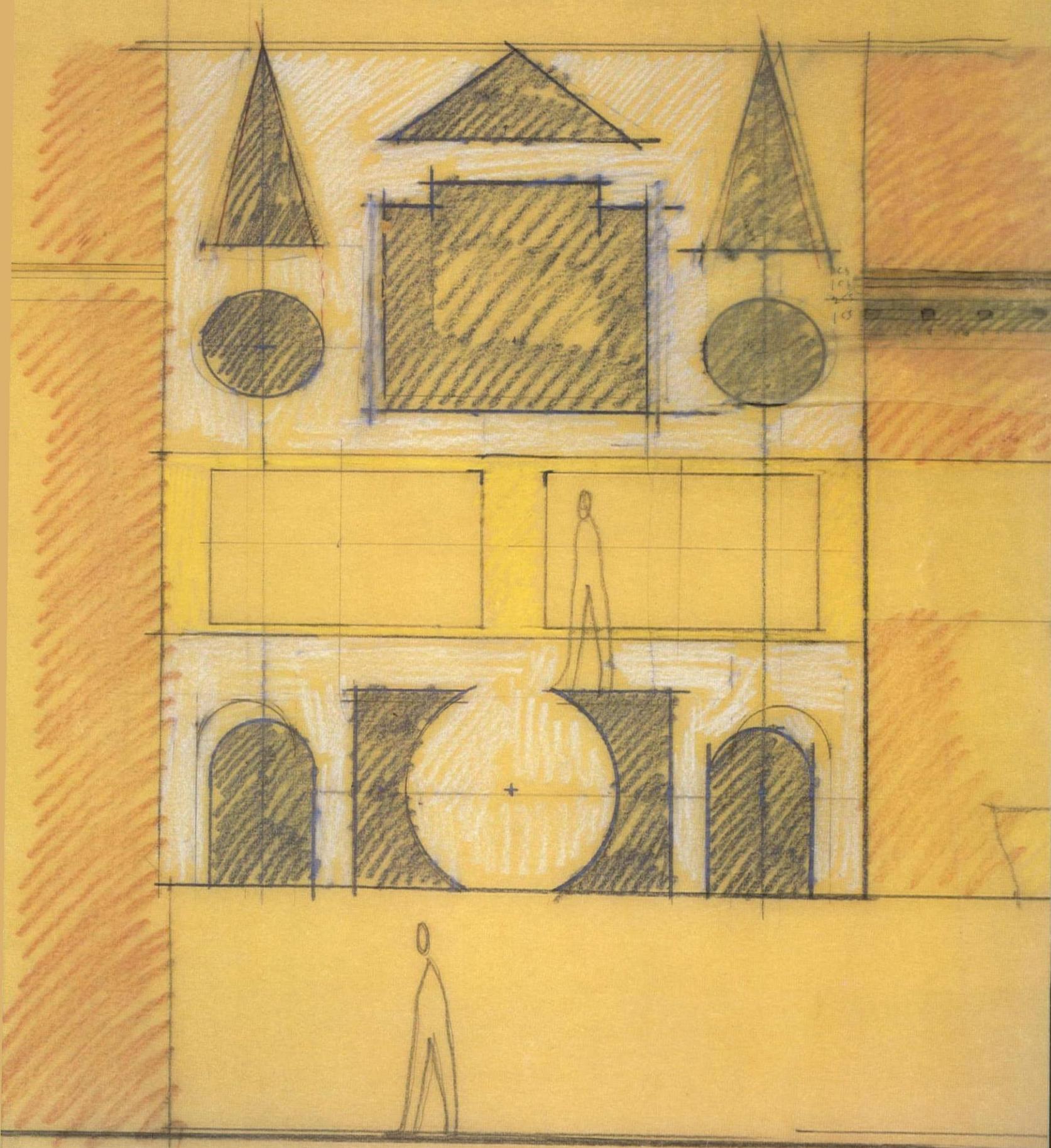


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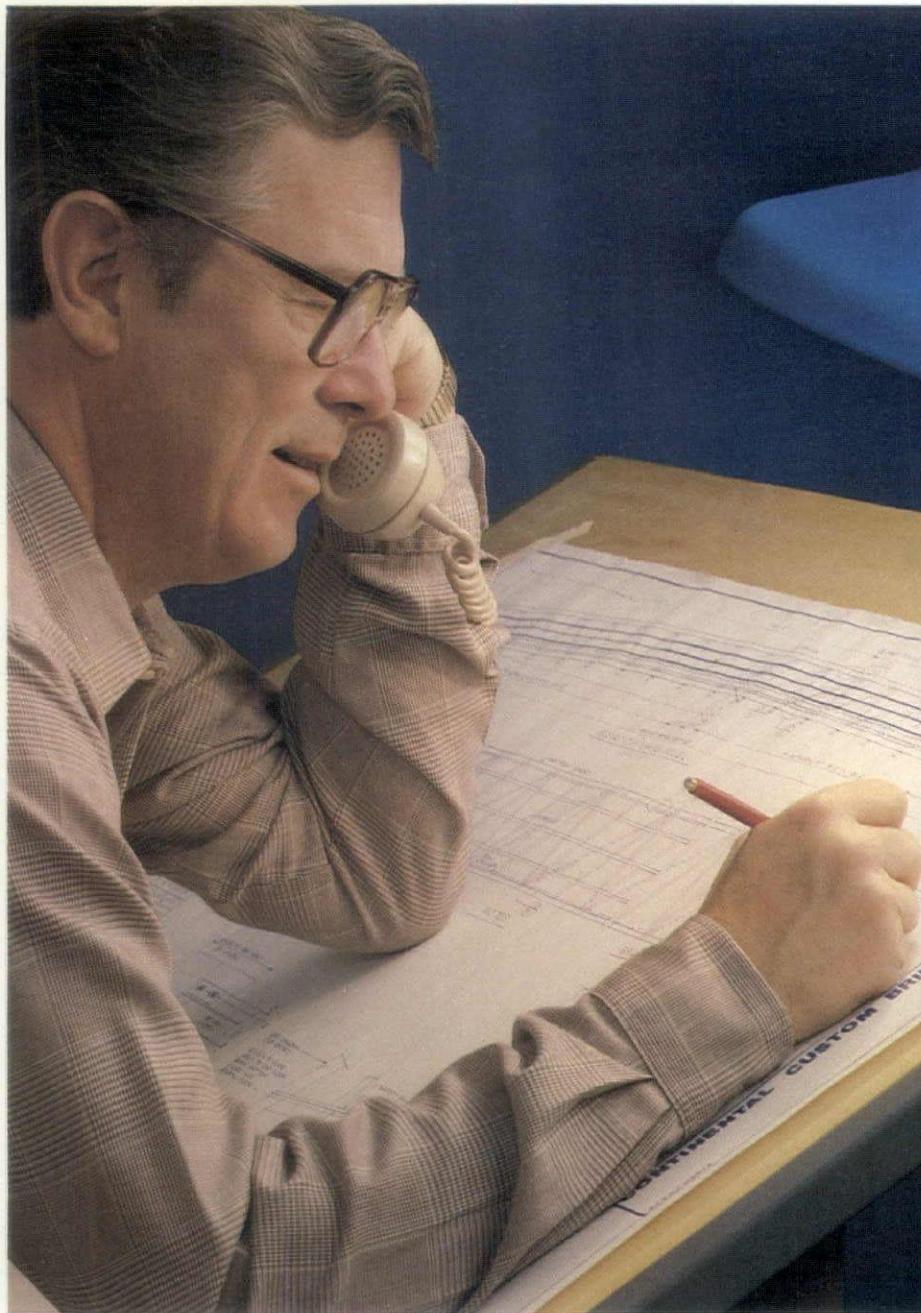
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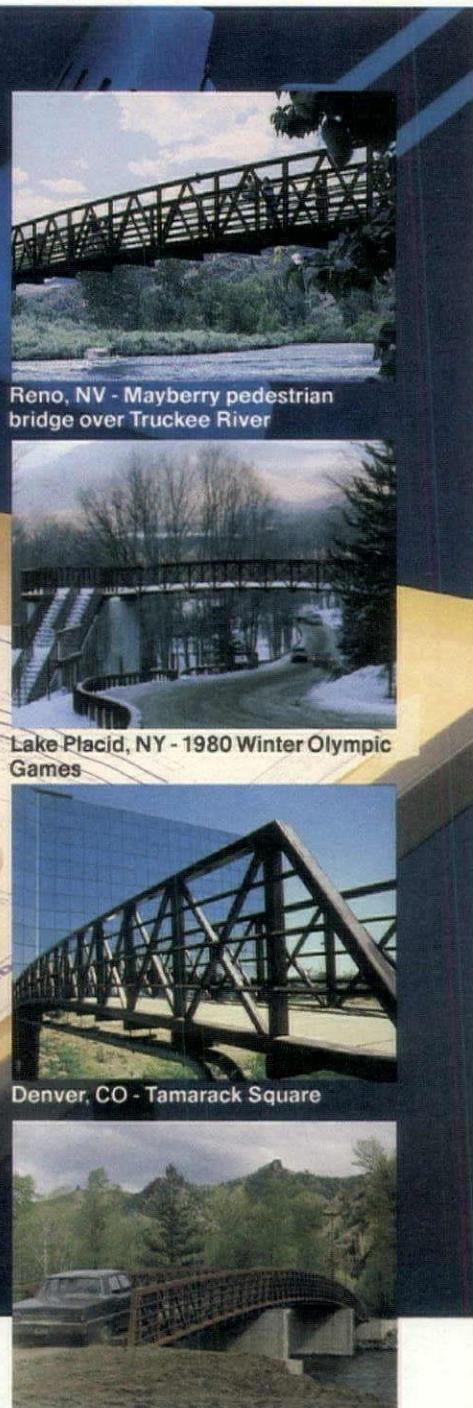




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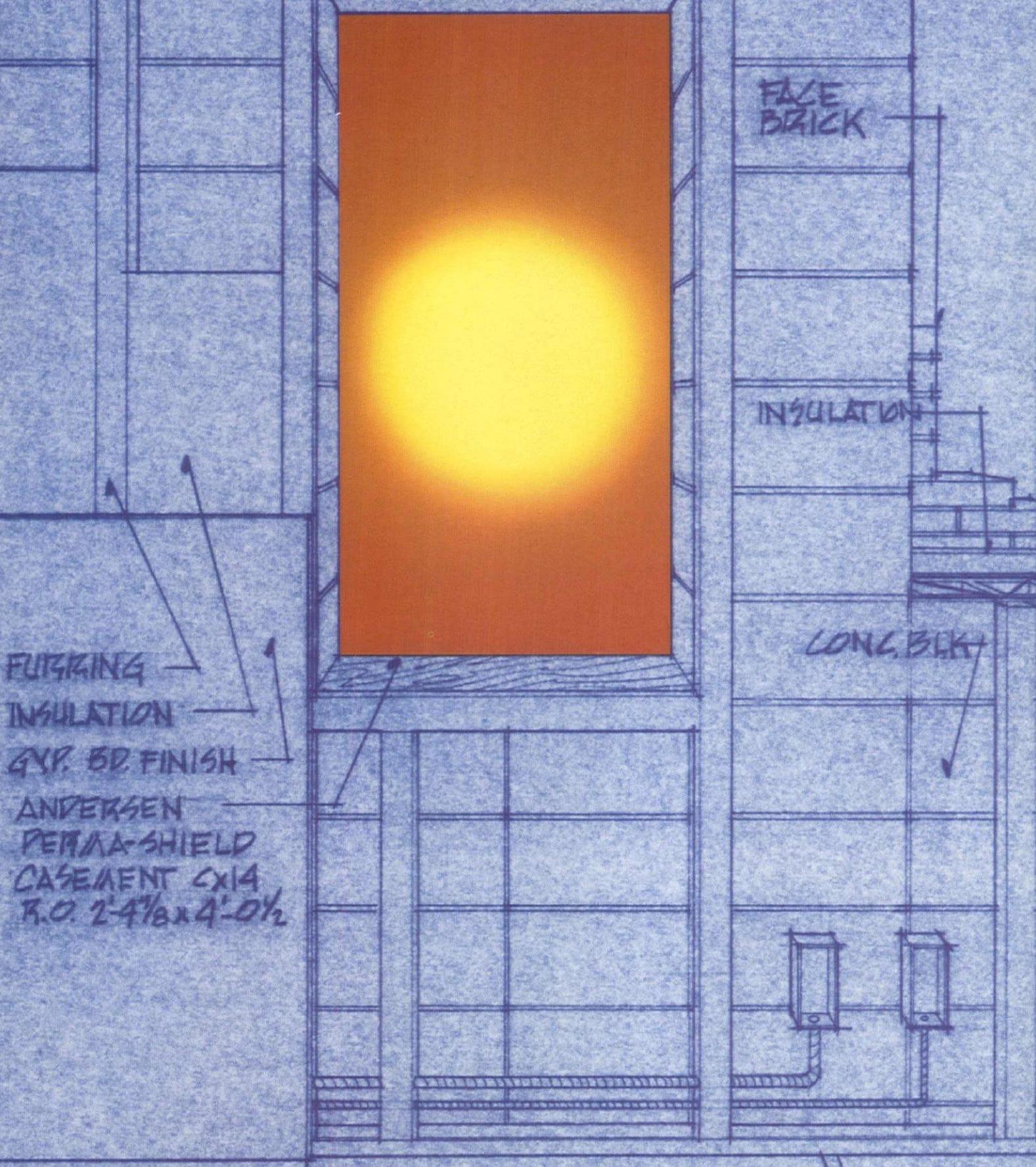
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I have just finished reading your editorial in the June issue ("A little anniversary, a little more evolution," RECORD, June 1983, page 9). To say the least, I share your disappointment in the "snail-like" progress that has plagued the NCARB/AIA-sponsored I.D.P. (Intern Development Program) since its inception, despite the heavy financial support that NCARB has made to the program.

The irony of the issue is the almost universal acknowledgment that a structural internship provides a fuller, more comprehensive experience than the traditional hit-or-miss training by osmosis. Yet most state regulatory boards and state and local components of the Institute have not rallied strongly behind the program to date.

NCARB remains as strongly committed to the program as it was in the past. The superior performance of I.D.P. "graduates" on the architectural examinations is certainly evidence of the value of the program to our purpose of enhancing the level of public protection, and I have consequently placed a greater priority on the expansion of the program during this forthcoming year. We intend to exert every possible effort to expand enrollment in the program substantially.

I find your proposal to cover architectural education on a regular basis commendable and one of the most useful additions that could be made to your editorial content. Having personally served on five architectural school visiting teams in recent years, as well as having been a member of the NAAB Special Committee that developed the restructured accreditation criteria this past year, I know that much good can accrue to the schools, the profession and the public from articles related to architectural education in the professional press. I look forward to this new service.

*Ballard H. T. Kirk, AIA  
President  
National Council of Architectural Registration Boards  
Washington, D.C.*

Reading your June 1983 editorial (RECORD, June 1983, page 9), my attention was immediately riveted by your remarks regarding that period of a young architect's life known as the "apprenticeship." The experiences of these years vary wildly from one person to the

next. For one it is a valuable time of learning, for another it may only represent years of drudgery and low wages.

For myself, I find it bothers my sense of fairness that such unevenness should exist. More important, I have yet to be convinced that a free citizen in a democracy need be indentured three years for the right to have his ability tested. This does not seem to be in the spirit of the Founding Fathers' wishes, nor in the American spirit of competition.

*David Carnivale  
New York City*

With so many negative things being said about Michael Graves's design for the Portland Building [see ARCHITECTURAL RECORD, November 1982, pages 90-99], I feel it is appropriate to paraphrase whoever said, "I might not agree with what he says, but I will defend 'til death his right to say it."

*Samuel M. Thomas, AIA  
Tacoma, Washington*

*Voltaire is supposed to have said something like this, though biographical reports differ.—Ed.*

Re: July 1983 issue of ARCHITECTURAL RECORD, architect Pelli's World Financial Center [pp. 110-113] with its Mies meets Raymond Hood flavor is a welcome effort on the confused skyline.

Dean Pelli should open up a "Learning from Manhattan" studio. It sure would be much needed relief from the "South Jersey Paintings Turned into Buildings" school, currently all too evident on the scene.

*Jeremy Scott Wood, AIA  
Weston, Mass.*

#### Corrections

It has come to my attention that we mistakenly omitted the names of two individuals in the credits for the Hult Center for the Performing Arts [ARCHITECTURAL RECORD, May 1983, pages 120-133]. Both Monica Morrow and Ronit Rubin played significant roles on the interior design team, and we hope this can be acknowledged.

*Malcolm Holzman  
Hardy Holzman Pfeiffer  
Associates  
New York City*

We regret that under the credits for the NYU Graduate School of Business Library [RECORD, August 1983, pages 80-83], the individual credits for the graphics by Carla Hall Design Group were omitted. They are: Carla Hall, Barbara Tanzman, Mia Jacob.

#### Through September 11

Exhibition, *Black American Landmarks*, photographs of sites associated with black Americans' contributions in education, civil rights, political and military affairs and the humanities; organized by the National Architectural and Engineering Record, Department of the Interior, and developed for national tour by the Smithsonian Institution Traveling Exhibition Service; at the American Institute of Architects, 1735 New York Ave. N.W., Washington, D.C.

#### September 15 to October 15

"Mediterranean Indigenous Architecture: timeless solutions for the human habitat," a traveling exhibition of drawings, photographs and paintings; at the AIA Gallery, 1911 First Ave., Seattle, Wash. For information: Steven House, AIA, House + House, 427 Chestnut St., San Francisco, Calif. 94133. (415/981-8611).

#### September 16 to October 14

Exhibition and sale of Frank Lloyd Wright drawings dating from 1893 to 1959; proceeds to go towards preservation of Taliesin; at the Max Protetch Gallery, 37 W. 57 St., New York City.

#### September 19-22

Seminars, "Roof Maintenance and Roofing," "Grounding and Lightning Protection," and "A Comprehensive Review of the 1984 National Electric Code," at the University of Alabama in Birmingham. For information: Beth Moore, 1945 9th Avenue South, Birmingham, Ala. 35294 (205/934-7451).

#### September 20-23

Seminars, "Elasto/Plastic Sheet Applied Roofing Systems" and "Roof Inspection, Diagnosis and Repair," in Denver, Colo. For information: Susan Mathews, Roofing Industry Educational Institute, 6851 S. Holly Cir., #250, Englewood, Colo. 80112 (303/770-0613).

#### October 3-6

Seminar, "Revitalizing Downtown: Understanding Real Estate Development," in Louisville, Ky.; also November 7-10 in Washington, D.C. For information: National Main Street Center, National Trust for Historic Preservation, 1785 Massachusetts Avenue, N.W., Washington, D.C. 20036. (202/673-4219).

#### October 5-6

Forum, "U.S. Technological Literacy: Framing the Issues," in Washington, D.C. For information: B. J. Harrod, American Association of Engineering Societies, 345 East 47th Street, New York, N.Y. 10017 (212/705-7845).

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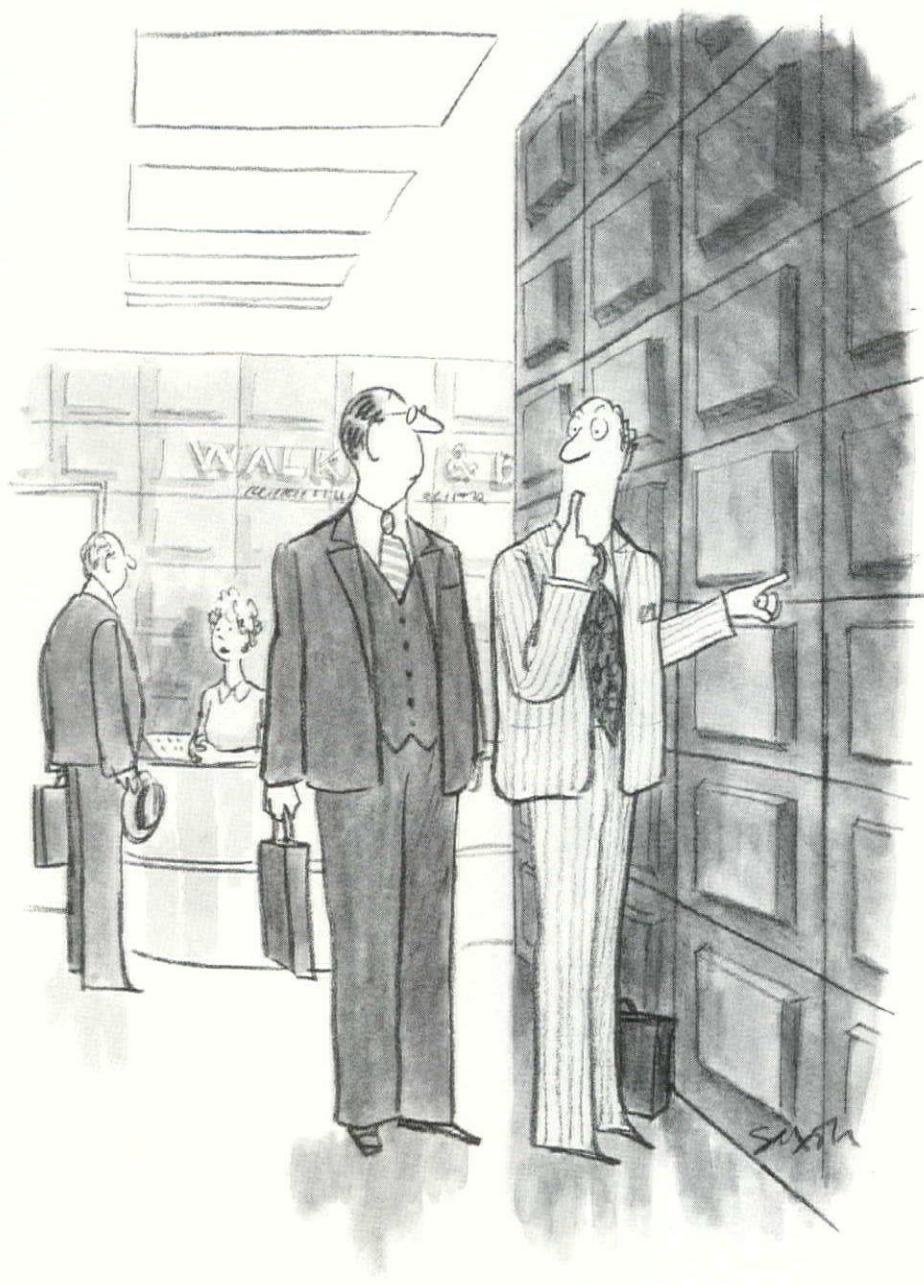
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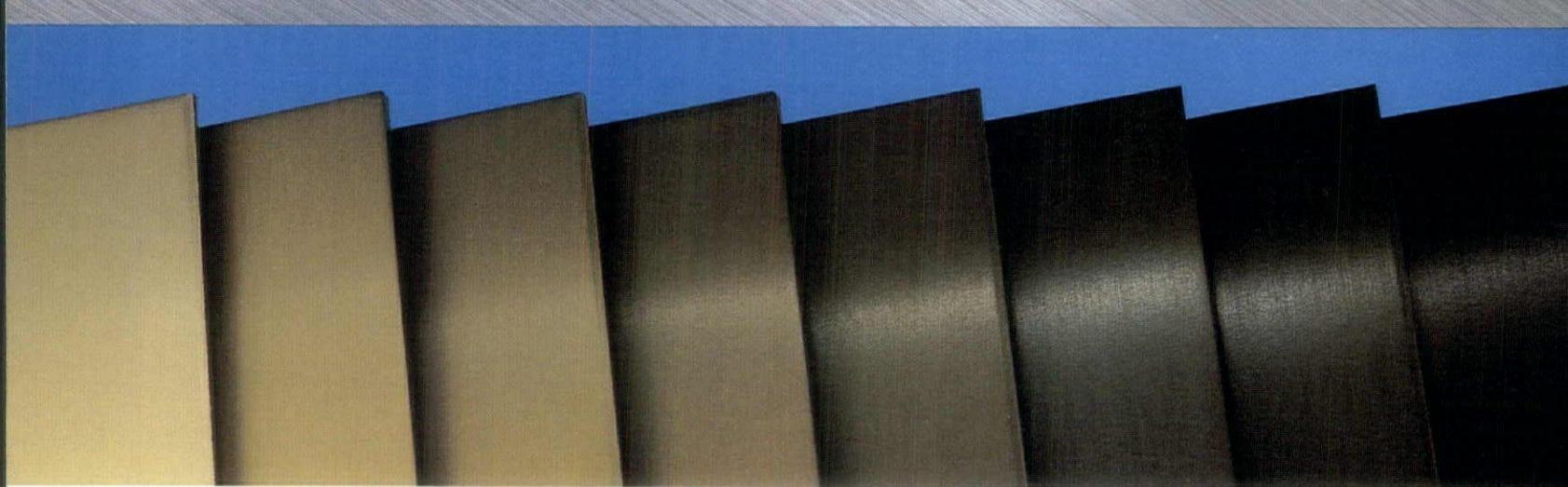
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## Architectural education: questions piled upon questions

This is a kind of postscript to the Round Table that appeared in *Record Interiors* earlier this month on "Educating the Architect in Interior Design." I suppose I should have known, but I expected some answers to simple and straightforward questions like: "Should study of interior design be mandatory in architectural school?" and "Is there time in architecture school for study of interiors?" Instead, the panelists—most of them architects skilled in both architecture and interior design, and most of whom take significant amounts of time away from their practices to teach—wanted no part of such specifics and instead pressed throughout the day-long conversation on questions that went to the very nature of architectural education.

Sharon Sutton of the University of Cincinnati said: "I believe not so much in the education of architects or interior designers, but in human development of people who want to be architects or interior designers. One reason that I became fascinated by design education is that it seems to correlate with human development and to have some essential characteristics that set it apart in the very essence of its learning process from other disciplines. Design studio work cannot be learned from a book—it must be learned from some other person. It's a cooperative venture—just as living in the world is a cooperative venture. So the very act of learning to design is learning to live.... I think that the model we have for learning to make the world in our image, working with one another, is a very relevant model, whether the particular courses we have been teaching are right on the money or not."

And, said architect Larry Booth: "For all our faults [as architects and as teachers] I think we have more to teach the business community than they think; and more to teach the business schools than the business schools have to teach us. We are constantly inventing and re-inventing a culture, and the charge of accomplishing that and of leading our society in that role is very important.... Teaching that role has to be entirely personal; it has to be something that you do together with other people. It's not totally subjective. It's not totally objective. It's dealing with the development of the student as a human being in terms of his or her sensibilities, and sensitivities, and consciousness of a cultural heritage, and understanding of the problems that are current right now and that will occur in the future. Architecture is not a science—decisions about building involve the total human consciousness."

These and other panelists set an exceedingly demanding standard for architectural education. Almost a given were the requirements for a high level of technical training. There was a clear belief in a return to a generalized education with major emphasis on humanistic values, on understanding of the cultural impact that building has on society. And, as Tom Beeby put it: "The design studio is the place where architectural education happens—or doesn't happen. One on one—teacher and student. When it doesn't work it's lousy; when it works, it's magic." Most of the panelists talked about the importance of the internship years, urging students not to settle for a job but to search for work where they could continue to learn from architects whose work they respected, who could offer "a different set of information" than the student had learned in school. Panelists wondered out loud whether admission standards were high enough, about the degree to which inborn talent was a factor; about what schools and educators can learn from the students who become, sometimes very quickly, recognized as superb designers. (What do they have that others don't have? What did they learn that others didn't learn?) Especially: how do we educate architects in terms that maintain architecture as an art, and not just a business?

All questions that reveal the concern of good architects about architectural education. Perhaps all we can do is keep questioning—at least as long as so many bad buildings continue to be built, as long as it takes to come at least closer to the ideal. W. W.

# Design a set-back and steel the show.

Oftentimes one man's set-back is another man's gain. But in the case of the "Saint Louis Place" building in downtown St. Louis, everyone was a winner. The architects included a set-back arrangement in their design and succeeded in creating a bold, interesting look. The structural engineer met the challenge of the unusual design and determined, not surprisingly, that steel was the answer. The owner received a distinctive yet entirely practical and functional building.

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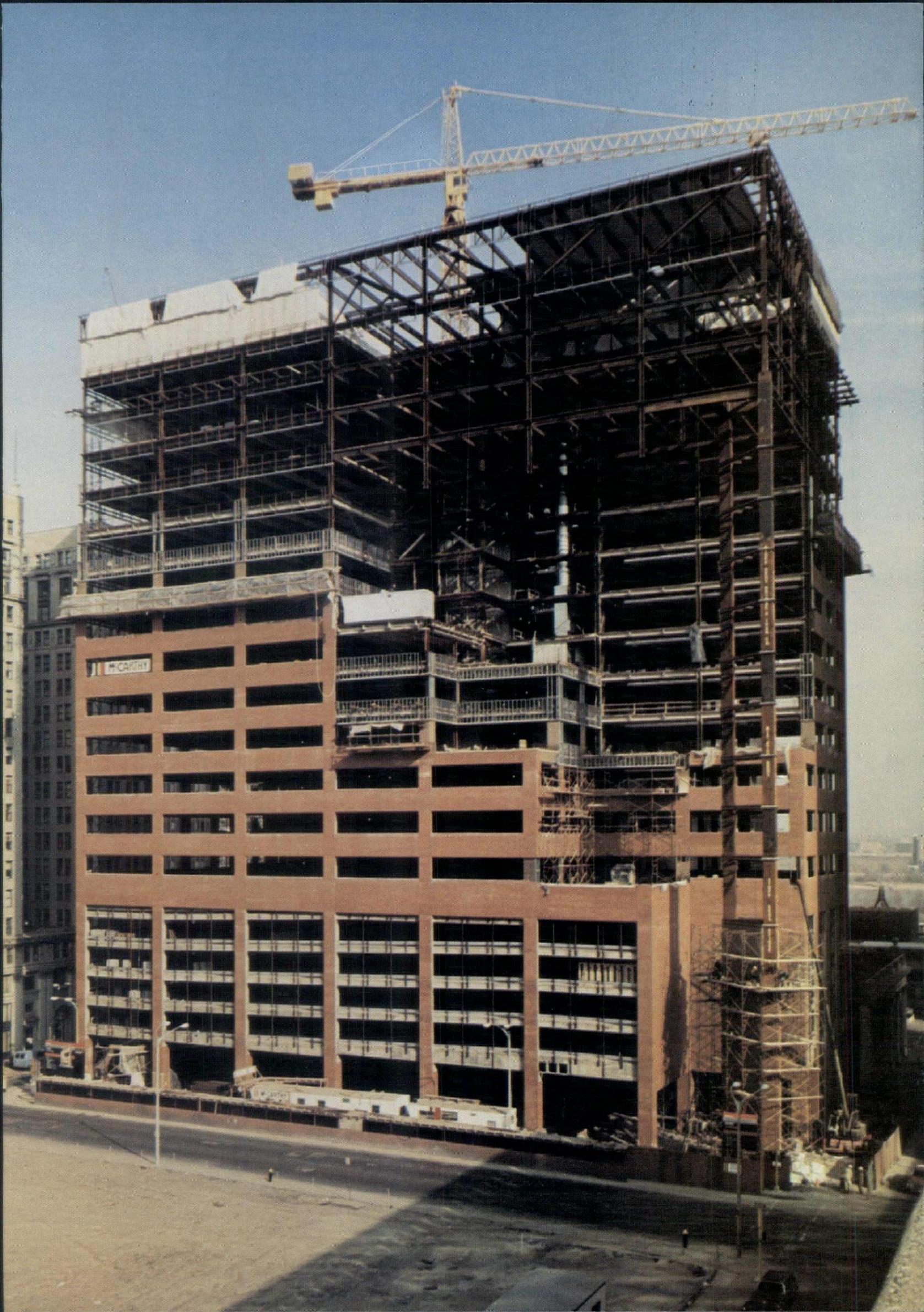
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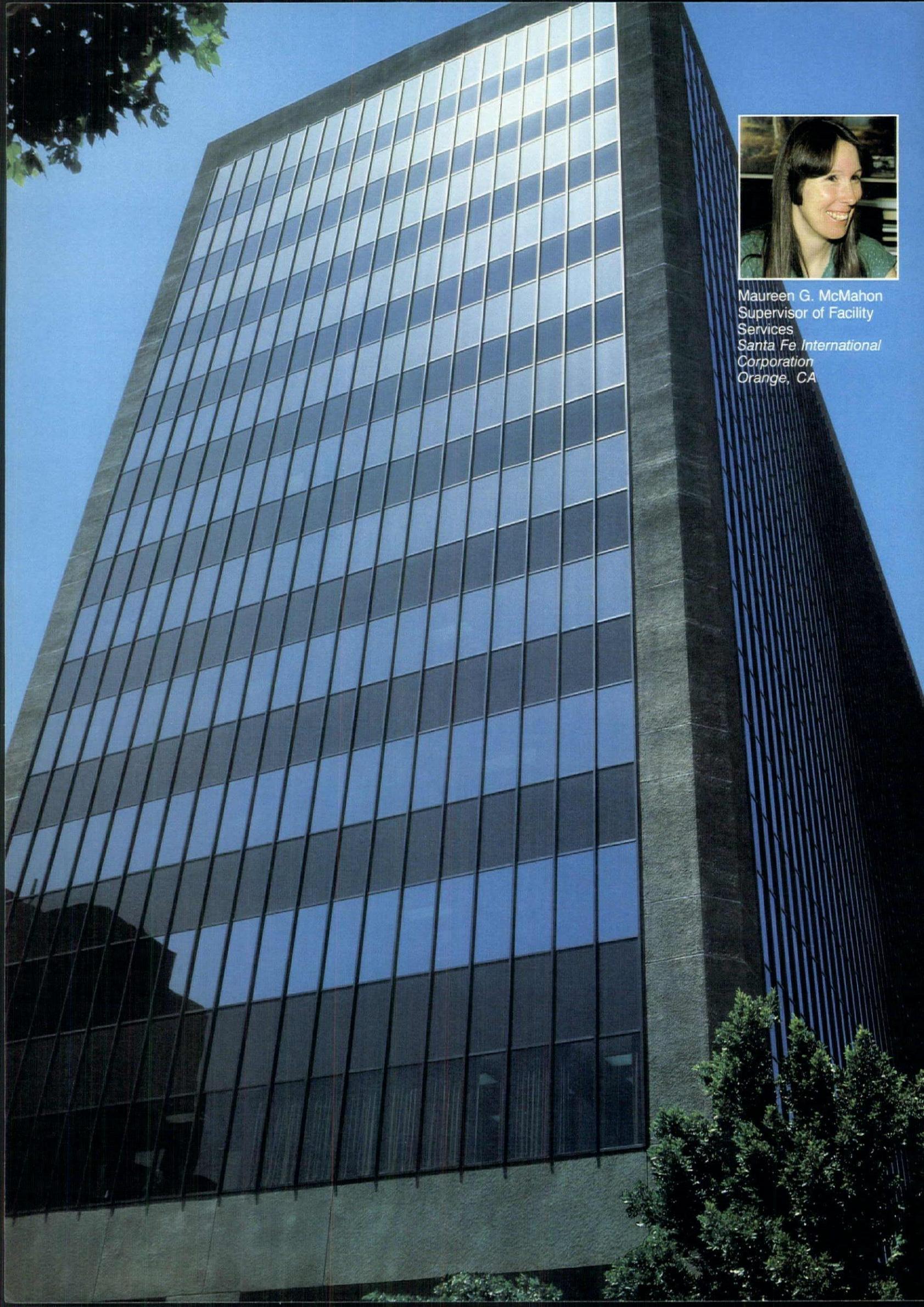
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- Data cables have been designed for most terminal applications. Plus, T&B has the capability to design and manufacture cable for virtually any system.

## Grounding is assured with the VERSA-TRAK® system.

As with all electrical systems, a grounded system enhances safety. When pedestals are relocated, re-grounding automatically occurs with the VERSA-TRAK® system. The patented cable has a factory welded connection at 27" intervals to interconnect the ground shield and the ground conductor. However, all other systems require manual reconnection. Time is lost. Re-grounding is left to chance.

## Three systems. One source responsibility.

The VERSA-TRAK® system includes all



the wiring systems needed for any office: power, telephone and data. If you need one system, or all three, you can be sure of top quality product performance as all components of the VERSA-TRAK®

system are manufactured by T&B. You also receive full technical support from one source: Thomas & Betts, an electrical industry

leader since 1895.

**Local availability and assistance.** The VERSA-TRAK® system is available locally through authorized VERSA-TRAK® system distributors. And over 140 T&B product specialists have been factory trained to assist you every step of the way. Call your nearest VERSA-TRAK® distributor or write Thomas & Betts Corporation, 920 Route 202, Raritan, NJ 08869; (201) 685-1600.



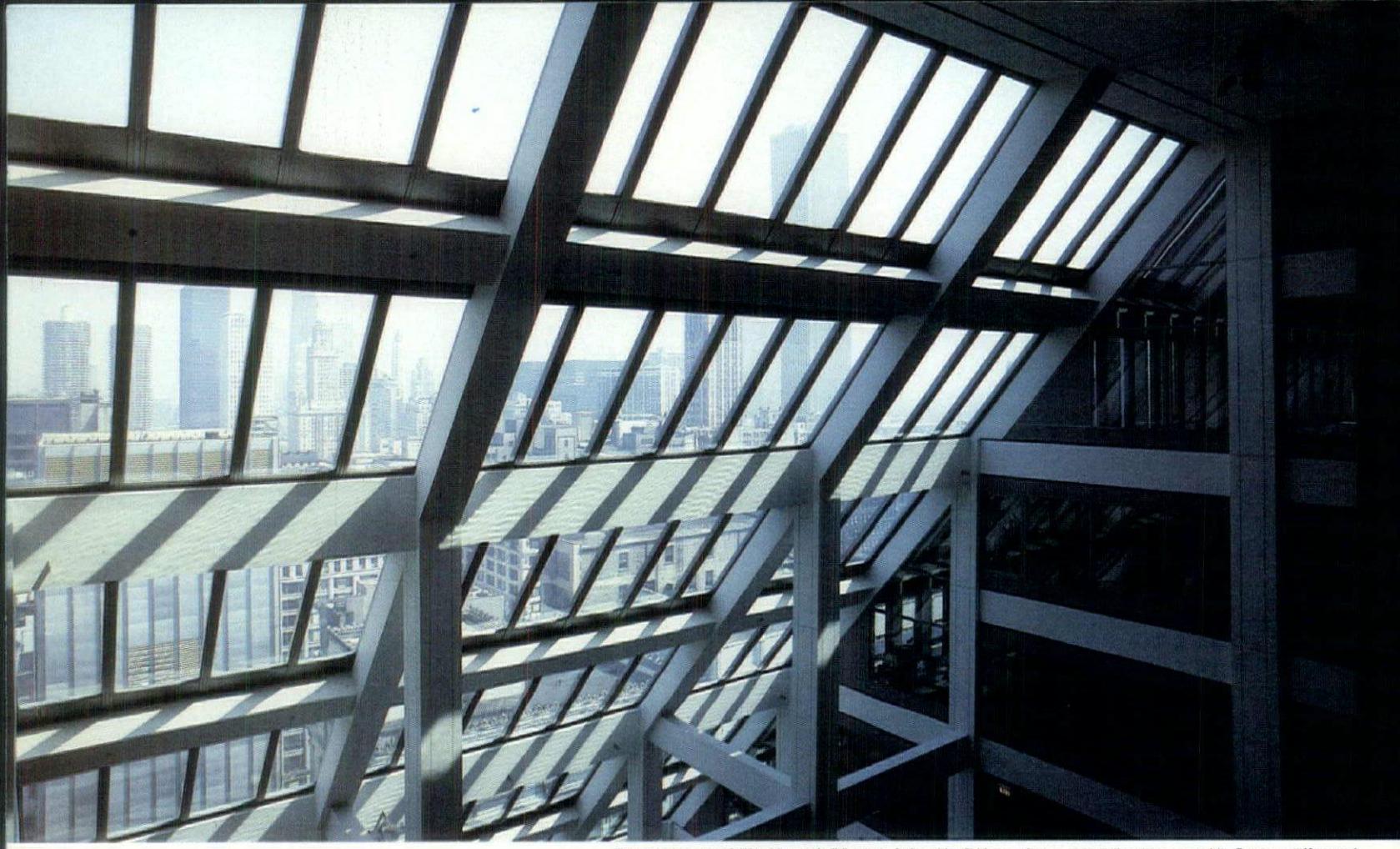
The VERSA-TRAK® system is listed by Underwriters' Laboratories and recognized under Article 328 of the National Electrical Code. See SWEETS CATALOG, 16.2c/Th.

## The VERSA-TRAK® system. Engineered performance.

**T&B**

CONSTRUCTION & INDUSTRIAL DIVISION

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Chicago's dramatic 33 West Monroe building was designed by Skidmore, Owings & Merrill and is managed by Draper and Kramer, Inc.

# How Laminated Glass helped move the great outdoors upstairs.

It was an inspired idea.

Instead of a ground-level atrium, create a sunny, open space on the top eight floors of Chicago's 33 West Monroe building.



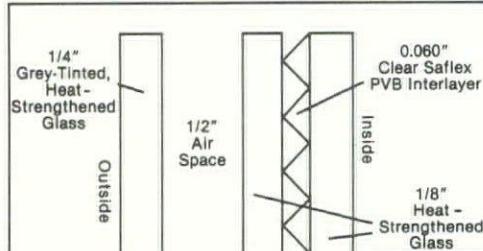
Laminated architectural glass, with its resilient Saflex® polyvinyl butyral interlayer, made by Monsanto, brought the idea to life.

To help protect people beneath this soaring expanse from glass fallout, laminated glass was the ideal choice.

Without foregoing any of the physical beauty of glass, it offers fallout protection. In the event of breakage, shards and fragments tend to adhere to the Saflex polyvinyl butyral interlayer.

To help protect building management and tenants from high energy costs, laminated glass was again the ideal choice. A wide variety of reflective coatings, tints and configurations can be specified to provide precise control of glare, solar heat, light transmittance, insulating properties and reflectivity.

The configuration specified at 33 West Monroe is detailed in the illustration:



This configuration provides the following performance characteristics:

	Winter (Nighttime)	Summer (Daytime)
U Value	.49	.57
Shading Coefficient	.55	.55

Laminated glass, with a Saflex interlayer, gives you opportunities no other glass offers. That's why it ended up on top at 33 West Monroe.

If your aspirations are equally high, write us for a list of suppliers. Monsanto Polymer Products Company, an operating unit of Monsanto Company, Dept. 804, 800 N. Lindbergh Blvd., St. Louis, Missouri 63167.

**SAFLEX**®

PLASTIC INTERLAYER BY **Monsanto**

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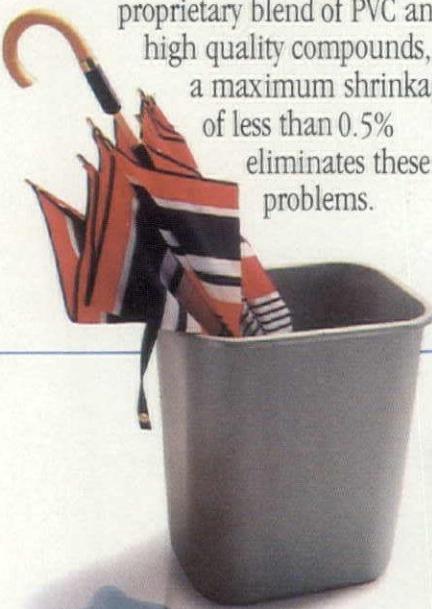
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# For Every Roof That Fails...

The alternative to conventional roofing that often fails is durable single-ply roofing. But most single-ply materials are calendered and stresses produced during the calendering process cause shrinkage that can break seams, pull away flashings... or do even more extensive damage.

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It takes confidence to guarantee a roof will last through 100° summers and subzero winters, but WatPro guarantees that Flagon® will do just that and more—for 10 years.

Designed to last 20 to 30 years, even in the most demanding circumstances, Flagon® outlasts other roofing systems time after time.

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JOB NO.

DATE

SCALE

# The computer that architects plan on.

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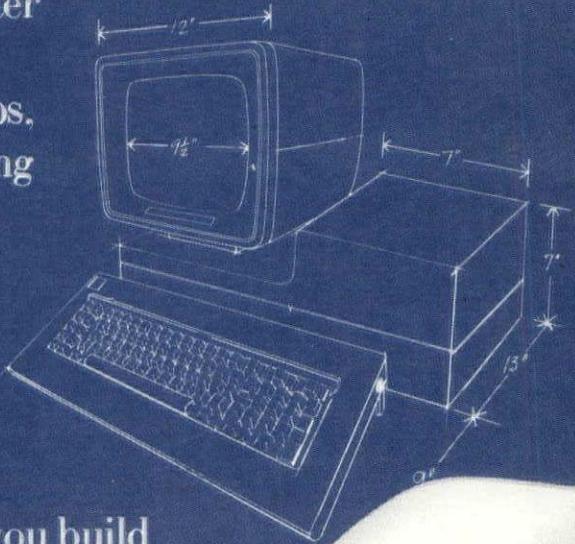
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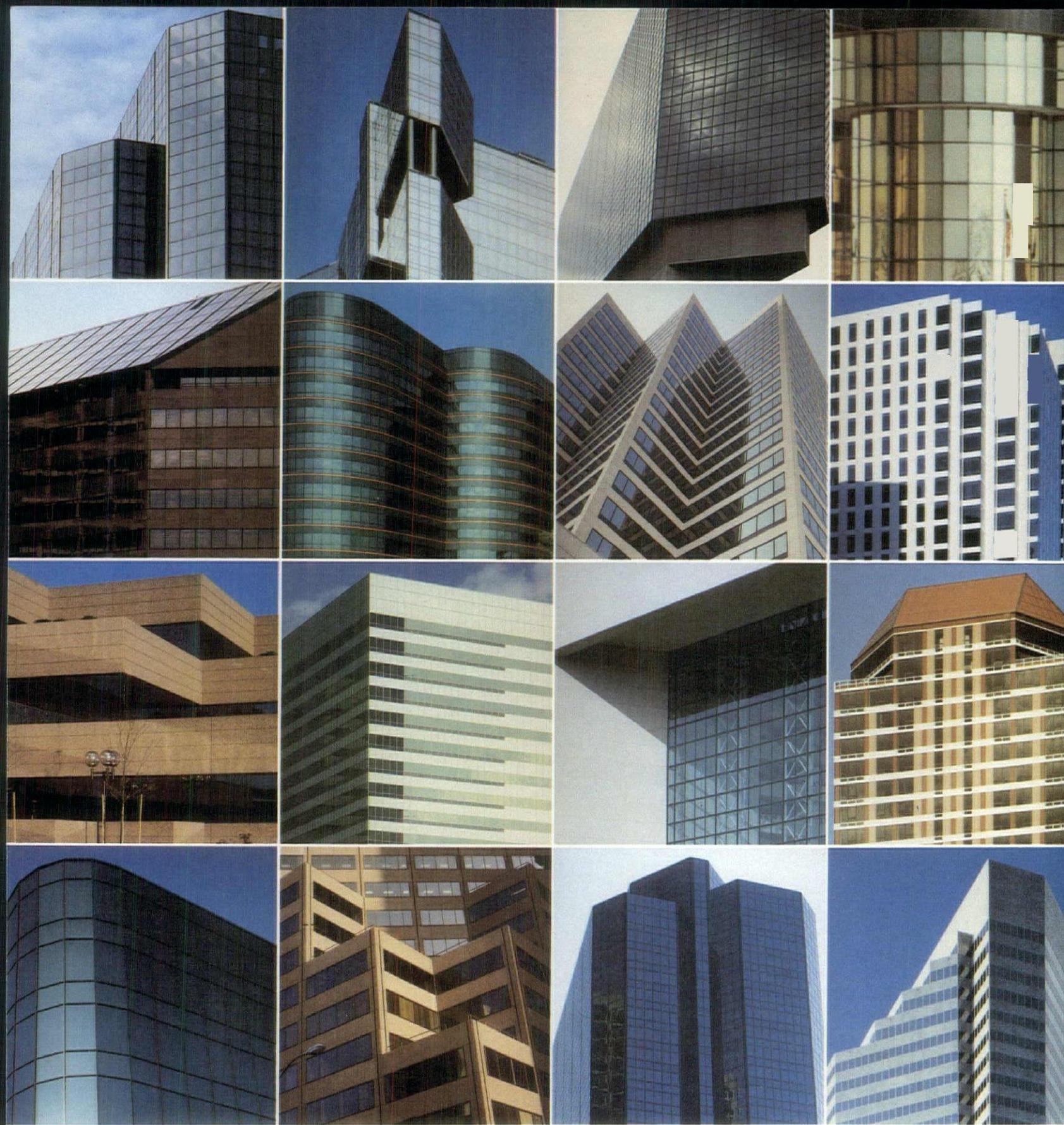
the industry standard for combatting corrosion. And beating nature at her own game—economically.

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We can help build your success, too. For details on the right glass, see Sweet's 8.26a/Pp. For the right support, contact your PPG architectural representative. And for details on the successful buildings shown here, write: "Building Details," PPG Industries, Inc., Glass Advertising, One PPG Place, Pittsburgh, PA 15272.

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ppg

# The right support. the last detail.

TWO GRAND PARK, Oklahoma City, OK Owner: Spaulding & Slye, Burlington, MA Architect: Frankfurt • Short • Bruza, Oklahoma City.



CURTAIN WALLS BY INRYCO

## Financial incentives may not be the way to go on new-codes compliance

A study conducted for New York State's Department of State by Building Technology Inc. indicates that other factors beside direct publicly backed financial incentives such as tax deductions may be more important in gaining owner compliance with the retroactive building- and fire-safety code changes that are currently proposed in a number of states and cities. It is the retroactive aspect of these changes that is particularly troublesome without an expensive and difficult building-by-building check by inspectors.

The factors that the study found to be most important are: extensive distribution of information on potential insurance savings to owners by the insurance companies, distribution of information on public safety to the public by government, awards of fire-safety seals of approval or certificates of noncompliance, strong enforcement efforts through use of Federal and state resources, and income-tax penalties. In general, the study found it was particularly important to increase enforcement efforts and to offer a reasonable amount of time for compliance.

### Historic building elements offered

The Society for the Preservation of New England Antiquities is offering for sale two lots of architectural elements dating from the 17th, 18th and 19th centuries. Interested buyers can inspect the collection during September, and sealed bids for each lot must be submitted by October 1. Included in the first lot are doors, windows, shutters, trim, staircases and a complete portico. Some of the trim comes from the John Hancock House of 1737. The second lot consists of mantels, including 15 wooden examples from the late 18th and early 19th centuries. Successful bidders must remove the entire lot by November 15. Contact Penny Sander, Assistant Curator, SPNEA, 141 Cambridge Street, Boston, Mass. 02114 (617/227-3956).

## Churches challenge landmark designation

In a move with possible far-reaching results nationwide, New York's churches have banded together to have a bill introduced in the state legislature that would effectively remove the preservation controls on their buildings that exist in a growing number of communities. At stake are not only a number of distinguished older buildings that the churches would like to tear down for new development, such as St. Bartholomew's annex in New York City, but the integrity of landmark-preservation laws, including one of the nation's pioneering statutes in New York City. Clearly, a wide variety of special interest groups, as well as churches nationwide, will be watching the outcome of New York's new proposed legislation. Opponents believe that the success of such a bill for one group would lead to the eventual elimination of controls for all groups.

The proponents of the legislation say that churches should be exempt from landmark laws because of the required separation of church and state under the Constitution. Opponents note that churches are not so exempt from other local ordinances for the public benefit, and that the concept has been well tested in the courts. The proponents believe the state legislature, which gave the communities powers to pass landmark laws, is the proper place to have these laws altered. Opponents believe that once the powers are given, the taking away of some part becomes an issue of home rule. The proponents cite economic hardship in maintaining their

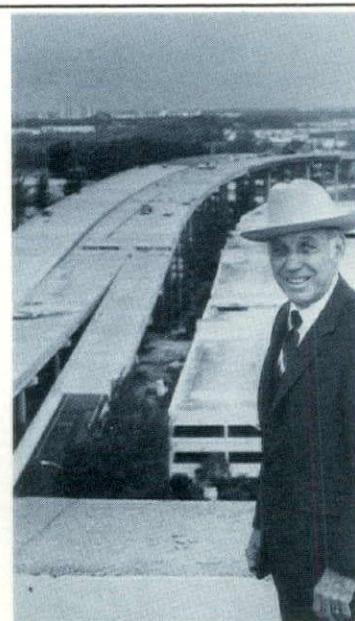
current physical structures, while the opponents point out that mechanisms for relief exist within the current legislation when hardship can be proven. They also question the whole concept of tax exemption for those churches that would become profit (developer) oriented, and argue that the entire issue of tax exemption should be examined for religious organizations that behave like private developers.

Local and state AIA chapters worked with concerned civic groups to assure that the bill was not passed in the recent last-minute rush to close the 1983 legislative session, as the sponsors had hoped, but the bill remains very much alive for consideration in the next session. Known as number 7942 in the Assembly and 6684 in the Senate, the bills stand a good chance of passage with the support of key figures: Assemblyman James McCabe, chairman of the Committee on Local Government; Daniel P. Walsh, Assembly majority leader; and John Flynn, Senate majority leader. They can be reached at either the Assembly Office Building, Albany, N.Y. 12248 or the Senate Office Building, Albany, N.Y. 12247.

With ironic timing, the Preservation League of the State of New York has just published *How to Care for Religious Properties*, a booklet designed to cover preservation techniques such as water control, masonry repair and ornament stabilization. It can be obtained for \$1.50 from the League at 307 Hamilton Street, Albany, N.Y. 12210. C. K. H.

### Bridge named for living architect

In an undoubted first, a Miami causeway has been named after architect Norman Giller, who, as president of the Concerned Citizens of Northeast Dade County, pressed for the new bridge's construction. The bill naming the bridge was passed by both the governor and the state legislature.



# Trilogy called for intelligent flexibility.



Interior Design by Gensler and Associates/Architects

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## Rehabilitation credits in jeopardy from retroactive bill

In yet another joust with what the government contends are abuses of industrial development bonds (IDBs), both houses of Congress are considering bills that would discourage their use in financing historic preservation projects.

The full House Ways and Means Committee just before the August recess approved a bill, H.R. 3110, sponsored by Rep. J. J. Pickle (D-Tex.), that would limit the degree to which tax-exempt organizations and local governments can sell, and then lease back, depreciable property to private investors, as the investors can reap various tax breaks. The bill, which would recoup \$2.5 billion to \$3 billion in revenues for the Treasury between now and 1986, may be taken up by the full House as early as September. As amended, the bill would also deny rehabilitation tax credit for the portion of any cost of property that was financed by tax-exempt obligations such as IDBs if the property is subject to accelerated cost-recovery deductions.

The Senate Finance Committee held hearings on a similar bill, S. 1564, in late July, and industry spokesmen say that bill is considerably harsher than the House version. "It's atrocious," as one put it, adding that Finance Committee chairman Robert J. Dole (R-Kan.) reportedly has characterized the existing arrangement as "too lush" for the industry. The industry fears that the Democratic House, unwilling to write a tax bill, may forego the Pickle bill and may act on the Senate version which may come up for action at the end of September.

## New emphasis on architecture at Fontainebleau needs funding

Alan Schwartzman, architect and partner in Davis, Brody & Associates, has been elected president of the Board of Trustees of the Fontainebleau Fine Arts and Music Schools Association, Inc. He has announced a fund-raising campaign aimed at increasing the ratio of architects and painters from the current 28 per cent to 50 per cent of the total

Pleading for a special exemption for historic preservation, Robert Broshar, president of the American Institute of Architects, wrote in a letter to House Ways and Means Committee chairman Dan Rostenkowski (D-Ill.), that the bill "would harm the nation's efforts to preserve historic structures and rehabilitate urban areas."

Because of its retroactive date to May 23, 1983, when H.R. 3110 would become law, the bill would have "negative, chilling effect on much-needed projects well along in the planning process but not yet at the point of contract."

While the bill is designed to end abuses of IDBs and to stop double-dip tax benefits from the use of both devices, Broshar noted "it is precisely this combination of tax incentives that allows many rehabilitation/preservation projects to proceed in the first place.... Without the ability to apply tax credits to tax-exempt financing, many important historic properties will be lost that could be otherwise saved."

In the Senate hearings, Michael L. Ainslie, president of the National Trust for Historic Preservation, told the finance committee that IDB financing helps historic properties to overcome the disadvantage they have in the market for long-term financing. If limits were to be imposed, the Senate bill should provide a flexible choice between the investment tax credit and IDB financing in the case of tax-exempt occupied properties, Ainslie urged. *Peter Hoffmann, World News, Washington, D.C.*

## Symposium on art in public places announced

Called "Private Sector/Public Art," the symposium on October 5 will feature an unusual mix of attendees that ranges from developers to architects to artists to art administrators. The location is Washington Square, a new development in Washington, D.C. designed by Clothier Woodward Smith and Associated Architects, where an exhibit of bronze sculpture by well-known artists will be in progress. Both the symposium and the exhibit are sponsored by the Public Art Trust. For more information, contact Karen Ringen (202/965-6066) at the Trust or Carol Morgan (212/794-1650).

## Housing affordability index announced

A quarterly index that establishes how well families can afford the new housing on the market is being issued by the National Association of Home Builders. Of special interest to those design professionals with large markets in housing, the index measures changes in eight cost components of new house purchases, including interest rates, property taxes, marginal tax rates, and maintenance costs, and compares these costs to changes in median family income. The 1977-to-1983 index shown here depicts a five-year decline in affordability ending in the last quarter of 1981, followed by a year of relatively rapid improvement in affordability to an index level of 82.6 in the first quarter of 1983. According to this index, today's median-priced new house is 17 per cent more affordable for the typical family than it was in late 1981, but still 17 per cent less affordable than it was at the start of 1977.

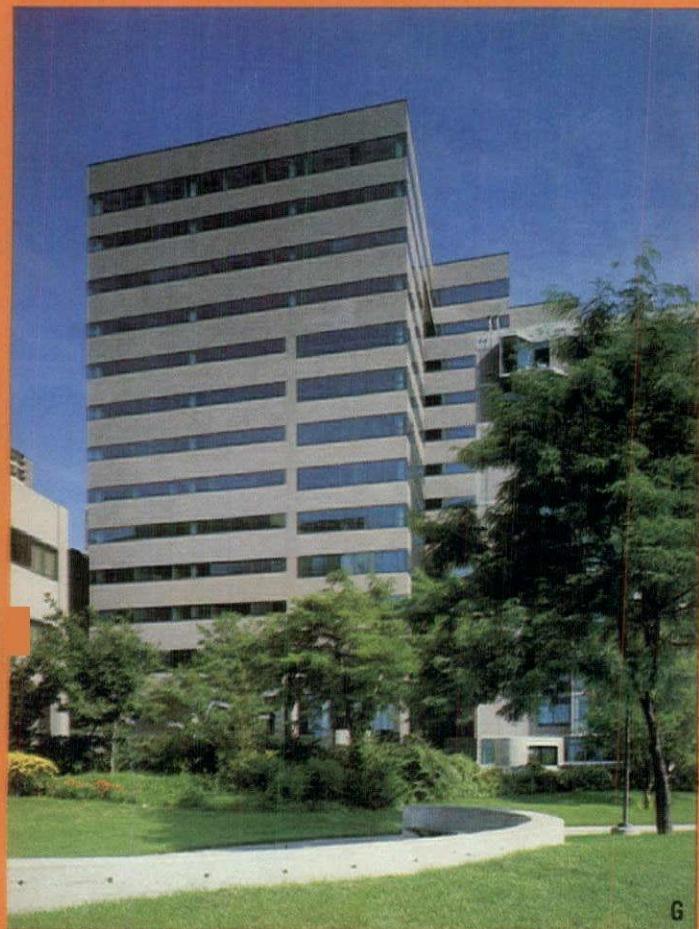
For more information, contact the NAHB, Fifteenth and M Streets, N.W., Washington, D.C. 20005.

student body in the coming year. The association is responsible for the recruitment of students of fine arts, architecture and music for an eight-week summer session at the Ecoles d'Art Americaines at the Palace of Fontainebleau. The schools were founded in 1921 to provide a cultural and artistic exchange between France and the United States, and a counterpart French association provides faculty and facilities.

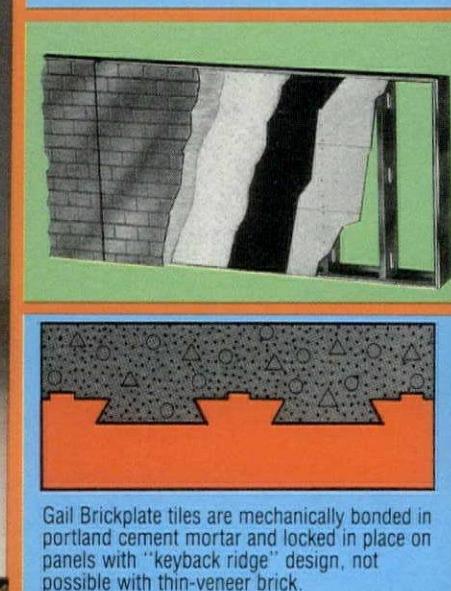
For the 1983 session, the association provided scholarships covering tuition and room and board to more than half the American students attending and, in a number of cases, was able to cover transportation.

For further information, contact Mrs. John N. Crawford, executive secretary, at 47 Fifth Avenue, New York, N.Y. 10003.

