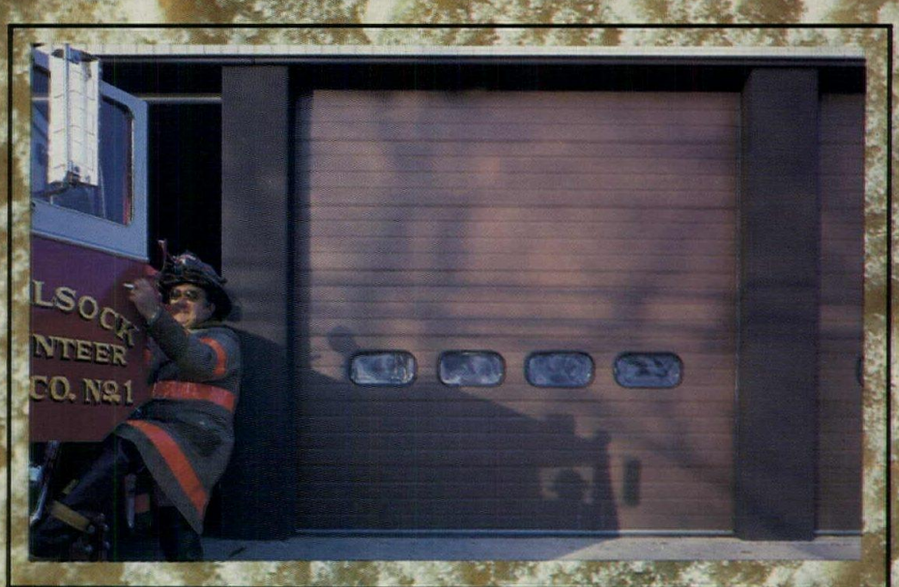
FIVE YEAR WARRANTY

...against panel delamination.

Couple this rugged panel with our patented seal system, high quality hardware, track channel and counterbalance and you get a door that will save you enough on fuel bills to *literally pay for itself* in a matter of years* and go on earning you dividends for many years to come.

And while your investment is paying off, you'll be a lot more comfortable — warmer in the winter, cooler in the summer and more secure from unwanted intruders.

It pays to invest in a "sure thing" — it pays to invest in...



THERMACORE®

THE WORLD'S MOST ADVANCED INSULATED INDUSTRIAL DOOR

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*Approximate energy savings can be calculated for your facility upon request.

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THE GE ELECTRONIC HEAT PUMP HAS EIGHT SOPHISTICATED FEATURES.

IF YOU LIKE ITS LOOKS, MAKE IT NINE.

The General Electric Zoneline® IV electronic heat pump has the most advanced control system of any package terminal unit today.

There are eight reasons why.

One, our Zoneline IV heat pump reduces temperature swing. That means greater comfort.

Two, it operates at lower outdoor temperatures than previous GE models, only switching to electric resistance heat when absolutely necessary. That means better operating economy.

As does three, the temperature-limiting feature that allows upper and lower restrictions to be set on both heating and cooling. And four, the optional energy-management interface that allows the Zoneline IV heat pump to be controlled from a central location.

And reliability? The Zoneline IV heat pump gives the word new meaning. With five, a solid-state compressor protection circuit. Six, a service LED that indicates compressor malfunction. And seven, emergency heating capability should it ever be needed.

Not to mention number eight, a freeze sentinel feature that automatically helps prevent freeze-ups, even when the unit is not in use.

Oh, and that brings us to nine. But that's only if you like the sophisticated electronic touch controls as much as we do.

For further information on the General Electric Zoneline IV heat pump, write J.A. Michelsen, Mgr. Cont. Sales, General Electric, AP 4-130, Louisville, KY 40225.

WE BRING GOOD THINGS TO LIFE.

GENERAL ELECTRIC

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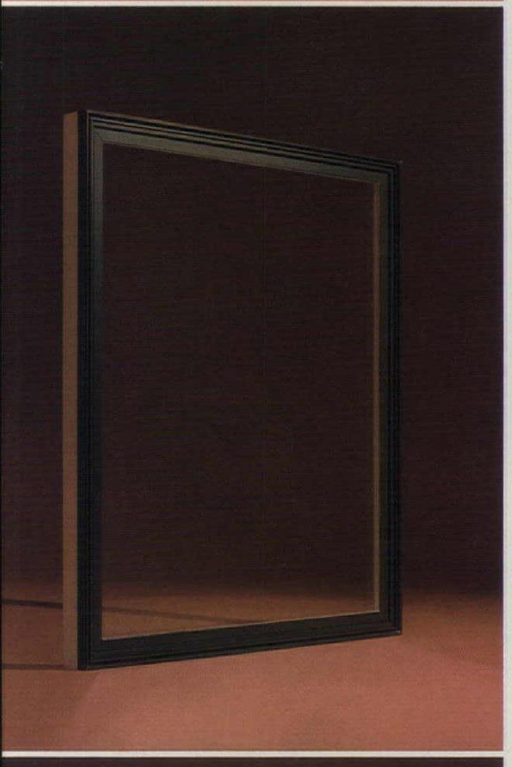
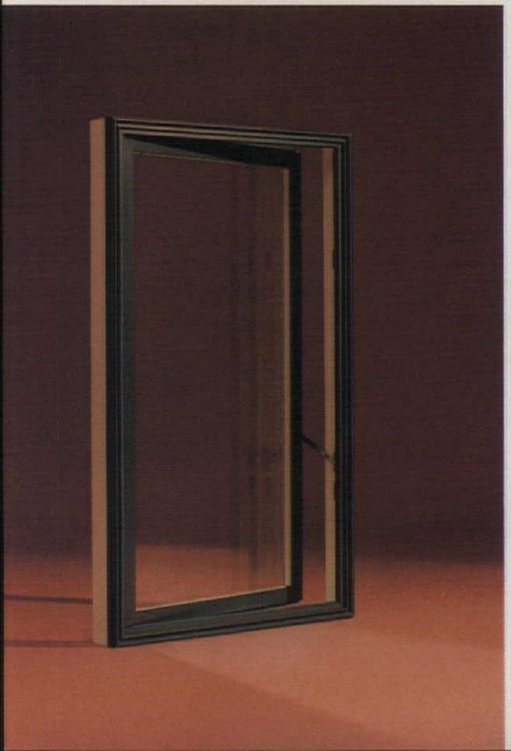




How to fill openings on a grand scale.

Introducing the new Pella Clad Monumental Window Series.

It's called the Monumental Window because it can fill openings that range in size from modest to magnificent. This is actually a system of four different windows that can be used singly or combined with each other in a single frame.

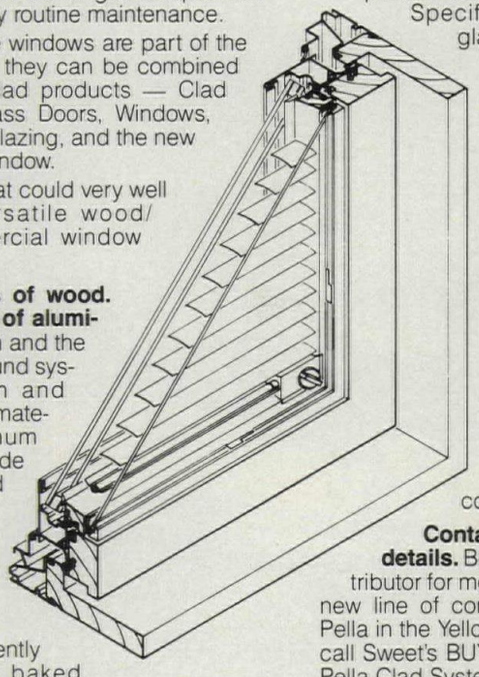
Series 1 Casement
Series 2 Hopper
Series 3 Top-hinged
Series 4 Fixed

All operable windows are hinged to open into the building for easy routine maintenance.

And because these windows are part of the Pella Clad System, they can be combined with other Pella Clad products — Clad Panels, Sliding Glass Doors, Windows, Skylights, Sloped Glazing, and the new Pella Circlehead Window.

It all adds up to what could very well be the most versatile wood/aluminum commercial window available today.

The best features of wood. The best features of aluminum. Both the sash and the frame are a compound system of aluminum and wood, using each material for its maximum benefits. The outside of both frame and sash is a structural aluminum extrusion assembly, joined with die-cast corner locks and stainless steel screws. It's permanently protected with a baked enamel finish in standard white or dark brown.



The aluminum assembly is mechanically bonded to an interior assembly of select western pine, pressure treated with a water-repellent preservative. The smooth-sanded surface is ready to accept any finish, or these units can be factory pre-finished, at extra cost, with two coats of acrylic and a top coat of urethane. Standard interior colors are off-white and dark brown.

Sash locks. Not one system, but two. Choose from two locking systems. One is operated by turning a handle on the side opposite the hinges. The other lock is recessed into the side of the sash. It must be operated with a special tool, making this system particularly useful in applications where windows must be secured except for maintenance and occasional ventilation.

Glazing and shading options. Four thicknesses of insulating glass from ½" to 1". 1" triple insulating glass. Single glass in three thicknesses. Various combinations of single or insulating glass with the removable Pella Double Glass Insulation Panel. Specify the removable panel in clear or Solarcool® bronze glass. Specify environmental insulating glass. And in certain sash sizes, specify the Pella Slimshade® set between panes of glass in windows with Pella Double Glass Systems.

That pretty much covers the realm of possibilities for glazing, all part of the versatility only Pella offers.

A perfect fit. Because every window is custom made. Each window and window arrangement will be built to specifications. So even in the trickiest replacement projects the windows will fit properly. And, of course, custom sizes also offer design flexibility in new construction.

Contact your Pella Distributor for details. Be sure to contact your Pella Distributor for more information on this versatile new line of commercial windows. You'll find Pella in the Yellow Pages under "Windows". Or call Sweet's BUYLINE. For a copy of the 1983 Pella Clad System Catalog and information on the new Monumental Window Series, use this coupon.

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Firm _____

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Pella. The significant difference in windows.

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A few inches can give a business room to grow.

A business can't get ahead if it can't keep up with technology. In the fast-changing world of business systems, an office layout can become obsolete overnight. Unless the design is agile enough to adapt quickly and easily to changes in business and technology. ■ **I**nstead of locking utilities in the floor or walls, Donn access floors let you run communication lines, CRT connections, HVAC duct, electrical lines and mechanical systems in a plenum only a few inches deep under the floor. ■ **W**hen you need to upgrade support systems, change office layout or repair utilities, you can do it with a minimum of expense and work disruption. Simply lift the floor panels and move the services. ■ **A**nd if you think you can't afford access floors, think again. Donn access floors can cost about the same as conventional systems for providing flexibility in services distribution. ■ **T**alk to your Donn representative. You'll find a few affordable inches and Donn access floors allow a business to get a head start in this fast-changing world. Donn makes Liskey™ and Severn® brand access floors. **Donn makes sense.**

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P/A Calendar

Exhibits

Through April 17
Compact Comfort: Apartments and Bungalows in Chicago, 1890–1940, Chicago Historical Society. Also, **through Aug. 31,** Chicago Furniture: Art, Craft & Industry.

Through April 26
H.H. Richardson's Allegheny County Courthouse and Jail. Gallery at the Old Post Office, Dayton. Also, **May 1–24,** The Young Designers: 1984 AGC/AIA Student Competition.

Through April 29
Kandinsky: Russian and Bauhaus Years, 1915–1933. High Museum of Art, Atlanta. Also, **Apr. 7–June 3,** The Experience of Architecture.

Through April 30
Bertrand Goldberg: A Retrospective. The Archicenter, 330 S. Dearborn, Chicago.

Through May 5
Architectural Views: Photography by Ezra Stoller and Judith Turner. Ledel Gallery, New York.

Through May 27
The Product of Design: An Exploration of the Industrial Design Process. The Katonah Gallery, Katonah, N.Y.

Through June 10
Chinese Traditional Architecture. China House Gallery, New York.

Through July 29
Chicago and New York: More than a Century of Architectural Interaction. Art Institute of Chicago.

Through September 3
The Folding Image: Screens by Western Artists of the 19th and 20th Centuries. National Gallery of Art, Washington, D.C.

April 20–June 17
Design in America: The Cranbrook Vision (1925–1950). Metropolitan Museum of Art, New York.

April 23–May 5
International Exhibition of Undergraduate Architectural Student Work. Avery Hall, 100 level, Columbia University, New York.

April 24–May 11
Vittorio Gregotti. Gund Hall Gallery, Harvard University, Cambridge, Mass.

April 28–June 3
Architecture in Silver. La Jolla Museum of Contemporary Art, La Jolla, Calif.

Competitions

April 15
Entry deadline, Second Annual ASID/Wilsonart Design Competition. Contact 1984 ASID/Wilsonart Design Competition, % McKone & Company, Inc., 2700 Stemmons Tower East, Suite 800, Dallas, Texas 75207 (800) 433-3222.

May 1
Postmark deadline, Second Annual Vicrtex/ASID competition, using Vicrtex in an installation. Contact Larry O'Neil, L.E. Carpenter & Co. (201) 366-2020.

May 15
Entry deadline, National Student Design Competition on Metal Building Systems. Contact Butler Architectural Design Competition, P.O. Box 32314, Washington, D.C. 20007.

June 28
Entry deadline, KDesign 84, for ready-to-assemble furniture. Contact KDesign 84, Design Awards, Cahners Exposition Group, 999 Summer St., Stamford, Conn. 06905.

July 16
Submission deadline, Presidential Design Awards (for government supported projects in all design disciplines). Contact Design Arts Program, National Endowment for the Arts, Nancy Hanks Center, 1100 Pennsylvania Ave., NW, Washington, D.C. 20506.

Conferences, seminars, workshops

April 24–25
Workspace 84, second annual conference and exposition on the automated office, San Francisco. Contact National Fairs, Inc., 1902 Van Ness Ave., San Francisco, Calif. 94109.

April 25–29
1984 annual meeting, The Society of Architectural Historians, Minneapolis/St. Paul. Contact SAH, Suite 716, 1700 Walnut St., Philadelphia, Pa. 19103.

April 26–28
1984 Wind/Solar Energy Technology Symposium, Columbia, Mo. Contact Linda Rodden, Engineering Conferences, 1020 Engineering Bldg., University of Missouri-Columbia, Columbia, Mo. 65211 (314) 882-3088.

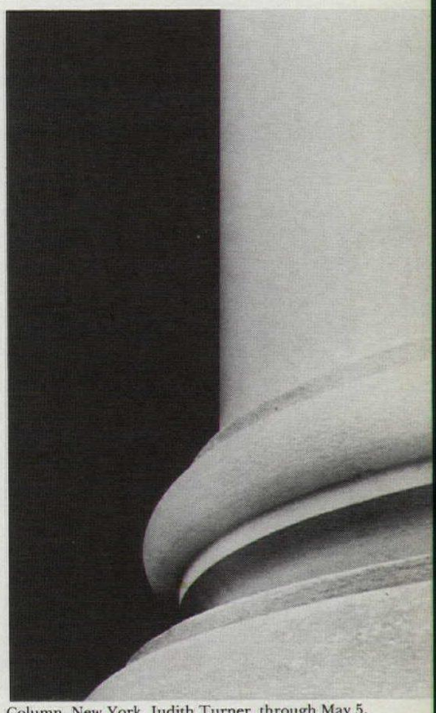
Through April 27
Florida Solar Energy Center workshops. Contact Ken Sheinkopf, Florida Solar Energy Center, 300 State Rd. 401, Cape Canaveral, Fla. 32920 (305) 783-0300.

April 27–29
Legacy and Change: Caring for Historic Religious Properties, New York. Contact Preservation League, 307 Hamilton St., Albany, N.Y. 12210.

April 30–May 1
Practical Computer Graphics: New Tools for the Building Industry, University of Wisconsin, Madison. Contact Donald R. Schramm, Dept. of Engineering & Applied Science, University of Wisconsin-Extension, 432 N. Lake St., Madison, Wis. 53706 (608) 263-7757.

May 1–2
Contract Canada '84, business interiors show, Omni International Hotel, Miami. Contact Canadian Consulate General, 400 S. Omni Int'l, Atlanta, Ga. 30303 (404) 577-6810.

May 5–9
1984 American Planning Association National Planning Conference, Minneapolis. Contact APA, 1313 E. 60th St., Chicago, Ill. 60637.


Column, New York, Judith Turner, through May 5.

May 6–10
AIA Annual Convention, Phoenix, Ariz. Contact AIA (202) 626-7300.

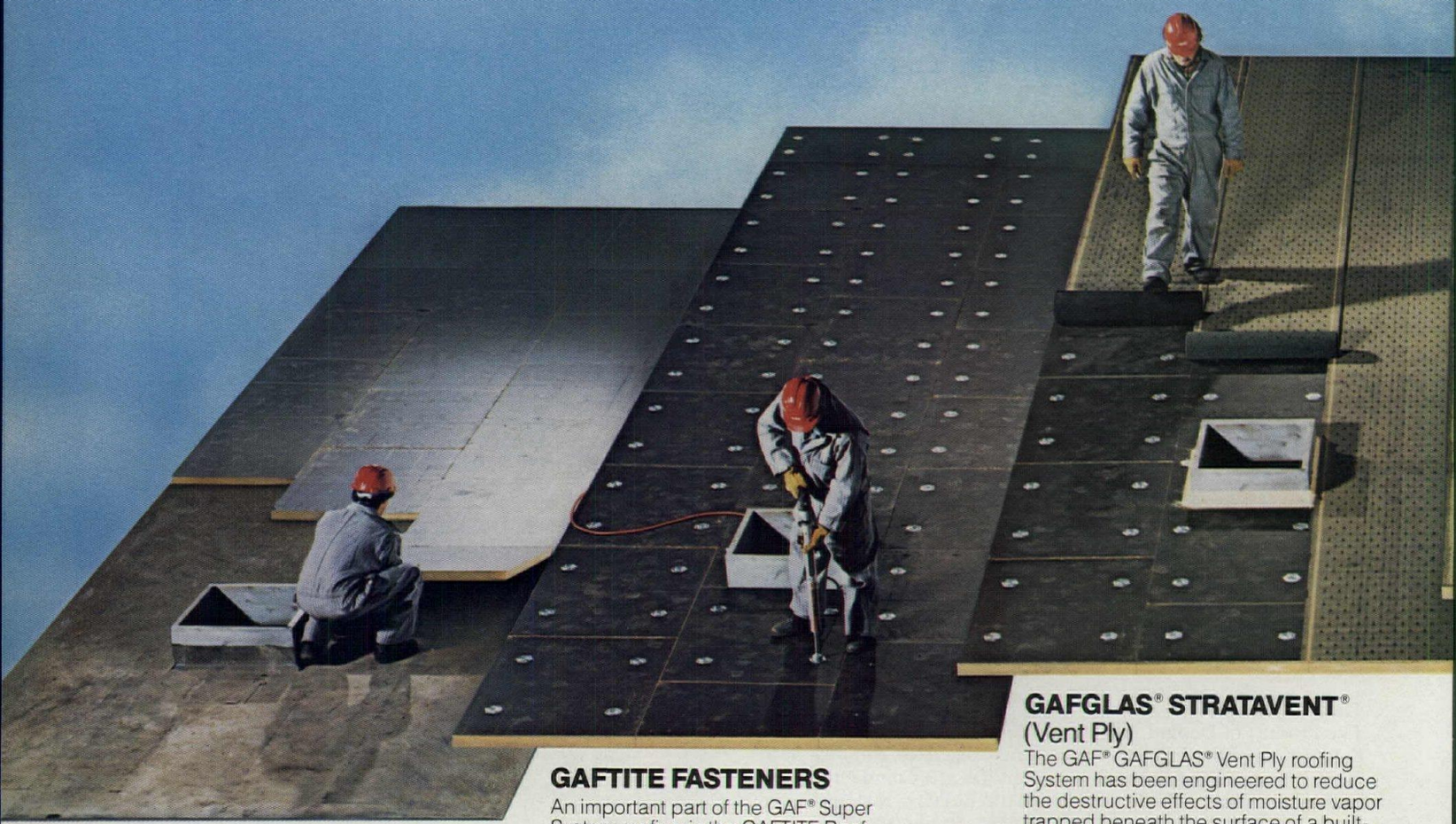
June 4–7
A/E Systems '84, Baltimore Convention Center. Contact A/E Systems, P.O. Box 11318, Newington, Conn. 06111 (203) 666-1326.

June 5–9
ASES 1984 Annual Meeting and Solar Technologies Conference, Anaheim, Calif. Contact ASES, 1230 Grandview Ave., Boulder, Colo. 80302 (303) 492-6017. Also, **June 5–7,** RETSIE '84 (Renewable Energy Technologies Symposium & International Exhibition), Anaheim, Calif.

June 12–15
NEOCON, national contract furnishings trade show, Merchandise Mart, Chicago. (See May P/A for program and list of exhibitors.)

June 17–22
International Design Conference in Aspen, Colo. Contact IDCA, Box 664, Aspen, Colo. 81612 (303) 925-2257.

WE REROOF WHAT OTHERS JUST COVER UP



GAFTEMP® INSULATION

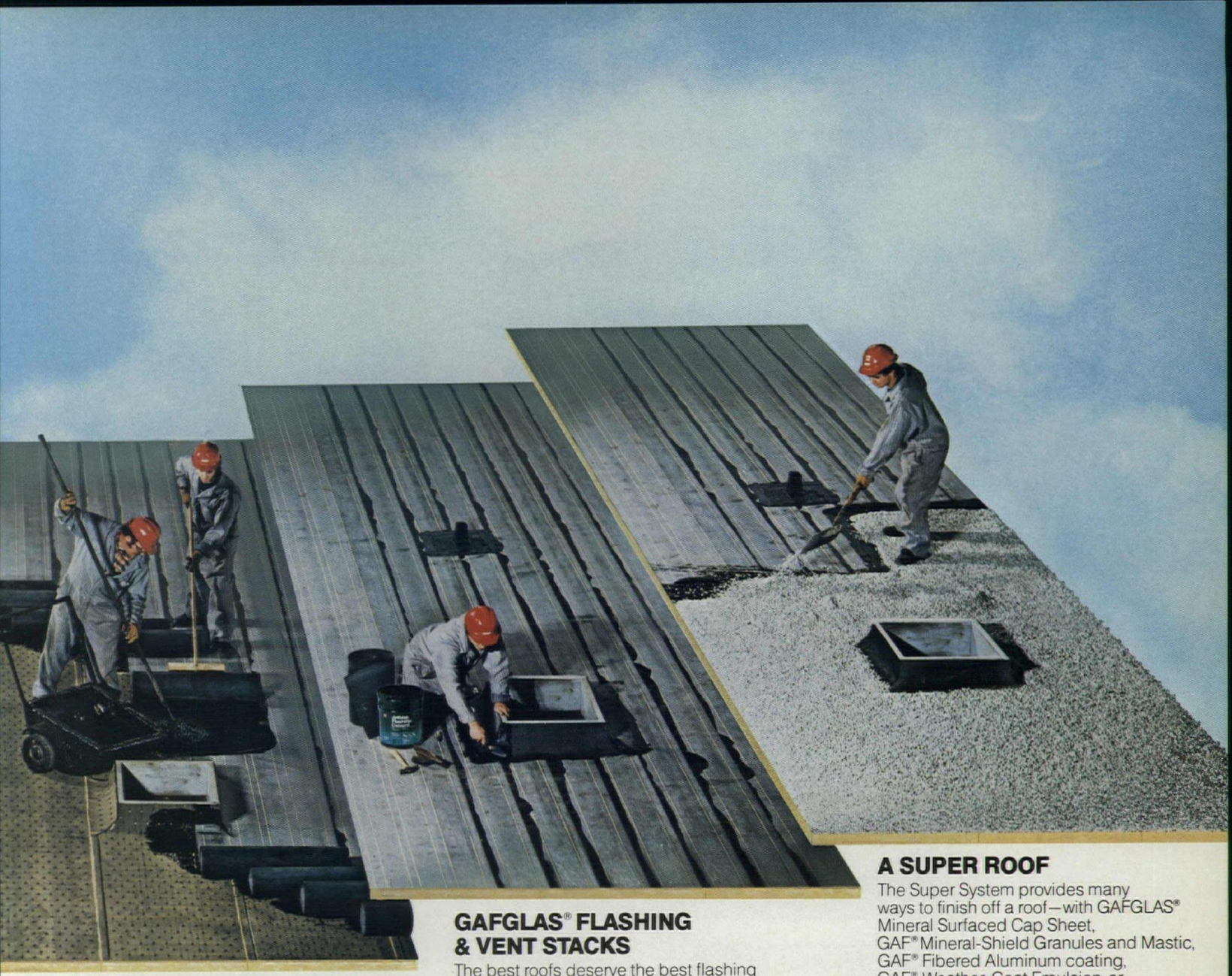
GAF offers one of the widest lines of roof insulation products in the industry. Under the GAFTEMP® name, you'll find six different insulations to choose from as the important first step of the Super System. Here, we're starting with GAFTEMP Isotherm insulation, a non-composite board made up of asphalt-coated facers bonded to a core of isocyanurate foam. No lower "U" value is available in any other FM Class I rated product of equivalent thickness. It's lightweight, easy to handle, and fast to install.

GAFTITE FASTENERS

An important part of the GAF® Super System roofing is the GAFTITE Roof Insulation Fastening System. It's the time-saving, and the money-saving, way to lock insulation down to stay. No more bitumen or other adhesives. No more hot mopping. No more nailing. 50% less labor. Quick and easy installation with half as many fasteners as most traditional nailing methods. Fewer problems during installation and after, with positive protection against wind uplift, vibration, and construction movement. Factory-Mutual Approved Systems.

GAFGLAS® STRATAVENT® (Vent Ply)

The GAF® GAFGLAS® Vent Ply roofing System has been engineered to reduce the destructive effects of moisture vapor trapped beneath the surface of a built-up roof. Granules on the underside of Stratavent Base Sheet provide venting for any trapped moisture vapor. Moisture won't rot, shrink, or expand it. It's easy to apply and can be specified for any type of roof deck. Since it's rolled out dry, it yields significant savings in asphalt and labor. Carries the U.L. Type G 2 BUR label.



GAFGLAS® PLY 4

GAFGLAS® PLY 4 glass ply roofing sheet is the *superior* membrane for all built-up roofs in all climatic zones. You'll like the ease of application. It's light in weight and rolls out fast, so your labor costs will be lower. It has high tensile strength, great dimensional stability, and resists blistering, fishmouthing and rot. Interply adhesion is excellent. GAFGLAS® PLY 4 roofing sheet meets Fed. Spec, SS-R-620B Type III requirements, and exceeds ASTM D2178 Type IV. It carries the U.L. Type G 1 BUR label.

GAFGLAS® FLASHING & VENT STACKS

The best roofs deserve the best flashing —GAFGLAS® Flashing. The specially formulated long fiber glass mat and heavy asphalt coating give maximum protection from the elements and insure long lasting strength and durability. It's easy to install using GAF® Jetblack™ Flashtite Cement, the asphalt plastic cement that's unequalled for longlasting adhesion. And for maximum moisture protection, you'll want to install GAF® Vent Stacks that let warm air and vapor from the sun-heated roof out, and keep cool outside air from coming in.

A SUPER ROOF

The Super System provides many ways to finish off a roof—with GAFGLAS® Mineral Surfaced Cap Sheet, GAF® Mineral-Shield Granules and Mastic, GAF® Fibered Aluminum coating, GAF® Weather-Coat Emulsion, or GAF® Special Roofing Bitumen or Roofing Asphalt and aggregate. Whichever way you choose, you'll have a Super Roof that solves problems, and not just a cover-up.

Reroofing is more than just covering up an old roof with material. It requires a carefully executed plan of determining specific problems, selecting the correct products, and placing the system down with proper application procedures. At GAF, we pride ourselves in reroofing with a time-proven built-up roofing Super System. Shown here are only a few of GAF's roofing products, which also include complete single-ply roofing systems and residential asphalt roofing shingles.

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GAF super system

BEST EVERY STEP OF THE WAY

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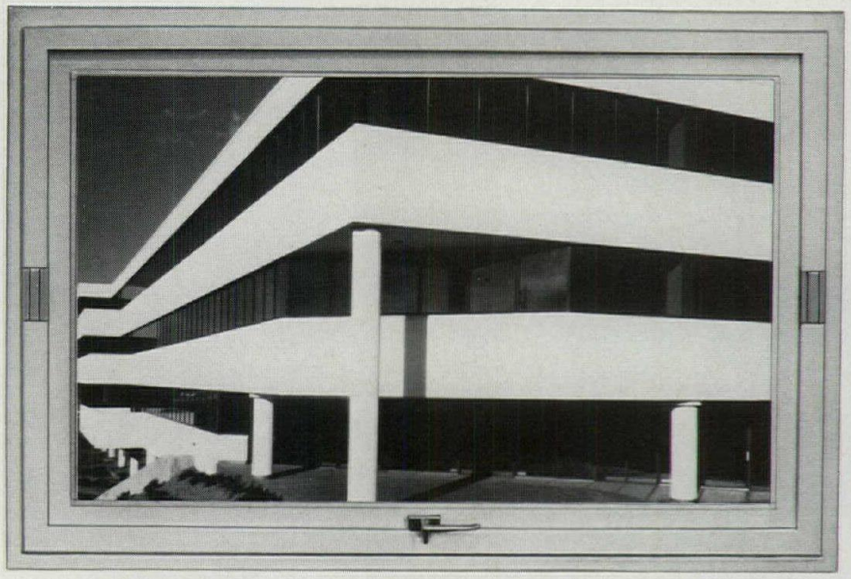
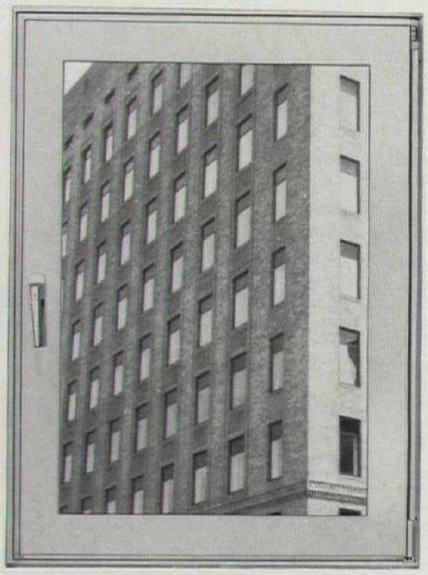
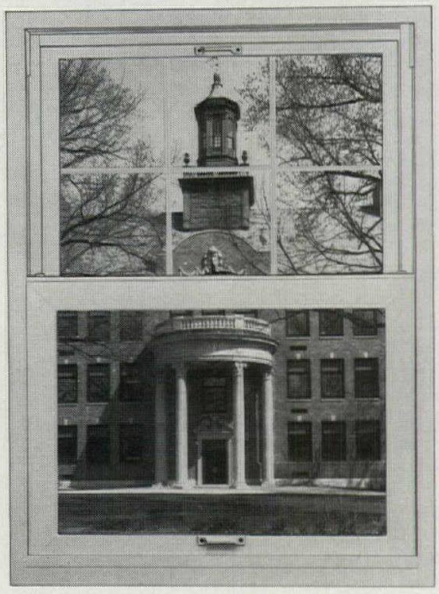
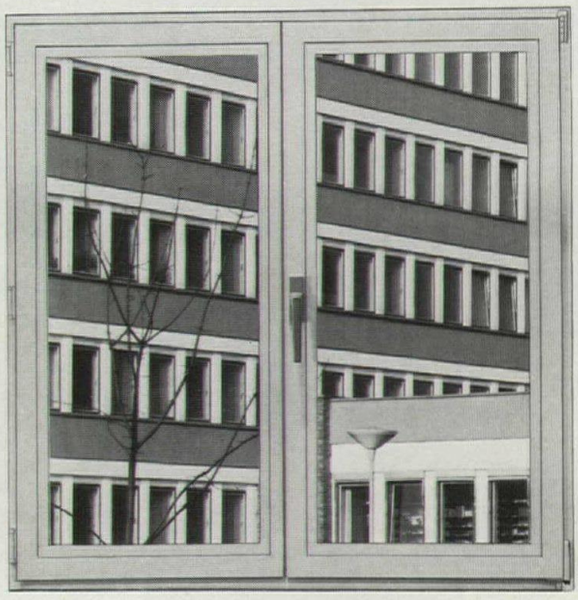




No matter what your design or size requirements, no other window offers the exceptional range of built-in benefits that you get with versatile Trocal PVC Window Systems.





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Beauty: Integral neutral white color for permanence • Also available in 8 attractive exterior colors (co-extruded vinyl/acrylic) • Glass of all types

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Trocal has over 24 years of highly successful applications in commercial and residential buildings.

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WINDOW SYSTEMS

For a more detailed view of Trocal Window Systems, send for your free 8-page brochure, "A New Dimension in Energy Saving," Dynamit Nobel of America, Inc., Trocal Commercial Windows, 10 Link Drive, Rockleigh, NJ 07647.

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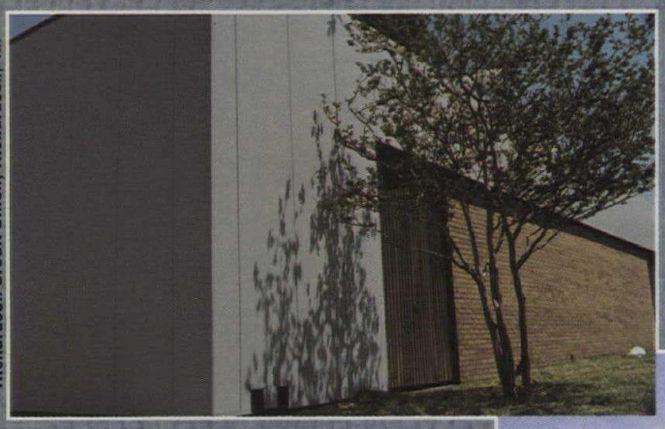

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Maximum Versatility!

- 2½" Foamed-in-Place Insulation
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- 24" and 30" Panel Widths
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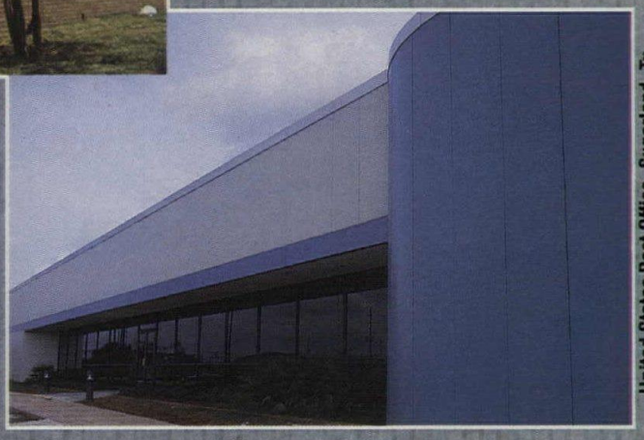

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2½" Thick Insulated Metal Panel. Therm-U-Wall uses urethane, foamed-in-place insulation for premium energy efficiency as well as superior spanning capability.

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PC GlassBlock™ units help to control natural light transmission and provide excellent insulating efficiency. By selecting the appropriate pattern or by specifying on-site sand-blasting of the interior surfaces of PC GlassBlock™ windows, an architect can maintain privacy, exploit natural light to the fullest and reduce reliance on artificial illumination. Employing PC GlassBlock™ panels or windows in a new or renovated building can also result in reduced heating and air conditioning requirements and substantial energy savings.

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P/A Practice

This month, in P/A Practice, Ann Dunning writes on systems drafting in small firms, William Lohmann discusses how to cope with change, and Norman Coplan reports on the legal implications of inaccurate cost estimates.

Systems drafting in the small firm

Most articles on systems drafting emphasize big projects by the big firms. Yet 85 percent of all architectural firms range in size from five to ten persons. But you don't have to be a big firm to use big firm technics. The big firms may have the staff to research and develop new ways of doing work faster, and more accurately, while maintaining the quality of hand-drafted drawings. But the small firms, scrambling to get jobs and then working all night to complete drawings, which are usually of embarrassing quality, can easily adapt techniques of the big firms to their own practices.

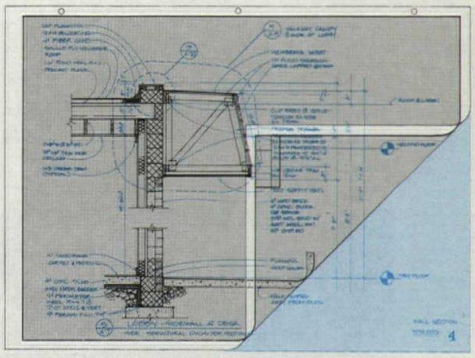
To do so, architects must change their attitudes. No firm can compete in today's economy if it is not using the most effective, most time-saving tools available. Our business is designing buildings and planning environments, not drafting. The drawings are merely a tool we use to communicate our ideas; the more informative those documents, the better the end product.

The first thing to do in adopting systems drafting is to attend a seminar on the subject. While some seminars are available on a national basis at expensive big-firm prices, they also are available through local reproduction houses and through Du Pont technical representatives, who often come into your office and help you with your first project. Several local AIA chapters have held seminars on the subject; other firms even may help.

The systems drafting technique most commonly used is pin registered overlay drafting, although there are four other techniques: cut and paste, subordinate imaging, photo restoration, and photodrafting (P/A Feb. 1984, p. 57). You do not have to spend a lot of money to start overlay drafting. The only thing needed is the pin bar ($18 or less), punched Mylar, and ink pens (pens work much better than they used to and the ink for film dries faster). Drafting on Mylar with ink is faster than pencil, the quality of the drawings is often better, and ink erases faster as well. There are new erasers (PT20) designed especially for erasing ink on film, and Windex can be used with Q-tips to erase larger areas.

Renovation projects offer a good place to start using systems drafting. Begin by having the existing plans photographed on punched Mylar sheets that become the base sheet. Draw the changes on the next layer and the lettering on another layer so that it is easy to erase and does not interfere with mechanical and electrical layouts. Keep the layers to a minimum for the first project. The base layer of the floor plan can be made into a slick, with one sent to each consultant for schematic design. The consultants have to draw only that required for their own disciplines; the background is kept under the architect's control. Consultants can run check prints by simply taping their layers together with the slick and running the layers through a standard diazo machine, or sending the layers to the repro house for a composite slick and a number of copies for checking, pricing, or client review. The smaller firms must use the repro house and its tools to best advantage; they often can't afford the $35,000 necessary for in-house reproduction equipment. Using the repro house seems more expensive, but it will save you time and allow you to try all the techniques involved in systems drafting. Also, the expense of the repro work is reimbursable by some clients.

Once you start using systems drafting you will be surprised, not only at all the time you'll save (often 25 to 35 percent in drafting time), but at all the ways you can use its tools. You'll find that systems drafting, rather than limiting your creativity, allows you to be much more creative by eliminating the repetitive part of your work. The only disadvantage of systems drafting is that you must organize your work. The discipline of organizing work and assigning layers to drawings is basic to CADD systems (although it is surprising the number of firms, both small and large, that have neglected systems drafting, which has been available to them for over ten years, while being the first to seriously consider CADD). If you have not yet learned to separate data into three or four layers,



imagine learning to use the 250 or more layers available on a CADD system.

Of course CADD systems may be a great sales tool and in the past year have become easier to use and more affordable. But for a firm to use any CADD system efficiently from the very first, it must understand all aspects of systems drafting. Who can afford building a data base and entering standard details on a CADD system that might cost $2,000 per month? When those tasks are accomplished through systems drafting, the CADD system will start paying its own way.

A CADD system should not replace systems drafting. It is simply another tool to add to the systems drafting techniques. CADD will make some tasks faster, easier, more accurate; other tasks cannot be done efficiently with CADD. When you consider the cost ($30,000 to $75,000 or more) and how long it has taken for the big firms to get their CADD systems to be productive, you must question the wisdom of a small firm, with very limited funds, taking such a big step without any preparation. The best preparation for any size firm is systems drafting. It teaches you to organize the work, the documents, and the people who work on those documents. It introduces you to a variety of techniques and enables you to choose the best and most efficient for each part of the project. By starting small, keeping it simple, and learning step by step, systems drafting produces results in quality and in profits. [Ann M. Dunning]

Ann M. Dunning, *AIA, is the principal in the firm Ann Dunning, AIA, Inc., located in Chagrin Falls, Ohio.*

Coping with change

We hear it from all sides: "tendency to fall behind" . . . "living in a time of the parenthesis" . . . "victims of change." But we do not need reminders. We need help. We have already experienced greater changes in our lifetime than the world has known in its history. And the rate of change is accelerating. At a recent design conference in Houston, the moderator observed that we have gone through several architectural styles in the time it used to take to build a cathedral.

Much has been said about the forces of change that are dramatically reshaping our society. When the ten o'clock newscaster describes the closing of another factory in the United States, we recognize it as a symptom of the shift to a global economy. Communication systems that will foster decentralized work patterns are already in place. From lifestyles to television channels, we live in a multiple choice world.

Development of the computer has been a major factor in these trends. It was directly responsible for initiating some of them, such as the swing to an information society, and is now affecting the direction and impetus of others. If, as has been suggested, computer information has a half-life of as little as three months, we can expect even more precipitous changes ahead.

The effect of such rapid change on architectural and engineering practice is overwhelming. The construction industry traditionally has been conservative, slow to try new products and reluctant to change its ways. Now, products appear overnight that have seen little or no field experience. Materials developed for unique applications in another industry are marketed for construction without knowledge of (or even concern for) their compatibility with other materials. In addition, regional and national distribution lines are fading, and relative cost data become unreliable over a short period of time. Product literature and test data are quickly obsolete.

As a beleaguered resource person, the specifier must make an increased effort to keep up. Current information is essential for design, estimating, and bidding. That will mean more reading, many telephone calls, and continuing education, including college courses and in-house product presentations and training seminars. Because of their flexibility, small firms will find it easier to adapt their office procedures to new demands. But larger firms will also have to make the effort.

Changing ground rules will thrust us into new ways of doing things, and we must learn to use them. We will need to review and revise familiar communication lines with consultants, contractors, and attorneys. New filing systems may be necessary. Initially expensive, word processing equipment is now cheaper to operate than a manual typewriter. It is also an effective means for managing data files and indexes for office literature. Computer-aided design and drafting systems are applicable to most work. Toll-free telephone numbers already make a manufacturer's current technical information instantly (and economically) available. By using Sweet's Buyline Service to find a local representative or telephone number, a nationwide databank can be tapped. Carrier Corporation may have been the first producer to put its design catalog on a computer diskette, but it will not be the last.

As an individual, the specifier will experience adverse reactions to change, finding it to be unsettling, perhaps even threatening. That part of human nature stems from the development of comfortable patterns that allow us to function more or less efficiently, in which any challenge is met with subconscious resistance.

The patterns are not immutable, however, and we must recognize and work with the forces of change, sometimes even becoming an agent for change. Knowing of new potential imposes a responsibility for evaluating and utilizing it. The specifier, at the creative center of technical services for a firm, may be

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in a unique position to do that. It takes a special insight to keep track of the broad changing picture while struggling with day-to-day demands. It also helps to be achievement oriented, focusing on results.

In the future, we must learn to live with temporary routines, knowing that they will change. The best way to accomplish a task will be "best" for only a limited time. Ambiguity and uncertainty will be even more a part of our daily concern than they are now.
[William T. Lohmann]

William T. Lohmann, *AIA, FCSI, is Specifications Manager for Murphy/Jahn, Chicago.*

Malpractice claims for inaccurate cost estimates

The responsibility of an architect under the usual owner-architect agreement to provide statements of probable construction cost, if not carefully exercised, can jeopardize his fee and otherwise subject him to claims for damages. Many factors not under the control of the architect have an impact on construction costs, and therefore the architect's function of estimating costs can indeed be a hazardous one.

The standard AIA form contract provides that because neither the architect nor the owner has control over the cost of labor, materials, or equipment, or over the contractor's methods of determining bid prices, or over the competitive bidding market, the architect does not warrant or represent that any bid or negotiated price will not vary from any statement of probable construction cost which he prepares. In spite of this disclaimer, however, architects are often subject to claims for damages premised not on a guarantee of costs, but rather on the architect's alleged negligence in providing such estimates of cost. Obviously the greater the disparity between an estimate and the bid price, the greater the probability that the architect's performance will be successfully challenged.

One of the unsettled issues relating to the liability of an architect in furnishing cost estimates is whether a court or jury may infer negligence on the part of the architect based solely upon the magnitude of the disparity between the bid or negotiated price for construction and the architect's cost estimate, or whether negligence can only be established through expert testimony. This was the issue considered in a recent case (*Pipe Welding Supply Company, Inc.* v. *Haskell, Conner & Frost,* 469 N.Y.S. 2d 221) in which the plaintiff-owner sought to recover from an architect the fees that it had paid him, contending malpractice in negligently preparing statements of probable cost. The architect in turn sought to recover from the owner the balance of the fees earned but which had not been paid. The plaintiff had entered into a contract with the architect to design a new building containing offices, a store, a warehouse, and a repair maintenance area. The plaintiff anticipated that the project cost would be between $500,000 and $600,000 but conceded that no absolute limit had been fixed. The last estimate provided by the architect for the construction cost was $609,790. Five contractors submitted bids, the lowest of which was $816,000 and the highest $890,000, a range from 33 to 45 percent over the architect's estimated cost. After efforts to reduce the cost were unsuccessful, the owner informed the architect that it did not wish to proceed with the project. At that time, 80 percent of the architect's services had been completed, but the architect had received only approximately 50 percent of the fee to which he would otherwise have been entitled based upon a rate of 8 percent of the cost of construction.

At the trial, the plaintiff presented the testimony of an architect who was not familiar with the details of the project but who stated that a variation of 10 to 15 percent between estimate and actual cost was allowable or standard and that a greater difference would indicate to him that the architect had not used the skill and judgment ordinarily possessed

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by proficient architects. He conceded, however, that he could not state with certainty that every time a bid exceeded an estimate by more than 15 percent, malpractice had occurred. The defendant offered proof, including expert opinions, that he had followed proper practices and that because of the volatile nature of the market in the past years, the degree of variance was not indicative of inadequate performance.

The Court charged the jury to "decide whether the bid submitted was so far out of line with what the defendants gave as their probable cost as to indicate (to the jury) that they did not exercise the reasonable skill required of an architect . . . or whether the divergence is not so great as to indicate a departure from (applicable) standards." The jury ruled in favor of the plaintiff-owner, awarding him damages in the amount of the fees paid, and dismissed the architect's action to recover the balance of his fees. Upon appeal, the verdict was reversed on the ground that it was improper to allow the case to go to the jury based solely on an inference of malpractice drawn from the discrepancy between the bids received and the cost estimate.

In support of its reversal, the Appellate Court stated:

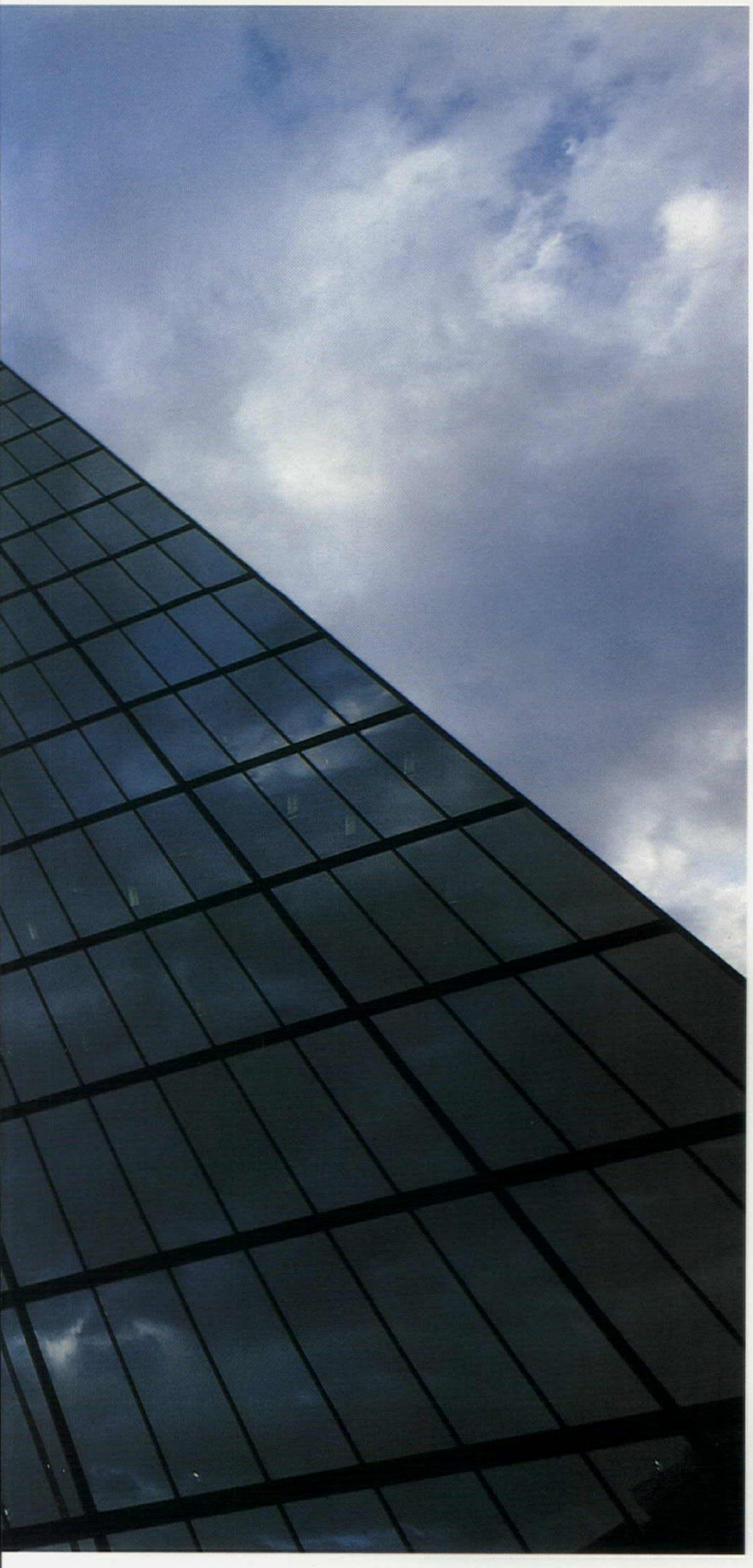
"In proving architectural malpractice, the Court of Appeals has held that a plaintiff must present expert testimony in support of the allegations except where the alleged act of malpractice is within the competence of laymen to evaluate. . . . Plaintiff pointed to no specific negligent act or omission as a cause of the injury sued for. Thus, it appears that if a recovery is to be permitted in this case the principles of res ipsa loquitur *must be relied on.*

"The rule of res ipsa loquitur . . . *permits a jury to draw an inference of negligence, without direct proof, where the surrounding facts proved present a great enough probability of negligence. But the rule allowing such an inference cannot be applied if a plaintiff's damages can be accounted for on any reasonable grounds other than the defendant's negligence.*

"Here, plaintiff offered lay proof in support of its theory that the malpractice complained of was caused by the architectural firm's negligently designing a building too expensive for plaintiff's requirements and budget. This theory, it would seem, could have been established through the expert testimony of another architect showing that defendant's evaluation was in error. Plaintiff made no attempt to do so. It is not proper to rely on an inference of negligence where, as here, specific acts of negligence, if existing, could be shown."