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A) PRUDENTIAL INSURANCE CO., Philadelphia, PA. Prefabricated 20" x 7'4" panels installed by Duggan & Marcon. Arch.: Ballinger Co., Phila. Gen. Contr.: Daniel J. Keating Co., Villanova, PA. B) MT. SINAI HOSPITAL Cleveland. Architect: Dalton, Dalton, Newport. Gen. Contr.: Turner Constr. Co. 5" x 10" Glazed Brickplate on prefabricated panels fabricated by Duggan & Marcon. C) SACRED HEART HOSPITAL, Eugene, OR. Curved, quarter round prefabricated panels fit circular columns. Arch.: Balzhiser Longwood, Smith, Paul & Assoc., Eugene and Kaplan/McLaughlin/Diaz, San Francisco. D) FRUCON BUILDING, St. Louis, MO. Arch.: Helmuth Obata Kassabaum (HOK Associates), St. Louis. Gen. Contr.: Frucor Corp. 8" x 8" Glazed Brickplate. E) SPECTRUM BUILDING, Denver, CO. Architect: McOG Associates, Denver. Gen. Contr.: Turner Const. F) CENTRAL PENN BANK, Philadelphia, PA. Panels prefabricated by Duggan & Marcon in Allentown, PA. Arch.: Ballinger Co., Philadelphia. Gen. Contr.: Nason & Cullen, Rosemont, PA. G) LAWRENCE STREET CENTER, Denver, CO. Office building and 43-unit condominium buildings designed by McOG Associates, Denver. Gen. Contr.: Al Cohen Construction Co.



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# Computers: Using CAD effectively with reprographics

*One firm's experience makes  
a good argument for a flexible marriage  
between two drawing techniques*

By Bradley Meade

*In this first of two articles, associate Bradley Meade of Swanke Hayden Connell Architects tells how his firm got into computer-aided drafting with the firm's solid background in overlay drafting techniques, why this background is important, and how a successful marriage between the two systems can produce the best efficiencies. He thoroughly agrees with previous authors in RECORD on such points as doing an exhaustive examination of available systems capabilities and on the necessity of marrying those capabilities to existing office functions and experience.*

*But he offers some surprises. He urges staying flexible in your use of the systems and what you actually want to put on your CAD software. "Don't waste a lot of time loading your CAD down with details you may never use," he says, "when instead you could be producing thousands of square feet of floor plans."*

*Despite a possibly useful "impression on clients" (stressed by a tendency to display CAD equipment in a glass room off the lobby), SHC elected to put their system in the drafting room for close interaction with all of the staff in day-to-day operations.*

*It is worthwhile to note that CAD is coming to mean either computer-aided drafting or drafting and design, the latter definition taking in the whole scope of computer design possibilities, including word processing, and sometimes referred to as CADD or computer-aided design and drafting. The next article in this series will deal with the more detailed concepts of reprographics and CAD as practiced by the author's firm.*

C. K. H.

We had developed an efficient overlay drafting procedure. The incentives that made the purchase of a CAD system important to our firm included the promise of even more productivity and improved quality control, and the ability to expand the firm's research and development efforts. They also included the increased selection priority given to firms with CAD by many clients who have come to appreciate automation in their own businesses. Swanke Hayden Connell realized that a computer-aided drafting system could be a significant marketing tool.

## The key to successful CAD use is in integration with other systems

If computer-aided drafting is not integrated with ongoing office systems, it can become a bottleneck—worse yet, a liability, as some firms have discovered. Most newly acquired systems have between one and three workstations. Even with two shifts, such systems can handle only part of the work for a medium or large firm. Accordingly, compatibility of CAD with more conventional design and production procedures such as pinbar overlay, photo drafting or cut-and-paste drafting, is essential.

As early as 1970, SHCA completed its first overlay drafting project. By 1978, it had refined the process to the degree where working drawings for a 1,000,000-square-foot interior project could be completed in less than one third of the time and with one third of the staff required for the 1970 project.

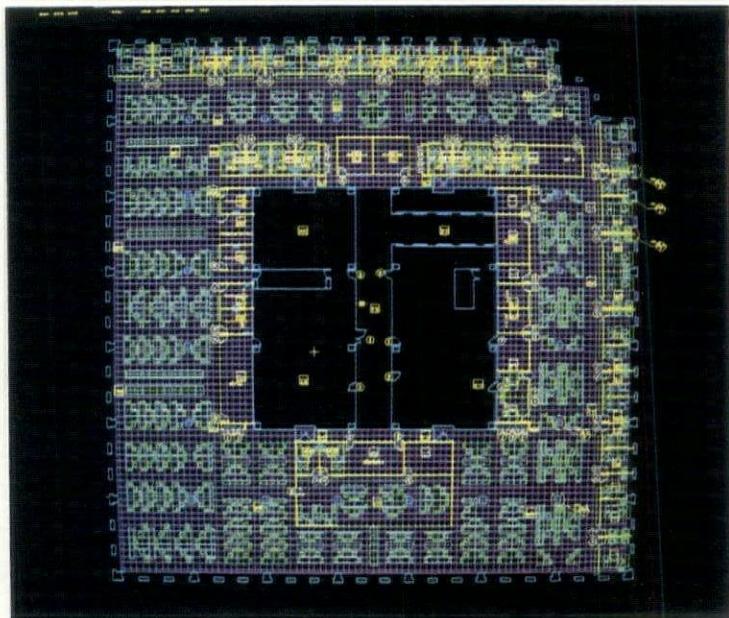
About this time, the firm began to investigate the possibility of integrating this experience with emerging CAD technology. Our studies showed that there were many similarities between CAD and pinbar methodologies. After analyzing these studies, the firm decided to develop additional reprographic capabilities as preparation for purchase of a CAD system.

## You must study how the systems will work together

During the reprographic development process, it was determined that three capabilities were essential to integrate CAD with it:

- Color workstations (to distinguish layers).
- Printout registration (to combine with pinbar methods).
- A database management system with intelligent symbols (for bill-

*The photograph below shows the type of drawing—large repetitive floor plans—that Swanke, Hayden Connell found immediately adaptable to the combined use of CAD and reprographics.*



of-materials and facilities management).

Next, the firm required a CAD manager who had both architectural and computer training. He would assist in the selection of the system and manage the CAD department.

Once on the staff, the CAD manager, along with the firm's director of technical production, were assigned the task of preparing a benchmark for the final three systems under consideration. Equally as important, they were assigned the problem of integrating the selected system with the firm's existing technology.

As a result of a comparative analysis and the benchmark, a system was ordered in the third quarter of 1982 that has workstation resident-graphics capability. That is, the functions are self-contained at each workstation, except for the ability to call up data from a central server (or CPU).

Two weeks before scheduled delivery, the CAD manager and three other staff persons with reprographic experience attended the manufacturer's training school. They returned to an installed system.

After four months of operation, the transition to CAD, as well as its integration with existing technology, had been so successful that three additional workstations were ordered and operations were extended to three shifts. After only six months, with six workstations in operation, projects with up to 1,700,000 square feet of floor space were being produced.

In some cases, reprographic methods proved to be faster than CAD methods. This further

supported our concept of merging the two techniques.

## Reproducing all drawings in your office saves valuable time

The key element in the marriage of CAD with reprographic technology was the decision to expand the firm's abilities to reproduce drawings without wasting valuable time in transit to and from printers. By 1978, the firm's overlay skills were fairly sophisticated. However, the cost of wash-off mylars was steadily increasing. In addition, check prints were often run by designers or draftsmen whose skills could be better used elsewhere.

Several key persons were selected from the staff and sent to seminars to broaden their reprographic skills. One man from this group was selected to be the firm's director of technical production. While we needed in-house reprographic facilities as a means of educating the firm's technical staff, it was decided that these facilities would best serve our interests if they were operated by an outside company in our own offices.

## An independent reprographic company may be the best answer

A specification was developed and a bid package was prepared, issued and awarded. To supplement this facility, periodic technical seminars were held, and quality control and standards committees were established. Simultaneously, investigation and testing of CAD systems was taking place.

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*As many as 256 layers go to make up one drawing with as many as 16 different colors employed to distinguish the different functions described by each layer. The photo right shows a blow-up or "zoom in" on the floor plan on the previous page.*

keep up with state-of-the-art technology, it was decided that the reprographics center contract would be periodically rebid.

The most recent bid package asked for bidders not only to submit unit prices, but also to specify what equipment they would recommend and provide.

The current successful bidder also provides monthly technical seminars and arranges annually for a nationally recognized guest speaker. Their installation at our offices includes:

- One camera with integral processor (four media—negatives, clears, mylars, paper).
- Four vacuum frames.
- Two high-speed printers.
- Two medium-speed printers.
- One high-speed photocopier.
- Two commercial light tables.
- Two pinbar punches.
- One lettering machine.

They also provide a staff of six. Their facilities, services and seminars support the firm's pinbar overlay, photo drafting, cut-and-paste drafting and CAD operations by greatly reducing turnaround time while providing the highest quality end product available.

#### **It is important to get the right CAD capabilities**

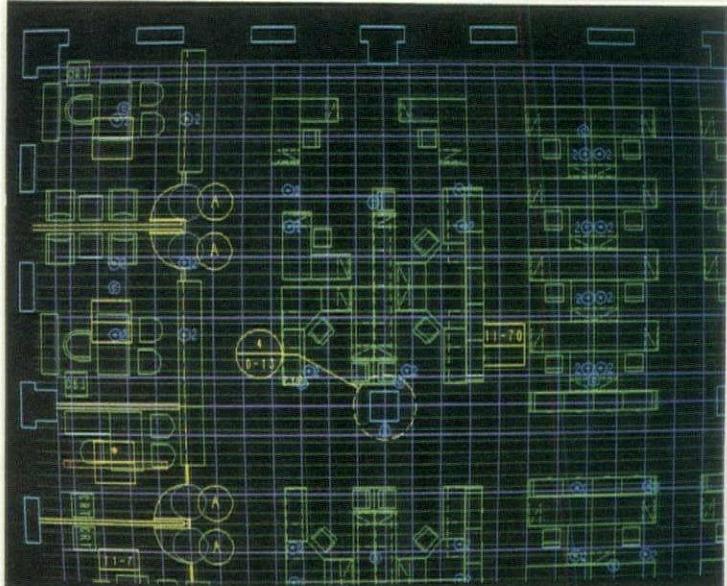
Because of our benchmark, our previous reprographic training and because of the "user friendliness" of the CAD system we chose, most types of work were being accomplished at ratios of two-to-one efficiency within four weeks of system delivery.

High-resolution color workstations on that system allowed 256 layers with up to 16 colors. This was probably the single most important capability in that it permitted operators to easily understand what drawing components were on each level.

Without such definition, working on a specific level would have been virtually impossible. Color also greatly facilitated checking and coordination. Initially, three color workstations were ordered. A CPU and 200-megabyte disc drive, trilog dot matrix checkplotter and pen plotter made up the balance of the system.

The second essential capability was to provide accurate registration between plots (various layers of a drawing). This effort will be described in greater detail in the second article of this series. Once the registration methods had been established, plotting time could be cut by as much as 80 per cent.

The final capability allowed use of the system for component



inventories (e.g. doors, windows, furniture, equipment), and for related facilities management. SHCA's CAD manager worked closely with the manufacturer and our clients to develop the data fields and report formats. Using this capability, the firm provides facilities management and management information services, such as client seating assignments and related personnel information. This eliminated many labor-intensive manual procedures.

The use of intelligent symbols (graphic symbols that are associated with programmed descriptive material) combines several functions. For example, the design for a given floor can be analyzed by obtaining inventory reports and cost estimates. Also, printouts can be provided for purchase orders. Such procedures tend to eliminate costly mistakes as well as expedite the entire design/production process.

#### **The final test is how fast jobs get done**

The marriage of reprographics and CAD has fulfilled many of our needs, but the final test is how fast a job goes through the office. SHCA implemented a number of procedures that permits us to fast-track a job.

The underlying concept of fast-tracking (as in critical path) is that sequential steps can be overlapped successfully. Fast-tracking has proven most appropriate for interiors or alteration projects, but of course it can be applied to new construction as well. For example, while architectural programming and stacking and determination of adjacent functions are taking place, an accurate field survey can be completed, and all existing conditions can be documented. CAD input is accomplished simultaneously.

This step generates appropriate layers that will provide backgrounds (sheet borders, titles and existing-building conditions such as core and perimeter). These layers

which are plotted separately, not only provide backgrounds for design development, but also are the basis for final working drawings.

Pin-registered backgrounds are furnished to those consultants who do not have initial graphics exchange specifications compatible to CAD installations. These consultants work on pin-registered overlays. The final composite for bidding is CAD-produced backgrounds, photographically married to manually produced consultants' overlay drawings.

#### **CAD and reprographic use must be kept flexible**

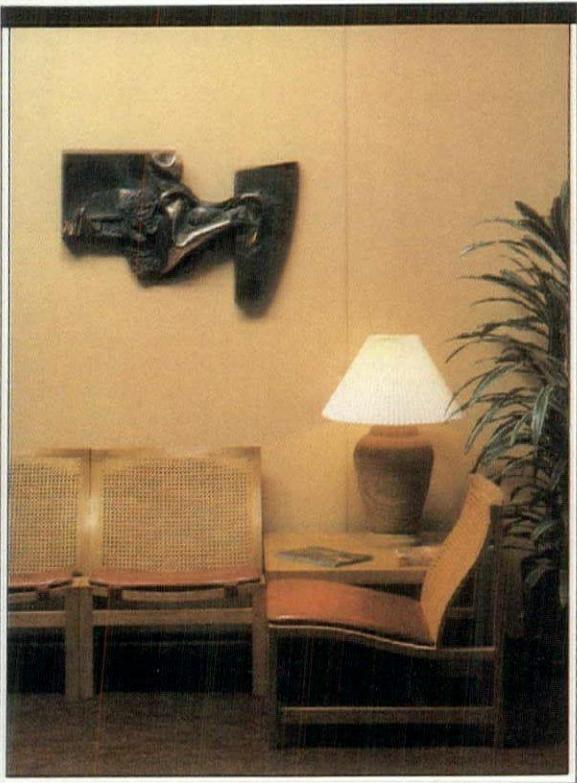
For practical purposes, SHCA has not put construction details on the system, because we feel that they can be handled more efficiently with cut-and-paste methods. This frees operators from inefficient workstation use.

One of the real benefits of integrating CAD and reprographics is that hand-drawn and computer-drawn work can be combined. This is most important to meet deadlines when there just are not enough workstations available or when the CAD system is down.

SHCA's latest enhancement of its system is the acquisition of an electronic plotter. With it, plots that used to take an hour to prepare can be completed in less than one minute.

In summary, SHCA made three critical decisions that significantly aided the firm in achieving early high productivity and that have permitted it to integrate its new system with conventional design and drafting procedures. Our experience suggests the following:

1. Develop the firm's pinbar overlay and reprographic skills in preparation for CAD.
2. Don't try to use CAD for everything. Many procedures can be accomplished using more time- and cost-effective methods.
3. Plan every job to incorporate the flexibility to best use both automated and manual tools and skills available.



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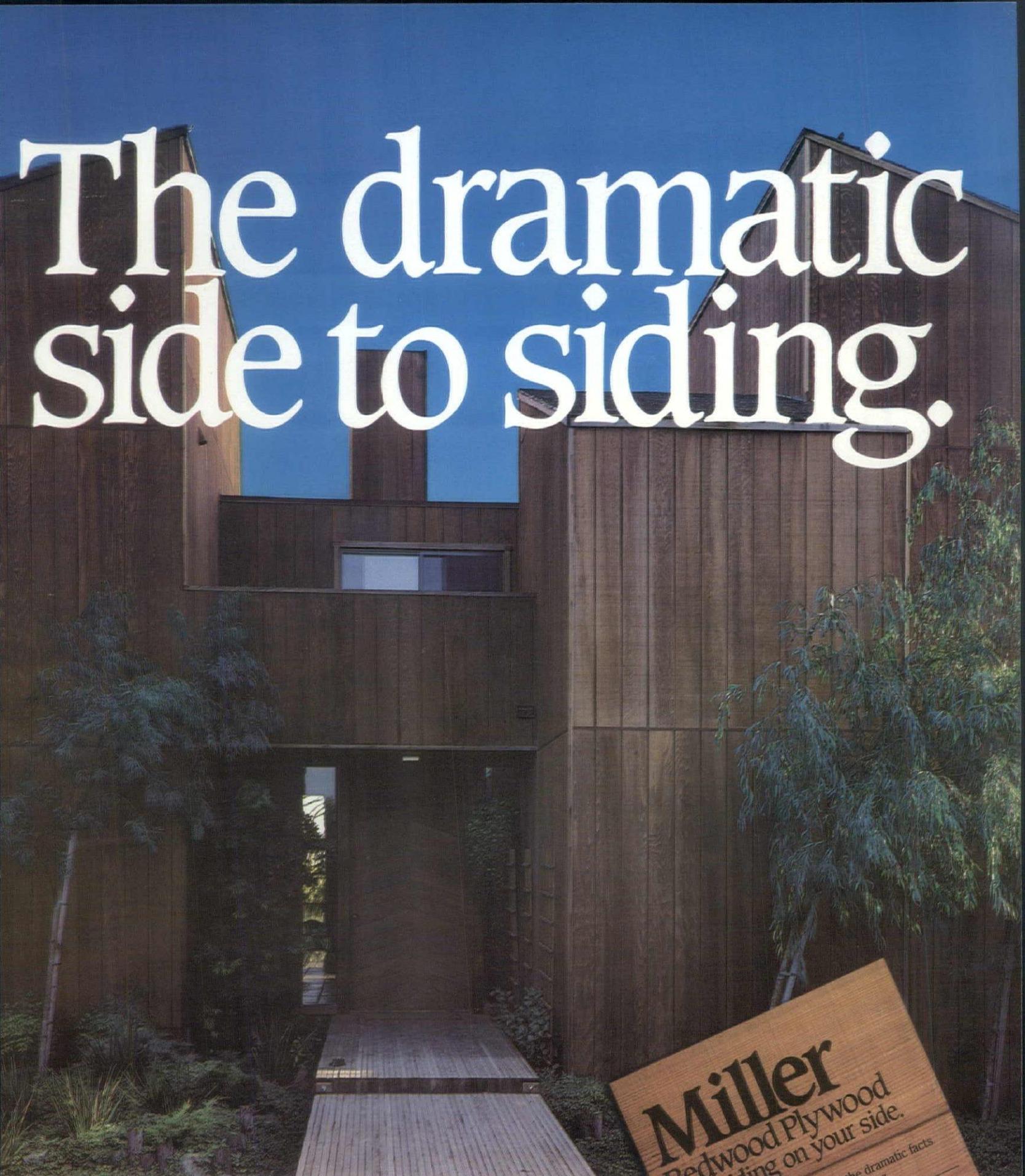
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edited by Charles K. Hoyt



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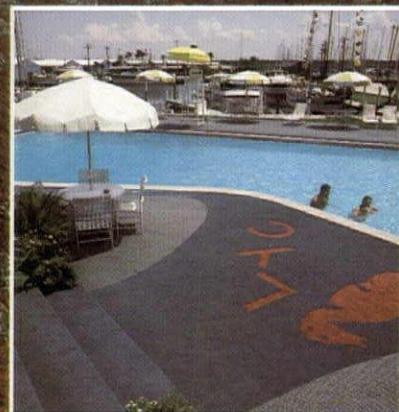
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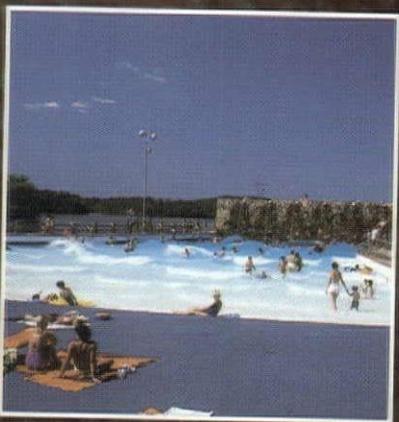
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ARCHITECTURAL RECORD

# Practice: So you want to do business in China? *One firm's experience shows you what to expect*

In the summer of 1982, Prentice & Chan, Ohlhausen began architectural design on a project for the Chinese government to be built in the capital at Beijing. The firm's design has now been approved, and partner Lo-Yi Chan looks back on the lessons he learned with staunch good humor.

## Are American architects ready for China?

"There are a lot more people than things in China," says Chan, "so things get the priority." According to Chan, that attitude carries over to professional services, as well as the way in which buildings get built: "Given the choice between, say, an extra air compressor or additional design services," he says, "the Chinese would choose the former. Also, there is no priority on construction technology when any number of laborers is available to do anything we can do with construction technology and machines." Another frustration for Americans: Most buildings are designed within a large civic bureaucracy in which the Chinese are careful to give no one a controlling hand.

Prentice & Chan, Ohlhausen's contract came as part of an agreement by the Rockefeller Foundation, the client, to fund part of the project, and might well have never materialized otherwise.

The project that Prentice & Chan, Ohlhausen was commissioned to design is a national seed bank or storage and research facility where different types of seeds can be kept free from mutation and disease for future use. Each new seed bank should represent an improvement over previous ones built because national seed banks are a relatively new building type. Prentice & Chan, Ohlhausen wanted to design the best one yet.

The architects researched seed-bank facilities around the world and also paid a visit to the one reputed to be the best to date, in Manila.

## The client may make unusual demands

In accepting the commission for the seed bank, the architects asked that such determinates as the source of utilities be established before they began work. Also important was the selection of a site. When Chan got the go-ahead that all the determinates had been made, he traveled to Beijing with associate Marjorie Hoog to produce the



Prentice & Chan, Ohlhausen's first design for a seed bank in Beijing included the facade shown above—red brick with a large gray-brick inset, the composition defined by stucco lintels and long horizontal band courses and a decorative terracotta stepped course with star insets. It also included columns at

schematics en charrette. The design was met with great applause by a board of those experts who would be using the facility.

It was only then that he was told that the site might be any one of three choices, including the original one, and that two other schemes would be required. Chan's first reaction was to say no, but in the end he relented and produced one design that could be adapted to any of the three sites by adjusting the elements. "It just didn't seem right to go all that way and fail," he says.

## The client isn't always who you think he is

When a final site was chosen—between the Beijing Opera and a steel research institute—the architects went to work in New York on the preliminary-design phase of the scheme that fit that site, and the final package was shipped off for approval. Back came the response from a completely different bureau: "Rejected. Submit six more designs."

Chan explains that the Chinese way of doing things is not to modify or improve an unsatisfactory start, but to start over completely. Hence the complete lack of any explanation for the rejection.

**Coping with client may be easier than it first seems**  
Chan replied to the directive for six more designs with an emphatic no. Instead, he looked at the esthetic aspects of the

the entrance that continued inside the building in alternating red, white and blue colors. Partner-in-charge Lo-Yi Chan describes the obvious symbolic elements as an attempt to indicate the nature of the cooperative technology and funding effort between China and the U.S. It was, however, these

symbolic elements that Chan astutely observed were the reason for the entire set of plans being rejected by the Beijing Municipal City Planning Bureau, for when he resubmitted the same plans minus the symbolic stars and colors, the entire scheme was approved.

## What is the optimum amount of services to provide?

As casual as the construction techniques may be, working drawings are so meticulous that "they show every reinforcing bar and virtually every nail," says Chan, "and—since you don't even know how they will really build the building—it is almost impossible to produce working drawings from which the workers can actually build."

Consequently, the architects insisted on a contract that called for only very advanced preliminaries, for an informal consultation on construction with joint responsibility with very competent Chinese architects and engineers, and for only direct construction-phase responsibility for those items that were directly furnished from the United States. Since the latter category included not only equipment but such unfamiliar items to the Chinese as prefabricated skylights, there will be some interesting experiences yet to come for the architects.

Charles Hoyt

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## Construction economy update: The outlook continues good, but there are a few more hurdles to overcome

The second quarter of 1983 marked the first anniversary of the construction industry's turnaround. After four consecutive quarters of improvement, the building business was in a curious state of contrast at mid-1983. The broad measures of the market's performance were very encouraging:

- The Dodge Index of total construction contract value (the market's leading indicator) hit 148 in May—a new high.
- The value of construction put in place (the measure of ongoing work) reached \$250 billion in the second quarter—another record.

If things are that good, why isn't everybody happier? As usual, there is another side to the statistics:

- Unemployment in the building trades, at 20 per cent in May, was still uncomfortably close to its 1982 high.
- Contractor failures continued to rise in the first half of 1983.
- Building materials shipments, at a rate of \$150 billion in the second quarter, were perking up. But profits of building products manufacturers weren't.

Clearly, the market is heading in the right direction. But recovery hasn't developed far enough to deliver tangible results in the places where they count most. At least not yet.

### So far this has been a housing recovery—and not much more

Experience shows, however, that wherever the construction industry is going, housing gets there first. So if the current rise in homebuilding can be sustained, nonresidential construction will eventually catch up, as it usually does.

Several conditions must be met, however, to nudge the year-old recovery into its second phase of expansion:

- Interest rates must decline further if the housing market is to top its present 1.6 million unit plateau.
- Public spending—both Federal and local—must be unlocked to reverse the declining trend of public works construction.
- The economy's recovery must accelerate to take up excess capacity and prepare the way for a turnaround of commercial and industrial building.

Chances are excellent that all of these conditions will be met during the next year or two.

### Mortgages and housing: There will be enough credit to go around

The reappointment of Paul

Volcker to head the Federal Reserve removed one element of uncertainty about monetary policy. Mr. Volcker may not be the building industry's first choice—or its second, either. But with the Fed committed to monetarism, a pragmatic monetarist like Volcker is to be preferred over a dogmatic one.

As long as economic recovery holds a higher priority than inflation in national policy—as it must for the balance of 1983 and through 1984—even a monetarist central banker will lean toward credit ease. This puts the focus of interest rates less on the supply of credit, and more on the demand for it.

It would be hard to make a case for "crowding out" during the next year and a half. Business demand for capital funds, according to current plans for investment in plant and equipment, will remain light for the time being. Federal government borrowing, which has dominated the money market recently, will continue to be huge, but not larger than it is now. As the economy continues to make its way through the early stages of recovery, a limited demand for funds, coupled with an adequate supply, means there will be ample credit to go around. This leaves room for a further modest decline of long-term rates. The housing outlook which follows is based on the assumption that mortgage rates (25-year conventional, 75 per cent loan) will continue to recede slowly from their recent level of 13½ per cent to a low of 12 ¼ per cent by mid-1984, and rise gently thereafter. This indicates potential for additional expansion of homebuilding over the next year or two. But it also means that the ceiling is not far beyond 1983's volume.

As mortgage rates drift slowly downward over the next several quarters, housing starts are expected to fluctuate in the range of 1.60 to 1.65 million during the second half of 1983, and then creep up to a rate of 1.75 million by the closing quarter of 1984. On a calendar year basis, this quarterly pattern would yield a full year total of 1,585,000 units in 1983 and 1,685,000 in 1984. In both years, the gains in one-family homes will exceed those of multifamily units.

### Public works construction: Two new programs make the outlook bright

Like monetary policy, public spending—at least for public works construction—has changed course abruptly, from restraint

to stimulus. And like lower interest rates, the loosening of the Federal purse strings adds another dimension to the construction outlook that has been missing for several years.

The steady decline of public works construction since 1979 is being reversed, if only temporarily, by a pair of very recent legislative acts. They are reviving the tradition of using public works spending as a stimulus to the economy in times of high unemployment. The Surface Transportation Assistance Act (with its 5-cent fuel tax) and the Emergency Supplemental Appropriations Act (better known as the Public Works Jobs Bill) are just now beginning to make their influence felt on contracting for new construction.

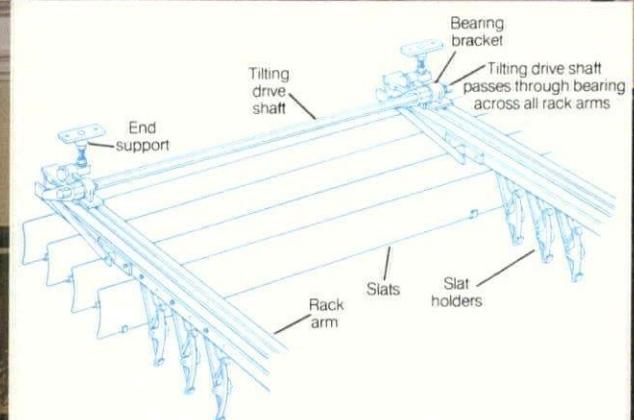
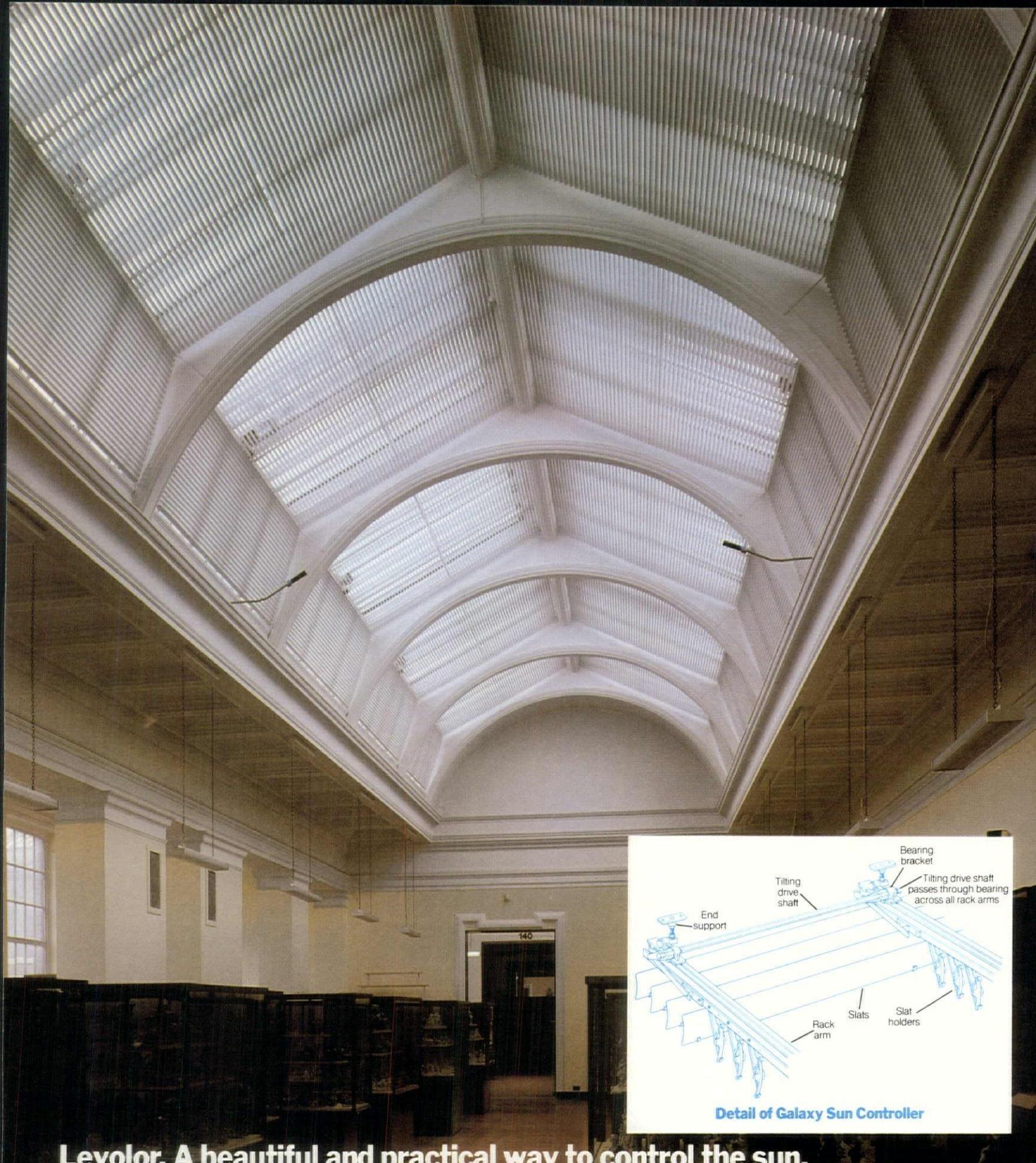
The Surface Transportation Assistance Act is by far the more consequential of the two new programs, both in its duration and the dollars it will generate. The Public Works Jobs Bill will merely shift a few billion dollars of future appropriations for already existing programs into the current fiscal year, leaving a comparable gap in fiscal year 1984 (or 1985). The fuel tax, on the other hand, will divert as much as \$5.5 billion annually from the private sector to public works construction through the end of fiscal year 1986—a potential windfall of \$20 billion or more.

In 1983, contracting for public works construction is now estimated at \$28.7 billion, up 11 per cent from last year's total. Highway and bridge construction, at an estimated \$15.1 billion, will be 23 per cent higher in 1983.

Utility construction cancellations have been outnumbering new plans. With six projects started in 1983's first half, and only another four or five scheduled to start before year-end, the 1983 forecast of utility construction contract value has shrunk to \$9.5 billion, a 17 per cent decline from 1982.

### Capital spending: Don't look for expansion until next year

The economy's turnaround in the opening quarter of 1983 was the first link in a chain of events leading to the recovery of commercial and industrial building. The quickening pace of business activity in the second quarter brought added support, but the expansion process has a long way to go before enough slack has been taken up to justify making net additions to the



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	Hospital & Health	70	73	+ 4
	Other Nonresidential Buildings	112	125	+12
	<b>Total Institutional &amp; Other</b>	<b>256</b>	<b>268</b>	<b>+ 5</b>
	<b>Total Nonresidential Buildings</b>	<b>937</b>	<b>939</b>	<b>-</b>
Contract Value (millions of dollars)	Office Buildings	\$ 17,333	\$ 16,875	- 3
	Stores & Other Commercial	10,794	13,225	+23
	Manufacturing Buildings	9,361	5,175	-45
	<b>Total Commercial &amp; Manufacturing</b>	<b>\$ 37,488</b>	<b>\$ 35,275</b>	<b>- 6</b>
	Educational	\$ 6,142	\$ 5,875	- 4
	Hospital & Health	7,833	8,350	+ 7
	Other Nonresidential Buildings	7,914	9,075	+15
	<b>Total Institutional &amp; Other</b>	<b>\$ 21,889</b>	<b>\$ 23,300</b>	<b>+ 6</b>
	<b>Total Nonresidential Buildings</b>	<b>\$ 59,377</b>	<b>\$ 58,575</b>	<b>- 1</b>
<b>Residential Buildings</b>				
Dwelling Units** (thousands of units)	One-Family Houses	636	1,000	+57
	Multifamily Housing	434	585	+35
	<b>Total Housekeeping Residential</b>	<b>1,070</b>	<b>1,585</b>	<b>+48</b>
Floor Area (millions of square feet)	One-Family Houses	994	1,555	+56
	Multifamily Housing	426	575	+35
	Nonhousekeeping Residential	59	67	+14
	<b>Total Residential Buildings</b>	<b>1,479</b>	<b>2,197</b>	<b>+49</b>
Contract Value (millions of dollars)	One-Family Houses	\$ 37,603	\$ 61,975	+65
	Multifamily Housing	16,748	22,050	+32
	Nonhousekeeping Residential	4,243	4,800	+13
	<b>Total Residential Buildings</b>	<b>\$ 58,594</b>	<b>\$ 88,825</b>	<b>+52</b>
<b>Nonbuilding Construction</b>				
Contract Value (millions of dollars)	Highways & Bridges	\$ 12,259	\$ 15,100	+23
	Sewer & Water	7,347	7,175	- 2
	Other Public Works	6,260	6,400	+ 2
	<b>Total Public Works</b>	<b>\$ 25,866</b>	<b>\$ 28,675</b>	<b>+11</b>
	Utilities	\$ 11,488	\$ 9,500	-17
	<b>Total Nonbuilding Construction</b>	<b>\$ 37,354</b>	<b>\$ 38,175</b>	<b>+ 2</b>
<b>All Construction</b>				
Contract Value (millions of dollars)	Total Construction	\$ 155,325	\$ 185,575	+19
	Dodge Index (1977 = 100)	111	133	

\*\*FW Dodge basis.

Prepared July 1983 by the  
Economics Department,  
McGraw-Hill Information  
Systems Company, George A.  
Christie, vice president and chief  
economist.

capital stock. For another couple of quarters, contracting for commercial and industrial building will remain at its cyclical low point (650 million square feet), motivated only by relocation, replacement, and upgrading—but not expansion.

Experience of the 1975 recession/recovery period shows what to expect next. Once recovery from the mid-1970's recession began, it took another four quarters before the first stirrings of contracting for commercial and industrial building appeared. Even then, recovery was hesitant at first. Considering the greater severity of the early 1980s recession, it would be reasonable to look for the next expansion of commercial and industrial building to begin around the middle of 1984.

Three key categories of nonresidential building—stores, offices, and factories—are responsible for most of its volatility, and deserve special attention. These three sensitive building types are now heading in three different directions, a condition that is typical of a general nonresidential building turning point. Contracting for offices declined during 1983's first half and still has a long way to go before reaching the bottom of its cycle. Industrial building appears to have hit bottom, but is showing little inclination to recover. Retail building not only has bottomed out, but already has three quarters of recovery behind it.

Taken together, these offsetting cyclical movements within the nonresidential building market preclude any net improvement in total square footage of nonresidential building contracting in 1983. The stage is set, however, for a sustained recovery beginning in 1984.

Contracting for retail building is already leading the nonresidential sector out of its deep recession. The demand for stores and warehouses, which is motivated by consumer relocation, is derived from homebuilding. The year-old housing recovery began to stimulate retail building late in 1982. In 1983, the greatly improved housing market is bringing forth a modest but important 15 per cent gain in contracting for stores and warehouses that will develop into a much stronger expansion in 1984, as retailers strive to catch up with the current year's wave of homebuilding.

Industrial construction will be the next key nonresidential

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### 1983 Regional Estimates

#### Dodge Construction Potentials

##### North-east

Contract Value (millions of dollars)				Percent Change 83/82
	1982 Actual	1983 Forecast		
<b>Nonresidential Buildings</b>				
Commercial and Manufacturing	\$ 6,520	\$ 7,325	+12	
Institutional and Other	4,433	5,000	+13	
<b>Total</b>	<b>\$10,953</b>	<b>\$12,325</b>	<b>+13</b>	
<b>Residential Buildings</b>				
One-Family Houses	\$ 5,717	\$ 9,800	+71	
Multifamily Housing	3,060	4,300	+41	
Nonhousekeeping Residential	1,016	1,175	+16	
<b>Total</b>	<b>\$ 9,793</b>	<b>\$15,275</b>	<b>+56</b>	
<b>Nonbuilding Construction</b>				
Highways and Bridges	\$ 2,463	\$ 3,075	+25	
Other Public Works	2,901	2,925	+1	
Utilities	1,198	600	-50	
<b>Total</b>	<b>\$ 6,562</b>	<b>\$ 6,600</b>	<b>+1</b>	
<b>Total Construction</b>	<b>\$27,308</b>	<b>\$34,200</b>	<b>+25</b>	

##### Mid-west

Contract Value (millions of dollars)				Percent Change 83/82
	1982 Actual	1983 Forecast		
<b>Nonresidential Buildings</b>				
Commercial and Manufacturing	\$ 7,371	\$ 5,550	-25	
Institutional & Other	4,827	4,500	-7	
<b>Total</b>	<b>\$12,198</b>	<b>\$10,050</b>	<b>-18</b>	
<b>Residential Buildings</b>				
One-Family Houses	\$ 5,374	\$ 9,125	+70	
Multifamily Housing	2,521	3,050	+21	
Nonhousekeeping Residential	403	550	+36	
<b>Total</b>	<b>\$ 8,298</b>	<b>\$12,725</b>	<b>+53</b>	
<b>Nonbuilding Construction</b>				
Highways and Bridges	\$ 3,021	\$ 3,675	+22	
Other Public Works	2,670	2,725	+2	
Utilities	2,721	1,300	-52	
<b>Total</b>	<b>\$ 8,412</b>	<b>\$ 7,700</b>	<b>-8</b>	
<b>Total Construction</b>	<b>\$28,908</b>	<b>\$30,475</b>	<b>+5</b>	

Second Update  
July 1983

##### South

Contract Value (millions of dollars)				Percent Change 83/82
	1982 Actual	1983 Forecast		
<b>Nonresidential Buildings</b>				
Commercial and Manufacturing	\$14,327	\$13,200	-8	
Institutional and Other	7,625	8,700	+14	
<b>Total</b>	<b>\$21,952</b>	<b>\$21,900</b>	<b>-</b>	
<b>Residential Buildings</b>				
One-Family Houses	\$17,788	\$27,550	+55	
Multifamily Housing	7,257	9,675	+33	
Nonhousekeeping Residential	1,656	1,725	+4	
<b>Total</b>	<b>\$26,701</b>	<b>\$38,950</b>	<b>+46</b>	
<b>Nonbuilding Construction</b>				
Highways and Bridges	\$ 4,244	\$ 5,125	+21	
Other Public Works	4,630	4,725	+2	
Utilities	3,207	3,500	+9	
<b>Total</b>	<b>\$12,081</b>	<b>\$13,350</b>	<b>+11</b>	
<b>Total Construction</b>	<b>\$60,734</b>	<b>\$74,200</b>	<b>+22</b>	

##### West

Contract Value (millions of dollars)				Percent Change 83/82
	1982 Actual	1983 Forecast		
<b>Nonresidential Buildings</b>				
Commercial and Manufacturing	\$ 9,270	\$ 9,200	-1	
Institutional & Other	5,004	5,100	+2	
<b>Total</b>	<b>\$14,274</b>	<b>\$14,300</b>	<b>-</b>	
<b>Residential Buildings</b>				
One-Family Houses	\$ 8,724	\$15,500	+78	
Multifamily Housing	3,910	5,025	+29	
Nonhousekeeping Residential	1,168	1,350	+16	
<b>Total</b>	<b>\$13,802</b>	<b>\$21,875</b>	<b>+58</b>	
<b>Nonbuilding Construction</b>				
Highways and Bridges	\$ 2,531	\$ 3,225	+27	
Other Public Works	3,406	3,200	-6	
Utilities	4,362	4,100	-6	
<b>Total</b>	<b>\$10,299</b>	<b>\$10,525</b>	<b>+2</b>	
<b>Total Construction</b>	<b>\$38,375</b>	<b>\$46,700</b>	<b>+22</b>	

building market to respond. However, excess capacity left over from the recession will be inhibiting new construction until mid-1984. Meanwhile, contracting is holding steady at 95 to 100 million square feet while rising industrial production gradually absorbs the surplus.

The office building market, which is coming off a boom of unpreceded proportions, is now glutted with space. To restore a workable balance between supply and demand will require several years of below-normal office building. (Normal is approximately 200 million square feet per year; current contracting is still up around 250 million, on the way down from 325.) It's unlikely that balance will be achieved before 1986. Until then, offices will be a drag on the nonresidential building recovery.

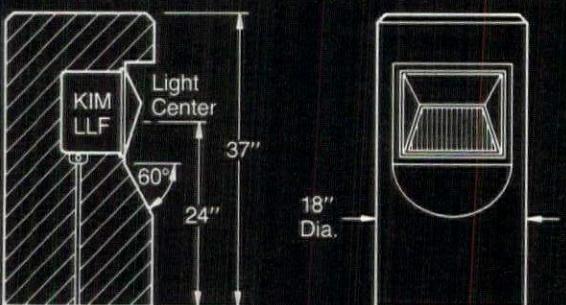
The sequence of the nonresidential building recovery is sending out two conflicting signals. One is that expansion has already taken hold in the retail building sector. The other is that a few nonresidential building types, offices in particular, will be slow to link up. This delay means that the recovery of the nonresidential building market won't hit full stride until well into 1985.

#### Outlook for 1983's second half: Plateau, then go

For the next couple of quarters, contracting for total new construction will stabilize, due to some temporary trade-offs:

- *Housing* will continue to advance, but not very much. Further expansion by an additional 50,000 units (annual rate) will boost contract value 5 per cent higher during the second half. Against this...
- *Nonresidential building* will be about 7 per cent lower in the second half. A lot of the weakness will be concentrated in office building. In addition...
- *Nonbuilding construction* will be off its first half pace by roughly 4 per cent despite a higher level of public works construction. The reason: a reduced amount of utility contracting.

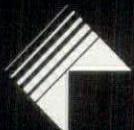
Expansion will resume during 1984, as the nonresidential building cycle reverses direction. Meanwhile, for 1983, partial recovery of construction markets to \$185.6 billion of contract value means a solid gain of 19 per cent, with the promise of more on its way.



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## On the waterfront...



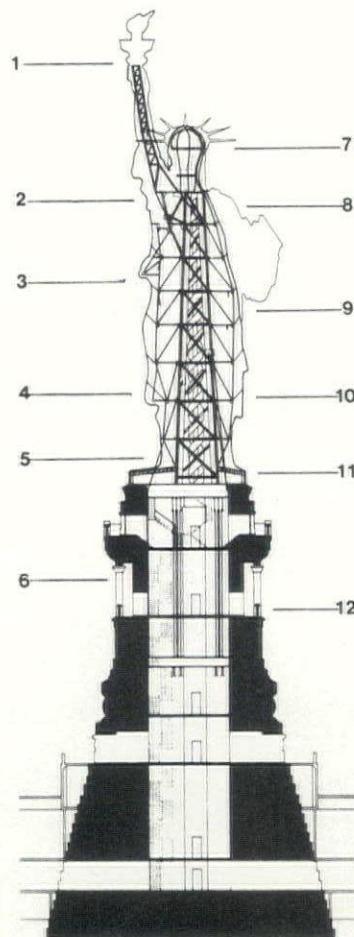
Despite its spectacular natural harbor and 578 miles of shoreline property, New York has never really been in the vanguard among cities developing waterfront areas for recreational use. Public demand, however, is beginning to change the shortsighted policies of the past, as the recent opening of the Battery Park City Esplanade handsomely illustrates. The

quarter-mile esplanade is part of a man-made landfill comprising 92 acres along the Hudson River. Planned ultimately to run the entire one and one-quarter mile length of the site, the tree-shaded walkway exhibits the design elements and materials—hexagonal asphalt pavers, granite curbs, cobblestone borders, and curved iron railings—that one associates

with a classic city park. Furnishings, too, evoke strong memories of traditional New York recreational areas: lightposts atop the granite seawall resemble those found in Central Park, while benches facing the river and New Jersey are replicas of seating units created for the 1939 World's Fair. Architects for the park are Cooper, Eckstut Associates.

## ...and in the harbor

While officials at Battery Park City were working on their esplanade, a joint team of French and American architects and engineers was taking steps to ensure that the focal point of the view from the park would be around for all to enjoy well into the 21st century. Underwritten by the French-American Committee for the Restoration of the Statue of Liberty in anticipation of the landmark's centennial celebration in 1986, the study pinpoints 13 trouble spots where the statue requires major preservation and rehabilitation. The passage of time and the ravages of the harbor's breezy environment have led to severe deterioration of the system of attachments that hold the statue's copper skin in place and allow the exterior to expand with heat or move with



the wind. The skeleton itself, moreover, has been weakened at the statue's upper extremities, and the consultants' report indicates that the famous torch may have to be removed and rebuilt. Restoration work, projected to cost \$20 million, is scheduled to begin this fall with completion set for July 1986. Participants in the study included French architect Philippe Grandjean; engineers Jean Levron, Jacques Moutard, and Pierre Tissier; and the American firm of Swanke Hayden Connell Architects.

*Areas pinpointed for repair include (1) torch, (2) shoulder, (3) helical stair, (4) secondary frame, (5) guy rods, (6) tie rods, (7) crown platform, (8) head arches, (9) skin support system, (10) copper envelope, (11) lattice girders, (12) interior environment and envelope.*

# Computers cut costs in Los Angeles building. ELEVATORS BY DOVER

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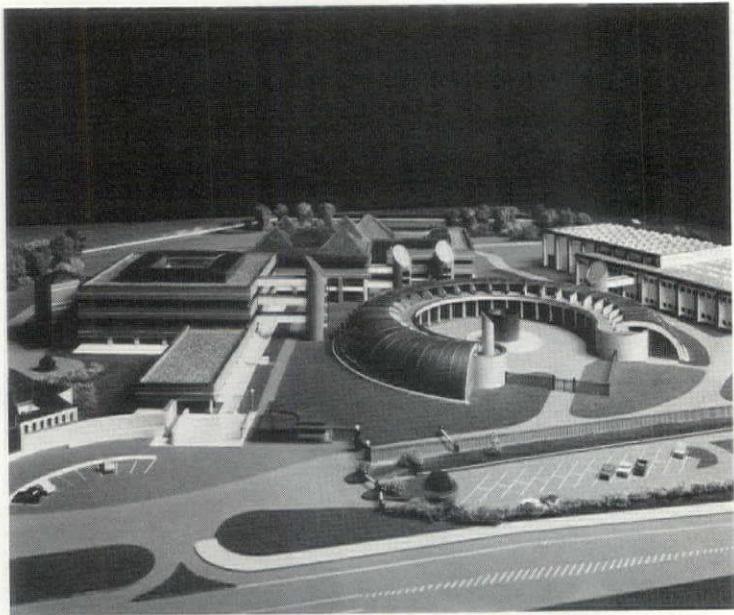
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*Architect:* Albert C. Martin & Associates  
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## Emilian update



Known to most Americans for its Romanesque architecture, Renaissance painting, and bountiful North Italian cuisine, the city of Parma will soon boast an innovative electronic data processing center for Cassa di Risparmio di Parma, one of Italy's largest savings banks. The centerpiece of the ten-building, 300,000-square-foot complex is a C-shaped copper-clad structure

that houses all mechanical equipment and is linked to satellite facilities by means of striking circular stair towers. The center, with its flat, campus-like setting interlaced by pedestrian walkways, is meant to evoke the contemplative ambience of ancient abbeys nearby. Architects for the project are the Austin Company and Vico Magistretti in joint venture.

## Blowin' in the wind

Designed by Japanese artist Susumu Shingu in collaboration with Cambridge Seven Associates, a 45-foot tall wind sculpture entitled "Echo of the Waves" was recently dedicated on the plaza of the New England Aquarium in Boston. The red-painted skeletal steel piece is crowned by fiber-reinforced plastic wings that "swing and sway to their own rhythms to make visible the essence of the wind." Capable of rising to a height of 65 feet as the wings rotate to their fullest extension, the sculpture was conceived as an animated vertical counterpoint to the horizontal cascades of an existing fountain that Cambridge Seven designed for the plaza site in 1979.



## Competition calendar

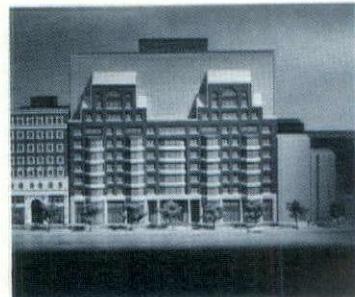
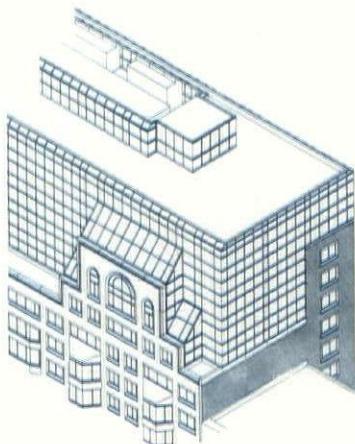
## Looking forward in Back Bay

- The Building Stone Institute has announced its eighth annual Tucker Architectural Award Program for designs that incorporate the use of natural stone. Open to all architects, designers, and contractors, the program will consider entries in the project categories of residential structures, nonresidential structures, landscape site development, and restoration/alteration. The deadline for submission is November 1. For further information contact the Tucker Awards, Building Stone Institute, 420 Lexington Avenue, New York, N.Y. 10170.

- A call has been issued for entries to the first annual design competition sponsored by the Columbus Coated Fabrics division of Borden, Inc. Open to full-time students at accredited schools of architecture and to practicing architects under age 35, the competition seeks interior design solutions that emphasize the role of the wall and the use of color. Two first prizes of \$1,000 each will be awarded in student and professional categories. The deadline for submission is January 14, 1984. For details contact Competition Manager, Columbus Coated Fabrics, 1280 North Grant Avenue, Columbus, Ohio 43216.

- A joint competition focusing on the design of three commercial blocks in the predominantly Haitian section of northeast Miami has been announced by the City of Miami Economic Development Department, the Florida South Chapter/AIA, and the Haitian Task Force. The winning entry will set the standard for the redevelopment of a larger, 20-block commercial core. For information and guidelines contact the FSC/AIA, 1150 SW 22nd Street, Miami, Fla. 33129 (305/854-4790).

- The National Institute for Architectural Education has announced its annual traveling fellowship program for 1984. Open to current students and recent graduates of schools of architecture, the program consists of the William Van Alen Memorial Fellowships (\$25,100 in prizes); the Lloyd Warren Fellowship/71st Paris Prize (\$25,100 in prizes); the John Dinkloo Traveling Fellowship in Architectural Technology (\$10,000); and the American Academy in Rome Traveling Fellowship in Architecture (\$5,000). For application forms and deadline information contact NIAE, 30 West 22nd Street, New York, NY 10010.



Steve Rosenthal

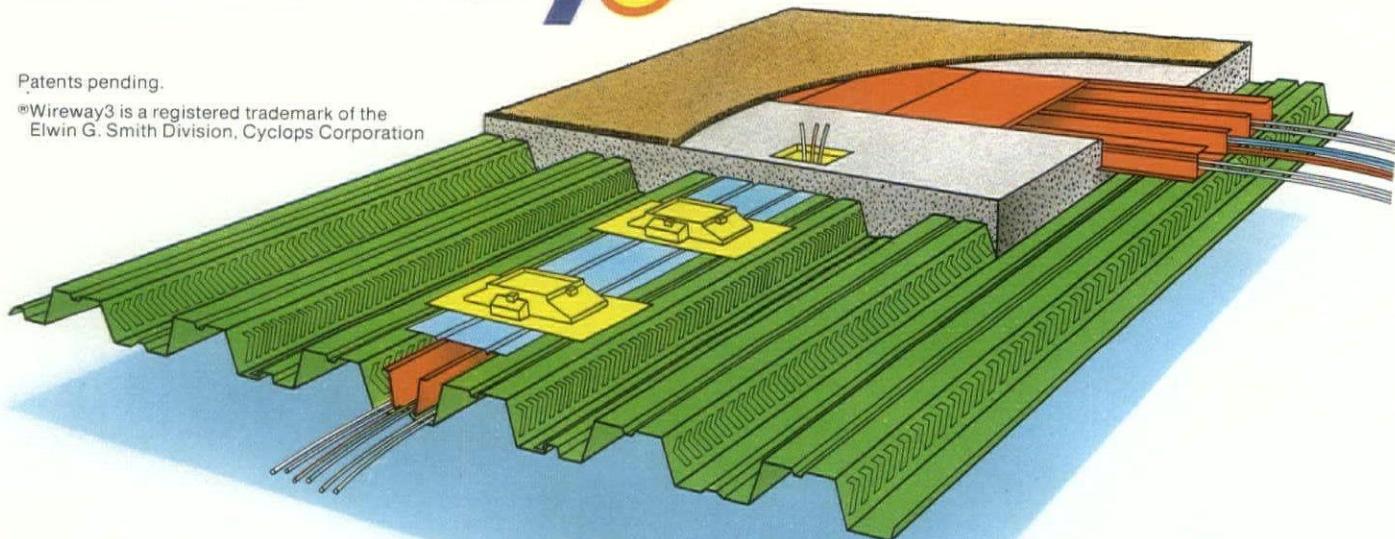
Offering a developer sound investment potential in a building that is sympathetic to the architecture of an historic district is never an easy task, but perhaps nowhere has the marriage of past esthetics and current economic realities been more successfully handled than in Boston. And no neighborhood is more deserving of sensitive infill construction than Back Bay, the smart, architecturally distinguished enclave that is a veritable textbook of 19th- and early 20th-century American design modes. Consistent with the city's tradition of blending the old and new, the design of 399 Boylston Street provides 210,000 square feet of office and retail space in a 13-story building that is a model of Bostonian decorum. Although the project required the demolition of four deteriorating structures that were judged economically unfeasible to preserve, the scheme by Childs Bertman Tseckares & Casendino Architects does incorporate the handsome Renaissance Revival Warren Chambers Building into the office complex. The first eight stories of the new building are clad in brick with limestone trim that echoes the materials of its older neighbor, while seven-story, three-sided bays and crowning round-arched windows repeat architectural forms that articulate many of the area's old rowhouses. The upper five stories of the structure are sheathed in reflective glass and although they rise above the surrounding buildings, a deep setback limits the pedestrian's perception of over-all height.

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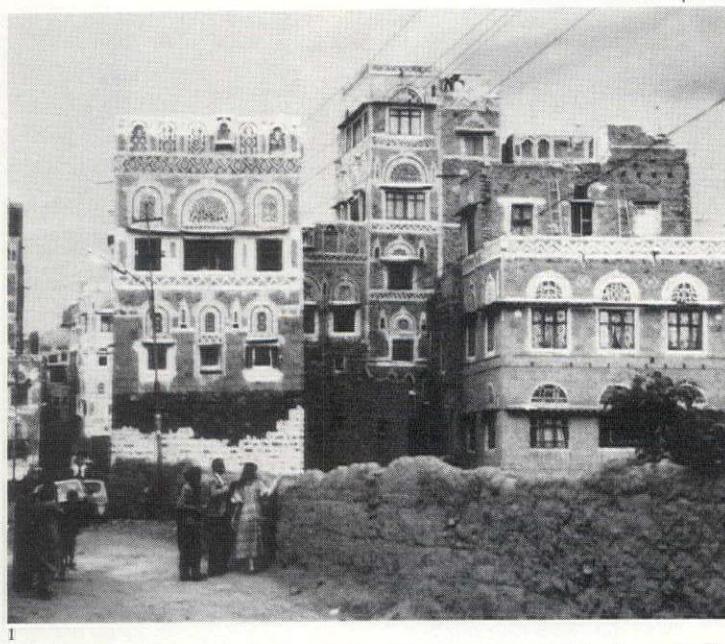
## Conserving the traditional architectural culture of Yemen

An international seminar consisting of more than 56 specialists recently convened in North Yemen to study what remains of its magnificent architectural heritage and to propose ways to save it

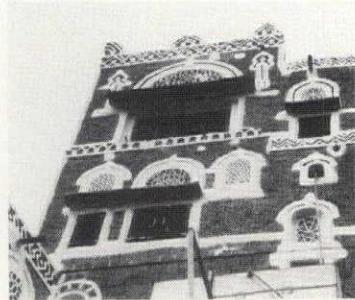
The Aga Khan Award for Architecture held its Eighth International Seminar in May of this year in Sana'a, the capital of the Yemen Arab Republic, on the theme "Modernity and Tradition: The Impact of Development on Architecture and Urbanism." The first held in both Arabic and English, it follows a series of seven, sponsored by the Award, over the last five years. It was also the first to focus on a single Muslim country, but the participants were encouraged to draw parallels from their experience and knowledge of other countries and to relate this learning to the Muslim world as a whole. Furthermore, notwithstanding its Muslim focus, the questions probed by the seminar, and the conclusions and recommendations it reached, are broadly applicable to the entire Third World.

In addition to the Aga Khan; His Excellency the Prime Minister of the Yemen Arab Republic, Dr. Abdul-Karim Al-Iryani; His Excellency Qadi Ismail El-Akwá, Yemen's Director of the Organization of Antiquities and Libraries; and Dr. Said Muhammad Al-Attar, Yemeni socio-economist and Executive Secretary of the United Nations Economic Commission for Western Asia (ECWA), there were 38 other principal conferees. Among them were 25 architect/planners, several engineers and various social scientists and historians, including one participant each from Algeria, Australia, Kuwait, Malaysia, Portugal, Sweden, Switzerland, Sudan and the Yemen Arab Republic's southeastern neighbor, the People's Democratic Republic of Yemen; two each from India, Iraq and Turkey; three from Great Britain; four each from Pakistan and the United States and six each from Egypt and France.

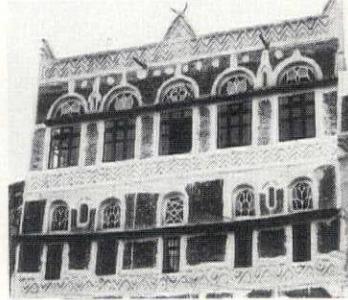
Largely in the role of observers were 39 citizens of Yemen, many of whom are on the faculty of the University of Sana'a or hold posts in the various Yemeni ministries. Additionally, there were 18 specialists from abroad residing in Yemen: architects, anthropologists, archaeologists and a geotechnician/hydrological engineer. The latter group, mostly in their early thirties and employed by international agencies, served as highly knowledgeable guides to the remarkable old towns of Yemen visited by the participants, the more remote of which are in advanced stages of decay as their populations move to the cities.



1



2



3

1,2: Houses in Old Sana'a. 3: House in Wadi Dahr

### Site visits included a trip in eleven Land Rovers to a triad of mountain towns

Kawkaban, Shibam and Thula, to the north of Sana'a, were chosen for study because of the beauty of their stonework and the drama of their settings. On another day, four buses took the participants to Amran, Kohlan and Hajja. Amran resembles many other Yemeni towns—comprising an ancient settlement surrounded by contemporary sprawl. Fortunately, the traditional wall-surrounded core of the town is one of the best preserved in Yemen. Despite its growing garbage problem, the structure and organization of the old town gives the visitor a sense of its almost vanished agricultural and tribal life. Kohlan, spectacularly perched on a mountain top, has become an attraction for the gradually developing Yemeni tourist industry. Hajja, only 150 years old, is by Yemeni standards a very recently developed urban settlement.

In both the mountain towns and in the major cities the houses are high and narrow, shelter several families and frequently have shops on the

ground floor. Regardless of the size of the settlements, the urban patterns follow the typical medieval Islamic town configuration: a tightly knit labyrinth of markets, caravanserais, mosques, shops, warehouses and residential quarters. Almost all larger towns and cities in Yemen are fortified.

In Sana'a, houses from five to nine stories high line streets just wide enough for pedestrians and mule-drawn carts. The first two or three stories are usually of stone with few openings, while the upper portions are often of baked brick. The higher the floor, the more windows, often handsome ornamental works—delicate plaster tracery filled with stained glass and alabaster, the heads, jambs and sills strengthened by coats of plaster applied exuberantly in sweeping curvilinear strokes. The roofs are flat and used for growing plants and herbs. Many houses overlook communal gardens and orchards now neglected or abandoned.

The urban Yemeni have begun to abandon their houses as well because they cannot afford to maintain them, and prefer new villas out of town. Poorer people move in and the upkeep worsens.

Mildred F. Schmertz photos

### Development versus conservation

The last twenty years of economic development has made the introduction of modern construction technology unavoidable. New reinforced-concrete-framed structures have become eyesores among the traditional buildings, even though their cladding, ornament and window treatment may have a superficial resemblance to vernacular, hand-crafted forms. Yemeni officialdom, however, is proud of this neo-traditional style, which is used most often to reflect social status and wealth. Some seminar participants interpreted this inept use of tradition positively, seeing it as a sign of the deep-rooted attachment of the Yemenis to their cultural heritage.

Against the force of development, however, conservation of the genuine Yemeni architectural culture has a hard job validating its claims. British architect and planner Michael Welbank, who completed a UNESCO conservation study for Sana'a in 1978, reminded the seminar participants that the tremendous power and thrust of the development process is irresistible in its concern for the advancement of the living standards of its people. Added Welbank: "I admit to an immense dissatisfaction with progress in the urban conservation field.... Have I the right to voice this dissatisfaction about conservation in societies other than my own? Does it matter? I think it does matter, for a number of reasons. First, many of the elements worthy of conservation and currently under threat are part of the world's cultural heritage; therefore the world has a right to make its views heard. The world ought to do more to help, but we can come to that later. Secondly, I think that any society would be the richer for conserving its cultural heritage. Lastly, and particularly in the Muslim world, the deterioration is so fast that if conservation is not effected quickly, everything of Islamic value and beauty will soon disappear from the face of the world. This gives the question of conservation in urban areas a tremendous sense of urgency.... In an urban quarter there is very little realization by the people who live there of why the physical fabric of such an area is held in such high regard by others. It is not always an area that they venerate and would wish to see conserved. Secondly, conservation requires a strong



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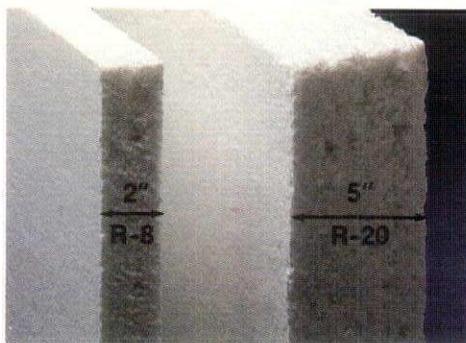
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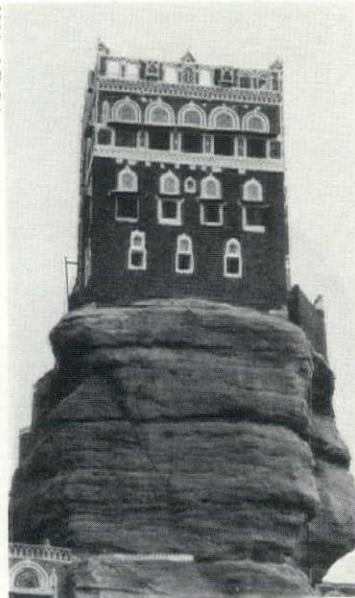
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Mildred F. Schmetz



and clear locus or base in which to coordinate all the activities that relate to it. Whereas we can find acceptance of the idea of conservation at the national levels, it is difficult to get that message and the means of carrying it out to the local governments. Further, the matter of conservation is often raised initially by those who do not live in the quarter itself—often in some countries by people who don't live in the country at all. This creates problems in getting local acceptance."

#### **Conservation never comes first**

Welbank went on to point out that few underdeveloped countries can afford any adequate allocation of funds for conservation, seldom among the top priorities of nations that are struggling to feed, educate, provide health care and create jobs for their populations. And sadly, many such countries are in the cradles of civilization. Unfortunately, Welbank noted, the people living in some of these countries perceive conservation as "often a sort of rarified nonsense, produced by an educated elite, aided and abetted by foreigners. We must find a middle course where the interests of conservation and development can be combined. There will need to be restrictions on development while at the same time conservation has got to adopt a very flexible attitude in order that it does not hinder intolerably the provision of facilities to the populations of those areas."

Welbank argued that it was essential that urban conserved areas continue to be peopled and therefore expectations in terms of services, convenience and comforts must be met. If such areas are allowed to become depopulated, as so often happens, they will become repopulated by a new grade of immigrants caring even less about the physical urban fabric around them. Said Welbank: "When the irresistible force for the economic and social development of these areas comes up against conservation, it is my experience that the force for development usually wins. Conservation has to arm itself with more power, more examples of how things can be done and above all, more funds. I suggest that there should be some investment bank to provide funds for conservation tasks. Such a bank could become part of a co-financing system where an institution like the World Bank is financing development. The specific and extra tasks that

conservation requires could be financed from this separate bank. There is no shortage of money in the world for investment. Conservation needs the authority that comes from having funds. But please don't think that UNESCO international campaigns will produce funds. Their money-raising efforts have so far been disastrous."

In urging that conservation, supported by adequate funds, come to terms with development, Welbank took an example from Sana'a. There the water-supply program is running ahead of the drainage projects. "It is a classic problem for conservation. The development pressures to produce potable water in a convenient way are there and the piped water is going in. But somehow or other, the drainage is lagging behind. We need only a few years of this situation before the deterioration of the fabric of Old Sana'a will be quite serious. At this level, conservation forces, if they had the funds of authority, could have insisted that water and drains go together. In fact one could make a good case that the drainage should go in before the water supply."

#### **Five recommendations and a proposal**

William Porter, co-director of the Aga Khan Program for Islamic Architecture at Harvard University and MIT and member of the Aga Khan Award for Architecture steering committee, asked to summarize the content of the seminar, went beyond this task to make a number of recommendations and one specific proposal. The recommendations were put forth with Yemen as a focus but are applicable to most countries in the developing world with especially valuable architectural heritages. They do not represent a consensus of the seminar.

He recommended first that the values of society that impinge on the physical environment be articulated. This entails formulating a conception of development that incorporates cultural as well as social and economic ideas, that incorporates both existing environments and plans for new environments, and that incorporates ideas of both tradition and modernity. Further, acknowledgement should be made of the extraordinary and extraordinarily individualistic character of the existing architecture, of the widely distributed pattern of settlement

and the need to reinforce it, and of the many sources of initiative in the society and the need to sustain them. To this end, Porter called for a framework of concepts and values that links architecture, settlement patterns and societal initiatives for the purposes of future development.

Porter's second recommendation is to place high national priority on upgrading and maintaining the existing environment within the context of values and information established under the first recommendation. This would entail: early identification of crisis and potential crisis situations and the initiation of actions to remedy quickly at least a few; the mobilization of financial support and creation of permanent mechanisms to sustain that support for upgrading and maintenance; the aggregation of appropriate materials; the formation of active clients for both upgrading and maintenance from within the existing communities; and the establishment of technical assistance programs to aid in devising appropriate solutions and help ensure the ongoing administration of environmental maintenance.

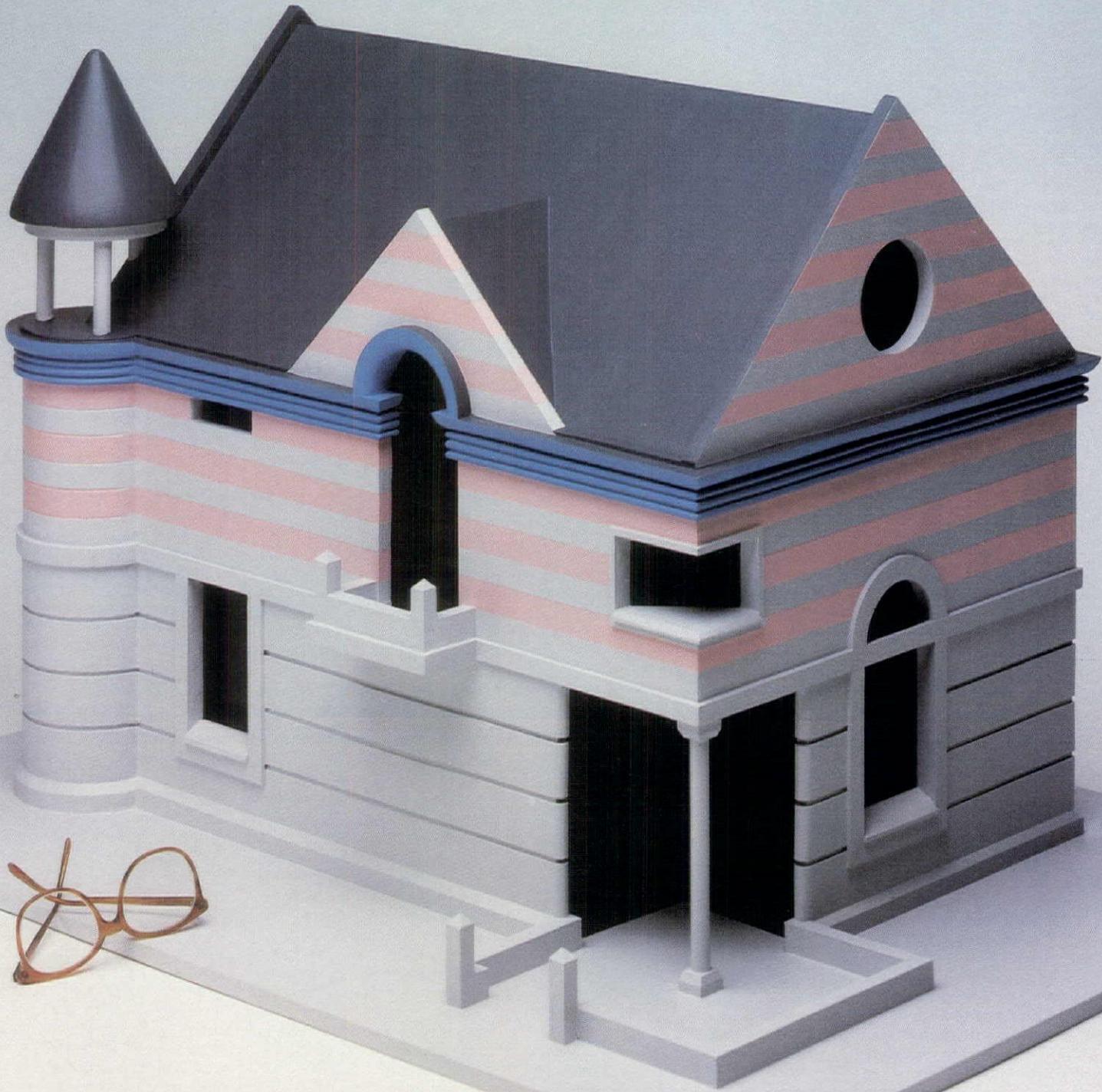
Porter's third recommendation is that *new* urban and rural extensions or infill achieve a continuity in cultural values and building traditions. This would require that the scale, location, timing and character of projects be in keeping with the size and scale of community groupings within the society and with the society's own capacity to build. This might imply smaller and slower projects than currently planned, with control of development and the administrative mechanisms, wherever possible, in the hands of communities and other groups directly affected. Ways would need to be found to avoid mere mimicry of past forms, and early initiatives made to bring certain projects into this new frame of reference.

Porter's fourth recommendation is to mobilize human resources from within the

society for building. The nation's leadership would have to cultivate an informed clientship at local levels; encourage culturally sensitive building professionals; educate financial managers to become more supportive of culturally sensitive building and reach out to the public at large with information and ideas about the significance of a great building tradition.

His fifth recommendation is to devise a system of checks and balances within which building occurs. The procedures would be to articulate national and possibly regional policies for culturally sensitive building; create norms and standards that could be flexibly administered by national and local building authorities; modify the existing criteria of financial institutions to become responsive to cultural as well as economic criteria; mandate local clientship for all building projects and establish mechanisms for mediating possible conflicts in situations where interests of many groups are at stake.

Porter pointed out that these first five recommendations, even if implemented, need a continuing force in society that could give imaginative leadership to the underlying goals of re-establishing Yemen's great building tradition while bringing it into a close relationship with Yemen's contemporary life and cultural values. This led to his sixth and final recommendation, specifically intended to provide that force. It is to establish in Yemen a National Institute of the Building Arts and Sciences to be composed of distinguished members of Yemen society and to include people drawn from both the public and private sectors. It would include those not in the field of building as well as building professionals. Their mandates would be: to articulate a philosophy for building; to undertake research; to test ideas in building; to promulgate professionalism through study and recommendations concerning education, training and the formation of professional ethics, standards and organizations; and to instigate a program of public professional information. The proposed institute would mobilize the voluntary forces in society that could contribute to the formation of new, vigorous and culturally responsive ways of building by offering their special talents: technical assistance, financial and organizational support and most importantly their inspiration and leadership. M. F. S.



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# ENERGY MANAGEMENT

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## A Million Pounds of Ice Melt Energy Costs At Union Oil Research Facility.

*Brea, California.* The small animal looked much like a tiny horse with toes, as it raised its head warily from the clear pool where it had been drinking. Around it, the fields of long amber grass rolled in gentle waves over the hills toward the great ocean itself, barely visible to the west.

A great roar ripped through the scene, as a snarling catlike beast with huge bared fangs landed where the small mammal had been standing. The little horselike creature, sensing its danger, had fled for the safety of the pond. The escape of its meal enraged the saber-toothed cat, and it rushed after its prey into the shallow water.

Suddenly both hunter and hunted found themselves sinking, trapped victims of a deadlier menace—a thick and viscous reservoir of tar lying just below the innocent surface of the pool. Inexorably the tar drew predator and prey deeper and deeper until soon only the quiet surface of the water remained to tempt its next victims.

**Union Oil has brought a new ice age to an area where prehistoric mammals once roamed among surface tar deposits.**

This scene took place thousands of years ago at the La Brea tar pits in Los Angeles, California. Brea means "tar" in Spanish, and in the nearby city of Brea, surface tar seeps also occur. The prehistoric mammals in this scene were pushed to extinction by the ice age which rolled down across the North American continent.

Today, those ice age glaciers have receded, but Union Oil has brought a new ice age to the area where prehistoric mammals once roamed among surface tar deposits. Brea is the site of Union Oil Company of California's Fred L. Hartley Research Center. Located about 25 miles southeast of Los Angeles, this 31-building complex of administration, office,

laboratory, warehouse and support facility encloses 420,000 square feet of conditioned space. Its cooling is handled by what may be the world's largest latent storage system, with a capacity for making over 1.1 million pounds of ice in a 12- to 14-hour period.

The Fred L. Hartley Research Center was created in 1951, building upon Union Oil's long history of carrying on research in the Southern California area. In 1982, the company completed a \$32-million expansion program, adding 156,000 sq. ft. of conditioned space, including three new 23,000 sq. ft. laboratories. The complex occupies 50 acres of a 125-acre parcel of land, and houses nearly 1,000 research scientists, technicians, administrators and support personnel.

The expansion project required preparation of a master plan which would allow for growth into the 21st century. An additional requirement for the expanded facilities was to express a fresh image at the location, one that would not be associated with any particular period or style. The architectural firm selected to develop the expansion was William L. Pereira Associates, an organization best known for design of the Transamerica Building in San Francisco.

*Small building, big image.* In organizing the expansion, it was determined to utilize three major zones—an administrative zone, a zone for basic research and a zone for specialized research, according to Robert B. Stockton, Principal-in-Charge and Pereira Project Manager for the Union Oil expansion.

"The administrative zone is closest to the public side of the property, and it was there that a focal point was needed. While the requirement was for a fairly small three-story administrative building, that building had to project a very large image," Stockton explained. "We needed to project the feeling of a corporation of size and stability, yet one which remains deeply committed to creative research and innovation."



**HUGH HAVEN AND OPERATING STAFF.** Senior research engineer Hugh Haven (R) sees ice bank-based cooling system as an innovative concept which is well-integrated with the overall expansion program for the Union Oil research center.

To express this concept and to anchor the most visible corner of the entire complex, the Pereira team chose a design utilizing a curved structure with large areas carved out within the curve to create the feeling of openness and to avoid the linear feeling of a wall preventing the public from seeing into the project.

"As a result," Stockton noted, "we have a building which appears to be at least twice the size it really is." The administration building joins with the stepped facade of the employees' cafeteria, forming a central outdoor garden area. The building is clad with fiberglass-reinforced concrete panels weighing about one-tenth as much as precast concrete. The lightened weight reduces seismic loads. The warmth of wood is used in the interior to help bring some of the very large public spaces (some walls 28 feet high) into human perspective.

Reflective glass is used for energy reduction, and on the west side the floors are stepped back from the top to create an overhang to shade the glass areas. Less glass is used on the west and south than on the east and north exposures. The landscaped vistas of the complex create a pleasant meadow-like exterior environment. Overall, the design provides an atmosphere for creative contemplation and productive innovation by Union's scientific personnel and support staff.

More than aesthetics was involved in the design for the expansion of the research center. Some very pragmatic concerns had to be addressed by the project, as well. Before the additions, most of the existing buildings in the complex were cooled by water from a central chilled water plant. Six buildings employed separate or supplemental refrigeration systems.

Before the expansion, the central plant had a 492-ton capacity, consisting of a 182-ton centrifugal chiller and five reciprocating compressors of 62 tons each. A 40-hp pump circulated chilled water through coils in individual air-handling units at each building.

*Rates force alternative assessment.* Going into the expansion project, both the owner and the architect knew energy costs would be a significant factor. The Union Oil research complex is in an area served by Southern California Edison (SCE) Company, and billing for large customers

is based on time-of-day rates. (A large customer is any that has a monthly maximum demand of more than 500 kW for any three months during the preceding year.) Summer rates for large power customers of SCE are highest during the afternoon and early evening peak. Rates drop for use during morning and evening "mid-peak" hours. During the night and early morning hours, the rates are lowest, running less than two-thirds the peak period charges. In addition, steep demand charges are added during the peak hours, with a much smaller demand charge levied during mid-peak times.

This rate structure, along with the knowledge that the building program would add another 1200 tons to the existing cooling load, provided Union Oil with an urgent incentive to explore alternative approaches for fulfilling its HVAC requirements. The first step was meeting with Southern California Edison. It was during these discussions that the possibility of using latent storage was first explored.

Edison had been encouraging large commercial and industrial customers to consider thermal storage since the mid-1970s. They outlined to Union Oil how such an approach could reduce peak demand. It was to their benefit to have Union Oil develop a latent storage system, since it could help reduce peak demand and the necessity to build plant capacity to meet infrequent peaks. According to Hugh Haven of Union Oil Co., "The utility rate structure provided Union with a strong economic rationale for considering a thermal storage installation."

Southern California Edison recommended that Union Oil representatives contact the Commercial Refrigeration Company of Los Angeles for more information on latent storage systems. Since the central air-conditioning refrigeration system at the Research Center was due for replacement, and since the existing chilled water distribution system is compatible with latent storage systems, Commercial Refrigeration recommended that one massive ice-storage system be considered, to provide cooling for the additions and the existing buildings as well.

*Ice system melts resistance.* Union Oil retained F.T. Andrews, Inc. of Fullerton, California, a consulting engineering firm, to undertake a comprehensive feasibility study of this innovative thermal energy storage concept.



**ARCHITECT AND CONSULTING ENGINEER REVIEWING PLANS.** Architect Robert B. Stockton and consulting engineer I. Ray Cranston are convinced that ice storage meets the need for economic cooling and a fresh corporate image.

The Andrews team looked at three alternative systems: first, a conventional refrigeration system using centrifugal compressors; second, a latent storage system; and third, a chilled water storage system. Based on the existing electric utility rate structure, and considering operating costs as well as initial costs, latent storage appeared the most economical approach.

According to I. Ray Cranston, President of F.T. Andrews, Inc., "the latent storage system would cost about \$300,000 more initially than a conventional chilled water system without storage, but would save about \$106,700 annually in electric energy and demand charges over the conventional system. This produces a simple payback in less than three years."

"Most of that additional expenditure is for the steel tanks, with a ice-making and storage capacity of 1.1 million pounds (100,000 pounds per tank)," Cranston added. "The water storage system was not recommended because it would have required 1.2 million gallons to provide the same thermal storage capacity as the ice. This would have meant that the system would have needed volume about eight times that required by the ice."

**Design Teamwork.** After reviewing the recommendations of its engineering firm, Union Oil elected to proceed with installation of the latent storage system. Both the economics and the technology appeared favorable. Commercial Refrigeration Company was selected to work in a cooperative effort with the F.T. Andrewss's team in design and building the system.

The thermal system at the Union Oil research complex is based on a type of system used in the dairy industry for over a century. It has advantages of design simplicity and ease of maintenance, and remains efficient through changes in the scale of its application.

Ammonia was chosen as the most economic cooling medium. According to Jack Carney, President of Commercial Refrigeration Co., "Ammonia was selected because of its higher efficiency and lower cost than other possible refrigerants."

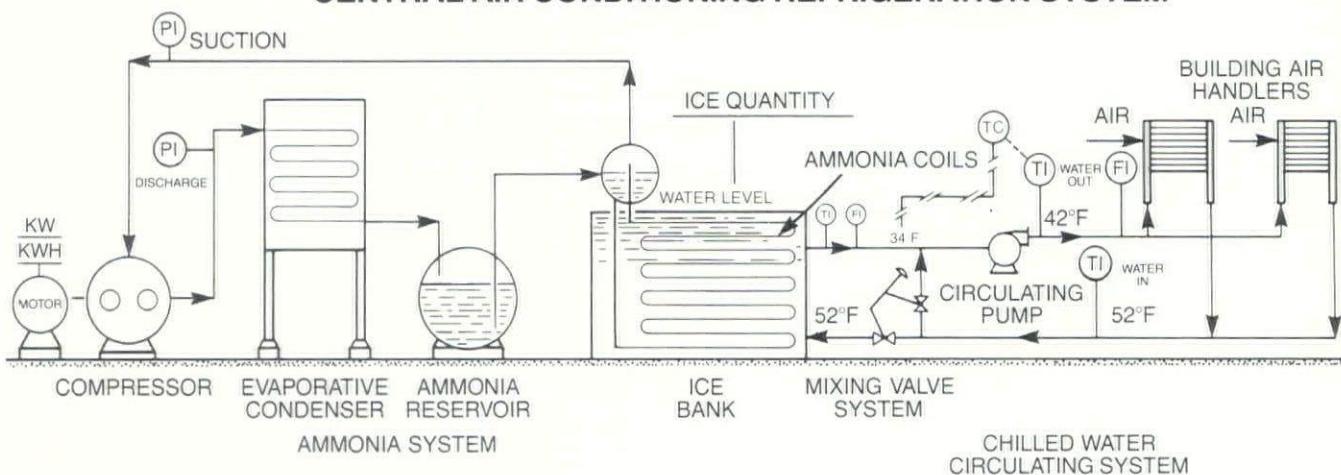
The efficient use of energy remained important throughout planning, in an effort to minimize cooling system energy use. Motors were sized for peak efficiency at design load, since the ice-making process allows for efficient, continuous full-load operation. An overall reduction in horsepower requirements results from this efficient energy utilization. In fact, the latent storage system for the research complex was designed with about half the horsepower requirements that would have been needed in a conventional installation.

### The utility rate structure provided Union with a strong economic rationale for considering a thermal storage installation.

The Union facility utilizes two 600-hp compressors housed in a tilt-up concrete structure designed to reduce compressor noise levels outside the building. The ice bank has a design capability to produce 1,900 tons of refrigeration. Should an emergency condition require the shutdown of one of the compressors, the other can meet the cooling requirements of the entire complex by continuing operations into the on-peak hours.

*A million pounds of ice.* A flood-coil, gravity system circulates the ammonia refrigerant through 1½-inch steel icemaking heat transfer pipe coils. Two 40 ft. x 60 ft. x 11 ft. water tanks each have the capacity to contain six Chester-

### FRED L. HARTLEY RESEARCH CENTER CENTRAL AIR CONDITIONING REFRIGERATION SYSTEM



#### OPERATION OF ICE STORAGE PLANT

The operation of the refrigeration plant and the HVAC system is completely automatic, with manual override control. In the summer, the two compressors operate in a predetermined sequence for approximately 12 to 14 hours per day, primarily during off-peak hours and sometimes during mid-peak hours. Ice is formed around the coils in a thickness which varies from one to two-and-one-half inches. As cooling needs require, ice melts off four coils at a time, two in each tank.

Three 100-hp pumps circulate the chilled water to the air handlers. Each pump is capable of pumping 1,500 gpm for a total 4,500 gpm flow. Staging allows the pumps to operate individually or together, depending upon the cooling requirements. They are the only equipment in addition to the air handlers operating during peak demand hours.

During months requiring reduced cooling, compressors continue to operate on a night schedule only, and ice build-up is based upon anticipated needs. Ice thickness controllers cycle the compressors as required.



**INTERIOR LOBBY.** Interior of the Fred L. Hartley Research Center greets visitors with dramatic design, the warmth of wood paneling and coolness from stored ice.

Jensen serpentine ice-building coils around which the ice forms. Eleven of the twelve planned coils are in place and operating. The twelfth will be installed when needed to meet expanded cooling needs.

Each ice-building coil has the capacity to produce 100,000 lbs. of ice in about 14 hours. When maximum thickness has been reached on all 11 coils, about 14,000 ton-hours of cooling is available.

The tanks are located above-ground, making them more accessible for maintenance and reducing concerns about possible earthquake damage. The location above-grade also avoided the need for installation of drainage tile in the event of seepage.

As the ice melts, 42°F water is supplied to the separate air-handling units in each building. After use, the water is returned at 52°F.

*Success breeds further interest.* After one year of operating the latent storage system, results have met design expectations. Maintenance has been no more difficult or extensive than for a conventional system.

Under a conventional system, and based on Union's previous experience, annual energy and peak demand charges could have been expected to run about \$170,000 according to Cranston. The cost using the latent storage system has been approximately \$67,300.

The net result is that Union Oil Company is very satisfied with the new system and the way it is working. Foreman Dan Vidal and operating engineers for the central plant, Mike Brewer and Robert James, say: "The system is quite simple and very easy to operate. It is as easy to handle as a conventional plant."

Hugh Haven states that "this ice storage HVAC system exemplifies Union's commitment to innovation and creativity. It has been made possible through more than 40,000 man-hours of labor from the personnel of the architectural, engineering and contracting firms involved firms which have the vision to help Union meet its goals for this important research complex for now and for the future.

This latent ice storage system, as well as the design of the complex itself, projects the image of Union Oil as a corporate leader in creative innovation."

In order to operate the system even more efficiently, Union has plans to add an energy management and control system with routines that will reduce energy consumption in the central refrigeration plant and in the individual air-handling units.

The commitment of the Union Oil Company to continued innovation in the field of energy management remains strongly in evidence through such continued planning. Its ties to the community are expressed through such commitment to the future.

## DESIGN SUMMARY

### GENERAL DESCRIPTION:

Area: 420,000 sq. ft.

Volume: 5,730,000 cu. ft.

Number of Floors: Typically one.

Types of Areas: Private and general offices, research laboratories, auditorium, dining rooms, cafeteria, library, mechanical rooms, storage

### CONSTRUCTION DETAILS:

Glass:  $\frac{1}{4}$ " reflective

Exterior Walls:  $\frac{3}{8}$ " thick glass fiber reinforced concrete panels; U value: 0.08

Roof and Ceiling: Built-up asphalt roof over composite insulating concrete and urethane insulation; U value: 0.045

Floor: Concrete

Gross Exposed Wall Area: 243,500 sq. ft.

Glass Area: 48,400 sq. ft.

### ENVIRONMENTAL DESIGN CONDITIONS:

Heating: (New Construction)

Heat Loss Btuh: 10,198,000 Btuh

Normal Degree Days: 1490

Ventilation Requirements: 242,460 cfm

Design Conditions: 34°F outdoors, 72°F indoors

Cooling: (New Construction)

Heat Gain Btuh: 12,340,200 Btuh

Ventilation Requirements: 242,460 cfm

Design Conditions: 101 dbt, 73 wbt outdoors; 75°F, 50% rh indoors

### LIGHTING:

Levels in Footcandles: 30-75

Levels in Watts/Square Foot: 2.5 over office tasks; 0.8 in general areas, 1.5 in special use areas

Type: Fluorescent, incandescent and mercury vapor

### CONNECTED LOADS:

Heating and Cooling (1824 tons): 995 KW

Air Handling: 369 KW

Pumps: 334 KW

Other: 270 KW

### PERSONNEL:

Owner: Union Oil Company of California

Architect: William L. Pereira Associates

Consulting Engineers: F.T. Andrews, Inc.

General Contractor: Pozzo Construction Company

Mechanical Contractor: Commercial Refrigeration Company

Utility: Southern California Edison Company

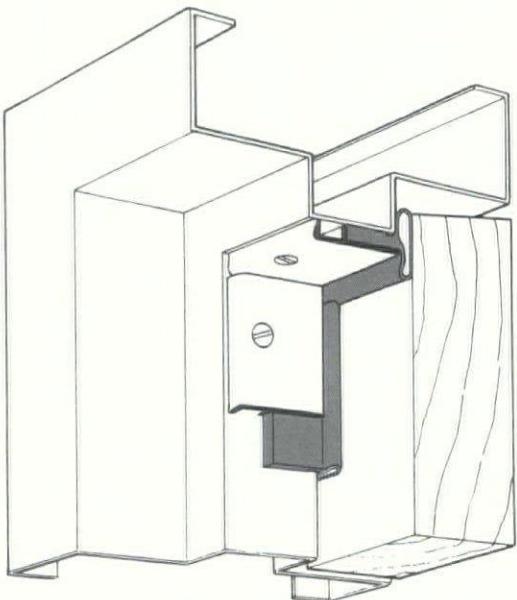
\*One of a series of reports giving recognition to the efforts of architects and engineers on behalf of resource conservation.

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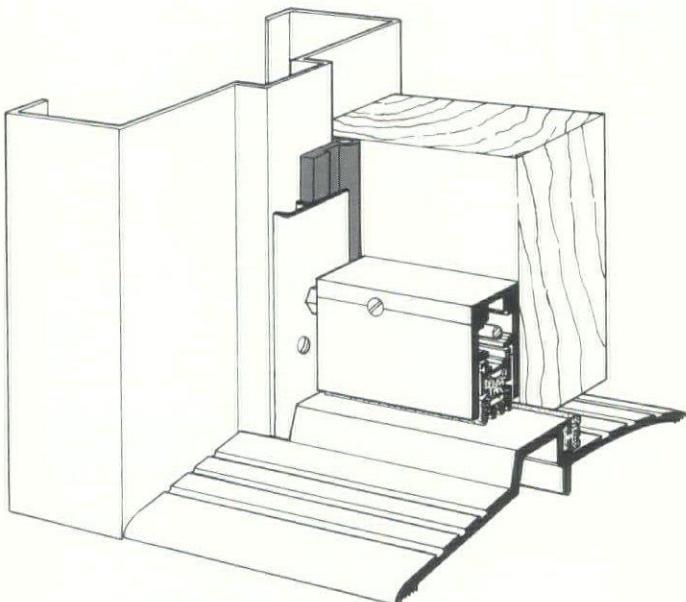
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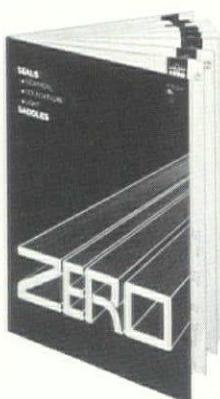
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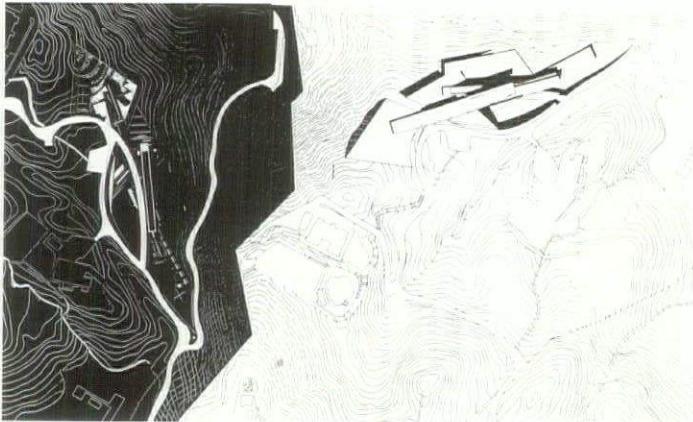
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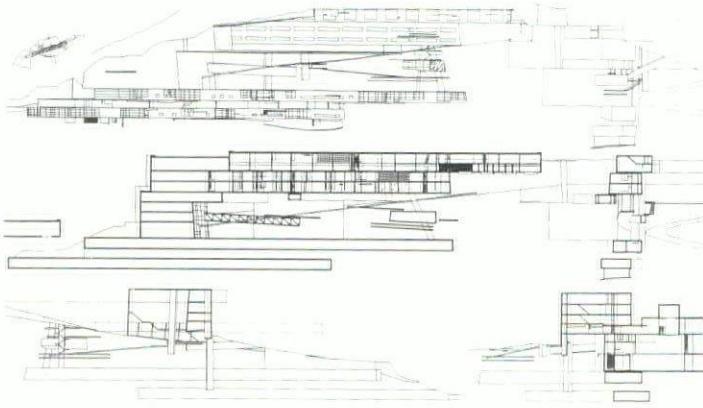
## Design awards/competitions: The Peak Architectural Competition

First-prize design: Zaha M. Hadid, Architect

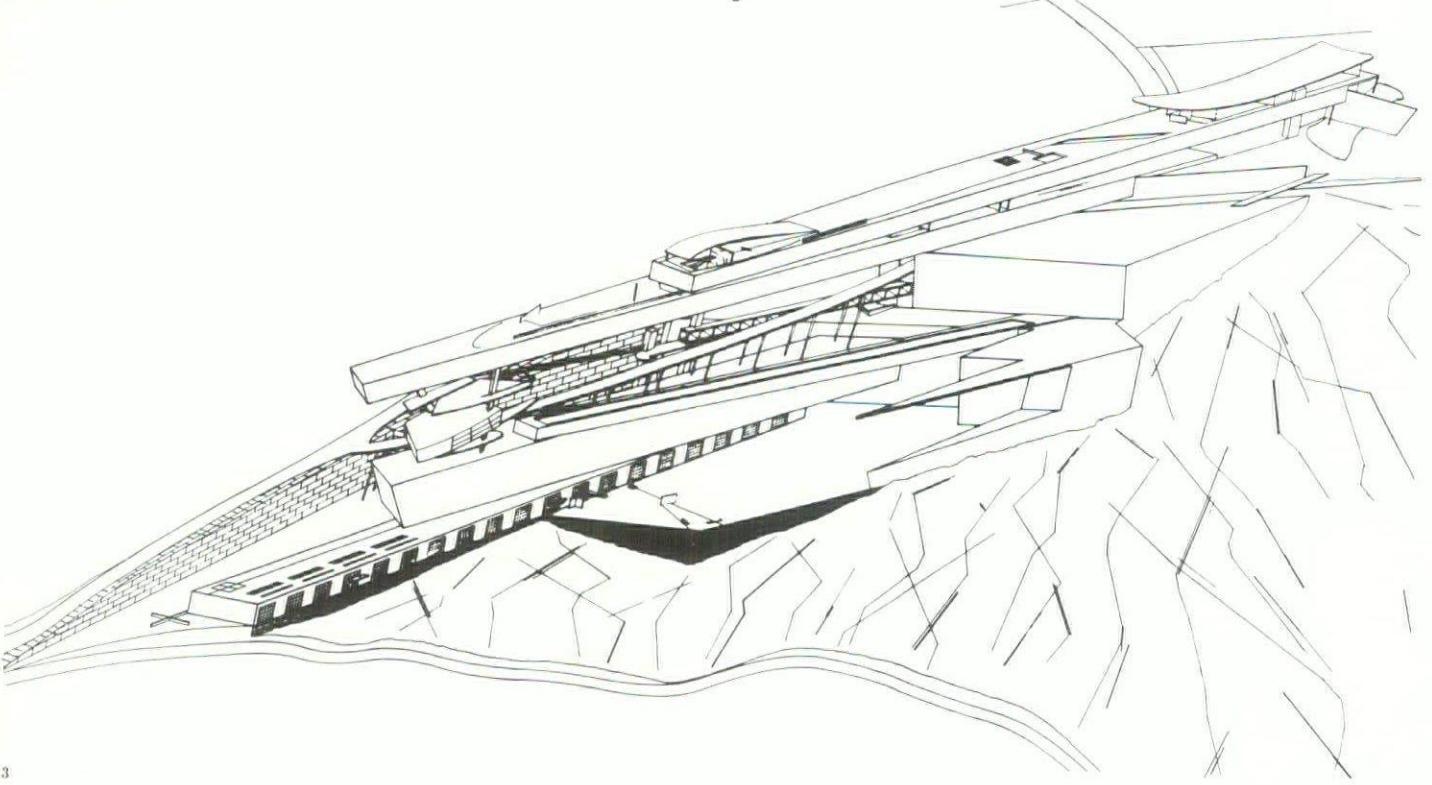
The Hong Kong Institute of Architects and the Union Internationale des Architectes have announced the results of a competition for the Peak, a luxury residential club overlooking Victoria and Kowloon, the two cities that face each other across Hong Kong Harbor. Sponsored by OLS Property Development Ltd., Hong Kong, the competition drew 539 entries from around the world. The jury consisted of architects John Andrews, of Australia, the panel's chairman; Arata Isozaki, of Japan; Gabriel Formoso of the Philippines; Ronald Poon, president of the Hong Kong Institute of Architects; and Alfred Siu, the client's



1



2



3

Located just below the apex of Victoria Peak, this residential club will accommodate 1,000 members. The Peak's facilities will be primarily for social and business contacts, and only marginally associated with sports activities.

The program comprises eight large and 35 smaller residential units directly linked to a centrally located club with restaurants, a library, swimming pool, squash courts, and a gymnasium. Four of the larger apartments are set aside for the developer's family in a completely detached block; zoning ordinances limit the height of the complex to four stories on a site covering nearly 75,000 square feet.

Although the developer did not want any reference to traditional Chinese architecture, he insisted

that competitors' designs be in accordance with *Fengshui* (literally, "wind and water") principles of orientation.

### Zaha M. Hadid, Architect, London, England

The winning architect describes her design as "Suprematist Geology." First, she proposes that the ground be leveled to the site's lowest point and then rebuilt from the excavated rock as a polished granite mountain. Four of the larger apartments are set aside for the developer's family in a completely detached block; zoning ordinances limit the height of the complex to four stories on a site covering nearly 75,000 square feet.

The building itself is composed of four beams (Figure 1), stacked atop one another in a splayed arrangement. Partially embedded, the two lowest layers (Figure 2) contain 15 studio units and 20 apartments, forming a podium for the club facilities. A void approximately 42 feet high separates these strata from the two uppermost levels, which

house the larger apartments and the developer's penthouse. Suspended within the void like hovering spaceships are the club elements, which extend back into the man-made mountain. The series of floating ramps and platforms that articulate this space are supported by two vertical members, an elevator, and a steel truss containing services. Two elevators linking the clubs to the upper residential zone provide additional support and a vertical counterpoint to the horizontal composition. Stress cables stabilize any other movement among the floating horizontal members of the void (Figure 3). The swimming pool rests in the roof of the second residential layer. Lateral changing rooms are hollow square beams in section, and act to stiffen the structure.

The entire complex is constructed of steel and reinforced concrete. All volumes suspended in the club area are framed in lightweight alloys with aluminum or stone cladding.

Although the jurors faulted the winning design for a "certain lack of resolution in its details," they praised its concentration "on the exploration of ideas.... The sculptural nature of this solution," they averred, "promises to extend the imagination and symbolize the essence of a new building type in a unique location."

### Architects:

Zaha M. Hadid, principal-in-charge; M. Wolfson, J. Dunn, N. Ayoubi, M. Vanderwaals, N. Lee, design team

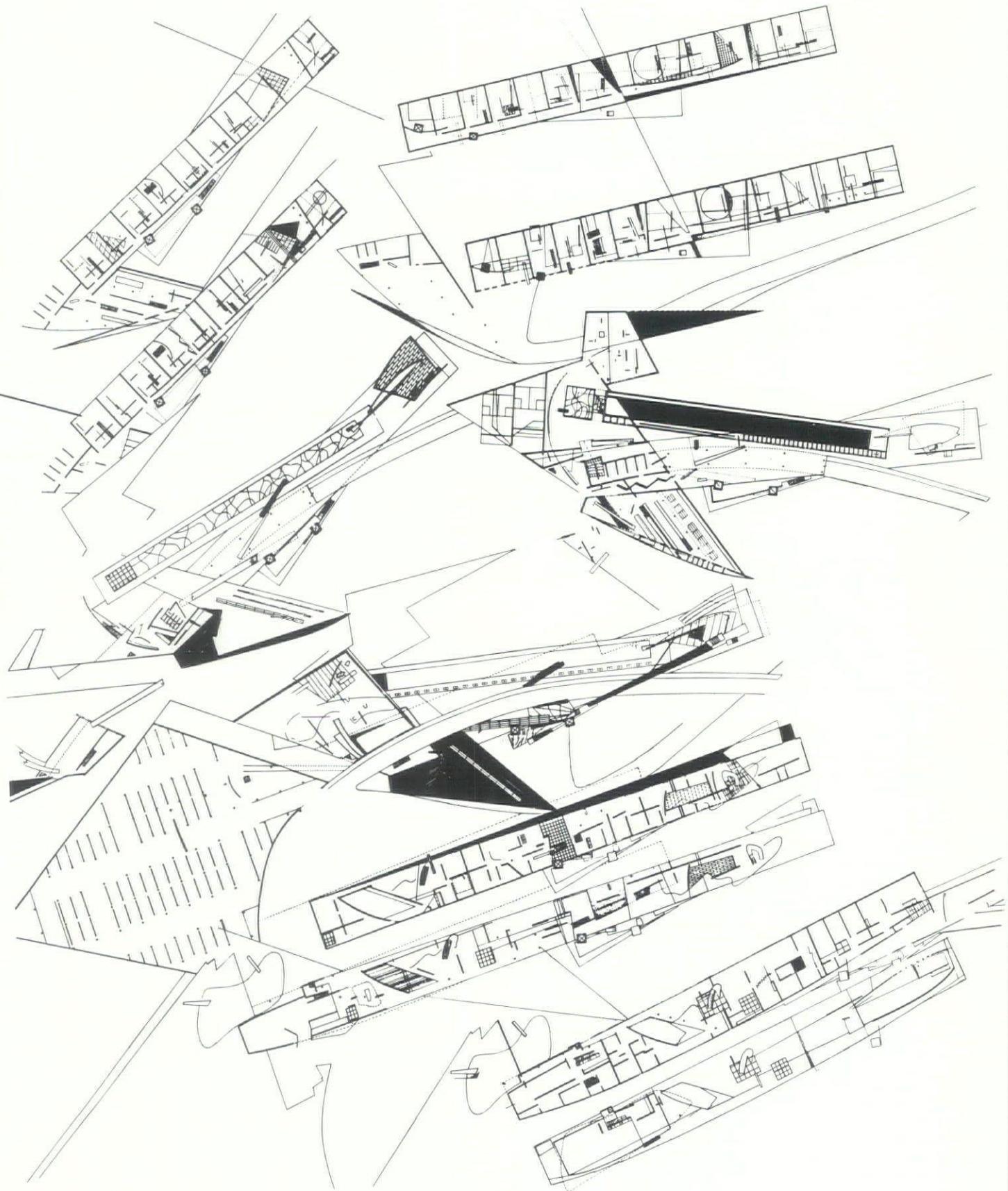
### Structural engineer:

David Tomlinson

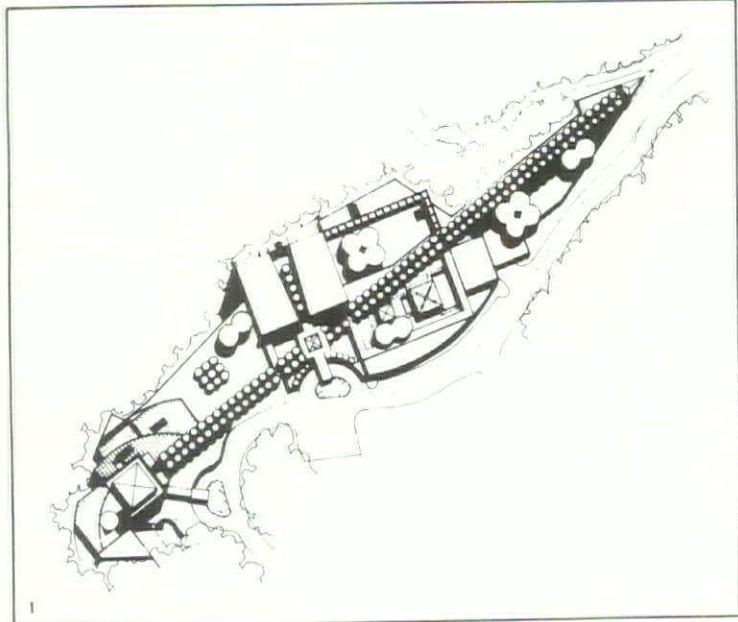
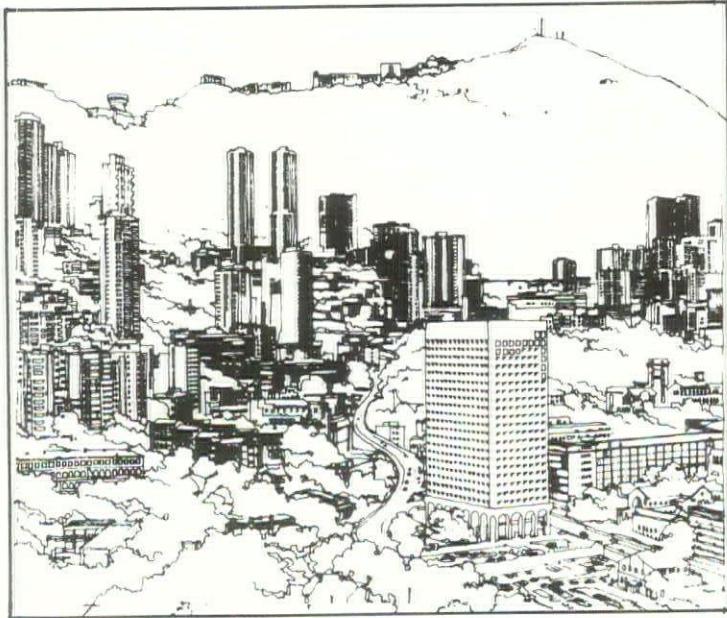
representative. Professional advisor for the competition was John A. Prescott, past president of the HKIA.

The jurors awarded first prize to Zaha M. Hadid (see below and opposite). Three other designs were also premiated (pages 56-59), with two entries equally sharing third place. The awards carried cash prices of \$100,000, \$60,000 and \$40,000 respectively. The jurors were generally disappointed by the caliber of designs submitted. "Most architects," they commented, "slavishly followed the brief without question and as a result, an alarmingly uniform range of solutions was presented." In this company Ms.

Hadid's design was unique. According to the jury, "at a time of highly referenced architectural thinking, [her entry derives] from the 1920s Suprematist philosophy and stretches the imagination well beyond normal bounds." The decision, however, was not unanimous and debate was protracted. The jurors characterized their discussions as turning on "the question of a selection based on demonstrable competence or the acknowledgment of a brilliant idea, with full competency obviously possible but yet to be demonstrated."



**Second-prize design: PDCM Pty. Ltd.**



**PDCM Pty. Ltd., Architects,  
Melbourne, Australia**

In Fengshui terminology, the Peak's site is a "leaping fish" configuration. The second-prize design is organized around this symbol. The fish's head, at the northern end of the site, contains the developer's penthouse and the four luxury apartments; its body, the club facilities and 20 apartments; and the tail, at the southern tip, the 15 studios (Figures 1 and 2). A formally planted avenue, the fish's backbone, unites these three programmatic elements on a longitudinal axis.

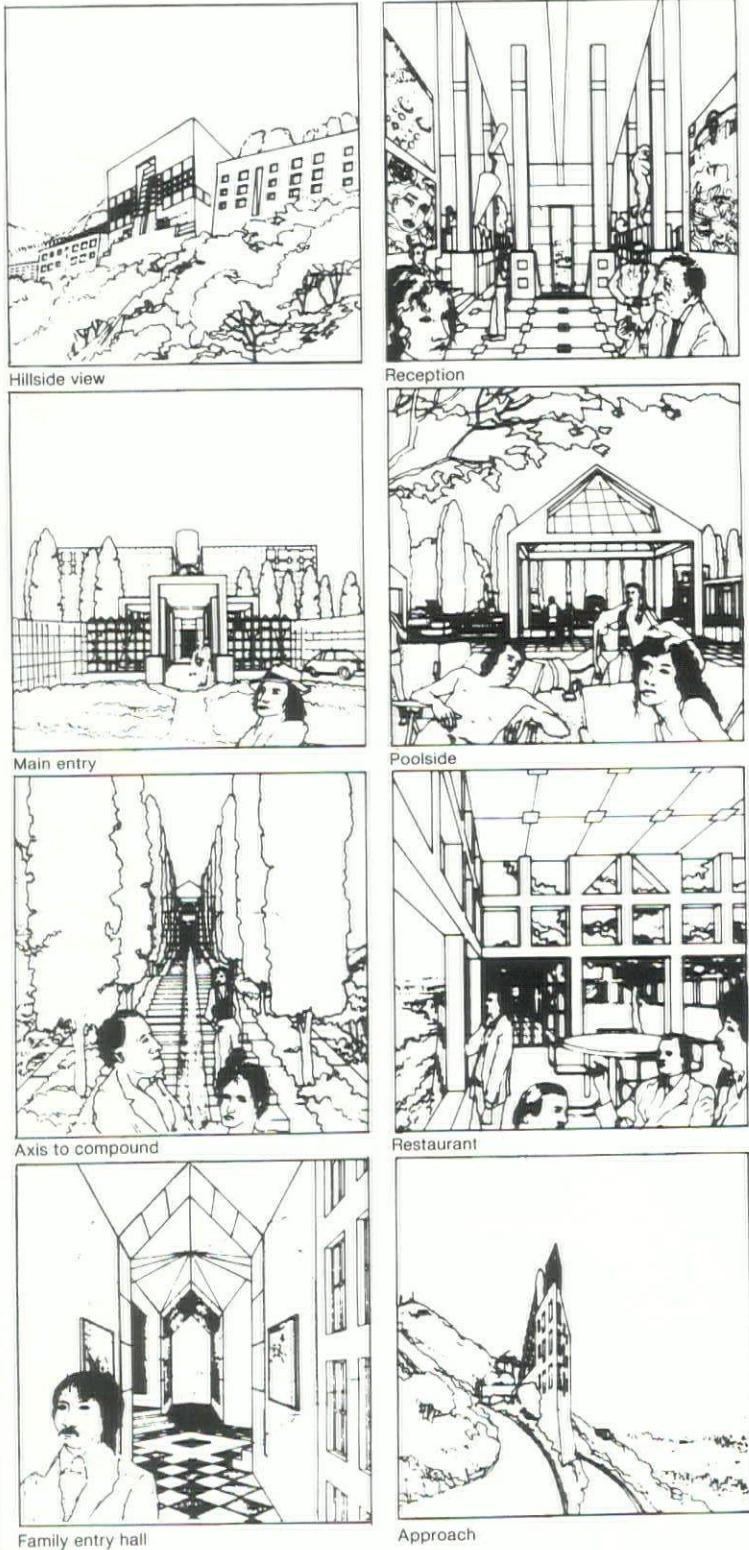
The equivalent of this axis in elevation is the rusticated wall surrounding the complex. Serving as a podium for the three units above, it responds to the existing topography. PDCM finds the wall "reminiscent of a natural

escarpment that might well have occurred on the site."

This battered wall also refers to Hong Kong's colonial buildings, pavilionlike structures mounted on stone podiums. These walls have traditionally provided a sense of privacy and security. In the PDCM design, the wall links the accommodations and distinguishes the Peak from surrounding buildings.

Placed atop the wall and penetrating it at different levels, the three pavilions housing the club and residential units also allude to colonial precedents. The central club facility is a cubic form balanced on either side by the pyramidal roofs of the two residential units.

Located at the site's highest point, the developer's compound (four apartments with a private pool, gardens and shared dining



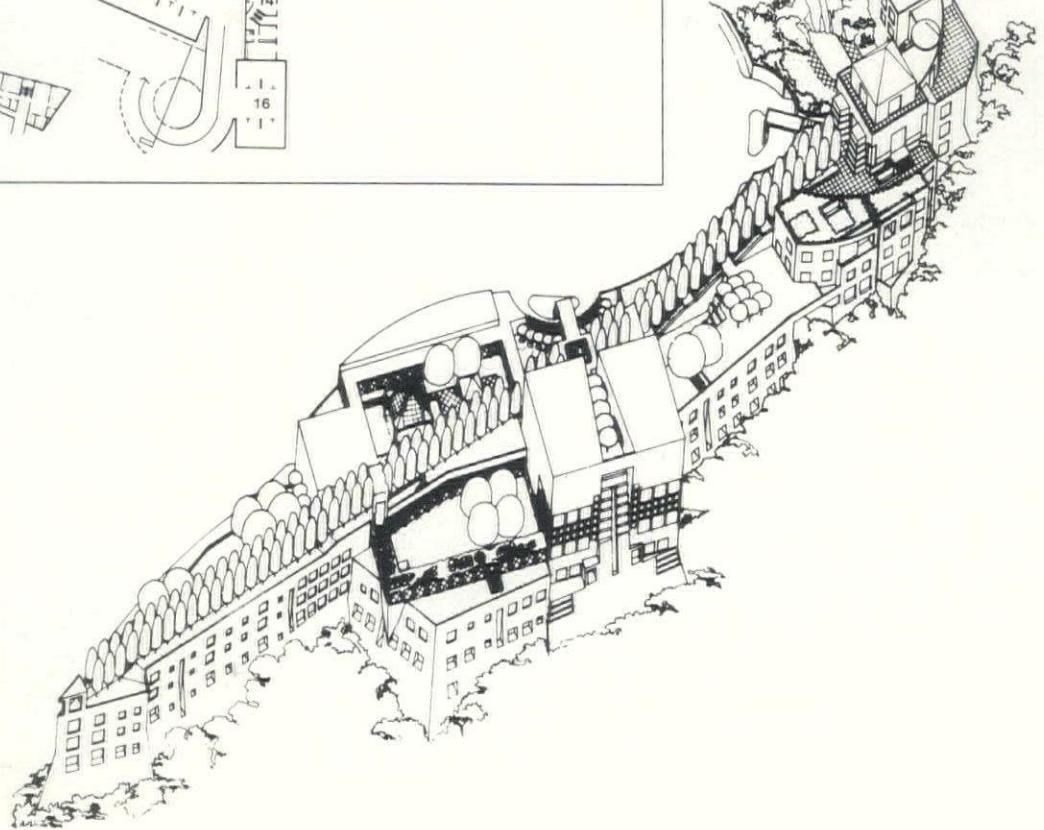
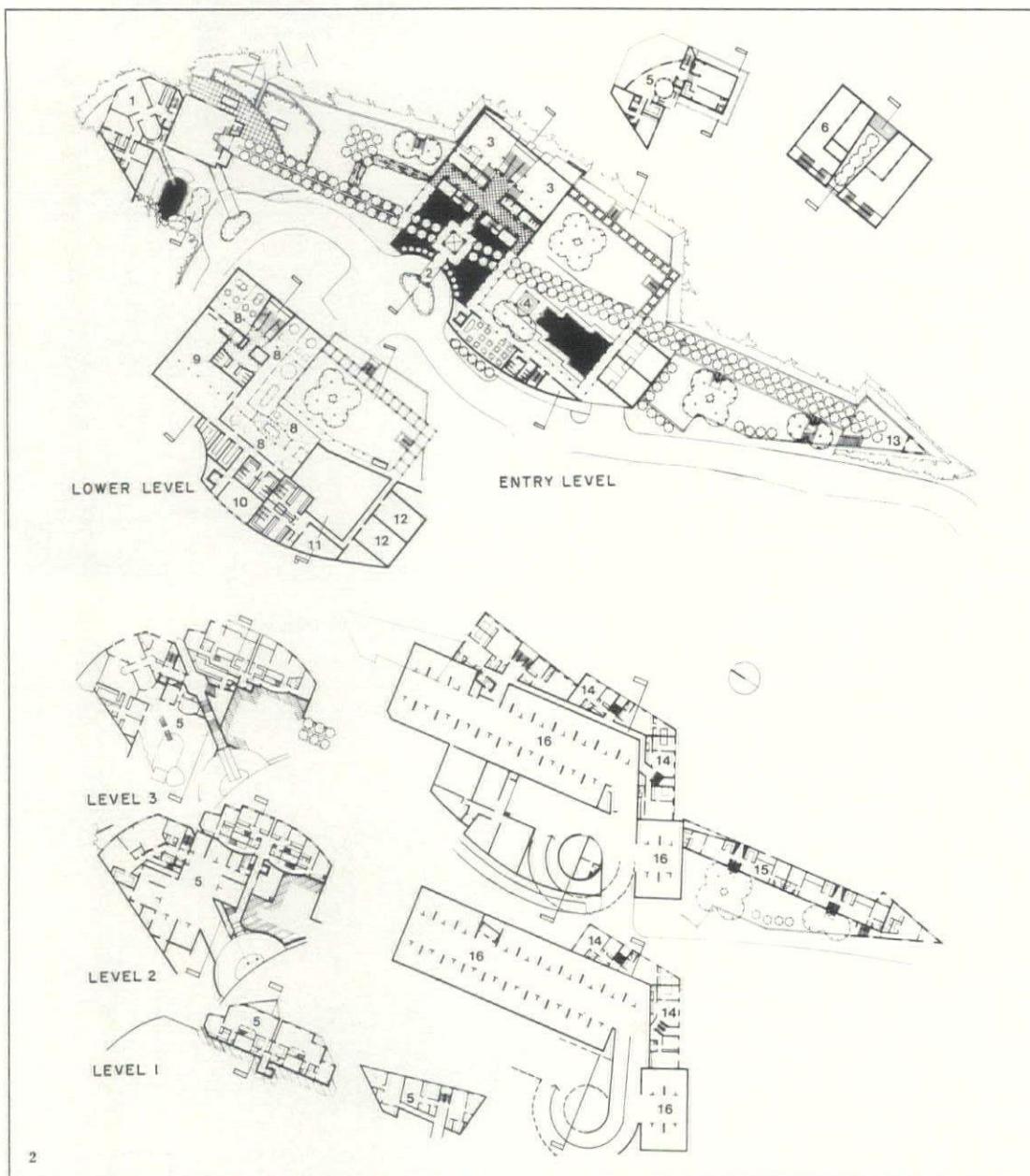
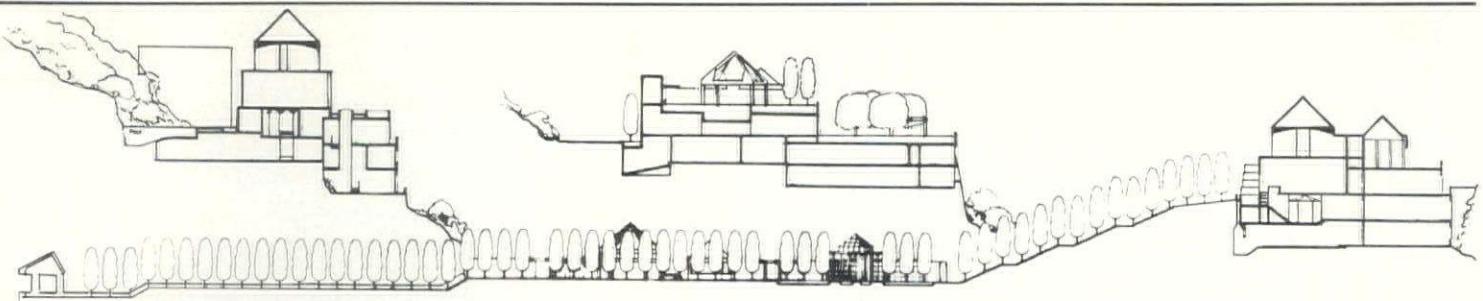
room) is arranged on four levels. The wall encloses two layers, while the rest emerge above it. Another four apartments are located just south of the family compound and are separated from it by an entry passage.