The Court concluded that since the plaintiff failed to establish malpractice, the defendant-architect was entitled to recover on its counterclaim for the unpaid portion of its fee.
[Norman Coplan]

Norman Coplan, *Hon. AIA, is a member of the law firm Bernstein, Weiss, Coplan, Weinstein & Lake, New York.*



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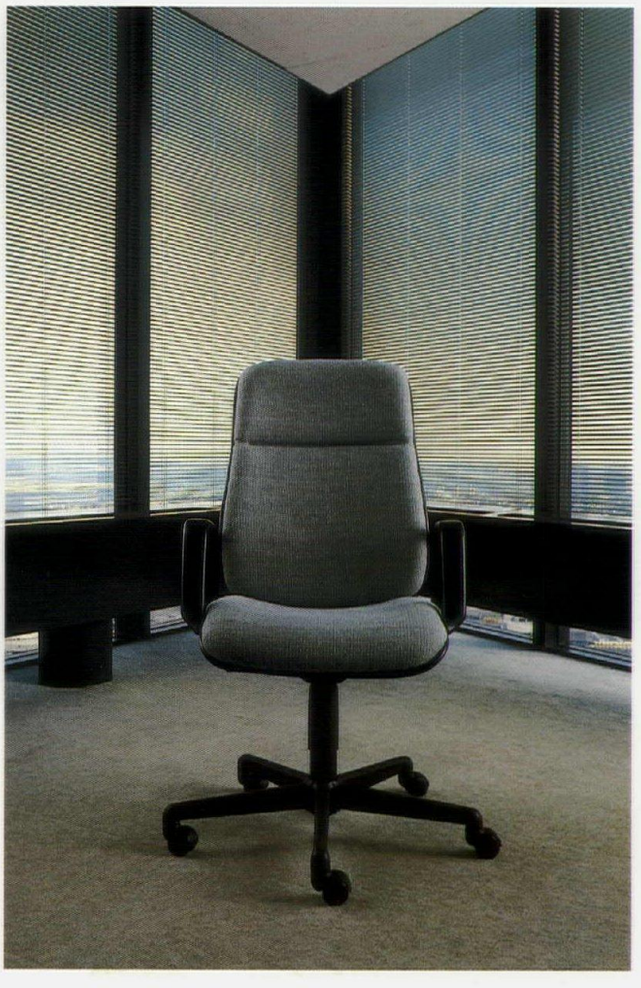

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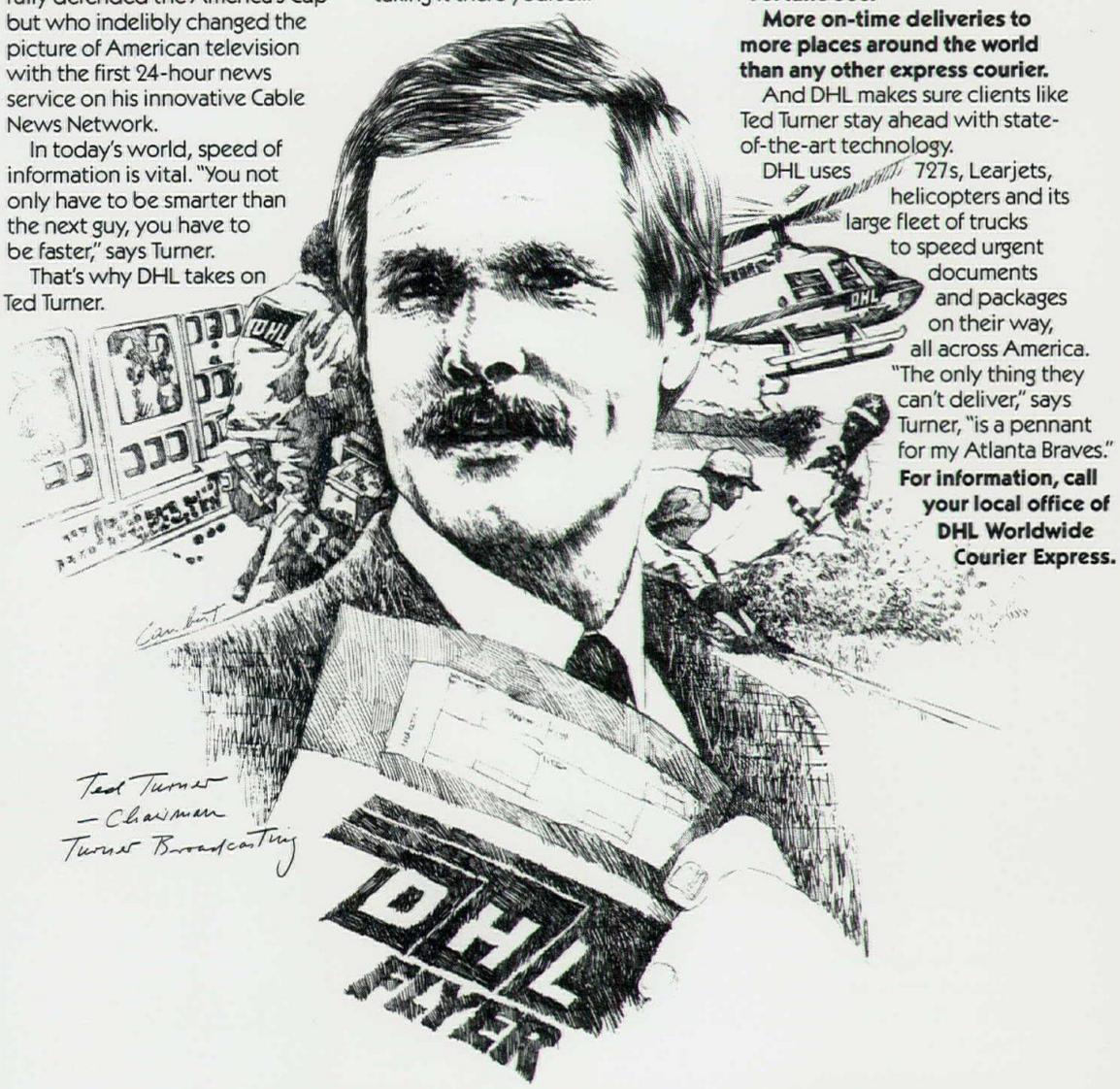

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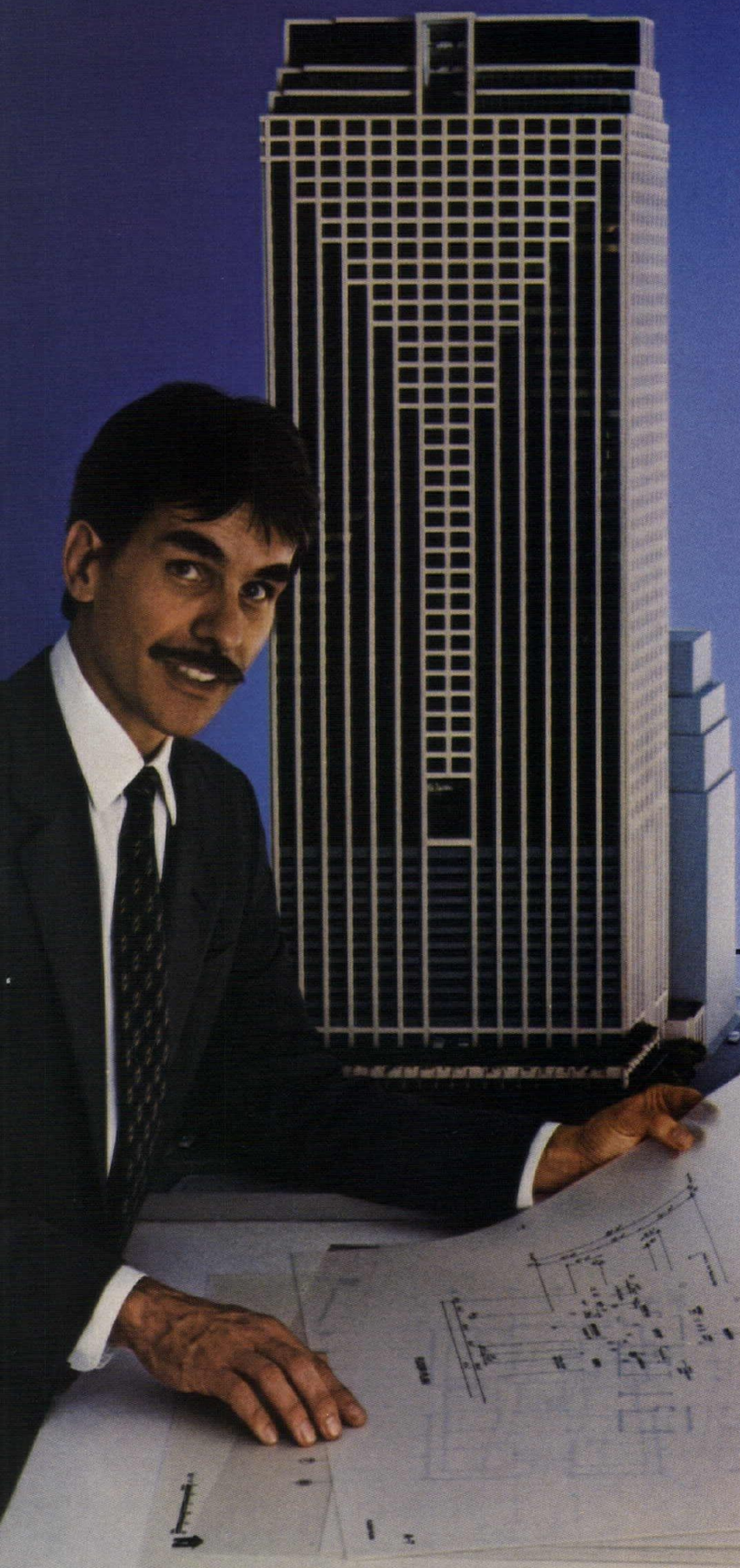

James W. Rivers, Vice President
The Mathes Group (formerly Mathes, Bergman & Associates, Inc.), New Orleans, Louisiana

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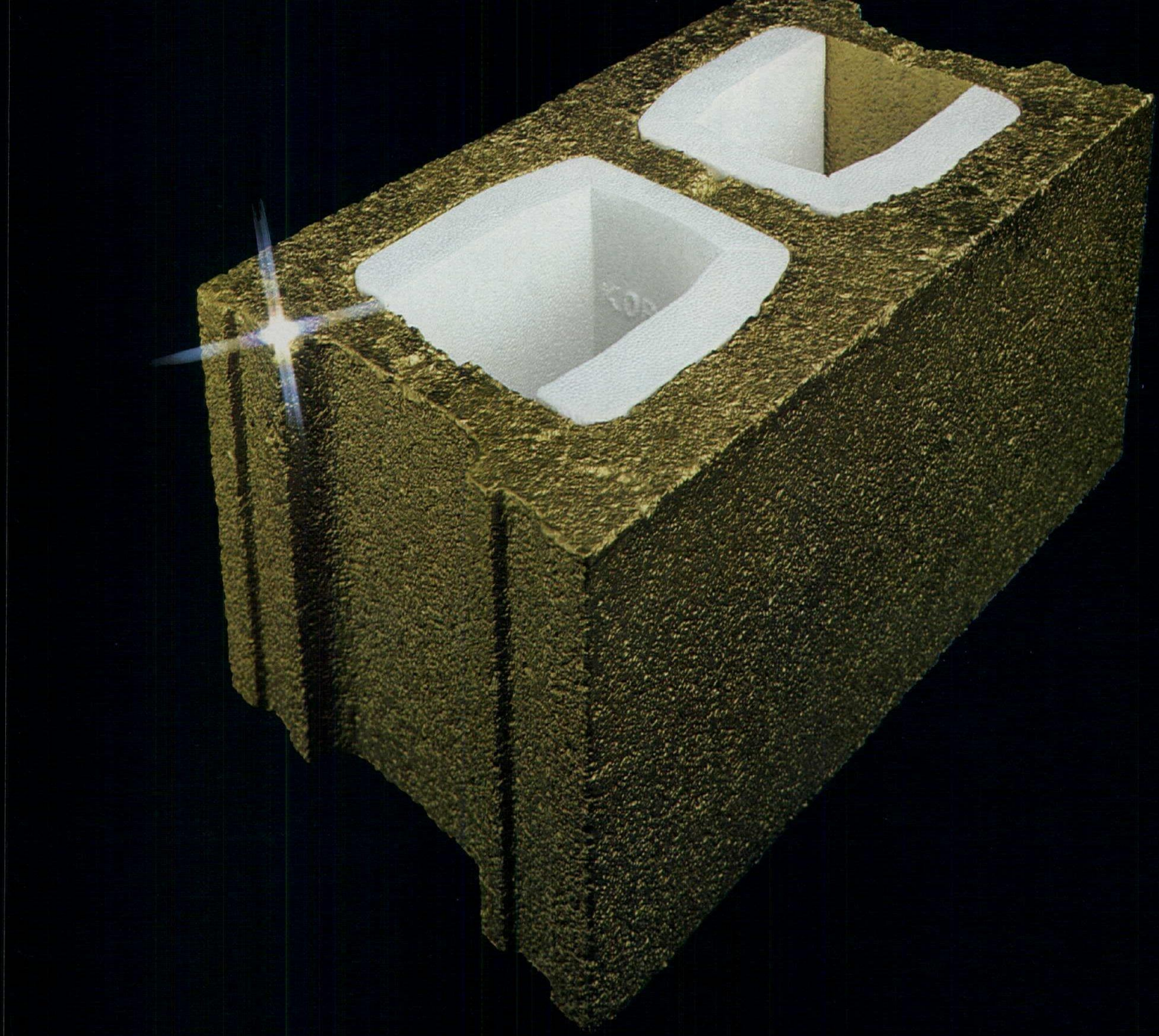

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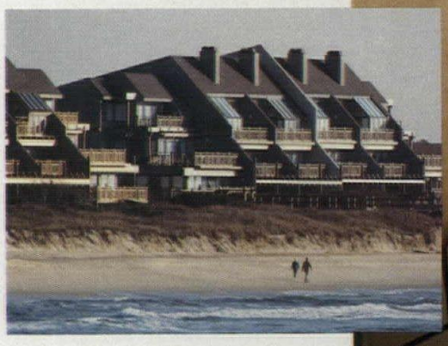

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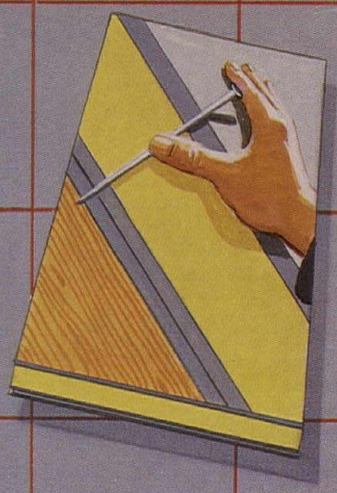

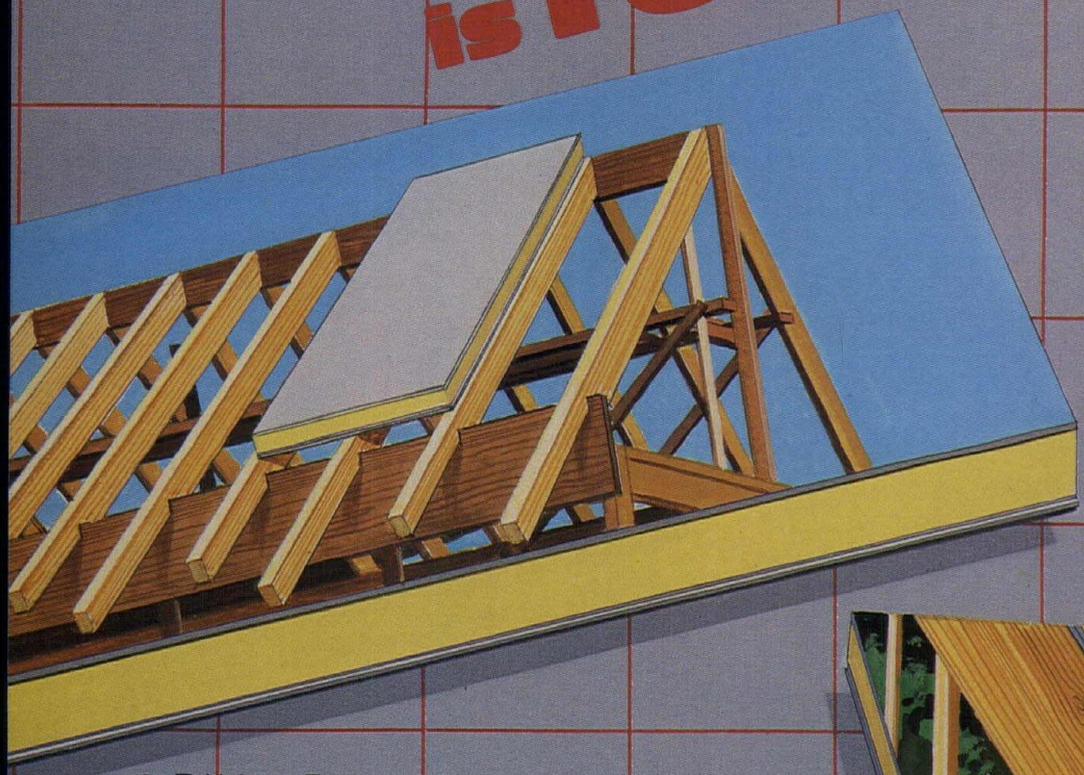

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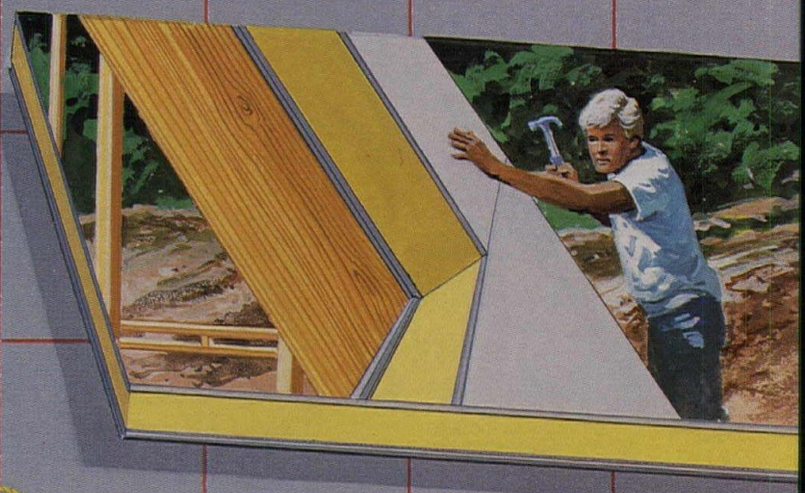

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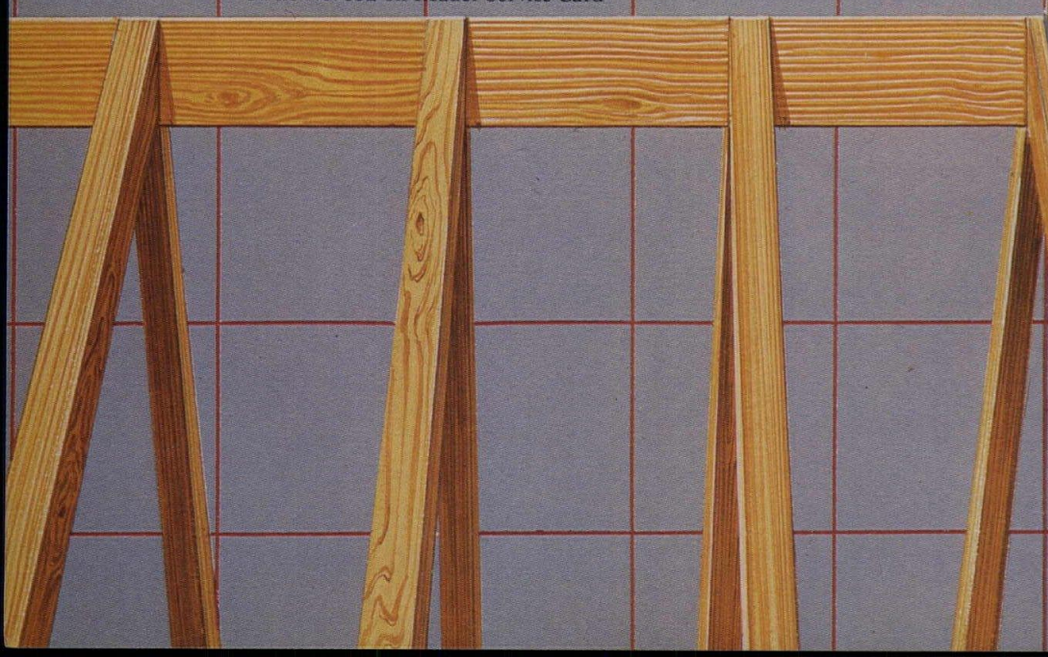

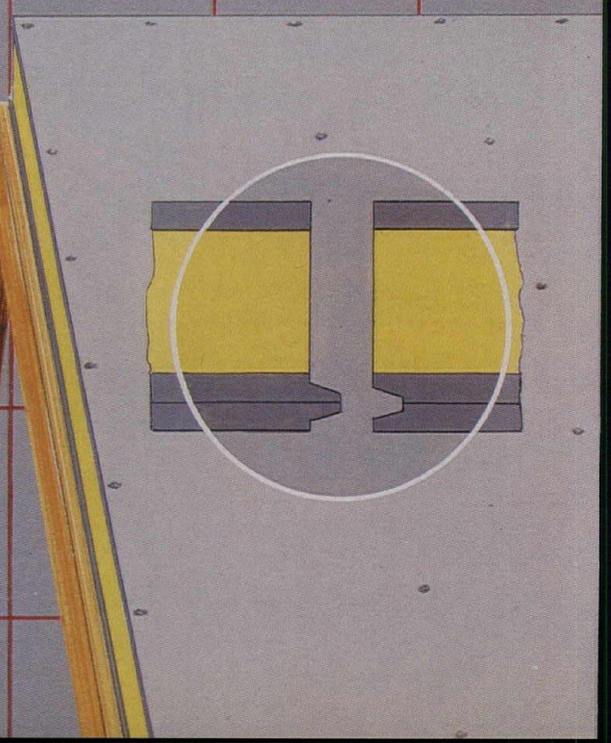

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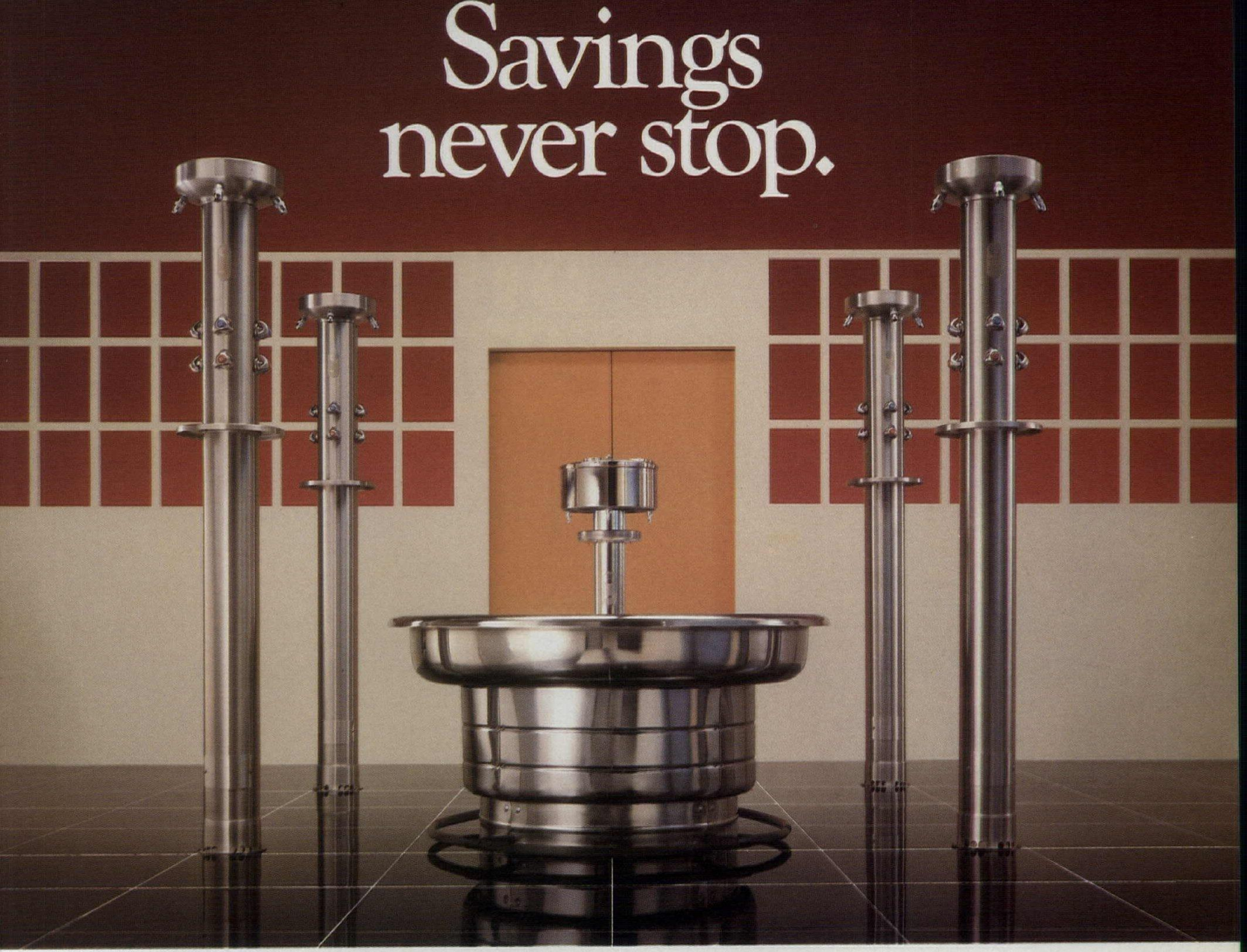

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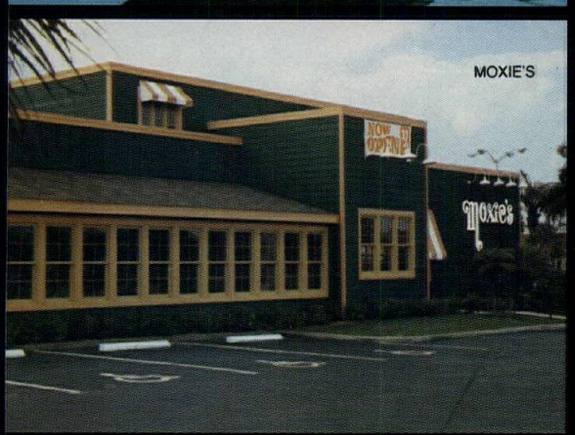

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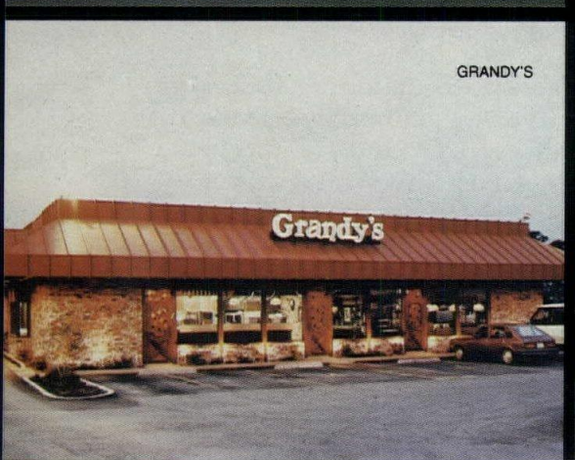

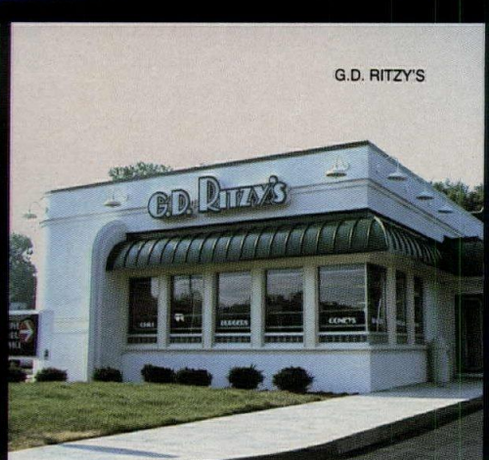

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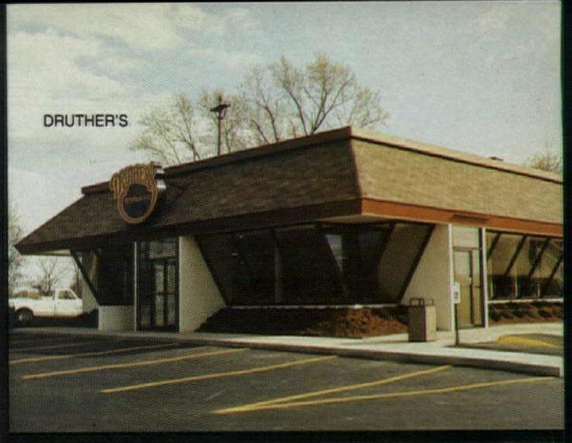
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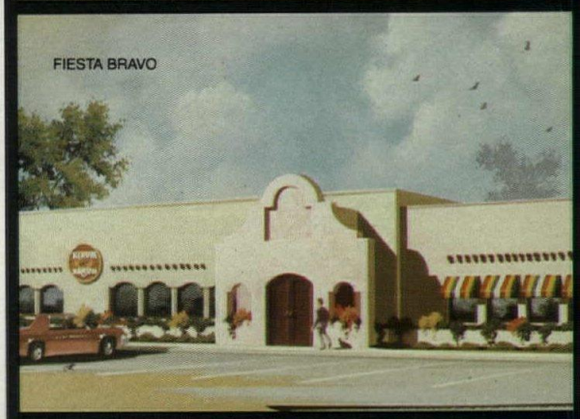
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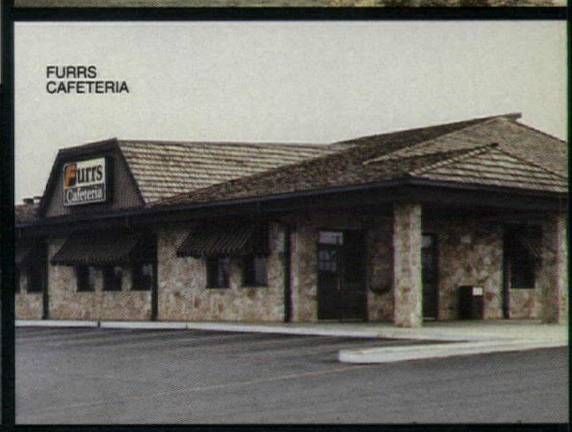

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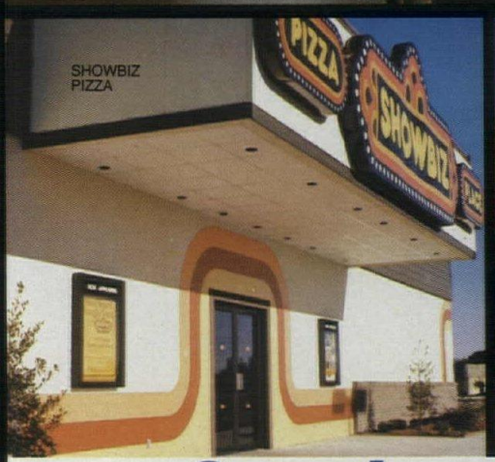

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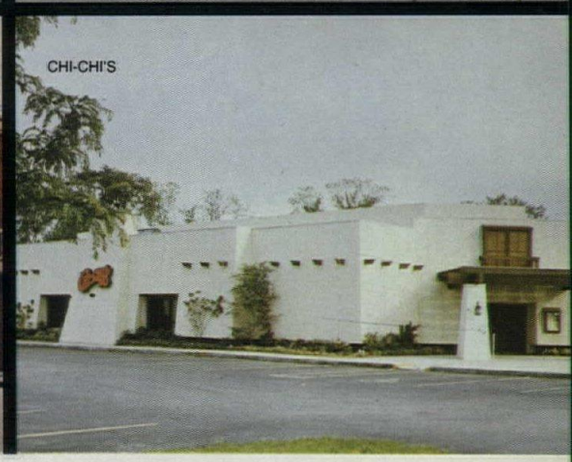
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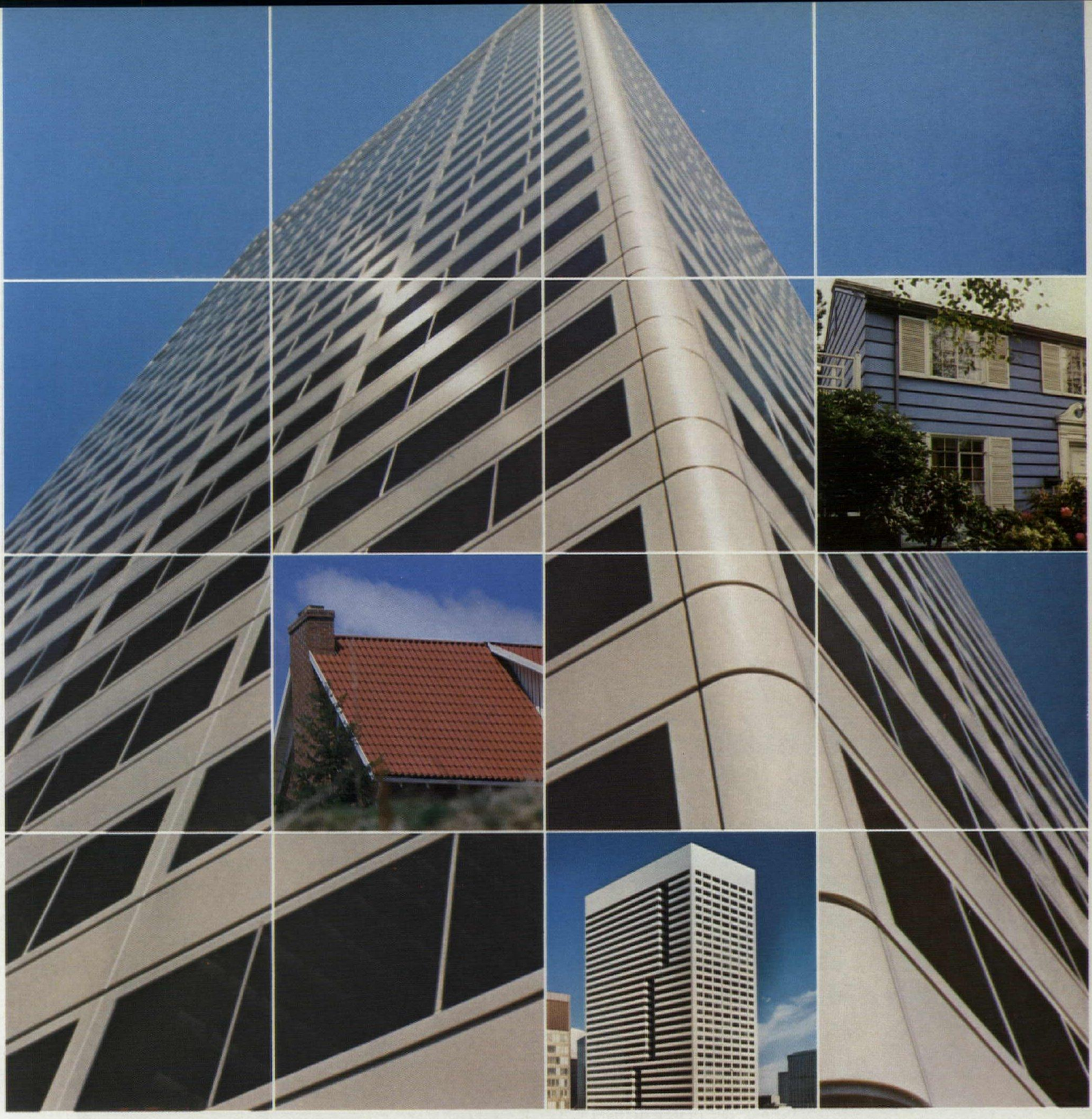

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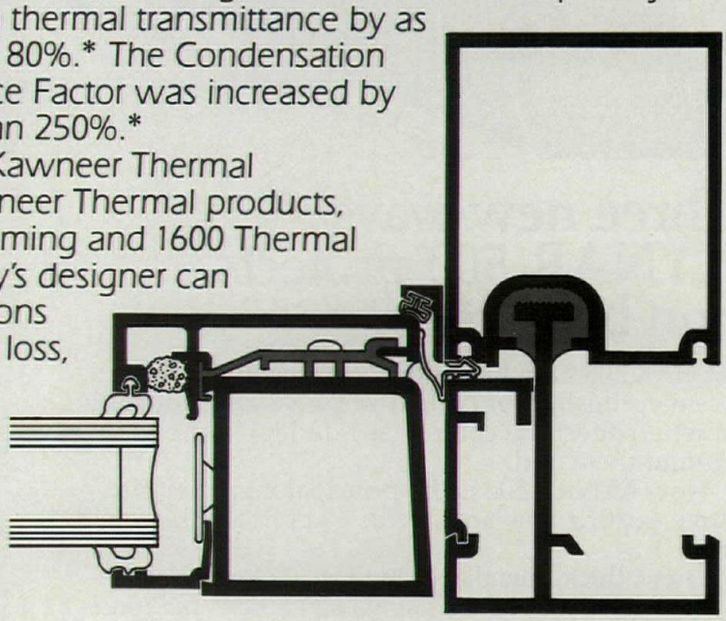
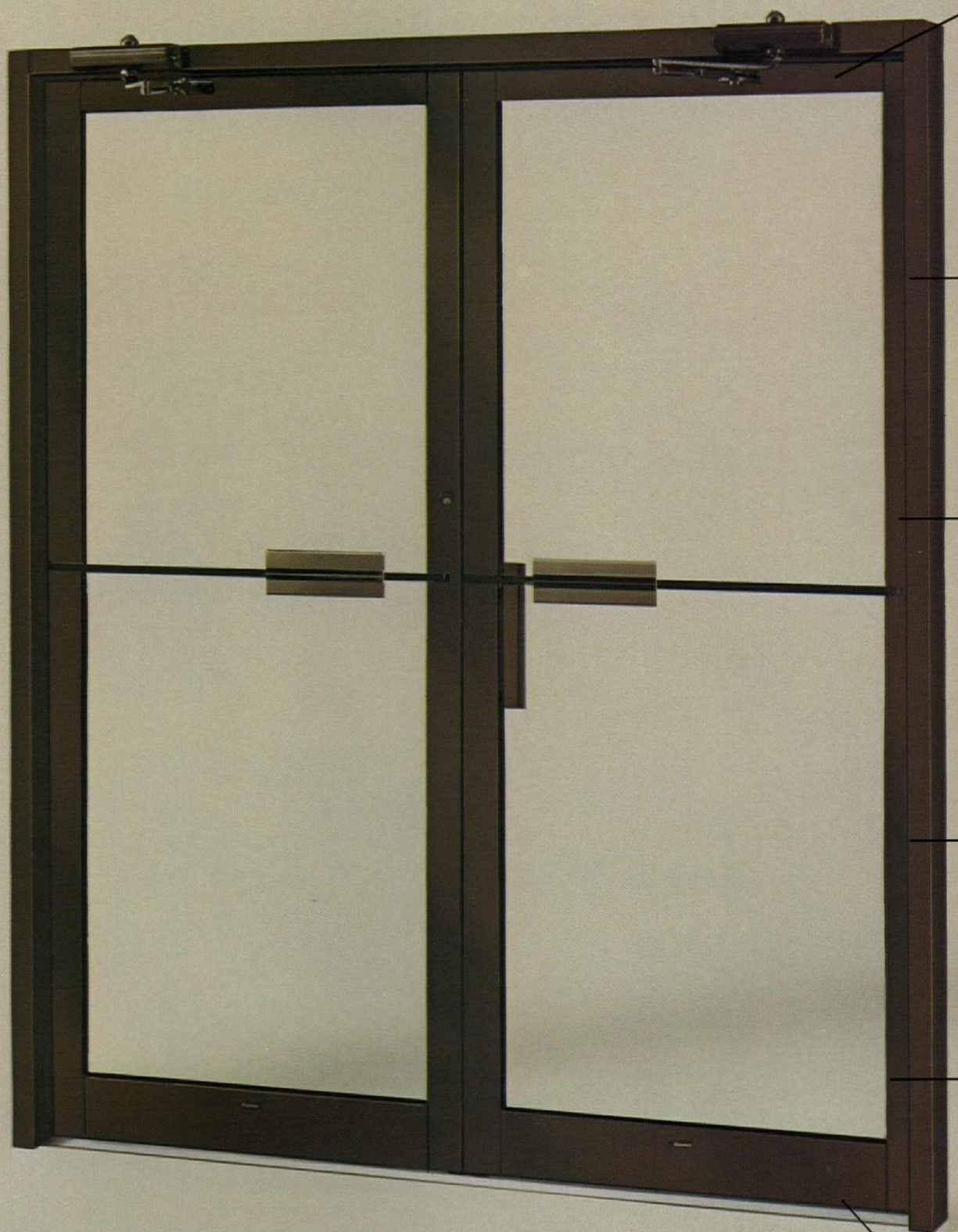
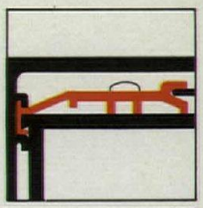


*Test results available on request.





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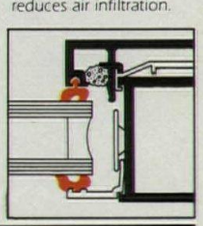

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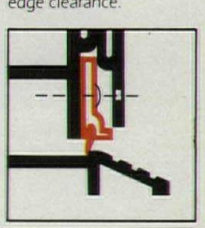

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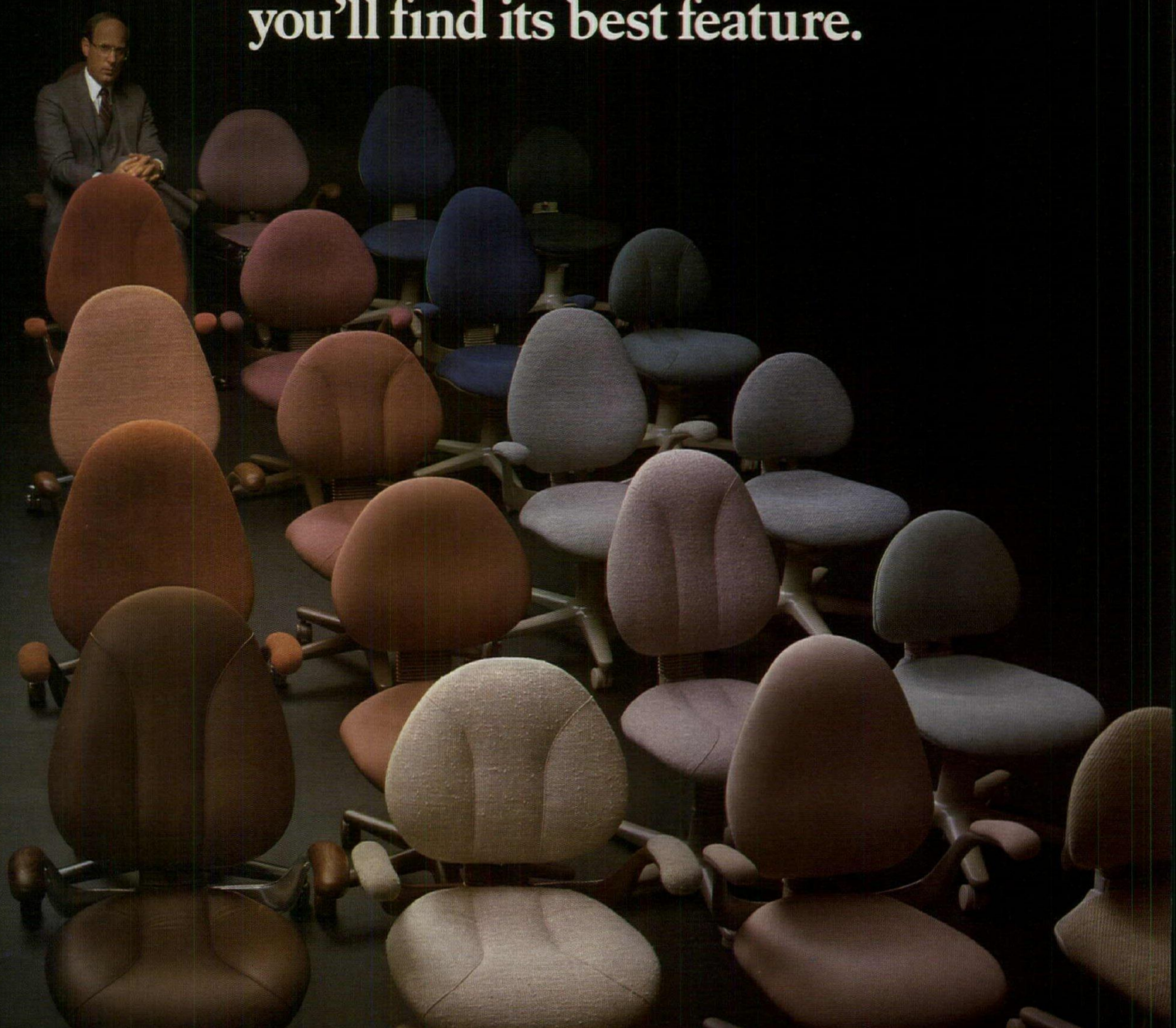

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Energy and design

Let's face it. Energy-conscious design has not always produced the best architecture. To some, that doesn't matter; they see energy conservation not as an aesthetic issue but as a technical or even a moral question: If we reduce the energy consumption of buildings in this country, should we care what they look like?

To those at the other end of the ideological spectrum, the disparity between energy and design also doesn't matter. They see energy conservation and aesthetics as separate issues, and as the responsibility of different professions. Architects should concern themselves with design; engineers, with energy.

There are those, however, to whom the design implications of energy-conserving buildings do matter. They see passive conservation strategies especially offering a new formal basis for design—a real alternative to Modern asceticism or Post-Modern aestheticism. They think that a building's thermal and luminous environment is not only within the architect's purview, but among those responsibilities architects have regretfully abdicated to engineers within the last 50 years. And they seek regional architectural vocabularies rooted to specific climates and cultures.

The articles that follow, while diverse, all have as their intent the integration of energy and design. They deal with subjects not normally associated with energy conservation but nevertheless crucial to its success: understanding the people who must work in passive solar structures (Sally Woodbridge's article, p. 86); educating those who own and operate energy-conserving buildings (Penny Loeb's article, p. 92); exploring the effect of the thermal and luminous environment on a building's form and organization (Harrison Fraker's article, p. 104); and emphasizing the importance of climate-responsive buildings to an environment's character and identity (Technics article, p. 98).