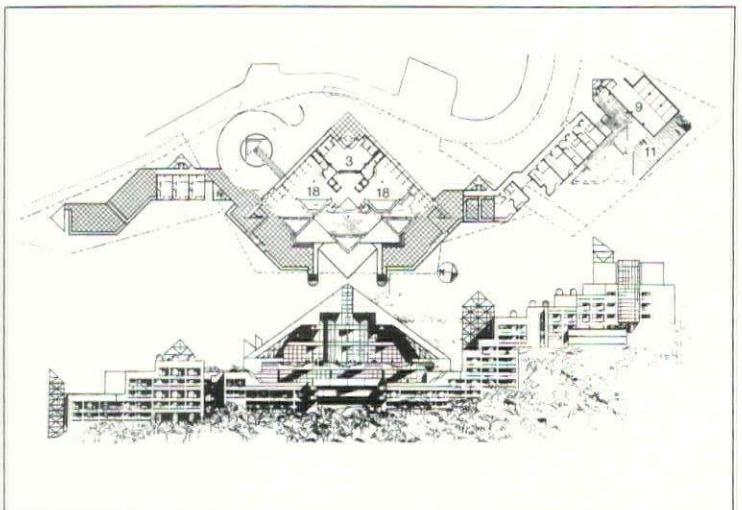
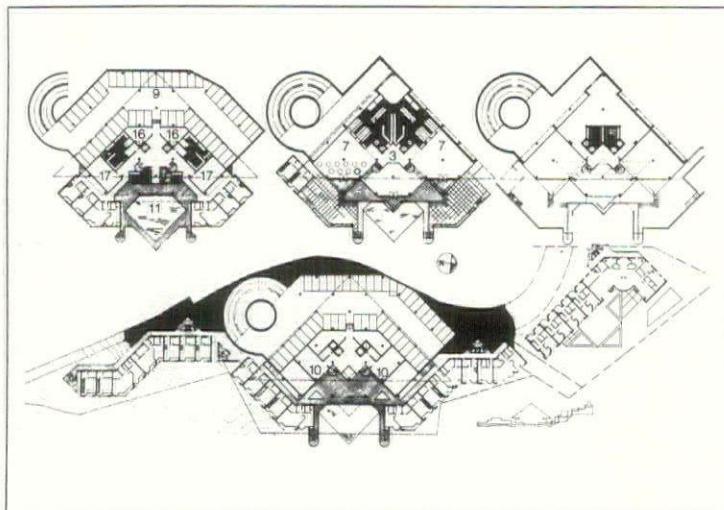
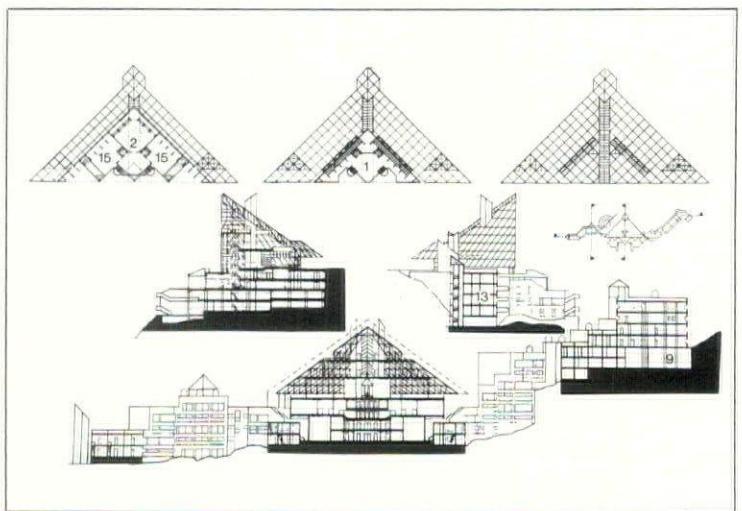
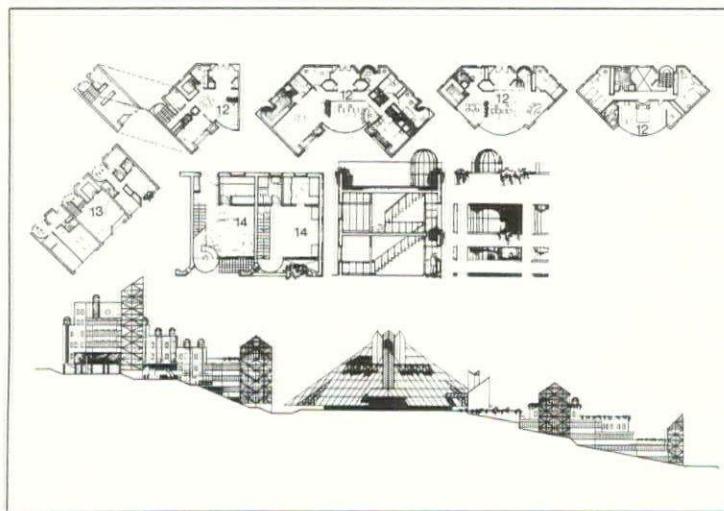
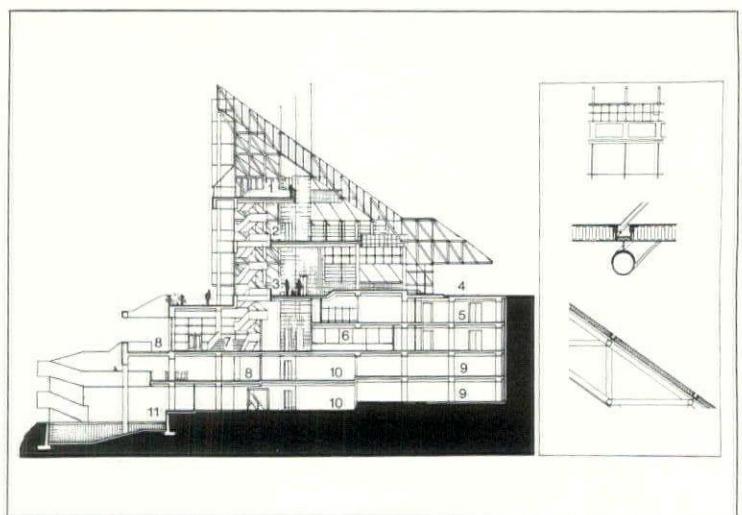
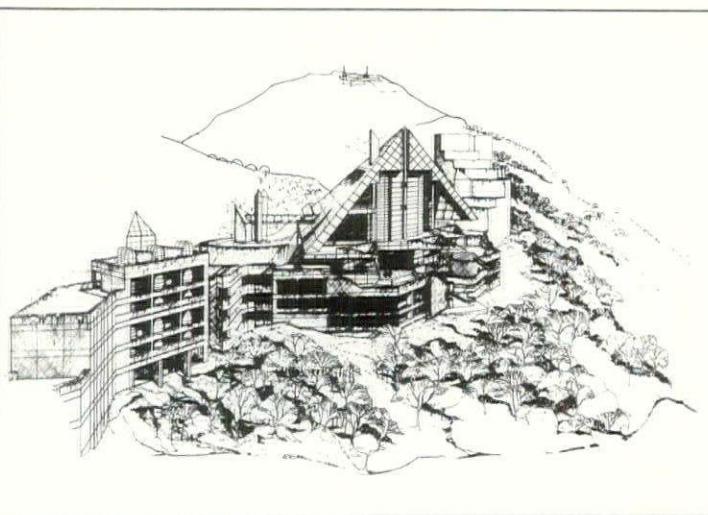
The second pavilion contains the club and 20 residential units. A central lobby provides access to the apartments and gardens on the north and to the athletic facilities and swimming pool on the south. One level below is the main restaurant, with views of the harbor through a partially enclosed courtyard.

Fifteen studios on three levels are located at the southern tip. Completely enclosed by the wall, these units are covered by gardens and a small lookout tower with a pyramidal roof.

Constructed of reinforced concrete, the complex is faced

with a variety of materials. The surrounding wall is clad with local beige granite with red-brick trim enframing some windows. The club building and residential units to the north are white aluminum panels set with rose-colored glass. Internally the same color scheme of white, pink, and beige prevails.





#### **Edmund Burke & Partners, Architects, Dublin, Ireland**

A half-pyramid containing the club facilities is the design's dominant feature. In the architect's view, this form creates a prominent landmark on the Hong Kong skyline and relates to the profile of surrounding mountains.

In plan the half-pyramid yields a fan shape. Along its curve all public and private rooms are positioned to overlook the view while the entrance and service areas are collected in the tip next to the road.

Below the entrance level are three dining rooms overlooking the harbor; above it are areas requiring greater seclusion, such as the library, the manager's office, and an observatory. The swimming pool, squash courts,

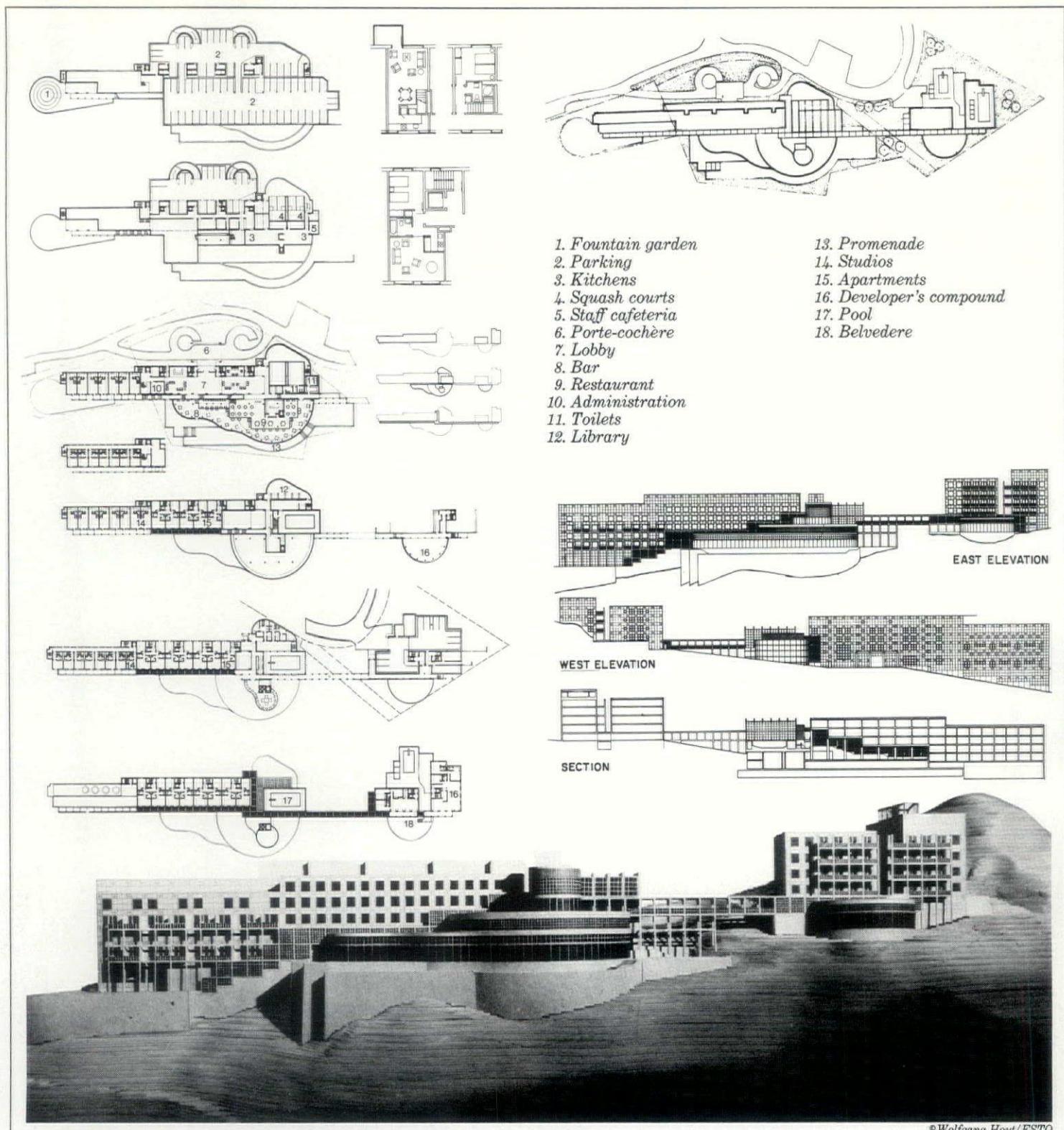
and gymnasium are directly underneath the restaurants.

The residential sector composes a ribbon wall that snakes along the eastern ridge. Its progress is broken only by the club rooms and sports facilities at the center of the development. The developer's own dwelling lies to the north and is linked to the half-pyramid by four apartments. The other residential units stipulated by the program are within or to the south of the club. A reinforced concrete grid rises from the basement to support the superstructure, interlocking with the half-pyramid's roof along the slope and at the apex. The roof itself is a tubular steel space frame that could be glazed with translucent or opaque panels and opens up to create the porte-cochère and balconies.

#### **Architects:**

*Edmund Burke & Partners—Edmund Baylon Burke, MRAI, RIBA; Charles Donnelly; Ciaran Mac Mathuna*

1. Observatory
2. Library
3. Lobby
4. Entrance
5. Service
6. Kitchen
7. Dining
8. Terrace
9. Parking
10. Health club
11. Pool
12. Developer's compound
13. Apartments
14. Studio
15. Administration
16. Store
17. Squash courts
18. Bars



©Wolfgang Hoyt/ESTO

#### Hagmann/Mitchell, Architects, New York City

The architects' intention is to complete the hill, in effect, with the building but to avoid merging the two forms. As the ground drops off along the north-south axis, a masonry wall—the facade of the residential units—follows its course. An undulating glass pavilion contains the club facilities and rests atop a terraced podium that protrudes from the wall. The design plays off the contrast between the stark stone wall and the sinuous glazed projection.

A promenade extends longitudinally across the site. It splits the public facilities from the residential blocks on either side and further divides the club into a cubic mass facing the roadway and a curvilinear form overlooking the harbor.

Nevertheless, the club's separation from the apartments is incomplete. Its facilities are partially inserted beneath the principal residential unit, and the space created at this juncture serves as the lobby. The club is arranged in three levels: the lobby, bar, and restaurant occupy the first floor; the library and a private dining room, the second; and the pool and gymnasium, the third level. The studios and apartments on the lower and middle sites are combined into a single block; the four apartments and the developer's dwelling at the extreme north end are separate structures.

The structural system throughout the complex is flat-plate concrete. The residences and foundations are faced with light and dark granite respectively.

#### Architects:

*Hagmann/Mitchell, Architects—John S. Hagmann and David Hannaford Mitchell, design principals; Alexandra Villegas, chief assistant; Lee Yee Hsu Hagmann, Anthony McAndrew, Karen Beth Albin, Louis Iglehart, David Ari Kessler, design team; Michaelyn Mitchell, editorial assistant*

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## Office notes

### Offices opened

Elizabeth Wright Ingraham announces the opening of a new office for the practice of architecture and land planning to be known as Elizabeth Wright Ingraham & Associates, 1228 Terrace Road, Colorado Springs, Colorado.

Cochran Associates Architects Planners have opened new offices located at 5019B Broadway, San Antonio, Texas.

Gerald Moorhead Architect announces the start of a new architectural practice located at 1842 Marshall, Houston, Texas.

ISD Incorporated announces the formation of a new organizational unit, space management services, to be headed by vice president John King.

David Slovic Architecture and Urban Design announces the opening of its offices at 112 North 12th Street, Philadelphia, Pennsylvania.

### Firm changes

Joseph A. Incaudo has been named vice president and treasurer of Daniel, Mann, Johnson, & Mendenhall (DMJM).

Cerna-Garza-Raba, Inc., a San Antonio-based architectural and engineering firm, has completed a major corporate reorganization naming Daniel A. Cerna chairman of the board and Laurence J. Raba president of the firm.

Priestley/Sterling Inc. Architects announces that Robert C. Nitishin, Constance W. Rives, Ann M. Storer and Marcia M. Stevens have been promoted to associates. Jonathan David Ross has joined the firm as an associate.

Sidney Philip Gilbert & Associates announces the appointment of Helen Krause to vice president of sales.

George E. Shear has joined the firm of Mason, Da Silva, Associates, P.C.

Ralph E. Johnson and Anthony B. McGuire have been elected vice presidents of Perkins & Will, Inc., Chicago.

The Austin firm of Renfro and Steinbomer announces the addition of Michael L. Petty as a partner. The new firm name is Renfro, Steinbomer and Petty, AIA, Architects.

Mermad C. Jaccard, Jr. has become a partner in the architectural firm of Calhoun, Tungate, Jackson and Dill.

Harley Ellington Pierce Yee Associates Architects Engineers Planners announces that Peter Turner has joined the staff as director of mechanical engineering.

Interspace/Miami has promoted Peggy Nye to senior vice president of the southeastern region and appointed to the firm's executive committee.

Diane C. Holland has been named public-relations director for Architects Design Group.

Russo + Sonder, Architects and Planners announces the appointment of Sheila A. Abrams as an associate.

Elliot + Associates Architects announces a new partner, Mike Gann, and the renaming of their firm to Elliott + Gann Architects.

Norman Murphy has joined Kenneth Hirsch Associates Architects, Inc.

James Ian Powell has been named a project manager of the architectural firm of SHWC, Inc.

Mark C. Campbell has been named an associate of Glave Newman Anderson Architects.

Randy E. Kreie and Allan A. McDonald, Jr. have been named associates of Olsen-Coffey, Architects.

Allan Neal Denenberg has joined The Grad Partnership as director of interior architecture and associate of the firm.

Bernard Rothzeid, Carl Kaiserman & Peter Thomson announce that Carmi Bee has rejoined their firm as a principal. The new firm name is Rothzeid Kaiserman Thomson & Bee, P.C. Architects and Planners, AIA. Martin Tuzman has been named an associate.

Skidmore, Owings & Merrill announces that Robert A. Halvorson has been named a partner of the firm.

Alan L. Heffernan has been named chief engineer for Barnard and Burk Engineers & Constructors, Inc., Gulf Coast.

The partners of Marcel Breuer Associates, Robert Gatje, Tician Papachristou and Hamilton Smith announce a change in the name of their firm to Gatje Papachristou Smith Architects Planners Interior Designers.

Steven P. Papadatos AIA and Associates will be known as Papadatos Moudis Associates P.C.

Donald H. Brackenbush has joined the firm of Albert C. Martin and Associates, Los Angeles as director of planning.

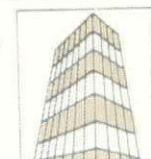
Hanssen Lind Meyer, P.C. announces that Larry M. Oppenheimer has joined the firm as director of project management and senior project manager.

Martin W. Bruner has joined the firm of Norman DeHaan Associates, Inc. as vice president.

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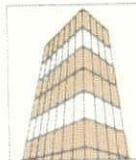
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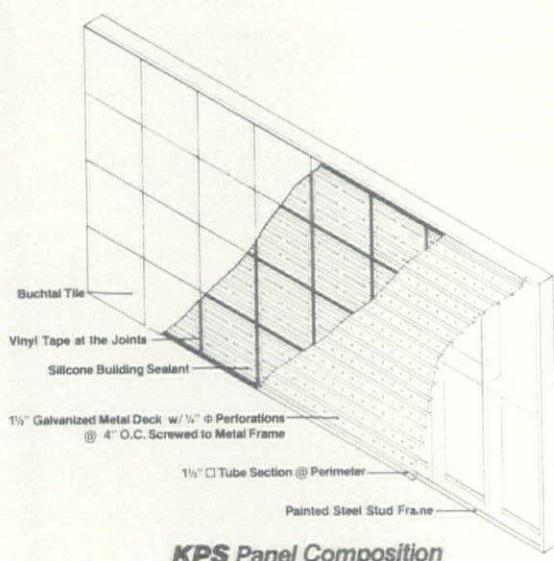
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# Conserving a rich architectural heritage

In Istanbul, on the evening of September 4th, in the famous second court of the Topkapi Sarayi, formerly the great palace of the Osmanli Sultans, His Highness the Aga Khan and His Excellency K. Evren, President of the Turkish Republic, presided over the 1983 Aga Khan Award for Architecture presentation ceremony. The court, a splendidly asymmetrical cloister filled with ancient cypress trees, was newly landscaped for the occasion and planted with flowers. The ceremony itself was held in front of the beautiful Bab-üs Selam (Gate of Salutations) and the entire garden, bordered by antique marble columns, was beautifully lit.

Once again, as in the first awards ceremony, held in 1980 in the Gardens of Shalamar in Lahore, Pakistan, the award winners turned out to be a generous assortment of the many kinds of people who help make and keep good buildings—architects and landscape architects, engineers, planners, archaeologists, wood carvers, tile makers, carpenters and masons. Additionally, among those honored were the heads of organizations devoted to the conservation and restoration of the Islamic architectural and cultural heritage.

Significantly, the first and second Aga Khan Awards for Architecture have established an original and encouraging new precedent. In typical architectural award programs, the honors and prize money go only to the architect/creators of a jury-approved work of art. In Lahore and now in Istanbul, however, the winning projects have not been selected for esthetic quality alone (although many have it), but are seen by the juries as stages of transition, experimentation and continued search, models to be studied and followed, not perfected artifacts. And the purse, rather than going to one or more heroic architectural figures, has been widely disbursed, the greater proportion awarded for the maintenance of the prize-winning structures or to the institutions concerned for the furtherance of their work. In all, 11 projects received prizes of \$45,000 each.

The 1983 jury members were: Dr. Turgut Cansever, Turkish architect; Rifat Chadirji, Iraqi architect; Habib Fida Ali, Pakistani architect/interior designer; Professor Mubeccel B. Kiray, Turkish sociologist; Charles Moore; Dr. Ismail Serageldin, Egyptian architect/planner; Roland Simounet, French architect; James Stirling, British architect; and Professor Parid Wardi Bin Sudin, Malaysian architect. The jury proceedings were facilitated by the Award office under the direction of its secretary-general, Said Zulficar.

In January of this year, the jury short-listed 34 projects from the 206 that had been nominated. Each of these projects was then visited by a qualified technical reviewer. The jury met again last June and chose the 11 projects, ranked equally, although as they stated in their report, "no one saw the projects as equal in accomplishment, merit or importance."

The awards given this year make all but one of the important points first defined by the 1980 award jury. Disappointingly, none of the 1983 awards addresses the problems of housing either the rural or the urban poor, although one prize-winning project, the Hafsa Quarter in Tunis, attempted the latter but failed. The neglect of this issue is particularly unfortunate since the 1980 jury took compassionate note of the needs of poor Muslims. Furthermore, this subject remains a principal concern of the Aga Khan himself and his steering committee, as evidenced by the fact that between the 1980 and 1983 award ceremonies, seminars that addressed many of the problems of sheltering the poor were held consecutively in rural Muslim China, Senegal and recently in Yemen (page 45).

As before, the geographical spread of the awards signifies the breadth and cultural diversity of Islam. And once again, distinguished restoration projects have been honored, warning that a heritage of architectural achievements is vanishing under the pressures of development and urging that ways be found at once to preserve what can be saved. Several awards were given in 1980 commending technological innovation, and this year the structure of the Hajj Terminal was chosen in this category. Attention was paid by the first jury to the importance of reviving vernacular craft skills, and was paid again this year, not only because the crafts are essential to the restoration and maintenance of great monuments, but because labor-intensive handicraft often produces the most economical and environmentally appropriate small structures.

In addition to restating all but one of the important themes of 1980, this year's jury members played a major chord of their own. Architecture, one of the jury choices reminds us, is at its best a lively *contemporary* art. And the jurors found a particularly original, spirited and lovely building that proclaims this—Sherefudin's White Mosque in Yugoslavia. *Mildred F. Schmertz*

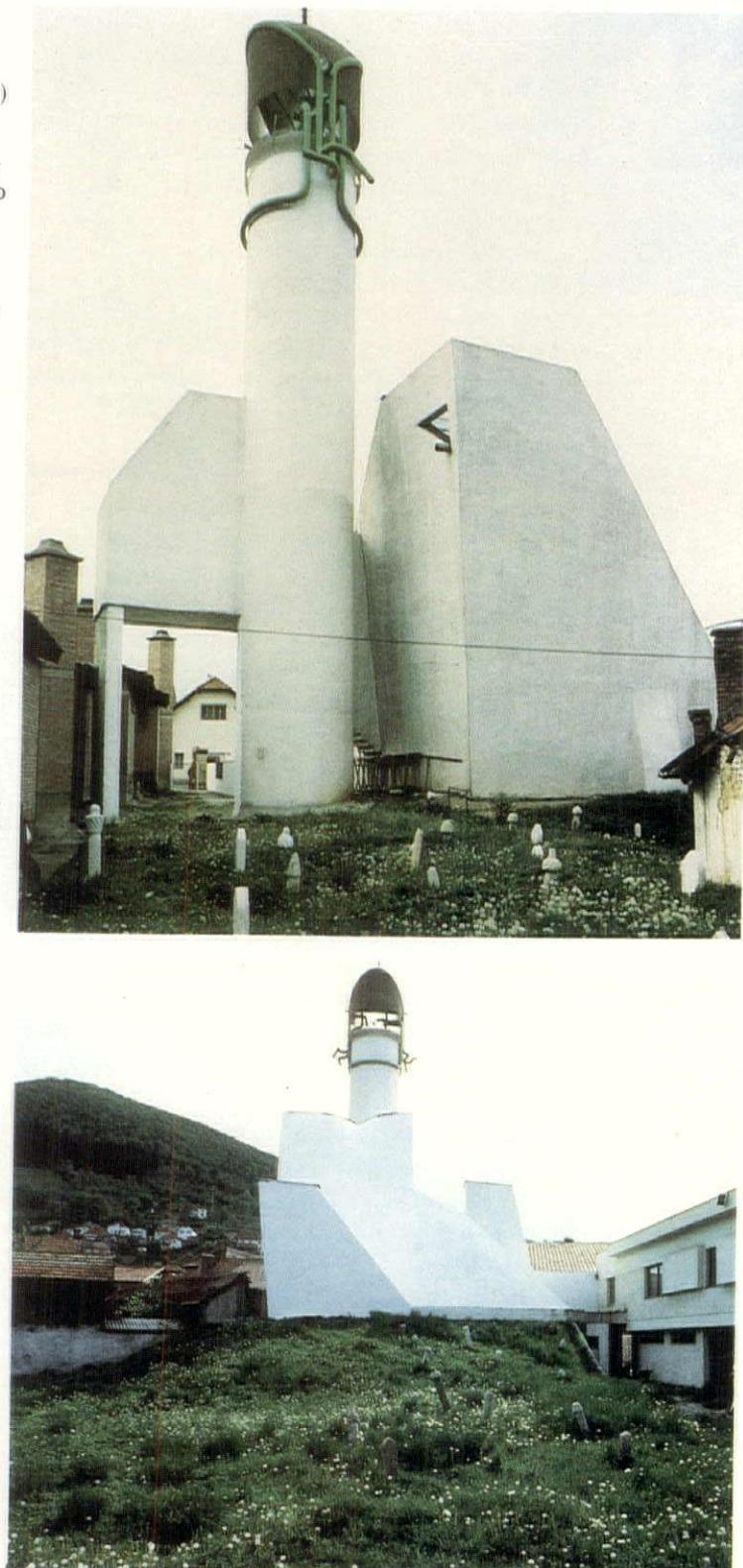
## Extending the vocabulary of the mosque

Sherefudin's White Mosque  
Visoko, Yugoslavia

Of the 11 projects selected for awards, the "white flower," as one juror described it, was the most widely (but not universally) admired by the jury of the Aga Khan Award for Architecture. They found this small and lovely Bosnian mosque near Sarajevo to be "full of originality and innovation (though with an undeniable debt to Ronchamp), laden with the architect's thought and spirit, shared richly with the community, and connecting with the future and the past."

For the jury, the problem of extending the vocabulary of the mosque into the 20th century is one of architecture's most difficult and challenging tasks. Another is the need to integrate and absorb the ideas of the modern movement into the developing architectural scene. The jury admired the skill with which architect Zlatko Ugljen brought together the abstract (modern) and the representational (traditional) architectural elements of the mosque, and found his combinations of the technological and vernacular building elements extremely convincing. Commending the mosque for its "boldness, creativity and brilliance," the jurors had praise for the ambience of the interior, applauding the refined and elegant manner in which old and new materials are conjoined, and the subtle and sophisticated use of natural light. Most importantly, they noted, the interior, so avant-garde in concept, nevertheless maintains the traditional atmosphere of the mosque. Finally the jury commended the Muslim community of Visoko for its courage in building such an original and creative scheme.

The prize money was distributed as follows: architect Zlatko Ugljen—\$20,000; civil engineer Ognjeslav Malkin—\$3,000; contractor "Zvijezda"—\$3,000; craftsman Ismet Imamovic—\$3,000. The Muslim community of Visoko received \$16,000 to help maintain the mosque. The building was completed in 1980.



Jacques Betant photos except as noted

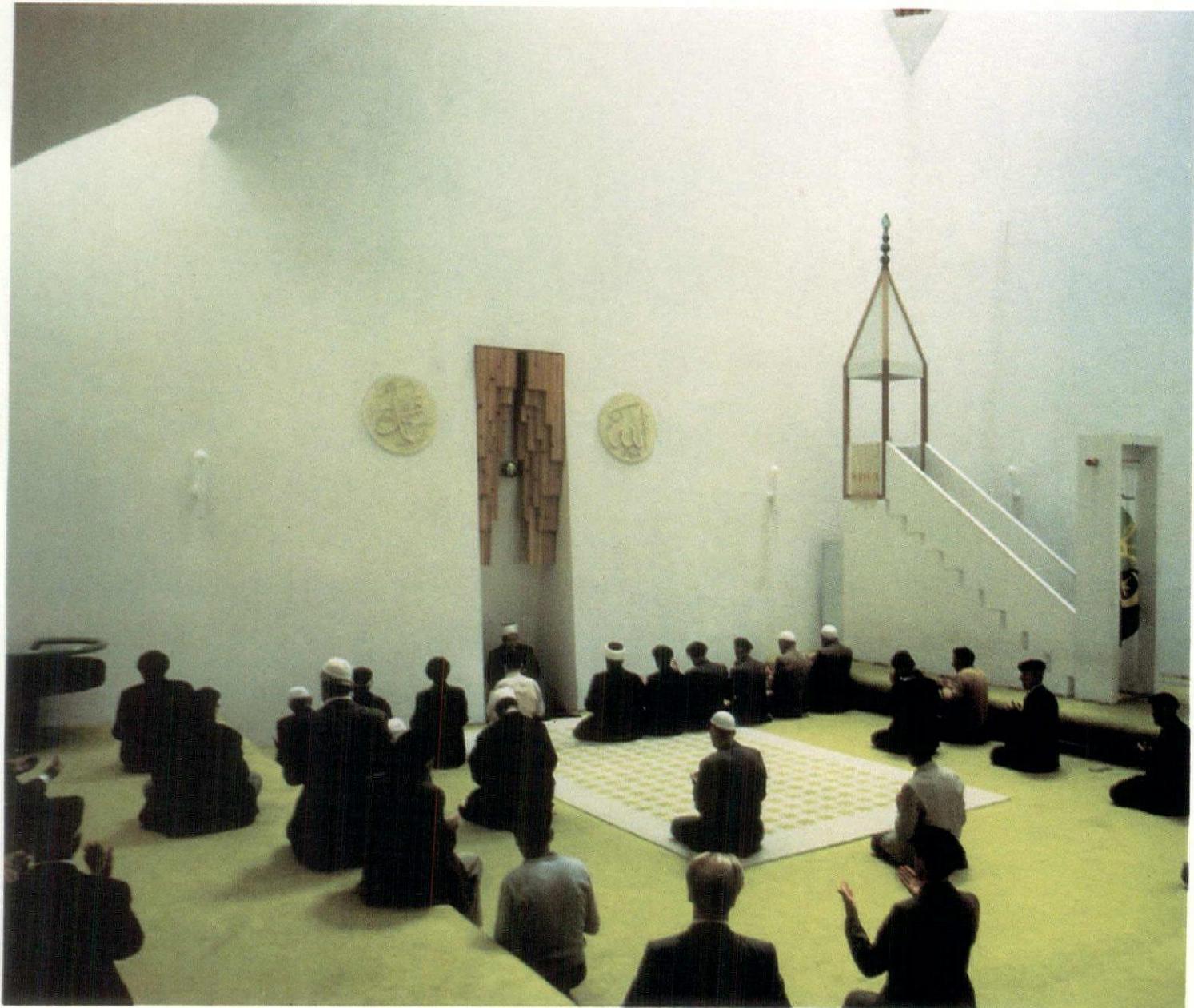
The new mosque, while somewhat larger than Visoko's principal mosque which it replaces, remains in good scale with its surroundings, yet stands out from them as an important landmark. The entire building is reinforced concrete. Its exterior is surfaced with stucco painted white and the interior walls are covered with white mortar. The sinuous green-painted iron tube that wraps the top of the minaret recalls Kufic calligraphy and also serves as an illuminating device.



Architect Ugljen has given Sherefudin's White Mosque a geometrically simple plan, a quiet, enclosed and protected worship space and a fresh folk-art character in his design of such principal symbolic elements as the mihrab, minbar, minaret and fountains. He included the surrounding old gravestones in the composition and relocated some of them for effect. Finally he placed the mosque as a

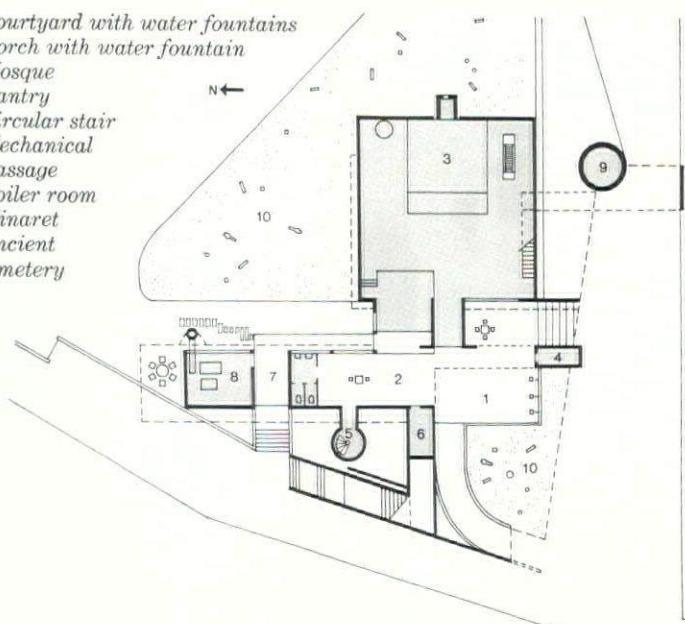
religious, cultural complex within a market area. Because of this level of care, Ugljen's highly original modern building is nonetheless a religious work which is deeply linked to Visoko's regional Ottoman mosque traditions. The award-winning mosque is one of several that serve the Muslim community of Visoko, near Yugoslavia's capital, Sarajevo. Visoko's population, which today exceeds

30,000 people, has been predominantly Muslim from the time of its occupation by the Ottoman Turks (1463-1878) to the present. Because Bosnian winters are rainy and relatively cold, with frequent snowfalls, both the mosque proper and its courtyards were designed to be more protected and enclosed than more typical mosques built in dry and hot climates. As the plans and section indicate, architect



As one descends the ramp leading to the first courtyard, replaced gravestones lie to one side and the splash of water from the fountains can be heard. The architect conceives this gradual descent into the mosque interior as a procession from the outer profane world towards the inner, intimate, sacred, communal atmosphere. The mosque proper is a perfect square in plan and free of columns. Except for the minbar and a stair against the south wall, the floor area is unimpeded by objects. The mosque holds as many as 300 worshippers on Fridays and holy days. Because it is also used for lectures, sightlines are improved by an arrangement of steps and platforms. Just behind the fountain (top right) is a glass wall visually interconnecting the inner and outer prayer spaces. A library annex and its entrance are located at street level.

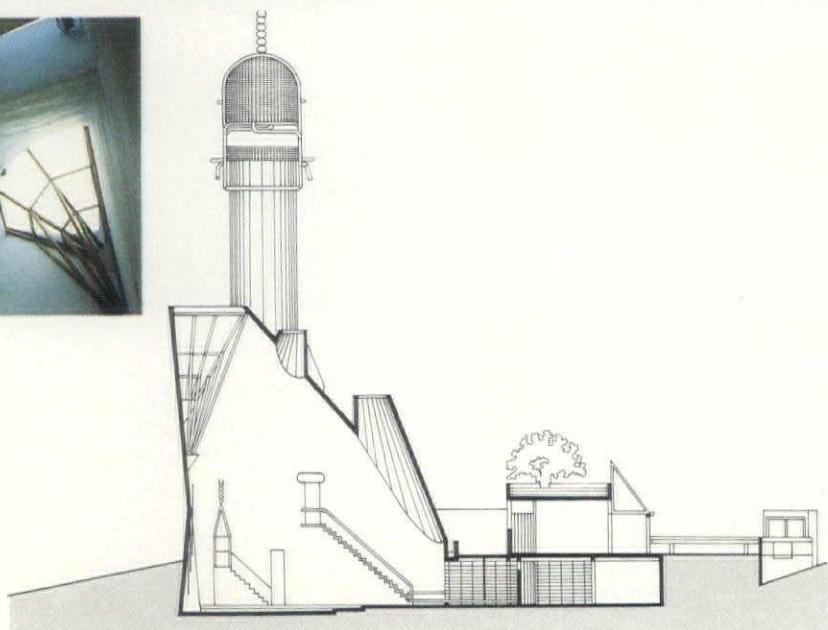
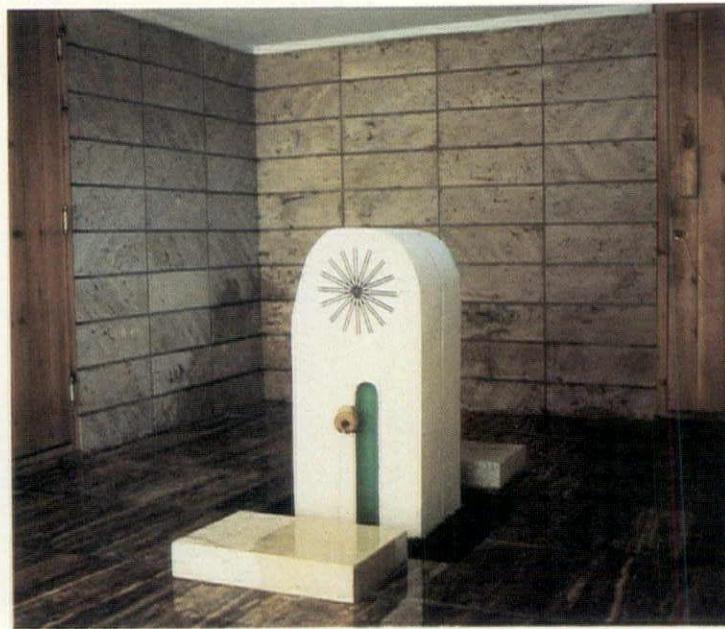
1. Courtyard with water fountains
2. Porch with water fountain
3. Mosque
4. Pantry
5. Circular stair
6. Mechanical
7. Passage
8. Boiler room
9. Minaret
10. Ancient cemetery



*Ugljen placed the worship area and the courtyards with their ablution fountains (below right) beneath the levels of the market street and the surrounding cemetery, connecting these spaces to the sidewalk above by means of a curved ramp. This very subtle arrangement not only increases the sense of remoteness and privacy within the mosque proper but helps to insulate it against heat loss. The archetypical*

*Bosnian mosque has a simple square plan crowned by a cupola and entered by means of a small porch. The White Mosque's plan conforms to the archetype, but its roof is a freely deformed quarter of a cupola pierced by five skylights, themselves composed of segments of quarter cupolas. The effect is one of confrontation between the elementary plan and the sophisticated hierarchy of roof cones.*

A. Yucel



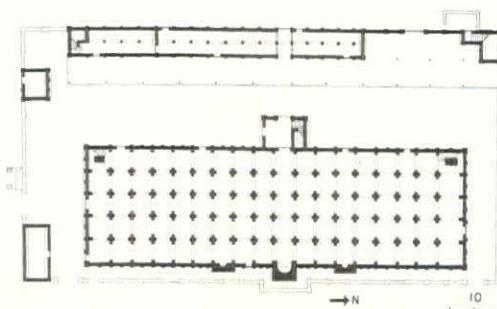
## A major source of continuing inspiration

This mud mosque, the work of a local master mason, Lassiné Minta, stirred considerable controversy among the members of the jury. According to the jury statement, some "felt strongly that in spite of its elegance and beauty, it was not in a class with the architecture of more sophisticated societies, that it represents the last efforts of a traditional culture that cannot survive for long; other jurors saw it, in its continuity and poetry, as representing a major source of continuing inspiration."

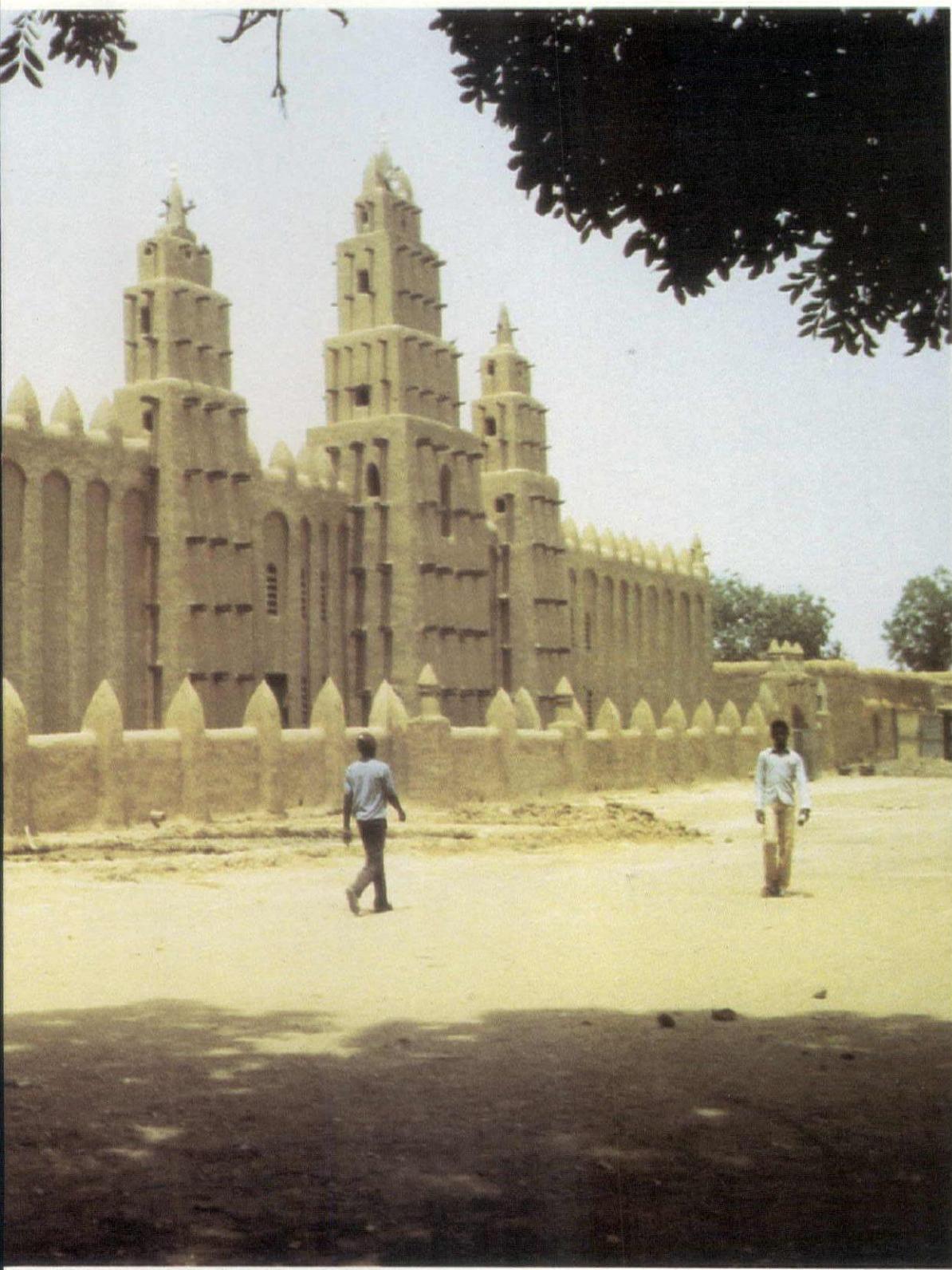
Islamic countries, like the rest of the developing world, are emerging from a past in which all esthetic objects were handmade toward a future whose products will be for the most part machine produced. In moving from a craft esthetic to an industrial esthetic, the continuing existence of traditional forms—both sophisticated and primitive—can be, in the words of the jury, "one of our strongest allies in retaining architectural character and cultural identity as large-scale modern industry and worldwide building models assert their presence. Hence the will and the conscious intention to continue the traditional should be commended and encouraged."

Minta conceived and constructed the mosque almost exclusively with local materials using only workmen from Niono. The construction techniques used reflect the deep and powerful tradition of vernacular architecture. In the opinion of the jury, only when Minta introduced new fenestration did the work "falter stylistically if not functionally." Considering this uncertainty to be a manifestation of the "ongoing process of change, reflecting life itself," the jury urged that this process receive "careful attention if we are ever to secure sufficient continuity—free of stylistic flaws—for the benefit of present and future cultural development. Hence the conscious volition of the community of Niono to continue their tradition in their contemporary building, thereby retaining cultural indigenous identity, deserves recognition."

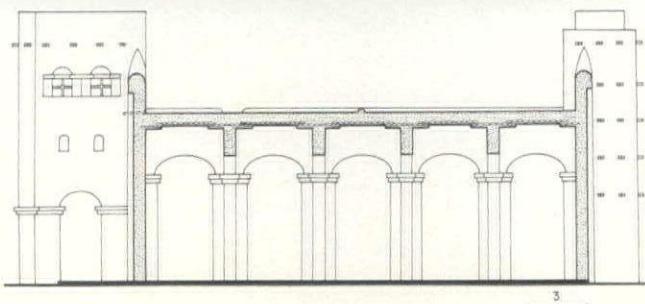
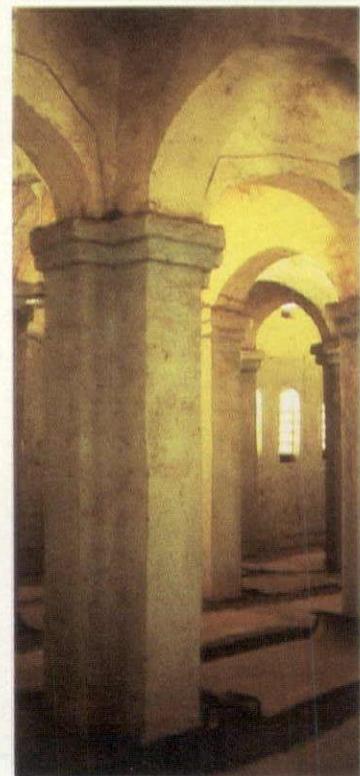
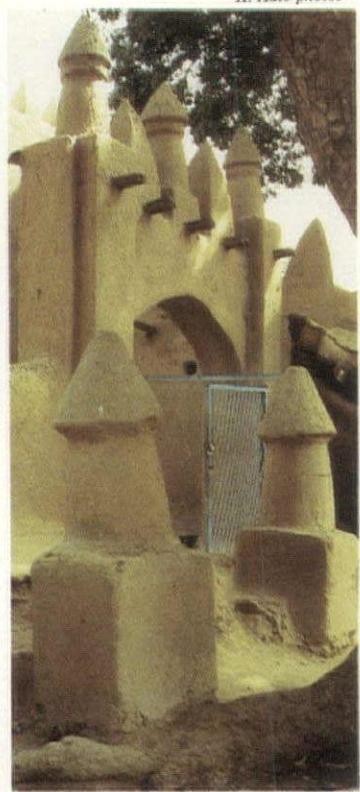
The prize money went to Lassiné Minta, master mason, and the committee of Elders of the Great Mosque, for the mosque, the former receiving \$15,000 and the latter \$30,000. The mosque was essentially completed in 1973.

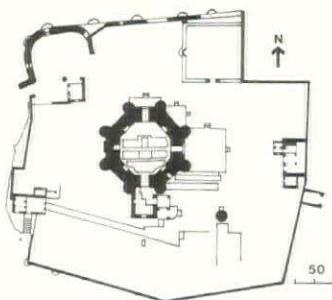


The Great Mosque of Niono  
Niono, Mali



K. Adle photos

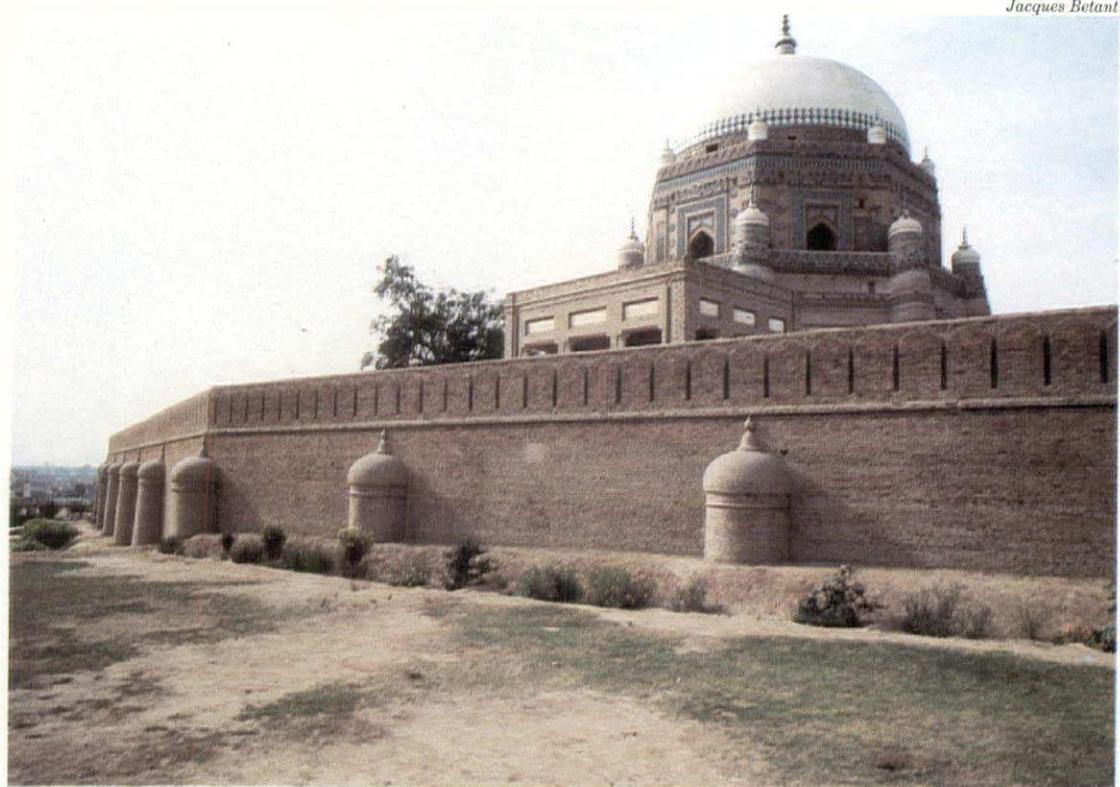




The restoration of the Tomb of Shah Rukn-i 'Alam Multan, Pakistan

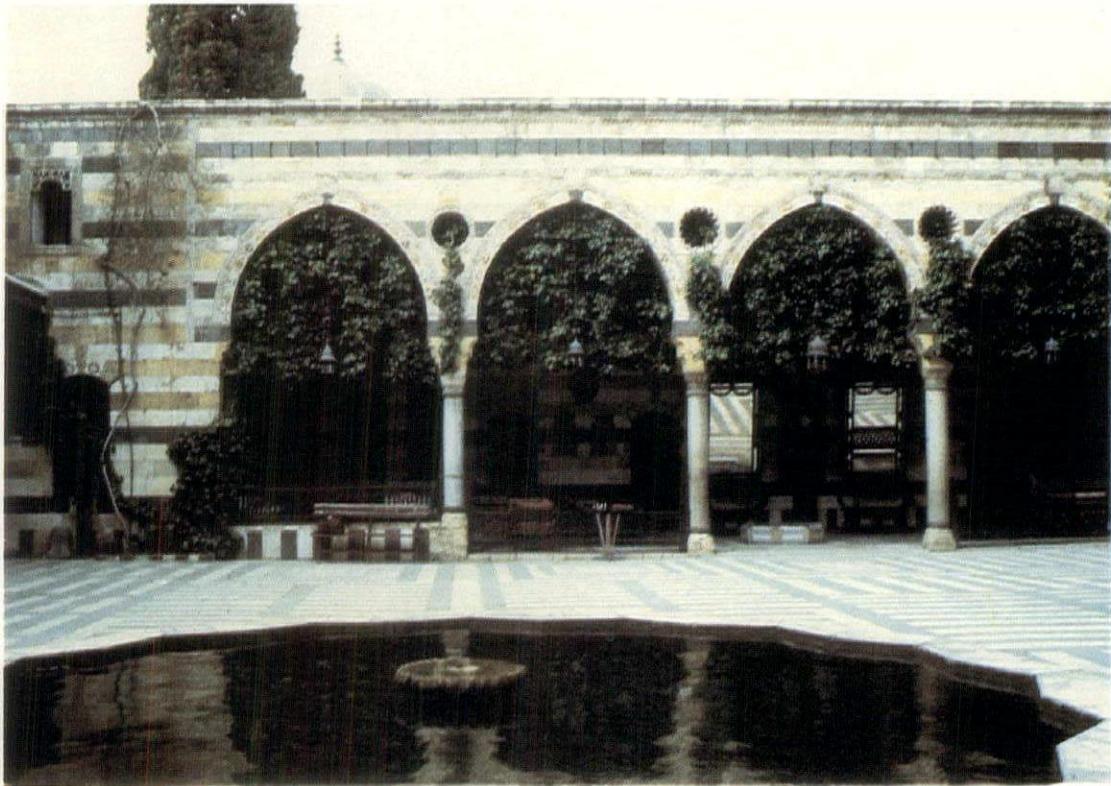
A conservation project of the 1970s, this 14th-century Tughlug-period tomb is one of the outstanding architectural treasures of Pakistan. The jury commended architect Muhammad Wali Ullah Khan for restoring it while establishing a training program for Pakistani artisans in the great crafts of 600 years ago and fostering an awareness of the need to conserve other great monuments in Pakistan. The award was divided as follows: \$16,000 to the Auqaf Foundation, for which the architect has served as conservator/director; \$15,000 to the architect; \$2,000 apiece to each of two civil engineers; and the remaining \$14,000 divided equally among the supervisor, a sub-engineer, a wood carver, two tile makers, a draftsman/photographer and the widow of the mason.

## Maintaining cultural continuity and traditional skills

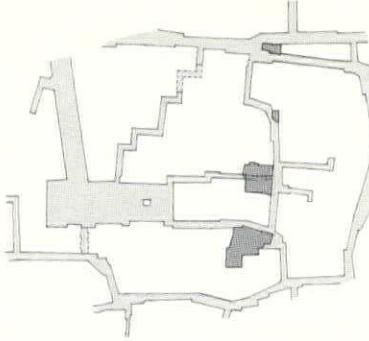


The reconstruction of the Azem Palace  
Damascus, Syria

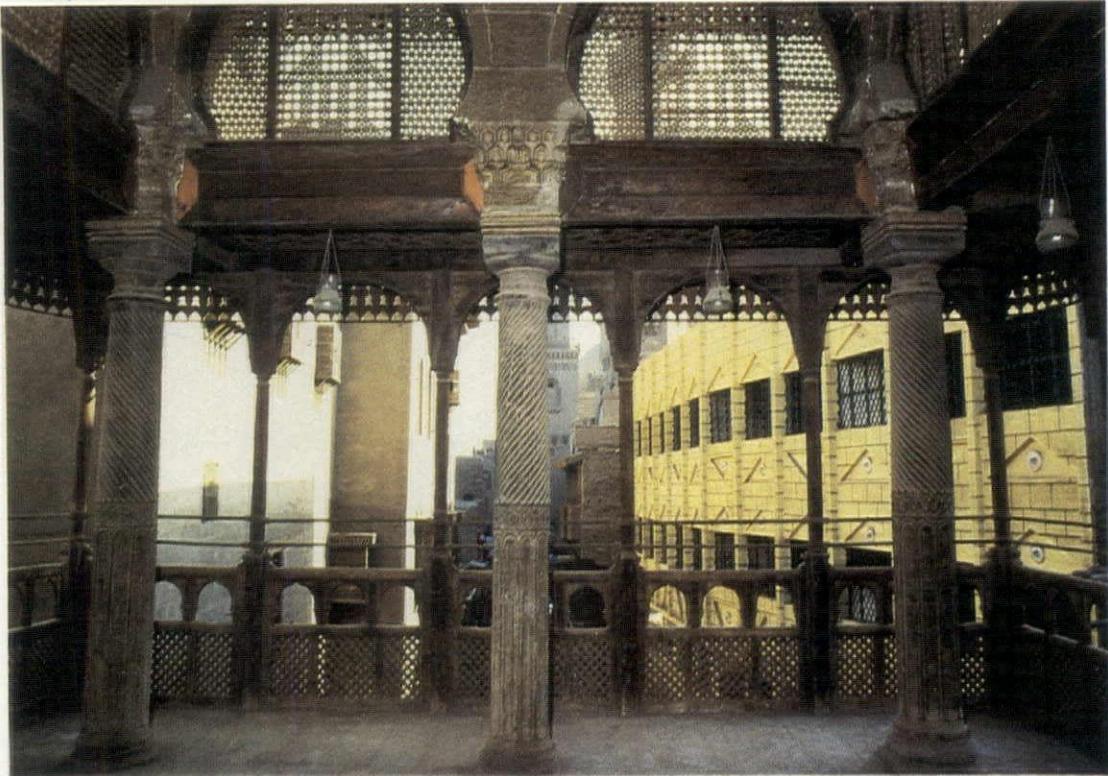
One of the masterpieces of 18th-century Islamic architecture, this palace was extensively damaged in 1925 when French troops shelled the old quarter of the city. After earlier restorations by the French architect Michel Ecochard in 1951, the Syrian government appointed Shafiq Imam to become curator of a proposed collection of folk art to be installed in the palace, and the director of the reconstruction and conservation work. The jury praised the high standard of the restoration, and the quality of imagination applied to the problem of rebuilding the destroyed parts of the palace. For example, M. Imam had the foresight to purchase for re-use in his reconstructions stones and ornament from other buildings of the same period being demolished to make way for the modern roads being constructed in Damascus. The jury noted also that this reconstruction has helped re-establish cultural identity and cultural continuity in the region and has contributed to the development of expertise and craft skills. Of the prize money, \$15,000 was awarded to Shafiq Imam; \$5,000 went to the director of the workshop, Zaqi Emir; \$5,000 was awarded to Michel Ecochard; and \$20,000 went to the Azem Palace Museum.



R. Gunay



R. Gunay

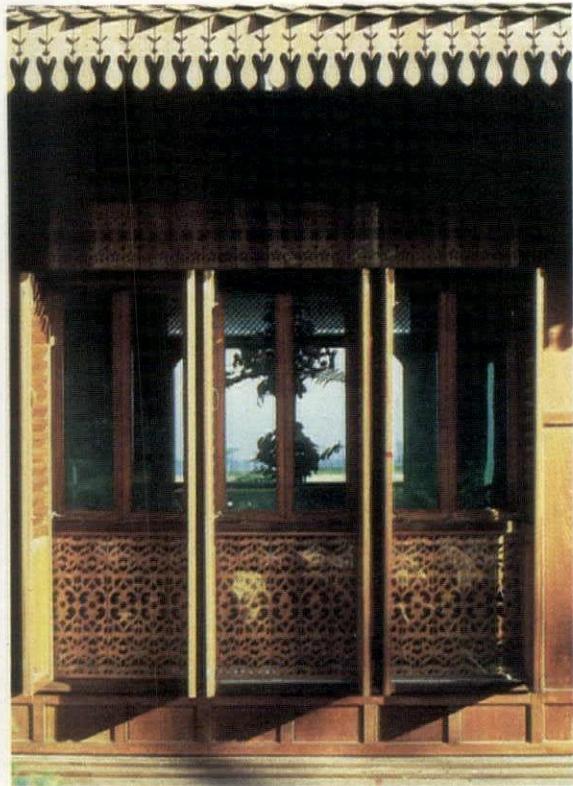


### The revitalization of the Darb Qirmiz Cairo, Egypt

The Darb Qirmiz is an obscure little lane in the ancient Fatamid quarter (site plan above). At one end is the most beautiful public fountain in Cairo, erected in 1744. The fountain is on the ground floor, and on the upper level a terrace (left) serves as a small Koranic school. This structure and two mosques and a mausoleum further down the street have been rehabilitated, and a small palace nearby is also in the course of restoration. The jury commended the effort to restore an historic area, admiring the "quality and purity of the restoration work." Responsible for the effort are the German Archaeological Institute and the Egyptian Antiquities Organization. The former has been awarded \$32,000 for the continuation of its work, and \$3,000 each went to the architectural historian, Dr. Michael Meinecke, and to the architect, Philipp Speiser. Architect Muhammad Fahmi Awad received \$2,000. And \$4,000 was distributed equally among four workers, with an additional \$1,000 going to Professor Abd al-Rahman Abd al-Tawal, general director of the Islamic sector of the Egyptian Antiquities Organization.



Jacques Batant



Tanjong Jara Beach Hotel  
and Rantau Abang  
Visitors' Center  
Kuala Trenggau, Malaysia

The tourist hotel is a building type for which elegant design is achievable. The jury commended the creators of this combined tropical, hotel crafts center and museum of local sea life (near turtle-hatching grounds) for having "the courage to search out and successfully adapt and develop an otherwise rapidly disappearing traditional architecture and craft, to meet the demands of contemporary architecture. The consistency and seriousness with which this approach has been pursued at all levels of design and execution has generated an architecture that is in keeping with traditional values and esthetics, and of an excellence matching the best surviving traditional examples."

The firm of Wimberly, Wihsenand, Allison, Tong and Goo, Architects, received \$5,000; Belt, Collins & Associates, landscape architects, and interior designers Juru Hiasan Consult Sdn. Bhd. received \$4,000 each. The local consultant, woodworker and tile maker also received \$4,000 apiece. The Tourist Development Corporation of Malaysia received \$20,000 for the museum and wildlife conservation program at Rantau Abang. The project was completed in 1980.



# Reviving the art of the Moorish garden

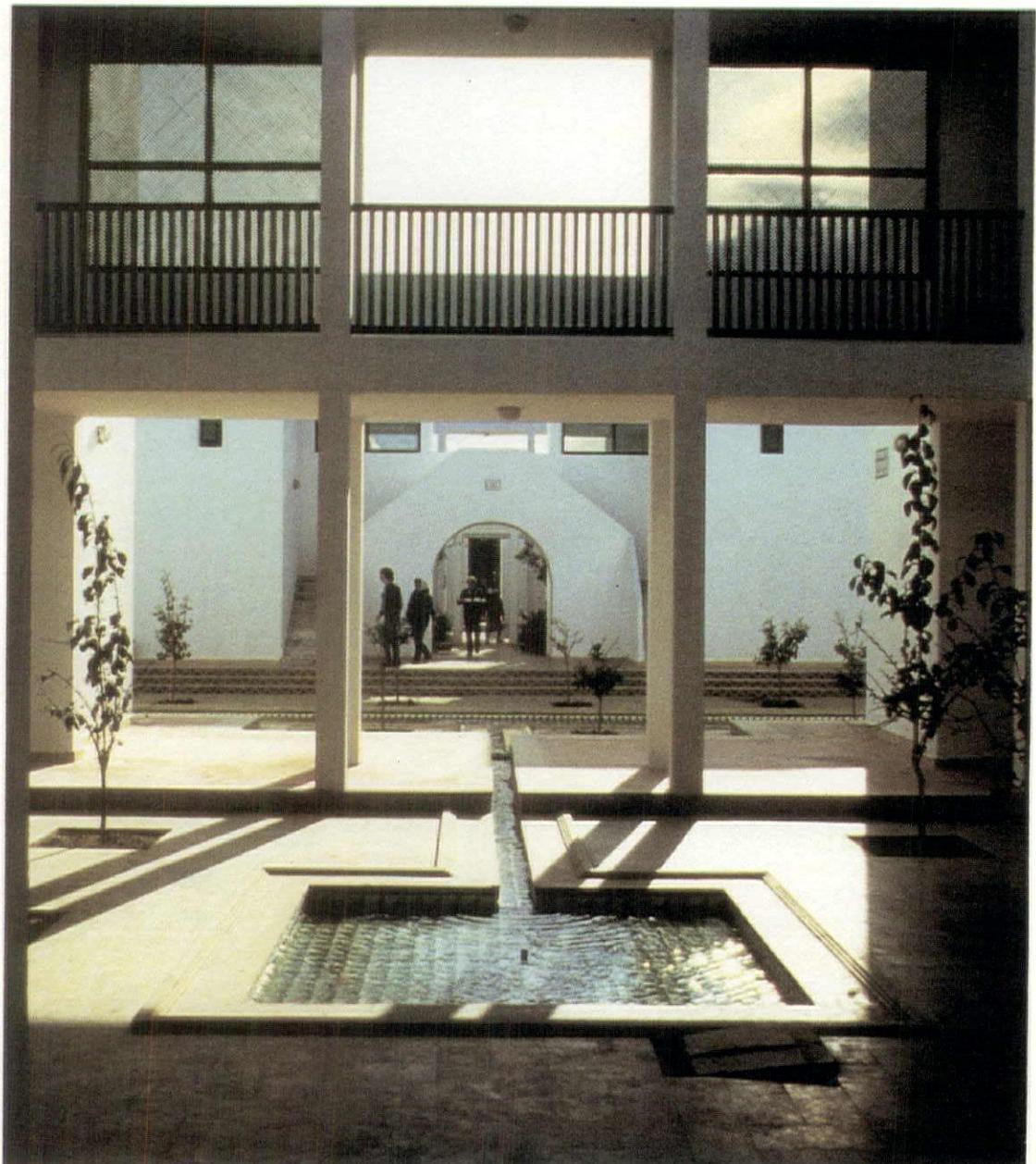
Residence Andalous  
Sousse, Tunisia

Much of the neo-Moorish architecture now widespread in Tunisia has a false exoticism in which Moorish ornament and forms are attached to buildings that are essentially Western in plan and construction. In contrast, for this hotel, architect Serge Santelli tried to achieve a contemporary expression of the structural and planning principles that govern traditional Arabo-Islamic architecture. To this end, he created an ordered series of symmetrical interior courtyards using porticos, iwans, pools, water channels, fountains and pergolas in a manner derived from traditional Tunisian domestic architecture. The latter consists of low houses of one or two levels arranged around courtyards or patios.

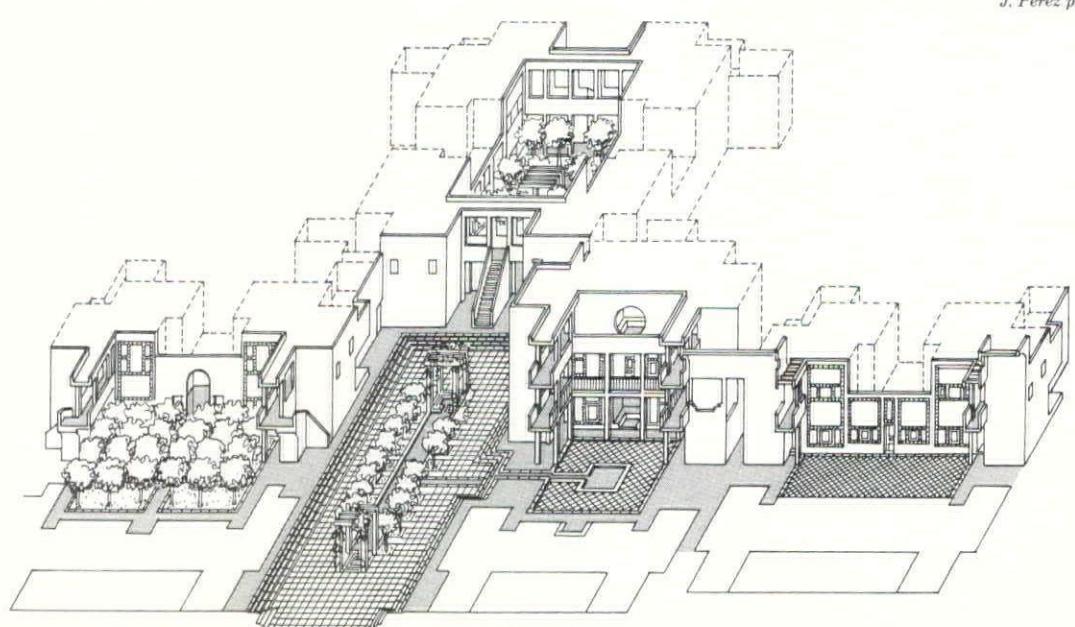
Because the hotel was sited in an uninteresting landscape (no views or attractive vegetation), the designer made the project itself the landscape event, focusing his considerable design skills upon the very center of the plan. All the courtyards are connected along a main longitudinal axis, from which secondary axes open. The succession of these courtyards along a simple path gives this hotel its original character and recalls the sequence of patios and gardens in traditional Arabo-Islamic palaces.

The jury commended the "simplicity and functional elegance of the design," finding it to be a significant achievement in the search for a new synthesis of the traditional and modern architectural vocabulary. They found particularly praiseworthy "the restraint with which materials and forms have been used and the subdued nature of the color scheme, which enable this group of buildings to achieve its imagery while avoiding pastiche effects."

Architect Serge Santelli received \$15,000; Cabinet G.E.R.A.U., associate architects and M. Cherif, \$5,000; and the Consortium Tuniso-Kowéïtien de Développement, \$25,000.



J. Perez photos





The courtyards, like those of Arab houses, are paved, and like their prototypes are entered by two or four porticos. Square or rectangular, these patios are volumetrically simple. They seem almost austere, but are enhanced by delicate ceramic decoration in the form of banding and panels. The dimensions of the courtyards differ and patterns of paving, pools and plantings vary from one courtyard

to another. The innermost courtyards, some of them planted with orange trees or jasmine, have the intimate quality of private gardens. As in all the great Arabo-Islamic landscapes, water is the most important element: it fills pools lined with traditional ceramic tiles, runs off through little channels and jets forth in fountains under pergolas. Covered walkways and galleries offer shade.



Bands of traditional tiles surround windows and form simple geometric patterns, not unlike those to be found on courtyard walls in traditional Arab houses. The windows are small and protected by wooden screens that filter the light. Doors are all of wood painted light green with dark-green frames. All joinery has been done by traditional methods.



*The hotel restaurant has four rooms, each with a capacity of only 20 seats, offering the hotel guests the feeling of dining in a very private space. Like the courtyards, the interior spaces are detailed and finished in the local Arabo-Islamic manner.*

## A new neighborhood in an old pattern

The task in reconstructing this residential commercial sector in the former Jewish quarter of Tunis was to insert new dwellings, offices, shops and a souk into a surrounding area bordered to the north and east by courtyard houses and narrow winding streets (photo below right) and to the west and south by modern construction including three four-story apartment buildings, a market, and two schools with playing fields.

The planners and consultants had two objectives: first, to try and maintain an harmonious relationship with the existing form and structure of the old neighborhood as well as to its modern additions, and second, to provide suitable housing for the poor from neighboring areas.

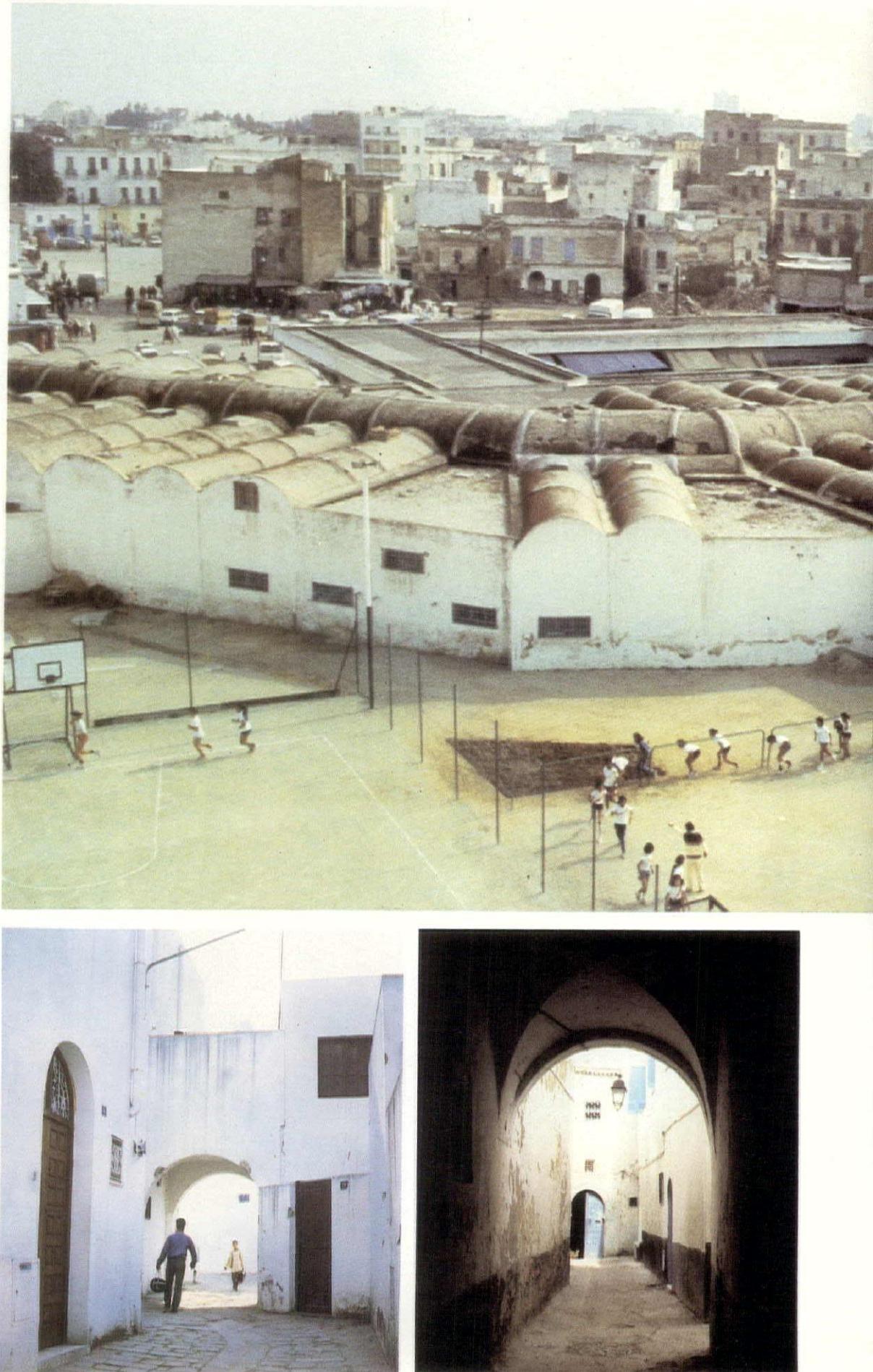
As the site plan indicates, the new barrel-vaulted souk (photo right) was located to serve as a barrier separating the new residential area from the large-scale facilities located to the west. The shopping street to the south faces lots which will remain empty until a later phase of construction. Most of the new dwellings are clustered around stone-paved common areas and pedestrian streets (photo below left). The project employs essentially low-tech construction in concrete and brick. Most of the on-site labor was unskilled.

Unfortunately, although the planners' first objective of maintaining an harmonious relationship with the existing urban form and structure has been largely attained, the goal of finding appropriate housing solutions for the poor from neighboring areas is almost a complete failure. Local political forces insisted upon eliminating the poorest inhabitants, and the housing is occupied by shopkeepers, artisans, white-collar workers, executives and professionals.

The jury praised the effort to accommodate the new buildings to the scale of the old medina and commended the use of the souk as both a linking and a screening device. "On the other hand," they noted, "the project is surely flawed: physically in its detailing and execution and socio-economically in its inability to cater to the needs of the lower-income residents of the medina."

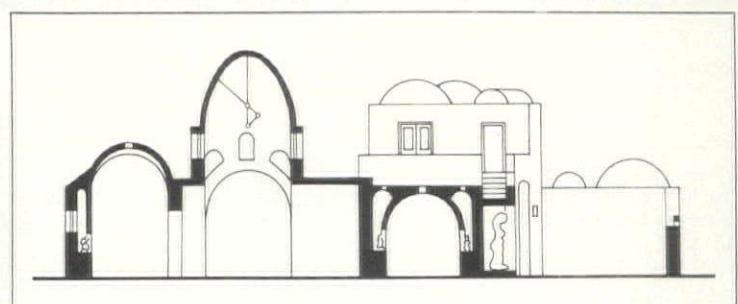
The award was divided as follows: \$30,000 to L'Association de la Sauvegarde de la Médina de Tunis to continue its work; and \$15,000 divided equally among architects Wassim bin Mahmoud and Arno Heinz and planner Jellal Abdelkafi.

K. Adle photos



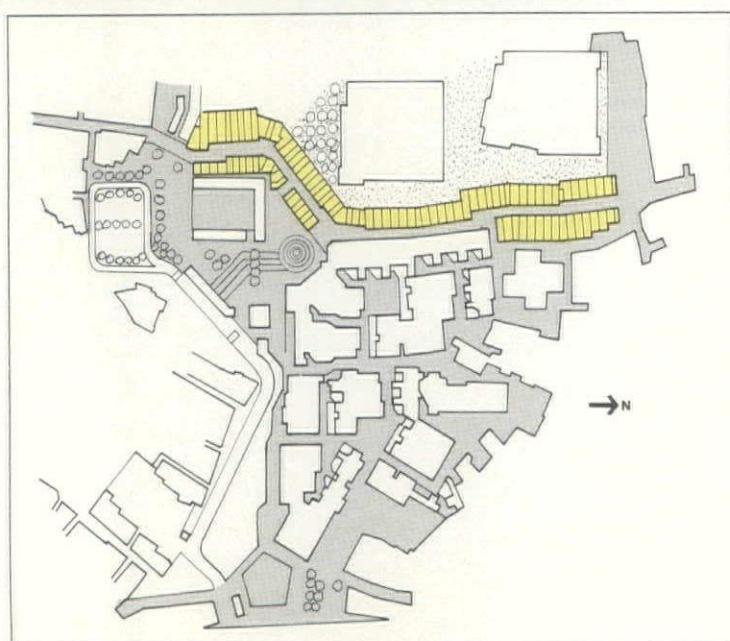
## Craft for craft's sake

C. Avidissian



Ramses Wissa Wassef  
Arts Center  
Giza-Cairo, Egypt

Near the pyramids outside Cairo, the center began as a weaving school in the early 1950s and has evolved over 20 years to comprise workshops and show rooms, a pottery and a sculpture museum, houses and farm buildings constructed entirely of mud brick. Founded by the late architect Ramses Wissa Wassef, it reflects his rejection of conventional modern Egyptian architecture and his search for ways of developing traditional mudbrick architecture to serve a wider range of needs. It also has a serious pedagogical intent, providing in the words of the jury "a place, supportive as well as poetic, where the young tapestry weavers of the community have been free to develop a local craft which supports the village with products of great excellence and reknown." The jury commended the center for "the beauty of its execution, the high value of its objectives, the social impact of its activities as well as the power of its influence as an example," and honors its endurance, continuity and promise. Shown above is a section through the sculpture museum. Wall niches contain terra cotta sculptures lit by unseen apertures on the outer wall. The roof domes and terrace of the weavers' workshop are used to dry skeins of dyed wool (top). The \$45,000 award was made to the Ramses Wissa Wassef Arts Center for the continuation of its work.



# A home reflecting traditional ways of living

Nail Cakirhan Residence  
Akyaka Village, Turkey

This traditional and well-crafted house was designed by Nail Cakirhan for himself and his wife. He also directed and supervised its construction. Because he wanted the house to remind him of the modest and peaceful traditional dwelling a few miles away in which he grew up, he studied the older local houses very carefully before he began.

Cakirhan was never formally trained as an architect. A journalist and poet until his forties, he first became interested in construction while accompanying his archaeologist wife Halet on her field missions. After spending over a decade as a supervisor of construction projects, he was over 60 years old when he began a new life as an architect by restoring his mother's house with the aid of two traditionally skilled local carpenters, themselves over 60. This award-winning house was their second project together.

Cakirhan and his wife wanted a house in which the functions of living and working, gathering with friends, and sleeping could overlap in the same space or change according to the time of day. A generous loggia was needed to provide additional living space during the warm season. Separate bathrooms for themselves and guests, two kitchenettes and lavatories completed the program.

The house was built beneath old pine trees facing south towards the cool sea breeze. Its ideas and forms were not formally drawn on paper, merely sketched and then plotted on the ground as traditional master builders used to work. In addition to the open loggia on the



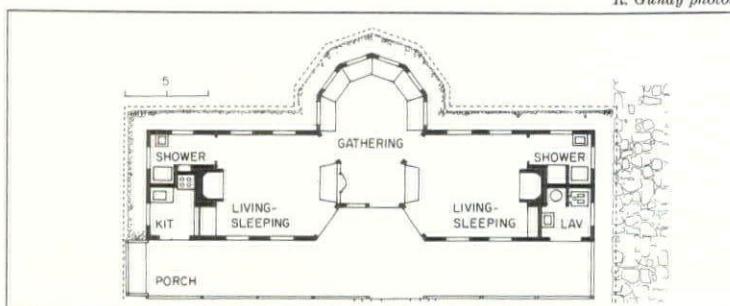
R. Gunay photos

southern facade, the house has two identical living/sleeping rooms, each with a fireplace flanking a wide and deep foyer and a large polygonal central hall. Similar spaces are to be found in traditional Ottoman houses. Cupboards on either side of the central hall store bedding during the day. A traditional shelf passing continuously over the doors and windows ties the rooms together, as do the old-fashioned windows and richly ornamented wooden ceilings. No moveable furniture is used in the house with the exception of small tables and low couches with cushions placed below the windows in the central hall and the two living rooms. The loggia is supported on wooden columns and contains the traditional raised seat at the west end where the breeze is strongest.

The house has a traditional timber frame which resists earthquakes through its elasticity. The entire construction was traditional as well: all materials were locally produced and the four workmen (two masons plus the carpenters) were Turks. The house was completed in 1972.

The jury noted that the spatial configurations of the house continue and reflect traditional ways of living going well beyond the simple reproduction of past models. "Its ornaments," commented the jury, "are sober, genuine and judicious."

Nail Cakirhan was awarded \$15,000; the two master carpenters Ali Duru and Cafer Karaka received \$5,000 each and \$20,000 was given to Cakirhan for a conservation program for traditional houses in the Mugla district.





# A field of tents in the sky

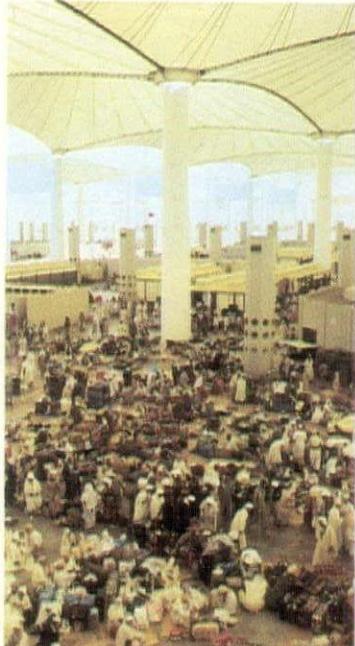
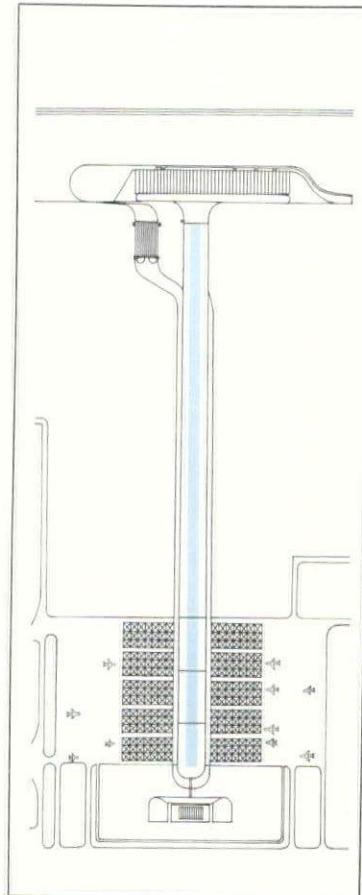
The Hajj Terminal was designed to house—for a short time—the approximately 950,000 pilgrims who will be on their way to Mecca in the year 1985. The capacity of the terminal at any one time is estimated at 50,000 pilgrims for a period of up to 18 hours during arrival and 80,000 pilgrims for periods of up to 36 hours during departure.

The fabric tension structure (RECORD, May 1980, pages 127-134) covers more area (105 acres) than any roof in the world. Twenty-one tent units, each 150-feet square, form a single module. The terminal is comprised of a total of 10 such modules: two identical five-module sections separated by a landscaped mall. Thus, the two large terminal units each comprise a total of 105 tents. The enclosed and air-conditioned arrival buildings are located under the tents along the outside edge of the terminal units parallel to the aircraft aprons (as can be seen in the site plan).

The tents are hooked to steel rings hung from suspension cables which are draped from single pylons in the interior of the module, ladderlike double pylons at the module edges and four-pylon towers at the corners.

In the jury's words: "The brilliant and imaginative design of the roofing system met the awesome challenge of covering this vast space with incomparable elegance and beauty. The Hajj Terminal structure pushed known building technology beyond its established limits, while demonstrating that such a massive structure can still be light and airy, a 21st-century echo of the traditional tent structures that have worked so well in desert climates. The scale of the structure and the uniqueness of the Hajj phenomenon that prompted its erection place it beyond the pale of direct replicability, but it will undoubtedly serve as a source of inspiration throughout the Muslim world for generations to come."

The award was distributed as follows: \$14,000 to the estate of the late Fazlur Khan; \$8,000 to the Skidmore, Owings & Merrill Fazlur R. Khan International Traveling Fellowship; \$7,000 each to Gordon Wildermuth and Raul de Armas of SOM; \$5,000 to Saudi Arabia's chief administrator for the construction of the terminal, General Said Y. Amin; and \$4,000 to administrator Mohamed Dahman. All modular tent structures were completed in January 1981.



SOM photos



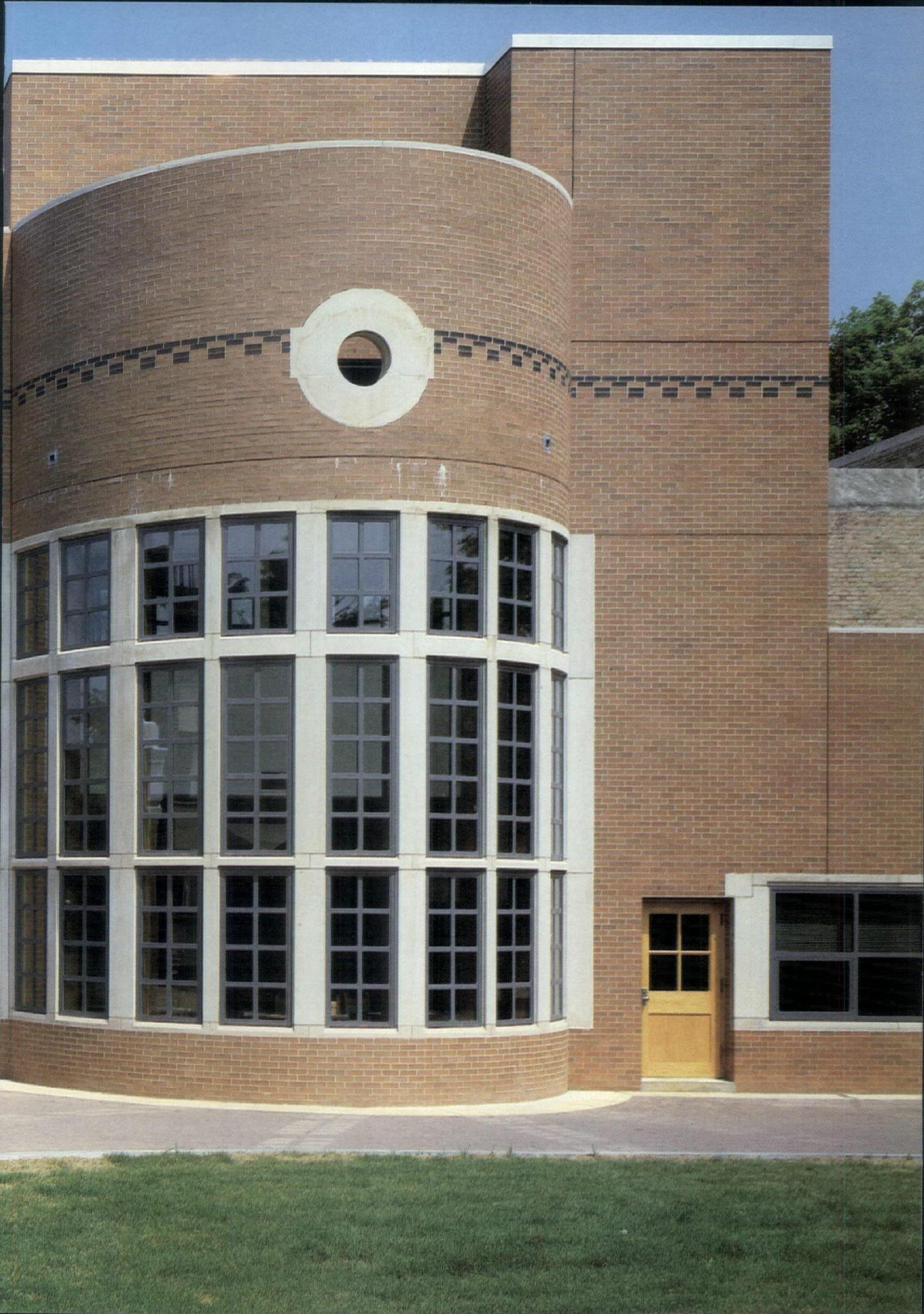
The structure of the Hajj Terminal  
King Abdul-Aziz International Airport  
Jeddah, Saudi Arabia



# Learning from Venturi



Gordon Wu Hall, Princeton University  
Princeton, New Jersey  
Venturi, Rauch and Scott Brown, Architects



*"Venturi's ideas and work...remain every bit as radical as the initial reaction to them in the late '60s seemed to suggest"*

By Alan Chimacoff and Alan Plattus

*"Some fifteen years ago in Complexity and Contradiction and later in Learning from Las Vegas we advocated architectural principles which were then considered polemical but which are now accepted wisdom. We called for an architecture that promotes richness and ambiguity over unity and clarity, contradiction and redundancy over harmony and simplicity."<sup>1</sup>*

It is somewhat surprising to reflect on the fact that Robert Venturi's book, *Complexity and Contradiction in Architecture*, is approaching its twentieth birthday and that several of the projects illustrated therein, notably his mother's house in Chestnut Hill, are now past that generational milestone. This means, of course, that a sizeable group, if not exactly a "generation," of architects have come of age reading, looking at, arguing about, and perhaps eventually taking for granted Venturi's ideas and images.

History, and especially architectural history, has been artificially accelerated by journalism and other media. Thus what is by any reasonable standard very much part of the recent past, if not actually of current events, is often rendered invisible by familiarity or failure to titillate senses jaded by a sustained overdose of the latest fashions. But it is possible that Venturi's ideas and work have been subjected to a process of low-level assimilation for yet another reason: that they were, and remain, every bit as radical as the initial reaction to them in the late '60s seemed to suggest.

In his introduction to *Complexity and Contradiction* Vincent Scully boldly, and with more prescience than almost anyone at the time was willing to admit, claimed that "It is probably the most important writing on the making of architecture since Le Corbusier's *Vers une Architecture* of 1923." What Scully did not point out is that Venturi's book challenged, in certain significant ways, the entire tradition of architectural theory since the Renaissance. From Alberti and the Quattrocento rediscovery of Vitruvius on, the principal thrust of the theoretical enterprise, with a few isolated exceptions, has been normative—concerned with the establishment and polemical propagation of rules, or systems thereof, according to which the "right" kind of architecture could be built, taught, and, of course, understood. Venturi, however, was not concerned with the substitution of one set of rules for another but rather sought to question, and even to undermine, the uncritical acceptance of any supposedly universal system of rules and the purity of style or taste they supported.

Although many architects have since been willing to entertain aspects of Venturi's argument and invoke his phrases, Venturi himself is one of the few who has evidenced the courage of those convictions in built work. As in any career, there have been lapses into the "one-liner" and the merely illustrative. But his recently completed Gordon Wu Hall on the Princeton University campus is decidedly not one of them. It is difficult and challenging in a rich and full-blooded way, and thus cannot be appreciated or even approached in the spirit of reductive "rule-

mongering." Wu Hall is a veritable case study in Venturi's tolerance of or, more strongly, preference for lack of definitive resolution as an expression of the circumstantial and inherent ambiguities of contemporary institutions, contexts, and techniques. At the same time, Wu Hall at its best displays Venturi's ability to sustain uncertainty against a background of thematic clarity: to be clear about the ambiguities he presents for consideration. It does not exactly disarm criticism, but rather challenges it to be, initially, as episodic and impressionistic as the building itself and, eventually, as genuinely accommodating and inventive as the program Venturi set out two decades ago:

*"A valid order accommodates the circumstantial contradictions of a complex reality. It accommodates as well as imposes. It thereby admits 'control and spontaneity,' 'correctness and ease'—improvisation within the whole. It tolerates qualifications and compromise. There are no fixed laws in architecture, but not everything will work in a building or a city. The architect must decide, and these subtle evaluations are among his principal functions.... He does not ignore or exclude inconsistencies of program and structure within the order."<sup>2</sup>*

The circumstances of site and program that condition Wu Hall seem, in many respects, made to order for an approach like Venturi's. This is of course an ex-post-facto impression based on the particular interpretation Venturi has advanced. But it is important to recognize the way in which the building emphasizes, rather than suppresses, the heterogeneity of the program and celebrates, rather than obliterates or ignores, the difficulties of the site and the architectural context.

The programmatic requirements include what initially appear to be a relatively simple set of functions loosely grouped around the idea of a social and dining center for a new residential college (Butler College) created by a shotgun wedding of two groups of adjacent but architecturally dissonant (in age, style, and configuration) existing dormitories. An inevitable point of reference for this project must be the tradition of the residential college as it developed at Oxford and Cambridge, and as it is so ably represented at Princeton by Cram and Goodhue's Graduate College of 1913.

Venturi alludes to this tradition and the typology in which it is embodied, as did the architects of many of the older Princeton dormitories, but he does not force a literal parallel in what is a fundamentally adverse context. The various public components of the traditional residential college are usually developed as more or less autonomous single-volume pieces (hall, chapel, library, entrance pavilion), which may be chronologically and even stylistically disparate. But they derive their institutional coherence by reference to a mutually defined and shared exterior space—the courtyard, cloister, or quadrangle. Venturi reinterprets this type in the face of several programmatic and contextual constraints, and in the light of a strong reading of the

Alan Chimacoff is a practicing architect in Princeton, New Jersey, and a professor of architecture at Princeton University. Alan Plattus is an assistant professor of architecture at Princeton University.

*"Wu Hall represents the mature work of an office that has generated an extraordinary variety of ideas and images and is not afraid to apply them..."*

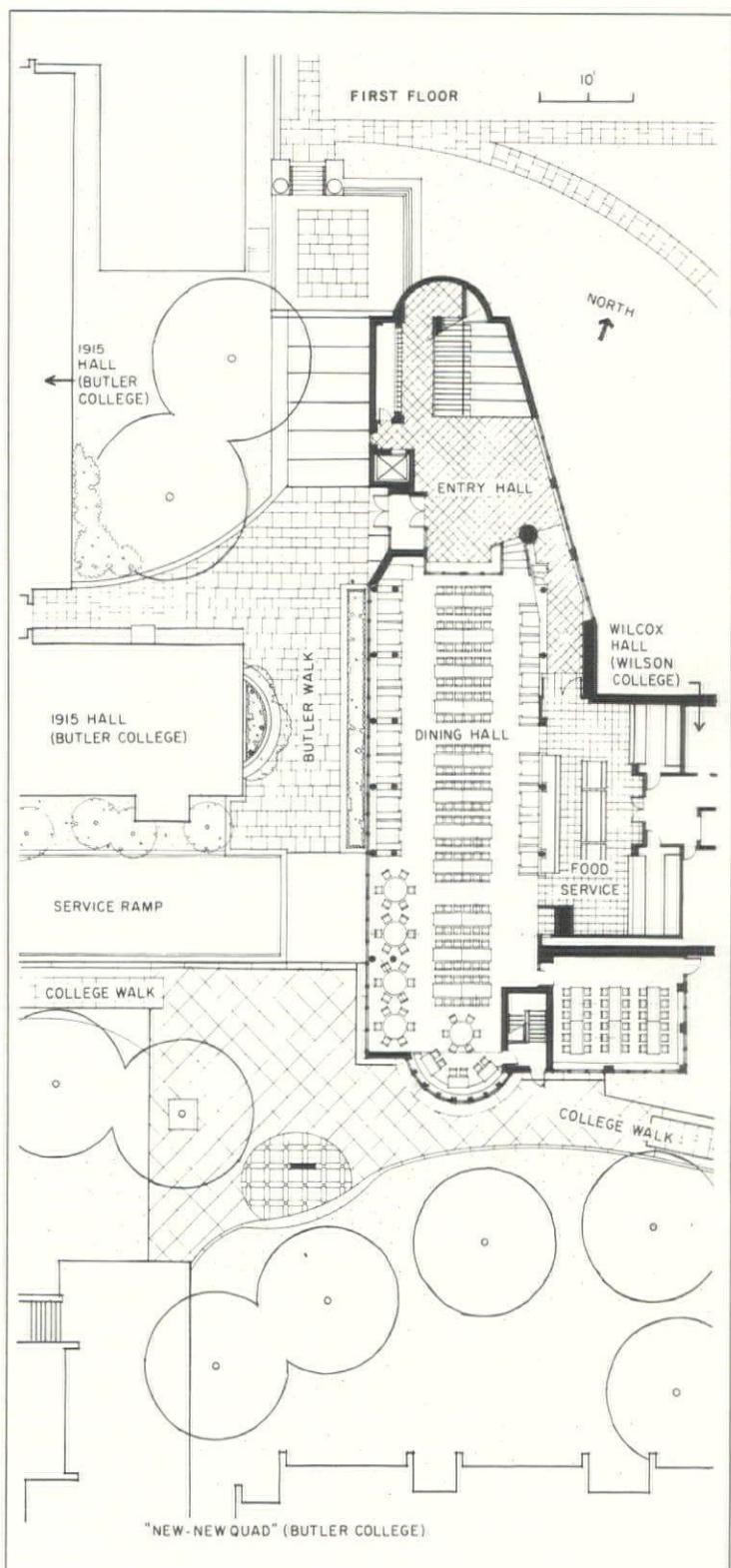
way the Princeton campus works.

First of all, the dormitories designated for incorporation into Butler College—1915 Hall (modestly traditional, by Aymar Embury, 1949) and the five dormitories of the “New-New Quad” (aggressively modern, by Hugh Stubbins, 1964)—are not only uncongenial neighbors but lie on opposite sides of a major transverse campus walkway, College Walk. Secondly, the program recommended an attachment to Wilcox Hall (which belongs to the ambiguously adjacent Wilson College) to the east, for the purpose of sharing service and food-preparation facilities, as well as a coordination of levels in order to share the Wu Hall elevator for handicapped access.

Finally, and most importantly, the over-all structure of the Princeton campus (insofar as such a structure exists), and especially the lower (southern) end of the campus where Wu Hall is situated, is not, with certain local exceptions, based on the kind of planning suggested and revealed by the conventional analytic/design techniques of figure-ground space-making within an urban grid (as at Oxford or Yale), or axial alignment governing the position of buildings and their entrances within a hierarchical system (as at Columbia or Stanford). Princeton, like so many “unplanned” American campuses, has a structure based on long lateral paths (e.g. College Walk) and short connectors, which move past and collect individual buildings and groups of buildings that are internally coherent on their own terms. It is indicative of Venturi’s sensitivity that he has recognized, accepted, and enhanced this nonformal planning while responding to the difficulties of establishing a relationship across College Walk and attaching to, but turning away from, Wilcox Hall.

Venturi responds to these diverse and often conflicting conditions with impressive economy. The programmatic elements traditionally unified by a shared exterior space are here packed into a single volume which is inflected, but not itself fragmented, to indicate its diverse ingredients and respond to a radically fragmented context. This volume is then slipped with elegant awkwardness into its interstitial site—a site that seemed not to exist until Venturi built on it—so that it flanks and asserts its presence along both College Walk and Butler Walk. Neither path is interrupted by buildings or courtyards attempting to establish a literal link between the components of the college, nor are the paths misinterpreted as academic axes aimed at entrances. Both, however, are temporarily appropriated and decorated, where they pass Wu Hall, as the public space of Butler College.

This strategy is reinforced by the syncopated position of Wu Hall in relation to the adjacent buildings, which it overlaps and acknowledges volumetrically without attempting to mimic or “complete” as artificially imposed figures. Thus the necessary institutional relationships are suggested by allusion and gesture rather than by literal spatial connections. The identity of Butler College is thus insinuated by the carefully ambiguous position of Wu Hall as it slides past 1915 Hall, leaning towards the “New-



*Venturi’s ability to establish a balance between the formal and the casually disarrayed is evident in the plan. The building is not fixed in a particular relationship of configuration with any of its neighbors. It slides past 1915 Hall to the west and gestures strongly toward the “New-New Quad” to the south as it links the disparate existing parts of Butler College together. The dining hall sits as a*

*discrete formal room, mostly uncompromised, while the circulation from the building entrance slides neatly behind to the food service area. At the north end the “grand-bleacher” stair draws attention upward and connects to the college lounge on the second floor. Views are open entirely throughout the length of the building between the bay windows.*

New Quad," like some great Gothic hall that has slipped its moorings in one local college context but has not yet arrived at a new resting point.

This interpretation of the dominant volume of Wu Hall as a Great Hall is perhaps the closest one comes to a single theme against which the profusion of incident can be read. But, it is more the case here that the building must be interpreted as "once the Great Hall, now filled in." The Hall, filled with the remainder of the Wu Hall program, has been squashed from a lofty Collegiate Gothic dining hall into a much more modest if no less aspiring "Collegiate Diner."

To achieve a sense of grandness in Wu Hall—as Venturi does with craft and cunning—is a real accomplishment. It is achieved primarily at both ends of the building, where "modern-Gothic" cylindrical bay windows in effect "steal" additional vertical space in small amounts to enormous advantage. At the northern end near the entrance the bay window is an exaggerated stair-landing-cum-window-seat extension of the "bleacher-stair" to the second-floor lounge. This, in conjunction with the adjacent dining hall and the companion bay window at its southern end, establishes the principal spatial theme of the building.

In spite of the programmatic pressures that have reduced it to modest proportions vertically, the dining hall is a remarkable room. It is long and narrow and lined on two sides with built-in booths; its walls are wainscoted with a board-and-bead oak paneling—all appropriate contemporary interpretations of the traditional model from which the room has been derived. Long refectory tables are arranged in pairs down the center of the room beneath a series of ceiling vaults that also run the length of the room, suggesting a loftier place. Suspended within the vaults is a single line of lighting fixtures. Designed as if a traditional chandelier, delineated in profile, had been extruded in length, the fixtures accentuate the length of the room, and illuminate the vaults, creating an indefiniteness about the actual height of the room—a significant contribution to the desire for verticality.

Although the south-end bay window encompasses barely 200 square feet, the vertical expansion it affords can be sensed from deep into the dining hall. It is a minimum-sized gesture that is suggestive and symbolic of "the Great Hall that cannot be" and thus far larger in its meaning and value than in actual size. Indeed it is that gesture that gives rise to the interpretation of the building as "once the Great Hall, now filled in."

At the second floor the filling-in of the Great Hall with the college administrative offices results in an organization that is fundamentally a modern single-loaded slab, with circulation against the back wall of the building and stairs at either end of the long corridor. One stair is a fire stair. But the other is an over-scaled "bull-nosed" grand stair that has expanded ceremonially to fill the entire width of the building, becoming not only a necessary vertical public connection but also a public space in its own right, bridging the gap between ground-floor dining room and second-floor lounge.

It is not clear at this point whether the lounge is intended to be a room or a significant widening of the corridor between the ends of the building. Its configuration is irregular and no definition is made by wall or column to distinguish between place and circulation. Without additional clues it might be assumed that the ambiguity was unwitting. Suspended from the ceiling, however, is a construction that creates a barrel vault, centralized above the main seating area and aligned in local symmetry with the fireplace. This vaulted construction suggests a room where clearly none exists and subtly demarcates a circulation route around the lounge area. Although the suspended construction is somewhat unsettling and precarious, it suggests the possibility of the simultaneous existence of the openness and flexibility of modern space made possible by the free plan and the configured definition of space characteristic of traditional architecture.

Of the major spaces in the building the library leaves the most to question. Unlike the dining hall, the library is without thematic structure—formal, typological, or decorative. And it is in the library that the major forces of the building intersect. The linear centralized thrust of the dining hall, indeed of the principal building volume, conflicts with the arrangement of the more circumstantial single-loaded scheme of the second floor, the two clashing with an awkwardness without purpose or meaning. There is also the representation of a cross-axis suggested by the arched "thermal" window placed high in the west wall, influencing the room from yet another direction. The introduction of a study balcony projecting oddly into the room exacerbates the problem. Lacking an underlying theme (or themes) to sustain the distortions and circumstantial incidents, the library confuses rather than stimulates.

Here in the library it seems as if Venturi has lost his control of "conflict management," as if his objectives have turned against him, and as if his rare ability to keep ambiguities clear has for once deserted him. Instead of representing a meaningful dialogue between inside and outside, the library seems to be the result of forces beyond control.

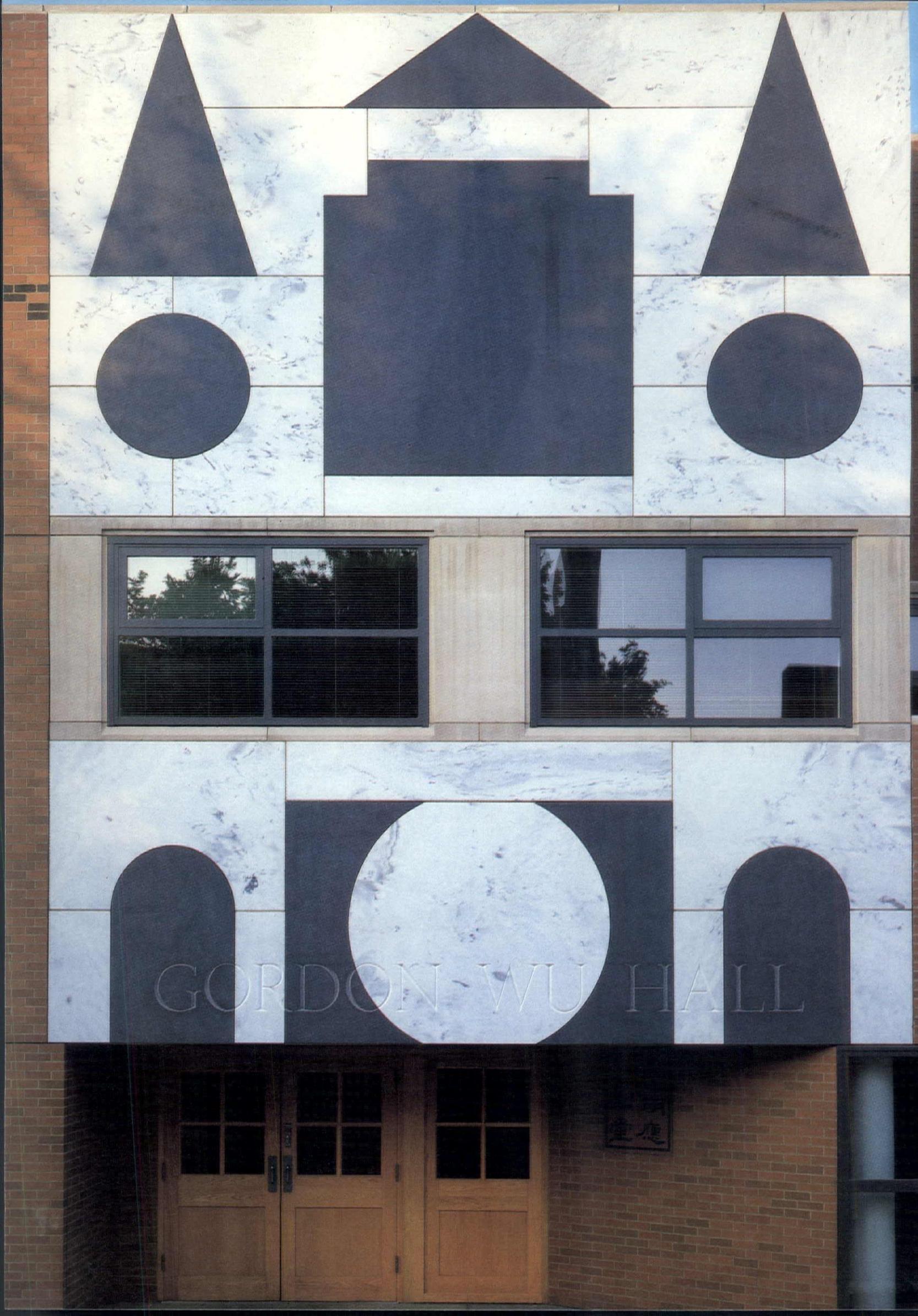
The forces that distort the library can only be understood by moving back outside the building and examining the west facade in greater detail as a register of particularized responses to the intricacies of the local context. Having understood the large-scale, single-volume gesture of the building on the site as a ship-like Gothic hall, ambiguously positioned in recognition of the disjointed components of the college it strives to constitute and identify, it is possible to read the episodic articulation of that volume as part of the same exercise in sustained ambiguity.

The west facade of Wu Hall is a hybrid creature from the outset. It is the principal public facade of the building, into which the heraldically decorated main entrance of the building is set, and against which all the major internal spaces are located. But it is also a piece of responsible contextual background. Rigorously respecting the continuity of Butler Walk, to which it presents a continuous and human-scaled edge, it serves as a vertically stable

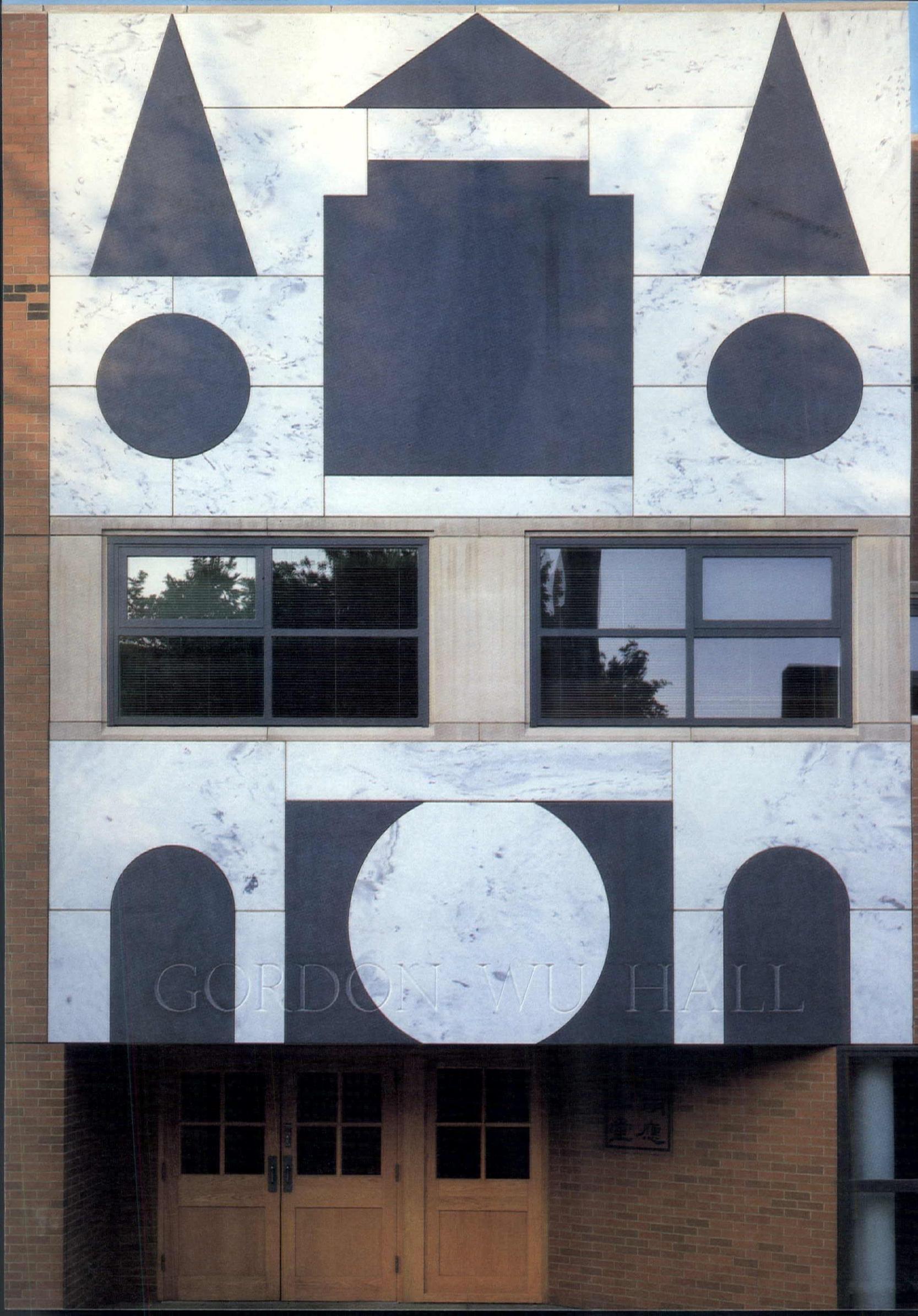
*Viewed from the principal approach from the main portion of the campus to the north (photo opposite), Wu Hall displays at the ground floor a continuity of surface and decoration that unifies the building over its entire length while the upper floor is articulated into*

*subsidiary volumes to respond to the pressures of local context and to emphasize the entrance. In the west facade the confluence of curtain wall and keystone, strip window and decorative panel, promotes an ironic dialogue between Modern and post (pre)-modern themes.*





GORDON-WU HALL



GORDON-WU HALL

*Showed opposite in an uncharacteristic frontal view is the ornamental panel above the entrance. Meant to announce not only the main entrance to the building but also the main entrance to Butler College, its starkness in contrast to the brick building*

*accomplishes those objectives and is especially effective when seen obliquely, as usually is the case. The self-conscious, cartoonish bit of heraldry is, however, the occasion of some controversy and disaffection, even among those who are taken by the building's richness.*

datum to the more or less random fragments of its institutional context. And while its configuration as an independent and spatially positive volume, bulging at either end, studiously avoids locking Wu Hall into a figural dialogue with any single building, its volumetric articulation above the continuous surface of its ground-floor level seems to indicate a set of local responses to the volumetric composition of 1915 Hall.

In this connection it is important to note that, for the students who use it daily, the principal approaches to Wu Hall involve oblique views of the long west facade. Thus the deep recesses in its upper floors serve to create a "skyline," qualifying the apparent length and singularity of the volume and setting up a series of local centers that are ornamentally articulated with conventional elements to indicate places of significance along the facade.

The west facade of Wu Hall is thus simultaneously the tautly stretched skin of an expanding volume, the "thin," continuously planar frontispiece of a programmatic "shed," and the active collection of a series of discrete and locally centralized incidents. The conjunction and carefully casual rendering of these various roles contribute to a facade that seems to shift and slide along its site in support of the ambiguous position of the entire building volume.

The rhythmic horizontal continuity and grammatical modernity of the ground-floor curtain wall (with visibly freestanding round white columns behind) and of the second-floor strip windows are momentarily arrested and qualified by the vertical emphasis and historical reference made by the black and white stone entrance panel, the clerestory "thermal" window, the keystone-like limestone inserts, and the vertical bay windows bracketing the entire facade. These in turn are qualified by their self-consciously "applied" character and such frankly modern details of assembly as the construction joints, which in the case of the keystones actually "cut through" the pretense of such details in what is clearly a non-loadbearing wall. No single episode remains undisturbed by Venturi's persistent irony. And none is allowed to dominate the composition for long: other themes literally slide out from under, keeping the facade in contrapuntal and sometimes discordant motion.

The refusal to allow the massing and articulation of the building to come to rest in any statically symmetrical or monumentally hierarchical composition seems especially appropriate considering Wu Hall's mediating position and role. The one exception to this undermining "rule" is the curious conjunction of several centralizing gestures on axis with the service ramp at a point where the building slides clear of its context and presents distant frontal views of the facade to the tennis courts farther to the west down College Walk.

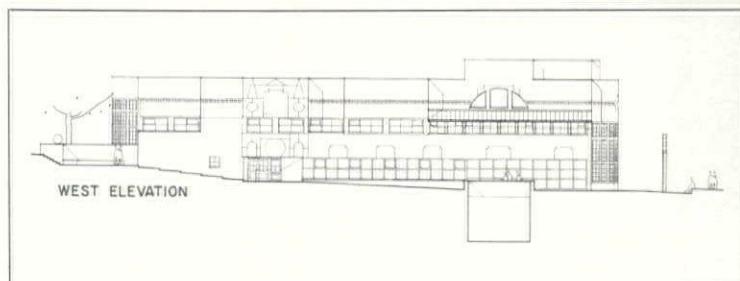
The position and treatment of the service ramp have been a focus of much unsympathetic criticism. But criticism of the ramp itself, which was the best available solution to the difficult problem of servicing both Wu Hall and Wilcox Hall, misses the



Tom Bernard photo



Tom Bernard photo



*The one exception to Venturi's general refusal to permit the massing and articulation of the building to come to rest in any stable symmetrical composition is found in the curious confluence of centralizing gestures on axis with the service ramp. The arched "thermal" window high in the library, in conjunction with the shed roof and keystone figures below, creates a static condition*

*precisely where one would expect confusion. The bay windows of Wu Hall refer via Lutyens to Gothic windows, whose hand-carved limestone frames were filled with a delicate tracery of leaded window frames. Venturi accepts the "clunkiness" of the modern manufactured window and places it in a machined limestone frame that only alludes to a handicraft tradition.*



The dining hall (opposite) takes its inspiration from the great "Collegiate Gothic" dining halls at Princeton. The elements of its composition—gridded bay windows, vaulted ceilings, chandeliers, wainscoted walls, and refectory tables—are poignant and appropriate contemporary interpretations of their historical predecessors. Venturi has responded to the programmatic

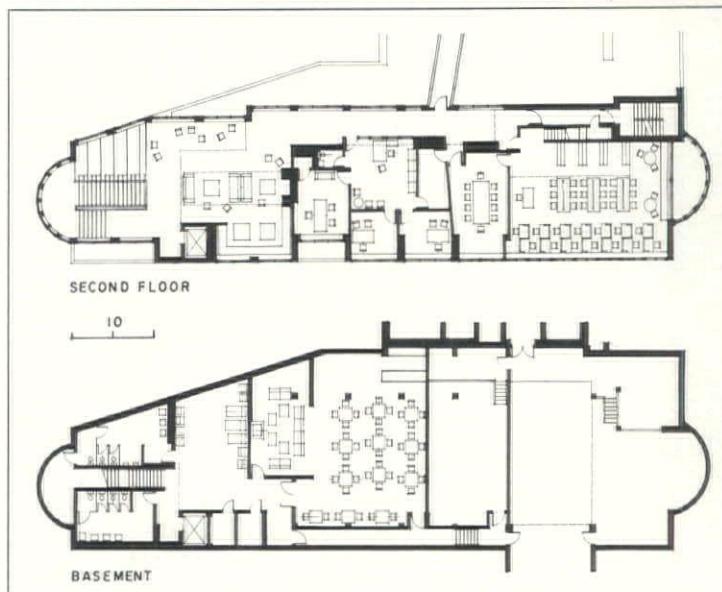
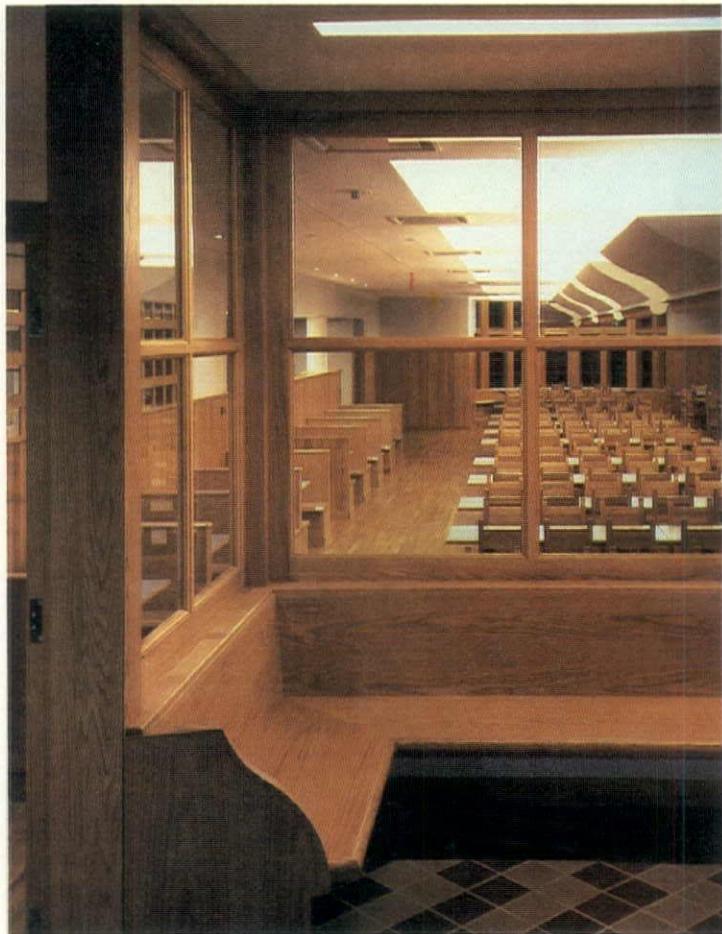
pressures and economic realities that compressed the height of the dining hall into a "Collegiate Diner" by illuminating the vaults from the suspended chandeliers, making the actual height of the room more difficult to discern and accentuating its verticality. The entrance hall (below), which is designed as a large vestibule to the dining hall, offers a view through the length of the building.

point. What does seem problematic is the emphasis Venturi places on the ramp by centering on it the only symmetrically stable arrangement of detail that is consistent through the entire vertical dimension of the building: It is a place where Venturi might have been expected to continue his strategy of slightly unresolved "slippage," without necessarily sacrificing the opportunity for large-scaled gesture.

The service-ramp episode recalls the sensibility that placed a controversial "pop" rendering of an Ionic column above the service ramp of the addition to the Allen Art Museum at Oberlin College (1973-76). But that column, which was only the most extreme sign of an attitude toward the economic and cultural impossibility of continuing the confident Renaissance classicism of Cass Gilbert's original museum of 1917, also points to the extent to which Wu Hall represents something more than the "decorated shed" epitomized by the Oberlin addition. Certainly Wu Hall's explicit allusions to the architectural historicism of the Princeton campus are rendered as thin and artificial versions of the more self-confidently illusionistic Collegiate Gothic stage sets of an earlier era. But they are nevertheless positively engaged in the life of the building—especially in the case of the bay windows—in a way that the rigorous separation of programmatic container and symbolic message in the theory of the decorated shed proposed as unnecessary (or even undesirable).

It is tempting to see Wu Hall as a return to the preoccupations of *Complexity and Contradiction* rather than an elaboration of the ideas emphasized in *Learning from Las Vegas*. This would be, however, only a partial account. In fact, Wu Hall represents the mature work of an office that has generated an extraordinary variety of ideas and images and is not afraid to apply them differently and selectively in a variety of contexts, often within the same building. A crucial distinction must be recognized. At Oberlin, where each of the disparate components of the program is given its own matter-of-fact shed, and all are then casually jammed together and into the existing museum, the message appears to be a vaguely pessimistic admission of irresolution and misfit. At Wu Hall, however, one finds the guarded optimism of a building that turns its difficult and conflicting tasks and circumstances to advantage, without wishing them away. The frankly modern shed is present and accounted for, as is the decoration, but here the two are engaged in a running conversation, with each other and with the particulars of context and program, that is richer and more challenging than anything Venturi has given us since his mother's house of 1962.