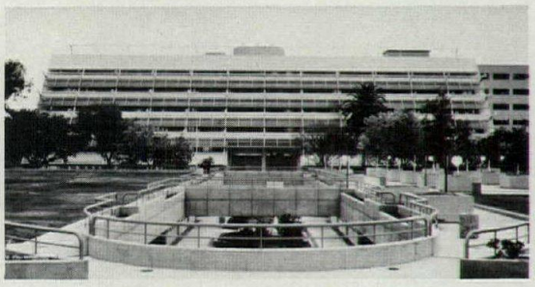
This is not to say that the gap between energy and design hasn't already been at least partly bridged. Look at the sophistication of the best energy-conserving details in Thomas Vonier's article (p. 94). Look at the integration of ventilating and shading strategies within the regionalist forms of Fernau and Hartman's Maoli House (p. 114). Or look at the number of energy-conserving buildings that have won P/A awards in the past and at the number of firms who have made energy conservation an established part of their design process. To recognize and encourage that, we intend to publish throughout the year, not, as in the past, in one issue, buildings that successfully integrate energy and design. We believe that the best energy-conscious design can now compete against the best work the profession has to offer. And we hope that it provides incentive for those who, like us, believe that the integration of energy and design is a goal worth pursuing. [Thomas Fisher]

Governing energy

The last of the much discussed solar state office buildings in California are complete. They show how dependent solar strategies are on our expectations.

More than the usual office worker, the civil servant has been stigmatized as a drone working in a hive. Our image of the faceless bureaucracy is reinforced by its depersonalized, hermetically sealed environment. The miles of corridors and acres of fluorescent-lighted office landscape guarantee that those who feed at the public table cannot be too comfortable doing it.

Because of the post-World War II population boom, California once led the nation in the construction of government office space. From the 1950s into the 1960s, the Office of the State Architect in Sacramento was the largest architectural office in the world. Around the state, slabs and boxes in



The Benham Group

Nacht and Lewis

The Employment Development Department Building (top) combines (somewhat illogically) movable collectors and a sloped façade. The building's strength lies in its solar imagery. The Energy Department Building (bottom) uses movable vertical louvers to shade the windows, a strategy that visually unifies the building but one that removes the user's control over light or view.

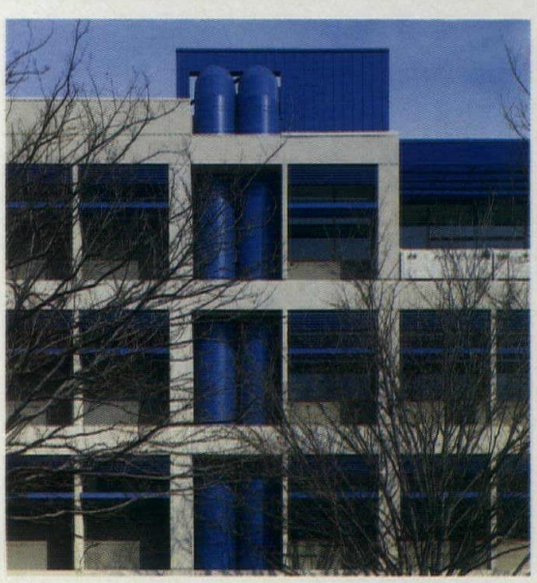
straitened versions of the current Modern Movement idioms housed the burgeoning state agencies. Then, under the governorship of Ronald Reagan, the Office of the State Architect and its building program suffered an attrition that many subsequently considered a blessing. When Reagan's policy of renting space from the private sector proved uneconomical, it gave his successor, Jerry Brown, the opportunity to create a new building program. Brown's newly appointed State Architect, Sim Van der Ryn, proved to be, like other Brown appointees, the kind of maverick public servant who was empowered by his radical convictions. To reform government's image, starting with the workplace, seemed to him a reasonable course of action.

Government office workers in Sacramento deserve a well-tempered workplace and need to identify with its place in the city. In the generation of post-war office buildings, their indoor needs have been measured and served by the central heating and cooling plant. Outdoors, beyond the Edenic park surrounding the Capitol, a feeling of anomie signals arrival in the district to the south and west of the Capitol where most of the government agencies are located. Although these conditions were substantially irreversible, the 1970s energy crisis provided a mandate for the reconsideration of building design. With energy conservation as the banner issue, Van der Ryn developed a program that also considered the overall quality of the working environment both inside the buildings and outside on the street.

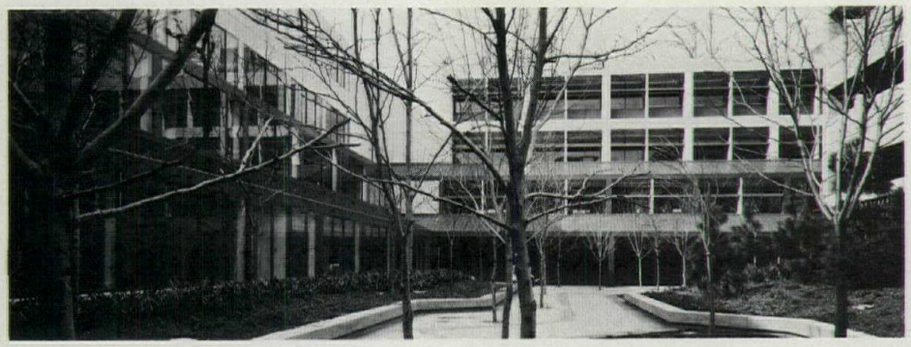
To promote a new community image for the redevelopment area south of the Capitol Mall where sites existed for the new office buildings, Van der Ryn had the Capitol Area Plan revised to reflect an urban village concept of low density and mixed use. To humanize the scale of the new buildings and reduce elevator use, a four-story height limit was imposed. Other strategies, which had the dual benefits of saving energy and ameliorating the workplace, were advocated. Courtyards, traditional ingredients of the California lifestyle, would provide more window walls and thus more daylighting for offices. Giving workers such homey options as opening windows and turning the lights on and off were thought conducive to a new sensitivity to the human environment.

By now, the program has been implemented to a degree that makes an evaluation of its effectiveness appropriate though, for reasons discussed below, conclusions are still premature. Of the eight projects completed, most have had under two years of occupancy. Perhaps the only safe conclusion possible at this writing is that it takes more time for people to change the habits and attitudes they have acquired from years of conditioning elsewhere. The benefits introduced by the programmers may not at first strike the occupants as outweighing the discomforts of change. For the general public, all the verbiage about passive energy conservation technology has created the illusion that the systems are truly compatible with human conduct, no matter what that is. In actuality, a tremendous amount of tinkering has been required to keep them in order, and occupant

The Water Resources Building (below) faces Roosevelt Park to the south. (Visible at the far left in the top photo is a 1960s high-rise state office building.) Color is used within the deep walls of the Water Resources Building to express the function of different elements: blue for sunshades and HVAC system, red for window frames, gray for enclosing walls, and white for the structure.



Photos: Rob Super



Rob Super

The first two buildings mentioned are in Sacramento on the periphery of Roosevelt Park. Along with the Bateson Building (P/A, August 1981, pp. 76–81), they occupy three corners of the intersection on the northwest corner of the park. The other two sides of the park are lined with housing, as the Capitol Area Plan proposed. Walking around the park gives a sense of the new landscape envisioned nearly a decade ago. While it is still suburban in character and dominated by the car, there is a diversity of human occupation

The courtyard view of the Water Resources Building (above) shows the flush glazing facing north and the shaded glazing facing east. The exterior shading devices (right) screen most direct sunlight and bounce indirect daylight deep into the building, allowing perimeter lights to remain off most of the time. The drawings (opposite) indicate how the sunshades, light shelves, and narrow plans work to increase interior daylight.

Harvey Bryan

control of the interior environment seems to have reverted to opening and closing doors for entrance or exit and not operating windows, lights, or shades. Whether this says more about the buildings or the people is hard to decide. Between the design of buildings and their construction are the budget reviews, which change specifications, as well as other intervening variables, which may adversely affect the buildings' performance. Unconventional systems are at the mercy of unsympathetic managers. All of the above have happened to the new buildings, raising questions about the merits of innovation. Clearly, intensive education programs should precede occupancy of buildings that call for different patterns of use that affect many people. A closer look at three of the most recently completed state buildings—the Energy Resources Conservation and Development Building, designed by Nacht and Lewis, the Water Resources Control Board Building, designed by MBT Associates with Sam Davis, and the San Jose State Office Building, by The ELS Design Group/SOL-ARC--helps to clarify issues and problems.

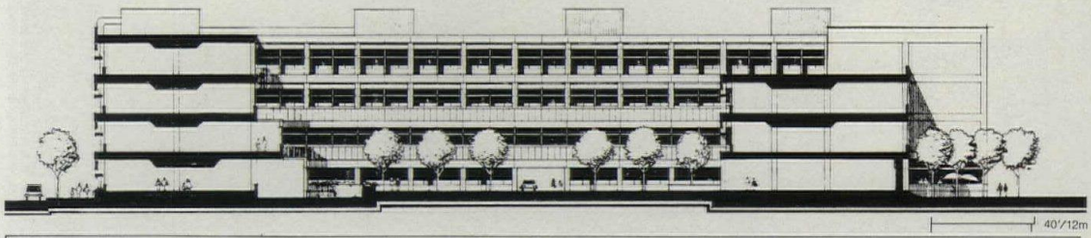
and use that makes the area more congenial than the single-use blocks toward the Capitol Mall.

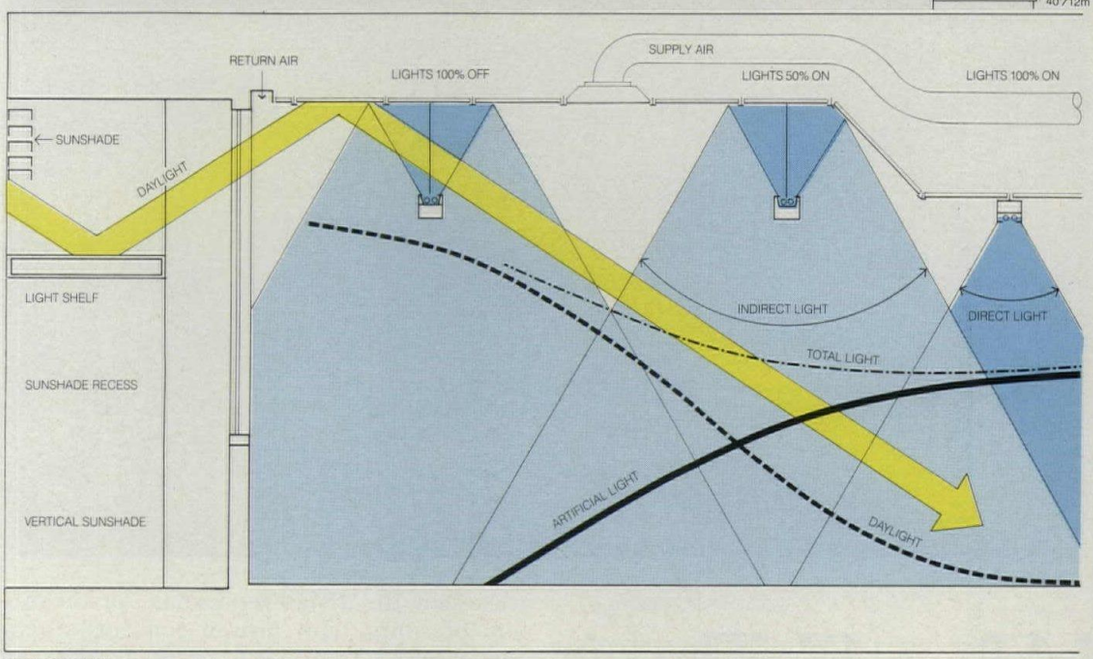
Directly north of the Energy Building, the last of the high-rise, slab-form state buildings, constructed in the late 1960s before the freeze, dominates the skyline—a grim reminder of the norm. To its west, the bermed block with the underground building of the Employment Development Department complex provides public open space, but lacks urbanity because of its removal from the sidewalk level. Directly to the north, the sloping, collector-bearing wall of the main EDD building, the 1977 competition winner by Benham Blair Affiliates, provokes some of the same feelings of human insignificance as the 1960s state building does, but for different reasons. Here the cause is the facelessness of technology. At the time of the competition, solar imagery was compelling enough to split the jury in favor of a scheme which, as it has turned out, has had no succession. If anything, the subsequent buildings have moved toward less formal emphasis on energy con-

servation as well as fewer and simpler strategies for obtaining it.

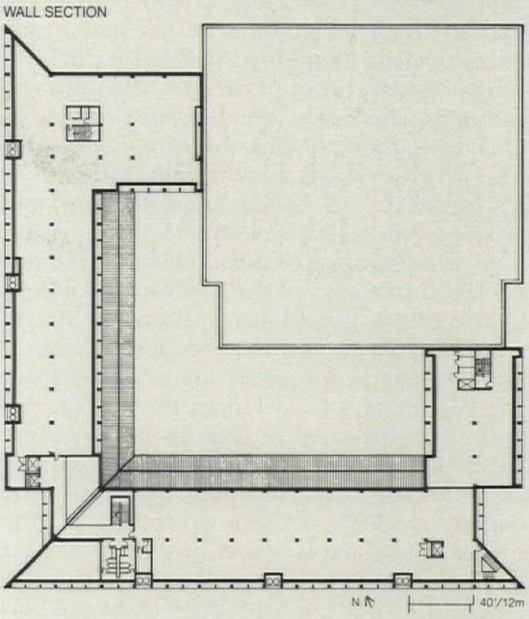
The progression from more to less is clear in a comparison between the Bateson Building, designed under Van der Ryn by a team composed of Peter Calthorpe, Scott Matthews, and Bruce Corson, and the Energy and Water Resources buildings. Whereas the Bateson Building is almost a catalog of brightly colored, energy-conserving elements, the two other, smaller buildings are more conventional.

The Energy Building's most obvious statement about energy, the system of vertical fixed and movable metal louvers that admit light in varying degrees, is visually and psychologically problematic. On the exterior, the louvered bands give the building a mechanistic character, which the occupants experience as frustration because they can neither control the louvers nor avoid seeing through the windows. That the rest of the structure is monochromatic only serves to rivet attention on these elements of the building at the expense of other, more appealing aspects, such as the stepped mass, which minimizes the scale and creates more perimeter wall area for increased daylighting.





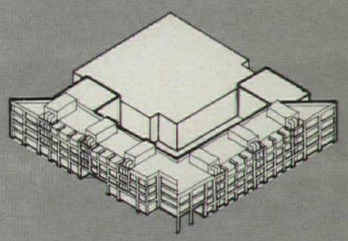
WALL SECTION



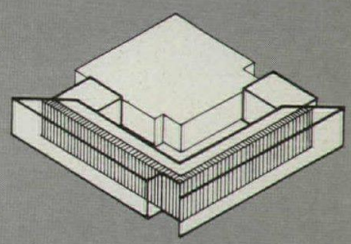
Like the Bateson Building, the Energy Building has an interior court. But in comparison with the former's large and airy space, this one seems rather mean and grim. Gone is the diversity of color and form. Yet the most insoluble problem results from a budget cut that changed the movable louvered ceiling to a fixed, tentlike structure, pulled away from the edges of the court just enough to admit torrents of rain. Fortunately, during the longer dry season, people can and do enjoy the decks, which complement the offices on several levels.

Across the street, the Water Resources Building is the most discriminating statement about architecture and energy. The crisp wall structure stands out cleanly from the energy components, the fixed metal sunshades and exposed air ducts leading to roof-top mechanical units. The color scheme of white and blue accented with red is particularly handsome and appropriate for the agency. As the archi-

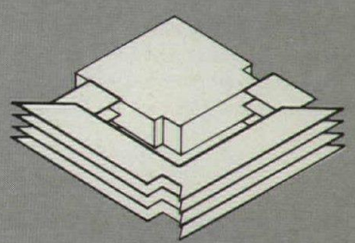
ENERGY CONCEPTS



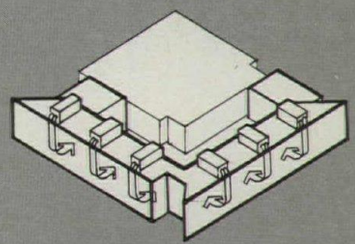
Shading
Fixed horizontal and vertical elements shade the building from direct sunlight, reflect daylight into the building, and prevent penetration of low angled morning and afternoon sun.



Daylighting
The narrow floor plan places most work space near natural light, reducing the need for artificial lighting and cooling. The artificial lighting is coordinated through a photocell activated and microprocessor controlled dimming system.



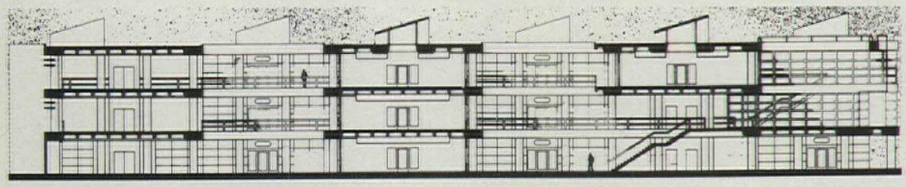
Thermal Mass
Because of the wide diurnal temperature variations in Sacramento, cool night air is used to reduce the temperature of the concrete floor mass and cool the building for much of the following day. This system uses off-peak electrical rates to run the fans.

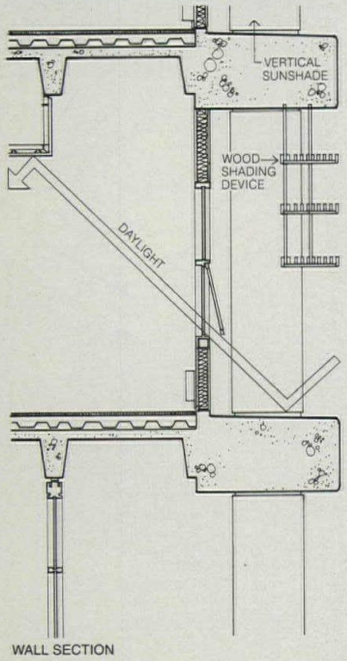


Decentralized HVAC
The rooftop air-handling units have supply and return ducts on the building's exterior, which eliminates the need for internal chases. The low velocity, variable volume air handling system uses an enthalpy controlled economizer.

John Sutton Photography

San Jose's state office building (below and right) creates an extensive daylighted perimeter within a rectangular building through the use of interior courts. The structure, rather than the sunshade, acts as the light shelf to reflect daylight. As in the Water Resources Building, a clear distinction is made between sunshade, enclosing wall, and structure. Also, as in the Water Resources Building, north-facing glazing is flush with the structure's outer edge. The air view (opposite top) reveals the extent of top-floor skylights and the shaded courts.





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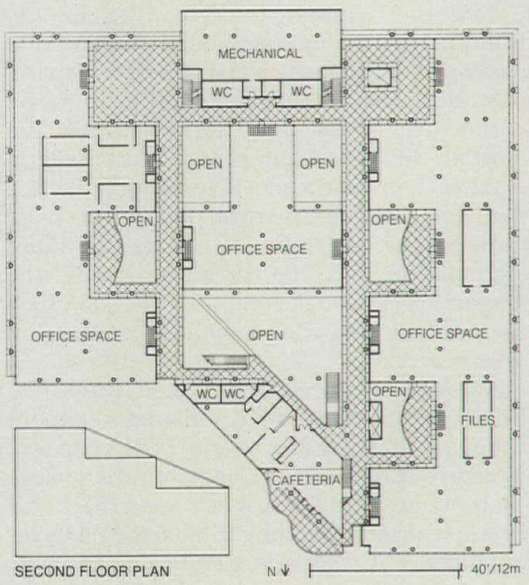


SECOND FLOOR PLAN

tects state, the design represents "an integration of simple and proven concepts which contribute to an efficient yet uncomplicated approach." The building design had to accommodate a four-story parking garage on the northeast corner of the site. Making a virtue out of necessity, the designers opted for a narrow, uniformly massed, L-shaped building, which encloses a court within the block. Entrances are set back behind diagonal wall sections that follow the street to the corner. The main entrance thus complements the cutback entranceways of the other two buildings on the intersection while respecting the street.

When foliage from the generously landscaped beds in the court finally screens out the garage, it will no longer intrude on this pedestrian area. Auto access from the garage through the court is happily limited to a few hours in the late afternoon. Otherwise, the court provides a pleasant prospect from the offices. The narrow offices provide abundant daylighting and a feeling of access to the outside world. Yet even the floor plans are vulnerable to ill-considered interference. On the top floor, conventional walled offices, installed after the building was occupied, have obviated the architects' attempts to provide shared daylight and views.

Thanks to the Capitol Area Plan and the employment of outstanding architectural talent, the area is a distinctive place. In San Jose, a hundred miles or so southwest of Sacramento, the state office building is also in a redevelopment area, but one which is in flux. Although the building faces a landscaped pedestrian mall called the Paseo de San Antonio, the other three sides are, variously, a parking lot, a parking garage, and the new federal courts building. This context will change with the implementation of the new Silicon Valley Financial Center Master Plan by SOM-San Francisco. Instead of the tiered concrete fountain, which now occupies the mall opposite the state building's main entrance, there will be a large retail structure (a small one was originally planned for a portion of the space cut out from the corner of the state building) with a circular sunken court and elevation designed in a configuration to direct the mall toward a diagonal passage cut through the next block to the east. The Paseo will terminate in a gate to San Jose University. The new development will strengthen the edges of the area and create many more destination points—offices, shops, convention facilities, housing—than now exist in the eight blocks. Still, a concentrated urban mix is some years in the future. At present, the Paseo is not heavily used; those who come to the area are mostly on errands or business connected with government.

Twenty agencies plus the offices of two state senators and an assemblyman occupy the three-story state building. The design emphasizes the structural concrete frame in a matter-of-fact way. Wooden louvered sunshades, maroon metal spandrels, and red rooftop monitors warm the exterior. Some of the occupants complain that the building too much resembles its adjacent parking garage, but the severity of the exterior serves to heighten visual diversity of the interior. The plan employs two large and five small courts to maximize exterior wall area for daylighting and to create an open and informal shopping-mall character. Exterior galleries were linked to make the circulation "crystal clear," as stated in the state office building program developed for Van der Ryn by Bobbie Sue Hood. Also to this end, a pyramidal concrete directory was placed inside the court opposite the main entrance.

Alas, the diagrammatic clarity of all this does not easily translate three-dimensionally to those unaccustomed to the building. Puzzled people wandering around the galleries asking for directions are a common sight. Although more and better signage will soon correct the situation, there may be a more subtle issue. By now, in office buildings of any size the public has been conditioned to expect a certain configuration of space in the form of an elevator lobby with a wall-mounted directory. Circulation is limited to going up or down in the elevators or in and out of entrance doors. To be confronted with the choice of courtyards, stairs, and elevators to upper galleries may be a pleasant prospect in a shopping mall, but in an office mall it can be disorienting unless the visitor has prior experience with such things.

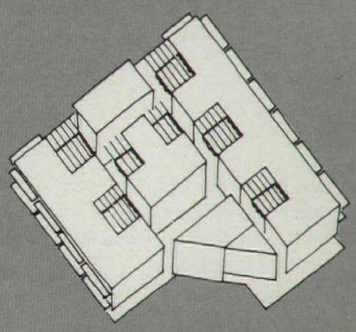
Steve Proehl

John Sutton Photography

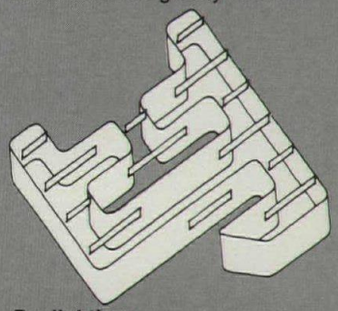
For the employees, the visual menu offered by the courts is appetizing. The small scale of the office units and the proximity of desks to windows with views not only humanizes the scale of the building but also permits visual communication across the courts. Actual use of the courts as social spaces is not yet very great, another indication that people need more than a year to settle into a place.

The San Jose building has also had its share of successes and goofs in operating its energy-conservation program. The perimeter lighting, for example, was zoned separately to to be controlled by rooftop photo-cell sensors. Instead of the several sensors specified by the SOL-ARC energy consultants, only one was mounted. Nevertheless, the new generation of state buildings is succeeding remarkably well considering the ambitions of the program. It appears to be stalled under the present governorship. More's the pity since now is the time to learn and to build for the future. [Sally Woodbridge]

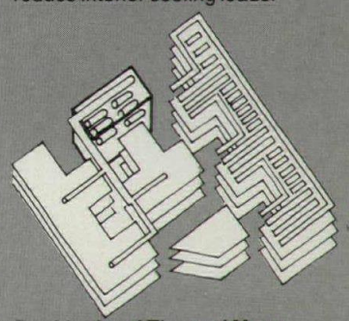
ENERGY STRATEGIES



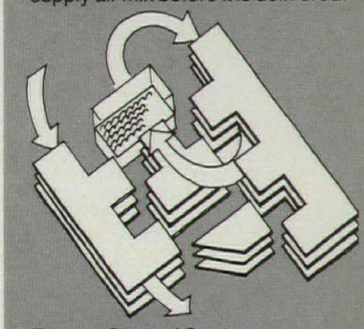
Sunshading
Shades over the courtyard and on the walls protect the building against direct solar heat gain but let in usable daylight. By dealing with the sun on the building exterior HVAC loads inside are greatly reduced.



Daylighting
The courtyard geometry increases the glazed building perimeter. With north/south light monitors on the rooftop, virtually all the lighting needs for the third floor are met naturally. Both strategies significantly reduce interior cooling loads.



Rockbed and Thermal Mass
The concrete floor system acts as a sponge to soak up heat generated inside the building by lights, machines, and people. Cool nighttime air is used to flush the heat. The rockbed is then used to cool off the supply air mix before it is delivered.



Energy Control Systems
Centralized variable volume HVAC, night ventilation, and economizer cycle, and the rockbed cooler are all computer coordinated. Artificial lighting is governed by a two-tier system of perimeter shut-off zones and interior photocell dimmer zones.

Solar, once removed

Just five years old, the solar collectors at the Cary Arboretum have been dismantled, with lessons learned on all sides.

The Cary Arboretum in Millbrook, N.Y., created to "forswear dependence on petroleum," replaced its active solar heating with propane boilers in June 1983. Since the solar heated Plant Science Building opened in 1978 (P/A, April 1979, pp. 124–127), the system had had several problems, including summer overheating, costly repairs, and high operating costs.

In the spring of 1983, the Arboretum, whose Institute of Ecosystem Studies is an educational and research arm of the New York Botanical Gardens, weighed five years of high solar costs as it decided to enlarge the building to house an expanded educational program. Consultants were hired to determine whether solar was the most economical and effective way to heat the larger building. A study by The Ehrenkrantz Group and Syska & Hennessy, showed it would cost between $70,000 and $90,000 to repair and expand the solar, compared to $35,000 to install the propane boilers. At current prices, the study predicted propane would cost $800 to $1800 less than solar to operate each year. However, though cheaper, propane will probably use nearly one-third more fossil fuel than solar, taking into account the oil and coal burned to generate electricity to run the solar pumps and auxiliary heat pump. The trustees of the Mary Flagler Cary Charitable Trust, which is responsible for the grants that support the Arboretum, chose the cheaper propane.

Fred Dubin, the nationally known solar engineer who designed the original system, was not consulted on the decision and thinks it was a mistake. He said it violates the building's original intention to operate without burning petroleum. He also said that "the operator did not fully understand the board of trustees' requirements, nor did the Arboretum hire sufficiently skilled personnel to operate the system properly. There are a number of ways to cool the collectors, and we feel the repairs could have been done for less money than boilers. It's been a terrible blow for solar, and very unfair, because they never brought out all the facts."

Edward Ames, one of the Cary trustees, and Stephen Weinstein, vice-president of The Ehrenkrantz Group, both argue strongly, though, that it was the right decision, made after careful study. "We agonized," Ames said. "Our first preference was to upgrade the solar, but the facts spoke for themselves. Even if we had a lot more money, we might have come out the same way. If this is a demonstration project from which other people are to draw lessons, there's no point in saying we can make it work if we put in enough money." Weinstein said it reemphasizes that active solar for winter heating, only, doesn't work in the Northeast; the heat collected must be used in the summer, too. "This isn't damning to solar. It's another big system which didn't work, but for a number of discrete reasons," he said.

Solar energy is not easy for the general public to understand, and some people thought the removal of the collectors meant solar doesn't work. There was much hoopla about the solar when the building opened, and the solar demise was also widely covered in local and national press. "Solar is in a difficult situation," said Sam Enfield, policy analyst for the National Solar Lobby, last June. "People aren't going to look beyond headlines saying it's not cost-effective to see if it was the right decision at the time, nor understand that there needn't be a problem with a system bought today."

The reasons for the solar removal and the ensuing controversy can best be understood by looking at how the building operated.

The total yearly energy use—with solar—was approximately 20,000 Btu per sq ft, about 12 percent of the 150,000 Btu per sq ft used by a conventional building of the same size. Solar supplied 85 percent of the annual heating load of 335 million Btus. There were 203 collectors mounted in seven rows atop the sawtooth roof, the most striking part of the building's exterior. Antifreeze circulated in the collectors and transferred heat to two storage tanks with 15,000 gallons of water. The warm water was piped to heat exchangers where it warmed air for heating the building. For maximum collector efficiency, the heating system used the lowest possible temperature—110 degrees. A heat pump provided backup heat. It was designed to cool the building, but circulating well water has sufficed. Solar panels supplied domestic hot water.

The computerized control system for the solar system was designed to provide data for research, much of which was never done because funds were cut. This left the system with unnecessary parts costing $7000 a year just to service. Both Weinstein and Dubin said it could have been replaced years ago with inexpensive controls.

For experimental comparison, two types of liquid collectors were chosen—KTA copper tubular and Chamberlain selectively coated steel plate, both no longer made. The steel plates, on four rows, corroded and had to be replaced with copper. Since the collectors were never compared, Dan Brown, architect in charge of construction, now says they all should have been the same kind.

From the beginning, the collectors and their controls seemed to create continual problems for Winfried Schubert, coordinator of Arboretum operations. "Dubin said solar is free, how can we throw it away. But in our large, active system, we had to expend an inordinate amount of energy to collect that 'free' energy," Schubert said shortly after the collectors were taken down. The collector pipes were corroded by the nontoxic propylene glycol, which circulated in the collectors the first two years. It was then replaced with toxic ethylene glycol. Left briefly without liquid, copper collector tubes exploded and had to be replaced. Silicon connectors leaked, and plexiglass covers warped. The lining of the storage tanks had to be replaced.

The biggest headache, though, was the summer overheating. Twice as much heat was collected as in the winter, and it cost money to get rid of it, Weinstein said. The system was designed to drain down in the winter. But after buying the steel collectors, it was discovered they couldn't be drained without damaging them, Brown said. Most summers, the Arboretum ran the system during the day and exhausted heat through the collectors at night. This also required additional cooling since the heat in the storage tanks bled into the interior.

One summer, workmen covered the collectors with aluminum foil. It worked like a charm, but was costly and time consuming, according to Schubert. The collectors couldn't be whitewashed like a greenhouse because it rinsed off into water collected for plants. Dubin said, in June, there were several solutions to summer overheating: using the cooling tower which was installed but never used; installing shades for the collectors; or storing the heat in underground coils for winter use. Excess heat also could have powered absorption cooling for the new addition, which was the original intent.

After dealing with the problems for five years, Schubert told Arboretum officials early in 1983 that solar wasn't cost-effective. The consulting firms were hired to check his conclusions and look at the Arboretum's future needs, Ames said.

During the study, interior air quality and possible health problems became concerns. Weinstein said studies show there may be a relationship between low-temperature heat delivery and respiratory infection or even Legionnaire's Disease. Also, air in and near the laboratories smelled of chemicals. Dubin's fresh air ventilation and heat recovery systems weren't used because the Arboretum minimized operating costs. Dubin, who is a member of a transdisciplinary team studying indoor air pollution, answered the Legionnaire's allegation: "Ridiculous; 85 percent of the hot-water systems in the U.S. operate at less than 160 degrees, where most bacteria are killed. By implication, it gives solar an unfortunate picture." All water in the system is enclosed, having no contact with the ambient air, he said.

The study showed the ventilation system would have to be used in the future because the science labs would be used more. More instantaneous heat would be needed to replace exhausted air. If solar had been kept, Weinstein said there would have to be both a bigger heat pump, costing $20,000, and backup propane boilers, costing $18,000. Dubin said, however, his system was designed to heat an enlarged building. If it needed to be boosted, it could have been done for much less than $38,000, he said.

"The problems weren't addressed in the beginning," Weinstein said. "Now they don't have the money to support this installation. We have kept a lot of good stuff, and now we can run it more like a normal laboratory building."

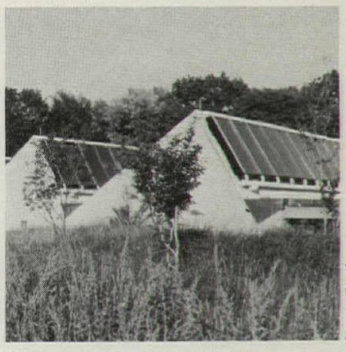
In January, after eight months without solar, the Plant Science Building was heating conventionally, and Schubert was pleased. The propane boilers have required less than five hours of maintenance since installation in September. By comparison, Schubert said the solar required five to six hours a week, at about $13 an hour. "Removing the solar system is like picking up another staff member, and in a small place like this with lots of buildings, that's important," he said.

The boilers burn so efficiently, Schubert said, that the exhaust temperature is never more than 105 degrees. The heat can be turned down from Friday to Sunday night, and it takes only a few hours to warm the building up. The solar system had to run all the time because it took too long to reheat the building, he said.

Brown, who left the Arboretum in 1979, as did Dr. Irwin, thinks removing solar was a mistake: "I'm not defending heat-only solar systems, but this one is highly defendable. . . . The decision is irresponsible because the Garden, whether it knows it or not, created a symbol known around the world. It's like taking the engine out of a car because the accelerator got stuck."

While the question of who was right will probably never be settled, the story of the Plant Science Building shows that the most carefully thought out solar promises can be defeated by forces no one can foresee. Who would have thought the solar apparatus would be gone within five years? Who would have thought propane would be cheaper than solar energy? [Penny Loeb]

Penny Loeb *is a free-lance writer and editor of the* Hudson Valley GREEN Times.



Penny Loeb

ARTOG/D.G. Olshavsky

The before (top) and after (above) views of the Cary Arboretum show the extent of the building's solar system and the visual effect of its removal.

Stephen Weinstein with The Ehrenkrantz Group supplied the following costs:

Repairing the solar system	
Cooling tower operation	*$2,000*
Shades or fin-tube cooling	*$20,000*
Repairing the collectors and replacing pipes	*$20,000*
New controls	*$2,500*
Revising HVAC controls	*$5,000*
Larger heat pump	*$20,000*
Backup propane boiler	*$18,000*
Total cost	*$87,000*

Installing propane system	
New boilers	*$25,000*
New controls	*$5,000*
Revising HVAC controls	*$5,000*
Total cost	*$35,000*

Details, details

If 'God is in the details,' then, when it comes to saving energy, He's in the detail section, as the following examples show.

The past decade of effort devoted to devising energy-efficient buildings has produced many new (or at least repackaged) concepts and approaches. Those likely to endure will last because they go beyond conserving energy; they yield more comfortable and appealing buildings, encompassing such universal and timeless factors in architecture as sunlight, air movement, and climate-responsive form.

To those concerned with architectural approaches to energy, the following representative ideas and details—although by no means entirely new or comprehensive—are worth examining together. First, they have significant architectural implications. Sometimes wedded to innovative mechanical systems, these design strategies are concerned first with architectural elements and building form. Second, they address ways—ranging from simple to more complex—to handle some of the basic, common, "big" energy issues in nonresidential buildings. Third, the examples embody ideas that have been around for some time. Most of them are real, not hypothetical, and while not always unqualified successes, they have been applied and tested, and continue to show promise in the minds of designers.

If one reaches for a conclusion about recent activities on the energy and buildings front, it may be that concern over energy as an architectural design issue has reached a new stage of maturity. It involves growing departure from the divisive view of "passive" design as somehow different from other kinds of design. One happy result is that energy-conserving design concepts now show greater promise of fitting into larger frames of architectural reference, carrying with them little more in the way of aesthetic baggage than, say, spatial concepts, yet enjoining designers to engage and respect certain environmental imperatives.

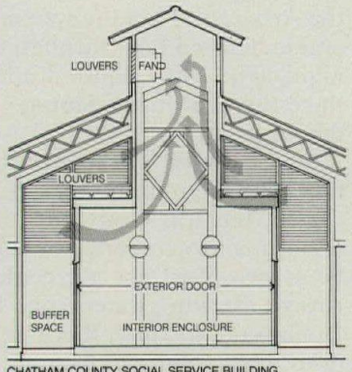
The architectural imperatives—and the following examples of ways to respond to them—concern the control and exploitation of thermal and luminous energy, but from the point of view of how things look and feel, as well as from the bottom-line vantage point of the saved Btu. And as is usually the case in carrying design concepts through to practical execution, all of this is largely a matter of detail. [Thomas Vonier]

Thomas Vonier, *AIA, is a Washington, D.C., architect and correspondent for P/A.*

Ventilation

The virtues of "natural" ventilation have been extolled since the first serious advent of mechanical or forced ventilation in the early 19th Century. Rereading today the work of bygone proponents of the salubrious effects of naturally induced fresh air, one realizes that they could have been driven by today's concerns over indoor air quality, which have been exacerbated by the energy-conservation emphasis placed on tighter building skins.

Harvard architectural historian John Stilgoe recently exhorted a lecture audience to "consider the implications of an era in which wood-burning stoves are being controlled by Apple computers." He might as easily have mentioned that



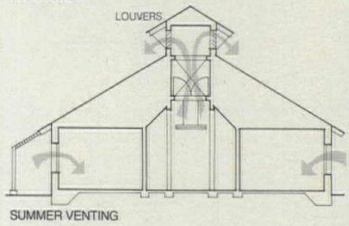
CHATHAM COUNTY SOCIAL SERVICE BUILDING
PITTSBORO, N.C.

decisions about whether or not to allow windows to open and close in nonresidential buildings, too, have become largely dependent on outputs from computer analyses. Less vivid an image, perhaps, but no less a sign of the times.

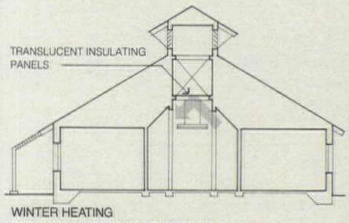
Whether or not a window sash operates, buildings always experience some ventilation induced by wind-driven effects; areas of negative and positive air pressure, within and outside of the building envelope, conspire with accidental and intentional pathways to push and pull air from inside and outside. In designs that take intentional advantage of wind-driven venting, the size and placement of windows is crucial.

Less often exploited are stack effects, where thermal differences—sometimes in combination with pressure differences—induce vertical air movement.

In a complex of small buildings for a technology center in Gaborene, Botswana, architects David Norris and Peter Temple provide ventilating stacks that are switchable depending on the season and time of day. In summer, low wall inlets and high outlets combine to move heated air up through and then out of interior spaces. The rooftop monitors can be closed off in winter, when the solar heat is to be retained, by means of translucent insulating panels; this approach admits light, while reducing the interior volume and surface area exposed to conduction losses. In climates that experience large diurnal temperature swings, such as occur in the high Botswana desert, the venting stack permits nighttime cooling without resort to supplementary devices.



SUMMER VENTING



WINTER HEATING
BOTSWANA TECHNOLOGY CENTER

Burnstudio Architects combined similar stack ventilation principles with a double-envelope concept for an Owens-Corning energy conservation award-winning social services building in Pittsboro, N.C. Large fans in the roof monitors pull fresh air through the office spaces when weather is suitable for open windows and temper a buffered area between the inside and outside shells when windows are shut for air conditioning. Motorized dampers are placed behind stationary end-wall louvers.

Atriums as thermal buffers

The concept of degrees or layers of "insideness" and "outsideness" is by no means the sole province of energy-oriented buildings, yet the potentials of thermal buffering have been carried through to maximum advantage in several buildings most notable for their energy-saving qualities. Indeed, if one formal type has been widely proclaimed as an outgrowth of the recent energy-conscious-design era, it is the atrium. It is probably more accurate to say that the atrium—a covered space within or between buildings, usually on more than one level and acting as an architectural focus—has been rediscovered and adapted to contemporary requirements.

British architect Richard Saxon, writing in Atrium Buildings: Development and Design *(Van Nostrand Reinhold Company, 1983), identifies four generic atrium types:*

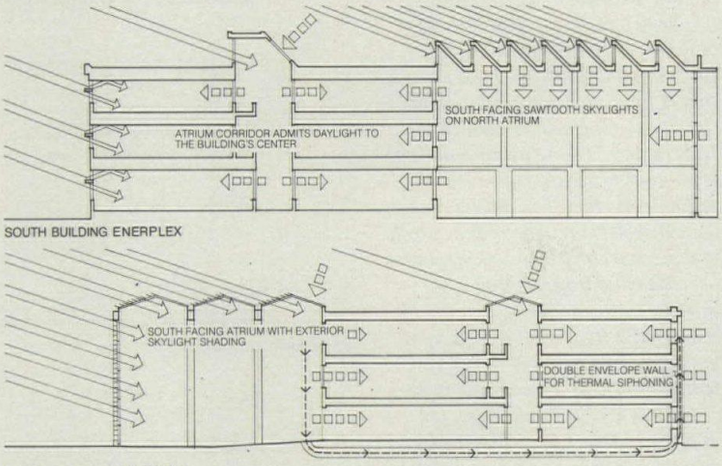
- ***Canopy.*** *Provides shelter and shade but no air containment; the minimal cover.*
- ***Buffer.*** *Provides for winter air containment and summer ventilation, but provides no heating.*
- ***Tempered buffer.*** *Does all of the above, and is heated to a minimum temperature in winter.*
- ***Full comfort.*** *Heated and cooled to normal occupied space standards.*

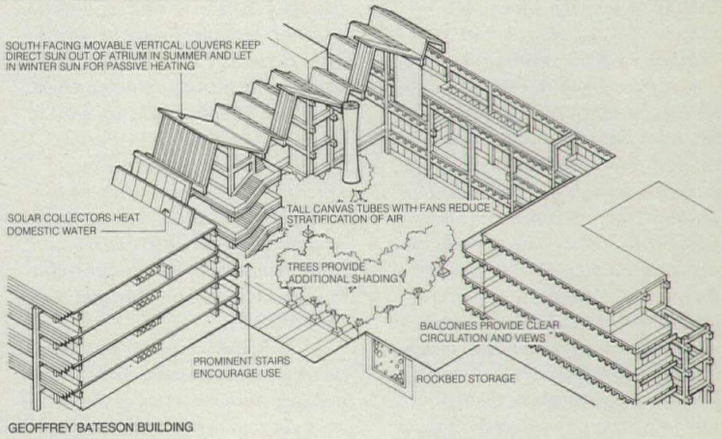
Although it was originally intended to be more, the atrium cover for the offices of the California Energy Commission (often referred to as Site 1-B, designed by the office of the state architect and Nacht and Lewis) emerged as a canopy. A translucent tension structure covers the central space, providing shading, allowing ventilation, and keeping out at least some of the rain. The principal energy functions of the atrium are as a source of daylight for interior offices and as a source of "preconditioned" (meaning cooler-than-otherwise) air.

The neighboring Geoffrey Bateson Building (also by the office of the state architect) goes well beyond canopy to tempered buffer, with extensive air stratification and solar control measures. In the hot Sacramento summer, the atrium interior is shaded from direct beam radiation, while in winter, movable vertical louvers admit direct rays to the structural thermal mass.

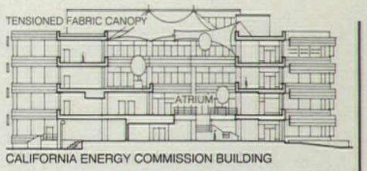
In buildings whose thermal dynamics are dominated by internally generated loads, basic atrium design strategies suited to cooler climates may differ little from those used in hot climates. Site-specific orientation constraints play a larger role, as suggested by the very different approaches used for two adjacent buildings with nearly identical programs for the Prudential Insurance Company at the Princeton Forrestal Center (SOM New York, Flack and Kurtz, the Princeton University School of Architecture, and others). In essence, here are two halves of the same coin, really a single atrium divided by (or, as the designers might have it, joined by) the out-of-doors. The project handles the imperatives imposed by one atrium facing north and the other facing south, principally through differentiation in sun capturing and shading devices.

The Princeton project also raises—but doesn't really exploit—the prospect that atriums need not be central; thermal buffering can occur at the building perimeter.





GEOFFREY BATESON BUILDING

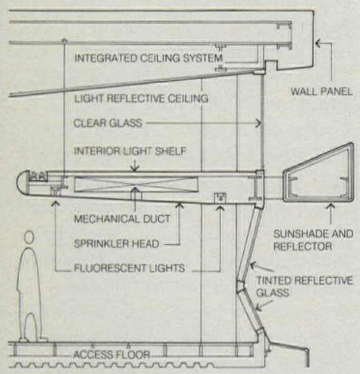


CALIFORNIA ENERGY COMMISSION BUILDING

Said another way, the atrium is but one manifestation of the opportunity for thermal buffering by spatial means. The example set by European sidewalk cafés, where there can be as many as three or four "degrees" of being inside or outside, is instructive: It begins with the completely open, moves to the nearly open (under an awning, whose position is altered throughout the course of the day and year), then to an operable glass enclosure, and finally to a fully enclosed indoors.

Light shelves and wall sections

Light shelves illustrate well the opportunity for a single architectural element to serve many purposes. The light shelf can at once be a light reflector, a glare controller, a shading device, a separation between viewing plane and light-admitting plane, an interior scale-definer, and an element in the exterior façade composition.



LOCKHEED BUILDING 157 SOUTH WALL SECTION

In the Leo A. Daly design for a Lockheed Company engineering facility in Sunnyvale, Calif., light shelves assume the added tasks of housing HVAC distribution equipment and electric lighting fixtures. The extraordinarily deep interior shelves on north and south are intended to work in combination with inward-sloping interior ceilings to enhance daylight penetration. The south-facing exterior shelves slope upward to bounce direct beams and act as sunshades. Questions have been raised about the need for so deep a light shelf facing north, where less complex means are available to move the diffuse light inward.

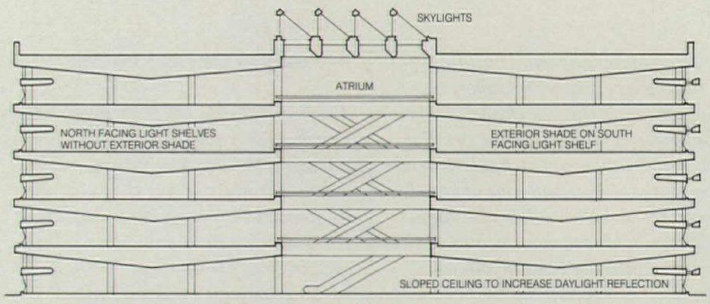
Both the glass above the light shelf—which, as in most designs, is kept clear for maximum light transmission—and the tinted glass in the viewing plane are provided with rolling shades so users can control uncomfortable glare and radiant gain. On the south elevation, the lower tinted glazing is also given a reflective coating.

Philippine architects Jorge Y. Ramos & Associates, working with Cambridge, Mass., counterparts at The Architects Collaborative and lighting consultant William M.C. Lam, devised simpler light shelves for the Government Service Insurance System headquarters at Manila. In part this was made possible by the flexibility of the program and site, which permitted a favorable orientation and stepped building configuration. Here, too, elements of the interior ceiling and structural system are employed to promote penetration of daylight and light from integrated fluorescent lamps. The upper surfaces of the interior and exterior light shelves are white.

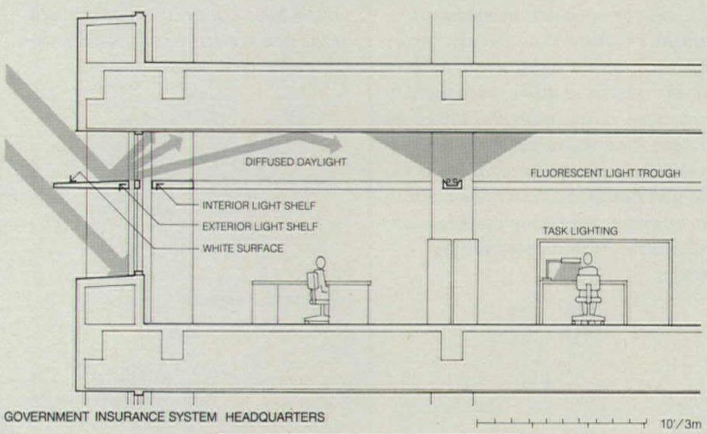
The design for a corporate office building in Ventura, Calif., by Rasmussen & Ellinwood, also uses a simple light shelf, coupled with the inward-sloping ceiling seen in the Daly design. The Ventura building is laid out to assure that no work station is further than 30 feet from the perimeter, and photocell controls and dimmers help to assure maximum use of daylighting when possible. Surface coatings can be a key to the success of a light-shelf design, and must take into account initial cost, maintenance, and durability factors.

SOM's United Gulf Bank for Bahrain (P/A, Jan. 1984, p. 104) takes the light shelf and wall section to an architectural extreme, using shelf curvature to screen the bright translucent transom glazing from view and to reflect light upward to an interior ceiling cove. Vertical tinted glass fins protect the lower reflective glass from western solar gain. The overall effect is supposed to enhance possibilities for views, while minimizing unwanted radiation and maximizing daylight along the perimeter.

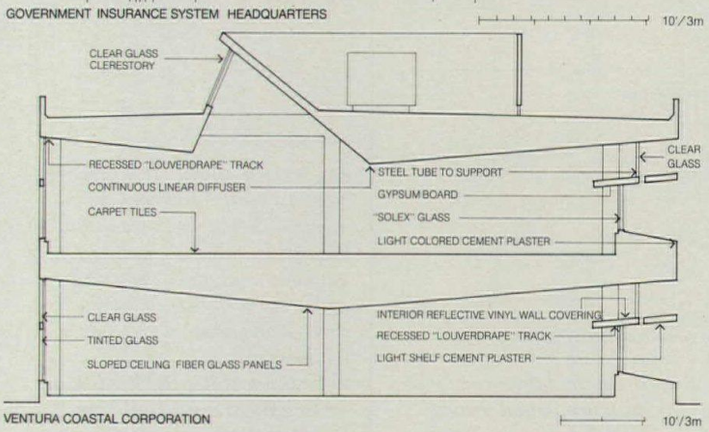
Most studies conclude that the added costs of light shelves cannot be justified solely in terms of the electrical light and air-conditioning savings they may yield, but must be used to meet a variety of architectural, acoustical, mechanical, and electrical objectives.



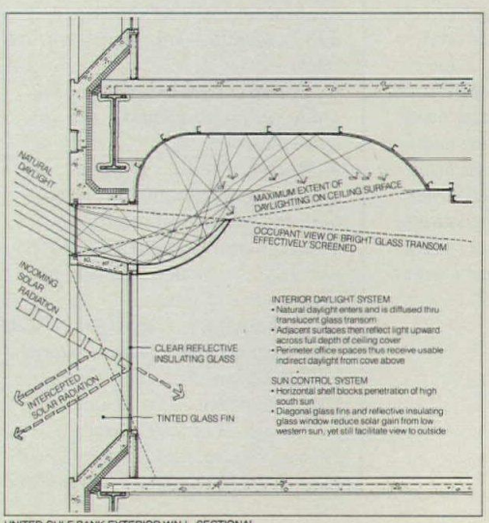
LOCKHEED MISSILES AND SPACE COMPANY, INC. – BUILDING 157 40'/12m



GOVERNMENT INSURANCE SYSTEM HEADQUARTERS 10'/3m



VENTURA COASTAL CORPORATION 10'/3m

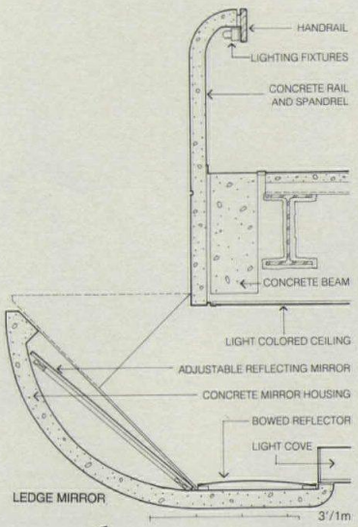


UNITED GULF BANK EXTERIOR WALL, SECTIONAL

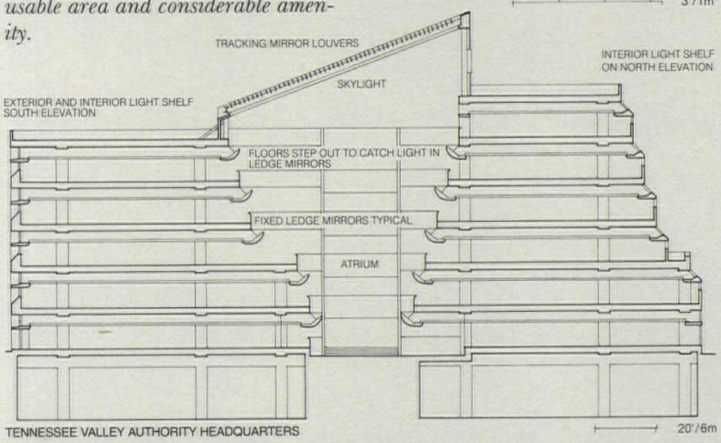
Beam daylighting

How does one get daylight, bountiful at the perimeter, into the depths of today's net-rentable-space-at-a-premium office buildings?

The Chattanooga headquarters building for the Tennessee Valley Authority, by CRS, TAC, and Van der Ryn, Calthorpe with lighting consultant William M.C. Lam, coalesced some of the best thinking on this subject; one result was a design that effectively halved the depths of the office space by means of a central atrium and lightwell. This concept survived and has become very nearly a generic diagram for large, relatively low-rise offices, not least because the atrium provides both usable area and considerable amenity.



LEDGE MIRROR

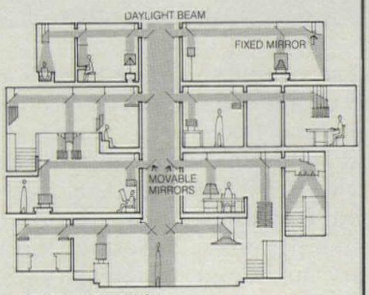


TENNESSEE VALLEY AUTHORITY HEADQUARTERS

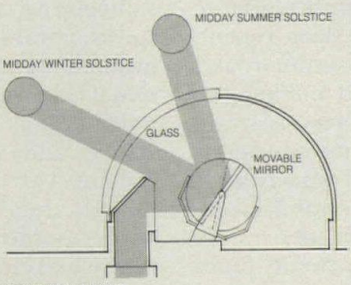
Yet promising aspects of the beam daylighting concept were not implemented. Tracking mirrored louvers above the atrium were to control thermal and luminous gain, bouncing direct beam and diffuse light to fixed ledge mirrors that would in turn help daylight penetrate deep into the office interiors.

Abandoned for the TVA project to the sound of phrases like "unrealistically experimental, of unproven benefit and possibly unwarranted cost," mirrored beam reflectors have been used at a more modest scale with light shelves.

Independent beam daylighting design studies by MIT-graduate Henry Plummer suggest some of the major problems: What are the mirrored surfaces to be made of? How will they be protected from damage and dirt buildup? Can advantages of the apparatus really *outweigh its costs?*



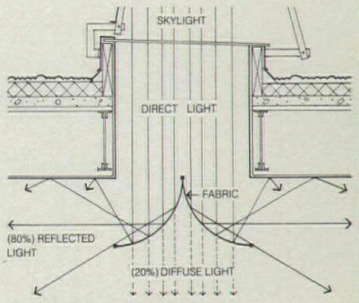
HENRY PLUMMER DESIGN



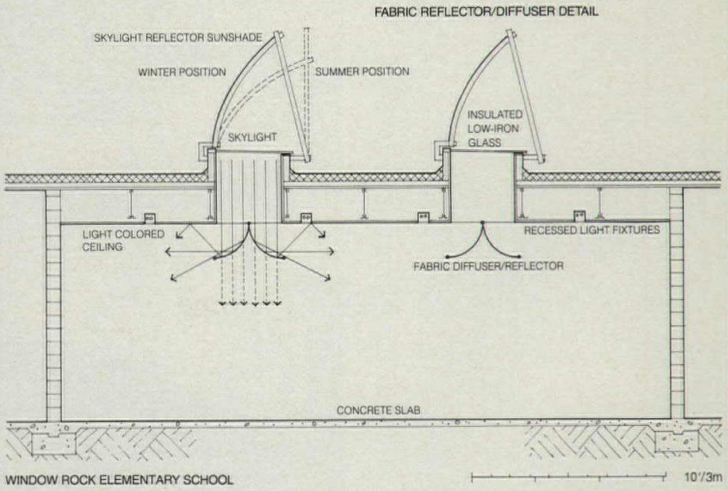
SECTION, SKYLIGHT

Skylights and roof monitors

Where there is light there is heat, but rarely are the two desired in combination at all times. Skylights have long been used to bring daylight into central cores and even to distribute it over wide floor areas. When the objective includes better solar diffusion to thermal mass, the design approaches take on added complexity



FABRIC REFLECTOR/DIFFUSER DETAIL

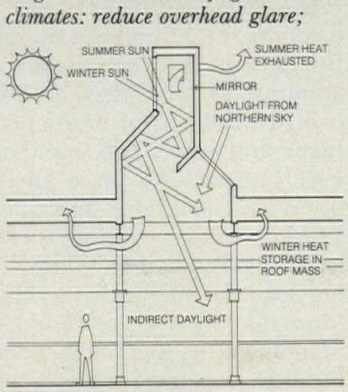


WINDOW ROCK ELEMENTARY SCHOOL

to meet requirements for seasonal control.

A design by architect James Joseph Doolan and engineer Don Felts for an addition to the Window Rock Elementary School in Arizona combines the basic horizontal skylight with movable exterior sun reflectors and simple interior diffusers.

The tendency of many school districts to frown on large areas of exterior wall glazing, because of vandalism and security considerations, has caused architects increasingly to seek rooftop natural lighting schemes. There are three basic challenges to be met with skylights in most climates: reduce overhead glare;



ONE UNIVERSITY PLAZA MONITOR

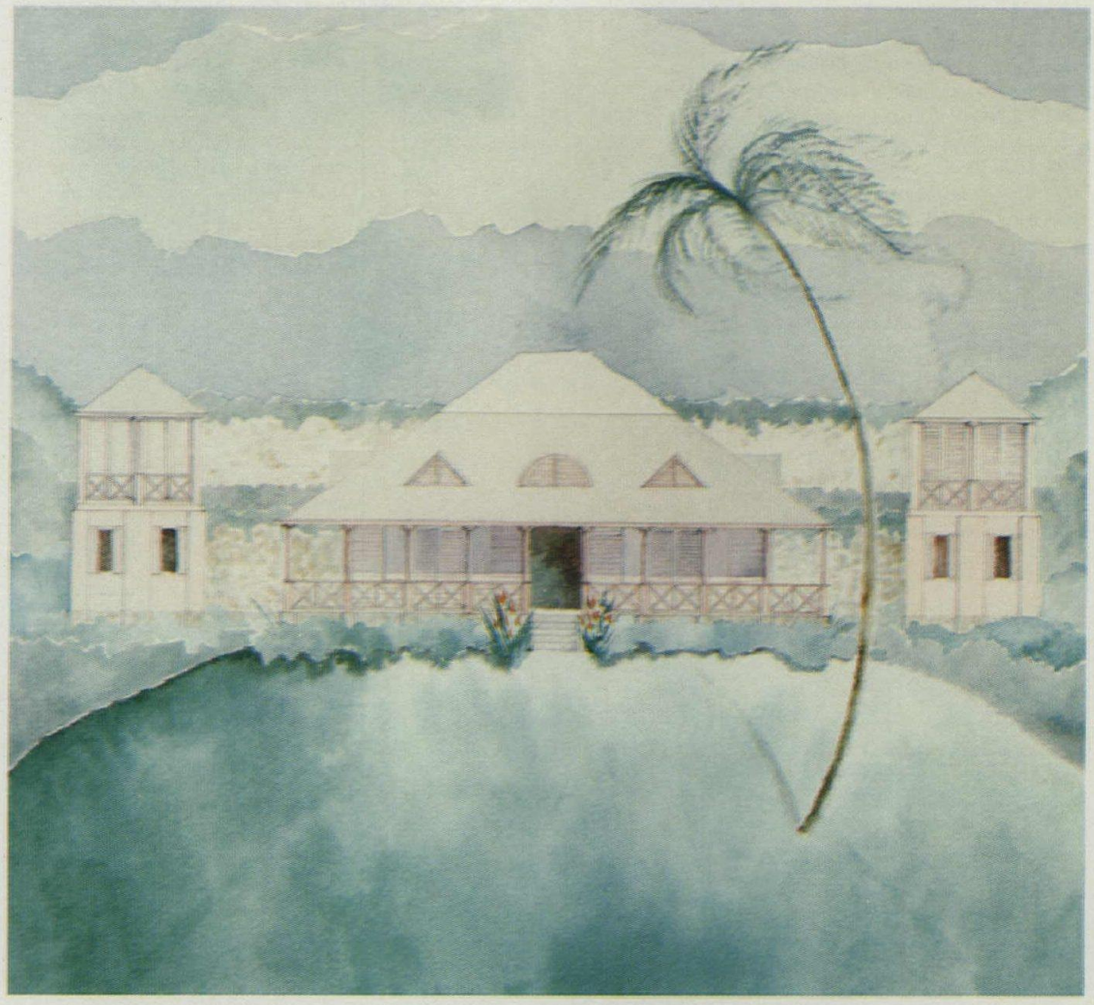
increase interior diffusion of light and radiant energy; and eliminate direct gain in the cooling season.

Skylights on the Window Rock school can be "dampened" to limit direct gain, while the lightweight fabric interior diffusers spread the lighting and thermal benefits throughout classrooms below.

Roof monitors, too, bring light from above and can have added benefits as heat-exhaust stacks in summer and solar incubators in winter. The latter approach requires close coupling of the monitor with thermal mass to accept the collected heat, as well as provisions for automatic venting. In his design for the earth-covered One University Plaza office development in Fairfax, Va., architect Walter F. Roberts, Jr., incorporated vertical south-facing glass, mirrored reflective surfaces, and sloped north-lights into 10' x 10' light monitors occurring at the center of each 30-foot structural bay. Photoelectric dimmers within the monitors adjust interior light levels, while heated air rising into the monitors from below is exhausted through automated louvers.

The well-tempered tropics

In a hot, humid climate, how do we maintain comfort, improve materials performance, and reduce energy consumption? A lot of research and many new tropical buildings show how.



The climate is what attracts most people to the tropics. Yet once there, many people come to depend upon air conditioning and tinted glass as a shield against the heat and humidity—removing themselves from the very thing that first attracted them. Tropical conditions can be wilting: year-round temperatures range from 70 to 90 F and vary little from day to night; humidities stay above 70 percent for most of the year; storms can bring large amounts of wind-driven rain; skies remain overcast or hazy for most of the summer; and plant and insect life, mold and mildew are ever present. We place an enormous strain upon electric utilities and consume enormous amounts of energy when we seal ourselves off in air-conditioned buildings. The annual cooling load in Miami, for example, is over six times that of New York and over twenty times that of Seattle. Reducing energy consumption has thus become a major goal in the tropics.

The tropics and subtropics

In this country, only the southern tip of Florida has a tropical climate, with hot, humid conditions year-round. Most of the Southeastern U.S., however, has subtropical conditions that, during the summer months, approach those in the tropics. What distinguishes the subtropics are its mild, relatively dry winters.

The architectural response to tropical and subtropical conditions differs in some respects. For instance, a subtropical house needs insulation and a heating system for the occasional cold weather during winter, while tropical buildings often function without a heating system and without insulation, as long as radiant barriers are installed. In general, though, the issues involved in tropical design apply to the subtropics, and to any place where extreme heat and humidity exist.

Ventilation

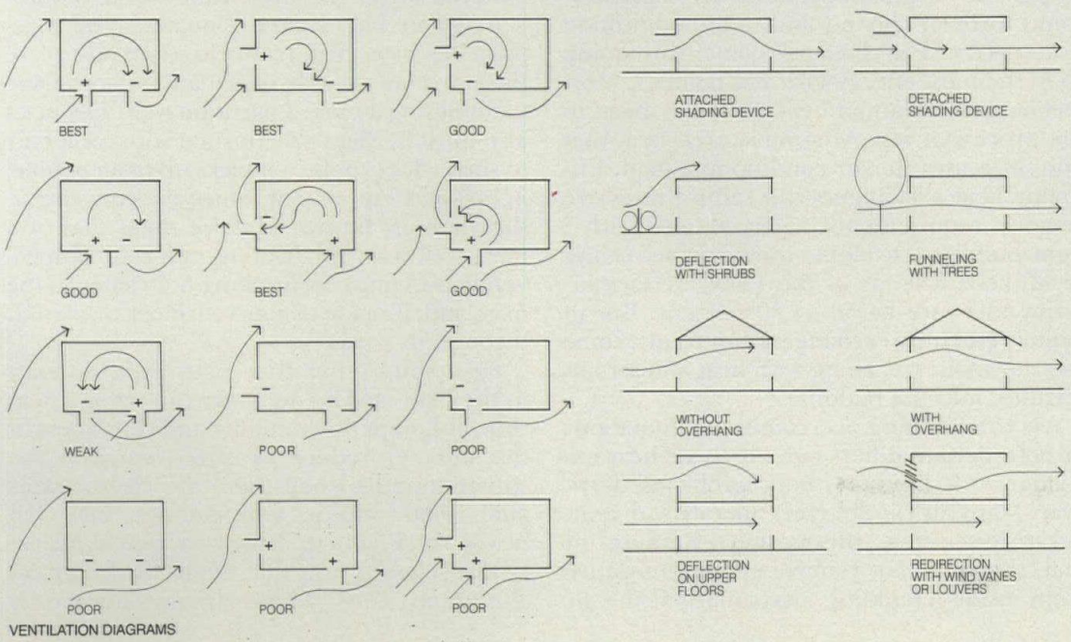
Inducing air movement within a building during some seasons remains the most effective means of reducing the year-round use of air conditioning in the tropics. Most of the literature on natural ventilation has as its goal the cooling of people within buildings. Yet the passive cooling of people requires large openings to achieve sufficient ariflow and airspeed, while the air conditioning of buildings, which cannot be avoided some months, requires openings small in number and in size to reduce the cooling load. Combining natural ventilation and air conditioning in a building thus presents a conflict in the sizing of windows. Researchers at the Florida Solar Energy Center (FSEC) have shown that ventilation and air conditioning can coexist as cooling strategies in the same building as long as natural ventilation cools only the building and not people. Window openings amounting to just 10 percent of the floor area will provide enough airflow to cool the mass of most buildings when the outside temperatures are lower than those inside, without significantly taxing the air-conditioning system when outside temperatures are high. Using windows that size for natural ventilation demands the simultaneous use of ceiling fans to cool people.

Using natural ventilation to cool a building's mass rather than its people also affects the placement of windows. When the wind strikes a building, it moves around the structure, creating positive pressures on the windward sides and negative pressures in the leeward wake. The wind also may enter openings in the building, moving in a straight path until it strikes an interior object or is pulled out through a leeward opening. People-cooling strategies call for an inlet window smaller than the outlet to increase incoming wind speeds, and for an unobstructed path between the two to maintain that windspeed as long as possible inside the building. The goal of cooling buildings changes both guidelines. The inlet and outlet openings should be the same size, to maximize the number of air changes rather than the air speed, and the air should be directed along wall and ceiling surfaces to cool them, rather than to an outlet window.

Directing air within a building depends upon myriad details. A window on an upper story or one located beneath an overhang or next to a building projection will, because of unequal positive pressures adjacent to the opening, divert the air current along the ceiling or wall. Projecting windows, blinds, and louvers can further modify the direction of air currents.

Little air will move through a room if its windows face only positive or negative pressure zones. That normally occurs with windows on the same or on adjacent exterior walls. (Avoid, if possible, rooms with only one window and no outlet.) Building projections or wing walls, and to a lesser degree, foliage or solid fencing, can create the necessary pressure differences in those situations, especially when prevailing winds strike a building face at an angle. A projection perpendicular to the building and downwind of the inlet window will funnel air into a room, while a similar projection upwind of the outlet window will create a negative pressure area in the projection's wake. To be most effective, the wing wall should project out as far as the window is wide. Ridge vents that take advantage of the negative pressure behind a roof ridge, as well as attic fans, also work to pull air through a building.

The traditional guidelines for building in the tropics also advocate the location of a building perpendicular to prevailing winds to induce the most interior ventilation. The research of Baruch Givoni, however, has shown that the highest air velocity and best air movement result from orienting a building at a 45-degree angle to the prevailing winds, due to the broader wake and thus greater suction forces pulling air through the building. The benefits of a large suction force become apparent in the wake of tall buildings. Research has shown that buildings located downwind of a substantially taller structure have better ventilation than when downwind of buildings their same size, because of the large amount



VENTILATION DIAGRAMS

This West Indies house by Hammond Beeby & Babka (opposite above) recalls indigenous tropical architecture with full veranda, louvered openings, open plan with cross ventilation, breezy hillside location, and lightweight construction. The diagrammatic plans (far left), adapted from material provided by the Florida Solar Energy Center, indicate the effect different window and wing wall configurations have on interior ventilation. The sections (left) show different ways of directing breezes into a building.

of turbulence created behind the taller building. When planning groups of buildings, though, it's best to space them apart and to stagger them against the prevailing wind to minimize the chance of one building's wake preventing another's ventilation. Also avoid planting dense foliage upwind of buildings or placing pavement or attic vents in front of inlet windows.

Dehumidification and air conditioning

Natural ventilation and air movement go only so far in cooling buildings or people in the tropics; in the summer months especially, some form of cooling and dehumidification is necessary. The challenge comes with doing so in the most energy-efficient manner. Most mechanical dehumidifiers generate heat in the process of removing moisture—heat that only increases the air-conditioning load. Enthalpy heat exchangers can reduce moisture removal requirements; when coupled with a tight building envelope, they can, according to Mukesh Khattar of the FSEC, reduce interior moisture by 50 to 70 percent. But in winter, enthalpy exchangers can return some interior moisture, along with heat and air impurities, into the building.

Air conditioning overcomes the limitations of both dehumidifiers and air-to-air heat exchangers. It is not without problems, however. Many air conditioners operate with temperature-sensitive thermostats. Because of that, they may not remove enough moisture from inside a building, particularly if the air conditioner's sensible heat factor (the ratio of its sensible to its total heat capacity) does not equal the building load sensible heat factor. According to Khattar, an air conditioner with a sensible heat factor (SHF) above 0.7 should not be used in low-energy tropical residences. Few manufacturers give the SHF of their equipment unless specifically asked. Also, very few produce high-efficiency air conditioners that have an SHF below 0.7, because to bring interior relative humidities down, the cooling coil temperature must be lowered, which reduces the air conditioner's efficiency and capacity. To maintain 55 percent relative humidities in warm, humid climates, an air conditioner with a higher SHF must cool the air below human comfort levels and then reheat it to room temperature.

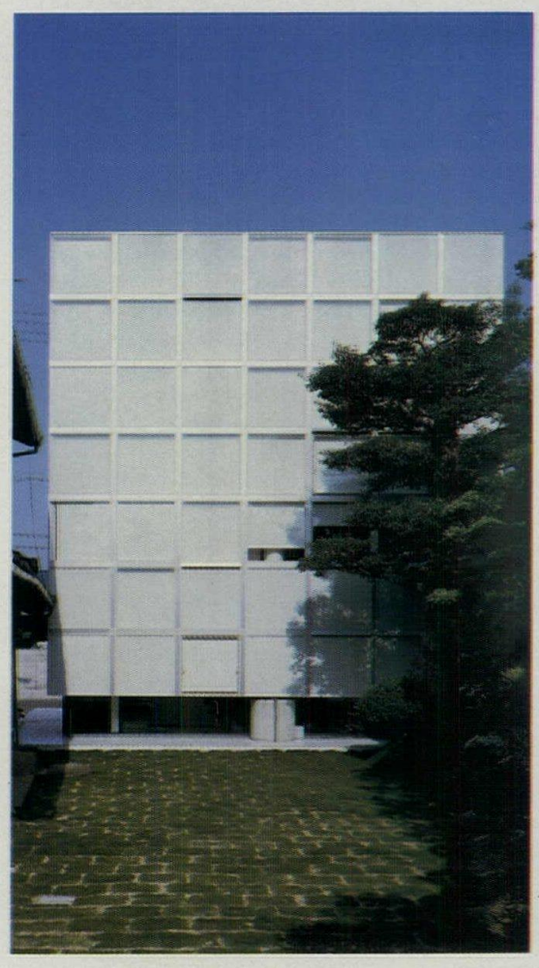
The lack of an energy-efficient means of both cooling and dehumidifying the air has prompted much research and some new products. One product now available is the air-to-water heat pump that, after cooling and dehumidifying the air, uses the heat for the domestic hot water system. In the development stage are air conditioners that have various types of heat exchangers that use the building's own warm air to reheat the dry, overly cooled air coming off the cooling coils and desiccant dehumidifiers that use gas or solar heat to regenerate the desiccant material after it has removed moisture from the air.

Until that technology becomes available, Khattar offers some recommendations that will aid in moisture removal: sizing air conditioning at or just below the building's peak load; using two-speed units; reducing the fan speed of the air conditioner; not oversizing the fan-coil unit; and operating the thermostat at fan "auto" instead of at fan "on."

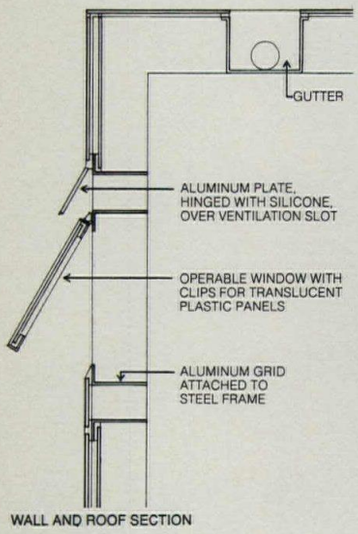
Heat sinks

Heat sinks offer another way of cooling buildings. One of the most effective heat sinks is the building's own mass. This runs counter to the tradition of using low-mass construction in the tropics, but researchers at the FSEC and elsewhere have shown how a high-mass material such as concrete can work to our advantage in hot, humid climates. The mass must be protected from direct exposure to the sun at all times by placing the mass inside the building as, say, a partition wall. The mass also must be regularly flushed with cooler air to shed whatever heat it picks up from people, lights, and equipment. Since its exposure to the air must be two to three times that of a mass wall used for heating in a cold climate, ventilation must occur along both sides of the mass and, if made of concrete block or planks, through its cores.

Heat sinks other than mass walls do exist in the tropics. The night sky can act as a heat sink, although the humidity and cloudiness in the summer reduce its effectiveness to the winter months when there are clearer skies and when outside temperatures may fall below 68 F. Philip Fairey, a researcher at FSEC, suggests how that might work with an aluminum roof whose upper surface is



Shoei Yoh's "Glass House with Breathing Grating" in Japan is a cube, with an open plan and an exterior aluminum frame that contains operable windows and flaps covering horizontal ventilation slots. Translucent plastic panels clip to the inside of the windows to provide shading, not an ideal solution since they don't prevent the sun from striking the glass itself. The ventilation strategy, however, is ingenious.



WALL AND ROOF SECTION

painted with white latex paint and whose underside is polished aluminum. "The roof will absorb the least solar radiation during the day because of its highly reflective white surface coating, (and) the radiation absorbed will not be radiated to the ceiling plane because of the low-emissivity polished aluminum undersurface. At night, the high-emissivity, white upper surface will radiate to the night sky, rejecting heat." Earth sheltering or groundwater heat sinks do not work well in the tropics because of the high temperatures of the ground and of subsurface water.

Shading and insulation

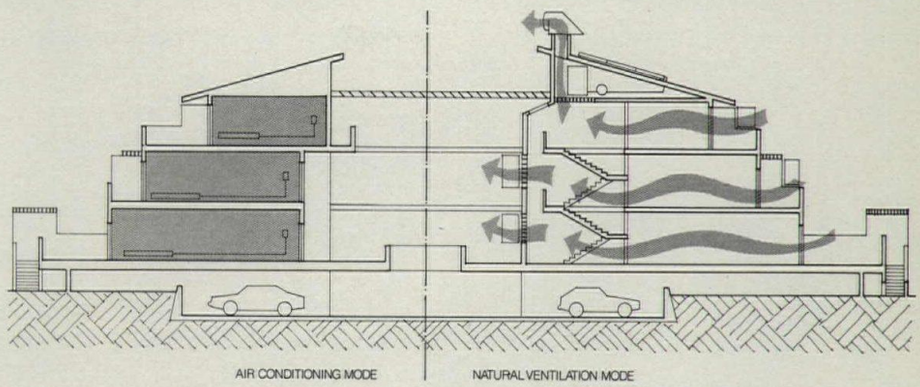
Because of the difficulties encountered in flushing heat from a building's mass in hot, humid climates, it's best to shade entire walls and roofs with such devices as double roofs, wall screens, vertical louvers, broad overhangs, verandas, or trees. Where that can't occur, at least shade the windows, including those on north elevations. The shading of windows with louvers, blinds, awnings, and overhangs not only reduces direct solar gain, it also reduces glare, which, in the tropics, comes from the hazy skies and ground and water reflections. Some researchers recommend limiting views to about 15 degrees above and below the horizon to adequately reduce interior glare. Other ways of reducing glare include the use of bright interior finishes, the placement of windows adjacent to walls to reduce interior contrast, and the avoidance of reflecting objects within a window's field of view.

Buffer spaces that can tolerate a greater range of ambient temperatures can also protect the interior of a building from excessive thermal gain. Those spaces prove most useful along east and west elevations, for in the tropics, it is the low east and west sun that is the most difficult to shade. In residences, those buffer spaces might include closets, storage areas, garages, or laundry spaces; in nonresidential construction, they might include mechanical chases, elevator shafts, or exit stairs.

The exterior envelope, though, remains the primary means of protecting buildings from the sun. Research has shown that in hot, humid climates, radiant barriers can equal or exceed the thermal protection of insulation, since in those climates, most of the heat transfer through a roof and walls is through radiation rather than convection or conduction. A radiant barrier is nothing more than a material such as aluminum foil with a high reflectiveness (and thus a low emissivity) facing an air space. Experiments at the FSEC have shown that a single layer of foil reduced downward heat flows by as much as 42 percent over unfaced R-19 fiberglass batts. A 44 percent reduction was achieved with an R-19 fiberglass batt and foil facing the attic space. In walls, a single layer of foil facing a 1½-inch air space provided the thermal resistance of 1½ inches of rigid insulation when both were applied to the exterior of a block wall receiving direct solar radiation.

Some precautions must be taken when using such unconventional insulation methods. For example, most foil-faced batt insulation creates a fire hazard if the foil faces an attic space. To eliminate the hazard, use unfaced insulation with separately attached builder's foil. Also, condensation may occur on the foil face if it doesn't have an air space on both sides or if it is not punctured when in contact with insulation.

Condensation within the wall or roof assemblies of tropical buildings doesn't present as much of a problem as it does in colder climates because of the uniformly high temperatures. What condensation does occur results from warm, humid outside air migrating toward drier, air-conditioned interiors. Even then, the temperature differences may not warrant the installation of a vapor retarder. But should one be required, do not attach it tightly to the structure nor place a vapor retarder on both sides of the insulation.

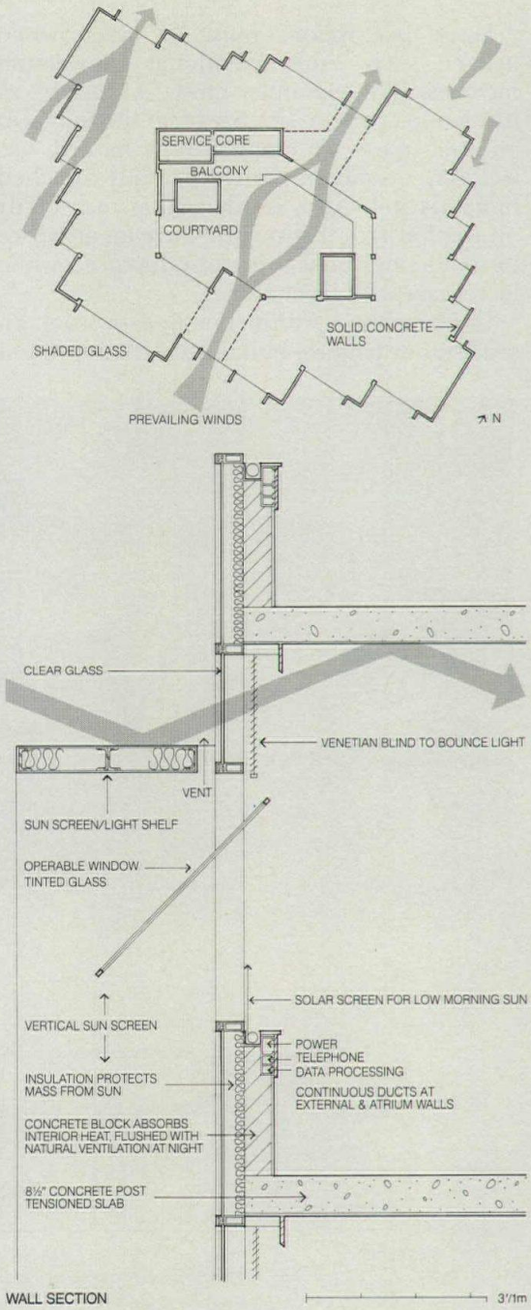


This recently completed U.S. embassy housing in Manila by ELS Design Group has shaded courts to funnel and cool the prevailing wind. When the units are air conditioned, the terraces, attics, and courts act as thermal buffers; when naturally ventilated, the terrace dividers, open stairwells, and ridge ventilators act to direct breezes through the buildings. Cars park under shading structures or in open-air stalls beneath the buildings.

The earth and the sky

Hurricanes and typhoons threaten many, but not all tropical regions, leading to special code restrictions in certain coastal regions against such things as loose-laid roofing or unbraced

The Petroleum Corporation of Jamaica building (right), by Marvin Goodman with Fred Dubin as energy consultant, has a sawtooth perimeter that faces shaded, operable windows north-south toward the prevailing winds, and insulated concrete walls east-west to block low sun angles. The courtyard helps pull air through the building while providing additional daylight. The operable windows, as the wall section shows (below right), are shaded by the lightshelf (which is detached from the wall to equalize air pressures) and are provided with interior shades set in the sill to block low sun angles. The concrete block spandrels, protected from the sun by exterior insulation, absorb interior heat during the day and dump that heat during night air flushing.



shading devices. Other building details, while not code derived, have also been developed in response to the tropical storms. Louvered shutters, for example, protect glazed areas from flying debris and allow windows to be left open for ventilation during storms. (Louver vanes in a double "m" configuration seem to work the best in keeping out the rain at wind velocities over 4 meters a second.) Gutters, downspouts, drains, and scuppers often are oversized and, in places such as Singapore where there is a lack of fresh water, the drainage system often feeds storage tanks for the reuse of the rain water. Many tropical buildings also have paved aprons to minimize splashback and to keep plant life at a distance.

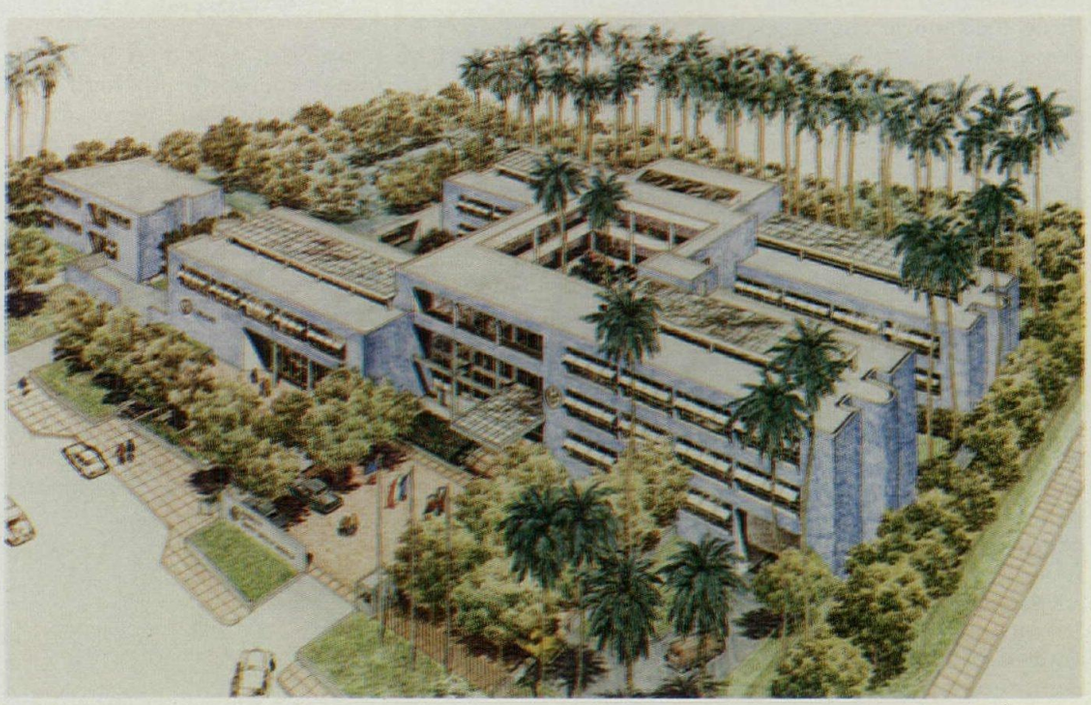
Keeping insect life at a distance is more difficult. While no one has improved upon screening for flying insects, it can corrode in the humidity if made of galvanized metal, or reduce ventilation if placed directly over a window rather than over a larger opening such as a balcony. Tropical termites will quickly destroy all wood that is not treated or that is too close to the ground. Because termite shields provide little defense, it's best to poison the ground around buildings.

Materials

Hot, humid climates can be harder on building materials than on people. Indigenous materials such as mud brick, thatch, and stucco demand constant maintenance: the mud attracts termites, the thatch mildews, and the stucco provides ample crevices for algae.

Some modern materials have not fared much better. Says Kellogg Wong of I.M. Pei & Partners, "The small tiles used on buildings in Singapore tend to crack and spall. Architectural concrete, with its coarse surface and many pockets, allows algae growth, while improperly detailed stone cladding could face problems with the collection of moisture behind the panels and with the rusting of anchors." That list could include galvanized iron

The U.S. embassy in Costa Rica (right), by Marquis Associates with Vladimir Bazjanac energy consultant, needs no heating. Says Bazjanac, "The cooling load exists only in air-conditioned spaces (33 percent of net usable area). Simulated with DOE-2.1, it amounts to 27,312 Btu/sq ft of net air-conditioned area (8998 if distributed over the entire building). Compared with the energy consumption of a fully air-conditioned building, this represents an 80.15 percent reduction. Natural ventilation is effective, as inside temperature rises above comfort levels for more than one hour only ten times a year. When tested under an artificial sky, the fixed sunshades reduced the daylight component by only 8 percent because of the brightness of the hazy, tropical sky."

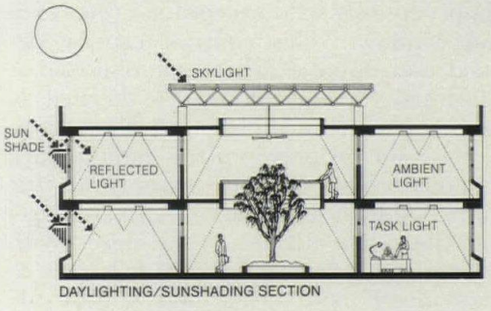


that can corrode in a marine environment, untreated wood that is susceptible to fungal as well as insect attack, and oil paint whose slow drying vehicle can collect debris and mold. (Fungicide paints help prevent mold growth, but according to Kellogg Wong, "they don't quite do the job, requiring painting after three to five years.")

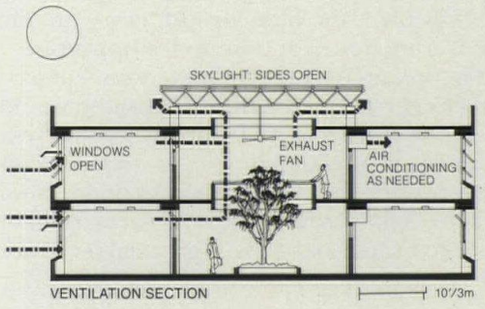
Generally, the harder and less porous a material, the better its performance in the tropics. Cladding materials that have proven successful include aluminum with anodized or baked enamel finishes, polished or epoxy coated stone attached with stainless steel anchors, naturally resistant woods such as cedar or cypress, enamel or alkyd resin paints, and glass. Concrete also is a popular and highly resistant material, although it's not immune to the corrosive action of acidic water found in jungle areas nor to the loss of strength that results from the recrystallization of high-alumina cement at high temperatures.

A tropical aesthetic

Just 25 years ago, the tropics had a distinctive climate-responsive architecture: from thatch-roofed pole structure or veranda-shaded plantation houses to stuccoed urban dwellings with arcaded streets and louvered openings or modern buildings elevated on pilotis with open balconies clad with perforated concrete screens. Now, one glance at the sealed glass towers and air-conditioned suburbs in tropical cities such as Miami, Singapore, and Hong Kong shows how much of that tropical aesthetic has been lost. Its loss doesn't just mean that we now consume more energy in tropical buildings. It signifies the much greater loss of an indigenous culture and of a sense of place. Reducing a building's energy consumption in the tropics, however important, must not be our only goal. We must see it for what it is: a first step toward reconnecting people to their climate and their culture. [Thomas Fisher]



DAYLIGHTING/SUNSHADING SECTION



VENTILATION SECTION

The Arbor Professional Park in Boca Raton, Fla., by Barretta & Associates (left and below) has operable windows behind exterior louvers for shading and rain protection. The cypress cladding resists insect attack while the exposed concrete base resists mold growth and helps keep luxuriant plant-life at bay.

Photos: The Siesel Company

Acknowledgments

We would like to thank the following people for their contributions to this article: Kellogg Wong, I.M. Pei & Partners; Ava Tinfo, Cosentini Associates; Fred Dubin, Lisa Saurwein, Dubin-Bloome Associates; Marvin Goodman; Jim Barretta; George Hoover, Hoover Berg Desmond; Donn Logan, ELS Design Group; Vladimir Bazjanac, UCLA; Theodore Schultz, Davis Brody & Associates; Andre Houston, Metcalf & Associates; George Hartman, Hartman-Cox Architects; Winthrop Faulkner, Wilkes, Faulkner, Jenkins & Bass; Tannys Langdon, Hammond Beeby & Babka; Michael Sizemore, Sizemore/Floyd; Dan Halacy, SERI; Philip Fairey III, Ross McCluney, Michael Houston, Mukesh Khattar, Subrato Chandra, Timothy Merrigan, Florida Solar Energy Center; Nick Naumovich, Parsec.

Further reading

Some of the best books on the subject include: *Tropical Architecture,* Maxwell Fry and Jane Drew, Krieger Publishing Co.; *Building Construction in Warm Climates,* R.L. Fullerton, Oxford University Press; and *Building in Hot Climates,* Building Research Establishment, Distribution Unit, Garston, Watford, U.K. WD2 7JR. A good reference book on ventilation is Richard Aynsley's *Architectural Aero-Dynamics.* One of the best sources for information and workshops in this country is the Florida Solar Energy Center, 300 State Road 401, Cape Canaveral, Fla. 32920, Public Information Office, 305-783-0300.

For product and literature information related to this article, see p. 169.

Formal speculations on thermal diagrams

Harrison Fraker explores the formal implications of solar strategies, showing how the latter give a rational basis for the shifting of grids or the juxtaposition of forms.

In the history of modern architecture, approaches to the technology of environmental control have had a significant impact on the formal expression of many important buildings. As Reyner Banham has explained, the elegant abstraction and detailing of the Seagram Building would not have been possible without advances in HVAC technology, which provide comfort through the use of inexpensive "concealed power." Documenting a change in the attitude of designers about the importance of mechanical equipment, Banham cites Kahn's Richards Medical Building as a seminal expression of "exposed power."

Passive design is an obvious reaction to positions of both concealed and exposed power. Rather than relying on HVAC equipment and the consumption of hidden energy to provide comfort, passive design seeks to use the form and envelope of a building to act as mediator between climate and people, providing comfort by natural energy flows. Although there are many successful technical examples of this approach, the integration of passive design concepts into the formal language and aesthetics of architecture has been limited at best. The causes are complex and reveal in part the extent to which our reliance on HVAC systems and artificial lighting have cut us off from experiencing thermal and luminous phenomena.

In the early stages of the passive design movement, some designers took the approach of showing off the special features of passive design, such as Trombe walls or sunspaces. Because the mere presence of a passive element symbolized a conservation ethic, many designers were lulled into a sense of moral superiority and developed the architecture no further; or they became absorbed in solving the many detail problems of an emerging technology. In the best examples, the thermal diagrams became the architecture, and in the worst, passive elements were attached to buildings in a superficial or awkward fashion.

Most of the serious research going on concurrently focuses on understanding and validating the technical performance of design concepts, classifying systems into direct gain, mass wall (indirect gain), and sunspaces (isolated gain) and carefully defining such components as the collector, absorber, storage, and distribution subsystems. All of this activity is essential in any emerging technology. The principles and components of passive design, however, have physical consequences that go beyond technical performance. They can profoundly influence our perception of architectural space and our understanding of formal concepts. As we refine the technical performance of passive design prototypes, it is important that the designers begin to explore their latent formal content.

A complete understanding of the relevance of passive concepts on architectural form goes beyond the formal analysis of visual qualities alone. It requires the perception and understanding of thermal and luminous phenomena which are not visible in the same sense as architectural space. Boundaries in the thermal or luminous environment are subtle and not sharply defined, although a Trombe wall can create a radiant thermal space or a clerestory window can provide gradations of luminous space just as real as the boundaries of the architectural space. Before architects can make passive design concepts a part of their architectural language, they must understand the spatial implications of the thermal and luminous environment.

Spatial vs. solar layering

David Wright's simple direct-gain house in Santa Fe (1) has a strong differentiation between the back (north) and the front (south). The south side is entirely glass; the north side is almost entirely solid except for a few ventilation windows. This contrast can be described as an opposition between solid/void or open/closed. In this building, the thermal diagram and the formal object are almost synchronous; the progression from light to dark (luminous space) and the mass walls that create a radiant enclosure (thermal space) match the visible qualities of the object. With such a strong image or gestalt, it is easy to orient oneself both inside and outside the building. Yet, where does one enter? In Wright's plan, the little air-lock entry on one side is a modest response to an opportunity rich in potential. If the building were entered along a central axis (2), the composition would force a response to its frontality—to the experience of the building as a sequence of layers progressing from closed to open, from dark to light, from a heavy, warm radiant adobe to brittle cold glass. This axial sequence

raises its own set of questions: What is to the right or left of the axis? Is the sequence made up of a chain of events with some structured rhythm or references to what might be at the end of the sequence? All of these questions are generic to a formal parti where the axial sequence and spatial layering are coincident with the solar orientation and thermal zones of the object. Having recognized this latent formal potential, it is interesting to examine how other solar buildings have explored this parti.

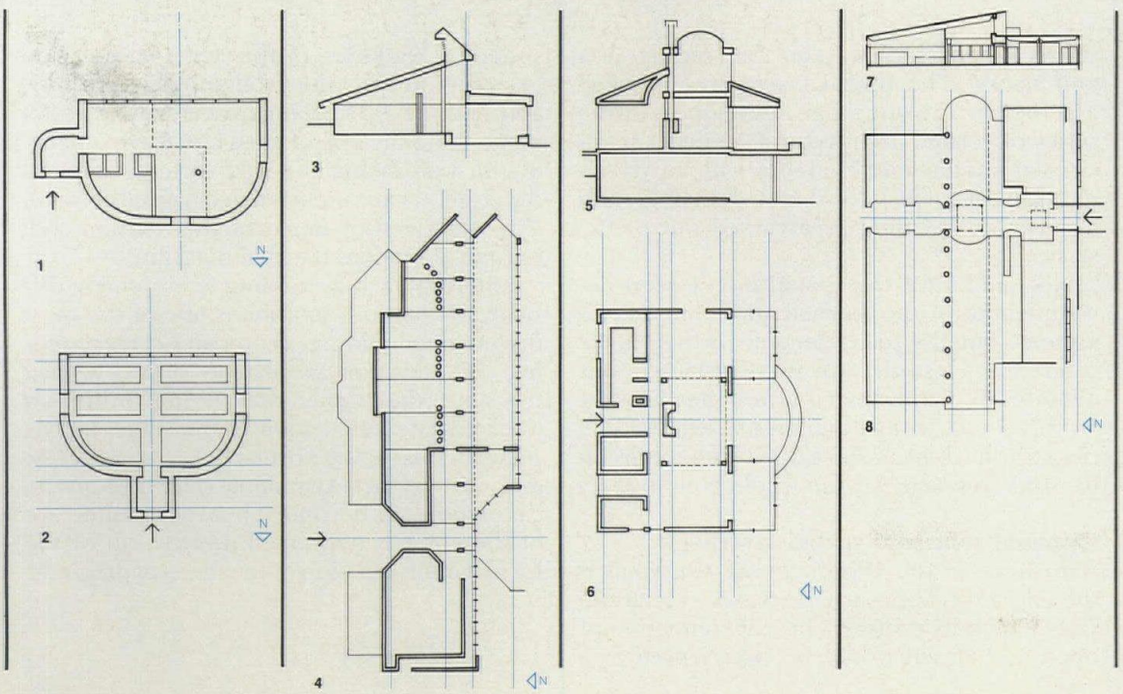
Coincident spatial and solar layering

The New Hampshire Conservation Center by Banwell, White & Arnold (3, 4; P/A, April 1983, pp. 86–89) has a similar kind of differentiation between open and closed as in David Wright's house. The entry axis is also from the north, but rather than approaching a small air lock at the end of the building, one approaches a bermed, closed façade frontally with its entry slightly off center. This makes it similar in composition to the frontal, axial version of the Wright house.