*"In this argument I have cast Modern architecture in a bad role, but I want to qualify my attitude toward the Modern movement and distinguish it from that of many of the postmodernists. I have never intended totally to reject Modern architecture in words or work, because I do, and I think our architecture should, in many important ways evolve out of it.... Today we focus on its excesses*

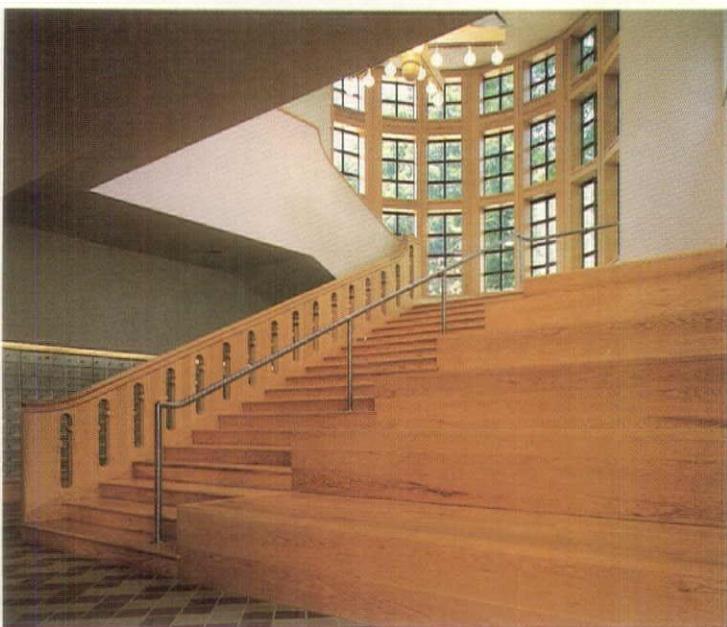


The basement houses recreation spaces including game room, TV room, and coffee house as well as bathrooms, receiving, and mechanical spaces planned in a casual and circumstantial way. The second floor is arranged as a single-loaded corridor scheme with the Butler College administrative offices separating the lounge at the top of the stair from the library at the south end of the building. The

corridor is illuminated with high windows placed along the back side of the building adjacent to Wilcox Hall, enabling the principal rooms of the second floor to have windows overlooking Butler Walk.

The dramatic but comfortable "grand-bleacher" stair offers a place for casual seating (by students awaiting friends before mealtime, for example) as, by sheer size alone, it promotes an awareness of the lounge located on the floor above. Along the way the stair engages the over-generous landing, located in the north bay window at an elevation that mediates between the levels of the site outside as the land

falls away from north to south. At the head of the stair is the lounge (opposite). Purposefully ambiguous in design, this area is irregularly configured over the entire width of the building. A centralized sitting area beneath a vaulted ceiling adjacent to the fireplace establishes a dialogue with the irregular configuration of the area around it.



Tom Bernard photo

Gordon Wu Hall, Princeton University, Princeton, New Jersey  
**Owner:** Princeton University  
**Architects:** Venturi, Rauch and Scott Brown—Robert Venturi, partner-in-charge; Arthur Jones, Missy Maxwell, project team

**Engineers:** Keast & Hood Co. (structural); Vinokur-Pace, Inc. (mechanical)  
**Consultants:** George Patton (landscaping)  
**General contractor:** Scozzari Construction Inc.

and weaknesses at the end, to the exclusion of its successes and glory at the beginning. This makes us want to be revolutionary rather than evolutionary, anti-Modern rather than truly postmodern.<sup>1</sup>

It is easy to become absorbed with the profusion of incident presented by Wu Hall, losing sight of the general attitude the building reflects. This has often happened with Venturi's buildings and writings, resulting either in complete rejection based on an inability to get past the stumbling block of one or more disturbing details or, perhaps more dangerously, in a misdirected acceptance that exaggerates certain explorations proposed by Venturi but misses the genuinely critical edge that informs his best work.

In Wu Hall that critical dimension comes from the fact that forays into the banal, the nostalgic, or the exotic are never allowed to become permanent migrations but are presented against a background that is fundamentally if qualifiedly Modern—and not just in terms of modern construction details and off-the-rack components. The siting and contextual treatment of the building have as much to do with the partial enclosure of directed space by object buildings, suggested by Le Corbusier's plan for St. Die, as with the intricate configurations of the Nolli map of Rome. The interior planning exploits the flexibility of the free plan, into which are set incomplete "paraphrases" of traditional space-making. And the "figures" of historical and stylistic allusion float across the surface of the building in clearly delineated quotation and/or question marks.

Venturi's positive relationship to Modern architecture has often been acknowledged, and it is important to recognize that at Wu Hall this alleged "modernity" is not merely residual. Nor is it a case of the increasingly prevalent attitude of seeing Modern architecture as one among many equally available styles. Indeed, Venturi cares enough about this recently unfashionable culture of modernity to have tried, continuously, to update it—that is, to prevent it from stagnating into a system of academic rules or puritanical prejudices. One has only to recall the opening passages of *Complexity and Contradiction*, where he deploys an argument that appeals unmistakably to the "calling card" of most architectural polemics since the 19th century: the *Zeitgeist*, or spirit of the times, of which Venturi presents his own revised version. It is perhaps the self-imposed obligation to engage persistently, if not to accept wholly, contemporary culture that gives Wu Hall its peculiarly disturbing vitality and raises so many challenging questions about where one thought Venturi—or, for that matter, architecture—was headed or had gone.

<sup>1</sup> Robert Venturi, 1982 Gropius Lecture (ARCHITECTURAL RECORD June 1982)

<sup>2</sup> Robert Venturi, *Complexity and Contradiction in Architecture* (1st edition, page 46)

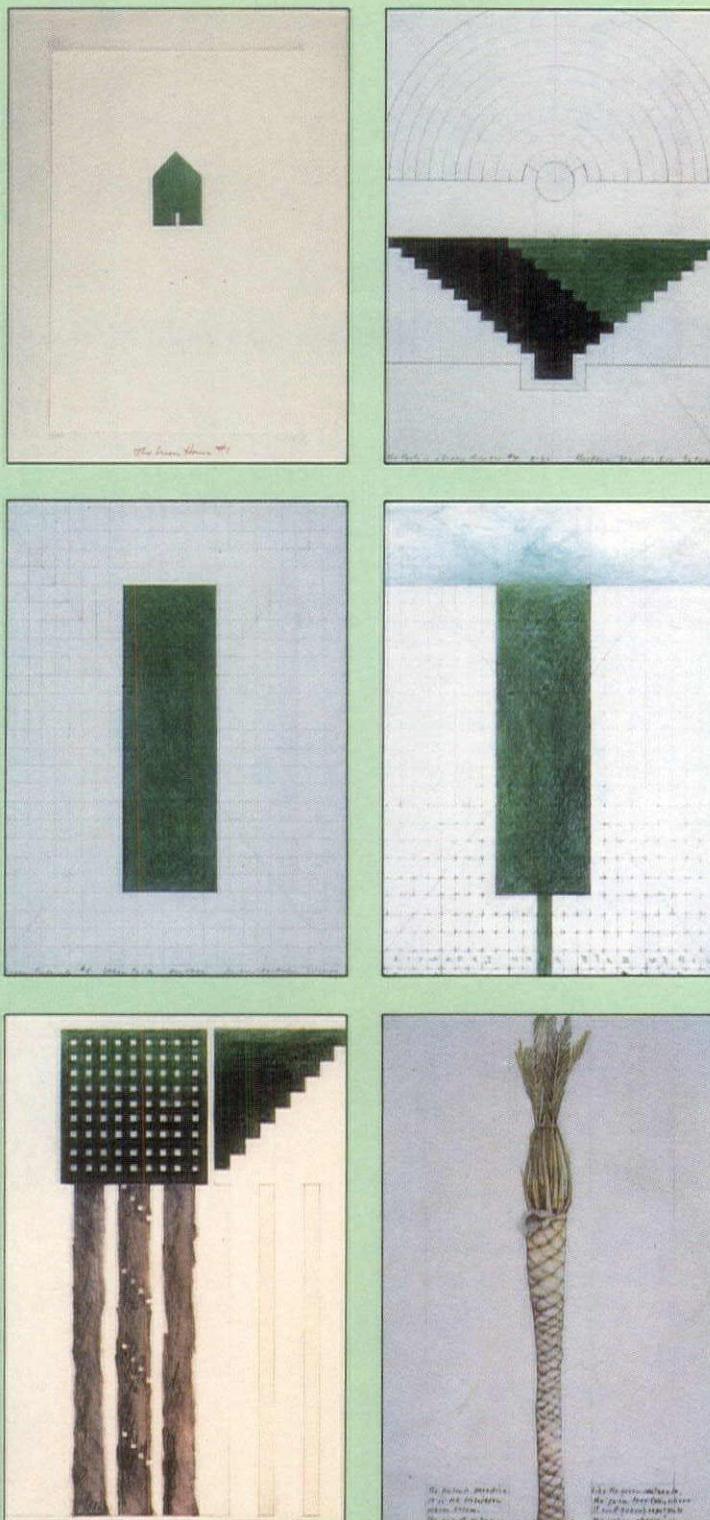
While the architect is referred to as Robert Venturi throughout, the authors recognize the collaborative nature of the projects and positions discussed.



# "Green architecture"

Among the more genial offshoots of the current enthusiasm for classical ornament and proportion is a renewed interest in the formal garden. Scholars have long cherished this mode of horticulture as a sacred precinct in the terrain of humanism, a landscape of man-made Edens that encompasses the well-tempered villas of Pliny the Elder no less than the amorous bower of the *Roman de la Rose* or the metaphysical pleasure of Andrew Marvell's "green thought in a green shade." Even though it is usually esthetic rather than philosophical pursuits that lead the present-day architect down the garden *allée*, there are still timely lessons to be learned amid the topiary, the floral knots, and the sun dials. Few of our contemporaries have conveyed the rewards of this study so engagingly as San Francisco architect Barbara Stauffacher Solomon, whose drawings we reproduce here. With pencil in hand, she has ventured beyond the familiar herbaceous borders of the picturesque Anglo-American landscape to the statelier terraces and avenues of an older European tradition. Besides delineating the features of great Renaissance and Baroque gardens, Solomon has attempted, in words as well as in drawings, to analyze the basic elements of all outdoor spaces shaped by the hand of man.

Most of our illustrations come from an exhibition of Solomon's work entitled "Green Architecture: Notes on the Common Ground," organized last winter by the Walker Art Center in Minneapolis, and displayed subsequently at the American Institute of Architects in Washington, at the University of Massachusetts, and at the Rhode Island School of Design. The exhibition will resume its travels early next year for an appearance at the Architectural League of New York. (The commentary by Barbara Solomon that accompanies our selection of her drawings has been excerpted from a special issue of the Walker Art Center's *Design Quarterly*, number 120, that serves as a partial catalog to the exhibition.) The "common ground" Solomon surveys is, by her definition, the area "where architecture and landscape overlap." Be it an aristocratic demesne, a city park, or a suburban back yard, this is an ambiguous zone, both organic and artificial, public and private, mundane and symbolically transcendent. "There is no line where landscape stops and



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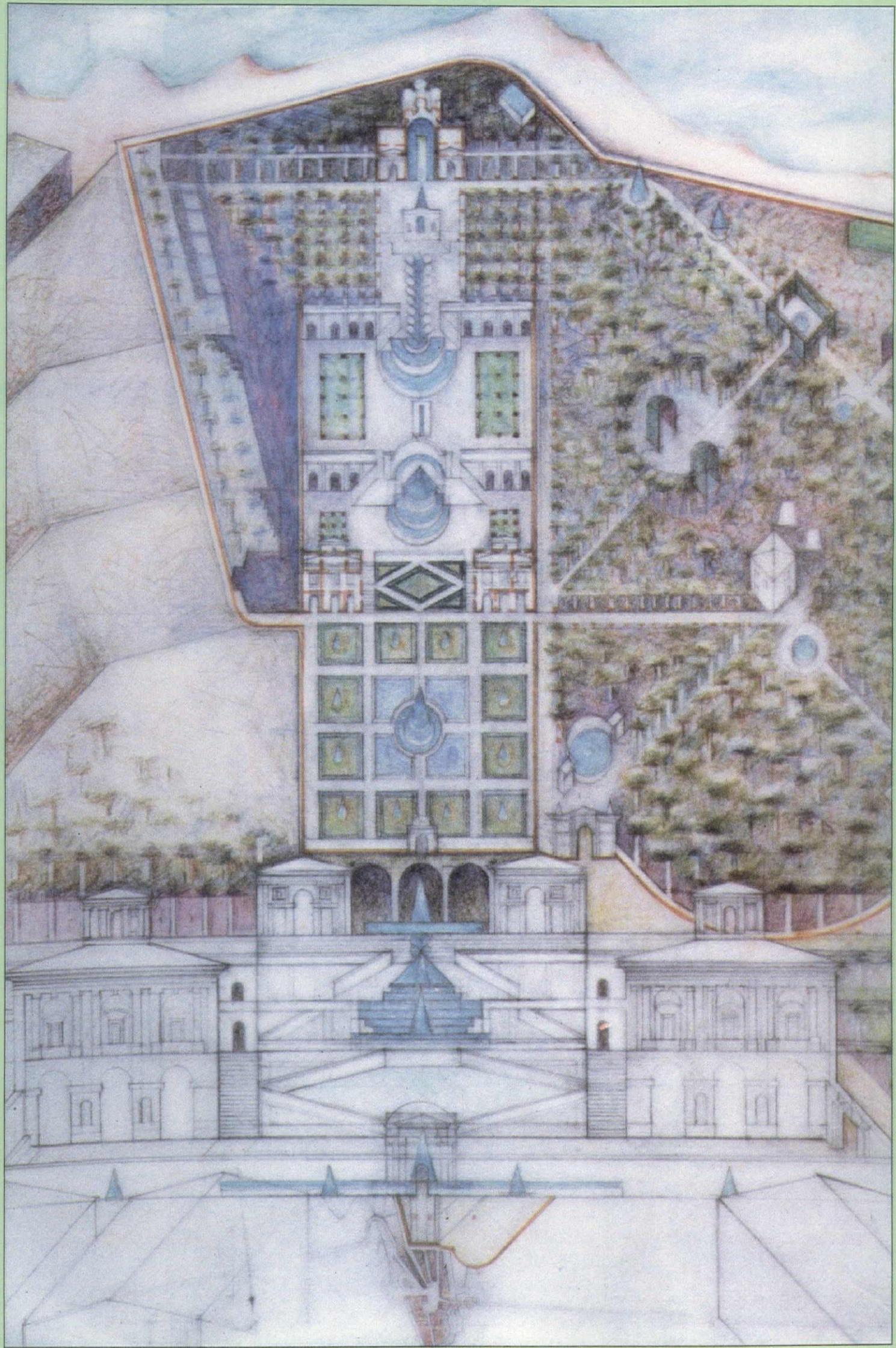
"In the city we can decide that a selected rectangle in the grid will be green. This piece of hallowed ground becomes particular, possessed, a garden. A square of grass is a garden. A tree is a garden. We plot a path, enclose a lawn, order trees and make the water rise. We plant a palm and, like the green rectangle, the palm

trees, standing alone or in straight lines, assuredly lead to paradise. We make a park. It is uncommon common ground; a green theater for playing and play acting." B. S. S. Opposite:

Villa Lante, Bagnaia, Italy; buildings and landscape attributed to Giacomo Barozzi da Vignola, 1578-1588.

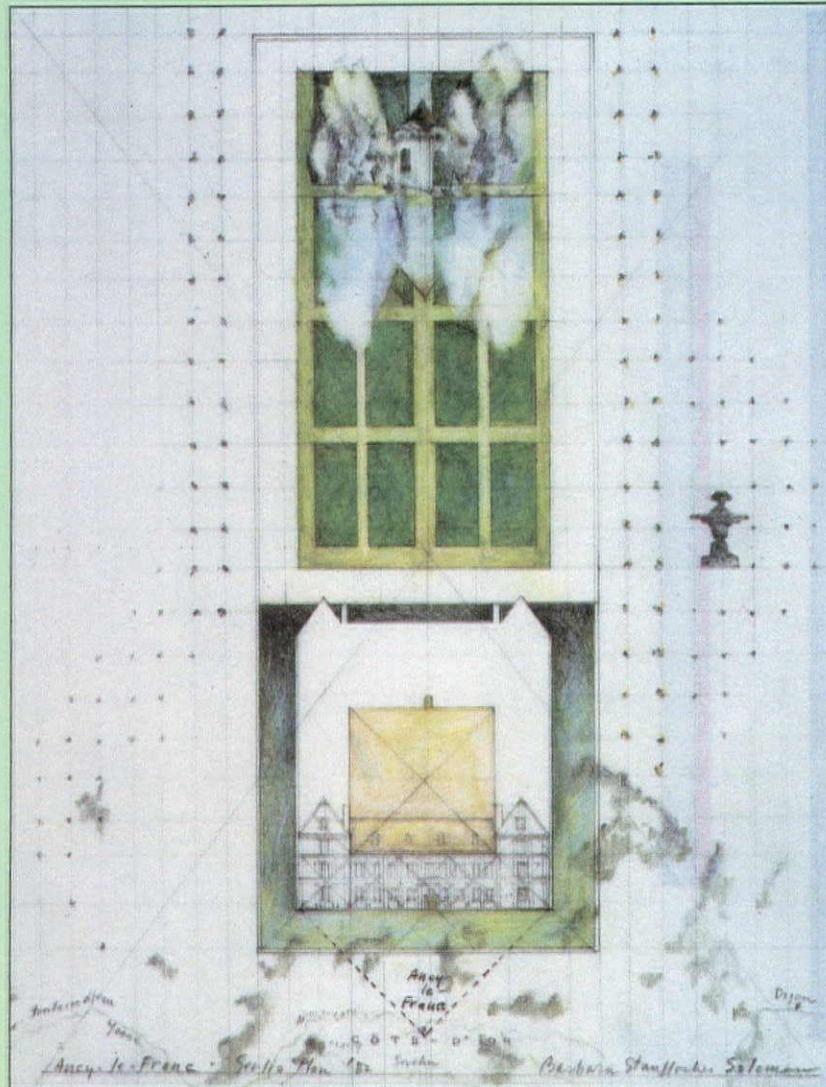
buildings begin," Solomon observes. "Trees become columns. The park leads to the building; the building makes a view of the park. Paths clarify rather than obscure."

Solomon's examples range from the simplest reductive ideograms—"The Green House" (upper left), "The Tied Palm Tree" (lower right)—to delicately plotted schemes of monumental complexity, such as Vignola's plan for the Villa Lante (opposite). As Solomon takes pains to demonstrate, the salient qualities of "green architecture" do not depend on absolute size or refinement of detail, and though her choice of subjects betrays a predilection for geometric order, she does not disdain the nonaxial romantic garden composed in a painterly, naturalistic manner. What rouses her indignation is the ideologically motivated divorce of architecture and landscape, most recently as a tenet of modernism. "In the name of the Modern Movement, and despising historic cities, the *tabula rasa* object building was dropped into the romantic garden. The landscape was a buffer between buildings. It looked wonderful in Le Corbusier's drawings. The problem," she concludes, "was that the disconnected romantic garden reverted to a parking lot." The remedy Solomon proposes is virtually the accepted wisdom of postmodernism: "Insert typological buildings into continuities of traditional urban structures and landscapes, and make use of the common ground between buildings with semipublic elements and formal gardens." She has not hesitated to expose her own green thoughts to the sunlight in actual landscape projects. A formal pool with *jets d'eau* and symmetrical avenues of potted palms (mounted on stainless-steel "trunks") adorn the gardens she has designed as consultant to Gensler & Associates for their remodeling and expansion of the San Francisco International Airport Central Terminal. In another joint venture, with the Spanish firm Taller de Arquitectura, Solomon has developed proposals for a municipal park in Valencia (illustration overleaf). She is convinced that, far from being an antiquarian diversion, the revival of the formal landscape offers fertile inspiration for new architectural and urbanistic creativity. "For some years God was in the details," she observes; "He now yearns to return to the garden." D. B.



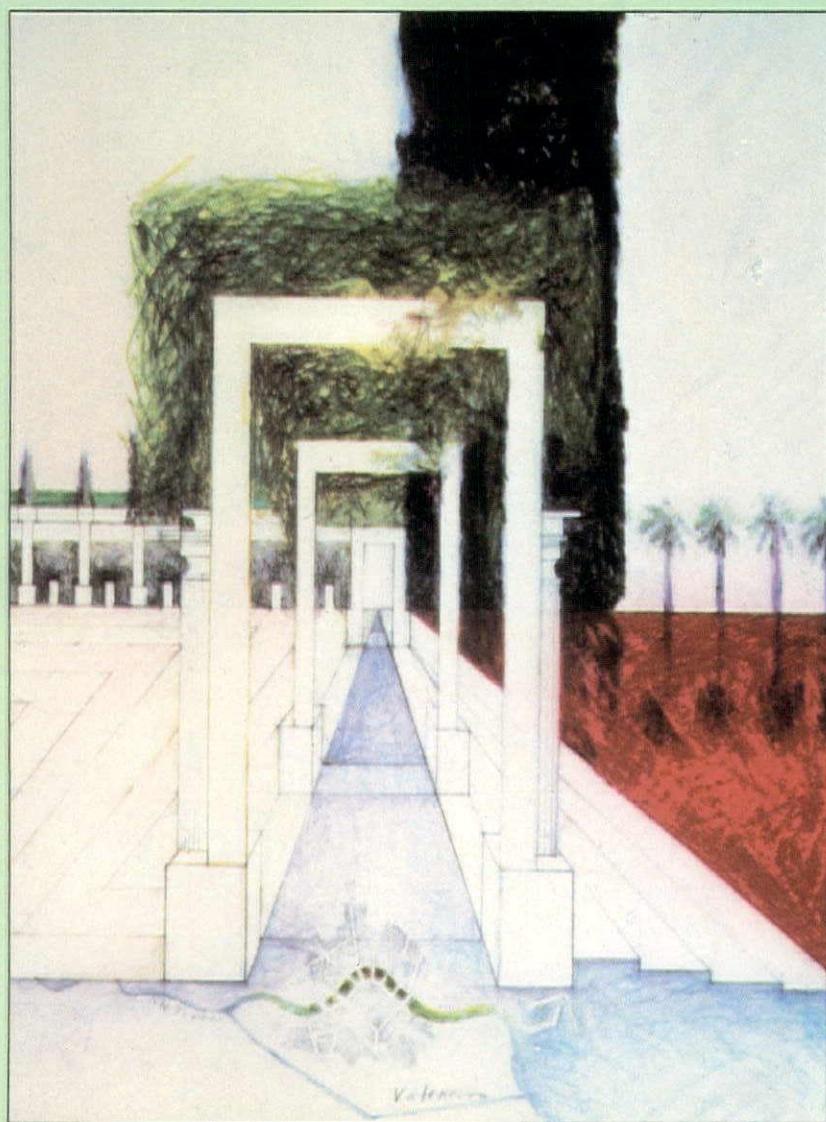
*Château of Ancy-le-Franc,  
Burgundy, France; designed by  
Sebastiano Serlio, 1541-1550.*

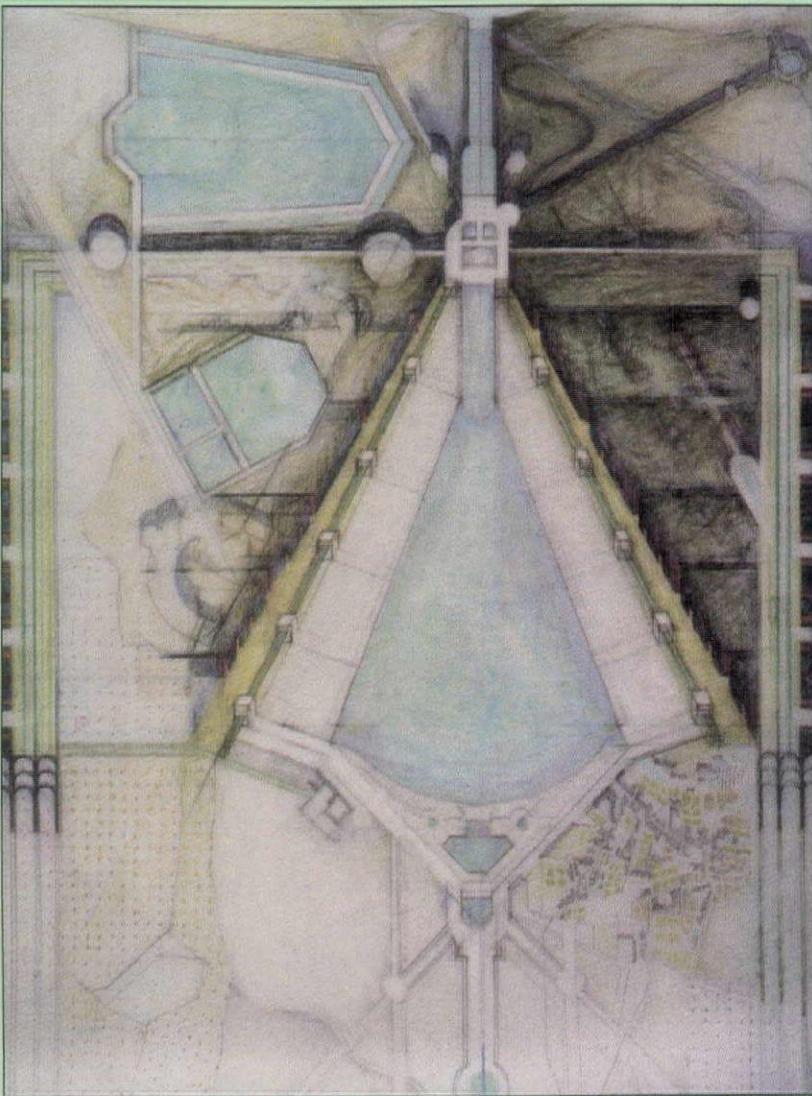
"The château is a square around a square interior court. Originally a square belt of water enclosed the building. Each outward facing doorway is different from the others, suggesting four views of, or toward, the world.... A drawing can try to show the place as the architect and original client conceived it, what historians have written about it, plus the way it felt to walk through it in the rain last Sunday. A drawing can try to show the building from the inside out; what you know about it and what you only can see. The sky and the mountains are inside the front door; the bottle in the cellar is opened on the roof.... To draw the common ground between the object and the ground on the piece of paper is to draw not the shadow of convention, but the plan, the elevations, sections, and paths of movement. There are overlays from maps, texts, photos, sketches, and memory." B. S. S.



*Turia Gardens, Valencia, Spain;  
project designed in collaboration  
with the Taller de Arquitectura/  
Ricardo Bofill, 1982.*

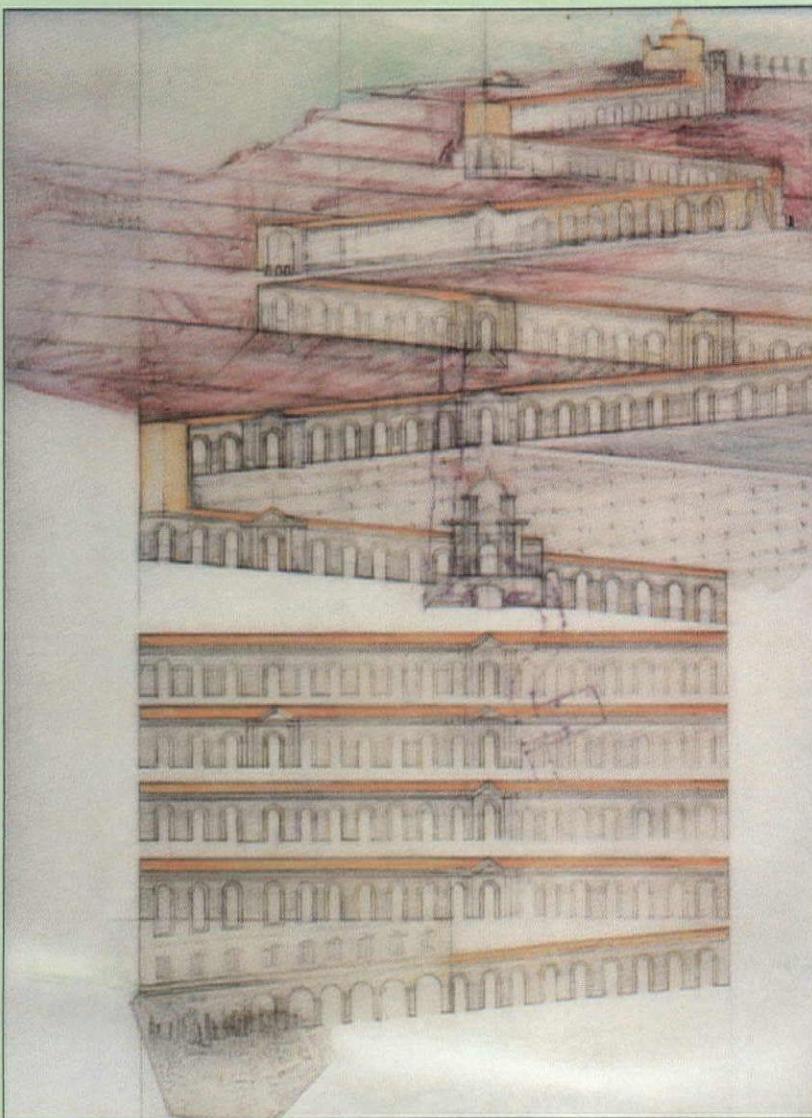
A series of public gardens and athletic fields, 5.3 miles long, would fill the dry bed of the diverted Turia River in the urban center of Valencia. This interpretive drawing shows a geometric lake lined with red tiles, on the right, separated by cypresses and a pergola from a marble-paved piazza, on the left. The serpentine form below the arbor traces the course of the Turia. "The formal garden traveled with the Arabs to Spain and France and Italy. In each land it had antecedents in the local farm gardens and in each land the plan grew different elements and elevations.... The word 'garden' comes from the Indo-European root 'gherd,' meaning enclosure. The word 'paradise' comes from the old Persian 'pairi dieza,' meaning enclosure. It is unpleasant to be exposed." B. S. S.





*Château of Marly, Marly-le-Roi, France; designed by Jules Hardouin-Mansart and Charles Le Brun, 1679-1705.*

*"Men who work the land have always furrowed their earth into sensible straight lines. They have planted their orchards in grids. Until enlightened romantics sought to free the trees along with the people, the habit of planned order was the model for . . . gardens, palaces, and for the avenues and perimeter blocks of great cities. . . . Marly is green architecture. Louis XIV's program called for bosquets. Bosquets enclosed green rooms. Each green room was a paradise and landEscape. Marly was a model for its own destruction. This suburb of gilded gazebos anticipated the minimal house and recreational garden. Today only the landscape remains. The planted forests are green walls enclosing fields for picnics." B. S. S.*



*Portico of San Luca, Bologna, Italy; begun 1675 by G. G. Monti, and completed in 1723 by Carlo Francesco Dotti.*

*The 1.3-mile-long arcade connects central Bologna with the hilltop Sanctuary of the Madonna of San Luca. "[This] is landscape architecture where the distinction between planted landscape and constructed building is eliminated and the use of permanent or impermanent materials does not define a discipline. . . . An extensive semipublic/semiprivate ground compensates for the lack of private amenities available to each individual; it is a connection between buildings for strolling, running, talking, sitting, playing, praying. . . . a sequence of seemingly endless idealized passages broken to allow a utility road up to the mountain. . . . ordered, enclosed, and magical. . . ." B. S. S.*

# Suburban sophistication

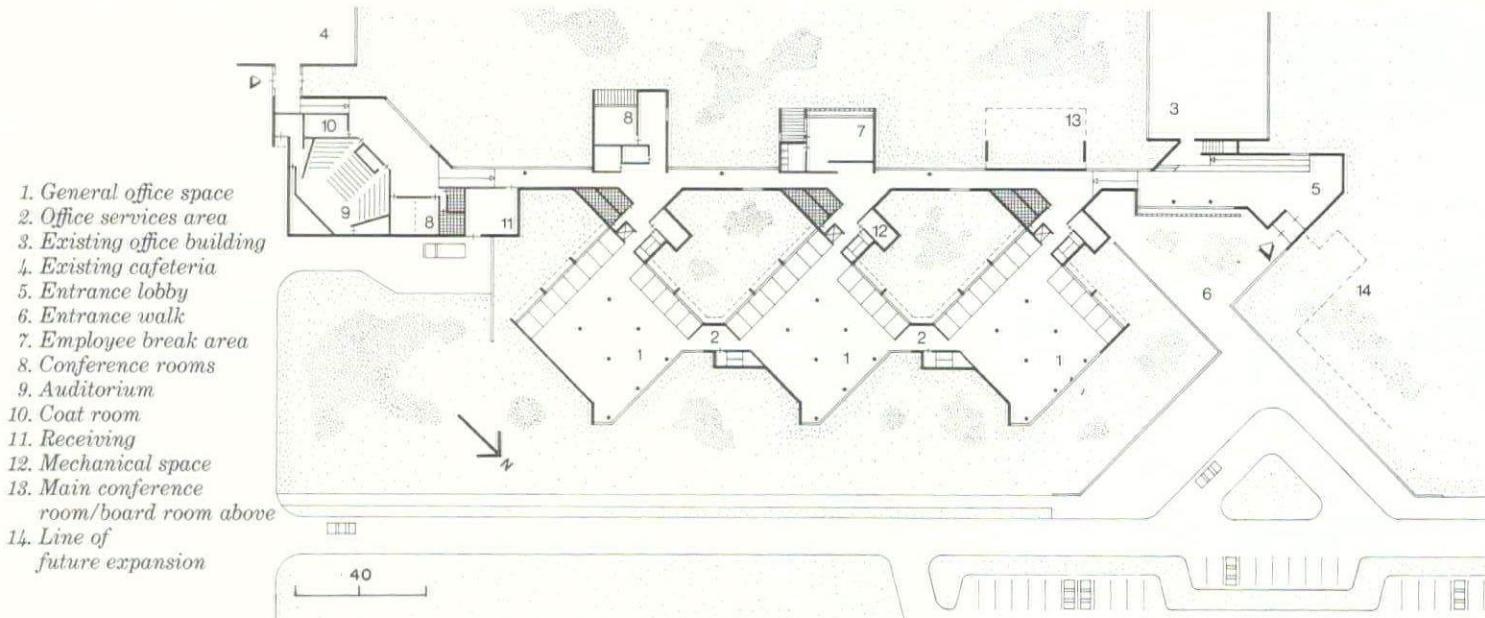
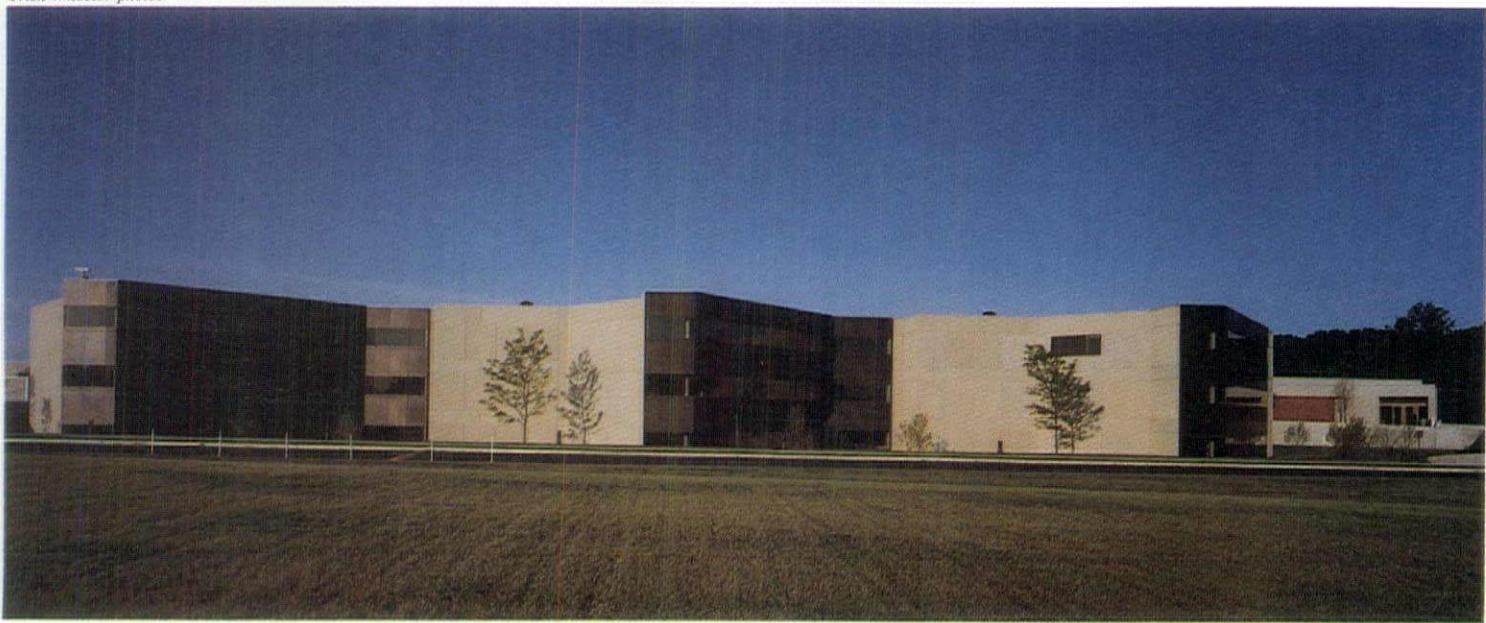




Merck, Sharp & Dohme  
West Point, Pennsylvania  
MBA/Architects & Planners

Nick Wheeler photos

Sharply projecting rectangular volumes characterize the quadrangle facade of Merck, Sharp & Dohme's divisional headquarters (overleaf), in contrast to the subtle crystalline quality of the three street-facing office units that greet visitors entering the 300-acre pharmaceutical complex from Sumneytown Pike (below). The site plan shows the new building's relationship to existing facilities.



It is called, with characteristic corporate restraint, Building 37, but to the 400 employees who spend most of their waking hours within its walls, the new divisional headquarters of Merck, Sharp & Dohme, manufacturer and marketer of prescription pharmaceuticals, is much more than a mere number on a company map. The 120,000-square-foot office structure was designed by Herbert Beckhard of MBA/Architects & Planners to combine a high level of worker comfort with energy efficiency—and, not so incidentally, to provide MSD with a distinctive focal point for its sprawling 300-acre campus, a diverse assemblage of buildings located 30 miles northwest of Philadelphia.

The three-story, competition-winning design forms an important physical and psychological link between MSD's previous administrative home, a standard metal-and-glass building that dates from the early 1960s, and a low pavilionlike structure built later in the same decade to house the employee cafeteria and personnel offices. The architect bridged the 420-foot expanse separating the existing buildings with a brick-and-glass spine, placed at the second-story level, which functions as something of a communal thoroughfare. Initially conceived to run

straight through a rectilinear office block, the spine was later pulled out during the design development phase to set apart office spaces from such ancillary facilities as conference rooms and staff lounges. Its apparent length is significantly diminished by the placement every 100 feet of small triangular lobbies that enclose elevator shafts, stairwells, and restrooms, and lead into the structure's three 80- by 80-foot office units. Encompassing both open-plan and conventional office space, these "pods," as they have been dubbed, are turned at a 45-degree angle to the spine—a diamond-shaped configuration that forms trapezoidal courtyards and allows for interior circulation via the diagonally opposite corners of each unit. This modular system, notes Beckhard, eliminates the problem of one office looking into another and will enable Merck eventually to expand the facility by simply extending the spine westward and adding more pods.

Although esthetic considerations were clearly at work in the organization of the spine/pod scheme, the over-all design of MSD reflects energy-related concerns. By swiveling the office units on a diagonal, the architect achieved a direct north-south orientation so that pooled open space is illuminated by soft north

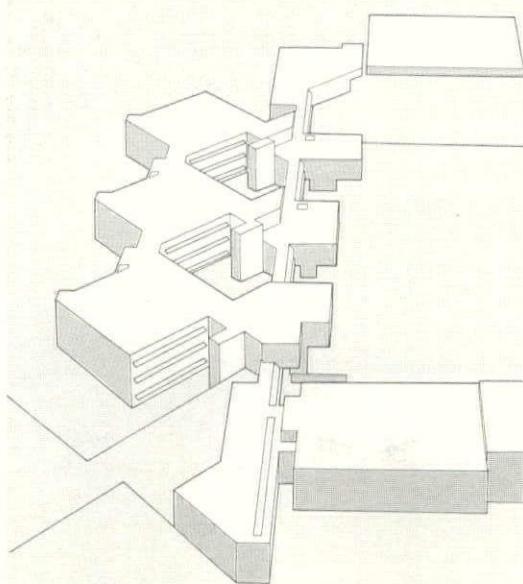
By raising the central circulation spine up to the second-story level, project designer Herbert Beckhard of MBA/Architects & Planners freed ground-floor space for an outdoor pedestrian passageway running the full length of the building (top). Energy factors dictated the use of two distinctive window treatments on the office blocks: bronze anodized aluminum walls emit as much light as possible

through the north facade (bottom left), while south-facing courtyard windows are shaded by heavy precast concrete sunshades (bottom right).



light through tinted double-glazed window walls; south-facing private offices, by contrast, are shaded by fixed, precast concrete *brisés-soleil*. Moreover, while screens of terra-cotta flue tiles add a welcome note of color to a facade that is otherwise articulated by neutral-hued striated concrete panels and anodized aluminum, they also "do a heck of a job sunshading," according to Beckhard. Other less dramatic energy-saving devices include independent heating and air-conditioning units on each floor, light switches in every office and, along the courtyards, operable windows.

Quietly innovative and handsomely detailed, the MSD building reflects the research-oriented, humanistic spirit of a firm whose origins go back to the 17th century. While the bottom line at Merck reads in dollars and cents, there is considerable satisfaction knowing that the company's product line helps cure some of the maladies that at one time or another afflict all of us. Likewise, MBA/Architects have produced a building that successfully addresses a nonfatal, but nevertheless debilitating ailment—office drudgery—with a thoughtful prescription that other designers of corporate structures would do well to follow.  
*Paul Sachner*

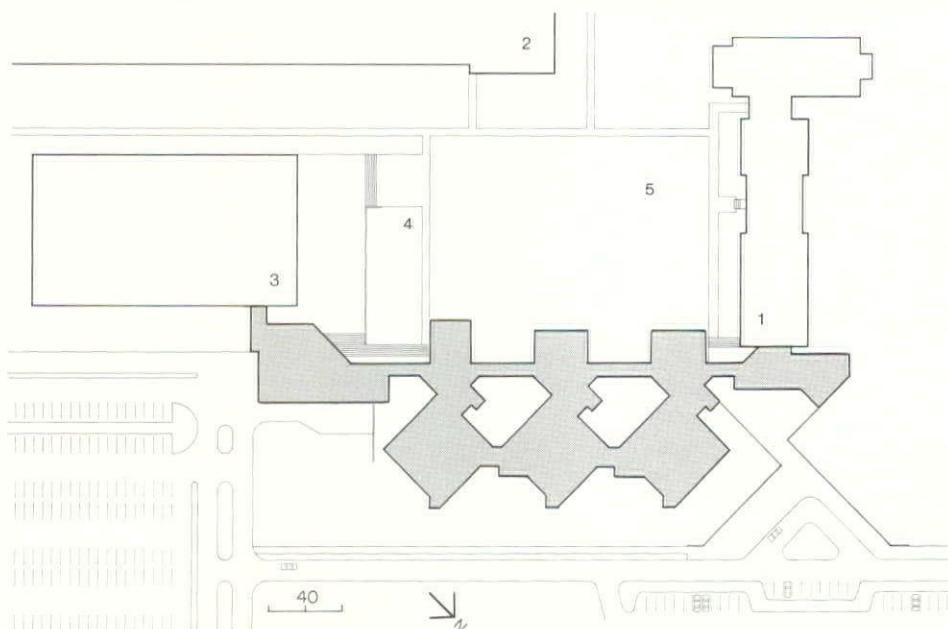


*With its brick paving, lavish greenery, and views into the manufacturing and research quadrangle, the central spine at MSD is more a street than a typical office corridor. In addition to providing access to all facilities in the administrative center, the 420-foot spine serves as the site for the temporary and permanent display of art by Merck employees. A typical floor plan shows the use of*

*crisp geometric forms—square, triangle, trapezoid, and parallelogram—in the layout of the office structure.*

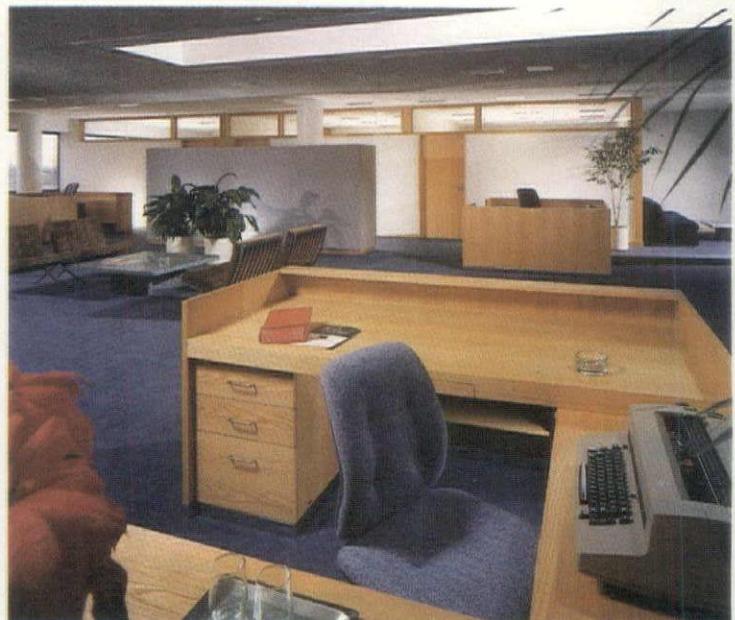
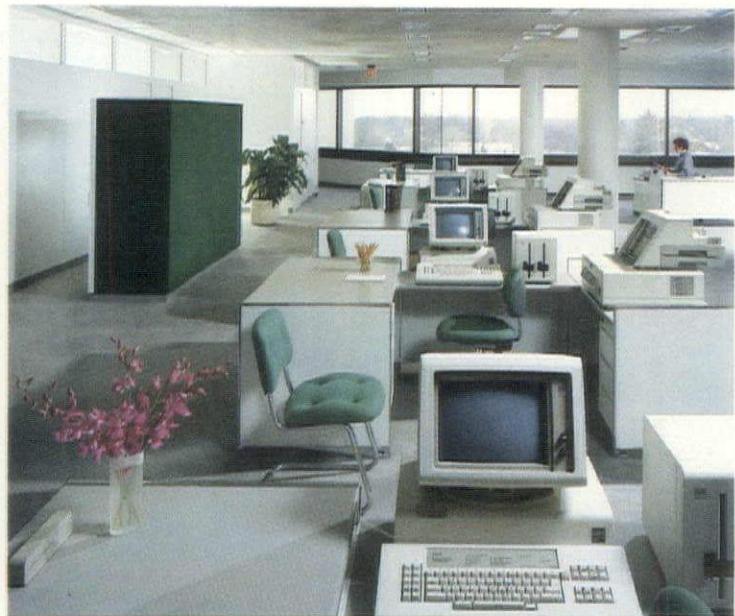


1. Existing office building
2. Existing line of plant structure
3. Existing cafeteria
4. Future pool
5. Main quadrangle



*Interiors conform admirably to MSD's requirements for elegance, comfort, and flexibility. The auditorium lobby (top left) marks the eastern terminus of the circulation spine, while the 250-seat auditorium itself, with its intricately patterned acoustical ceiling, gives Merck a handsome meeting room for company staff (bottom left). In each office pod, white walls and furnishings*

*produce "a pristine look to space that one might associate with a pharmaceutical firm," notes architect Beckhard, in contrast to bright color accents of blue, burgundy, or green (top right). The executive suite, on the other hand, is trimmed somewhat more sedately—and luxuriously—in ash (bottom right).*



*Merck, Sharp & Dohme  
West Point, Pennsylvania*

**Owner:**

*Merck & Company, Inc.*

**Architects:**

*MBA/Architects & Planners—  
Herbert Beckhard, designer and  
partner-in-charge; Frank Richlan,  
design collaborator; Andrew Wong,  
project architect*

**Engineers:**

*Weidlinger Associates (structural);  
Joseph R. Loring & Associates  
(mechanical)*

**Interiors:**

*ISD, Inc. and Herbert Beckhard*

**Consultants:**

*Claude Engle (lighting); Peter  
George Associates (acoustical); Zion  
& Breen (landscape)*

**Construction manager:**

*Barclay White, Inc.*

# On the waterfront





Developers are quick to acquire waterfront properties; however, they often wind up destroying what they seek to revitalize. The redevelopment overpowers the site, obliterates its original character, and then coyly recalls it with ersatz detail. Located off Long Island Sound, Harbor Plaza gracefully avoids this Disneyland syndrome. It preserves, and, in fact, enhances a marina while providing 740,000 square feet of space for corporate, professional, and retail tenants.

The site's proximity to downtown Stamford, a mecca for *Fortune* 500 companies, and its magnificent views convinced developer Arthur Collins that this boatyard site presented a unique opportunity. Its redevelopment could include not only the predictable shops and restaurants but also offices for a major corporation. Constructing such a huge office complex essentially on spec, architect Do H. Chung recalls, was more like designing a car than a building. He had to come up with a distinctive design but one that could accommodate the eventual corporate client's customized interiors.

Harbor Plaza's five buildings follow the shoreline along a narrow 18-acre peninsula (see site plan below). The three buildings at its tip contain the world headquarters for the Continental Group, Inc., while Group W/Westinghouse's broadcast facilities occupy the fourth structure. Restaurants, shops, and professional suites are housed in the building adjacent to the complex's entrance. Although more intensive development was allowed, the project was limited to only 60 per cent of what would have been permitted by the area's zoning ordinance because neither the marketplace nor the surrounding infrastructure could support anything larger.

Traffic and parking, Chung asserts, were the most difficult problems he faced. Unable to go underground because of the sandy soil and water level, he nevertheless wanted to avoid encircling each building with a ring of asphalt and parked cars. The solution (expensive but unavoidable) was a parking lot on each building's first floor with teak screens set behind a brick arcade to hide the cars.

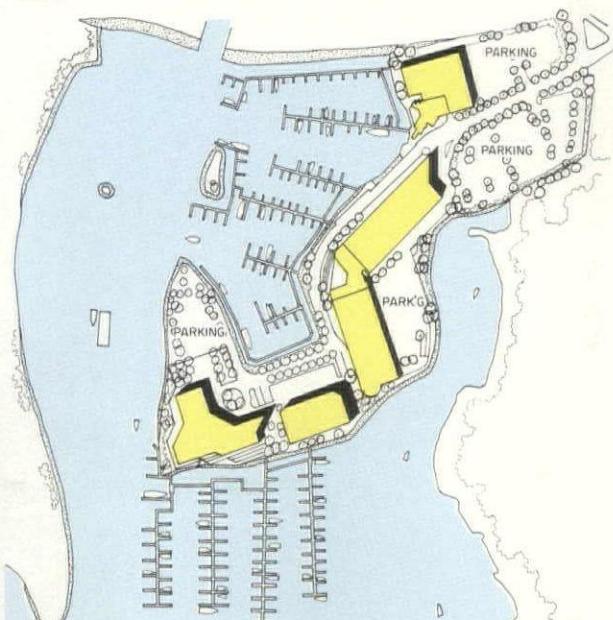
As a design, Harbor Plaza's strength is, paradoxically, its gentleness. In spite of its size, the complex is architecturally subdued. Limited by law to a height of 60 feet, the buildings are low horizontal masses composed of alternating bands of brick, concrete, and glass. The forms twist and turn with the shoreline. Prow-shaped masses and semicircular projections terminate each building and thrust it out into the landscape.

The forms and materials recall the modest commercial structures that have traditionally lined the waterfront. Arcades open up the base of each building and link the pedestrian to the harbor view. Pink brick and teak windows and detailing impart a warmth to the facades.

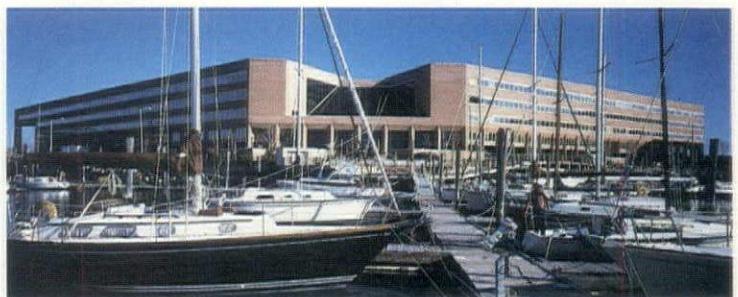
Do H. Chung describes this project as "an architectural process... almost totally dictated by development strategies." It is encouraging that a sensitive use of the site and careful attention to detail were evidently good business at Harbor Plaza.

Mary Woods

Norman McGrath photos except as noted







*Part of Harbor Plaza's appeal is that it does not beat you over the head with its vernacular references in order to score ideological points. Its brick arcades, corbelled spandrels, lantern-topped light fixtures, and boardwalks subtly allude to the waterfront tradition (see photos opposite and top right). A diamond-shaped motif, associated with Mr. Chung's native Korea, recurs in the parking screens' vertical slats, the arcade piers, and the pavement pattern. The materials and forms are practical as well as historically resonant. The operable teak-framed windows and screens withstand the corrosive salt air well. Overhanging spandrels on all elevations except the north reduce glare. The interiors, which were executed by another design firm, do not always mesh with the exterior. Some interiors are more successful at picking up the facade's scale and textures than others (see photos below and right). While the office spaces for the Continental Group, Inc. make the most of the view and carry through the teak detailing, the atrium—with its polished travertine surfaces, glazed bridges and spiral staircase—does transport you from the Stamford harbor to a midtown skyscraper.*



*Harbor Plaza  
Stamford, Connecticut*

**Owner:**

*Collins Development Corporation*

**Architect:**

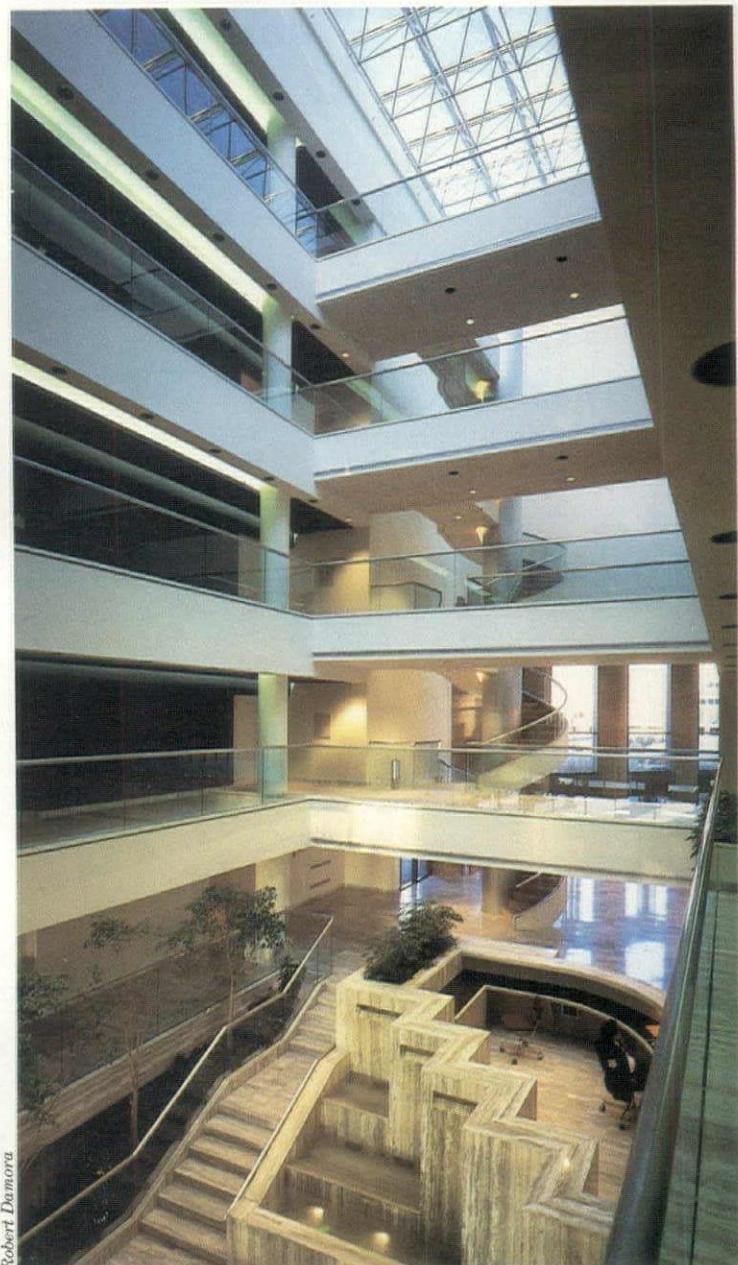
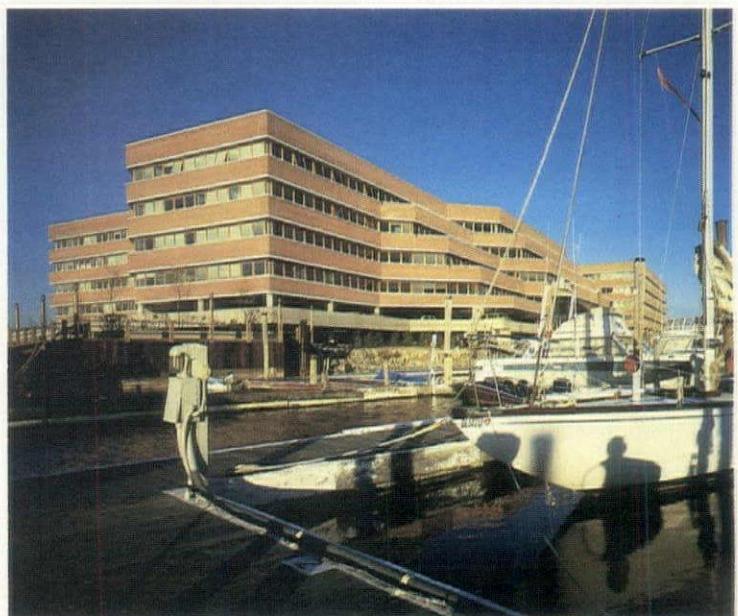
*Yankee Planning/Do H. Chung,  
AIA—Do H. Chung, partner-in-  
charge; Han Young Bang, associate  
in charge of design; Arthur Collins  
III, associate in charge of  
landscaping*

**Engineers:**

*Thune Associates and Spiegel/  
Zamecnik (structural)—Phase I  
only; NIKO Engineering and  
Cosentini Associates (hvac and  
electrical)—Phase I only*

**General contractor:**

*Fusco/Amatruda Construction  
Corporation*



*Robert Damora*

# Two-way teleconferencing: room design comes first

By Robert E. McFarlane and Robert J. Nissen

Many executives have been lured by the popular press into thinking that everyone else is doing videoconferencing, and that it can be bought at the local electronics supermarket. Anxious to jump on the teleconferencing bandwagon and unaware of the limits of the state of the art, the well-meaning executive assigns the project to communications, television, electronic data processing or another corporate department that seems logical. Thereupon one of two approaches is usually taken: the chosen department either issues a Request for Proposal to myriad vendors and consultants, or it assembles an in-house team of designers.

In either case, emphasis is usually, and mistakenly, placed on equipment. The room surrounding the equipment gets little attention, though in fact its design must precede and complement equipment selection.

The proper design of any special facility, including that for teleconferencing, must follow the proven architectural design sequence: programming, or needs analysis; concept design and cost estimation; detailed design, with bid and construction documents; and implementation, including supervision and checkout.

In the case of teleconferencing facilities, the needs analysis is fundamental to the entire process. It must cover the functions of the rooms, including who will use them, how, why, how often and for what purpose, but the answers to these questions cannot be obtained directly because most potential users have no teleconferencing experience upon which to base responses. Finally, two main questions must be answered: does the facility solve the company's communications problems, and is it cost effective? Since teleconferencing facilities may well be the most complex entities communications designers have ever tackled, the remaining design functions cannot be properly accomplished without a valid study of needs.

At the stage of concept design, the results of the needs analysis are used to determine the numbers of active participants required, the types of graphics that must be accommodated, the type of meetings the rooms will serve, and the extent of equipment performance needed—full-motion video, freeze-frame video, augmented audio or audio only. The determinations made at this stage will allow selection of a general table shape, establishment of room sizes, and a generic listing of the various places of primary equipment needed in each room. In some cases,

sites may be equipped differently, so that, for example, a site equipped for freeze-frame video can also accommodate an augmented audio teleconference with a site not needing video support. But it must be understood that compatibility among different companies' videoconferencing rooms does not yet exist. Videoconferencing is still primarily for communication between sites within the same company.

Unfortunately, this is where many design efforts end and equipment acquisition starts. In reality, it is only the beginning. The detailed design must be done first, to examine and establish every aspect of the equipment and the human interface and to commit them to drawings.

The room design should consist of full architectural drawings showing the limitations on lensing, the precise locations of all equipment, the ventilation system, the architectural and structural designs, special interfacing for dissimilar equipment, the particulars of acoustical treatments, the room finishes and all ancillary equipment required for a complete operational system. The systems design drawings should include equipment layouts, table details, rack elevations, functional block diagrams showing audio, video and control interconnections, schematic diagrams of special circuitry, control panel layouts, and every piece of equipment required, identified by manufacturer and model number.

Only after detailed design should one begin the implementation phase, which is usually what everyone wants to get to on Day One. If the detailed design has been done well, and if a competent systems contractor has been chosen, most of the equipment can be prefabricated in the contractor's shop while room construction is in progress. This keeps the equipment and technicians out of the way of carpenters and electricians, avoids equipment damage and dirt contamination, and allows thorough pretesting of most of the system in the shop.

To the experienced architect, the sequence just outlined will appear rather normal, and it is. The problem is that most new users don't follow it. Making matters worse is that much of the application of technology to teleconferencing is still more art than science. There are not, as yet, proven design rules to follow, nor is there a broad selection of equipment specifically designed for teleconferencing.