On the simplest functional level, the entry axis divides the building into a public meeting room (right) and private offices and work area (left). The entry sequence approaches frontally the primary passive solar element, a two-story direct-gain window, which, in turn, frames the major site view as the axial terminus beyond. The planar position of the window acts as a formal reference in plan and is transformed in section as one moves along its edge in either direction from the entry. On the left, it becomes a clerestory window providing heating and daylighting, with rows of thermal water tubes and structural columns creating a circulation spine for the work spaces. On the right, it becomes an attached sunspace, which provides heating for the meeting room and a link to an adjacent building. The solar collector thus organizes the building, providing a physical datum that creates different zones of thermal and luminous space appropriate to each function. The building's spatial organization is layered in response to these thermal and luminous zones, similar to Wright's plan. Unlike Wright's direct gain window, however, this passive collector differs along its length, creating a rich spatial experience.

Donald Watson's little "Belvedere" house (5, 6) on Block Island explores similar formal ideas: a progression of spatial layers, from closed to open, which here is organized into a service zone, living zone, and solar zone. These layers are clearly delineated in both plan and section. However, Watson has added an additional formal theme: The entry axis, fireplace, and belvedere create a strong centrality, reinforced by the lines of the hipped roof. The open deck with bowed seat, flanked by the symmetrical sunspaces, forms a protected niche and an appropriate end to the progression. In addition, the entry sequence has a clever move in plan and section that introduces the experience of centrality. The fireplace is positioned on axis, blocking passage, forcing movement off axis. At this juncture, the section is opened to the belvedere, revealing it as a kind of baldacchino around which one must move. It is only after reoccupying the seating area around the hearth and underneath the belvedere that one is back on axis with relationship to the open deck and view. Thus, the thermal concepts of centralized natural ventilation and solar layering have been developed into primary and secondary architectural themes within a composition that has the integrity and directness of vernacular prototypes.

Both of the layered schemes discussed above have their entry sequence from north to south. The experience has an element of contradiction in approaching the closed back of the building and moving toward the open front. What are some of the formal potentials when the sequence is reversed, when the sun is at one's back and the approach is toward the solar front?



The prototype for the Mercer County Libraries by Harrison Fraker Architects (7, 8; P/A, April 1983, p. 39) explores some of these potentials. Again, the building is approached frontally, but the major passive solar element, a clerestory window that runs the entire length of the library, is in the middle of the building over the reading rooms. This massing creates a large-scale frame of reference against which the lower front section is perceived as preparatory to arrival in the main space.

The plan is organized into functional layers, which correspond to gradations in luminous space created by the clerestory and in thermal space created by the Trombe wall. The solar elements articulate important transitions between layers. The Trombe wall establishes the front plane of the building, while the clerestory marks the separation between staff and reading space and creates a sense of being outside. On the other side of the reading space, a colonnade of thermal water tubes forms a transition between the reading area and stacks. The spatial layers are "pinned" together by the entry axis, developed with a series of related architectural events: a semicircular sundial entry, a lobby with a pyramidal skylight, a kiosk for the card catalogs, and a periodical reading area carved out of the stacks.

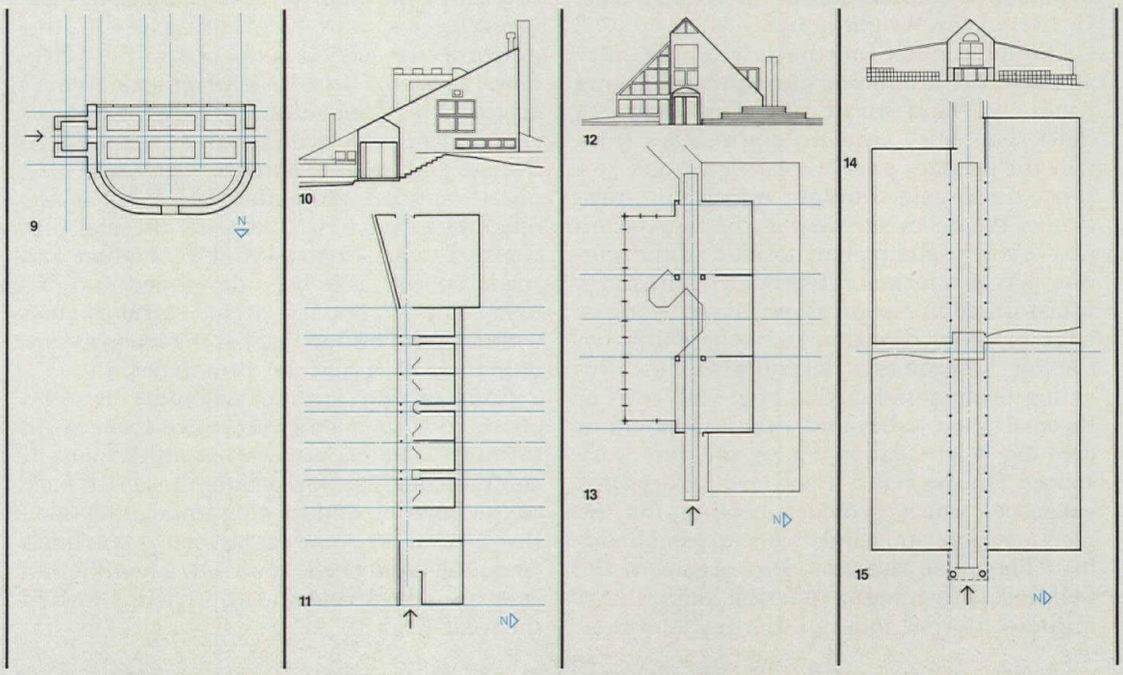
Not only have the spatial layers been developed out of the thermal and luminous diagrams, but the solar elements, which make reference to historical forms, reveal intentions about each of the spatial layers they occupy. In this sense, formal qualities of the thermal diagram have been developed into an architectural language for the whole building.

Opposed solar and spatial layering

Returning to the Wright house (9), what if the object was approached on axis with its end rather than its center? The differentiation of open and closed would be experienced as a progression from side to side, with the axis of movement 90 degrees to the spatial layering created by the thermal and luminous gradations. Architecturally, this is one of the more difficult partis to resolve because the building has two fronts, solar and entry. Furthermore, it is difficult to know both where and how to enter the end of a section that has such a strong contrast from side to side.

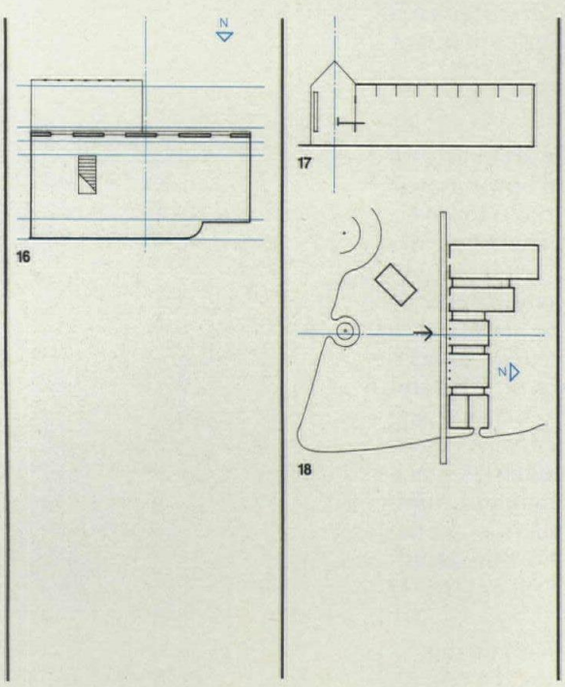
One approach to that dilemma is taken by Kelbaugh & Lee in their Milford Reservation Environmental Center (10, 11; P/A, April 1981, pp. 118–121). In this case the major circulation street is located along the edge of the solar glazing, that is, on the open side of the section. Thermal and luminous gradations occur at 90 degrees to the direction of movement and correspond to a series of minor cross axes, in plan and section, which move from the public street to private sleeping quarters. Spatial definition along the axis of movement is provided by a modulation in the column grid at the cross axes and a corresponding widening of the street on one side to accommodate the front doors, windows, and stairs of the sleeping quarters. The movement along the line of glass and the frontality of the wall facing the solar orientation and the street create a tension generic to the parti. The architecture explores this tension well beyond the initial thermal diagram.

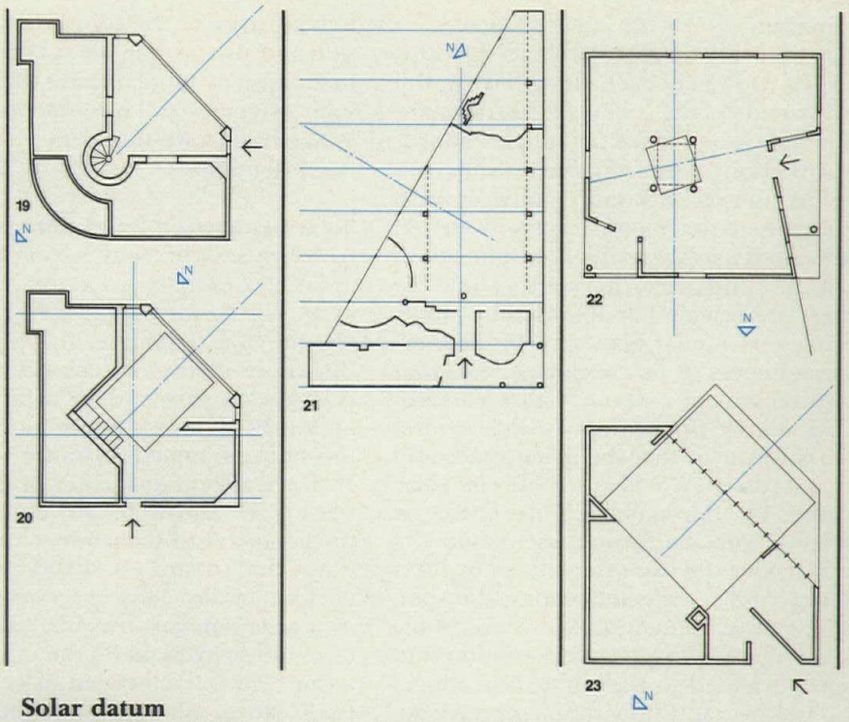
Entering such a building is extremely difficult. Kelbaugh's solution is one of the most direct. The building section and corresponding end elevation are sharply sloped toward the south, but rather than trying to find an intermediate entry point in the slope, he has pulled a small-scale portico forward at the low end, with its local symmetry centering on the circulation axis beyond. Thus the architecture of the entry is developed directly out of the formal interpretation of the thermal diagram.



By comparison, Buchanan and Watson have placed the entry to the New Canaan Horticultural Education Center (12, 13) on the center axis of its end elevation. Here again, the south side is open (glazed) and the north is closed. Unlike the single-sloped roof in one direction at Milford, however, the two sides at New Canaan slope in opposite directions, creating a gabled shape. Relying on the unifying strength of this form, Watson plays up the distinction between north and south as a stark contrast between greenhouse and roof rather than as a progression from solid to void. The intersection of these similar yet contrasting halves creates a logical position for entry and the central circulation axis; a slight shift in the ridge of the greenhouse glazing further articulates the central spine and its continuous gabled skylight. The spine's strong linear sequence is divided into three bays. The central bay has a rotated stair and double-height space creating a minor center and frontality to the solar cross axis. The successful architectural development of these solutions demonstrates the formal potential inherent in the dilemma posed by an entry sequence at right angles to the solar orientation.

Both Milford and New Canaan respond to the differences between north and south created by the solar diagram through asymmetry—even at New Canaan, which is entered in the middle. By comparison, Princeton Professional Park (14, 15; P/A, April 1983, pp. 94–97), designed by Harrison Fraker, Architects, has a symmetrical façade on its approach axis. Can a solar building ignore the differentiation between north and south? At Princeton, the façade's symmetry is countered by the asymmetrical operation of the glazed atrium's movable insulation and by the more or less even distribution of daylighting through the atrium clerestory windows in both directions. The luminous diagram thus enables a symmetrical entry when its axis is at right angles to the solar orientation.





Solar datum

Doug Kelbaugh's house (16; P/A, April 1979, pp. 116–117), as a formal object, has many of the same qualities of orientation, definition, and spatial layering as the Wright house, with one obvious difference. A concrete Trombe wall is placed just behind the all-glass south façade, introducing a contradiction: What is normally perceived as open or void is now closed. The Trombe wall dominates the plan, elevation, and section. Its orientation to the sun and its differentiation from the other walls create a powerful sense of place, both outside and inside, while its sheer size provides a datum or organizing element whose location, dimension, and treatment are of great architectural interest. As with the Wright house, the Kelbaugh house's thermal and formal diagrams are synchronous, producing a powerful gestalt with a number of possible architectural permutations.

Kelbaugh & Lee and Don Prowler have further developed the idea of using a solar element as a datum or formal reference for their winning submission to the Monroeville Civic Center competition (17, 18). The major datum or formal reference is not a solid Trombe wall, but a linear sunspace. Not only is it a multifunctioning solar device, but its size and linearity organize a series of disparate spaces which are plugged into one side. The sunspace also creates a powerful façade, which acts as a backdrop for a civic open space and isolates the Town Hall as a ceremonial object. The strong frontality of the entry sequence (coincident with the solar orientation) and the axial rotation of the Town Hall show how a single formal reference can help articulate subtle differences between the natural and man-made context.

Axial rotation
In Santa Fe, Unit I at First Village (19; P/A, April 1979, pp. 111–112), designed by Bill Lumpkins and Susan Nichols, illustrates another kind of latent formal potential. The spatial organization of the building wraps two wings of living space around a sunspace, with a spiral stair at the pivot, for both vertical circulation and natural ventilation. The orientation of the sunspace is due south, while the two wings are oriented at a 45-degree angle, producing a triangular plan. One of the thermal consequences of this organization is that the least amount of exterior wall area faces north. A more interesting formal consequence, however, is that the living space and façade are rotated 45 degrees off the solar orientation. The thermal diagram is no longer synchronous with the formal orientation.

Unit I divides the two orientations by thermal storage walls, thus delineating the split. A further development (20), where some spaces are put on the solar orientation and others are oriented to the context, produces what Colin Rowe and Robert Slutzky have described as "phenomenal transparency," where the two orientations become overlaid. That raises several questions: How should one approach such an object? What elements should be placed on which axis to articulate their difference? How should the rotation be experienced? And so on. All of these formal issues grow out of the potential opposition between the thermal and contextual orientations. The differentiations refer to real qualities of the site (context) and nature (sun) and not just to the building's own form.

Deformed object
One architectural approach to a building that has two diagonally opposed orientations is to deform it in response to one of the orientations. In the Shelly Ridge Girl Scout Center by Bohlin Powell Larkin Cywinski, the main building has a large, gabled shape (21). While the entry axis corresponds to the long axis of the gable and to the symmetrical treatment of the windows in the upper face of the gable, the local asymmetry of the front porch responds to the deformation of the other end and side of the gabled form by an angled glass façade, oriented south.

The architects use the intersection between the primary axis of the gable and the angled façade to locate the fireplace, with the glazing that steps up around the fireplace creating a local center along the south façade. Procession from the entry to the fireplace is blocked by a central column, forcing a choice between moving around the column or turning to the side and proceeding along a curvilinear path to an apsidal sundial space that fronts on the solar orientation. Thus, the architectural language has grown out of the "collision" of the two orientations.

Solar orientation fixed, context rotated
Another architectural response to diagonally opposed orientations occurs in a small house at the Girl Scout Center (22). In contrast with the previous example, the primary axes of this centroidal house coincide with the solar orientation, rather than with the connected buildings. The two orientations, apparent in the house's angled entrance, come together at the hearth in the center of the plan, where the hearth and wood stove are rotated onto the geometry of the context and the four columns are rotated onto the geometry of the enclosing walls. The center not only has a kind of "phenomenal transparency," with one orientation overlaid on the other; it responds to the centroidal thermal space created by the wood stove. Thus, the architectural expressions of "transparency" and "centrality" have acquired meaning from a thermal concept and from the tension between a primary solar orientation and an angled context.

Context fixed, solar orientation rotated
Richard Levine's house reverses the primacy of the solar orientation over the context (23). The square plan sets up the primary orientation, with the solar orientation expressed as a diagonal transformation. The resulting "transparency" is best experienced on the central stair, which has the same orientation as the primary square envelope, but which also occupies the middle of a rotated center space that is oriented to the sloped solar glazing. The dialogue between the two orientations creates a rich architectural experience, compensating for the almost incidental entry. In all three of the examples above, the formal potential of "transparency" has been given a new meaning because of its generation out of solar and thermal necessity.

Conclusion
This only begins to articulate the architectural possibilities of passive design prototypes; many more remain to be explored. However, this beginning is intended to challenge designers to investigate these latent formal potentials—not only to diagram technical energy flows but also to appreciate the significance that they can have on architectural experience. The value and importance of diagramming the formal essence of energy-conserving prototypes cannot be overestimated. As models of an idea, they act as intermediaries which allow the designer to see thermal and luminous intentions, to interpret their potential formal experience, and to ask how the building can serve both. [Harrison Fraker, Jr.]

Harrison Fraker, Jr., *is a principal of Harrison Fraker, Architects and The Princeton Energy Group.*

Four houses

On the following pages, four houses are shown, each with very special requirements; they range in location from the East to the West Coast, and points in between.

Timothy Hursley

Tim Street-Porter

The houses featured on the following pages are (clockwise from top left): a P/A Award winner in Princeton, N.J., by Olcott-Schliemann, followed by the Maoli House in San Rafael, Calif., by Fernau and Hartman, then by an addition to a Mies house in southern Connecticut, by Peter Gluck, and ending with their own weekend house in western Michigan by Stanley Tigerman and Margaret McCurry.

Barbara Karant

Henry Bowles

Private residence
Princeton, N.J.

First work

This house for a retired couple in Princeton, N.J., designed by 1982 P/A Award winners Olcott & Schliemann, lives up to the jurors' expectations.

The nine-square grid, the cross axes established and then violated, the treatment of landscape as architecture, the idea of house as town—and a host of other current notions about architecture—animate this first house by Richard Olcott and Todd Schliemann. These Cornell graduates handle the "pochéd" plan and abstract, neo-rational forms with skill and occasional wit; after all, it takes great courage (or folly) to terminate the entrance axis in back-to-back bathrooms connected by a two-way medicine cabinet straight out of the "Hi guy" commercials.

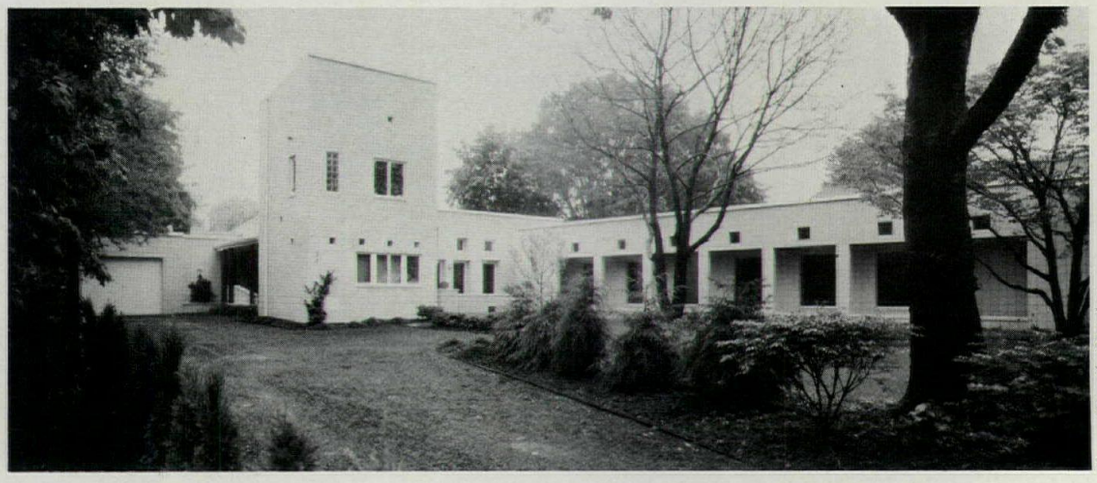
It may seem perverse, then, to say that the architects can gauge their success by the degree to which they have suppressed their schooling; but to their credit, the house is no mere amalgam of fashionable leitmotifs. Its dominant cadence is finally one set by the client's lifestyle, not the architects' style.

The scheme has been built almost exactly as it appeared in the pages of P/A when it won an Award for architectural design in January 1982. Although the jurors quibbled over such details as the "cranked" pool building, they were attracted to the house's strong, specific, formal statement, and admired the skillful manipulation of a very tight site. The 100′ x 150′ lot, situated close to the center of Princeton, N.J., is surrounded by a motley assemblage of suburban bungalows. Three existing trees further narrowed siting options. The house butts up to set-back lines in three directions.

The program, as specific as were the constraints of site, was determined by the very current but not particularly fashionable topic of design for the aging or handicapped. The client, the daughter of a prominent architect/educator, quotes *Building without Barriers for the Disabled* (Sarah Harkness and James N. Groom, Jr., Watson-Guptill, 1976) and with good reason: arthritis has forced her to focus on the logistics of daily living and to plan ahead, perhaps earlier than her peers, for a period of gradually reduced capabilities. Seeking to ensure their self-sufficiency, she and her husband, a retired publisher, "wanted a house where we could remain as independent as possible for as long as possible."

This house is most emphatically not a geriatric unit, nor can it be considered a generic prototype for housing the aging. Yet, in staging this couple's lifetime scenario, the architects have drawn upon some common-sense design principles that do have broader applicability. The simple, one-story layout and ramped entrances are theoretically wheelchair negotiable, although the tight passage from living room to bedroom might be tough to navigate. Butterfly faucet handles, built-in shower seats, 4-inch foam under carpets, and 40-inch counter tops were all specified for easy use, but the only truly specialized equipment is the therapeutic lap pool. In the event that specialized assistance becomes necessary, the "tower suite," which has its own bath, bedroom, and study, could serve as nurse's quarters.

The tower, of course, is a purely fanciful invention, a folly of sorts, that combines with the main "villa" and poolside "stoa" in a rich variety of picturesque vignettes. Where the view could not be composed, it has been cor-

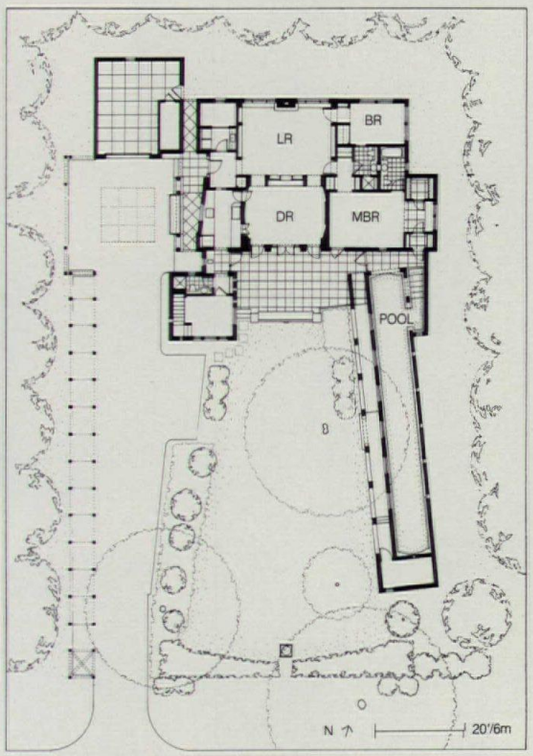


Photos: Timothy Hursley

Windows and openings are proportioned according to the concrete block grid. The rigorous, repeated pattern of arcade openings (facing page) contrasts the more random and playful tower façades (seen from the street, facing page, top; from the drive, right; and from the terrace, above).

Large photo: Timothy Hursley; small photo: Langdon Clay

Private residence, Princeton, N.J.



Photos: Langdon Clay

rected: Windows on side and rear walls are placed above eye level (and incidentally organized for good cross ventilation), framing views of trees and sky, not neighboring properties. These not-quite clerestories, while perfectly placed for interior purposes, create awkward and somewhat scaleless exterior elevations. One or two windows placed at conventional heights could have corrected (or at least clarified) the distortion; perhaps landscaping could now soften these otherwise blank east and north façades.

The owners, driven from their grand south-facing terrace in the heat of the summer, seek refuge in the leftover landscape at the back of the site, and have built their own gazebo there in the northeast corner. Significantly, the house has no back door: The ceremonial street and entrance façades clearly took design precedence, as well they should, but the more minor opportunities of back and side yards and their corresponding elevations have not been fully explored.

These backstage oversights aside, the house answers both present and projected needs of its clients, who take great delight in the rich variety of spaces and vistas coaxed from the limited program and constricted site. The house generally lives up to the promise conveyed in the evocative romantic/rational drawings that convinced the P/A jury. That promise is carried through in this first work with consistency and assurance.
[Daralice D. Boles]

The slight shift of the pool wing off the orthogonal grid (shown in plan, left) has the optical effect of elongating the arcade and expanding the front lawn (far left, top). The dining room opens out onto the terrace and lawn through French doors, which can be closed with Mediterranean blinds (far left, below).

From a swimmer's perspective, the pool's proportions are greatly exaggerated, and views out through the arcade from this lowered vantage point are among the most dramatic (right and below).

Photos: Langdon Clay

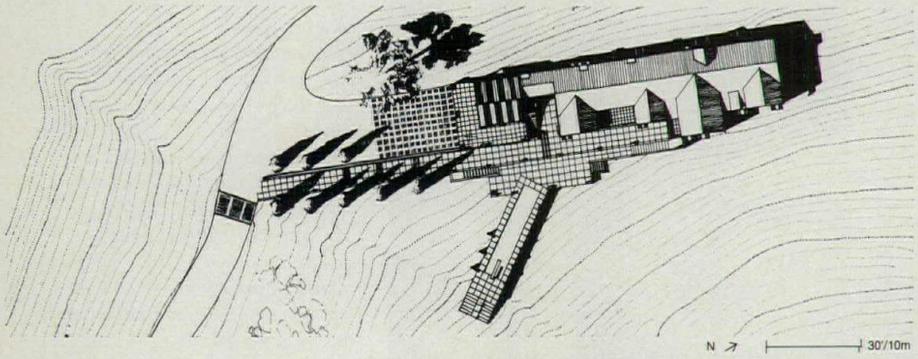
Project: *private residence, Princeton, N.J.*
Architects: *Olcott & Schliemann, New York. (Richard M. Olcott, Todd H. Schliemann, partners in charge, assisted by Andrea Simitch, Paul Pichardo, Gary Handel, Tore Knudsen).*
Client: *name witheld by request.*
Site: *100' x 150' flat lot with south-facing frontage and several large trees, one at center of site.*
Program: *3750-sq-ft living quarters on one level with the exception of tower bedroom/study; 65' x 8' lap pool; existing garage (rebuilt).*
Structural system: *house and tower—wood frame with concrete footings, concrete block foundation walls; pool building—bearing concrete block with wood frame roof; concrete pool.*
Major materials: *scored ground-face concrete block, exterior finish and interior pool finish; gypsum board, interior finish; red oak floors and cabinetry; glass block, tile, black slate, and bluestone gravel (see Building materials, p. 175).*
Mechanical system: *house—forced gas-fired air system, unit air conditioning, operable windows with roll-down aluminum shutters; pool—forced gas-fired air system with exhaust blower; self-cleaning pool filtration and heating.*
General contractor: *Nick Mauro & Son.*
Landscape architect: *Jayne Spector.*
Cost: *witheld by request.*

Roman regionalism

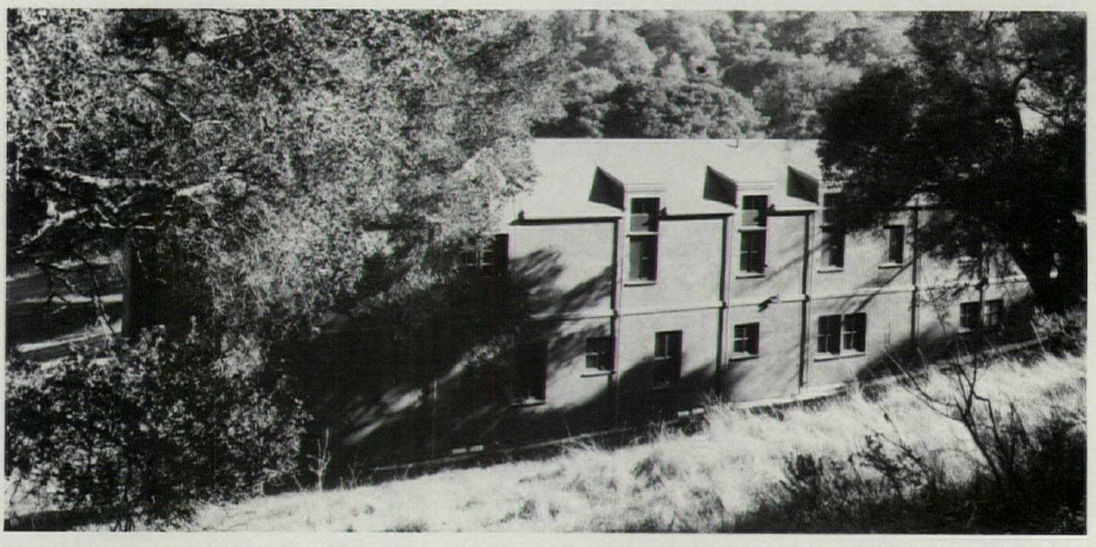
The Maoli House by Fernau and Hartman combines the image of the Mediterranean hill town and villa into a house firmly rooted in the California landscape.

Designing a house in the Marin County hills of California for a Roman family who formerly summered in a country villa near Rome is a nice challenge. Coastal California enjoys what geographers call a Mediterranean climate. But the venerable masonry buildings that enrich our perception of the Mediterranean scenery, near and far, are not present. Still, the Maoli house succeeds wonderfully in capturing the older image of the strong, man-made form standing out against the hillside yet wedded to it by its strong earth color.

While the linear form of the house, which runs parallel to the hill in a north-south direction, is aesthetically logical, active slide areas determined the site. To gain the maximum southeast exposure, architects



From afar, the Maoli House (opposite) has the character and finish of an Italian hill town. Its rear elevation (right), with its raised second-floor windows, has more the character of an Italian villa, complete with piano nobile. The pool shown in the site plan (above) has yet to be built.

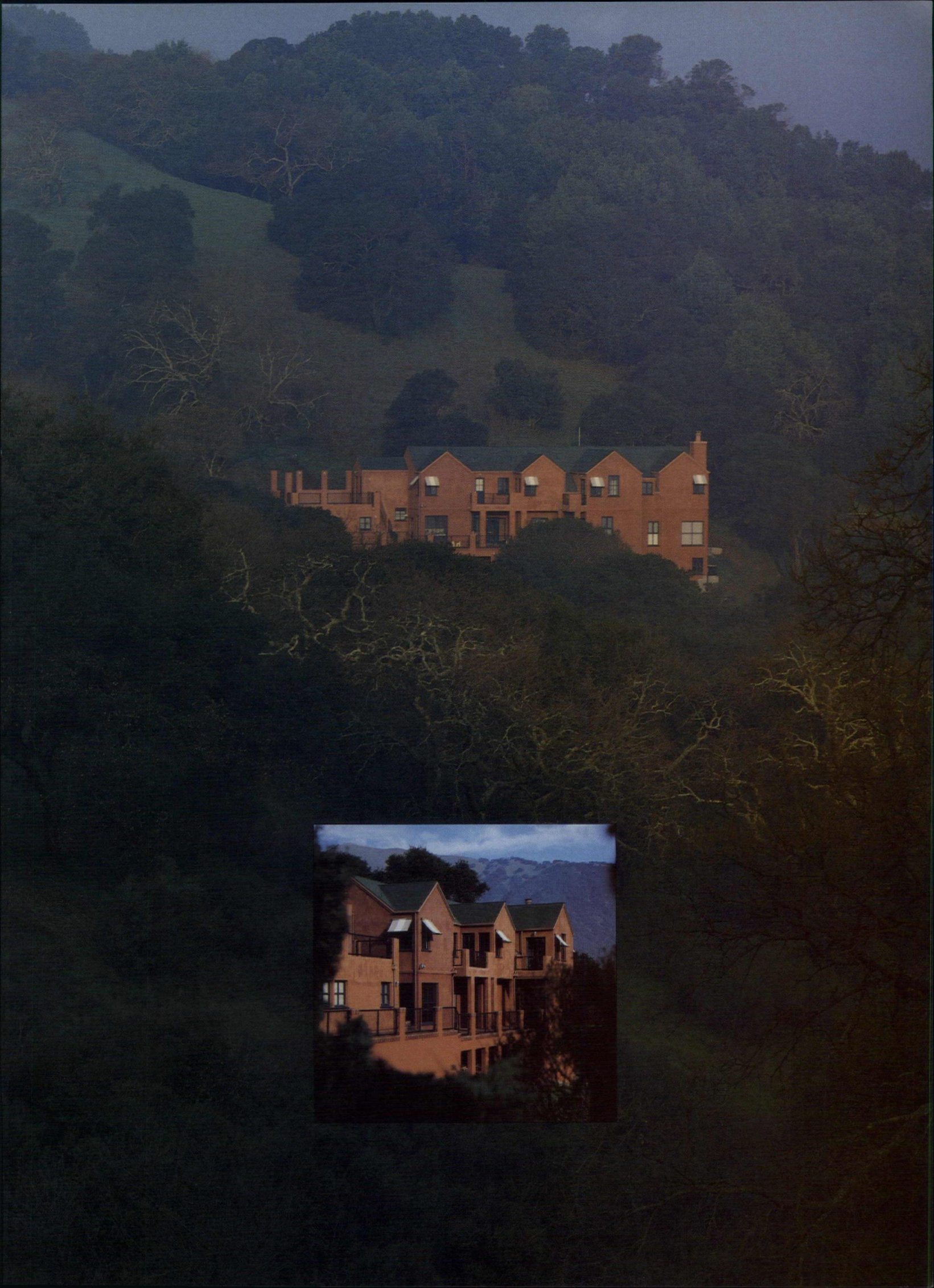


Large photograph, Mark Citret

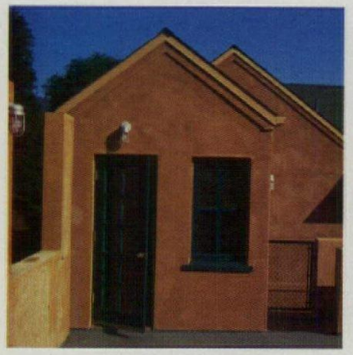
Richard Fernau and Laura Hartman worked out a plan shaped like a key. The back of the house follows the edge of the hill; the front steps in and out, multiplying the possibilities for southern sunlight and creating complementary indoor-outdoor spaces on a generous terrace, which is an integral part of the ground floor. Yet this main living floor is not the free-flowing, open plan associated with the California houses that partake of the out-of-doors.

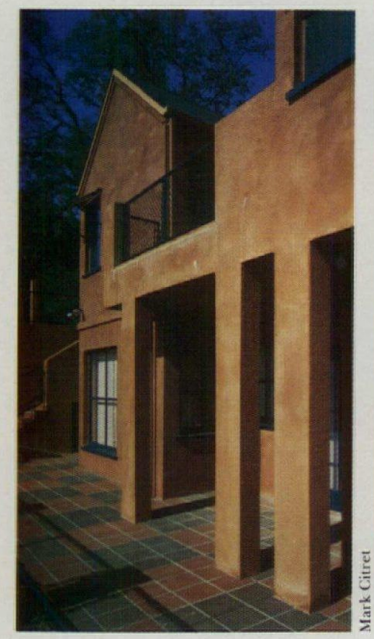
The approach to the house from the drive to the south, up the steps and along the terrace to the main entrance, is punctuated by intervals of small yet important spaces intimately related to the interior rooms. Beyond the terrace, a panorama of hills and valleys stretches to the horizon. The narrow section of the house makes the view across the valley as accessible to the inside rooms as it is to the terrace. Inside the main entrance at the north end of the terrace, the stair hall offers access to the living room as well as the lower and upper halls. Set down a few steps, the living room is a full stop, formally defined as such by the fireplace on axis with the double entrance doors.

The architects have a fondness for designing houses with definite rooms. This approach stems from both their experience in designing for energy conservation and a sensitivity to the proportional harmonies of small spaces. Designed for a family of four, the Maoli house has only 3000 square feet. Yet the spatial sequence is so carefully orchestrated along the length of the house that the experience of space is temporal; there seems to be more there than meets the eye. The plan is also articulated by the gable roofs, which define the upper-floor bedrooms. At ground level, the series of piers that support

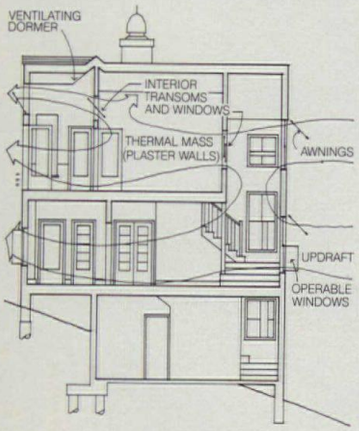


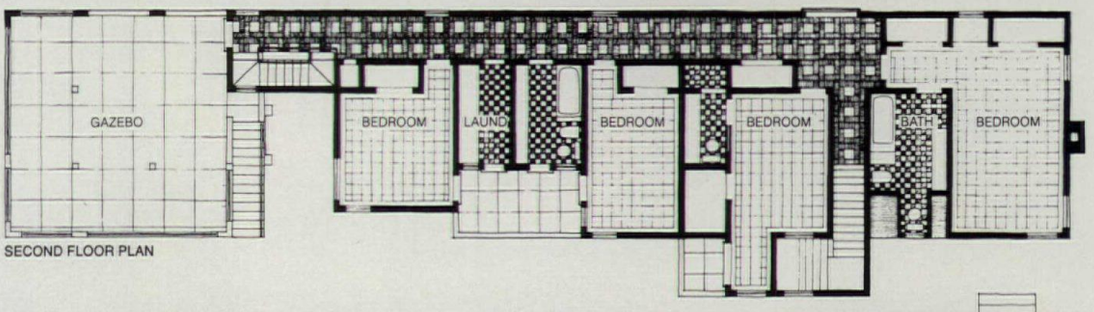
The large windows, small gables, and smooth surfaces (below and right) create a deceptive scale. The plans (bottom right) are key-shaped and organized along linear axes. The section (bottom) shows how interior windows and transoms help pull breezes through the house.



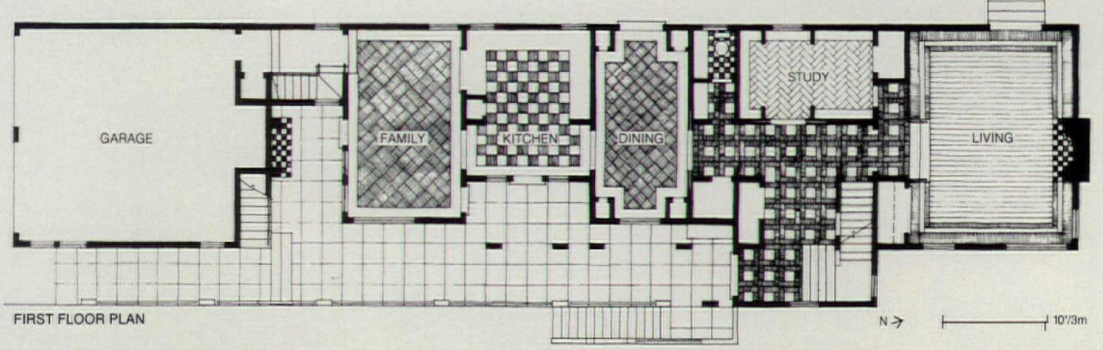


Mark Citret





SECOND FLOOR PLAN

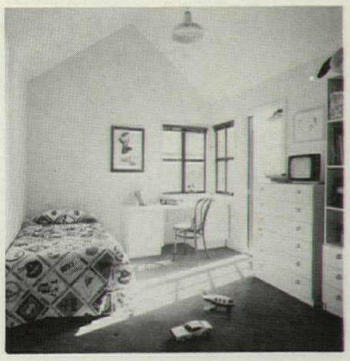


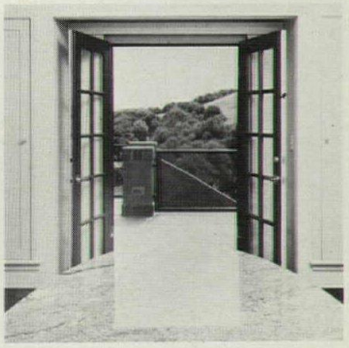
FIRST FLOOR PLAN

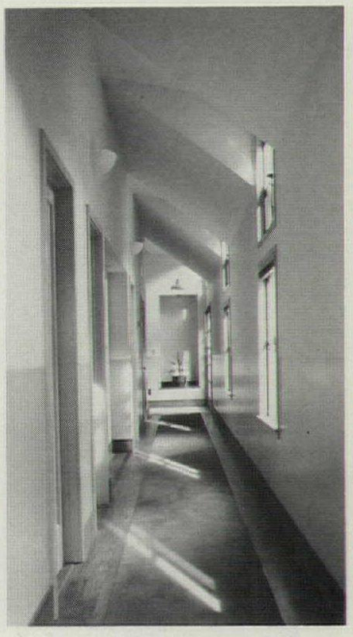
Project: *Maoli House, San Rafael, Calif.*
Architects: *R. Fernau + L. Hartman, Architects, Berkeley, Calif. (Richard Fernau, Laura Hartman, designers; assistance from Charles Davis, AIA, Pirkko Rehfeld, Michael O'Leary, Christine Macy).*
Site: *three-acre site on the eastern slope of Lucas Valley, 30 miles north of San Francisco.*

Program: *3200-sq-ft, four-bedroom house with 1500 sq ft of deck and a 500-sq-ft garage.*
Structural system: *foundation grade beams on drilled piers. 2 x 6 wood frame construction.*
Major materials: *integral pigment cement plaster, quarry tile, aluminum windows with baked-on enamel finish and wood sills, composition shingle roof (see Building materials, p. 176).*

Mechanical system: *heat pump.*
Consultants: *R. Fernau + L. Hartman, with Paola Maoli, interiors; Raymond E. Lindahl, structural; Dan Vandamant, Alice Meyer, mechanical; Stanley Anderson, electrical; Oberkamper & Associates, civil.*
Costs: *withheld by request.*
Photography: *Tim Street-Porter, except as noted.*







The interior consists of several discrete rooms, appropriately scaled. Circulation spines connect the rooms, which are further connected to the terraces and the view through glass doors.

the terrace and stand out clearly against the blank, raised basement wall recall the elemental quality of vernacular hillside buildings in rural Italy.

Though there is no overt statement about energy conservation, the Maoli house is efficient in this respect. The architects considered that, in addition to proper orientation, the house's narrow section with well-placed, operable windows and transoms would offer the maximum opportunity for cross ventilation. A hallway on the upper level running the length of the house serves as a means of circulation for air as well as people. During the often hot summer days, the hall windows can be opened to pull the prevailing southeast breezes through for cooling. The hall is appropriately colored an icy blue.

On the opposite side of the house, southeast windows admit sunlight early in the morning while southwest and northwest windows are shaded by the hill and by awnings during the hot afternoons. Though the climate is relatively mild, a diurnal fluctuation, which requires both heating and cooling, is not uncommon. Interior cement plaster walls help reduce the temperature fluctuation, but for the most part the occupants regulate the interior environment by opening it up or closing it off in the traditional Mediterranean way.

Although California's climate is one of its main attractions, a relatively small percentage of its houses have actually been designed to express the possibilities of living in that region. Houses such as the Maolis', which respond wholly to the environment, clarify our understanding of what regionalism in architecture is all about. [Sally Woodbridge]

Weekend house
Western Michigan

A piece of the American quilt

Architects Stanley Tigerman and Margaret McCurry have designed a weekend house for themselves on a main street of a small lakeside town.

All his professional life, Stanley Tigerman has been straining to create a piece of the American architectural quilt. Finally now, with his wife and partner Margaret McCurry, he has succeeded in his endeavor in the form of a weekend cottage designed for themselves and two children.

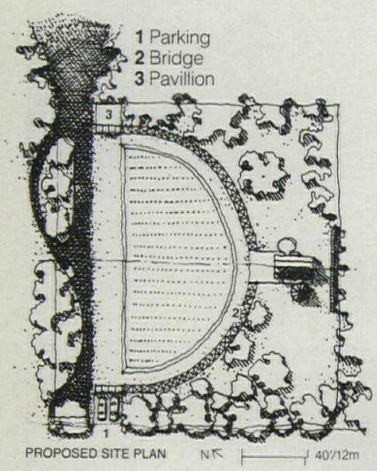
Why has Tigerman been straining for such an accomplishment? As he has been eager, in his lectures over the years and in his recent book *Versus* (Rizzoli 1982, P/A, Dec. 1983), to reveal his innards and to relate his designs closely to his person, we can deduce that he has wanted to please and simultaneously scandalize his (or the stereotypical) Jewish mother who would have been proud of "My son the doctor"; that he wanted to please clever Mies and yet break away from his strictures; that he wanted to earn inclusion in the circle of northeastern Post-Modernist "leaders," while retaining (for protection?) his separate Chicagoan—read brash, direct, earthy, *real* American—identity; and that he wanted to titillate his young followers by insistently using humor and even soft porn (the Daisy house), making himself more often than not the butt of his jokes.

He has been an indispensable leader of the vibrant Chicago architectural community, a generous educator, and a productive architect (the Illinois Regional Library, P/A, April 1978, and the Glencoe house, P/A, Aug. 1976, being two of his finer buildings). But he has been too quick, by his own admission, to jot down an idea and call it architecture. He has turned the flat cartoon too literally into plans and elevations. The circle—especially in reversed tangential segments and quarter-circular waves—has been used by him as a device to free, it would seem, the uptight Cartesian grid, but it has been an unattractive motif incomprehensible as part of an architectural language.

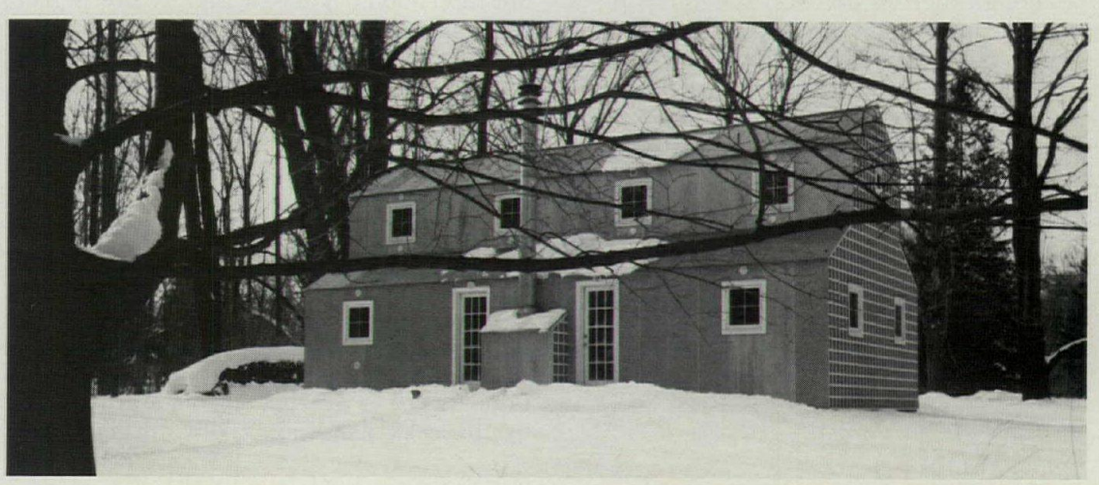
Finally now, in this small house (a 1984 AIA Honor Award winner), he and McCurry have separated the circle from the rectangle, taking time to develop each part as a legible architectural form, allowing them not to diffuse each other but to play off one another. Tigerman is no longer as attracted to "humor," or to personal anthropomorphic interpretations as before (though it is irresistible to interpret the round sturdy porch and the neat and shapely house as a metaphor for the couple). Instead, the partners have created a piece of patchwork that unites images—of the American industrial shed and silo beside it, as can be seen in the steel mills by the highway, connecting the house and Chicago; of the barn and granary; of the basilica and baptistery; and of the Rossi-esque section and square windows.