In two-way video conferencing, there are two elements that drive the design. In the case of systems design, the driving

element is the design of the control panel. It must allow the participants to control the conference equipment easily without dependence on technical personnel. The functions it contains dictate many of the system details and circuitry. Control panel design for video conferencing arises out of needs analysis, and is a post-graduate exercise in ergonomics.

#### The table "drives" room design

For the room design, which is the chief subject of this article, the driving element is the table configuration. Everything else in the room, including the walls, must relate to it. For practical reasons, the number of participants is usually limited to six at each location, although space for a reasonable number of observers may also be included at the back of the room.

The debates that rage over table shape are reminiscent of the Paris Peace Talks. Different approaches have their own devotees and their own advantages and disadvantages. The final decision must be based on a combination of suitability for the purpose, physical considerations and user preference. In this article, we shall try to provide an understanding of the advantages, the limitations and the tradeoffs of alternative designs. We will illustrate the considerations with three different designs: the semicircular table, typified by the AT&T Picturephone Meeting Service rooms, the wedge-shaped table, common to Satellite Business Services facilities, and a kidney-shaped table in a facility designed by our firm.

The arched shape of the semicircular table (Figure 1) satisfies two important optical parameters. First, every participant is approximately equidistant from the cameras. Second, every participant is approximately equidistant from the video monitors. The arrangement allows participants to be an appropriate distance from the monitors, and it avoids subjective image distortion introduced when lenses must encompass both very near and relatively distant objects. It also tends to give virtually equal importance to each participant. It was intended to approximate the feeling of a continuous conference table that extends to rooms at each end of the teleconference, divided from each other only by a transparent hole in space. (Unfortunately, this illusion of an extended conference table can be achieved only with large-screen television projection, which has other disadvantages.)

The voice-selected cameras provide excellent "people pictures,"

which support the needs of executive conferences very well, but the voice switching algorithm that determines camera selection, when, and why, will never satisfy every user in every situation.

Another objection sometimes voiced about the semicircular design is that it tends to create a formal setting and is not conducive to open discussion among participants within the room. The positive aspect is that this table shape orients participants toward the monitors, which in turn places prime emphasis on those participants at the *external* remote location. For this reason, we identify this table type as an "external-oriented configuration." The design is particularly suited to full-motion video systems, where social interaction is important.

One of the development principles behind the wedge-shaped table (Figure 2) was the intent to break down the hole-in-space barrier while using standard monitor sizes. The table can be looked at as the end result of "bending" the semicircular table inward until it forms a wedge or V shape. Proponents of this design say it provides a meeting setting more conducive to discussion within the room than the semicircular design, that it allows better overview pictures and that it avoids debate over switching algorithms. Since it requires fewer cameras to cover, it also tends to be less expensive.

Critics point to the variety of optical and mechanical problems that must be addressed if the wedge-shaped table is used. The person at the table apex is usually the chairman. However, the wide-angle lens tends to emphasize participants nearest the camera. Since the chairman is also farthest from the monitors, he or she thus has the smallest pictures to view. In other words, the main participant gets the worst seat in the house.

Another comment is that, because the table promotes interaction among those seated around it, it tends to make people at the remote location mere observers of an *internal* conference rather than active participants. It is for this reason that we label the wedge-shaped table an "internal-oriented configuration." The wedge shape also requires participants to perform an almost 180-deg head swing in order to look from an adjacent participant to the image on the monitor (Figure 3).

The kidney-shaped table (Figure 4) ameliorates some objections to the two basic configurations already described. Like the semicircular table, it places all participants within roughly equal range of both monitors and cameras. And like the wedge-shaped table, it allows each participant to see all faces around

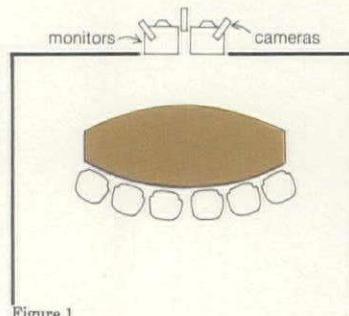


Figure 1

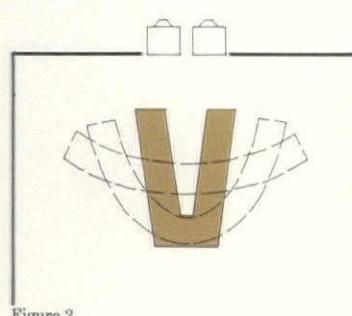


Figure 2

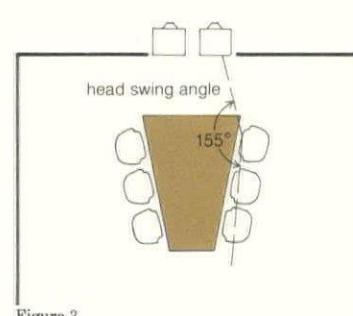


Figure 3

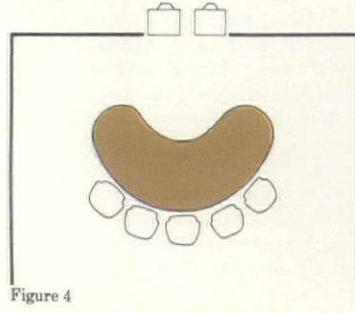


Figure 4

*Teleconferencing tables may take several shapes. The semicircular table (Figure 1) has the advantage of placing participants within equal range of the cameras and monitors, but the disadvantage of imposing formality on the discussion. By bending the working side of the semicircular table into a V (Figure 2) or by filling in the V as a wedge (Figure 3), designers can create a*

*more natural setting for discussion, but participants at the far end of the table get the worst seats in the house for both seeing and being seen. The kidney-shaped table (Figure 4) is an alternative that places all participants equidistant from monitors and cameras, as well as allowing them to see each other's faces with ease.*

## Teleconferencing: video monitors and cameras

the table without leaning forward. It is not a panacea, however, and each need must be separately evaluated.

A video conferencing facility is intended primarily to enable the transfer of aural and visual information. Visual information tends to be heavily oriented to graphics rather than to "people pictures." Even if closeups of people are important, the participants' need to read graphic information governs much of the room design.

Three factors limit the reading of graphic displays:

1. *The resolving capabilities of the human eye.* Generally, for good readability character height should subtend no less than 17 min of arc at the eye (Figure 5). Put another way, character height should be no less than 1/200 of the viewing distance.

2. *The density of information.* Ideally, there should be no more than 15 lines per page, with no line exceeding 40 characters across. This assumes that a standard video system with 525 scanning lines is being used.

3. *The size of available video monitors.* These generally have a diagonal measurement of 25, 27 or 30 in.

Assuming 15 lines of text per page, and using the 1/200 criterion diagrammed in Figure 5, it can be calculated that a viewer should be no farther from the monitor screen than five times the screen width. We refer to this as the 5W rule. Given these conditions, the normal eye can easily and comfortably resolve the text or equivalent graphics. As a rule of thumb, the width of a television image is approximately 0.8 times the diagonal measurement. So if, for instance, we design for a 27-in. monitor, which has an image width of 21.6 in., and use the 5W rule, we find that a viewer should be no farther from the monitor than 9 ft. At the semicircular table shown in Figure 6, the participants at the center are at the prescribed range, though those sitting at the ends are slightly beyond optimum range.

It is also undesirable to have the nearest viewer less than 2W from the screen. Figure 7 illustrates the 2W and 5W rules applied to the wedge-shaped table and the resulting problems—that is, the nearest viewer sits almost at 2W while the farthest sits well beyond 5W at 12 ft.

These arrangements of course assume that the graphics are sized as suggested. Should one try to show half of a typewritten page on the screen, there will be about 25 lines of print with about 70 characters to the line. While it is possible for the eye to resolve this amount of detail, it is certainly not ideal. Under

these conditions, the effective viewing distance would be equivalent to viewing proper graphics at about 8W. Most people will be unable to easily read the material at this distance.

### Cameras: covering the table

If the table position is set by the viewing distance, then camera lensing must be chosen to obtain pictures of the participants *at that distance*. If we plot the required lens angles for full coverage, we quickly find that both the semicircular table, shown in Figure 8, and the wedge-shaped table, shown in Figure 9, require very wide-angle lenses to cover all the participants simultaneously. Since these lenses produce subjective image distortions, we suggest that the widest practical lens that should be considered under these circumstances is a 12.5-mm lens on a 1-in. camera tube, or a 9-mm lens on a 2 1/2-in. camera tube. Both provide a horizontal coverage angle of approximately 52 deg.

To deal with the problem of subjective image distortions, designers of facilities with a wedge-shaped table will normally compromise the design by moving the table farther from the monitors, thus decreasing the apparent size of the displayed image. Alternatively, they will cover the table by using two cameras, one for each side of the table, or by putting the camera on a pan-tilt mount. Designers of facilities with a semicircular table frequently put an overview camera to one side, as in Figure 10. With a semicircular table, three cameras are typically voice-switched automatically to cover groups of participants.

If people pictures are at all important, it is vital that the camera, or cameras, be kept as close to the picture monitors as possible. The camera should also be slightly above eye level. This arrangement, shown in Figure 11, establishes a sense of eye contact. (This is virtually impossible to achieve with large screen projection, and is one of the problems of TV projection in teleconferencing.) If the camera is at one side, a participant looking at the incoming monitor will appear to the viewer to be looking off to one side. This is disconcerting to most viewers and is not conducive to good communication. The placement of the camera above eye level is a well-known tenet of professional television. The viewer feels more comfortable, and less threatened, if he looks slightly down toward the person talking to him. Only in a video conference can all parties feel they are in a superior relationship to their counterparts!

Satisfying these requirements means that the cameras should

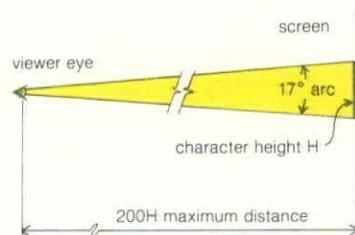


Figure 5

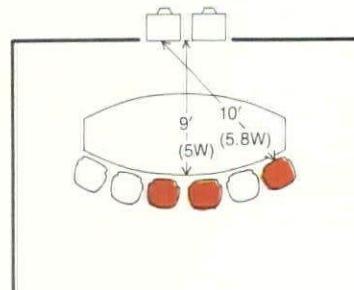


Figure 6

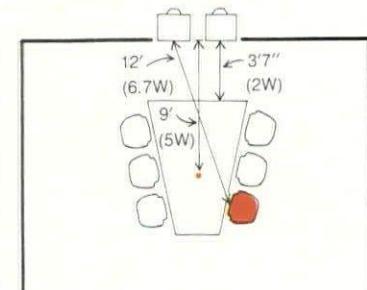


Figure 7

If the television image is to be legible, it must be sized according to the eye's capacity to resolve it—that is, characters no smaller than 1/200 of the viewing distance (Figure 5). In the case of television monitors, the optimum viewing distance is five times the width of the monitor screen—the 5W rule; in the examples shown, 5W is taken as 9 ft for a 27-in. screen. At a

semicircular table (Figure 6), participants at the outer seats will be slightly beyond the best viewing range if those at the center are optimally located. At a wedge-shaped table (Figure 7), participants at the far end of the table sit at a distant 6.7W, while those nearer the monitors sit almost at 2W, considered the minimum.

be as closely spaced as possible, between and slightly above the monitors. Small deviations may not be noticeable to many, but they may nonetheless take the edge off communication in a way few can enunciate but everyone feels.

Lighting for video conferencing rooms presents some difficult problems to the designer. There are not as yet universally accepted design solutions, and television lighting is both art and science. We are accustomed to seeing people in lighting that originates from above, such as the sun or the ceiling. To create a natural appearance on television, lighting must produce a similar effect, but it must also emphasize particular shadows and de-emphasize others to produce the illusion of depth without sunken eyes, shiny heads or triple chins.

#### **Lighting the video conference**

Classic television or film lighting standards, frequently modified for particular circumstances, provide both for the technical requirements of the media and for the desired esthetic results. The plan in Figure 12 illustrates a simple light plot for a fixed single person. The key light provides the main apparent source of illumination for the picture. In a studio environment, it is typically a Fresnel lens instrument causing sharp shadows. The fill light is normally a soft-light instrument, such as a scoop, that partially fills in the dark shadows caused by the key light. The back light provides the all-essential rim lighting on heads and shoulders to give a three-dimensional illusion to the two-dimensional picture.

The elevation in Figure 13 illustrates the desired vertical lighting angles. The key and fill lights should preferably be angled to no less than 45 deg below the horizontal. Such lighting produces a picture that is esthetically pleasing and normal. But, if the front lights are angled at substantially less than 45 deg, the light entering the subject's eye causes squinting. Conversely, the angle should not be substantially greater than 45 deg or the face shadowing will be too deep.

A back light angled approximately 60 deg below the horizontal will provide the desired visual separation between subject and background. The angle should not be greater than this or the visual effect of a top light will be created—a particular problem with balding people.

More specifically for video conference room lighting, we see several main criteria:

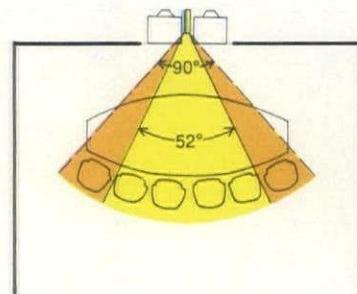


Figure 8

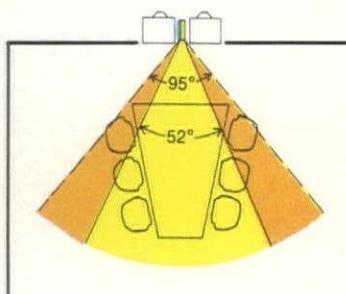


Figure 9

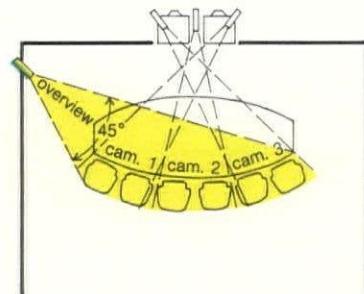


Figure 10

Because the table must be positioned for good viewing, that distance governs the selection of camera lenses. Both semicircular (Figure 8) and wedge tables (Figure 9) thus require wide-angle lenses for overview shots. The shaded triangles show that the optically best lens choices (center areas) cannot cover a sufficiently wide field, and lens angles wider than 52°

degrees are likely to result in unacceptable perspective distortion. At a semicircular table, designers typically use three cameras and sometimes add an overview camera at one side (Figure 10). For natural-seeming "people pictures," cameras should be placed just above eye level as participants look at the monitors (Figure 11).

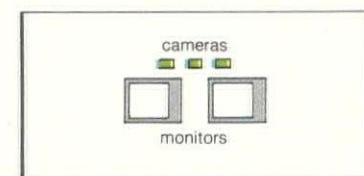


Figure 11

1. The intensity of the lighting should meet the technical requirements of the color cameras with the selected lenses set at the desired f stop. For typical designs, 50 to 100 fc incident is usually adequate.

2. Illumination should preferably be specular in nature rather than diffuse to delineate form and substance.

3. Illumination should be as unobtrusive as possible. Lighting angles should be outside the glint angle of the subjects' eyes.

4. Back lighting should be provided to accent the third dimension of the picture.

5. Participants should not feel that they are in a studio.

6. Ambient light falling on the monitor screens must be reduced to as low a level as possible to maintain a good picture contrast ratio on the monitors.

7. If lighting is provided by mixed types of luminaires, they should be corrected so that each has the same color temperature.

8. In addition to lighting for the participants at the table, proper lighting must also be provided for graphics, wall pin-up surfaces and participants not seated at the table.

9. The lighting design must be coordinated with other functions shared by the ceiling system, such as document cameras mounted overhead and hvac.

One approach to lighting video conferencing rooms—a very simplistic one—is to provide standard, flush-mounted ceiling fluorescent fixtures in sufficient quantities to achieve the required intensity of illumination. This approach may provide adequate illumination, but little else. Lighting will be diffuse, ambient spill light will be difficult to control and most of the illumination will be top light. It is not recommended.

A modification of this approach is used in many typical AT&T PMS rooms. Front lighting is provided by a bank of ceiling-mounted fluorescent fixtures that are aimed toward participants either by tilting or by internal reflectors. This directionality helps to control ambient light spill on the monitors. Back lighting is provided by incandescent downlights. The mixture of fluorescent and incandescent lamps can be handled by placing color-correcting filter material within the fluorescent luminaires. This approach can adequately satisfy most of the criteria we have listed except for the one relating to specular lighting.

A third approach uses the classic lighting techniques of television and film production. All instruments illuminating the participants are incandescent with specular characteristics.

# Teleconferencing: lighting for video

Additional ceiling-mounted fluorescent fixtures, with directional louvers and proper color correction, can provide ambient room illumination outside of the participant area. Properly designed, this approach can meet all of the criteria cited above. The main problem is how to design the system without giving participants the feeling of a television studio.

From an esthetic standpoint, it is preferable to use flush-mounted architectural downlight fixtures. Unfortunately, these seldom provide the degree of directional control attainable with studio instruments. An alternative approach is to use architectural light tracks with movable fixtures. A wide range of fixtures and accessories is available for light tracks, which can provide relatively good control of light distribution. If the tracks are recessed in coves, the instruments will not be so obvious.

One possible light plot for the semicircular table configuration (Figure 14) uses incandescent instruments on light tracks. The placement and adjustment of each fixture must be carefully controlled to approximate the key and fill lighting functions.

Another possible light plot uses incandescent instruments on light tracks for a wedge-shaped table (Figure 15). Clearly, lighting the wedge-shaped table is more complex than lighting the semicircular table because people face in different directions.

In any lighting design for teleconferencing, the designer must be particularly concerned about shadows on the conference table, often cast by the participants. Documents on the table, which are viewed by a ceiling-mounted document camera, must be evenly illuminated. Moreover, that illumination must not cause specular glints when documents have a shiny surface. This consideration requires that any light on the table top cannot originate from a ceiling location close to the document camera. Choosing fixtures of any kind requires careful study of the photometric data. But if a problem should develop, track-mounted fixtures can easily be changed or adjusted in the field.

## More lighting: special concerns

We hesitate to recommend that dimmers be used for video conference lighting systems. Unless the dimmers have expensive radio-frequency filtering, they can cause severe interference with the video and audio systems. Furthermore, since the function of the room does not require changes in the light plot once it is properly adjusted, there is little use for dimming systems.

The designer considering a light track must not overlook its

A classic lighting plot includes a key light, a fill light to fill out shadows and a back light to provide rim lighting and add the illusion of three dimensions (Figure 12). Front lighting should be set about 45° below the horizontal to prevent squinting on the one hand or deep facial shadows on the other (Figure 13); back light should be angled at about 60°. A possible lighting plot for a semicircular table (Figure 14)

uses incandescent fixtures on light tracks, the lamps carefully adjusted to satisfy the functions of key, fill and back lights. Since participants at a wedge-shaped table face each other obliquely across the table, a good lighting plot is consequently more complex than for other configurations (Figure 15).

effective reduction of ceiling height. With an 8-ft ceiling, for instance, the bottom of the lights will be at about 7 ft. This is too low for both optical and esthetic reasons, and track lighting should be installed only in rooms with high ceilings or where the track can be recessed in a ceiling cove.

One of the most important considerations for the readability of a display on a television screen is the contrast ratio between the characters and the screen background. It can be demonstrated that a contrast ratio of at least 10 to 1 offers a highly readable display. Since a properly adjusted television monitor can provide a contrast ratio of up to 40 to 1, any lack of contrast at the display will not be occasioned by inherent characteristics of the monitor but rather by the ambient light that falls on the television screen.

It takes only a surprisingly small amount of ambient light spilling onto the face of a monitor screen to diminish the contrast ratio to an unacceptable level. For example, if the lighted portions of the screen—that is, the characters or graphics—emit 40 ft-L, a typical value for a properly adjusted monitor, and if the ambient light spilling onto the screen causes the background to reflect 10 ft-L, the contrast ratio has been decreased to 4 to 1. It is important to emphasize that this is *not* an inherent problem of the television monitor but rather is caused by ambient light falling on the screen. One of the unique design requirements of a video conferencing room relates to this problem: adequate illumination must be provided on the participants for camera pickup, but it must be kept off the television monitors.

Another special problem of designing for video conferences involves the illumination of graphics. Since the majority of visual information is graphic rather than people pictures, it is important that the materials be properly lit. This is particularly difficult because of the wide variety of graphic materials used in teleconferences, ranging from a detailed chart prepared by graphic artists to a hastily drawn pencil sketch done by one of the participants during the conference.

It is important to use relatively neutral colors for walls, carpet and upholstery so as to avoid problems with colorimetry. Highly saturated colors can produce a colored "pall" on the image, particularly with cameras of lesser quality. Inappropriate background colors can also clash with the participants' faces or clothing. Vivid backgrounds can also call attention to themselves and detract from the primary focus, which should be on the

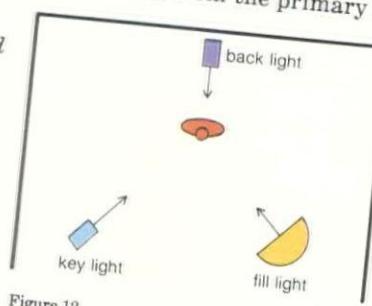


Figure 12

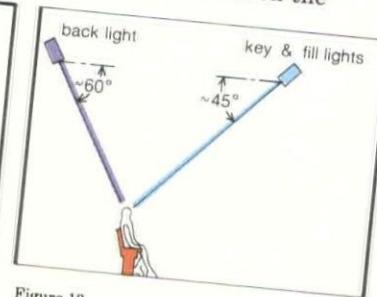


Figure 13

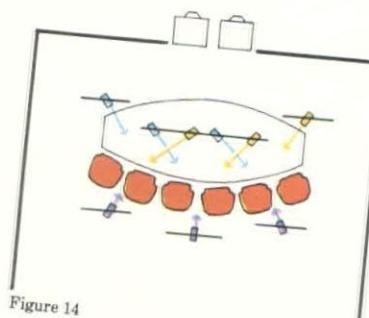


Figure 14

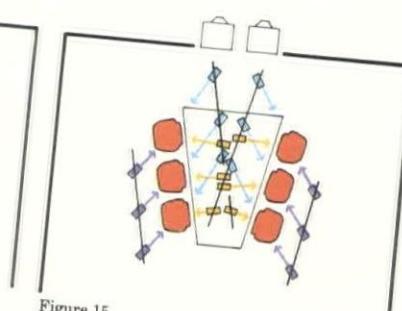


Figure 15

participants or the graphics. It is also important that surfaces in the room produce no spectral reflections, which means, among other things, no shiny table tops or chrome chairs.

#### Audio systems

Most teleconferencing users will agree that the audio link is the most important part of the system. If the video equipment breaks down, it is usually possible to hold a worthwhile meeting by audio only. The reverse is not true. For teleconferencing, participants want to engage in two-way conversations that are as close to natural as possible. Ideally, this would mean that the audio would be high fidelity, with all parties able to talk and listen simultaneously, just as if everyone were in the same room.

Wide-band audio, as much as 15kHz bandwidth, removes the tinniness of the normal phone call. But wide-band circuits also cost money. And since speech intelligence is contained within the normal telephone bandwidth of 3kHz, standard voice-grade telephone lines are generally used. If user-owned wideband facilities are available, they should certainly be used. Normally, however, one has to assess the value of the more costly circuits in light of the expected end results, particularly where widely separated locations are involved.

The designer must also consider the acoustical implications of using wide-band audio, since such systems require more critical room design. Inadequate room design could easily negate any advantages expected of better circuits, and could even make the circuits less effective than standard voice-grade transmission.

The ability to talk and listen simultaneously implies circuitry known as full duplex (FDX). FDX systems allow signals to move in both directions at the same time, as opposed to half-duplex (HDX) systems, in which the line must be turned around each time the signal direction changes (Figure 16). In teleconferencing, the full-duplex concept has become known as open audio because it leaves the lines open in both directions. This allows natural, two-way conversation, with performance similar to that of a standard telephone handset.

The fact is, however, that most rooms are not acoustically capable of supporting open audio systems. In the situation illustrated by Figure 17, sound originating at location A comes out of the loudspeaker at location B, is reflected by the wall, re-enters the microphone at B and returns to location A, where poor acoustics cause it to go round again. Since it has been delayed by

its round trip—as much as a full second if via satellite—it is very bothersome, even to the point of inducing temporary stuttering in the person talking. In the extreme, it sets up the familiar public-address-system howl known as acoustic feedback; the loop is completed acoustically, feeding the signal back to its origin.

To break the feedback loop, a Speakerphone employs a device known as a gain shifter, which in essence cuts off the microphone or loudspeaker at each end according to who is talking. The gain-shift circuitry (a rapid automatic volume control) reduces the amount of audio returned from the other end and so prevents feedback. If severe gain shifting is not utilized, the only way to stop an echo from causing feedback is to provide an acoustical environment that reduces echo to a point that is no longer bothersome. This requires a good interior acoustic design.

#### Keeping noise out

Sound originating outside a room can enter in three ways (Figure 18): via the structure as structure-borne noise, through an air leak in a wall or door as air-borne noise, or through a wall, ceiling or floor by barrier transmission.

The best way to get rid of noise is to avoid it. An effective approach for a teleconferencing room is to surround it with relatively quiet spaces like storage rooms or limited access corridors, which provide contiguous sound buffers. The space above the teleconferencing room can also be the source of objectionable noise and should have padded carpet to isolate the sounds of footfalls and rolling carts.

In determining the maximum permissible noise level for teleconferencing rooms, one must keep two things in mind. First, low-frequency noise may be annoying to room users but will not be transmitted to the far end if voice-grade circuits of limited bandwidth are used for the audio. Second, midrange noises will be annoying to people at both ends. Because microphones "hear" differently than people and prevent listeners from tuning out when they are listening to loudspeakers, it is probable that midrange noises will be more irksome to far-end listeners than to those in the offending room.

For a teleconferencing room, the ambient noise inside the room should not exceed the NC-30 level (Figure 19). NC-25 would be preferable but probably too expensive. This criterion relates to total ambient noise, including that from hvac systems, all room equipment, and intrusive noise originating outside the room.

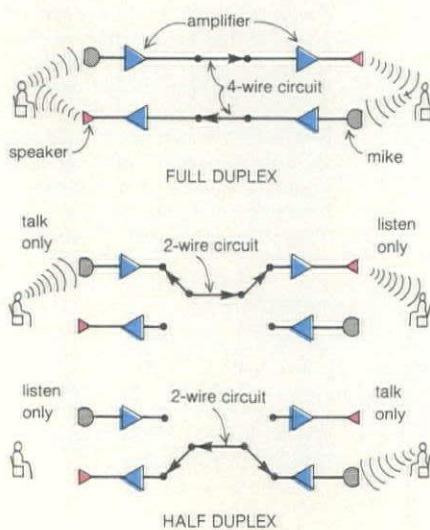


Figure 16

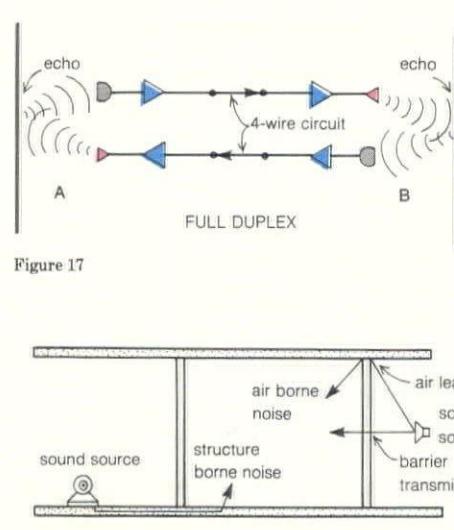
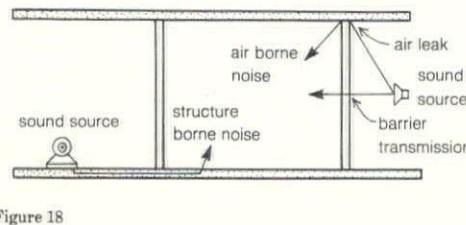


Figure 17

*To allow participants at both ends to talk and listen at the same time in a natural fashion, a teleconferencing installation needs a full-duplex, or open audio, system (Figure 16), in contrast with the half-duplex system familiar to users of Speakerphones. At the same time, however, the room must be carefully designed with respect to acoustics so that echoes inside do not set up acoustic feedback howls (Figure 17). Design must also guard against intrusive noises that might enter the room either as structure-borne and air-borne sound or by barrier transmission (Figure 18).*



# Teleconferencing: acoustics for audio

Still another acoustical measure for teleconferencing rooms concerns the control of noise transmission. If the maximum allowable noise level at each frequency is set by the selected NC curve, and if the noise level outside the room is also known, then determining the amount of sound insulation required in each band is a matter of subtracting one number from the other. Unfortunately, designing sound barriers—walls, floors, ceiling, doors and windows—is not so simple.

When air-borne noise strikes a sound barrier, it causes vibration. The amount the barrier vibrates, which is a function of its mass, and the degree to which the two surfaces of the barrier are coupled determine how much of the sound is re-radiated into the next room. The resulting amount of sound reduction, measured in dB at various frequencies, can be rated in two ways: the accurate but inconvenient STL (sound transmission loss) rating or the STC (sound transmission class), a single-figure rating that is simpler but less precise than STL. In designing teleconferencing rooms, one should be careful to specify the desired end results in terms of the NC curve and let an acoustician decide what barriers are needed.

Some wall constructions suitable for sound barriers are shown in Figure 20. There are two basic types of construction: homogeneous, in which construction is essentially the same throughout, and nonhomogeneous, in which two or more elements are combined and/or acoustically isolated from each other.

Homogeneous walls depend entirely on mass to attenuate sound. However, there quickly comes a point beyond which constructing thicker, heavier walls is impractical. Homogeneous barriers are adequate for most situations, but when they are not, nonhomogeneous construction must be used.

Nonhomogeneous walls use multiple materials that vibrate differently at each frequency. The multiple layers tend to equalize the performance of each material, creating a more uniformly attenuating wall. When the sections are fully separated by dead air space, this decoupling makes it much harder for the vibration of one surface to be carried to the other, which reduces re-radiation and improves the barrier's STC.

As the examples show, nonhomogeneous walls provide excellent sound isolation (high STC figures) using relatively thin, low-mass construction. However, the construction is rather complex. This is an important point. If a nonhomogeneous barrier is not built exactly as designed, its performance may be severely degraded. A

small air leak or a nail in the wrong place can negate the purpose. Parenthetically, using sound-absorbing materials for sound insulation is a common mistake. This won't work, since absorbing materials, by their very nature, leak like a sieve. A qualified acoustician should make the design determinations and inspect the construction at critical stages.

## Keeping sound in

The same principles applied to keep noise out are also used to maintain conference-room privacy. This isolation in reverse is often overlooked in room design, but it is very important for many types of meetings. Budgets, policy, new engineering designs and the like can all be compromised if secrecy is violated. A room that does not provide good control in this regard cannot be expected to be used for meetings requiring security.

It does little good to spend money stopping intrusive noise from entering only to generate noise inside the room. Common sources of internal noise are the hvac system, buzzing fluorescent lights, equipment motors and blowers, clicking control buttons, shuffling feet, tapping pencils and the like. All of these can be controlled; most of them can be controlled inexpensively.

Fluorescent lights should have sound-rated ballasts, or the ballasts should be separately located. Equipment with motors can be shock-mounted or put inside drawers or cabinets. Control panels can be mounted so as to avoid a sounding board effect when controls are used. Carpet will stop footfall noise, and a slightly cushioned table surface will reduce noises there.

Only the hvac system requires special and possibly expensive treatment. Assuming that the teleconferencing room has been isolated from fan rooms or compressor noises, the problems with hvac will probably be rushing air, creaking ventilation ducts or the transmission of noise from another room. Duct velocities should normally not exceed 500 ft/min in a good ventilation system. Standard grilles should not be used; they have a tendency to create turbulence and hence noise. Sound transmission from or to another room can be stopped with dog-legged ducts and good internal acoustic lining.

## Controlling reverberation

Reverberation is the multiple reflection of sounds by surfaces within the room. In nominal amounts, it provides the naturalness we like to hear. Excessive reverberation will cause severe

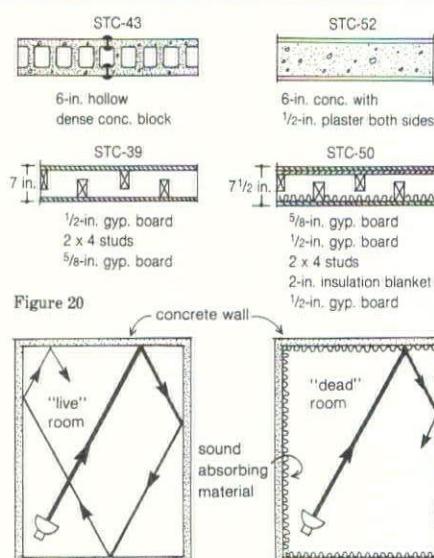
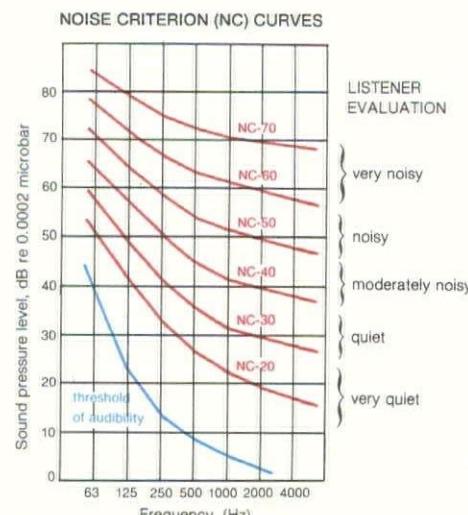


Figure 19

Figure 21

Ambient sound should not exceed NC-30 on the noise criterion chart (Figure 19). Wall construction can vary according to budget and the desired sound transmission class (Figure 20). Since hard walls result in reverberance (Figure 21), they should be lined with a material having an acceptable sound absorption coefficient (Figures 22 and 23).

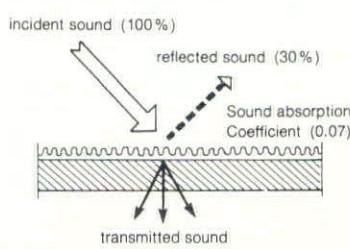


Figure 22

problems, however, especially in teleconferencing situations where speech intelligibility is of paramount importance. In teleconferencing rooms with open-audio systems, too much sound reflection, at the wrong frequencies, will cause sound from the loudspeaker to re-enter the microphones, setting up undesirable echoes or acoustic feedback. Acoustically, the room should be relatively dead, or dry, rather than live (Figure 21).

Room reverberation is controlled by the kinds of materials applied to the interior surfaces, how much material was used, and how it was mounted. As with so many things, a little knowledge is a dangerous thing. It is quite common to see rooms, or room designs, calling for carpet on the floor and thin fiberglass panels or fabric on ceiling and walls. A room thus finished will seldom provide good internal acoustics because different materials have different sound-absorption characteristics at different frequencies. Sound absorbers perform better at high frequencies, just as do sound barriers.

Materials such as carpet, acoustic tile and thin fiberglass panels are relatively inefficient sound absorbers at lower frequencies. When applied directly to a surface, they absorb high frequencies only. The result is a boomy room. This is not only bothersome to users; it does not solve the acoustic feedback problem.

The ability of a material to absorb sound is measured as the sound-absorption coefficient, which has a value between 0 and 1. When multiplied by 100, the coefficient indicates the percentage of sound absorbed. For instance, if a material has a coefficient of 0.7, it absorbs 70 per cent of the sound energy that strikes it at the frequency for which it is rated (Figure 22). A number of values must be examined to determine the effectiveness of any material in each situation. The table in Figure 23 provides the sound-absorption coefficient for several representative materials and mounting methods at six standard frequencies.

Sound absorbers are frequently rated using a number known as the noise-reduction coefficient (NRC). NRC is the average of the sound-absorption coefficients for only four frequencies—250, 500, 1,000 and 2,000 Hz. For rooms with critical acoustical considerations, NRC is inadequate because it does not include very low-frequency absorption. The numbers can also be misleading since two materials with the same NRC values can have considerably different sound-absorption characteristics. One must be careful not to confuse NRC with reduction of intrusive

noises. NRC relates *only* to absorption.

The answer to the question how much absorption does a teleconferencing room need is usually simple: as much as can be achieved using practical materials. Some newer microphone designed specifically for teleconferencing seem to perform better in a slightly reverberant environment. It is important that the absorption be flat over the entire speech-frequency range of 125 Hz to 4,000 Hz. The designer should remember that a teleconferencing room and its equipment must be considered an integrated system. The safest approach when designing a teleconferencing facility is to specify the desired end result, not the method of achieving it, and to leave the details of execution to a competent acoustician.

#### The interior environment

The hvac system must handle not only the heat produced by conference participants, including observers or secondary participants, but also the heat introduced by lighting and electronic equipment. Even if the room is meant only for audio conferencing, designing hvac for the needs of video conferencing may prevent an inordinately expensive retrofit later. Since by its nature teleconferencing invites meetings with other time zones, it may be advisable to keep the room's hvac system separate from that serving the rest of the building. Further, the hvac system must handle smoke removal, since it would be unrealistic to prohibit smoking in a teleconferencing room. In addition to bothering many people, smoke is not good for equipment. Anything less than six air changes per hour, with a high percentage of fresh air, is inadequate.

We suggest that the hvac system, with all equipment working and the maximum number of participants in the room, maintain a temperature range of 68F to 72F (dry bulb) and a humidity range of 40 to 50 per cent relative because videotape equipment, computers and other devices can be adversely affected by either high moisture or static discharge.

As we said at the beginning, the design of teleconferencing rooms is still more of an art than a science. There are more considerations than most people are aware of when the task is first begun, and room design is frequently given short shrift until the equipment is ready to be installed. Nonetheless, room design is critical to the success or failure of the entire video conferencing system. It should not be taken lightly.

SOUND ABSORPTION COEFFICIENTS FOR TYPICAL MATERIALS

Materials	Frequencies	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
gypsum board, 1/2-in. on studs		0.29	0.10	0.05	0.04	0.07	0.09
plate glass		0.18	0.06	0.04	0.03	0.02	0.02
heavy carpet on concrete		0.02	0.06	0.14	0.37	0.60	0.65
velours drape, medium weight		0.07	0.31	0.49	0.75	0.70	0.60
ceiling tile on hard surface		0.10	0.30	0.56	0.70	0.68	0.50
suspended ceiling tile with 16-in. air space		0.45	0.48	0.65	0.75	0.72	0.55
mineral wool, 2-in. with 1-in. air space		0.30	0.70	0.85	0.86	0.87	0.87
fiber glass, 4-in. on hard surface		0.40	0.92	0.98	0.97	0.93	0.88

Multiply coefficients by 100 for absorption percentage

Figure 23

# Product literature

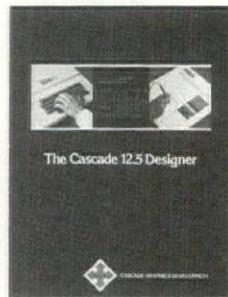
For more information, circle item numbers on Reader Service Card, pages 165-166



## Ducts

A 4-page brochure features the *UNI-RIB* light gauge, spiral lockseam duct with an external stiffening rib. Included is information on applications, materials and configurations as well as sizes and installation procedures. United McGill Corp., Groveport, Ohio.

Circle 400 on reader service card



## CAD

Hardware and software of the *12.5 Designer* CAD system, which is programmable in Pascal, is described in a 6-page color brochure. A diagram shows both a stand-alone set-up and a network system. Information on maintenance and specifications are included. Cascade Graphics Development, Santa Ana, Calif.

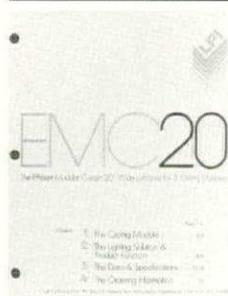
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## Office furniture

Six series of furniture, including chairs, cabinets credenzas, tables and desks, are featured in a 20-page color catalog. Photos show typical installations, and line drawings with dimensions illustrate each model. Fantoni, USA, New York City.

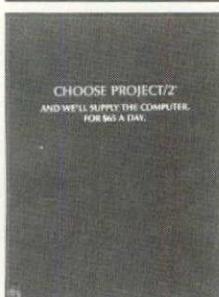
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## Lighting

Custom *EMC20* luminaires for 5-ft ceiling modules are covered in a 16-page brochure. Details and diagrams show design features and options. Air-handling and photometric data and specifications are included. Lighting Products, Inc., Highland Park, Ill.

Circle 407 on reader service card



## Project control

A 4-page color brochure introduces *Project/2* project management software for Digital Equipment's *VAX-11/730* minicomputer. System components are shown, and monthly rental costs are listed. Project Software & Development, Inc., Cambridge, Mass.

Circle 402 on reader service card



## Insulated steel doors

An indexed handbook on *Castlegate* insulated steel doors includes information on framing systems, insulation factors and repairs. It is divided into three sections covering specifications, installation and maintenance. United States Gypsum Co., Chicago.

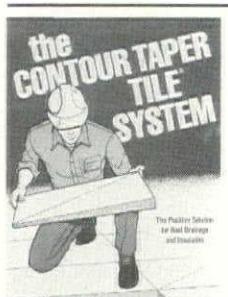
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## Roof windows

A page of literature features top-hung roof windows with integrated screens. Photos show installations, and sizes, flashings, accessories and prices are listed. Velux-America, Inc., Greenwood, S.C.

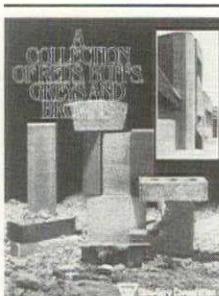
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## Roof tiles

*Contour Taper Tiles*, designed to drain and insulate dead-level roof decks, are featured in an 8-page brochure. Details show roof deck construction using the tiles and cricket applications. A chart listing insulating properties and specifications is included. Associated Foam Manufacturers, Lenexa, Kansas.

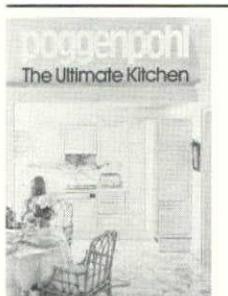
Circle 409 on reader service card



## Brick

Typical installations and seven available brick colors are shown in photographs in a 6-page color foldout brochure. Dimensions for nine facebrick series are listed. Glen-Gery Corp., Shoemakersville, Pa.

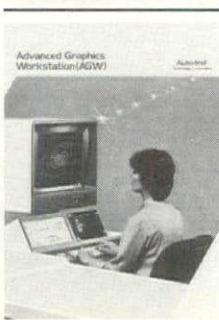
Circle 404 on reader service card



## Kitchen cabinets

Color photographs of installations of a line of kitchen cabinets are featured throughout a 32-page brochure. Among the materials used in the cabinets shown are hardwoods and veneers, laminates and lacquer finishes. Poggenpohl USA Corp., Teaneck, N.J.

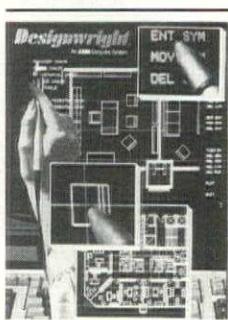
Circle 410 on reader service card



## Graphics workstation

A 6-page color foldout brochure features the *Advanced Graphics Workstation (AGW)*, a low-cost, full-function 32-bit CAD/CAM system capable of local area networking and distributed processing. System hardware and software are illustrated and described. Auto-trol Technology Corp., Denver.

Circle 405 on reader service card



## CAD

*Designwright*, an ASID computer system, is featured in an 8-page color brochure. Hardware and software for word processing, accounting, space planning, design and drafting are described. Hardware components are illustrated. ASID Computer Systems, Inc., New York City.

Circle 411 on reader service card

More literature on page 125

# Product literature *continued*

For more information, circle item numbers on Reader Service Card, pages 165-166



## Illuminated handrails

A 4-page color catalog illustrates and describes a selection of illuminated handrails. Extruded aluminum railings with concealed fluorescent lamps are shown in photos of typical installations. Section details and descriptions are included for each system. Livers Bronze Co., Kansas City, Mo.

*Circle 412 on reader service card*



## Kitchen cabinets

A 26-page color brochure covers a variety of cabinet designs. Styles are shown in photos of typical installations accompanied by photos of models exhibiting a wide range of color options. Options in woods, laminate surfaces and ceramic tiles are also shown. Allmilmo Corp., Fairfield, N.J.

*Circle 413 on reader service card*



## Faucets

Several styles of bathroom faucets and matching accessories are shown in photographs in an 8-page color brochure. Designs range from antique to modern and use such materials as solid brass, woods, porcelain, cut crystal and onyx. Norris Industries, Los Angeles.

*Circle 414 on reader service card*



## Lighting fixtures

A catalog sheet describes the cast-aluminum *Protector* series of HPS lighting fixtures, said to be vandalproof. Application data for 2 different series as well as dimensions are included. Kenall Manufacturing Co., Chicago.

*Circle 415 on reader service card*



## Chairs

Two models of the *Blitz* chair—with and without arms—designed by Motomi Kawakami are shown in a 4-page color brochure. Dimensions of the chairs are listed. Photos show how they may be folded and stacked together to take up very little space when stored. I.P.I., Inc., New York City.

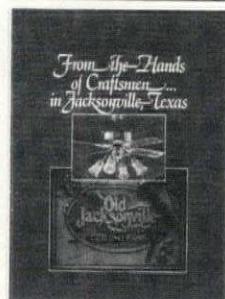
*Circle 416 on reader service card*



## Reception desks

Four configurations that may be achieved with *Series 12* round wood reception desks are shown in photographs and in diagrams with dimensions in a 4-page color brochure. Cumberland Furniture Corp., New York City.

*Circle 417 on reader service card*



## Ceiling fans

Eight models of ceiling fans, with and without light fixtures, are shown in a 20-page color catalog. A cutaway diagram shows various product features and photos show light fixture and blade options. Nichols-Kusan, Inc., Jacksonville, Texas.

*Circle 418 on reader service card*



## Lamp fixtures

Classic fixtures made of clear ribbed glass and solid brass are described and illustrated in an 8-page color brochure. Dimensions and bulb wattage for each fixture are listed. Both wall- and ceiling-mounted fixtures are shown. The American Glass Light Co., New York City.

*Circle 419 on reader service card*



## Clocks

Wall, desk and alarm clocks in both antique and contemporary designs are featured in a 20-page color catalog. Each model is shown in a photograph and described. Dimensions are listed. Howard Miller Clock Co., Zeeland, Mich.

*Circle 420 on reader service card*



## Leaded stained glass

A collection of hand-crafted leaded stained glass is featured in a 4-page brochure. Hand-cut and sand-etched center designs and frosted monograms are included. A color insert sheet covers full-color floral designs. Something Special, Pottstown, Pa.

*Circle 421 on reader service card*



## Carved wood details

Columns, capitals, finials and corbels are among the carved wood details featured in an 18-page brochure. Moldings and ballusters are also shown. Prices and dimensions are listed. Raymond E. Enkeboll Designs, Carson, Calif.

*Circle 422 on reader service card*



## Brass rails

Solid brass tubing for rails as well as accessories, such as end caps and brackets, are featured in an 8-page color brochure. Fence designs, post styles and custom and standard specialty bends are also illustrated. Dimensions are listed. Ship'n Out, Inc., Pawling, N.Y.

*Circle 423 on reader service card*

*More literature on page 133*

# WAUSAU.

Aluminum  
window  
& curtain  
wall  
systems.

## Outstanding structural integrity.

On every project, whether it's high rise, small or the unusual, you need a window system you can trust.

At Wausau Metals, we believe structural integrity is so important we go beyond recommended AAMA quality standards. We design window and curtain wall systems for you that will perform beautifully, under the most extreme conditions, years and years after your project is completed.

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It's another reason why more and more architects across the country are putting their trust in Wausau for high performance window and curtain wall systems.

Look for us in Sweet's to find the Wausau Metals Representative nearest you. Or, call or write us today for assistance in your next window design.

Our solid growth is built on trust.



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Metals Corporation

1415 West Street, P.O. Box 1746 • Wausau, WI 54401  
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Circle 37 on inquiry card

Madison Plaza • Chicago, Illinois  
Skidmore Owings & Merrill Chicago, Illinois  
Window wall and curtain wall by Wausau Metals.



## New products

For more information, circle item number on Reader Service Card, pages 165-166

### Slice it thin

*Granitello* is the latest development in the evolution of agglomerate products. Back in 1965, when Alberto, Pietro and Bruno Quarella, owners of the F.lli Quarella Company of Verona, Italy, first created marble agglomerate, they saw it as a lighter and stronger alternative to terrazzo tiles. In creating the agglomerate, they had replaced the cement bonding agent of the terrazzo with a polyester resin, which permitted them to cut slabs as thin as  $\frac{3}{8}$  in.

*Granitello* takes this process one step further. Like other agglomerates it is made with a base of marble chips, by-products of marble slab processing. However, where other agglomerates use chips ranging in size from 1 to 150mm, *Granitello* uses chips ranging only from 1 to 3mm. This results in greater uniformity of color and texture and greater strength due to its increased density. The increased density allows cutting 10- by 4-ft slabs as thin as  $\frac{1}{4}$  in. Thus, *Granitello* bears the same advantage over other agglomerates as they bear over terrazzo by using less mass to cover the same space.

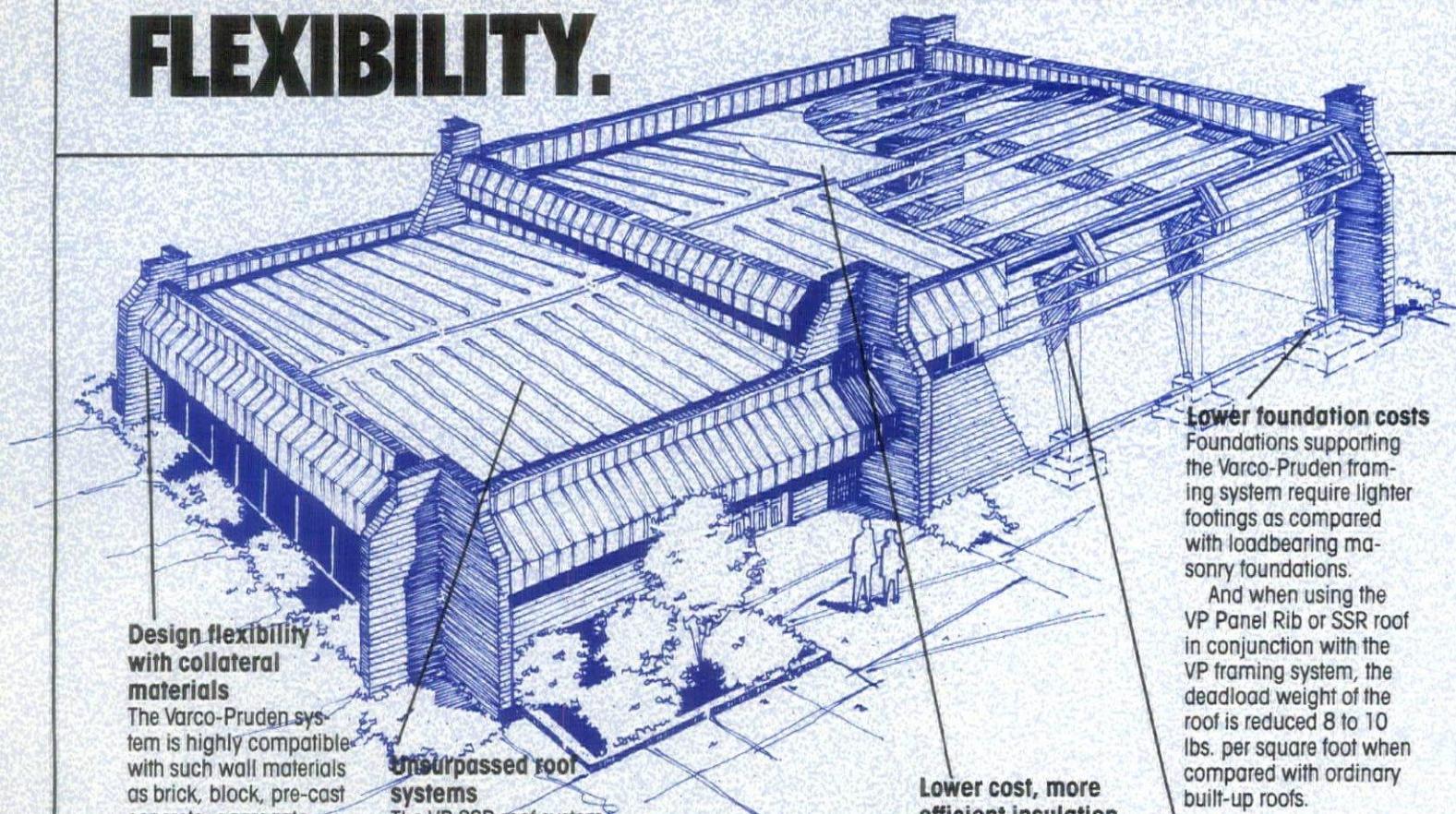
Available in more than a dozen tones—many of which resemble the most popular granite types—*Granitello* may be used for flooring, interior wall surfacing, treads, window sills and counter tops. According to Timothy H. Skirvin, president of Landis Marble, Inc., the national distributor of the product in this country, it costs 15 to 20 per cent more than other agglomerates but still does not begin to approach the cost of solid marble or granite.

Although it was not introduced to the United States until recently, *Granitello* was developed in Italy five years ago and has been installed extensively throughout Italy, West Germany, Austria, France, Great Britain and Saudi Arabia. It is produced only in Italy and delivery takes from 8 to 10 weeks. Landis Marble, Inc., Wilmington, Del.

Circle 300 on reader service card  
More products on page 129



# ONLY VARCO-PRUDEN OFFERS ARCHITECTS COMPLETE DESIGN FLEXIBILITY.



## Design flexibility with collateral materials

The Varco-Pruden system is highly compatible with such wall materials as brick, block, pre-cast concrete, aggregate panels, wood, glass...in fact, any wall material.

Of the major firms within the building systems industry, Varco-Pruden...and only Varco-Pruden...offers architects freedom in horizontal, longitudinal and vertical dimensions, roof slopes, bay spacings, as well as design loadings. At no extra cost. No added construction time.

## Unsurpassed roof systems

The VP SSR roof system is the finest standing seam roof system available. Panels are interlocked and then joined together by a panel seamer, resulting in a one-piece membrane with a 3" high rib...tallest in the industry. This means unsurpassed weathertightness...with an available 20-year warranty.

And through the use of dense thermal blocks of

extruded polystyrene in combination with fiberglass insulation and vapor barriers, longtime and predictable thermal efficiency is assured. A slotted clip even allows thermal movement up to a total of 2".

Furthermore, it offers a complete line of accessories including translucent panels, flashing units and vents.

## Lower cost, more efficient insulation systems

The very nature of the Varco-Pruden system provides for quick and easy installation of fiberglass blanket or Thermax® insulation systems...with insulation values to R42. The result is a more cost-efficient building, less investment in HVAC equipment, less maintenance cost and reduced energy needs.

## Lower foundation costs

Foundations supporting the Varco-Pruden framing system require lighter footings as compared with loadbearing masonry foundations.

And when using the VP Panel Rib or SSR roof in conjunction with the VP framing system, the deadload weight of the roof is reduced 8 to 10 lbs. per square foot when compared with ordinary built-up roofs.

## Economical frame design

Varco-Pruden framing systems are computer-designed to meet the precise design requirements for each building. Beams and columns are analyzed then shaped with selected web and flange thicknesses to satisfy given load conditions. Such a custom approach results in a more economical structure system.

The Varco-Pruden Building System can provide architects with the complete building...or the structural system only...or a combination of structural, roof and/or wall systems.

These are a few of the reasons why an increasing number of architects are finding the VP Building System offers lower and more predictable costs...quicker building occupancy...unmatched thermal efficiency...the industry's most complete array of warranties...and a remarkable degree of design flexibility inherent in the system.

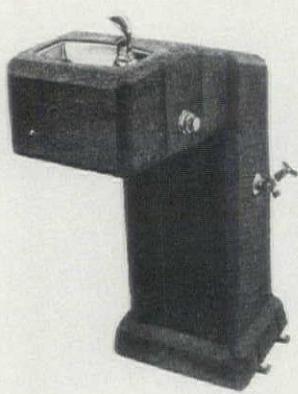
There are over 700 authorized Varco-Pruden Builders throughout the U.S. For more information on VP's services to architects, contact your local Varco-Pruden Builder...or write or call us toll free: 1-800-238-3246.



**VARCO-PRUDEN  
BUILDINGS**  
**AMCA  
INTERNATIONAL**

Clark Tower/Memphis, Tennessee 38137/901-767-5910

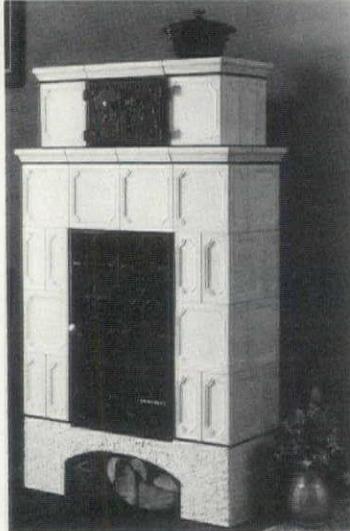
**WHEN YOU KNOW WHO WE ARE, YOU WON'T BUILD ANY OTHER WAY.**



#### Stone pedestal fountain

A barrier-free stone pedestal fountain, Model 4590 is made with dark brown exposed aggregate. Chrome-plated fittings include a 2-stream, mound-building projector with an automatic stream regulator and a side faucet for filling buckets. The 4590 complies with ANSI and ATBCB guidelines and has rounded edges and beveled corners. The pushbutton for the fountain is designed for easy access and operation by handicapped users. Halsey Taylor, Freeport, Ill.

Circle 301 on reader service card



#### Ceramic tile stoves

Four models of wood- and coal-burning stoves from West Germany, including a compact, apartment-sized model, feature automatic liquid expansion thermostats, shaking grates and pull-out ash pans. All models provide both convection and radiant heat. Stoves have cast-iron firechambers surrounded by 1 7/8-in.-thick ceramic tile sections with air space in between. Tiles are said to remain safe to touch regardless of the heat generated. Stoves are available in 8 colors. Ceramic Radiant Heat, Lochmere, N.H.

Circle 302 on reader service card  
Continued on page 131

# Watch your investment grow.

The kids of today are the doctors, the engineers, the scientists, the teachers, the leaders of tomorrow.

It will take your company's help to assure these children a first-rate college education because today colleges are having a hard time coping with the high costs of learning.

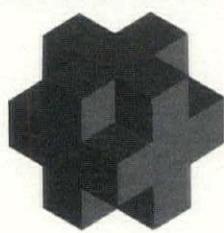
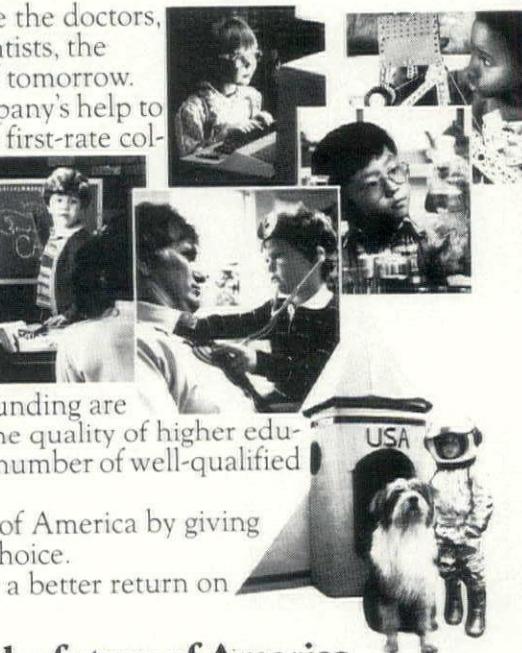
Rising costs and less government funding are threatening to lower the quality of higher education and reduce the number of well-qualified college graduates.

Invest in the future of America by giving to the college of your choice.

You couldn't ask for a better return on your investment.

**Invest in the future of America.  
Give to the college of your choice.**

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A unique series of limited partnerships formed to purchase oil and gas production payments from a specified portfolio of producing

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\$450 Million Offering

Production Payments with Initial Fixed Rate

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Circle 39 on inquiry card

Fifteen years of foam panel experience have resulted in the development of Therm-U-Wall — the most advanced factory insulated system on the market today. From conception to production, MOLENCO engineered T-U-W to combine more of the design features architects and owners require:

**2½" Panel Thickness.** An extra half inch of foamed-in-place insulation provides greater energy efficiency when compared to conventional systems. The increased thickness also allows greater structural spanning capability.

**Clipless Side Joint.** T-U-W's channel side joint supplies optimum strength without the use of clips for panel to girt attachment.

**Standard 30" Panel Widths.** T-U-W's flush, modular look combines clean aesthetics with the added benefit of superior insulating value.

**Kynar® Finish.** The recognized coating for long life application is MOLENCO's stock finish.

**Complete line of Accessories.** Extrusions with matching Kynar coatings are available for all trim conditions.

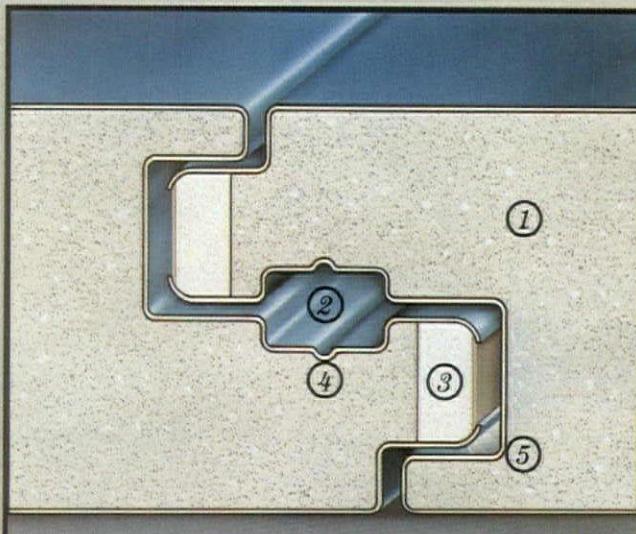
With over 65 years of experience in the metal panel industry, who better than MOLENCO to introduce Therm-U-Wall — the latest in flat, foamed-in-place metal panel technology.