At the same time, the house can be seen as part of the town's quilt, whose one-acre lots—each developed with a different house (a cottage, a "ranch"-style house, and so on)—are self-centered, but stitched together side by side. The Tigerman-McCurry lot is being developed like a primitive painting, the perspective not naturalistic but layered, with the parking area at one corner, a sweeping semicircular bridge drawing the visitor to the house at its midpoint, forcing the view of its most poignant side, the gabled end. The bridge will enclose a semicircular garden, its formal shape denied by its probable use (as a vegetable patch) and its orientation (toward the side of the lot, without a major view from the house's main space).

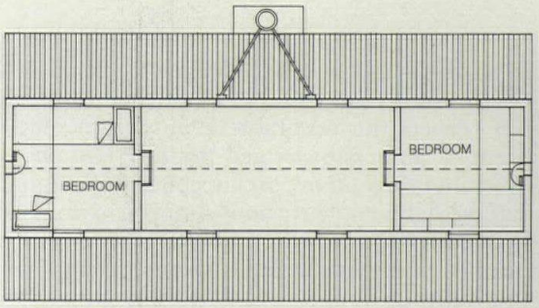
Sitting small and innocently in its lot, clad in corrugated galvanized iron and plywood,



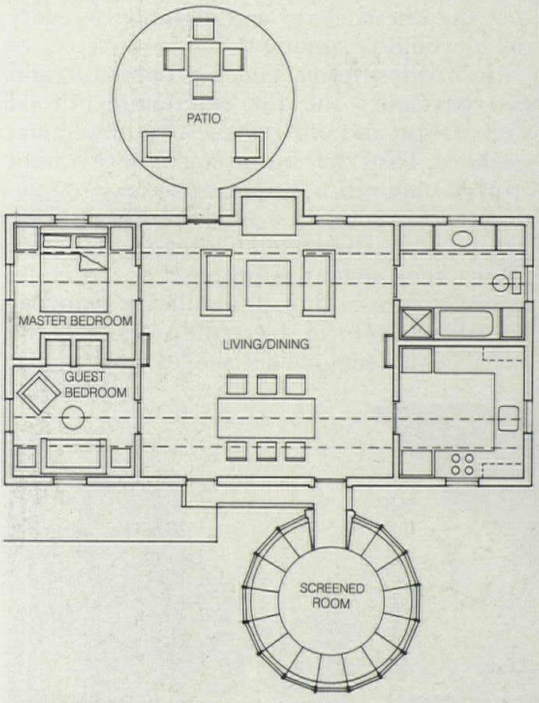
The sides of the house are clad in corrugated galvanized iron, the ends in painted plywood covered with wood lattice. The square wood-framed windows are standard, have snap-in muntins, and are embellished by small round ventilator grilles above them, which are amusingly tied by arched moldings when used over the doors. The screened porch (opposite inset) has a conical standing-seam sheet metal roof common to farm outbuildings.



Project: *weekend house, Western Michigan.*
Architects: *Stanley Tigerman and Margaret McCurry of Tigerman, Fugman, McCurry.*
Client: *Margaret McCurry, Stanley Tigerman.*
Site: *approximately one acre on the main street of a small lakeside town.*
Program: *weekend house with two bedrooms, two bedroom lofts.*
Major materials: *galvanized corrugated iron, plywood covered with wood lattice; gypsum board, vinyl asbestos tile flooring (see Building materials, p. 176).*
Structural system: *wood frame.*
Mechanical system: *electric baseboard heating; ceiling fans.*
Consultants: *Ray Beebe, structural; Norman Migdal, mechanical.*
General contractor: *Richard Brychta.*
Costs: *$70,000, including site work, interior finishes, and furnishings.*
Photography: *Barbara Karant.*

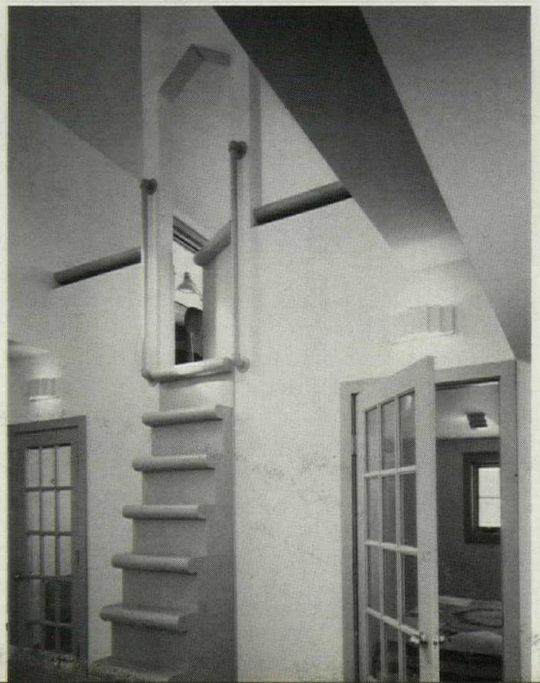


LOFT LEVEL



GROUND FLOOR 10'/3m

the house evokes not only historically resonant American images but also modest recent ones—such as that of the (immobile) mobile home. Inside, the compact plan is surprisingly dramatic in its use of double-height space, but it is rather full of eye-stopping furniture and charming tchatchkes. As the couple sits by their barbecue grill on the patio or in the screened porch, they can contemplate with pride their (most sophisticated) achievement of the all-American suburban dream, firmly stitched into the all-American small town scene. [Susan Doubilet]



All rooms feed off the central double-height living/dining room, shown on these pages, so that no additional space is required for circulation. This 20' x 20' main space is quite theatrical, overlooked as it is by two balconies. The bedrooms on these balconies are entered through pointed arches in the bracing walls, from which pour steep round-nosed stair/ladders with pipe handrails—"Baroque elements within a rational space," says Tigerman. Sofa lattice work and fabric pattern pick up exterior lattice motif. Ceiling fans and louvers in the end walls help ventilate the house.

Residence
Southern Connecticut

Return to grace

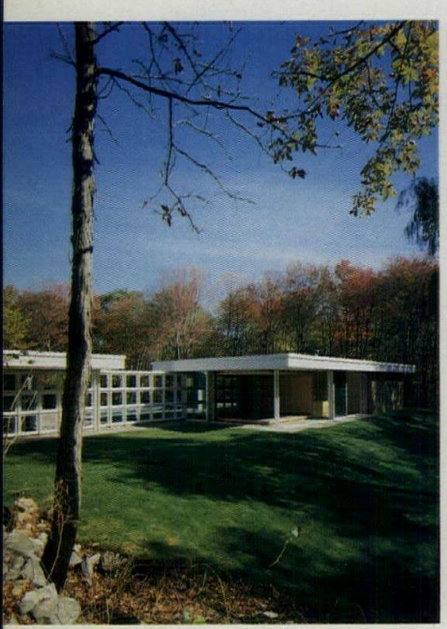
Given a current professional bias toward International Style unthink, a return to exquisite detail and classic formal siting by Peter Gluck forms a basis for revisiting the Bauhaus.

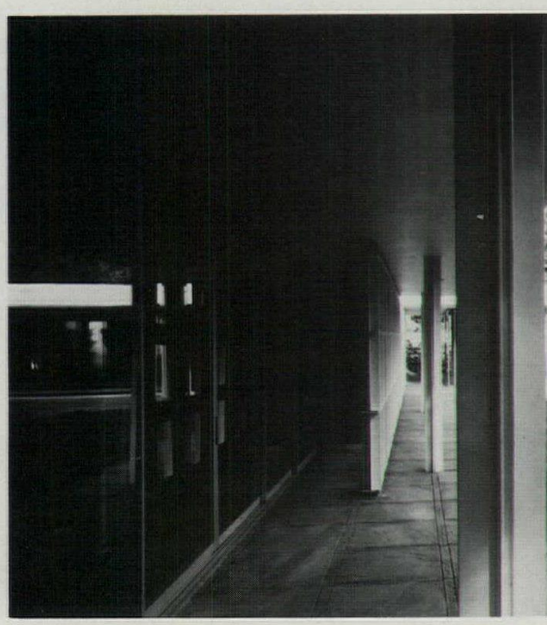
It was that kind of classic design problem we all thought only our design professors fiendish enough to devise. All that would be required to strike terror and paralysis into the heart of a prospective architect/designer is the imperative "Add to an existing house by Ludwig Mies van der Rohe." The rest of the program could say just about anything; God has left the details for later.

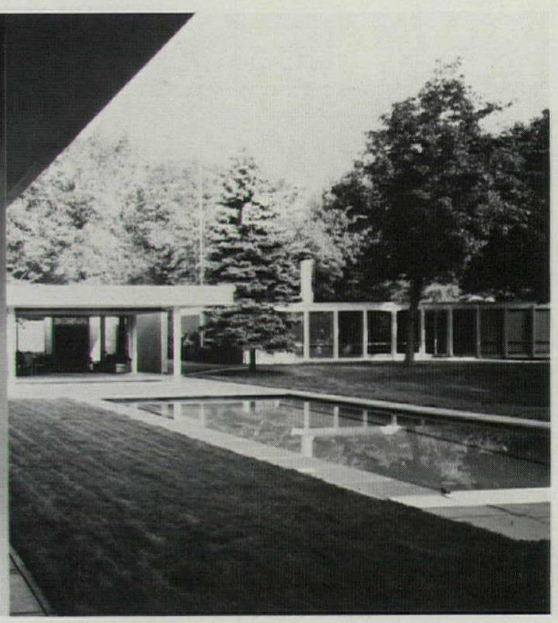
Originally designed in 1955, the house in lower Connecticut was built for the brother of Mies's client for the renowned Lake Shore Drive apartments. Its fenestration and glazing echo those apartment towers and, in fact, the house even used materials left over from the Chicago projects. This was a forgotten Mies, however, having been in quiet repose on its six-acre river-edged site between the 1950s and 1981 (it was not generally known that a Mies building existed in Connecticut). In 1981 new owners surfaced, with the house, in order to obtain zoning variances for a proposal by their architect, Peter Gluck.

So the challenge to Gluck was clear: increase the living space to more than double, but respect the venerable 1955 design statement of an acknowledged master. The obvious inner goal of any architect in this position is to be deferential without simply copying, to bequeath the new with required respect without becoming enslaved. It seemed clear that the existing house should not be physically affixed to the additions. It seemed just as clear that the Miesian grid and attention to every detail would be among the imperatives.

In broadest terms, Gluck proposed to add two pavilions, one for entertainment/food preparation and one for guest/bathing/sauna facilities. Thus the two variances were sought from zoning officials, waiving setback regulations and permitting a single residence comprising more than one building. Because the clients' representatives proposed this route to avoid compromising a significant self-contained architectural object, the granting of the variances is a seminal decision in acknowledging hardship with respect to architectural importance.



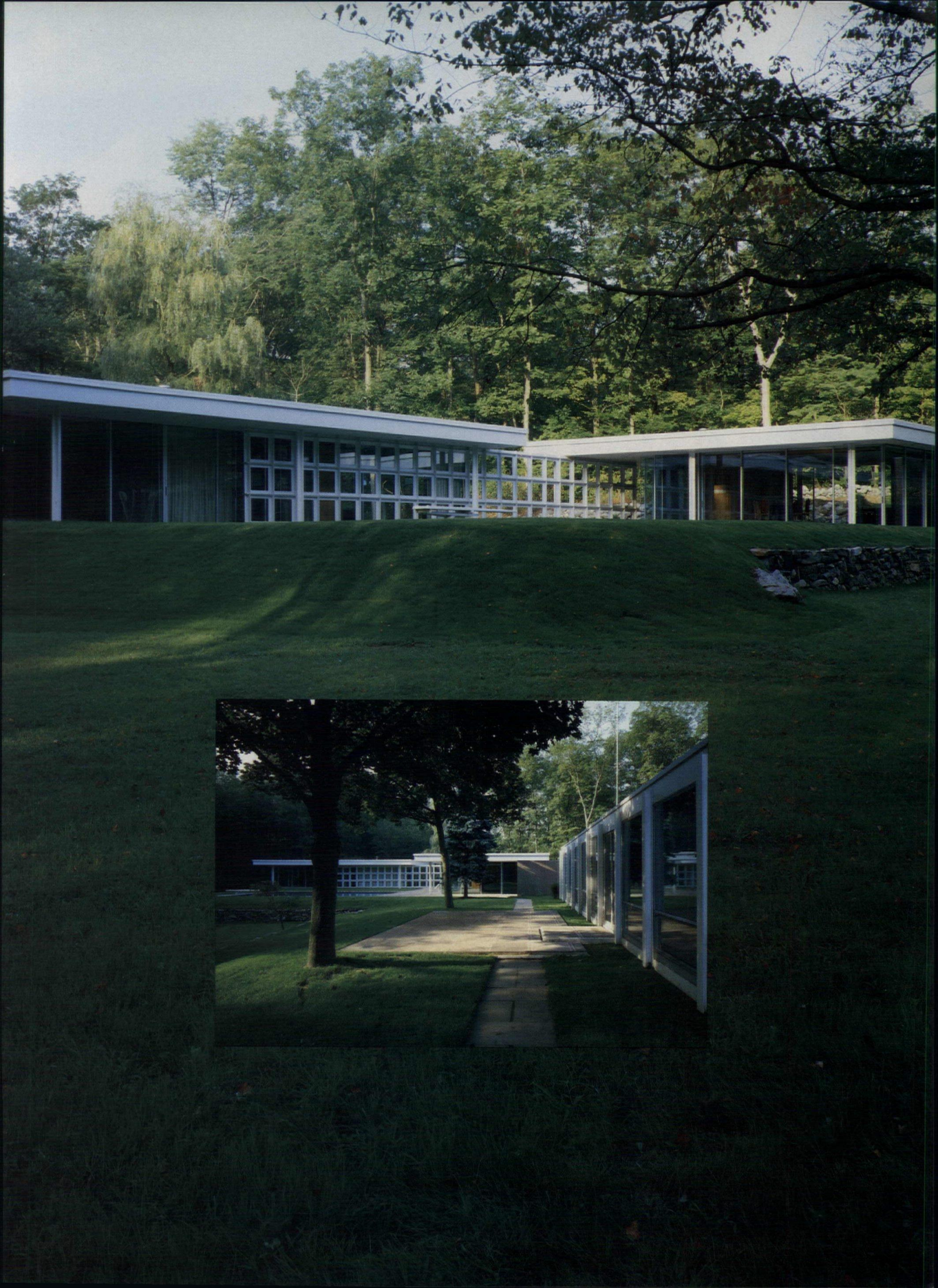


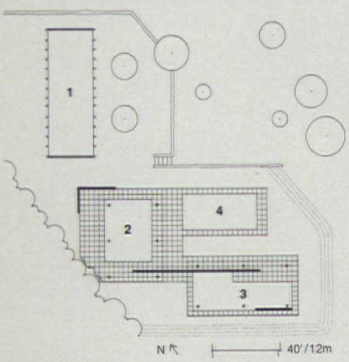


"Outside" the screen wall, the north guest bedroom is oriented away from the pool (above), while the south one and the entertaining pavilion focus on it (above right). Original Mies house (far right, this page, and inset, facing page) completes the complex.

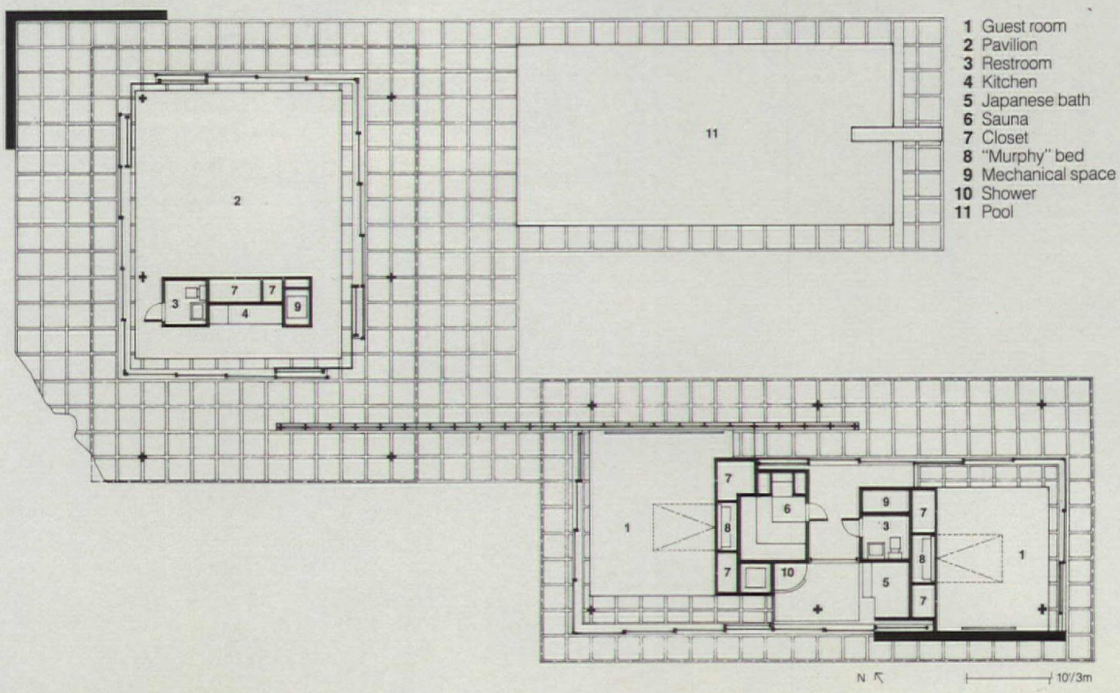
While the original house was a pristine example of Miesian clarity—even a two-bay later addition stuck to the rigorous aesthetic—it wasn't *livable*, within the new owners' definition. Gluck, therefore, was asked to provide an entertainment space, a pool, and guest quarters; the total of the additions would exceed the area of the original. The client wanted not so much a homey comfort as space for entertaining and perhaps business conferences away from Manhattan.

From a slightly closer viewpoint, the importance in Mies's work of the 1929 Barcelona Pavilion was not lost on Gluck either. In many respects, this Connecticut complex *is* the Barcelona Pavilion, with clear references in the



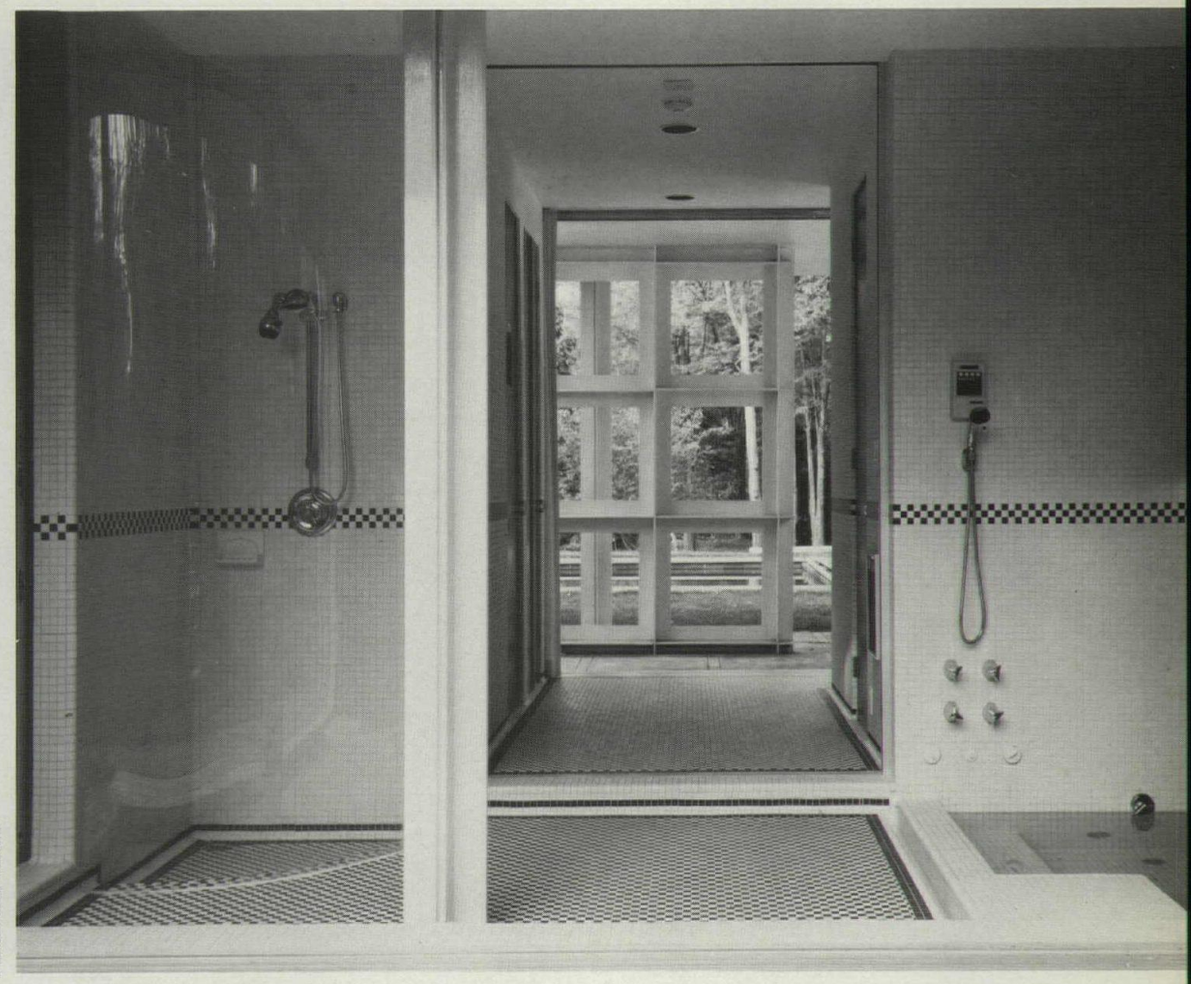


1 Existing Mies van der Rohe house
2 Pavilion
3 Guest house
4 Pool

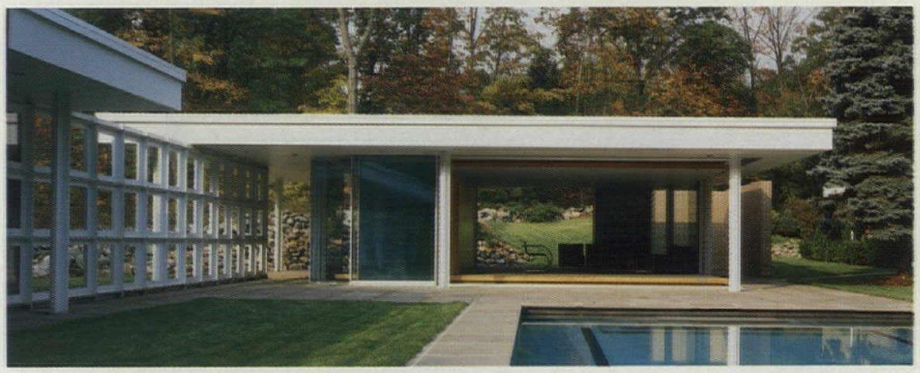


1 Guest room
2 Pavilion
3 Restroom
4 Kitchen
5 Japanese bath
6 Sauna
7 Closet
8 "Murphy" bed
9 Mechanical space
10 Shower
11 Pool

With all sliding sash stacked in an open position (left and bottom photos) the entertainment pavilion becomes an extension of the site, or vice versa. Detailing of the tracks, columns, and floor/ceiling planes assumes heightened importance, while those elements imply an easily crossed boundary. Sculptural steel screen wall goes from disengaged and open to engaged and glazed (right to left, facing page) as it becomes part of the exterior wall of the larger guest bedroom. Part of the central bathing area (below) is devoted to a shower enclosed in a curved acrylic screen and a recessed stepped Japanese bath, both with views out to the site.



Photos: Paul Warchol



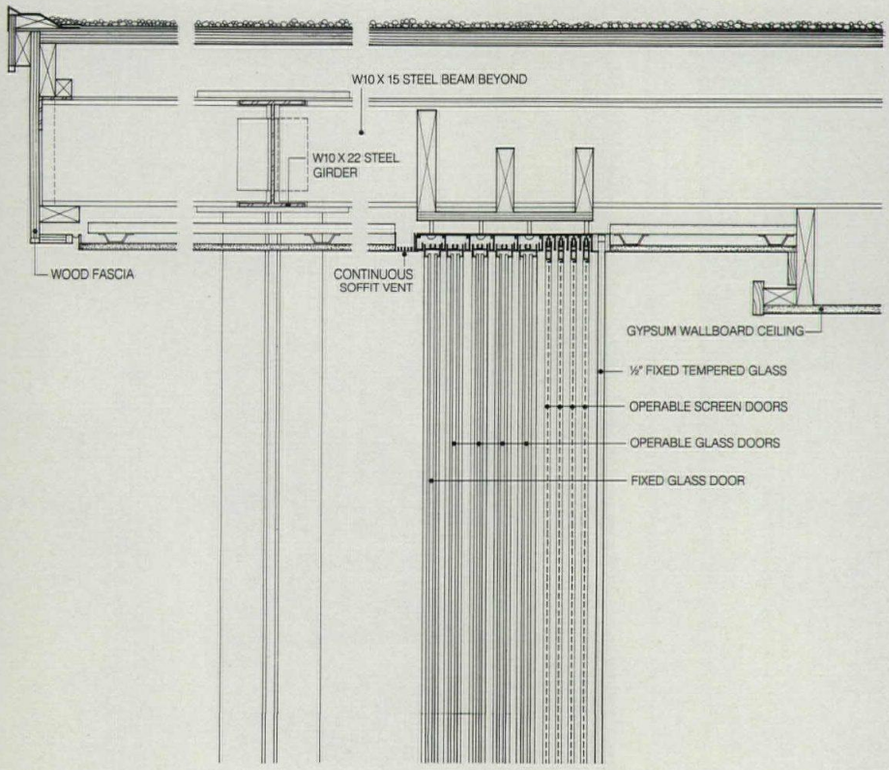
guest pavilion and the pool location. But Gluck, having lived in Japan for two years recently, began to notice the linkage between traditional Japanese and Miesian inspiration as it concerns structural and spatial refinement—including the flexibility of the latter.

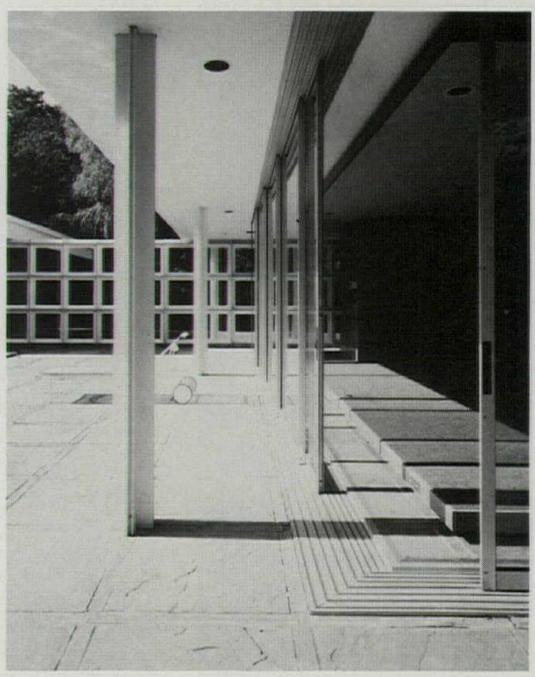
Deity must, therefore, return in the details. Not the least of these are the two planar design decisions which strongly pull Mies to Japanese. Creating an edge condition both top and bottom, Gluck has dropped the ceiling and raised the floor, giving the sense of a place-within-a-space inside and separate from the floor-to-soffit glass. This seemingly simple ploy is very effective in clearly defining living space within the transparent envelope.

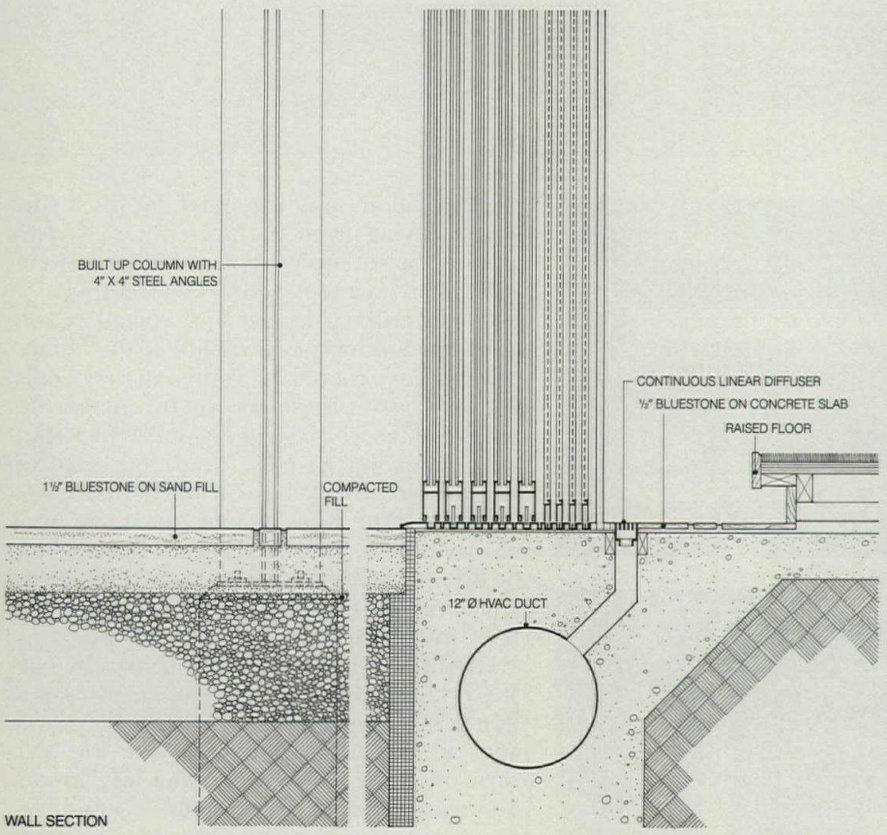
Another self-evident but brilliantly executed design element brings us from shoji to sliding sash. In a major way, the very large movable glass doors combine with the platforms to *create* Japanese tea houses; options are nearly complete openness—closed but transparent, or open but screened. The doors

Project: *additions to a residence, southern Connecticut.*
Architect: *Peter L. Gluck & Associates (Kent Larson, associate in charge; Peter L. Gluck, Kent Larson, and Louis Turpin, design team; Richard Allen Heinrich, sculptor, steel screen).*
Site: *six acres bounded by a river; rural, with stone walls, and slightly sloping toward the flood plain of the river.*

Program: *provide a pool with shower, whirlpool, and sauna facilities; provide two guest bedrooms, and an entertainment pavilion with food preparation area.*
Structural system: *steel frame roof with cantilever steel columns bolted to concrete foundation; concrete slab on grade with concrete grade beams.*
Major materials: *steel frame, glass walls, oak cabinetry, ceramic tile and carpet floors, bluestone pavers (see Building materials, p. 176).*
Mechanical system: *gas-fired forced-air with air conditioning.*
Consultants: *Vreeland & Gueriero, landscape; DeSimone, Chaplin & Associates, structural; Thomas A. Polise, mechanical.*
Photography: *Henry Bowles, Courtesy House & Garden Magazine, © 1984 by Conde Nast Publications Inc., except as noted.*







WALL SECTION

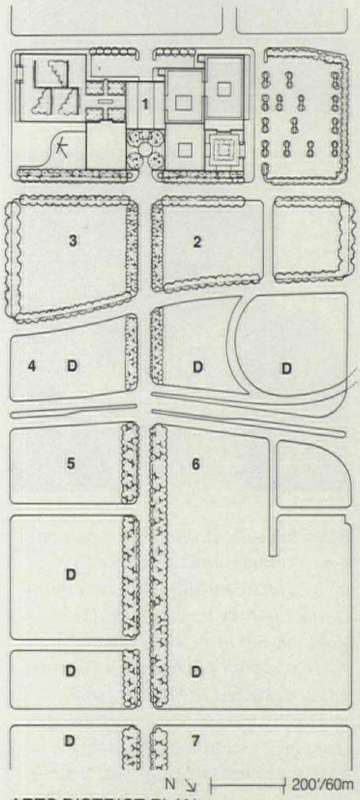
and tracks—some of the largest built by their manufacturer—generated 42 sheets of shop drawings. Needless to say, absolute structural rigidity is essential to the effortless telescoping of these planes. When everything is stacked in the open position, the multiple glass and screen layers create an illusion of a semisolid panel with a dramatic moiré overlay.

A gridded steel screen (executed in conjunction with sculptor Richard Allen Heinrich) links the pavilions visually and engages one wall of the largest guest bedroom. Here the vertical grid is glazed and wood trimmed inside, to harmonize with the other cabinetry—including panel-hidden pull-down beds.

By becoming the general contractor himself, Gluck was able to keep admirable control over the myriad details required to "out-Mies Mies." The overall complex is compelling, even stunning. But beyond that it arrives, again, at a sense of correctness and serenity—in our "beyond Modernism" era, a large accomplishment indeed. [Jim Murphy]

Art oasis

A low-profile civic museum by Edward Larrabee Barnes Associates is the first structure of the Arts District at the edge of downtown Dallas.

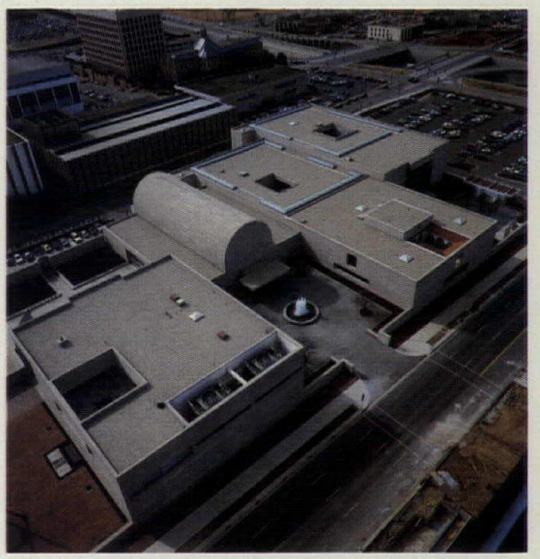


ARTS DISTRICT PLAN
1 Museum
2 Museum expansion
3 LTV Building
4 Belo Mansion
5 Cathedral
6 Concert Hall
7 Arts magnet school
D Development sites

The new home of the Dallas Museum of Art is an oasis in more than one sense: It is a place of calm between the advancing edge of the city's highrise core and the teeming circumferential freeway, and it takes the form of low, clustered blocks interspersed with planted courts. Opened this winter, the museum is the first completed part of a planned 60-acre Arts District (P/A, June 1983, p. 35) intended to realize the city's full cultural potential.

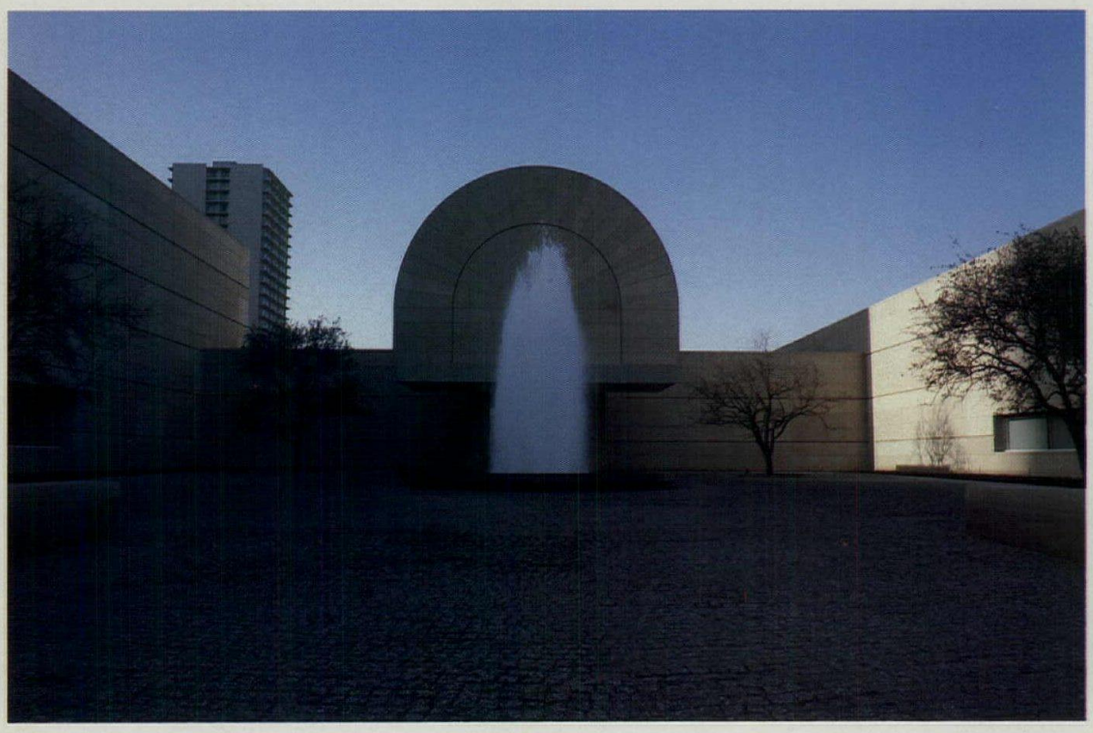
With no shortage of patrons, Dallas had long made do with architecturally charming but small and obsolete arts facilities in Fair Park, somewhat removed from downtown. Even Fort Worth, the smaller rival city just to the west, had an impressive museum precinct, including Louis Kahn's revered Kimbell Museum of 1972.

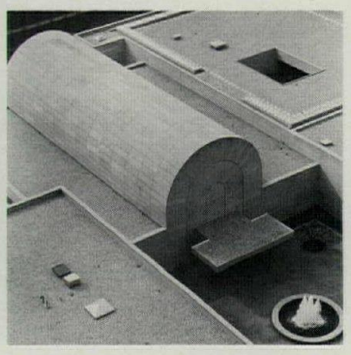
The concept of a mixed-use Arts District, proposed in 1977 by planners Stephen Carr and Kevin Lynch, fitted the museum's interest in larger, downtown quarters. After a few setbacks, museum supporters were able to win a public bond issue in 1979 for city construction of the museum. Meanwhile, a rigorous architect-selection process had taken place, during a period when the National Gallery's bravura East Building was the talk of the museum world, and the new City Hall back home in Dallas was feeding the city's reputation for bold gestures (both buildings by I.M. Pei & Partners, it happens). Eschewing monumentality, the museum committee chose Barnes for what they saw in his previous museums, such as the Walker Art Center in Minneapolis



and the Scaife Gallery in Pittsburgh: a commitment to environment for art and its viewers. (The Pei firm, it turns out, was chosen to design the nearby concert hall.)

A practitioner of contextualism even before it became an architectural buzzword, Barnes shaped a building that inflects in several ways to this developing edge of the city. Readily accessible from the commercial core just to the south and from the parking areas along the freeway to the north, the building presents its main entrance—and its characteristic





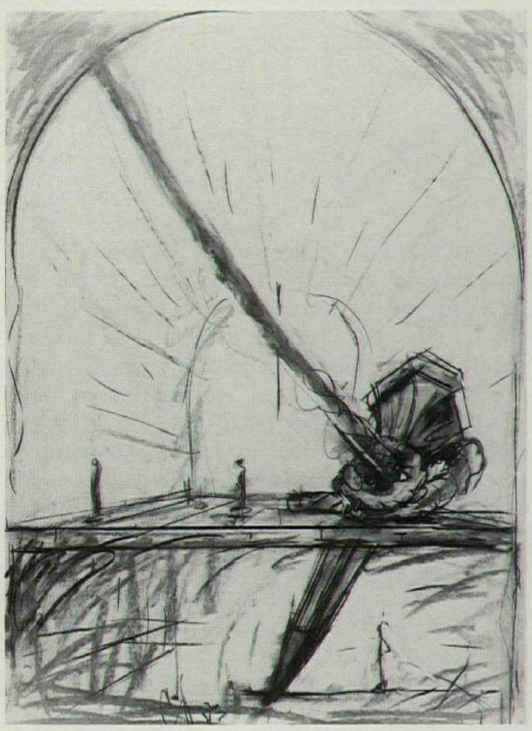
silhouette—to terminate the new tree-lined boulevard that will form the spine of the Arts District.

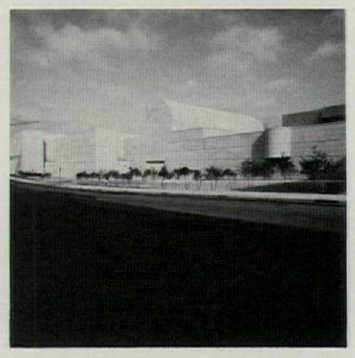
In its very concept, the building is a piece of urban design. In form, it reads as a group of background structures, with a modestly prominent landmark—the vaulted block—at its center. In plan, it is like a neighborhood, with an orthogonal network of internal paths that can be entered at several points. Like a fragment of cityscape, it offers the visitor various optional routes, which demand to be learned.

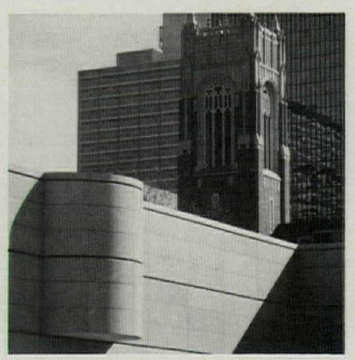
The main artery of museum circulation is a broad, straight spine that can be entered from either end or at the middle. The permanent installations lie mainly east of the spine, the other facilities mainly to the west. Each function can open and close on its own schedule—"like buildings on a street," says Barnes. (The opening to the permanent galleries, too large for doors, has a movable cable barrier.)

The plan cannot be described fully in two-dimensional terms, however, since the spine steps down from south to north—following the terrain—while the permanent galleries step up toward the north—leaving room at that end of the building for two levels of other facilities under the top gallery. (See plans and sections, page 130.)

The symbolic centerpiece of the complex—both inside and outside—is the tall vaulted space that crosses the spine at midpoint. This museum's equivalent of the traditional Great Hall or Rotunda, it is also the first of the permanent exhibition galleries and the lobby for the Arts District entrance. Barnes takes satisfaction in this merger of conventional functions: the ceremonial entry brings you directly into the collection.



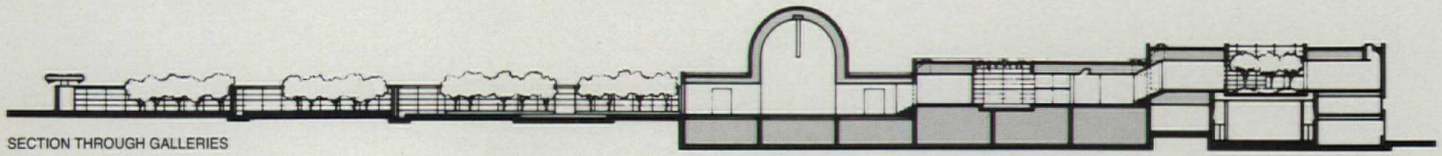




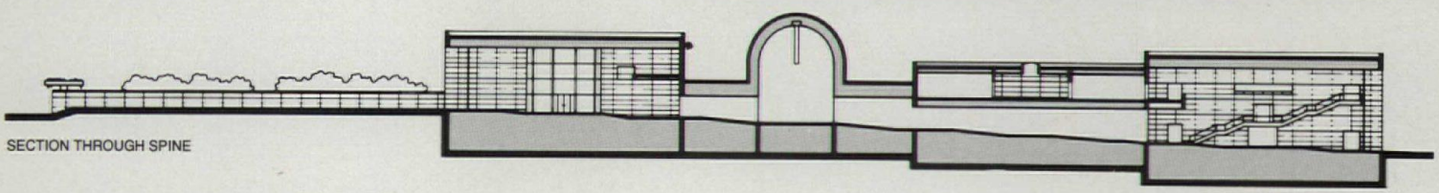
Museum's distinguishing vault rises over "ceremonial" entrance (top left), which leads directly into main Contemporary gallery (right). Limestone on top of vault is part of a roofscape (top photo and preceding page) designed to be seen from nearby towers (photo above). In view from west (middle photo, above), limestone clads virtually all visible surfaces, including garden walls. Claes Oldenburg's "Stake Hitch" (drawing above left) will be installed in vaulted gallery.

Crossing the vaulted space is a pair of transepts marking a secondary axis that reaches from the gardens toward the upper galleries. Four square rooms, filling in the angles of this cross, complete the 12,000-square-foot Contemporary portion of the permanent galleries—spaces of strong, basic geometry that will facilitate the frequent changes in installations expected in this department.

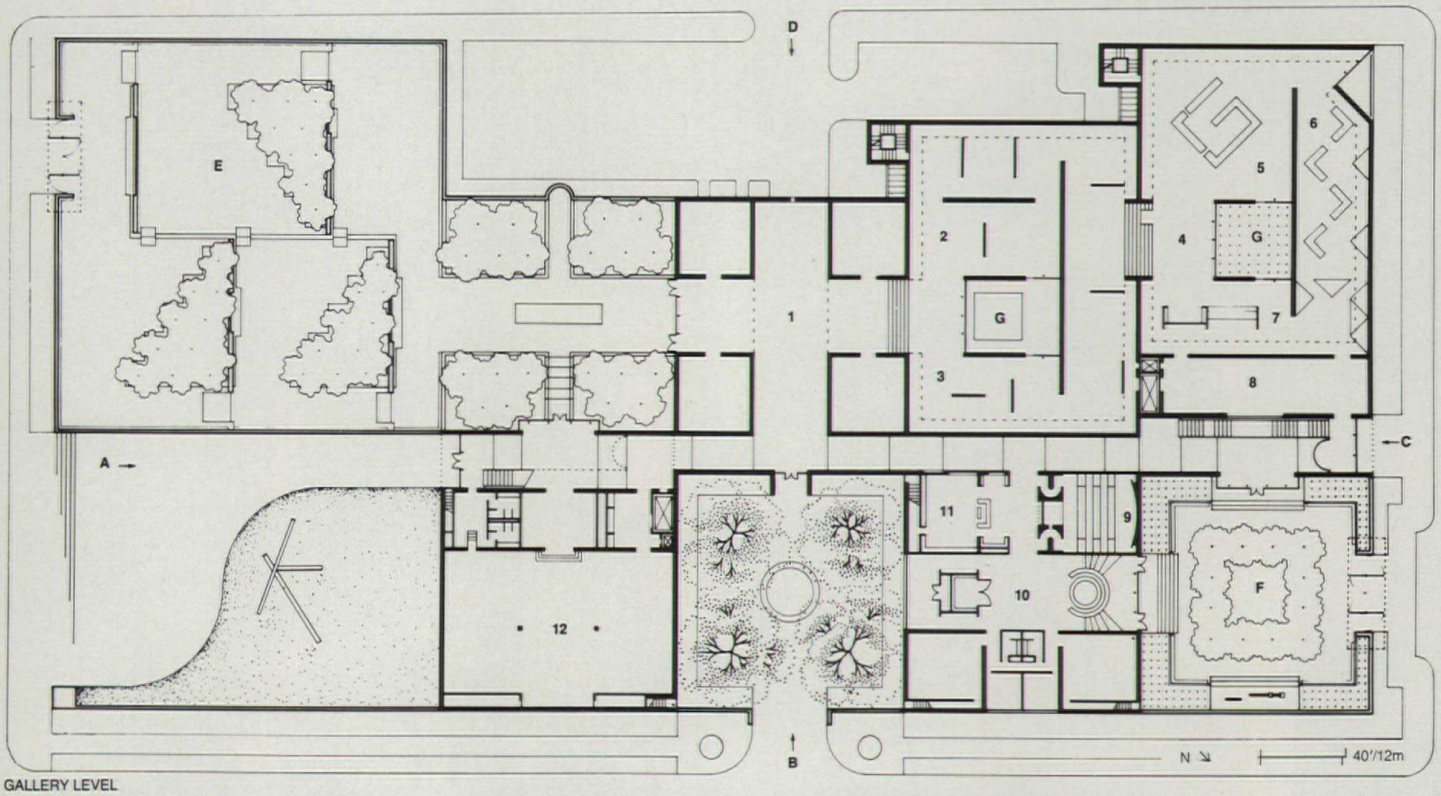
Ascending to the north are two more tiers of permanent display area of similar size (15,300 and 18,400 square feet) and configuration. Each is a well-defined rectangle, with linear skylights washing its perimeter walls (see P/A, Feb. issue, p. 110) and an open court near its center. Dividing these galleries are partitions laid out in a fluid, Miesian manner. Freer, geometrically, than the partitions of



SECTION THROUGH GALLERIES



SECTION THROUGH SPINE



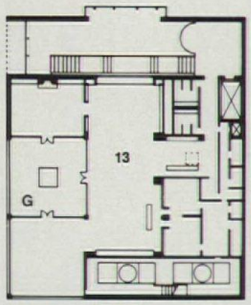
GALLERY LEVEL

the Contemporary zone, these layouts set up complex, processional viewing situations for works that will rarely be shifted.

Obviously viewing conditions are not uniform: paintings on the perimeter walls will be receiving varying amounts of carefully tempered skylight, works on the interior partitions only incandescent downlights, except for those that get daylight spilling from the central courts. Direct sunlight from the courts will strike only durable sculpture.

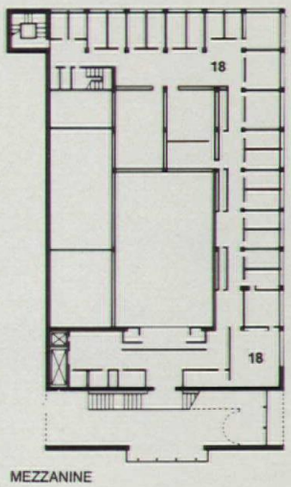
As one mounts from tier to tier, prevailing light levels drop, so that they are lowest for the sensitive Chinese scrolls and Peruvian textiles in the top gallery. The color of walls also subtly darkens, from near white in the Contemporary portion, to a limestone color in the last gallery. The vast scale of the Contemporary portion is followed by a variety of spaces in the upper galleries, some like rooms in fine houses, some like 19th-Century public galleries, all fitting comfortably under a 14-foot ceiling.

Along the way, arrangements of stairs, courts, and partitions yield calculated views, ending with prominent art works or patches of garden, which serve as nonverbal signposts. A stair down through the spine completes the gallery circuit. For handicapped visitors, there

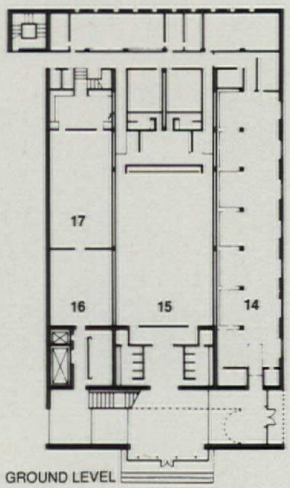


RESTAURANT LEVEL

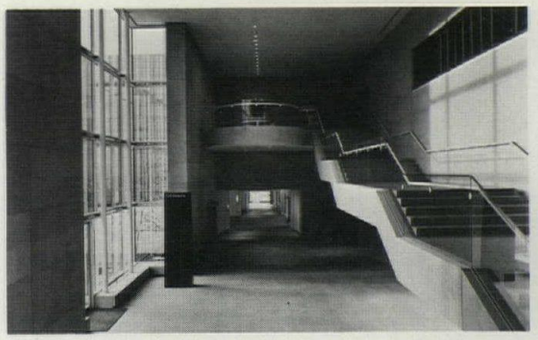
1 Contemporary
2 European
3 American
4 Classical
5 Pre-Columbian
6 African
7 Asian
8 Ethnic
9 Orientation
10 Education
11 Bookstore
12 Temporary Exhibits
13 Dining
14 Library
15 Auditorium
16 Prints & photographs
17 Print & textile study
18 Offices and conference
A Pedestrian ent.
B Arts district ent.
C Parking ent.
D Service ent.
E Sculpture garden
F Education court
G Court



MEZZANINE



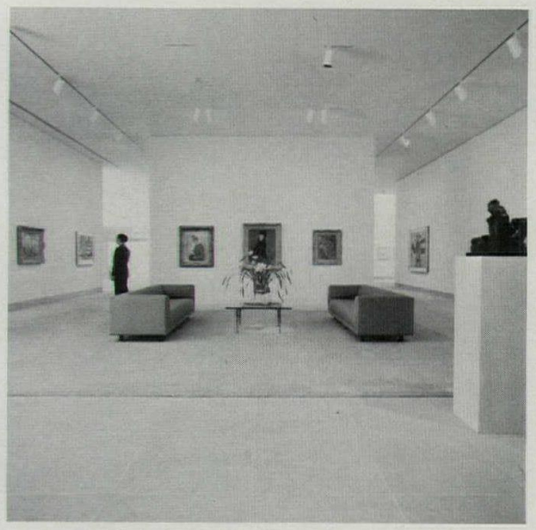
GROUND LEVEL



Block-long spine has major stairs at its south and north entrances (far left and left), each overlooking gardens through large glazed bays. South stair leads to cafeteria, which overlooks spine through row of fine windows from Wright's Little House. Stair details (below) exemplify Barnes's meticulous Minimalism.

European and American galleries (below and facing page) get natural light from perimeter skylights and central court. Photos exaggerate colors from different light sources. Note limestone at base of walls—not floating partitions—and at stairs. Skylights are further dimmed in Pre-Columbian and African areas (bottom photos). Walk-through "treasury" for gold has natural as well as artificial light over works. Display cases, designed by architects, show objects in the round and have canted planes at front edges for very readable labels.

Daniel Barsotti



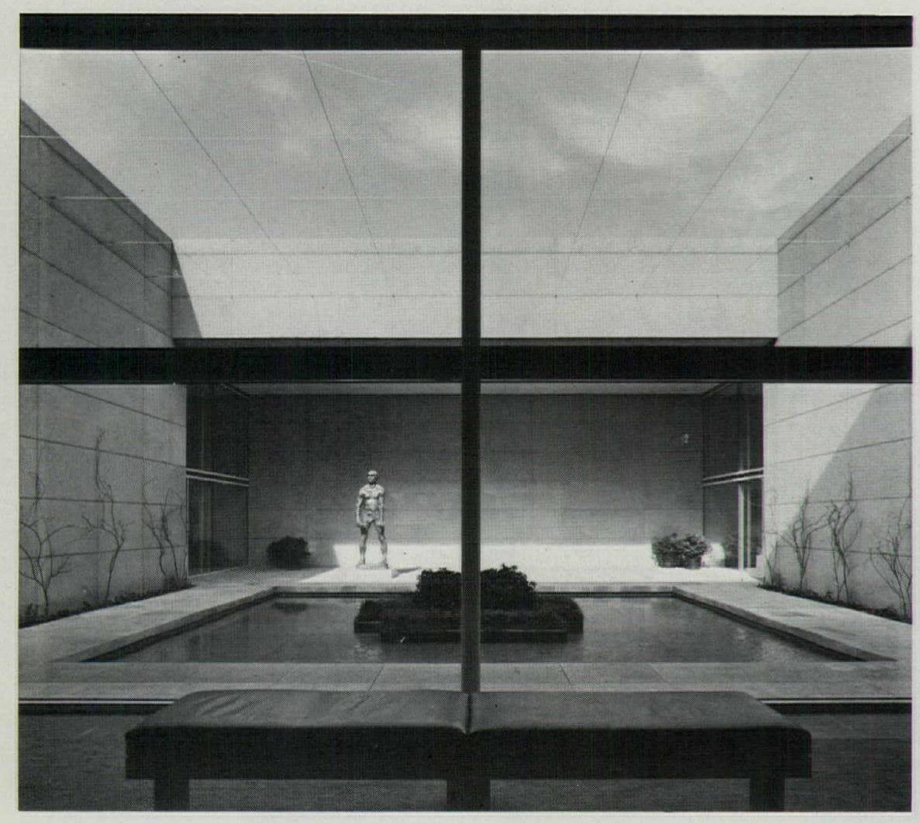
Daniel Barsotti

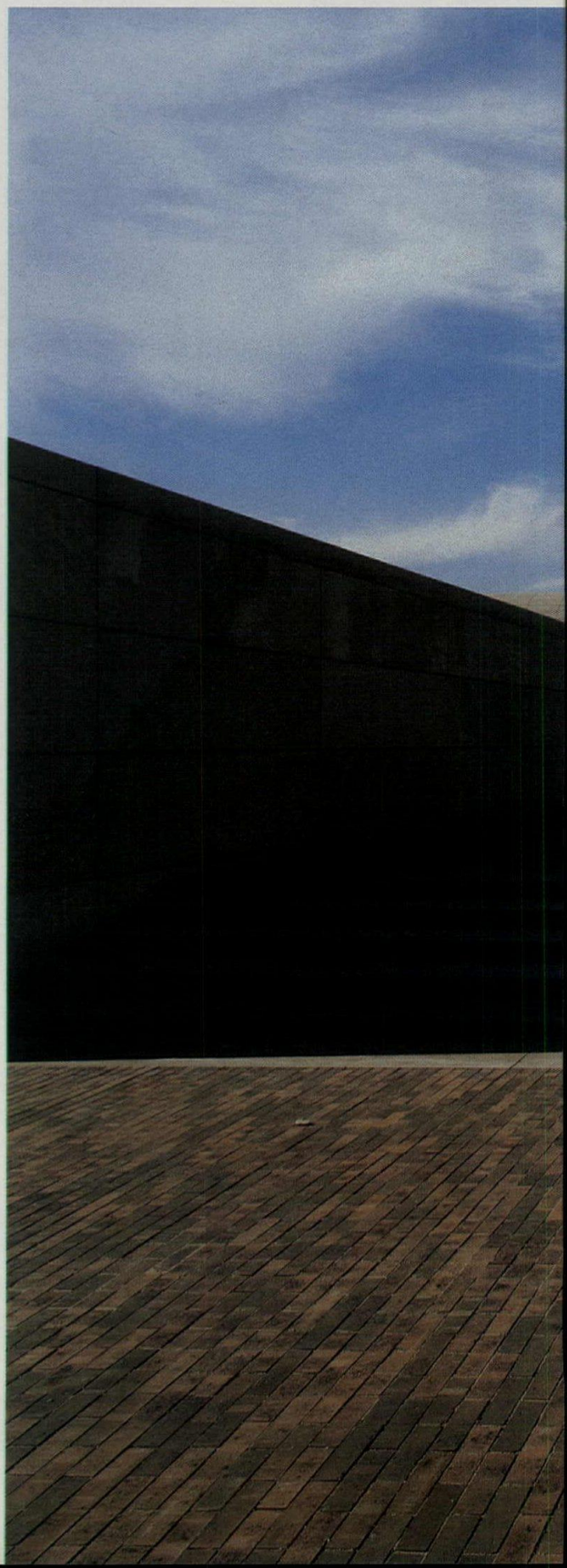
is an elevator with numerous stops for various levels, which connects to the sequence of ramps of barrier-free lengths and slopes (but no railings) in the spine.

The sequence of tiered galleries can be extended by two more modules to the north, as the museum grows. Property to the east, which may be leased for other construction, remains under museum ownership as a site for a potential "East Building" at a later date. The envelope of a 15,000-square-foot expansion area has already been completed, east of the top gallery. An opening in its outer wall reveals the arcade around its internal court (see cover).

Other facilities—auditorium, library, and offices—fit nicely under the toplighted gallery levels. On the opposite side of the spine are the "gateway" introductory exhibits, grouped with an orientation theater and a museum shop, and a 9500-square-foot temporary exhibition space. Above that is a cafeteria that surrounds a balcony/court and faces across museum gardens toward the palisade of downtown towers.

The museum gardens are laid out in rectangles that interlock, in roughly checkerboard fashion, with the building modules. There is the austerely symmetrical entry garden to the east. To the north is a children's entry garden, leading directly into the "gateway" area; designed by sculptor Richard Fleischner, this arrangement of limestone terraces around a graveled center fits so well into





Court between European and American galleries has Rodin sculpture on accessible terrace; wisteria on walls will form cable-supported canopy. View of south entrance (right) shows Vignelli-designed poster pylon and recessed cafeteria terrace which overlooks DiSuvero sculpture.

the architecture that observers misconstrue the abstract stone figures on one side as Fleischner's whole contribution. At the south end of the building, a similar square garden extends south into a larger walled space, interlaced with water troughs. A garden gate here allows the south garden to be open when the museum is closed—or to function as yet another route into the building.

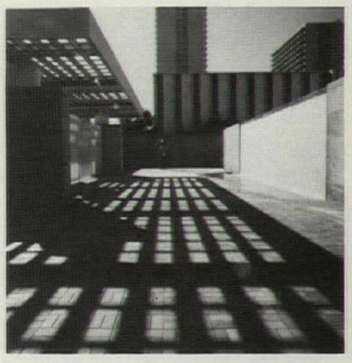
All of the stepping, jogging, inflecting forms of the museum—even the garden walls—are unified with a skin of Indiana limestone—neutral and nonreflective. Laid up in courses 2′-6″ high, the basic module for the changes in level, the walls have chamfers that yield deeper shadow lines at every third joint. Openings, glazed or unglazed, are Minimalist in their incised edges—carefully syncopated with stone joinery—and lack of visible lintels. At the central vault the limestone is carried right up over the top in a piece of virtuoso detailing (with a weatherproof roof under the stone). The continuous surfaces reflect the Minimalist aesthetic that Barnes has long pursued, but also a more current inclination toward Primitivism. Barnes speaks of the vault, "bleeding" into the gallery walls with no articulation, as recalling vernacular structures of the Aegean Islands.

The limestone is continued indoors, lining both floors and walls of the spine. As one moves deeper into the building, the stone gives way to carpet and gypsum board. In the upper galleries, however, stone is retained very effectively for stairs and for bases and border strips that delineate perimeter walls.

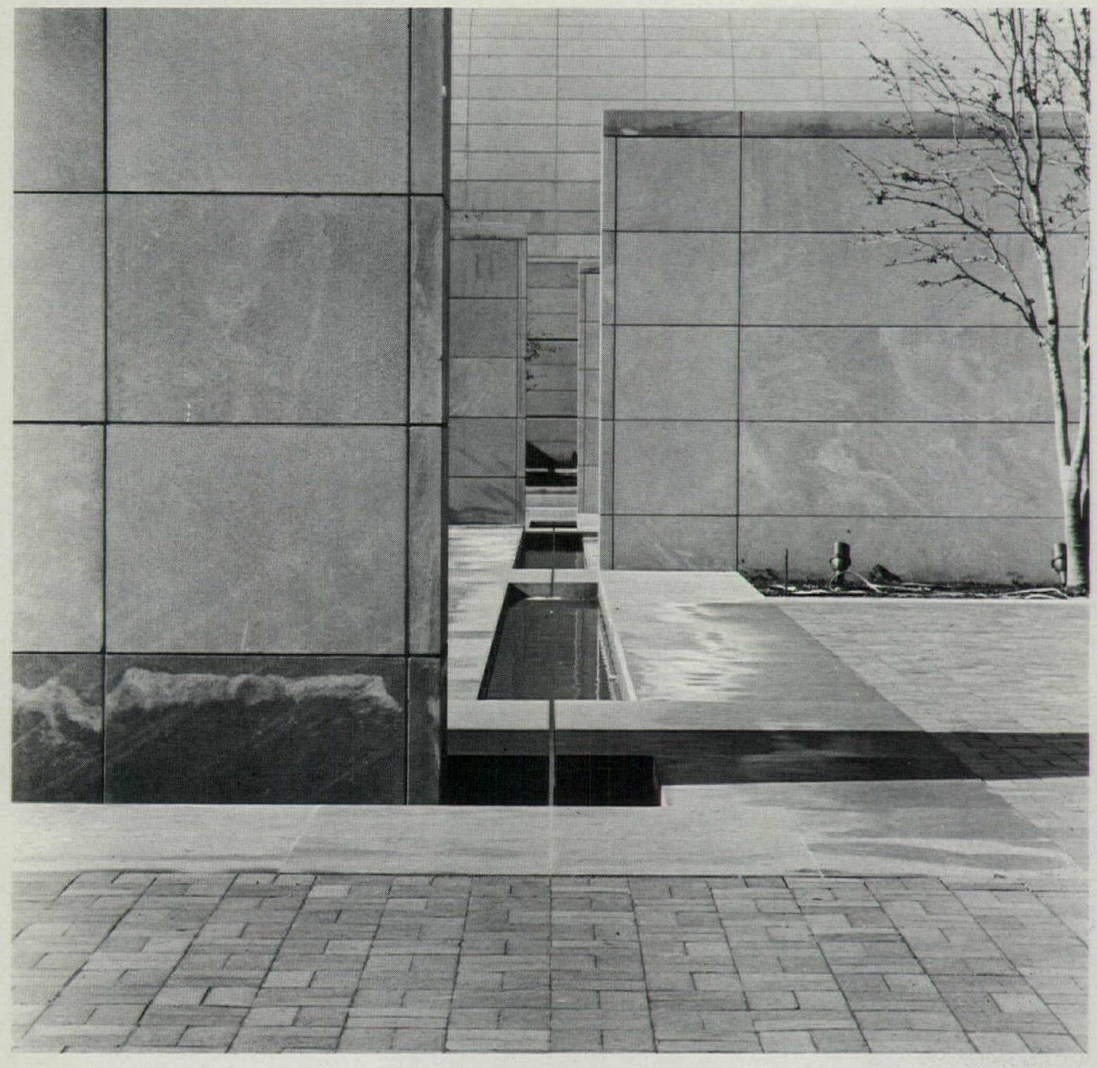
Architectural assessment

In this museum, the Barnes firm set out to meet the clients' request for a serene setting, "supporting the art collection rather than

Included in garden views (right, top to bottom): entrance gate from street, with water wall that feeds troughs; glazed bay at south stair, with LTV tower by SOM-Houston rising behind; Ellsworth Kelly sculpture aligned with doors from Contemporary galleries.



Limestone walls that subdivide the 1.8-acre sculpture garden stand apart to allow for water troughs that meander through. Limestone borders set into brick paving cantilever to form minimal stepping-stone bridges. Groups of native oaks will eventually fill out to soften garden's masonry backdrops.



Project: *Dallas Museum of Art, Dallas, Texas.*
Architects: *Edward Larrabee Barnes Associates, New York (Alistair M. Bevington, partner; Daniel T. Casey, project architect).*
Associated Architects: *Pratt Box & Henderson, Dallas.*
Clients: *Dallas Museum of Art (Harry S. Parker III, Director) and the City of Dallas.*
Site: *city block, 8.9 acres, gently sloping, at north edge of downtown area.*
Program: *210,000-sq-ft museum, with 82,000 sq ft of exhibition space, cafeteria, library, auditorium, shop, offices; 1.8-acre sculpture garden.*
Structural system: *steel frame, metal deck and concrete floors, concrete caissons to bedrock.*
Major materials: *limestone exterior walls and vault roof; aluminum windows and skylights, with insulating glass; stainless steel and glass entrance doors; exterior paving of limestone, granite, and brick; interior floors of limestone, oak, and wool carpet; interior walls of limestone, plaster, and gypsum board (see Building materials, p. 176).*
Mechanical system: *fully automated central air conditioning and humidification, with electric reheat.*
Engineers: *Severud Perrone Szegezdy Sturm, structural; Joseph R. Loring Associates, mechanical; Travers Associates, civil.*
Consultants: *Kiley/Walker, landscape; Jules Fisher and Paul Marantz, lighting; Benjamin Baldwin and Omniplan, interiors; Vignelli Associates, graphics; Joseph M. Chapman, security; Will Szabo, audiovisual; CMS, fountains.*
Construction managers: *J.W. Bateson Company, Inc.*
Costs: *$29.8 million, including fees, furniture, and equipment.*
Photography: *Roberto Schezen, except as noted.*

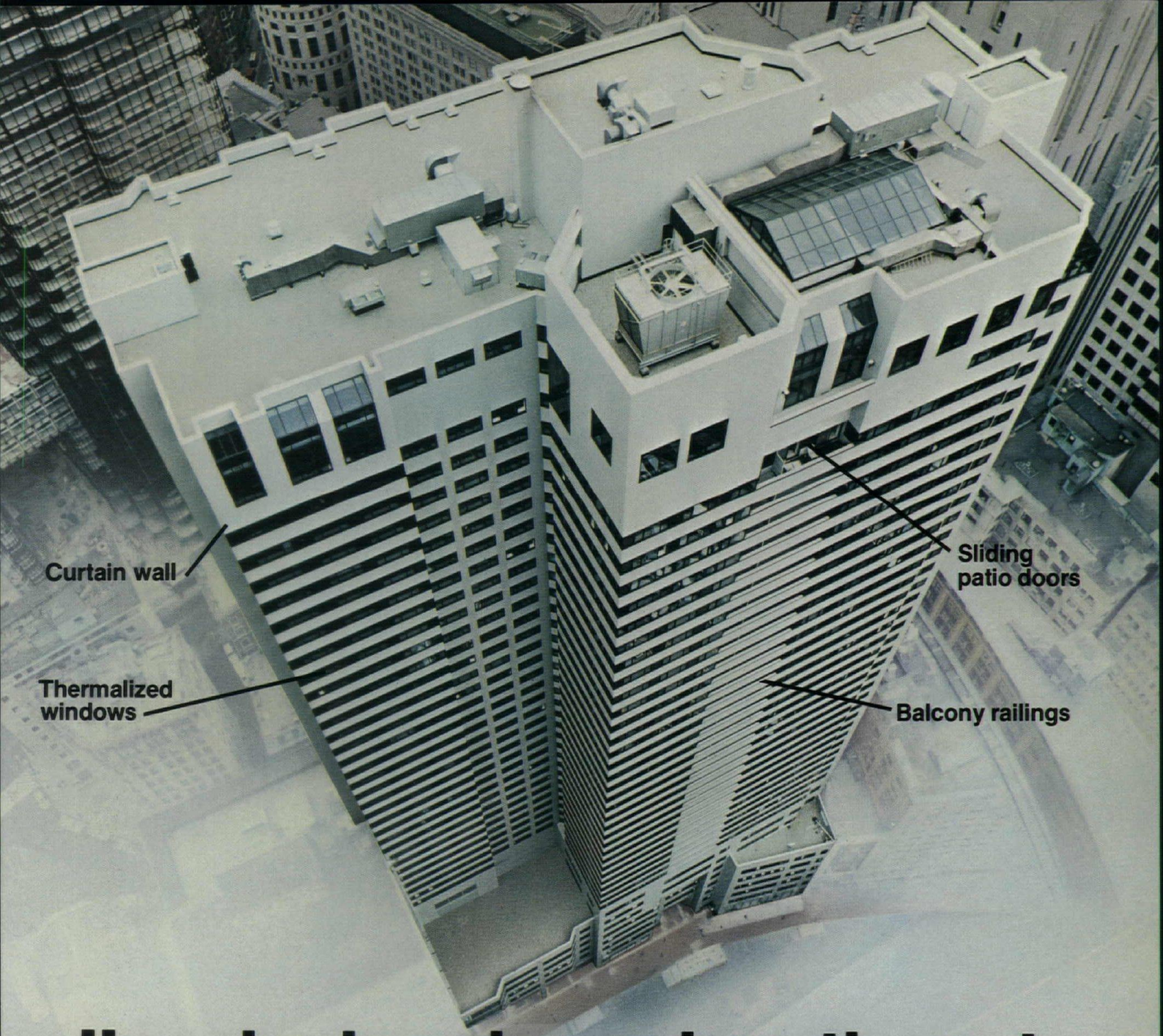
competing with it." How does the building meet this commendable goal?

The Minimalist approach to form is in some respects ideal as a backdrop for art. No exposed structural members or assertive surface patterns compete for attention. At the crucial intersection of the vaulted space and the spine, however, the lack of conventional articulations and transitions is felt. Moving along either axis, one seems to be trespassing on a space oriented the other way.

On the outside, the pattern of stone joints on the vault ends is problematic; bending the joints up into arcs creates a memorable image, but introduces a note of Art Deco superficiality into an otherwise gravely reasoned cladding scheme. And large glazed bays at either end of the spine add a high-tech character quite alien to the design as a whole.

The spatially ingenious plan is rich with options and incidents, but very hard to visualize. It is easy to lose one's way—or one's companions. From the outside, the additive forms and multiple entrances also make it hard to form a coherent image of the museum. Although the building has no clearcut front, it is burdened with an unmistakable back toward the west; almost devoid of openings except for a large, overly exposed truck entrance, this wall says too bluntly, "The Arts District ends here."

Notwithstanding some overly literal, diagrammatic accommodations to functional needs, however, Barnes has provided satisfying spaces and visual experiences. He has produced a building that rewards scrutiny, both as a museum and as a work of architecture. [John Morris Dixon]



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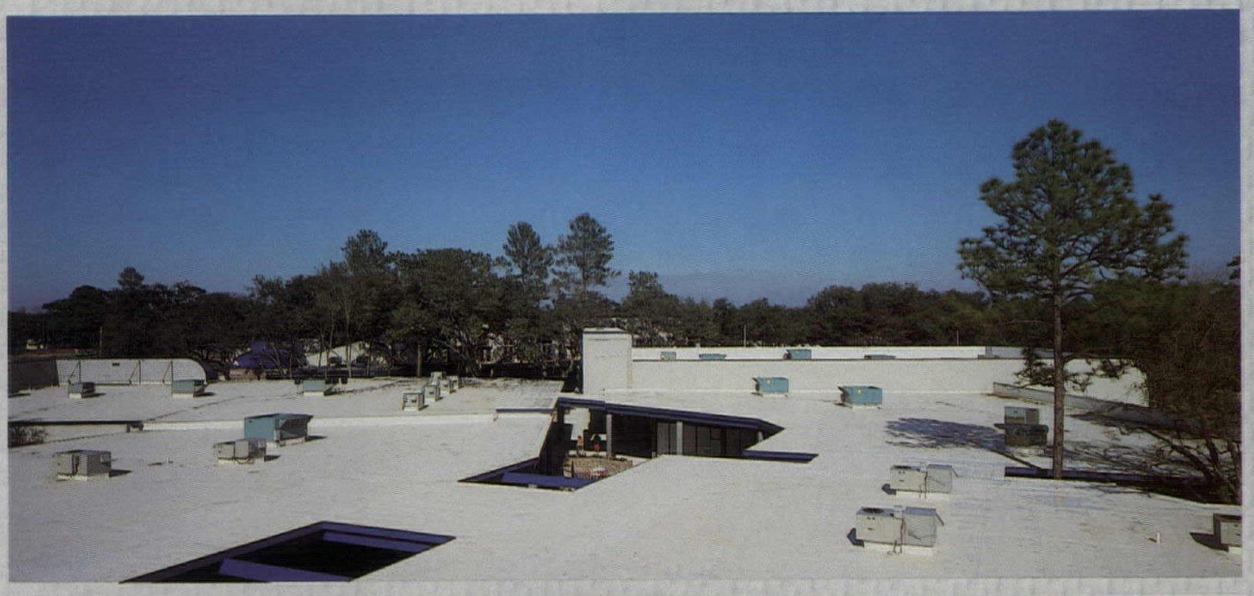

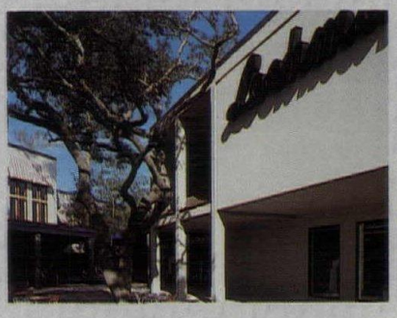

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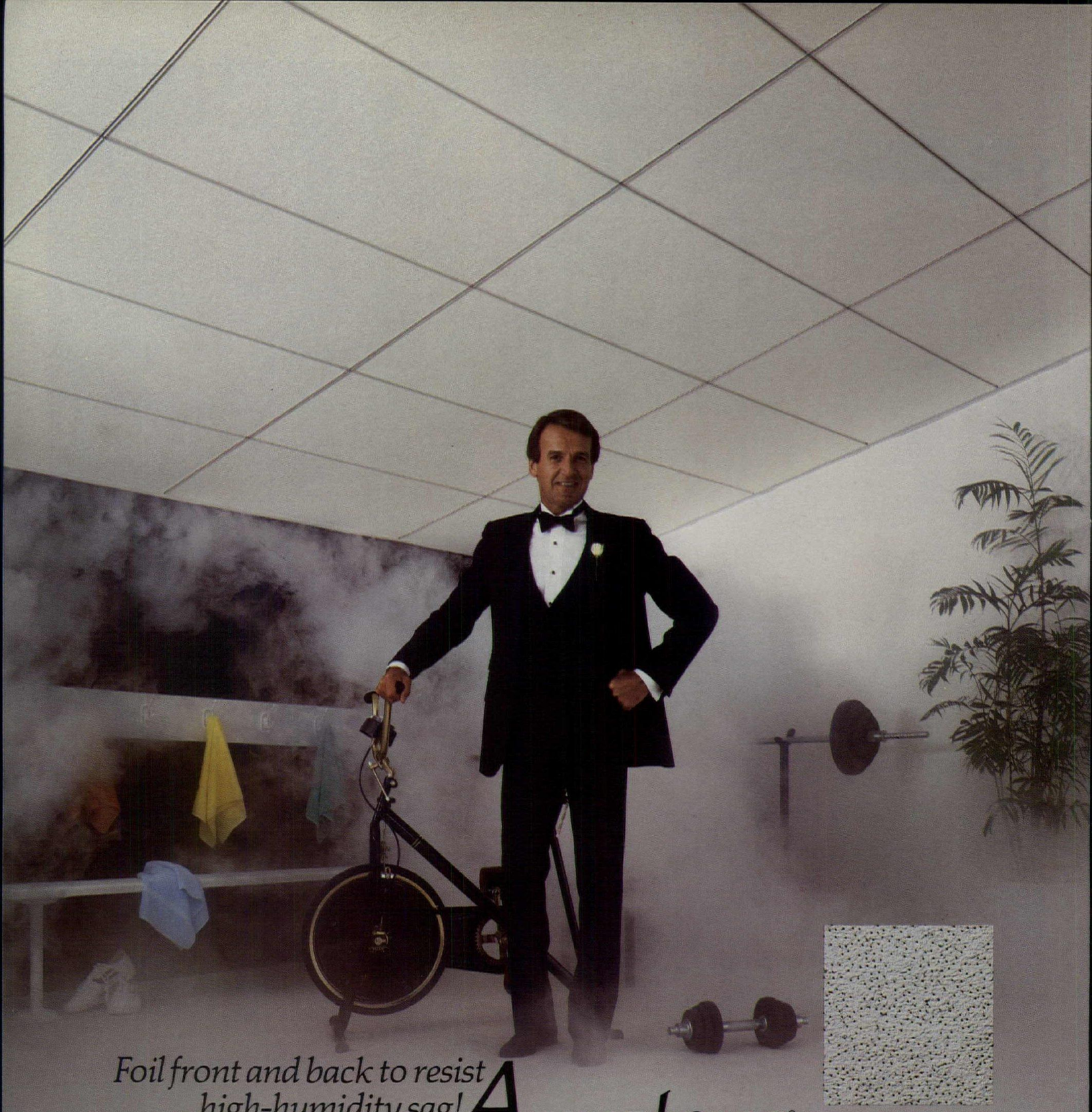

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Books

Lutyens: The Work of the English Architect, Sir Edwin Lutyens (1869–1944). ***London, Arts Council of Great Britain, 1981. 200 pp., illus., $27.***
Edwin Lutyens, Architect Laureate ***by Roderick Gradidge. London, Boston, and Sydney, George Allen & Unwin, 1981. 188 pp., illus., $24.50.***
Indian Summer: Lutyens, Baker, and Imperial Delhi ***by Robert Grant Irving. New Haven and London, Yale University Press, 1982. 416 pp., illus., $45, $15.95 paper.***

Lutyens roundup

The current Lutyens revival is a phenomenon of several dimensions and levels of interest. Sir Edwin Landseer Lutyens died on January 1, 1944, after a life of architectural success and honors. He was the leading English country house architect of the years 1900–1930, the prime creator of the colonial capital at Delhi, and the designer of many memorials, churches, and commercial buildings. Frequently referred to as the greatest English architect since Sir Christopher Wren, he was buried in St. Paul's. His honors included a Knighthood in 1918, the Royal Institute of British Architects Gold Medal in 1921, the AIA Gold Medal in 1925, a Royal Academy of Art associateship in 1913, a full academician in 1920, and president in 1938, K.C.I.E. in 1930, and the Order of Merit (the highest British honor) in 1942. Within six years of his death, three folio sized books illustrating his work and a thick biography, *The Lutyens Memorial Volumes,* were issued, an unusual honor at a time when Modern architecture in all its power controlled England and the world. Thereafter, as one might expect, he slowly slipped into obscurity, though by the mid-1960s the American architects Robert Venturi and Allan Greenberg began to write about him. Subsequently he was rediscovered in England, and the consequence has been, within the past few years, countless articles, pamphlets, and citations in books. There have been one reprint of an earlier book (Lawrence Weaver, *Houses and Gardens by Edwin Lutyens,* 1913), six books devoted to him specifically, and a major museum exhibition, probably the most extensive ever devoted to a single architect (including Palladio). Attendance figures for the exhibition held in London at the Hayward Galleries from mid-November 1981 to the end of January 1982, were in excess of 800,000.

The reasons for this explosion of interest in Lutyens are severalfold and must be carefully separated. To many architects, Lutyens' inventive planning, his twisting axis and circumlocutory routes, the extension of the building into the garden, and his enclosed and particulated spaces are a welcome relief from undifferentiated and open Modern spatial planning. An air of forbidden pleasure, a voyeuresque experience greets architects brought up on the dogma of Modernism when confronted with Lutyens' genius at stylistic confections, ornamental gamesmanship, form and detail for strictly artistic ends. One of the consequences is that he is a patron saint of so-called "Post Modernism."

For the historian or the "architecture freak" there is the above attraction plus the added enticement of a rather enigmatic figure, both personally and architecturally. Lutyens is one of the most fully documented architects in history, and while he did not create a foundation to preserve his memory, as did Le Corbusier or Frank Lloyd Wright, neither did he attempt to "edit" his past as they did. Practically all of Lutyens' buildings were extensively published soon after completion, and with rare exceptions most still exist in excellent condition. In addition to the many books devoted to him, including the unequaled *Memorial Volumes,* many of his drawings and letters exist and are catalogued. Yet there is a certain mystery about him. Born in 1869 (two years after Frank Lloyd Wright) into a ne'er-do-well painter family, his career parallels Wright's in a number of ways. Lutyens was largely self-educated, learned architectural form and design through sketching as a child, and spent only a short time in school and in an architect's office. By the age of 20 he was on his own. Concurrently he was befriended by the somewhat eccentric, also self-educated, spinster gardener Gertrude Jekyll, and together they created over 100 houses and gardens. Discovered by the new wealthy and also by Edward Hudson, owner and editor of *Country Life* for whom Lutyens would design a London office building and three country houses, Lutyens was by 1900 the best country house architect in England—and within five years, the leading one. Of particular interest is that Lutyens began in the so-called "Surrey Picturesque" idiom, a neo-vernacular mode much indebted to the ideas of William Morris and the Arts and Crafts Movement. By 1903 he had run through the vernacular revival, and had turned to Classicism so much that he could write: "In architecture Palladio is the game!" While presages of Classicism can be seen in his earlier work, the shift in style and sensibilities upset many later critics (Arts and Crafts design is not supposed to lead to Classicism!), and he was always considered suspect. Personally, Lutyens never seemed to find real happiness except in his work. Overwhelmingly in love with the daughter of an earl, he was forced to provide far beyond his means as a condition of marriage. And the marriage, except in his last years, was never very happy. He was a shy, round, balding, little man, who made up for his awkwardness with puns and funny drawings. So for the enthusiast, in addition to visiting and admiring the nearly 600 executed works, there are the knotty problems of architectural taste and personality.

Sir Edwin Landseer Lutyens, drawing by Sir William Rothenstein, 1922, from Indian Summer.

Finally, there is the question of the revival of interest in Lutyens with the general public. Some critics have charged that fascination with Lutyens in England is simply a symptom of a

malaise, a nostalgia for the loss of the Empire, the Raj in India, and the destruction of the Edwardian country house and its way of life. Other critics have gone further and claimed that the Lutyens revival is the front for a right-wing reactionary desire for the good "olde" days before England was besotted with the problems of immigrants, unemployment, the Labour Party, and Modern architecture. Of course almost the same analysis could be applied to the United States, though it is true that in England, at least among architects and historians, where you stand on Lutyens marks your political preferences. However, there is certainly more to the public fascination with Lutyens, both within England and abroad, than politics. And that is: his houses are appealing, they look like houses should. And similarly, his public and ecclesiastical buildings and memorials are identifiable as such; they serve to honor and uplift. Lutyens' genius was not so much in creating new architecture, though his stamp is upon whatever he designed, as in doing traditional architecture better than anyone else—no small achievement.

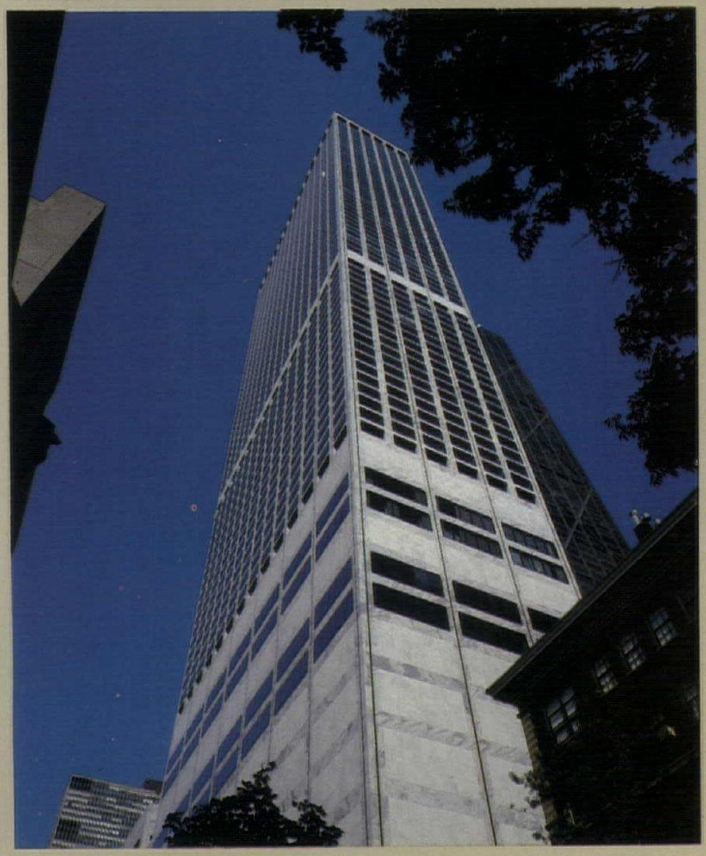
While the Lutyens exhibition is over, the catalog remains. The actual exhibit is certainly worth remembering, especially for the creative installation of materials by Piers Gough, the designer. Gough created a series of mock spaces based upon Lutyens' themes: gardens, castles, Palladio, and exposed timbers—a method of exhibiting architectural drawings and photographs that should be brought to the attention of exhibit designers. The catalog is not only a souvenir but an excellent introduction to Lutyens, containing many illustrations—in color and black-and-white—and six essays, including Mary Lutyens (his daughter) on his personal life, John Cornforth on the *Country Life* connection, Gavin Stamp on New Delhi, and the best essay, Sir John Summerson on Lutyens' great and only partially built design for the Roman Catholic Cathedral in Liverpool. The catalog is a bargain.

Roderick Gradidge's book has been described by the author as a "potboiler" and to some degree this is true. Gradidge is an architect, a restorer of one of Lutyens' houses, a member of the Lutyens Exhibition Committee, and a professed opponent of Modern architecture, as for instance: "Now that the Modern Movement is at an end—a movement which as much as anything destroyed Lutyens and all he stood for—we should ask what his architecture has to offer future generations." Gradidge's grasp of history, especially recent history, is not very sure, but if one can get beyond the polemics, there is some very good writing about Lutyens' designs. Gradidge feels for the three-dimensional form in Lutyens. He sees him as mass, color, line, and space.

Robert Grant Irving's *Indian Summer* is a very different matter, a major piece of scholarship on one of the great—though frequently unacknowledged—designs of the 20th Century, the British Imperial capital at Delhi, India. In 1911 during the Coronation Durbar of King George V of England as Emperor of India at Delhi, he announced the removal of the British capital from Calcutta to Delhi and the intention to build a new city. After some haggling over the architects, Lutyens was selected in 1912. Subsequently he was assisted by several others, most important, Sir Herbert Baker.

The center piece of the design, Lutyens' Viceroy's House, illustrates well his genius at integration; it is both Classical and Indian, abstract and new, and not

Watertower Place, Chicago, IL. /Architect: Loebl, Schlossman & Hackl, Chicago, IL.



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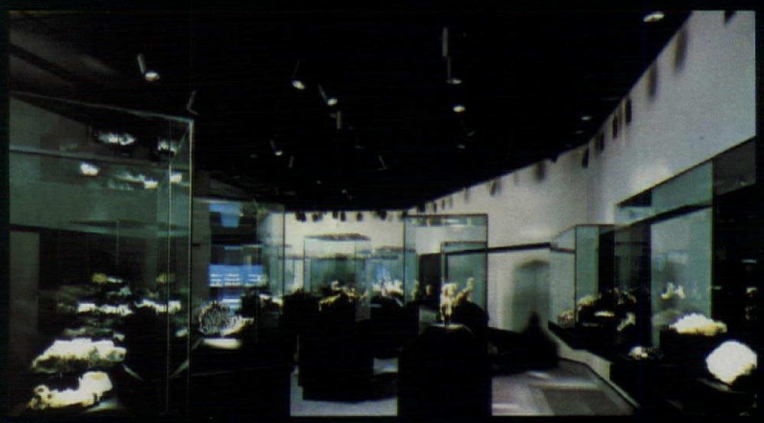

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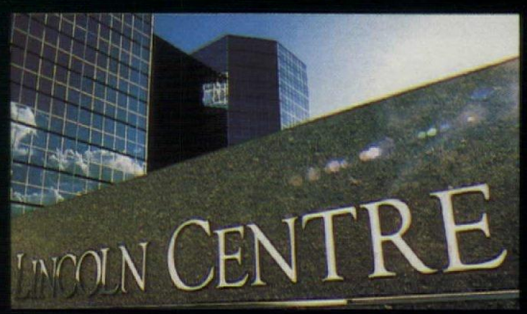

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a melange of motifs. Initially, Lutyens was repelled by Indian architecture, yet felt the need to understand and in some way to incorporate the local idiom he observed. Probably the greatest influence, the "tremendous violence" of Indian light, illustrates Lutyens' dictum that light is the architect's "most important instrument" for composition. He adopted the *chujja,* a beetling, downswept stone cornice common in Indian buildings. Girdling the Viceroy's House below the parapet, the principal *chujja* boldly projects eight feet from the wall's surface and provides a contrast of shadow and light. Lower, at the basement level, a five-foot-deep *chujja* also projects. Other Indian motifs were also adapted in an attempt to create an English building "dressed for the climate." A huge affair, containing over 200,000 square feet, larger than the Palace of Versailles, it is effectively dominated by the tall brooding dome, hard, blank and solid. Below, the tan and red Dolphur sandstone pierced by dark cavities is emphatically horizontal. In contrast, Baker's twin Secretariats and Council House are Classical revival structures with Indian ornament applied; they have no integration. Both Lutyens and Baker provided a number of other designs for Imperial Delhi; some were built, others remained as projects. They also influenced a number of architects who worked there and went on to create what Baker called "an Imperial Lutyens tradition in Indian architecture."

Ironically, Imperial Delhi took 20 years to build, between the announcement in 1911 and the dedication in 1931; British rule would last for only 16 more years until 1947. Today Lutyens' and Baker's city serves as the capital of independent India. The buildings and plan are vestiges of British aspiration, or as Georges Clemenceau remarked upon viewing the half-built city in 1920: "This will be the finest ruin of them all."

Irving's book is excellently illustrated with a wealth of color plates of many photographs taken by the author. The account is thorough, perhaps too thorough at times, since Irving tends to get bogged down in detail. Yet it is a necessary story that reveals why Lutyens was so highly regarded in his lifetime and why today so many architects, historians, and the public find him such a fascinating figure of genius.

Reviewed by Richard Guy Wilson, Chairman, Division of Architectural History, University of Virginia, Charlottesville.

Daniel O'Neill

Nashdom, Burnham, Bucks, 1905–9.

Lutyens' houses

Lutyens: Country Houses *by Daniel O'Neill. New York, The Whitney Library of Design, 1980. 167 pp., illus., $19.95.*

This profusely illustrated critical analysis traces Lutyens' prolific career, which saw output of more than 400 projects during the 50 years of his practice. Organized in eight chapters, the text covers the architect's background and influences, his work derived from the vernacular, his association with landscape gardener Gertrude Jekyll, his departures into medieval romanticism, the alterations and restorations, and the later monumental work, such as the British Embassy in Washington, D.C.

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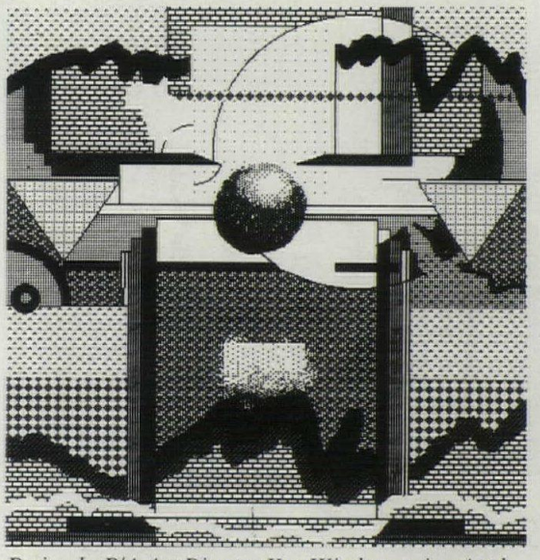
P/A in May: Computers/Furniture



Design by P/A Art Director Ken Windsor, using Apple Macintosh computer.

Computers and Architecture will be the major topic of the May P/A. After several years of step-by-step introduction into architectural practice, computers are now moving rapidly into the central arena of design. The impact of computers on architecture will be the focus of three major features.

Computer use in design will be surveyed in a set of articles that will shed new light on computer applications in a range of design areas.

Environments for computers will update readers on computer-friendly lighting, HVAC, furniture, and so on.

Computer control of building systems will cover the latest technical possibilities for control of security, emergency, lighting, and HVAC systems in buildings generally.

P/A's International Furniture Competition will be amply reported. The eight winners from three countries will be illustrated and accompanied by enlightening jury commentary.

A/E Systems '84, the computer/reprographics exhibition and conference, to be held in Baltimore, June 4–7, will be the subject of a special section that will include a program and other guidance for readers.

NEOCON, the annual contract furniture show and conference at Chicago's Merchandise Mart, June 12–15, will be previewed, with a program of events and review of new product introductions.

P/A in June will feature a rich variety of new buildings and alterations by some of the best known American architects, plus an article on some grand public park projects in Spain by the ever-provocative Bofill studio.

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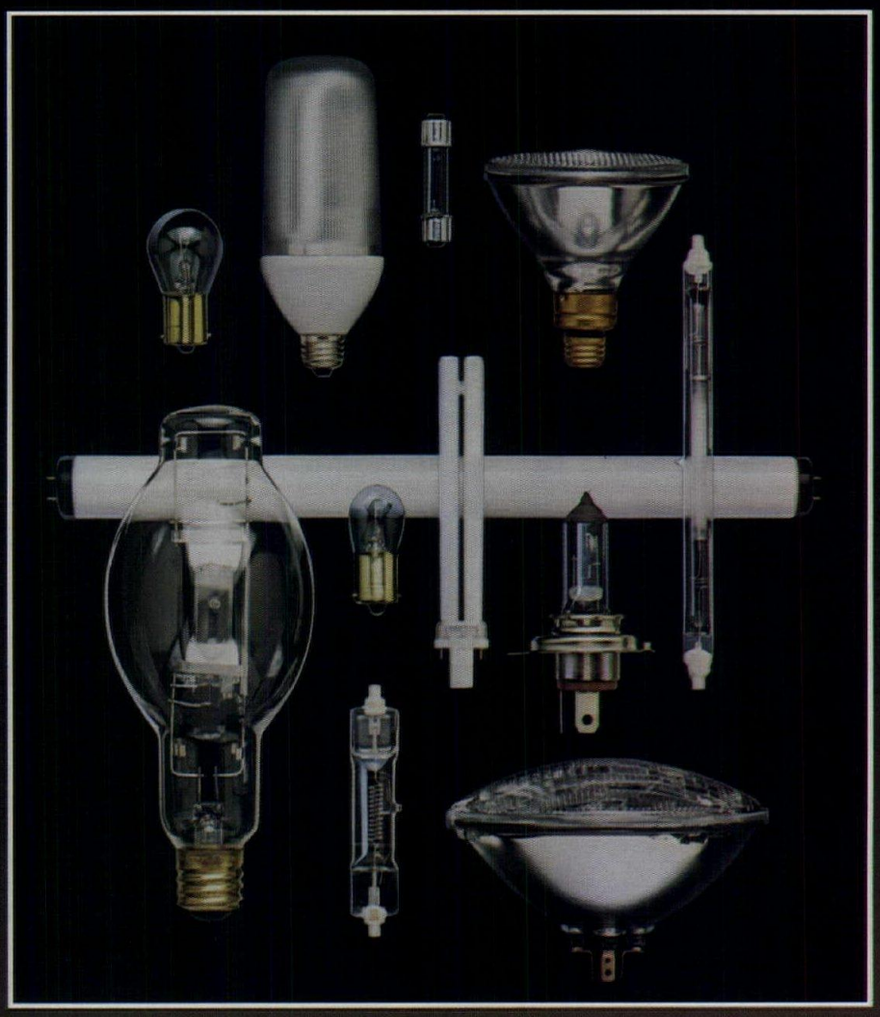

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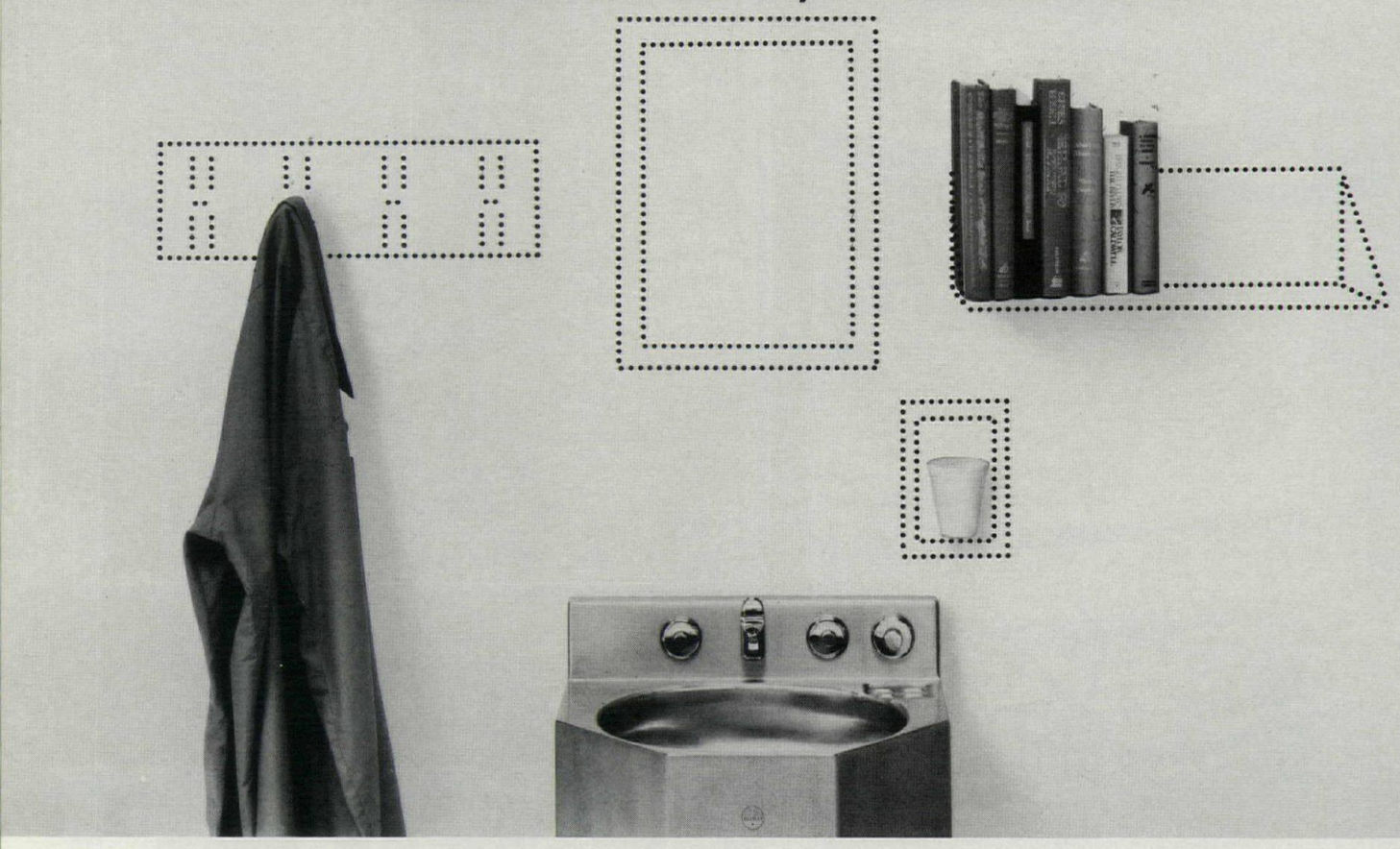

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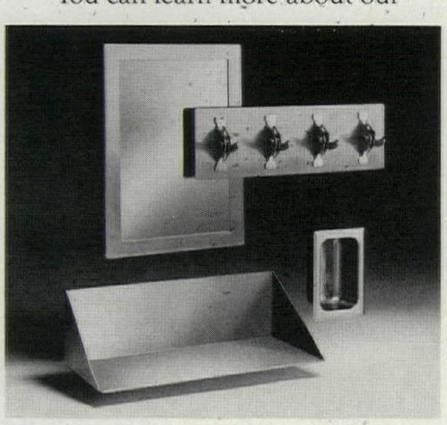

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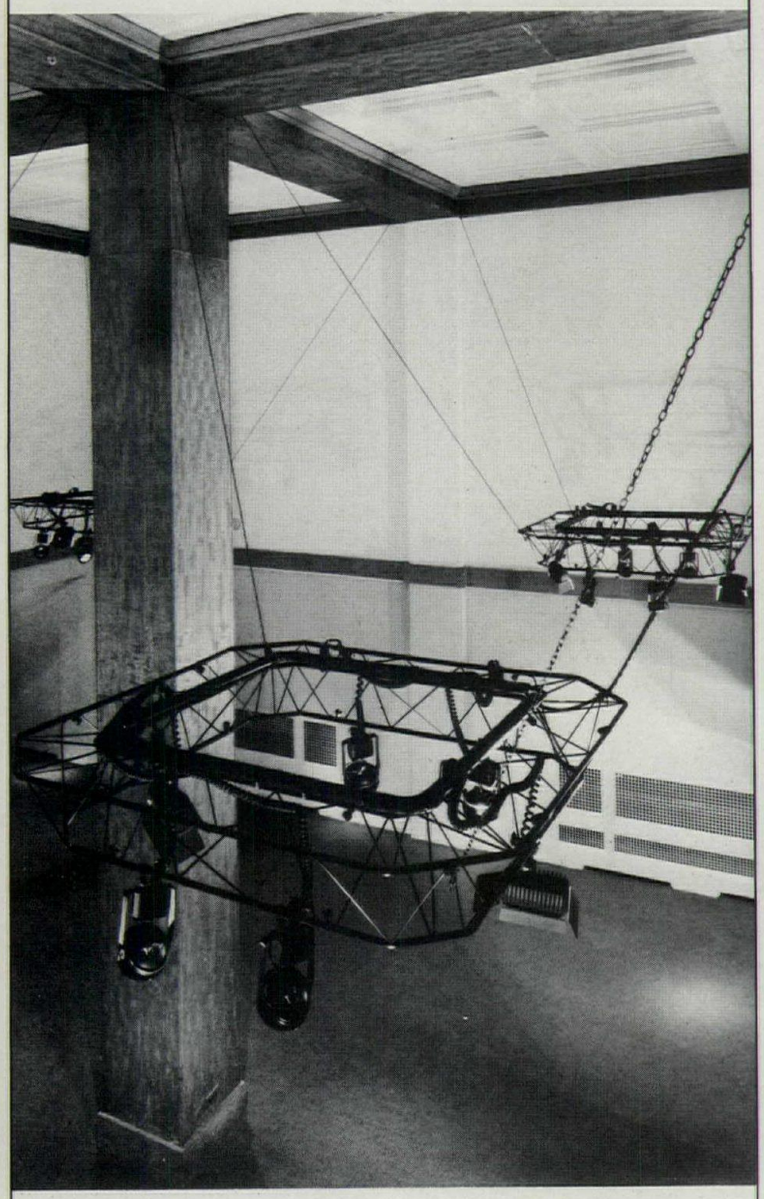

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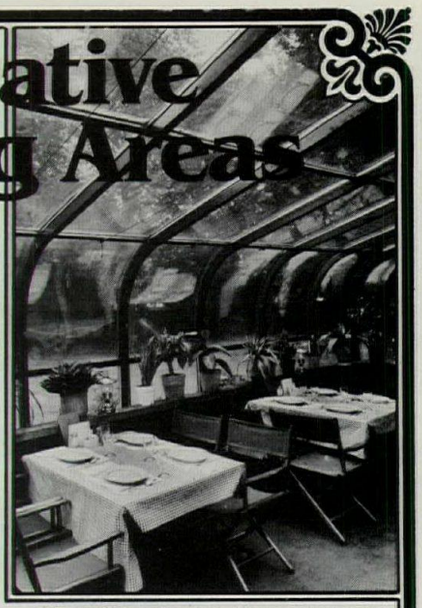

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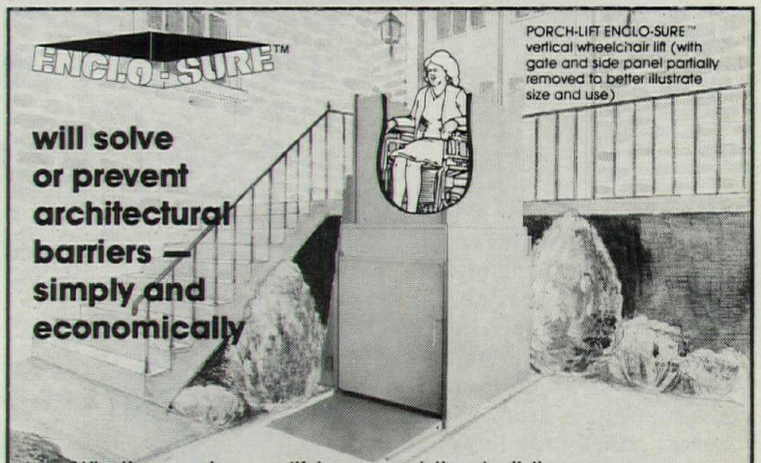

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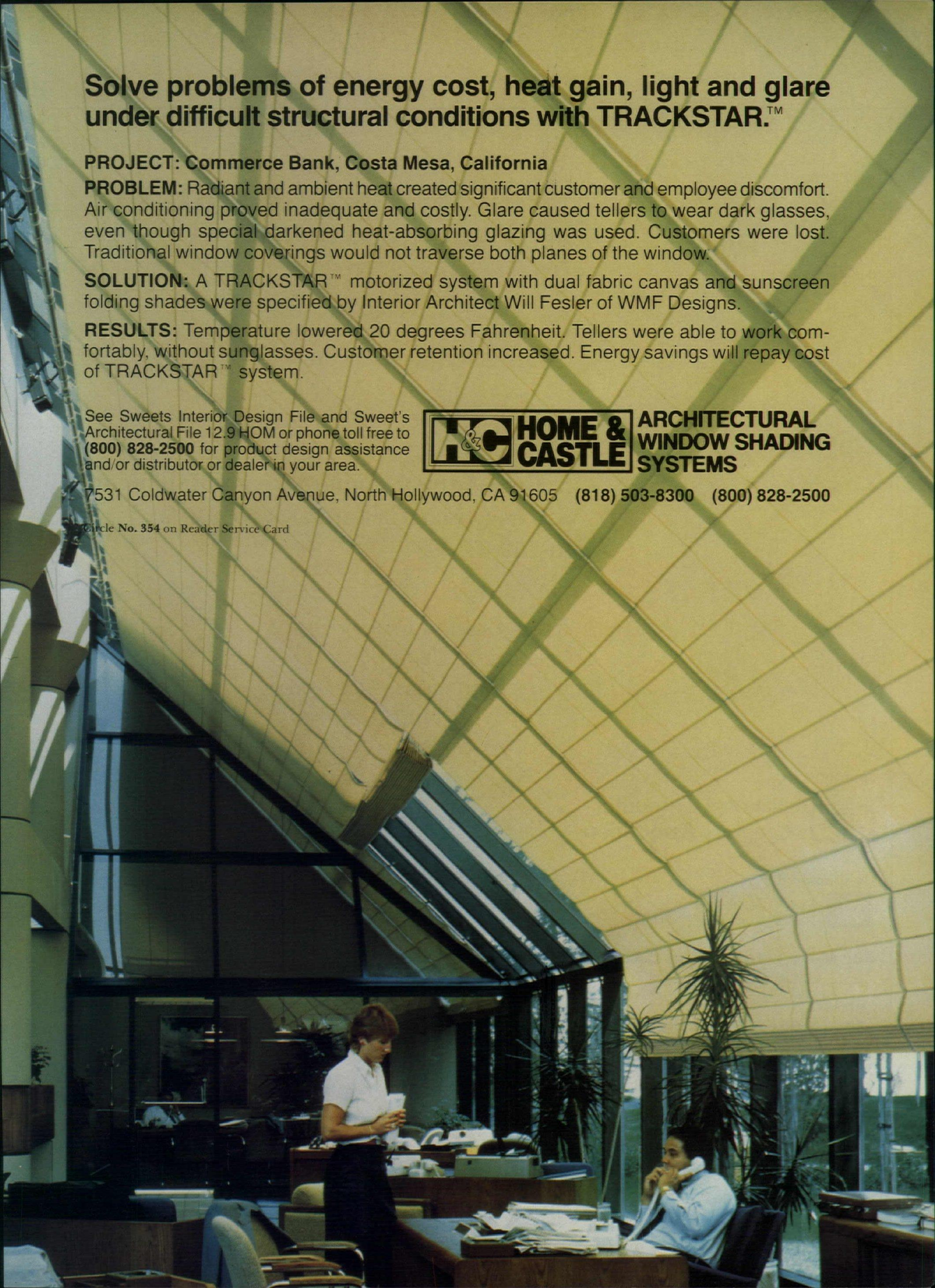

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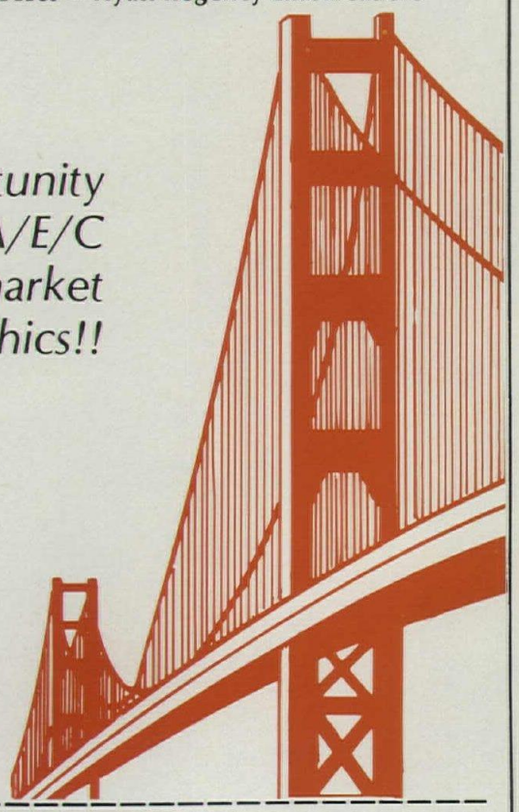

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P/A Products and literature

Products and literature this month are energy-related, with many having to do with shading to reduce energy use in hot, humid climates.

Litemaster computer controller operates motorized Riviera blinds to provide optimum shading and vision. The controller monitors the external light level by means of a photocell and automatically sets the blinds at one of five preset positions, from fully open to fully closed. One controller can operate as many as 30 blinds simultaneously. It is possible to override the automatic sequence manually. Levolor Lorentzen, Inc.
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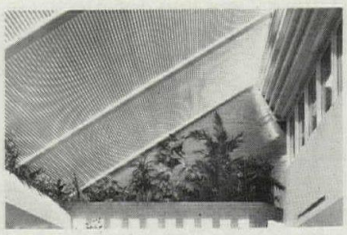

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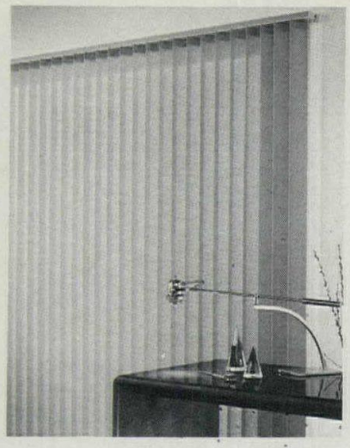
Silver Shadow, one of the Bali Classics, is a custom pleated shade with an aluminum backing to reflect solar energy. Blinds come in several colors in widths from 24 to 60 inches, lengths from 36 to 96 inches. Marathon Carey-McFall Co.
Circle 104 on reader service card



Touch-of-Glass vertical vanes, knitted of twice-coated multi-strand fiberglass yarns, are fireproof and emit no toxic fumes if exposed to flame. The vanes are knitted to width to minimize cupping and twisting. The fabric is highly resistant to mildew and sun rot, antistatic to prevent dust buildup, and protected with Scotchgard® to simplify maintenance. Touch-of-Glass vanes are available in a variety of textures resembling grass cloth, wool, berber, and flame stitching. Kirsch.

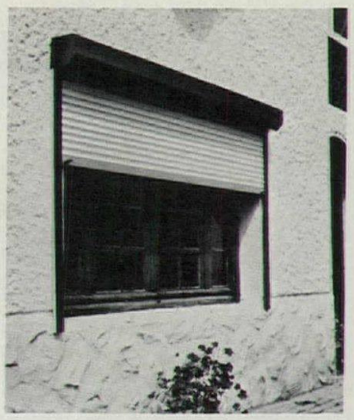
Circle 105 on reader service card

Thermo-Brite® reflective films stop air infiltration, reflect solar radiation, and act as interior or exterior vapor barriers. The Thermo-Brite product to be used depends upon the climate. For instance, adding Thermosol-Brite to a roof system in the Sun Belt controls heat absorption by reflecting 90 percent or more of the solar radiation, thus reducing the air-conditioning load. Other products include Thermo-Brite Insulation Sheathing for walls, and Thermo-Brite Retroflect Board for use in roofs of existing homes to provide an effective solar radiation barrier. Parsec, Inc.

Circle 106 on reader service card

Exterior sun louvers effectively shade from the summer sun, reducing the air-conditioning load. In the winter, they reflect part of the sun's direct rays, allowing diffused light to enter. Open construction allows uninterrupted natural air flow and unobstructed view. Panels are all white on the side facing the window for reflected light, with several colors available for the side facing in. Hunter Douglas.

Circle 107 on reader service card



Exterior-mounted shutters, made from rigid PVC slats with dead-air spaces molded in, reduce heat transfer by convection. The shutters operate from the inside by means of a crank or strap and are guided by side tracks. An automatic locking device prevents opening the shutter from the outside. Slats can be partially opened to admit a controlled amount of light. The shutters also protect against damage from severe weather and vandalism, increase privacy, and reduce noise infiltration. Parishutter, Inc.

Circle 108 on reader service card

Window Comforter shades have an insulating air cavity between two window shades, which are sealed on all sides. Made from an eight-layer fabric, the shades operate in Lexan® side tracks and have top, bottom, and side seals. Although they look like conventional shades, they have an R-7 insulating value, blocking the summer sun's rays to reduce heat gain, and providing protection against winter heat loss. Appropriate Technology Corp.

Circle 109 on reader service card

Insulated roof and wall panel systems have a 2½-inch polyurethane core between 26-gauge galvanized steel exterior and interior faces, producing an R-value of 19. There are also 4-inch and 5-inch-thick panels. Roof panels are joined three inches above the water surface of the roof by either a standing seam or overlapping joints. Roof panels are finished in polar white or Galvalume™; interior wall colors are white or light stone; exterior panels are offered in eight colors. Insulated Panel Systems, Inc.

Circle 110 on reader service card

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Among those 700 choices, LouverDrape® perforated vinyl louvers are perhaps the most unique. Unique, because a transparent quality is achieved by actually perforating the solid vinyl. Thousands of tiny holes are stamped into the louver creating these delicate patterns. From across the room Vinyl Mist® patterns give the illusion of lace, while retaining the practicality and energy efficiency of solid vinyl.

It's hard to believe the beauty of Vinyl Mist® until it's installed. Even though the louvers remain 87% to 93% solid, the view through the closed louvers is amazingly clear. And you can enjoy that view while the room is protected from glare, sun and solar heat. In fact, Oyster Beige Vinyl Mist® louvers reflect as much as 65% of the solar radiation striking the window.

LouverDrape® Vinyl Mist® — a strikingly beautiful, reasonably priced, low maintenance window treatment. Protect your furniture and carpet from the sun without giving up that beautiful view.

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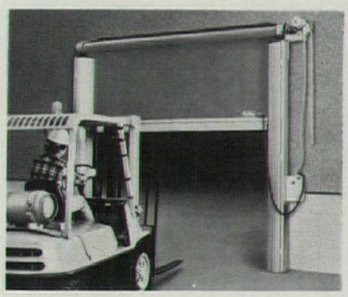
Circle No. 367 on Reader Service Card.

Skyshades® are pleated skylight shades made from aluminum-backed lightweight opaque fabric designed by Verosol. Produced for Wasco Skywindows, the neutral-colored shades will fit most skylights to manage heat gain or loss and light. A built-in locking mechanism in the frame adjusts to desired position. Wasco Products, Inc.
Circle 111 on reader service card

Venetian blind sensor and drive unit respond to changing sunlight conditions to maintain an optimum visual environment. The automatic daylighting controller adjusts louvers to eliminate direct sunlight and glare while allowing the greatest amount of diffused daylight to penetrate. At night the sensor operates to open or close the blind according to outside temperature. It reduces cooling energy costs and artificial lighting needs. Daylighting, Inc.
Circle 112 on reader service card

Verti-Coral™ Drapery Ribs™, for contract work, are said to meet or exceed fire code standards. Designed to admit light while keeping heat or cold out, they are inherently flame retardant. The material hangs as straight in damp weather as it does under dry conditions. The draperies are available in 30 styles and colors. Coral of Chicago.
Circle 113 on reader service card

Somfy-Matic™ is an electronic system that senses sun and wind levels and automatically extends or retracts an awning or a solar screen. The system can be preset to the weather conditions at which operation is desired. A manual control overrides the automatic control in order to operate the system from a wall switch. Somfy Systems.
Circle 114 on reader service card



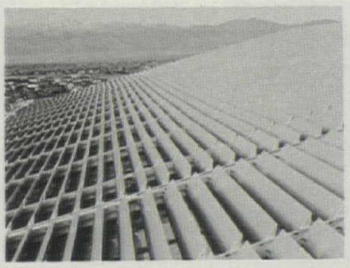
Rapid Roll industrial doors operate at high speed to save energy costs by reducing escape of heated or cooled air. The doors operate at two feet per second, with an 8′ x 8′ door opening or closing in four seconds. Made from bright orange plastic-impregnated woven plastic fabric, the doors flex on impact to reduce damage. They are guided by side channels in the frame. Kelley Company.
Circle 115 on reader service card

The TPS Roof Window, with integral screen and optional beige roller blind, opens by means of a crank that operates a scissor mechanism. The window, of tempered, double-paned, insulated glass, can be opened without disturbing the screen. An optional outside awning, of semitransparent net fabric, reduces inside temperature on sunny days yet allows views of the outside. The sash turns outside at 180 degrees for easy cleaning. Velux-America, Inc.
Circle 116 on reader service card

The IMSA MultyPanel System of wall and roof panels consists of an insulating rigid polyurethane foam core sandwiched between galvanized steel faces. Available in several thicknesses, the panel R-value ranges from 8.4 for one inch thick to 30.3 for four inches thick. The primed and painted lightweight panels come in six colors and white. Insulated Building Products, Inc.
Circle 117 on reader service card

Infracon® saves lighting energy costs by automatically turning lights on when a room is occupied and off when it is vacated. Each sensor can cover approximately 200 square feet of floor space, and each control box can accommodate three or four

sensors. Infracon is easily installed inconspicuously in a suspended ceiling. Tishman Research Co.
Circle 118 on reader service card

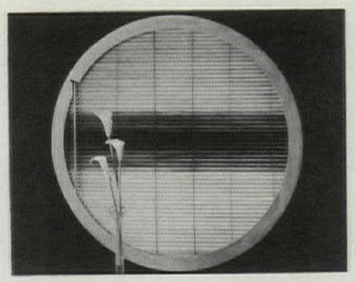


Automated Daylighting System brochure describes louvers for exterior shading of buildings. It explains louver design principles, describes and illustrates actuators for setting blade angles, and discusses the use of Mark III electronic controls that provide automatic operation of louvers for solar and lighting control. Charts and text cover energy savings possible in new construction and existing buildings. The Moore Company.
Circle 200 on reader service card

Eagle Sun™ System II is a combination space heating and domestic hot water system. It allows zone heating when desired and will provide a substantial part of hot water needs. There are models for residential, commercial, and industrial installations. U.S. Solar Corp.
Circle 119 on reader service card

Skylight brochure includes double-glazed thermalized skylights with PVC double-wall insulation and all-PVC frame and flange. The use of a PVC frame instead of aluminum virtually eliminates condensation and lowers heat gain. A compressible foam gasket between the top of the curb and the skylight frame prevents infiltration of heat. Several styles of skylights, with glass or acrylic glazing, and smoke and heat vents are also shown. Specifications, photos, and detail drawings are provided. Plasteco Inc.
Circle 201 on reader service card

'**Brick Architecture** versus Glass Curtain Wall,' a six-page color brochure, compares the costs of the two types of construction. Charts show initial cost, first-year operating costs, and rate of return on investment. Acme Brick Company.
Circle 202 on reader service card



Hardwood blinds catalog offers horizontal blinds in four widths as well as vertical wood blinds. The four-color catalog provides schematics for headrails to fit any size or shape window. Nanik.
Circle 203 on reader service card

'Insulations for Air Handling Systems' is a 20-page brochure describing and illustrating duct products and insulations for controlling both heat loss and noise levels in air-handling systems. Information is provided about thermal conductivity, heat transfer coefficients, ASHRAE minimum insulation standards, and recommended thicknesses. Detailed acoustical tables, pressure and friction loss graphs, and specification guides are included. Owens-Corning Fiberglas Corp.
Circle 204 on reader service card

Rayflect® coated glass, described in a 16-page brochure, includes: S-Series with reflective metallic-coated glass in clear, bronze, gray, or green; Spectrum Series insulating glass with a selection of visual transmittances and shading coefficients; and Spandrel glass. Tables show performance data and explain how the coatings work. There is also a section on design considerations. Advanced Coating Technology, Inc.
Circle 205 on reader service card

Solar greenhouse enclosures are made from tempered curved glass with laminated safety glass in overhead areas. The fully insulated enclosures are available in standard and custom sizes for residential, commercial, or industrial applications. Sun System Prefabricated Solar Greenhouses, Inc.
Circle 120 on reader service card

Shutter brochure illustrates a variety of interior shutters, with narrow slats, wide slats, or adjustable or fixed louvers. There are also open-frame shutters allowing for a change of fabrics. Maywood, Inc.
Circle 206 on reader service card

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Herculon Nouvelle is *the* contract carpet fiber that's truly qualified to perform on every floor of your corporate facility—from the lobby to the executive suite. With beautiful results.

Because carpets of Herculon Nouvelle give you the ultimate blend of beauty and on-the-floor performance. With a wide variety of new, contemporary styles and textures that are ready to accept the design challenge of any and every office space application. And with a proven record of durability in resisting the everyday spills, spots, and wear of the corporate grind. For years to come.

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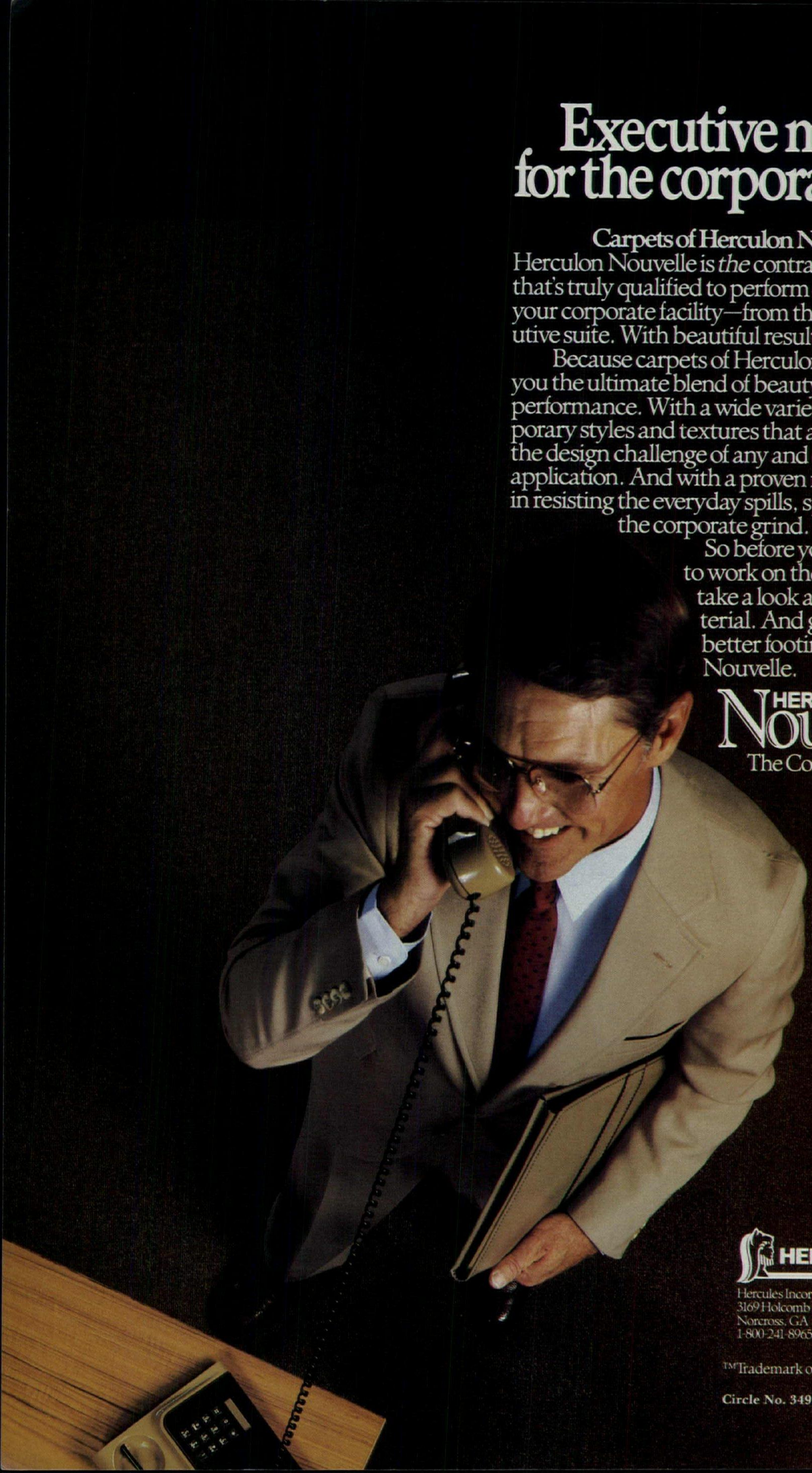

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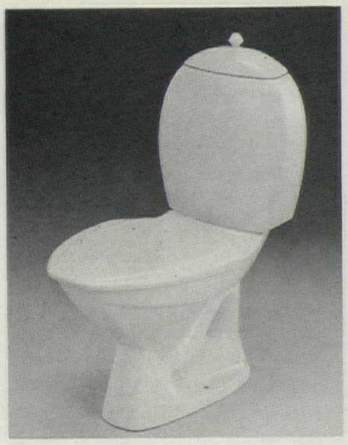

The Cascade toilet, with one-gallon instant flushing operation, is available to meet U.S. rough-in plumbing standards. Cascade is one-piece construction and has a pipe that divides in two to release water uniformly through the open rim for a fast, self-cleaning flush. The vitreous china toilet is available in standard white and several colors. Ifö Sanitär.
Circle 121 on reader service card

Energy Shield™ window systems consist of rigid, optical quality acrylic window covers, held securely to window interiors with Velcro strips, to block out heat or cold. The nonyellowing acrylic also filters out ultraviolet rays to retard fading. A fiberglass screen, using the same Velcro fasteners, can be used in place of the acrylic cover when air conditioning is not used. The windows are also available with tinted acrylic for additional solar control. ESM, Inc.
Circle 122 on reader service card

Profiled sheet glazing products of Lexan® can be used as primary glazing or as overglazing with an air space between to create triple glazing. The sheet has two surfaces joined by ribs, creating a dead air space for insulation. A proprietary ultraviolet-resistant surface coating resists yellowing and hazing and protects against light transmission and impact strength degradation. The sheet contributes to both winter heating and summer cooling cost savings. General Electric Company.
Circle 123 on reader service card

Aluminum thermal window brochure describes several windows designed for environmental control and energy efficiency. Several have optional integral Venetian blinds. They are offered with various glazing combinations and finishes. Full-color photos show installations and include information about building, location, architect, and builder for each. Disco Aluminum Products Company, Inc.
Circle 207 on reader service card

The Sun Bay Window, with right angle side windows and sloped glazing, admits more sunlight than conventional bay windows. It is available with triple glazing on side and center panes, one-inch insulated glass on sloped pane. Side unit weather stripping and a frame of ponderosa pine add to its insulating properties. A five-position lever lock on each side unit allows it to be opened to various degrees and secured against blowing shut. Marvin Windows.
Circle 124 on reader service card

Sunstrip® absorber plates consist of aluminum or copper fins with copper tubing. The surface can be black nickel selective anodized on aluminum fins or black chrome on a nickel substrate over copper fins. A six-page brochure describes the absorbers, their thermal characteristics, mechanical strength, sizes, system design, and applications. Sunstrip International.
Circle 208 on reader service card

Photovoltaic module M-53, uses single crystal silicon square cells that can be more densely packed than round cells for greater efficiency and more power. Single crystal silicon cells can power with as little as five percent of noon sun. They are laminated between tempered glass and polymeric back sheet and sealed in a weatherproof package. Frame is clear anodized with a white backing or black anodized with black backing. It is compatible with existing ARCO solar systems. ARCO Solar Industries.
Circle 125 on reader service card

Building materials

Major materials suppliers for buildings that are featured this month as they were furnished to P/A by the architects.

Private residence, Princeton, N.J. (p. 110). *Architect: Olcott & Schliemann, New York.* Windows: Andersen Window Corp.; Velux. Doors: Morgan Door Co. Hardware: Schlage. Paint: Benjamin Moore. Lighting: Appletone, utility fixtures; Lightolier, recessed incandescent track light. Plumbing: American-Standard. Aluminum roll-down

shutters: American German Industries, Inc.

Weekend house, Western Michigan (p. 118). *Architects: Stanley Tigerman, Margaret McCurry.* Gypsum board: U.S. Gypsum. Wood casement windows: Marvin Casemaster. French wood doors: Millmade. Vinyl asbestos tile VS304: Azrock. Batt insulation: Johns-Manville. Paint: Olympic (prime coat), Martin Senour (exterior flat latex, interior flat and satin latex. Hinges: Stanley. Locksets: Dexter. Refrigerator and dishwasher: Whirlpool. Stove: General Electric. Washer/dryer: White-Westinghouse. Fireplace: Majestic. Lighting sconces: Koch & Lowy. Tub, lavatory, w.c.: American-Standard. Plumbing fittings: Chicago Faucet. Kitchen sink: Just. Electric baseboard heaters: Berko. Ceiling fans: Hurricane. Area rugs: China Seas. Drafting lamps: Luxo. Table: Allibert from Triconfort. Sofa: R. Bryshta, cabinetmaker; Sylvia Hefler, upholsterer. Window shades: Perkowitz Chicago.

Maoli House, San Rafael, Calif. (p. 114). *Architects: R. Fernau + L. Hartman, Berkeley.* Integral pigment cement plaster: La Habre Products, Inc. Gypsum Board: U.S.G. Aluminum windows: Blomberg Window. Glass doors: F.S. Buckley Door. Wood doors: Allwood Door Co. Garage door: Overhead Door Corp. Quarry tile: Kraftile Co. Wood parquet tiles and strip oak: "Hartco" Tibbals Flooring Co. and Lebanon Oak Flooring Co. Resilient tile: Armstrong Co. Shingles: Johns-Manville. Coal tar bitumen and membrane: Koppers. Batt insulation: Owens-Corning. Exterior trim paint: W.P. Fuller Co. Hinges: Stanley. Locksets: Schlage. Closers: LCN. Cabinets: Zelco Cabinet Mfg. Plastic laminate: Formica. Dome reflector lights: Abolite. Fluorescent lights: Wellmade. Recessed lights: Prescolite. Tubs and lavatories: American-Standard. Heat pump: Janitrol. Carpets: Bentley Carpet Mills. Canvas awnings: Sullivan Co.

Residence, southern Connecticut (p. 122). *Architects: Peter L. Gluck & Associates, New York, N.Y.* Sliding glass sash: Kawneer. Bluestone: Connecticut Stone. Carpet: General Felt. Tile: American Olean. Gypsum board: U.S. Gypsum. Pivot hinges: Stanley. Prefabricated kitchen unit: Dwyer. Plumbing and sanitary fixtures: American-Standard. Showerheads, fittings: Grohe-Speakman. Heating system: Lennox. Drapery hardware: Kirsch. Sofa: Knoll.

Dallas Museum of Art, Dallas, Texas (p. 127). *Architects: Edward Larrabee Barnes Associates, New York.* Steel frame and reinforcing steel: Bethlehem. Foundation concrete: Texas Industries. Limestone walls and floors: Harding & Cogswell. Gypsum board walls: Gold Bond. Insulating glass: PPG. Glass block: Pittsburgh Corning. Skylights, insulating: Super Sky. Entrance doors, insulating glass in steel frame: Hoffman. Hollow interior metal doors: Texsteel. White oak interior doors: Weyerhaeuser. Granite paving: Cold Spring. Brick paving: Sioux City Brick Co. Hardwood strip flooring: Trinity Flooring. Composite plank flooring: PermaGrain. Acoustical ceiling material: Gold Bond. Roofing, ballasted membrane: Trocal. Waterproofing: Gates Engineering (liquid membrane); W.R. Grace (rubberized asphalt sheet); G.E. (silicone). Insulation: Owens-Corning Fiberglas (walls); Celotex (roof); Dow (plaza decks). Roof drains: Jay R. Smith. Interior paint, latex and enamel: PPG, Pratt & Lambert. Butt hinges: Stanley. Pivots: Rixson. Mortised locksets: Schlage. Door closers, concealed: Glynn Johnson. Panic exits: Von Duprin. Security: Receptors. Fire detection: Pyrotronics. Lockers: American. Painting storage racks: Crystalizations. Elevators, hydraulic: ESCO. Handrails: Livers Bronze Co. Lighting, exterior: KIM. Lighting, galleries: Edison Price. Flush valves: Sloan. Plumbing fixtures: American-Standard. Water coolers: Elkay. HVAC: Carrier Corp. Environmental control system: Johnson Controls. Blinds: Mecho-Shade (motorized sun screens); Levolor Lorentzen (window blinds and skylight louvers). Carpet: Otterburn Mills (wool); Patrick Mills (nylon). Office workstations: Atelier International. Cabinets: Wigand Corp. Dining tables: Jack Lenor Larsen. Auditorium seating: JG Furniture. Chairs: Jack Lenor Larsen, Brickel, Sunar. Upholstery material: Lee Jofa, DMS, Brickel, B.F. Ruskin. Exhibit cases in galleries: Helmut Guenschal.

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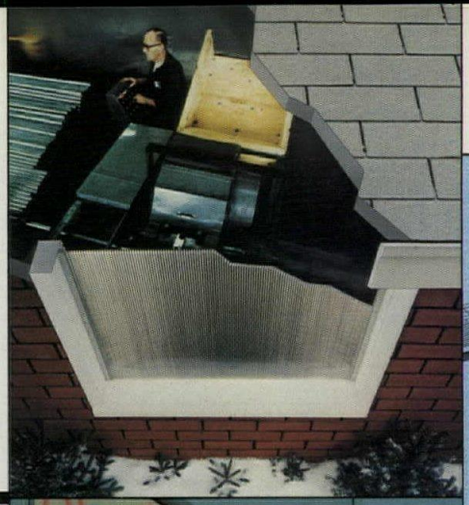

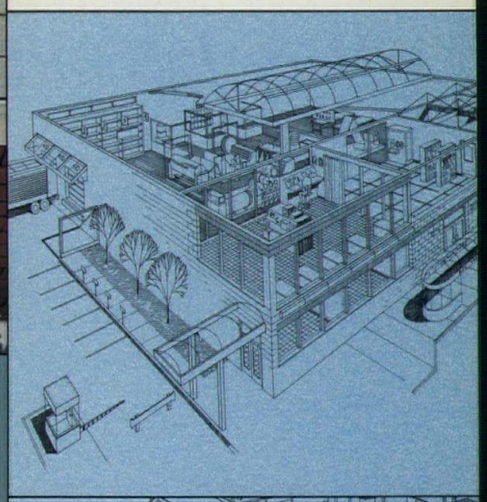

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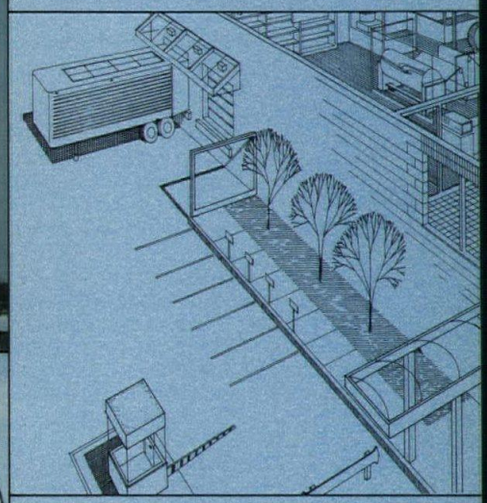

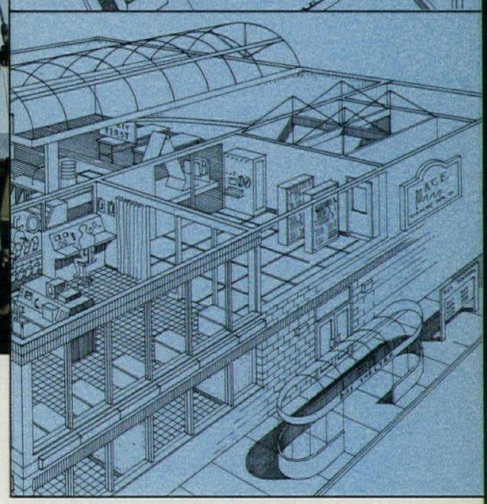

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Architect II, City of Hartford—$27,794–$35,737. Bachelors Degree in Architecture and four years of experience in all phases of architecture. Valid Connecticut Architect's License. Excellent fringe benefits. Applications will be accepted until April 30th. For more information contact Personnel Dept., 550 Main Street, Hartford, CT 06103, Telephone 203/722-6340. An Equal Opportunity Employer.

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Architecture—Barnard College, Columbia University: Assistant Professor. Beginning September 1, 1984. Teach design and history/theory. M. Arch. required. Send C.V., examples of design and scholarly work by June 1, 1984 to: Susana Torre, Director, Architecture Program, Barnard College, Columbia University, 606 West 120th Street, New York, New York 10027. Barnard College is an EO/AA Employer.

Chairperson, Division of Historic Preservation, Columbia University. Policy direction, administration, teaching, research supervision. Theoretical understanding of and experience in preservation is essential. Send *curriculum vitae* and three references to: Historic Preservation Chair Search Committee, Graduate School of Architecture and Planning, 402 Avery Hall, Columbia University, New York, NY 10027. Application deadline: April 30, 1984. AA/EOE.

Department Head, Architecture: Position available January 1985. Leadership duties include teaching and facilitation of the professional development of the faculty and departmental programs within the total structure of the school and the academic administration of the university. Position is eligible to receive tenure on the faculty but not as an administrative position. Qualifications: evidence of administrative competence; teaching experience in an accredited architectural program; a professional degree in architecture and a master's degree in architecture or related field or certified foreign equivalent; architectural registration by examination in the U.S., or equivalent foreign license. Candidates are preferred with advanced degrees, applied research experience, and a record of professional and civic involvement. Salary commensurate with qualifications and experience, 12-month appointment, professorship rank. Inquiries and request for application forms should be sent to Prof. Paul Wolff, Chair, Search and Screen Committee, Architecture Department Head, School of Architecture and Environmental Design, California Polytechnic State University, San Luis Obispo, CA 93407. The department is one of five in the school: Architecture, Architectural Engineering, City and Regional Planning, Construction, and Landscape Architecture. The department offers two degrees, has approximately 850 students, and 55 faculty. It also has comprehensive support facilities. Closing date for applications is September 15, 1984. Affirmative Action/Equal Opportunity/Title IX Employer.

Roger Williams College faculty position in 5 year Bachelor of Architecture program available August 1984. Position is to teach Architectural Design and in areas such as Technology/Energy/Constructional Materials. Professional degree in Architecture, prior teaching and/or practice experience. Salary negotiable based on qualifications and experience. Forward letter and vitae to: Raj Saksena, Director, Architecture Program, Roger Williams College, Bristol, RI 02809, by 15 May, 1984. Affirmative Action/Equal Opportunity employer.

School Architect Needed—Duval County School System, Jacksonville, Florida. Minimum Requirements: Graduate Architect, eligible for license in the state of Florida. Experience in design of educational facilities. Working with instructional personnel and transmitting educational needs into building design is highly desirable. Salary Range: $23,007–$37,177 (generous benefits package). To Apply: Send letter of application along with resumé to: Mr. Dalton D. Epting, Director of Certificated Personnel, Duval County School Board, 1701 Prudential Drive, Jacksonville, Florida 32207.

The Department of Environmental Design, Texas A&M University, is seeking one or more outstanding candidates for nine-month faculty appointments, effective 1 September 1984, to teach at the undergraduate level (beginning and advanced classes) in the general subject areas of architectural and environmental design, and design media, and to actively pursue research and other scholarly or professional activities. Special consideration will be given those with multiple interests and talents, such as: design and graphics; large-scale design experience, photography, interior architecture, facilities management, building sciences, materials technology, and computer technology. Appointment rank, track,

percentage of time and salary are, within limits, negotiable depending on qualifications and experience. A master's degree from an accredited school is preferred; professional degree required. A professional license is also preferred. Applications should include a resume, academic credentials and letters of reference. A portfolio, or slides, of professional or student work (for those with teaching experience), should be available if called for. These would be promptly returned. Applications or nominations should be sent to: John O. Greer, AIA, Head, Department of Environmental Design, College of Architecture and Environmental Design, Texas A&M University, College Station, Texas 77843. Equal Opportunity Through Affirmative Action.

Virginia Division of Energy is seeking professionals to develop a guide for building owners to help them achieve energy efficient designs for new buildings, additions, and renovations. Emphasis will be on the owner's role in the design process. Contact Herbert Wheary, OEES, 310 Turner Road, Richmond, Virginia 23225.

Situations Wanted

Design Architect: 21 years experience in design, production and contract administration of R&D labs, pharmaceutical, industrial, residential, institutional projects. Seeking a key position in conceptual design and project management with a growing firm. Box 1361-429, *Progressive Architecture.*

[*Job mart continued on page 181*]

CONSTRUCTION COST ESTIMATOR

Construction cost estimator applicants are needed for a supervisory position at the Veterans Administration headquarters in Washington, D.C. Beginning salary for this GM-15 position is $50,252 per year.

The selectee will serve as the top authority on all costs related to the accomplishment of the VA construction program and will have direct responsibility for planning, directing and evaluating the activities and functions of a staff of professional estimators; directing the preparation of cost estimates at various stages of the construction process for projects throughout the U.S.; providing the cost bases for agency requests for Presidential and Congressional approval; conducting special cost studies; and directing automated cost estimating applications.

The position requires 3 years of specialized experience directly related to the responsibilities described above as well as 3 years of general experience which provided knowledge of principles of management and administration. One year of the experience must be comparable to the GM-14 level in the Federal service.

If you meet these requirements, send a SF-171, Personal Qualifications Statement, and 10-point veterans preference if applicable to:

Veterans Administration

Rosemary McMahon,
Managerial Placement Division (054B)
810 Vermont Avenue, NW.,
Washington, DC 20420

Applications must be postmarked no later than May 4, 1984.

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Applicants and nominees must be familiar with architectural education and must have demonstrated professional accomplishment. Administrative experience at a senior level and capacity for leading and inspiring a diverse faculty and student body are clearly desirable.

Applications and nominations with supporting material should be submitted by May 15, 1984 to:

Herman D. J. Spiegel, Professor of Architectural Engineering
Chair, Dean's Search Committee
Yale University, Woodbridge Hall
New Haven, CT 06520

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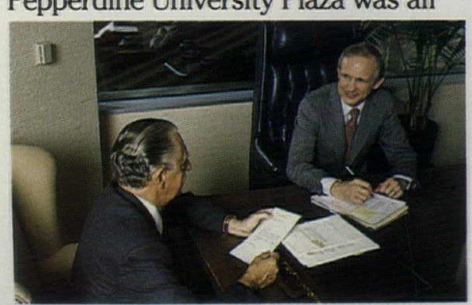

that separated the university administrative offices from the roar of this busy LA freeway.

To meet STC requirements of 36-38 would have required ¾-inch monolithic glass. However, that thickness exceeded weight limitations of the building design.

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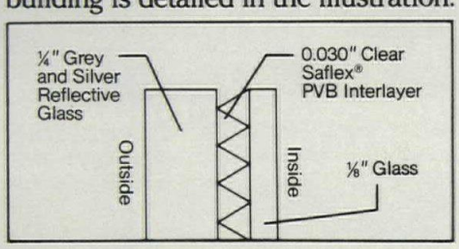

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And the Pepperdine University Plaza building went up quiet, beautiful ...and *not* overweight.

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