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**MOLENCO**

# MOLENCO Presents THERM-U-WALL.

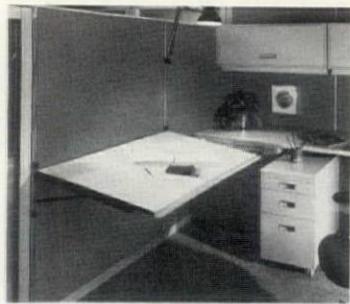
Now a proven system is even better.



- ① 2½" of foamed-in-place insulation.
- ② Innovative side joint design allows positive fastening of both skins without clips.
- ③ ½" gypsum board side dams.
- ④ Built-in fastener guide.
- ⑤ Factory-applied sealant provides vapor barrier.

Moncrief-Lenoir Manufacturing Company  
P.O. Box 2505 • Houston, Texas 77252-2505

Circle 40 on inquiry card



#### Panel-hung drawing board

An adjustable panel-hung drawing board comes in 2 sizes: 39 by 42 in. and 30 by 48 in. Both models feature white laminate surfaces and extruded pencil trays. Boards may be folded away when not in use. All-Steel, Inc., Aurora, Ill.

Circle 303 on reader service card



#### Fabric

The Double Facade group of reversible fabrics is 100 per cent wool and comes in 14 colorways. Fabrics, which may be used for upholstery or wallcovering, weigh from 20.2 to 25.1 oz/yd and are available in a 54-in. width. Joyce Vagasy, New York City.

Circle 305 on reader service card



#### CAD

Feasibility studies, design, working drawings, specs and presentations are claimed to be expedited with the *Arcade* system. The system includes a terminal, processor, 1.75 megabytes of memory, a matrix printer and a high-speed plotter. Bruning, Itasca, Ill.

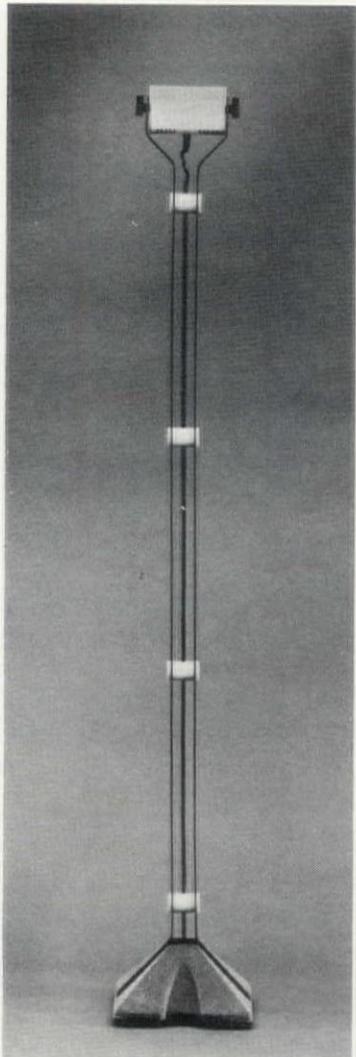
Circle 306 on reader service card



#### Wood slat blinds

*Flexalum Woodland* blinds have 1-in. wood slats, a wood wand, wood knobs and a wood valence. Blinds come in 5 different tones. Hunter Douglas, Inc., Maywood, N.J.

Circle 307 on reader service card



#### Floor lamp

The Techlinea *Torchere* has twin uprights of black-painted steel joined at intervals with short rods of contrasting colors—white, red or blue. The triangular hood rotates 90 deg and houses a 300W tungsten halogen bulb with a touchronic 3-way switch. The base is precast, glass-reinforced concrete. The lamp measures 72½ in. high by 11 in. deep. The base measures 11 by 11 in. Boyd Lighting Co., San Francisco, Calif.

Circle 304 on reader service card



"Kalwall, the most highly insulating light transmitting material."

See Sweet's 8.14/KaL, 7.8/KaL, 13.11a/Ka, 13.2c/Stu.

**Kalwall**  
CORPORATION

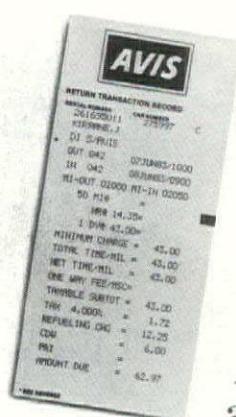
1111 Candia Rd., Manchester, NH 03103 (603) 627-3861

Circle 41 on inquiry card

# The New Avis Rapid Return.<sup>SM</sup>

## The Fastest Way To Return Your Car And Get A Record Of Your Expenses.

If you've been waiting at the counter to return your rental car and get a record of your expenses, Avis has great news. The wait is over.



You get a record of your expenses in seconds!

Avis has just introduced the new, computerized Avis Rapid Return,<sup>SM</sup> at selected airports and major downtown locations. It's the

fastest way to return your rental car and get a printed record of your expenses, to the penny. Automatically. Without waiting at the rental counter.

And Avis Rapid Return is as easy to use as a pocket calculator. Just enter your car number, your mileage and your gas gauge reading into the computer. With the push of a button, your car return is completed. And so is the record of your expenses.

Which means that you can catch your plane and get a record of your expenses, without ever waiting at the rental counter.

The new Avis Rapid Return. It's another Avis first that means better and faster service for you. And another way that Trying Harder Makes Avis Second to None.



Avis features GM cars. Chevrolet Caprice Classic.

**TRYING HARDER MAKES AVIS SECOND TO NONE.<sup>SM</sup>**

© 1983 Avis Rent-A-Car System, Inc. Avis\*



*We care about you, so whenever you drive, care about yourself. Please fasten your seat belt.*

Avis Rapid Return service available for charge customers only who require no modification of rental agreement charges.

Circle 42 on inquiry card



#### Masonry

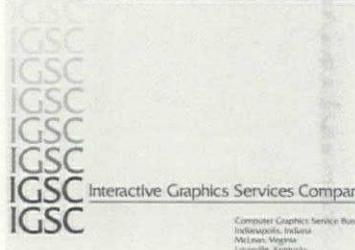
A 12-page color brochure features patterns of concrete block pavers for residential and contract use from a number of different manufacturers. Typical installations shown are roads, parks, shopping malls and patios. National Concrete Masonry Association, Herndon, Va. Circle 424 on reader service card



#### Laminated safety glass

A 16-page color brochure features *Saflex*, a plastic interlayer used in laminated glass to prevent pieces of glass from falling out if a pane is broken. It is fire resistant and is claimed to reduce heat, light and sound transmittance. Monsanto Co., St. Louis, Mo.

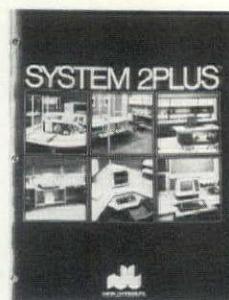
Circle 425 on reader service card



#### Computer graphics services

A pamphlet describes services, including CAD and digitizing support, CAD system consulting and training in applications, and remote CAD resource timesharing. A "user network," which benefits from centralized databases, research and development, is also described. Interactive Graphics Services Co., Indianapolis, Ind.

Circle 426 on reader service card



#### Open office components

A 15-page, color brochure shows a variety of office configurations that may be achieved with this manufacturer's furniture, panels and computer stations. A bi-level power distribution system, which provides desktop or baseline access, is also shown and described. Panel Concepts, Inc., Santa Ana, Calif.

Circle 427 on reader service card



#### Office accessories

A 6-page color foldout brochure covers walnut and oak office accessories, including desk top organizers, waste baskets, planters and coat racks. Letter trays have brass or chrome stacking bars; walnut- or oak-finished coat racks feature brass, bronze or brushed chrome hooks. Nucraft Furniture Co., Grand Rapids, Mich.

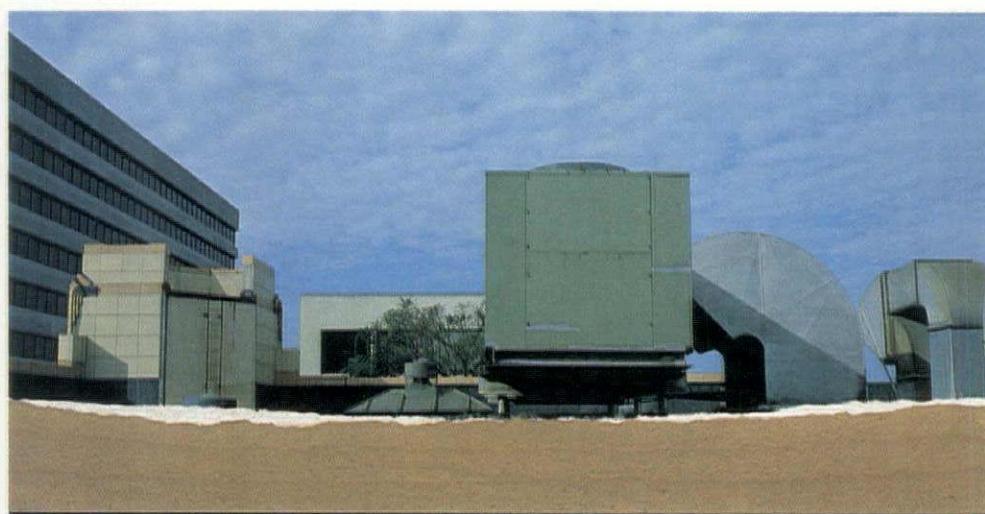
Circle 428 on reader service card



#### Building systems

A 24-page color brochure covers structural steel frames, roofing systems, wall systems, urethane surface finishes and accessories, such as telescoping doors, skylights, windows and vents. Details show different framing systems and photos show typical installations. Inryco, Inc., Milwaukee.

Circle 429 on reader service card



## Geotherm<sup>TM</sup> roof coating deserves to be on top.

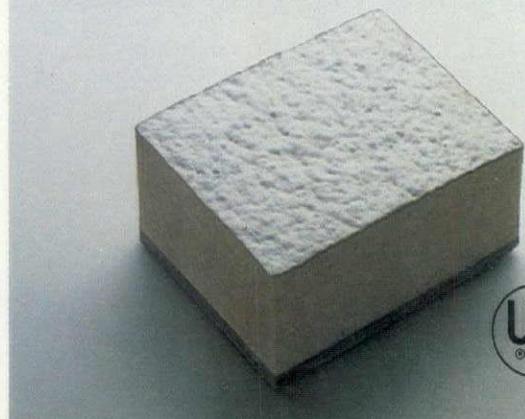
### Geotherm<sup>TM</sup> elastomer roof coating is:

- A flexible, breathable, fire-retardant coating developed to provide years of protection for urethane foam insulation systems.
- The only roof coating you need for any spray-in-place urethane foam.
- Waterproof. Rain, snow, or water won't affect it.
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than other coatings, so a sudden storm is less of a threat.

- UL-classified, Standard 790\*
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Put Geotherm on your next roofing job. It's the tough, energy-saving roof coating. For a free sample and all the facts, call today or send us your business card.



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800/348-7615 219/264-0645



\*Cements and coatings for built-up roof-covering materials classified by Underwriters Laboratories, Inc., as to external fire exposure only.

# **RECORD HOUSES 1984**

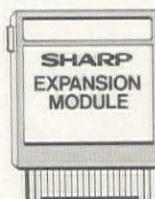
The editors of ARCHITECTURAL RECORD announce the 28th annual RECORD HOUSES awards program. This program is open to any architect registered in the United States or Canada; work previously published in other national design magazines is disqualified. There are no entry forms or fees, although submissions must include plan(s), photographs, and a brief project description—bound firmly in an 8½-by 11-inch folder—and be postmarked no later than November 1, 1983. Winning entries will be featured in the 1984 RECORD HOUSES. Other submissions will be either returned or scheduled for a future issue.

Submissions should be mailed to:

Douglas Brenner  
ARCHITECTURAL RECORD  
1221 Avenue of the Americas  
New York, New York 10020

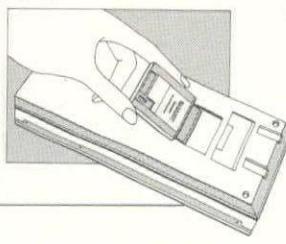
ANOTHER TECHNOLOGICAL BREAKTHROUGH FROM SHARP.

# THE HAND-HELD COMPUTER WITH POWERFUL CONNECTIONS.

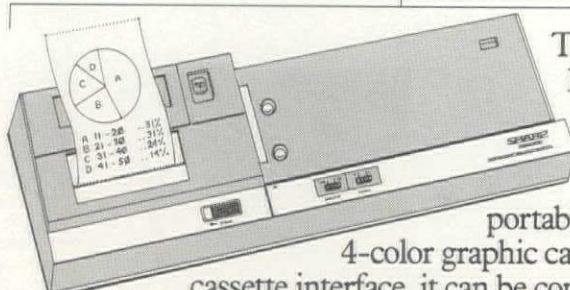
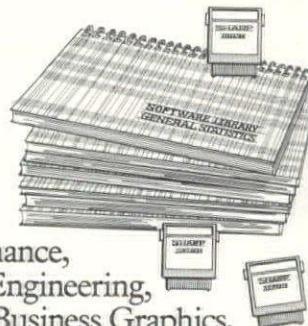


**24K  
(8K + 16K)** Now you can take 24K with you wherever you go—thanks to the new Sharp PC-1500A. It's the 8K hand-held computer that expands to a powerful portable 24K computer system when the optional 16K memory module is added. And because it's programmable in Basic, the most popular computer language, it gives you the power and capabilities to handle most scientific, engineering and management uses.

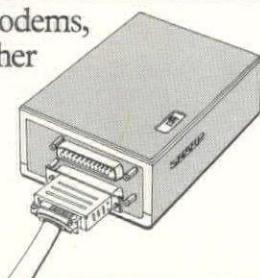
195(W) x 25.5(H) x 86(D) mm



The PC-1500A also has a complete library of plug-in software programs including: SharpCalc (Spreadsheet), Finance, Math, Electrical Engineering, Circuit Analysis, Business Graphics, General Statistics, Statistical Distribution and Graphics Development.



The optional CE-150 Color Graphic Printer/Cassette Interface not only gives the system portable printing but also 4-color graphic capabilities. And as a cassette interface, it can be connected with up to two cassette tape recorders—one for storage and one for recall. The CE-150's RS-232C Interface allows communication links to a wide variety of peripherals such as modems, bar-code readers, data bases, as well as other micro, mini or mainframe computers.



Perhaps the only feature of our portable computer system that won't overpower you is its price. It's not only less than you'd expect, it's probably hundreds of dollars less. So before you spend a lot of money and get a lot less computer, call toll-free for more information, dial (800)-447-4700.

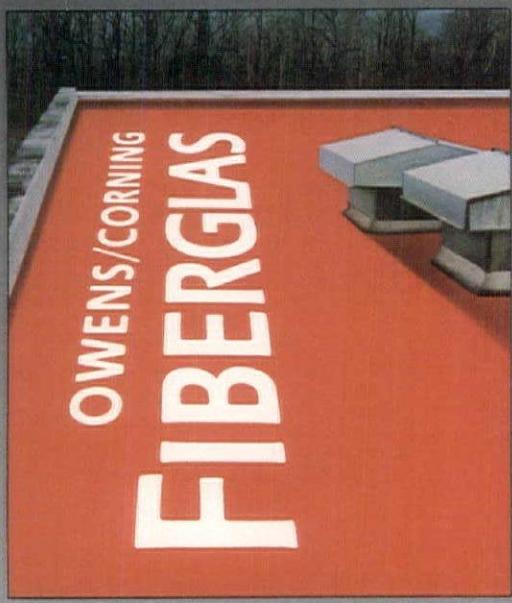


Watch for our TV commercial to learn more about the latest advance in computer technology from Sharp. We replaced a half-million transistors and diodes with one tiny "chip."

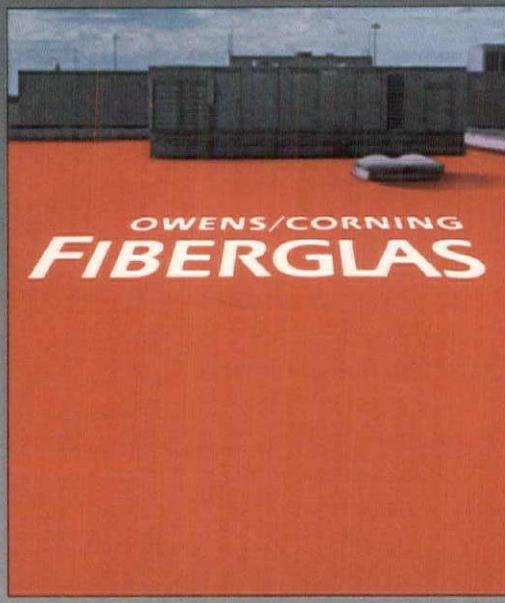
**SHARP**

FROM SHARP MINDS  
COME SHARP PRODUCTS

Sharp Electronics Corp., 10 Sharp Plaza, Paramus, NJ 07652. Call for information on custom applications: (201) 265-5600, ext. 4361.



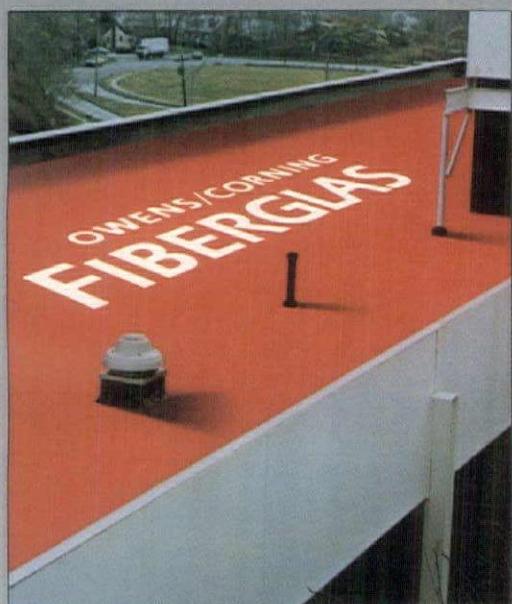
Double-layer Fiberglas insulation over FURI.  
3 plies Perma Ply-R. Gravel surface.



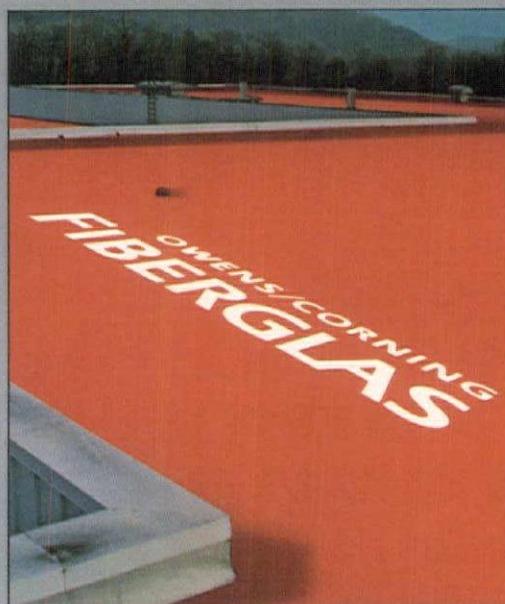
Single-layer Fiberglas insulation.  
3 plies Perma Ply-R. Perma Cap® surface.



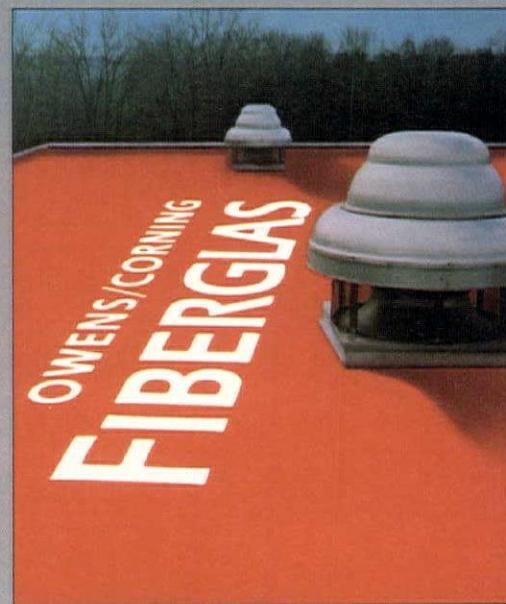
Single-layer Fiberglas insulation with taped  
joints. 2 plies Perma Ply-R. Gravel surface.



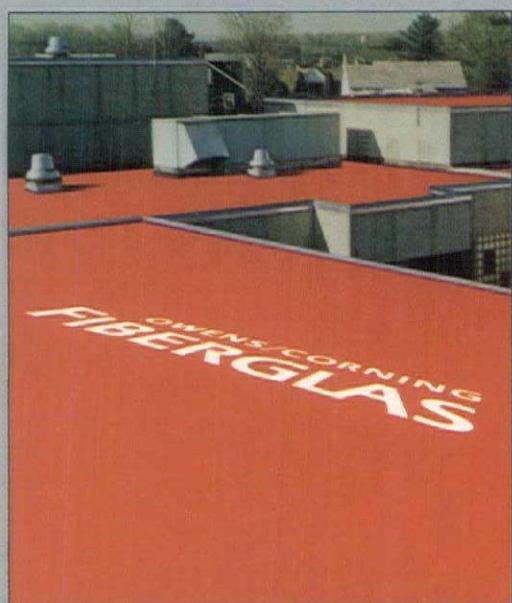
Double-layer Fiberglas insulation.  
4 plies Perma Ply-R. Smooth surface.\*



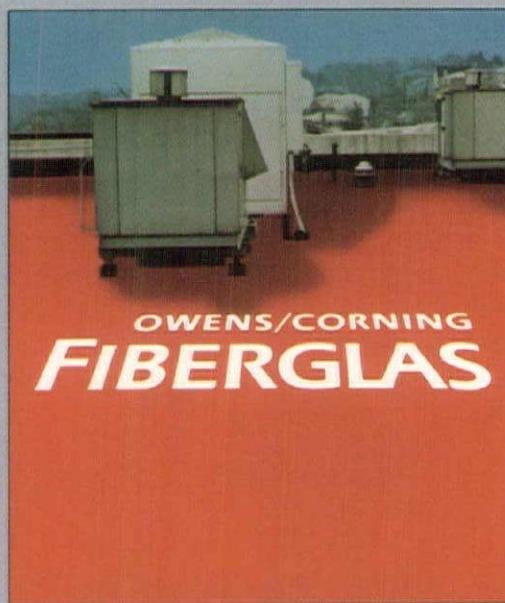
Single-layer FURI. Perma Ply No. 28 perf. base  
sheet. 2 plies Perma Ply-R. Gravel surface.



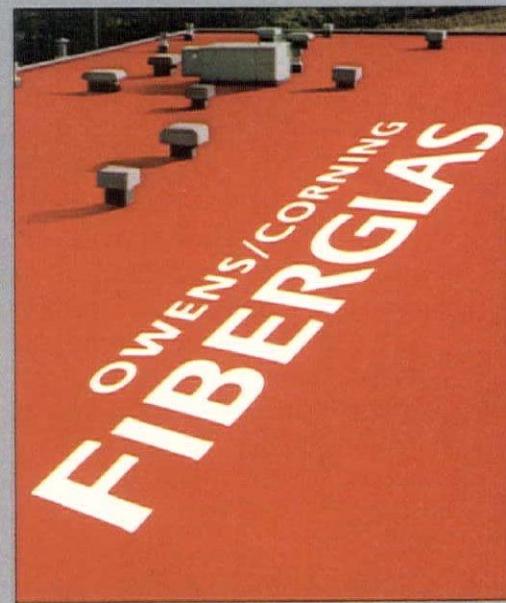
Single-layer Fiberglas insulation. New Perma  
Plus-2® system.† Smooth surface.



Double-layer Fiberglas insulation. New Perma  
Plus-2 system.† Gravel surface.



Single-layer Fiberglas insulation.  
3 plies Perma Ply-R. Unsurfaced.



Perma Ply No. 28 base sheet. 2 plies Perma Ply  
No. 11. Perma Cap surface over wooden deck.

# THE TOP ROOF FOR ANY BOTTOM LINE.

No two roofs are the same. No two applications will be either. At Owens-Corning, we offer a full range of specifications to fit virtually every roofing need. So we can put the best roof over your head at a cost that won't go over your budget.

## GO RIGHT TO THE TOP.

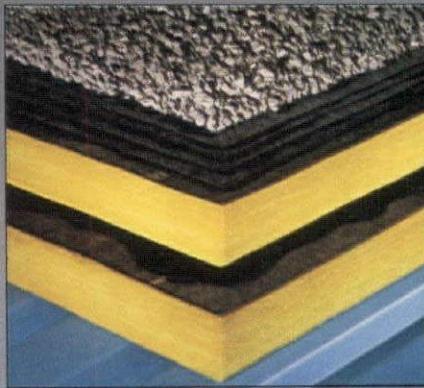
It stands to reason that to get the best roof, you have to start with the best roofing materials.

For instance, although it's underneath where you can't see it, your roof insulation deserves top priority. The chart shows you why Owens-Corning is your best choice.

We offer insulations for every application. In a full range of thermal values. A double layer of Fiberglas® or FURI® roof insulation can even provide R-values up to 40.

And the double layer serves a double purpose. It delivers better performance. By installing a second layer of Fiberglas roof insulation over the first and offsetting joints, you eliminate continu-

the highest tensile strength, best tear resistance and unequalled proven durability. Over four billion square feet installed over 17 years.



**OUR TOP ROOF.**  
The *Double Eagle* roof. Double layer of Fiberglas insulation and 4 plies of Perma Ply-R. Our best roof. The industry's best guaranty—20 years.

## AFTER IT'S PUT DOWN, WE'LL STAY ON TOP OF IT.

Even the best built-up roof is only as good as the way it's put down. That's why Owens-Corning has set up a unique Certified Roofing Contractor Program. Certified Contractors are specially selected professionals who have met the industry's most stringent requirements—Owens-Corning's. The result:

roofs that set the industry's highest standards.

And when a Certified Contractor installs our double-layer insulation, 4-ply Perma Ply-R roof, you can get the industry's best guaranty. 20 years.

## YOU CAN'T AFFORD TO OVERLOOK OUR ROOF.

The best products. The best contractors. The best guaranty. When you specify an Owens-Corning roof, you'll know it's not only cost competitive, it's the best you can

get for your money.

Let us show you how you can hold the bottom line. Call L. Diller at (800) 537-3476. In Ohio, (419) 248-5511. Or write Owens-Corning Fiberglas Corp., Fiberglas Tower, Toledo, Ohio 43659.

ous vertical gaps. So heat loss and gain is lowered. Membrane stress is reduced by as much as 10%. And roof life is increased.

## THE PROOF IS ON THE ROOF.

We've built our roofing reputation on the most durable roofing felt ever. Perma Ply-R®.

Our unique continuous-strand glass mat has

OWENS/CORNING  
**FIBERGLAS**

TRADEMARK ®

© O.C.F. Corp. 1983



# 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.

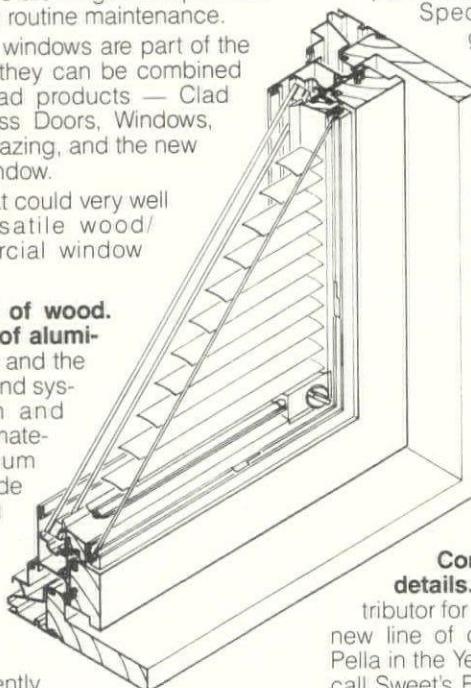
**Glazing and shading options.** Four thicknesses of insulating glass from  $\frac{1}{2}$ " to 1". 1" triple insulating glass. Single glass in three thicknesses. Various combinations of single or insulating glass with the removable Pella Double Glass Insulation Panel. Specify the removable

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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### This coupon answered within 24 hours.

Mail to: Pella Windows and Doors, Dept. T3113, 100 Main Street, Pella, Iowa 50219. Also available throughout Canada.  
© Rolscreen Co. 1983



**Pella. The significant difference in windows.**

# How to quickly re

If you'd like to turn the agony of small business bookkeeping into the ecstasy of total control, you've come to the right place.

Because even if you're starting with a shoe box full of invoices or a pile of checks hiding under a pile of deposit slips, we can tell you how to centralize, organize and monitor all that information, and manipulate it in ways that will make your business a

pleasure—all with an Apple® III Personal Computer.

## Attain instant financial status.

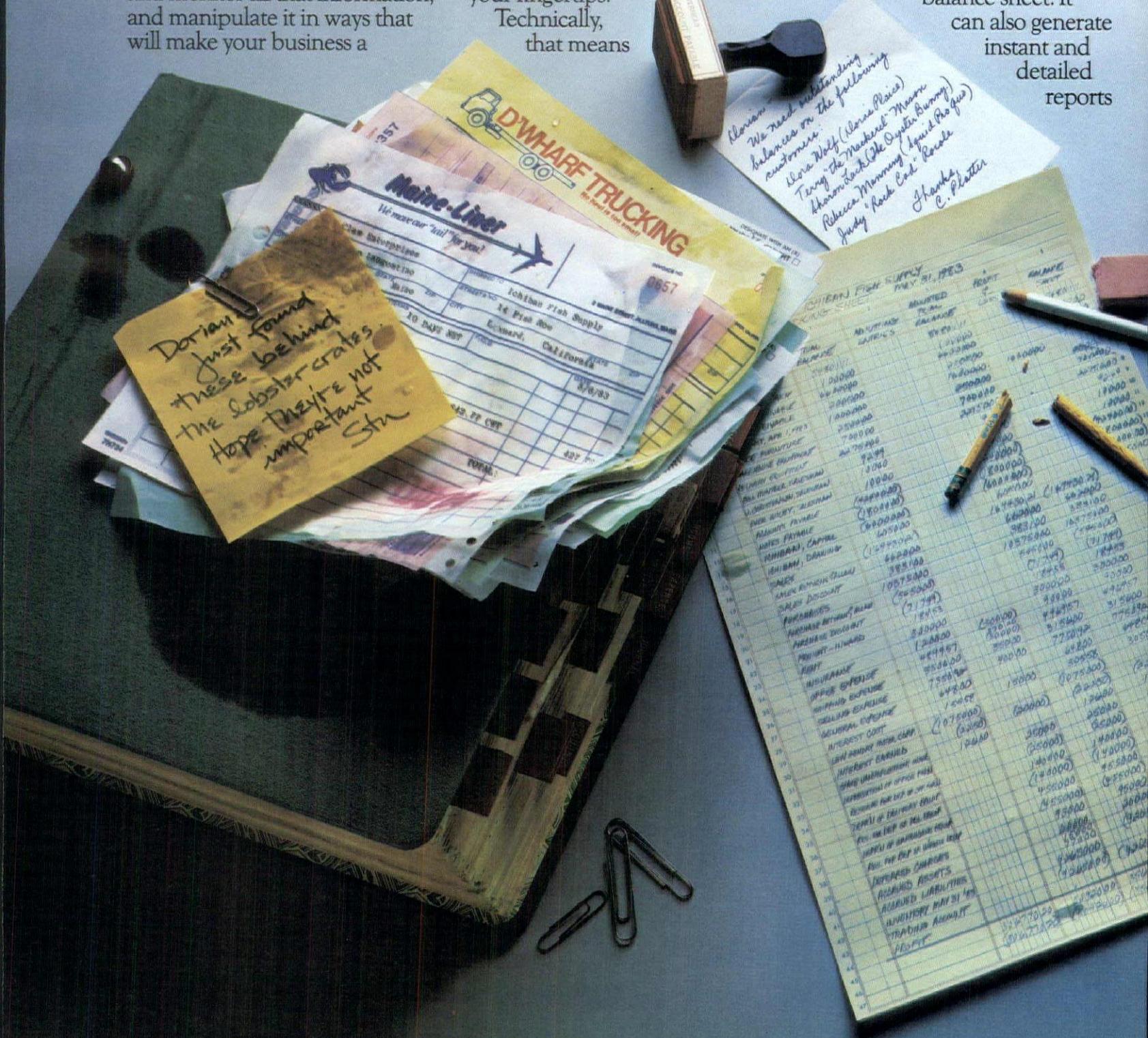
An Apple III, teamed with the BPI General Accounting Package, can put every basic accounting function right at your fingertips.

Technically, that means

General Ledger, Accounts Payable, Accounts Receivable and Payroll—all in one package.

Meaningfully, that means you can turn numbers into answers.

With BPI, your Apple III can give you a snapshot of your company's financial condition, an up-to-the-instant balance sheet. It can also generate instant and detailed reports



# gain your balance.

on your customers and vendors.

So you know who owes whom, how much, and how come.

And just how well your cash flow is flowing.

And where to give credit where credit is due (a customer inquiry

The BPI General Accounting Package also lets your income statements be coded by location, department or product line. So you know where your money's coming from.

And where it's not.

results will make an important statement to everyone you deal with—including your banker.

## More ways Apples pay.

There are more people in more places doing more things with

Ichiban Fish Supply Company Consolidated Income Statement Current Comparative Periods Ending May 31, 1983 and May 31, 1982				
	May 31, 1983	%	May 31, 1982	%
Income				
Contract Sales	\$2,818.02	91.3	44,176.52	92.7
Retail Sales	5,816.88	8.7	3,588.88	7.3
<b>Total Income</b>	<b>\$7,634.90</b>	<b>100.0</b>	<b>47,765.52</b>	<b>100.0</b>
Cost of Sales				
Cost of Contract Sales	37,738.88	64.6	31,866.55	66.7
Cost of Retail Sales	4,872.85	8.4	3,469.35	7.2
<b>Total Cost of Sales</b>	<b>42,611.73</b>	<b>73.0</b>	<b>35,335.90</b>	<b>73.9</b>
Gross Profit	15,623.85	27.0	12,430.62	26.1

Ichiban Fish Supply Company Merchandise Purchased by Due Date As Of 05/31/83						
Date	Vendor No. Name	Invoice Number	Acct No.	Detail	Net Amt	
05/02/83	1 Herring World Due 05/02/83	35278532	5818-01		501.23	
05/05/83	2 Consolidated Cod Due 05/05/83	4562	5818-01		209.36	
05/05/83	3 Levy Sushi Farm Due 05/05/83	212	5818-01		459.00	
05/05/83	4 Mussel Men, Inc. Due 05/05/83	657	5818-01		68.26	
					1,237.85	

Ichiban Fish Supply Company Accounts Receivable Ledger As of 05/31/83				
Customer No. Name	Folio	Balance Forward	Current Month	Balance
1 Moser's Sea Food Invoice 1124	IR	892.79		212.23
Invoice 1192	IR	156.56		829.80
Invoice 1326	IR	250.00		1,831.58
05/15/83 CR				

Your Apple can generate instant income statements (with expense ratios) or balance sheets, and let you compare them to last month's or year's, then print them out to suit your banker.

feature allows you to make credit decisions based on the most current information).

You can also list your purchases by discount dates. And take advantage of them in no uncertain net terms. You can even keep payroll records without paying more, because it's part of the same package.

## Profit from history.

In business as in life, experience is the best teacher. And the Apple/BPI system can provide you with instant comparisons of this-month-this-year vs. this-month-last-year, or this-year-to-date vs. last-year-to-date.

So you can quickly spot changing expense ratios and make decisions with 20/20 foresight.

It can also allow you to take full advantage of merchandise discounts. So you'll know whom to pay when to pay, how much to pay—and save a lot of clams in the process.

## Make a timely statement.

Add an Apple Dot Matrix or Daisywheel printer to your Apple III, and you can print out your entire balance sheet in minutes.

Or any number of reports, from cash receipts to payroll ledger to income. You can even print checks and customer statements.

The impressively professional



To avoid fishy transactions, you can instantly display customer's payments, charges and current balance. In this case, a few more cans of tuna would put Mr. Moser over his \$2,000 limit.

Apples than with any other personal computer in the world.

Because for one thing, there's more software for Apples than for any other personal computer in the world. So the same Apple that handles all your accounting needs can also handle financial spreadsheets, word processing and electronic filing.

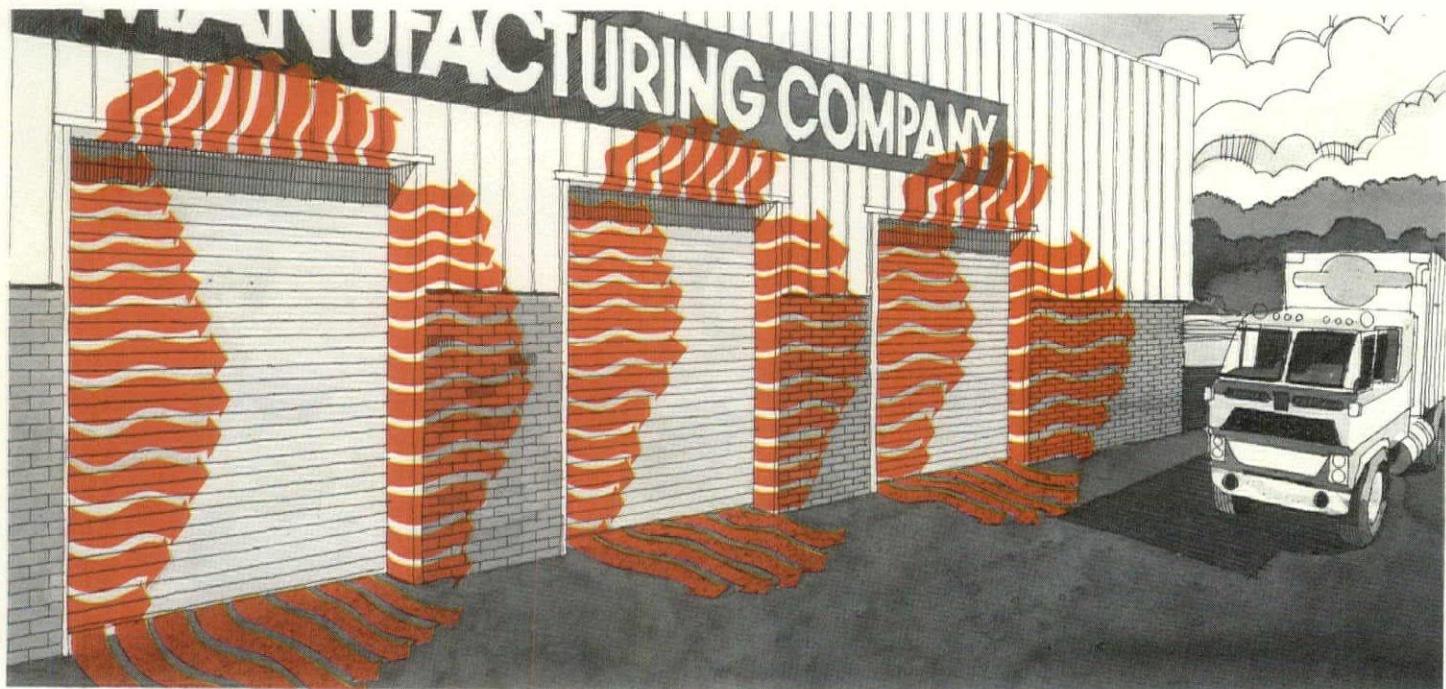
You'll also find programs that are designed specifically for your kind of business. Be it dentistry, architecture or swine herding.

Of course, the best way to learn all the ways Apples can help you make better business decisions is to visit any one of over 1500 authorized Apple dealers.

So drop in. For a full account.



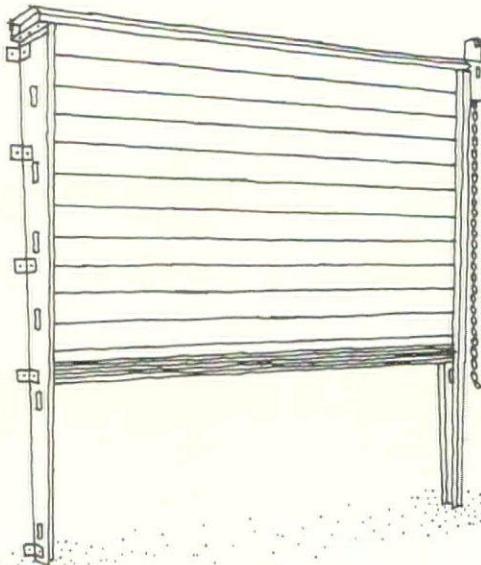
# Don't let drafty doors waste energy dollars



## The Inryco® Telescoping Door reduces air leakage for long range savings!

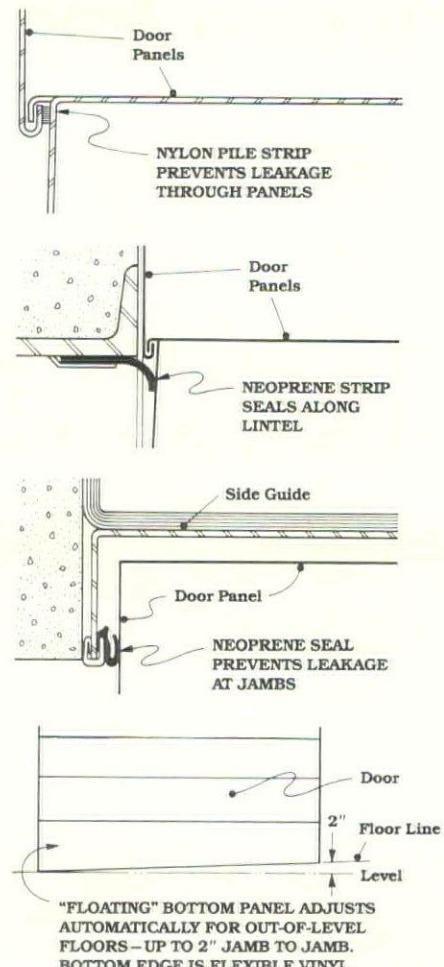
Air infiltration through vehicle door perimeters wastes energy—can add hundreds of dollars per door per year to a building's operating costs.

The Inryco Telescoping Door reduces such waste dramatically. Tested at 1.56psf air pressure (25mph wind) it achieved an infiltration rate of only 0.93cfm per foot of perimeter. Calculated rates for most other doors are at least three to six times higher. That translates into substantial life cycle savings.



Check the Inryco Telescoping Door before you specify. In addition to energy conservation, its unique design provides high cycle usage, offers long term maintenance savings, reduces down time and curtails noise.

For full details, see our Catalog 36-1 in Sweet's, section 8.8/In, or write for a copy: Special Products Group — Milcor Division; INRYCO, Inc.; Dept. J-4033; P.O. Box 393; Milwaukee, WI 53201.



**Inryco**

an Inland Steel company

**Neither fire, humidity,  
corrosion nor inflation will  
keep this product from its  
appointed task of providing  
superior building characteristics**

# DRICON®

## FIRE RETARDANT TREATED WOOD



Dricon® fire retardant treated wood is the only low-hygroscopic fire-retardant pressure-treated wood of its type that carries an Underwriters Laboratories Inc. FR-S designation for all species listed. It has a rating of 25 or less for flame spread, fuel contribution and smoke development. Dricon FRT wood surpasses the requirements of the four national model building codes.



Tests show that metal in contact with Dricon lumber and plywood experiences no greater corrosion than with untreated wood. You can put Dricon wood studs, trusses, joists,

purlins and beams in contact with metal truss plates, piping, conduit and other hardware.



Dricon fire-retardant pressure-treated wood eliminates virtually all moisture-absorption problems — even in 95% relative humidity. Plus, Dricon wood's low hygroscopicity inhibits blooming and doesn't reduce the longevity of paints, stains and other finishes.



Dricon treated wood is economical, too — the result of lower in-place costs, faster installation time and less maintenance than other fire-resistant construction materials. In

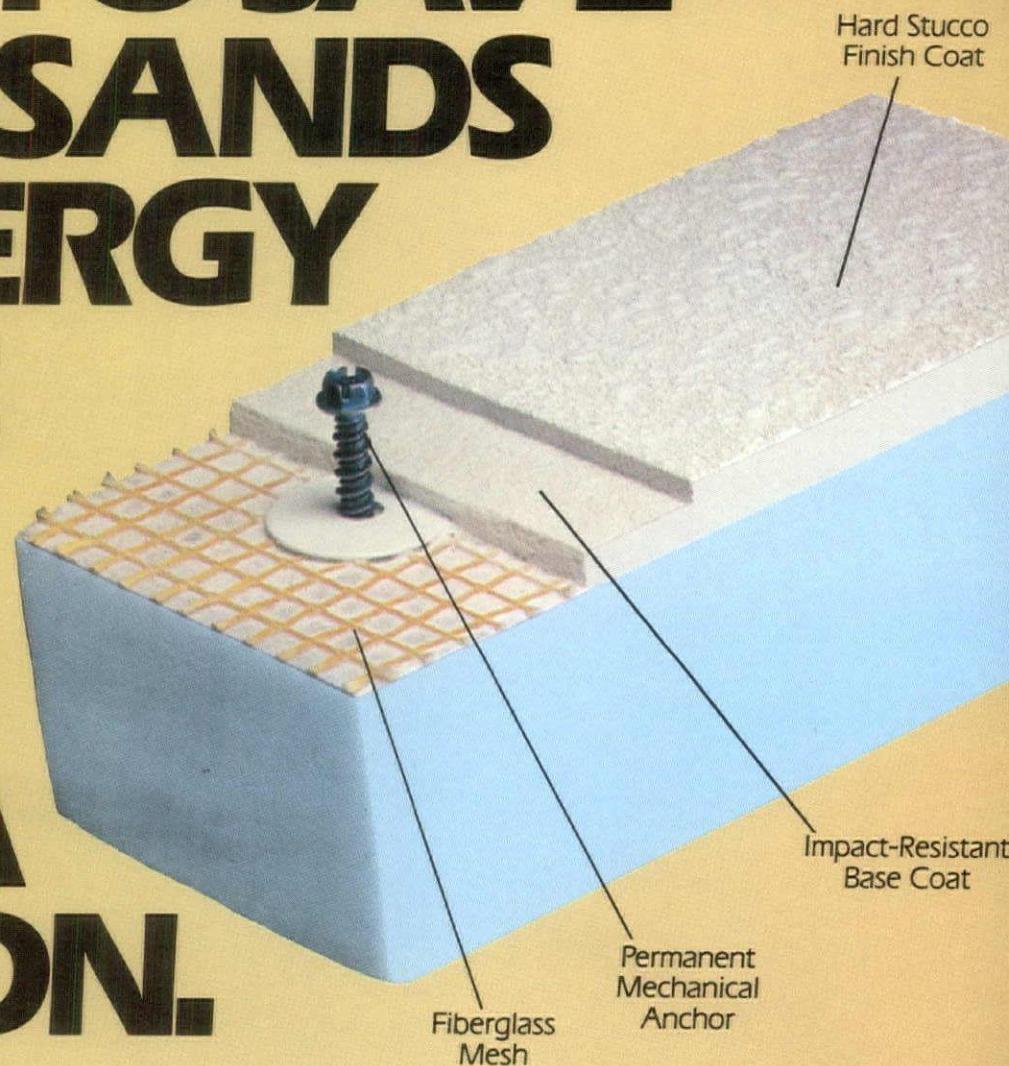
many cases, the use of Dricon wood may result in insurance rate savings. Dricon products can also be easily and inexpensively modified on site during construction or remodeling.

Specify Dricon fire retardant treated wood when you want to avoid fire damage, corrosion, finishing problems and maintenance.

**DRICON®**

Fire Retardant Treated Wood

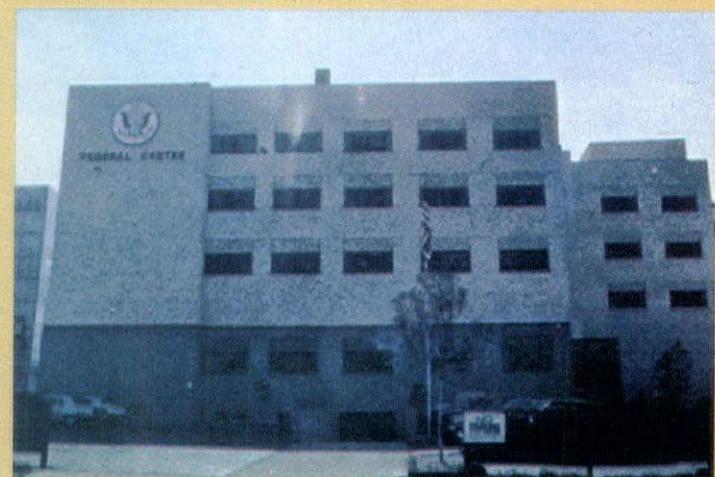
# HOW TO SAVE THOUSANDS IN ENERGY COSTS AND LOOK LIKE A MILLION.



Federal Center, Madison, Wisconsin



BEFORE

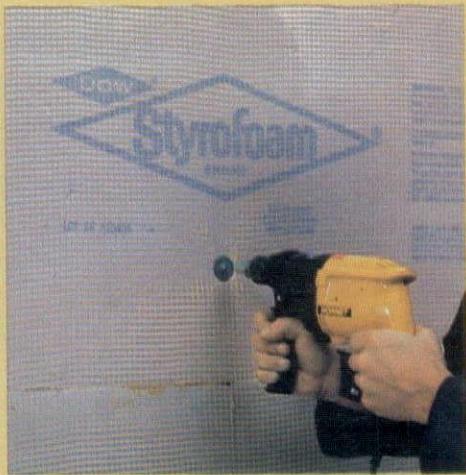


AFTER

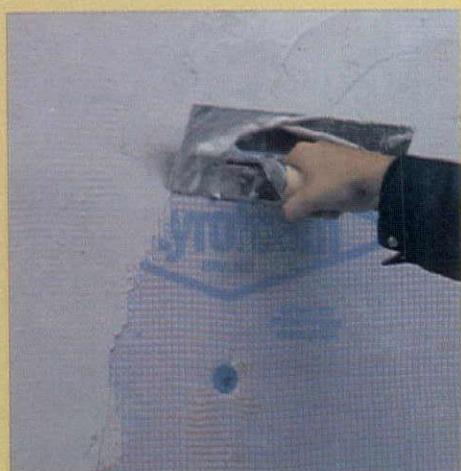
**STYROFOAM**  
Brand  
Insulation



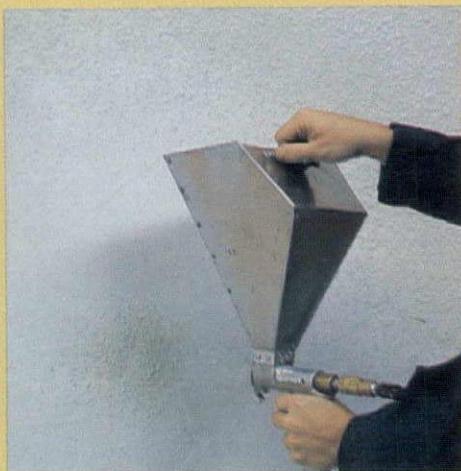
Boards of STYROFOAM brand insulation are set in place



Fiberglass mesh is applied,  
mechanical anchors are attached



Base coat is applied with trowel



Finish coat is applied

Insulate your commercial building and give it a facelift with one of these proven systems incorporating STYROFOAM brand insulation and a hard-coat stucco finish from SENCON SYSTEMS INC. or INSUL/CRETE.

**Save money, look good.** Exterior Insulated Wall Systems incorporating STYROFOAM\* brand insulation offer a handsome way to cut energy costs. STYROFOAM combines lasting high R-value and moisture resistance with excellent compressive strength. The hard stucco finish adds good looks to this great protection.

**Long-term savings, short payback.** The performance-proven combination of STYROFOAM brand insulation and hard-coat stucco on exterior walls reduces energy costs substantially, so the system can pay for itself quickly. And you'll enjoy the savings that come from lowered bills year after year.

**Start smart, with STYROFOAM brand insulation.**

Boards of STYROFOAM and a fiberglass mesh are mechanically attached to your building's exterior, whether it's masonry or concrete, metal or wood frame.

**Finish strong with stucco.** A base coat of polymer-modified cement is applied to the mesh. Then the finish coat is added in the color and texture of your choice.

**Learn more about the system.** Send for full details on Exterior Insulated Wall Systems, incorporating STYROFOAM brand insulation. Write: SENCON SYSTEMS INC., 21 W. Elm St., Chicago, IL 60610; INSUL/CRETE CO., INC., 4311 Triangle St., McFarland, WI 53558, or The Dow Chemical Company, STYROFOAM brand insulation, Midland, MI 48640.

CAUTION: STYROFOAM Brand Insulation is combustible and should be handled and installed properly according to Dow literature available from your supplier or from Dow.

\*Trademark of The Dow Chemical Company  
3540

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**TRUE BLUE**  
*Lookin' good*

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**RECORD**

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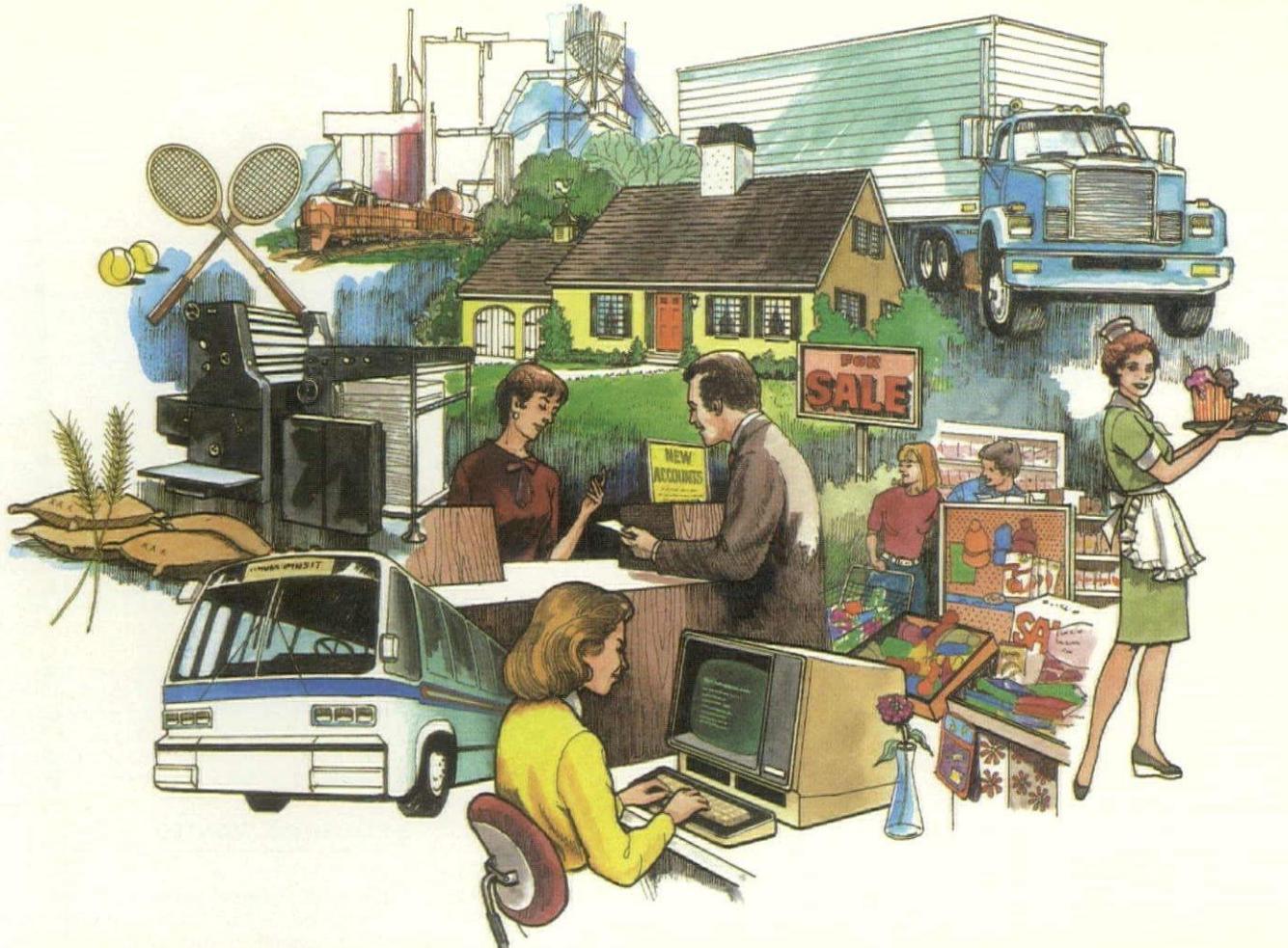
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It's that simple. CADO has a computer system to help you keep track of every side of your specific business—inside and outside.

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**EXPERIENCE.** CADO has been installing turnkey solutions to specific business problems for ten years—an eon in high-tech time.

**SOFTWARE.** Hundreds of programs are available through CADO's vast Distributor network. Your nearby CADO office has a staff of professional programmers who can also design or adapt an application tailored to meet your exact needs.

**EXPANDABILITY.** You can start with a desktop system (video terminal and printer) and grow—with CADO—to a 64-terminal system with 1.1 billion bytes of storage. The fact is, the CADO supermicro outperforms many mini-computers that cost tens of thousands of dollars more.

Complementing all that data processing power, you get CADO's exclusive WordBase™ which combines powerful data capture techniques and output control with com-

plete word processing capabilities. WordBase does all your word processing, lets you generate custom reports, prepare forms, and create unique data bases—all without hiring a technical staff.

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AR-9

# CLASSIFIED SECTION

## POSITIONS VACANT

### INTERIOR ARCHITECTURAL COORDINATOR

Marriott's Architecture & Construction Division has a challenging career opportunity for a creative Interior Architectural Coordinator for our hotel program.

Qualified individuals will be degreed architects, familiar with the contract interior design field. Three years experience in professional firm is absolute requirement, five + years preferred. Must have first hand experience doing interior detailing and construction drawings. Excellent drafting skills required. Must be knowledgeable in interior construction and renovation work. Experience required in both large and small scale commercial projects.

We offer competitive salary and a comprehensive benefit program. If your background includes these qualifications, send resume or call: 800-638-6707, Ext. 7048

**Marriott** corporation

Dept. 934.11

Marriott Drive  
Washington, DC 20058

An Equal Opportunity Employer M/F

**Design Director opportunity leading to executive management in a medium size, multi-disciplinary firm which is committed to the quality environment. Background should include 10 years as a design professional with team experience. Reply to Robert Jones, FAIA, Murray Jones Murray Incorporated, 201 West 5th, Tulsa, OK 74103.**

**Oregon School of Design** is continuing its search for a Director, to fill the position beginning academic year 1984-85. The School, in Portland, Oregon is a two-year old, independent, degree-granting institution with five-year programs in architecture and interior architecture. We are seeking applications from experienced educators committed to the visual, poetic and ideological aspects of design from the scale of the room to that of the city. The applicant must have appropriate academic and professional credentials along with strong administrative capabilities. The Director will be involved with instruction, curriculum and organization development, accreditation procedures, management responsibilities and community relations. Respond with resume and references by October 15th to: Search Committee Oregon School of Design, 734 NW 14th Avenue, Portland, OR 97209.

**Career advancement positions in Health care,** Criminal Justice, or Commercial projects. Leadership exp. in design; mg't; marketing; etc. considered. We are an active AIA personnel consulting firm — aware of the best openings nationwide. Inquire: William E. Engle Assoc. Inc., 909 Investors Trust, Indianapolis, IN 46204. (317) 632-1391 (Also Texas office).

**Senior Designer for Justice Facilities** — 75 employee firm from Pacific Northwest with international justice architectural practice seeking a Senior Designer with significant experience in justice facilities design. Candidate must possess leadership skills and dedication to exceptional design to meet client needs. This position requires some travel. Interested candidates are invited to submit resume/salary expectations to: William James, Jr., WMFL, West 244 Main Ave., Spokane, WA 99201.

**Medical Facilities Architect / Planner** — University of South Florida seeks an architect with Medical Facilities Planning experience to plan, program and administer major and minor projects for the University's Medical Center. Position requires a degree in architecture, and five years experience in planning/construction of medical facilities. Must be registered in the State of Florida. Please send resume to the attention of: Michael Patterson, Director of Facilities Planning, University of South Florida, 4202 Fowler Avenue, Tampa, Florida 33620. The University of South Florida is an affirmative action equal opportunity institution.

**Wanted — Lead architectural designer for mid-size Washington State architectural and planning firm.** Want person with proven design skills, dedication to implement and ability to lead several other designers. Three to ten years experience with some major health care projects desirable. Salary negotiable. Send resume's and other pertinent information or materials to: Designer Search, P.O. Box 2128, Spokane, WA 99210.

## FACULTY POSITIONS VACANT

**Building Environment / Energy Position** — The Department of Architecture at the University of California, Berkeley, has a tenure track position open at the Assistant Professor level in building sciences / technology and architectural design with an emphasis on the management of the physical environment and energy flows in buildings. Teaching includes undergraduates, graduates and PhD supervision. It will involve lecturing, work in computer and physical modeling labs, field exercises, and collaboration with design faculty in studios. Responsibilities will include course, program, and research development in an integrated Building Environment / Energy Study Area. Subjects include thermal properties of building design and construction, natural and mechanical ventilation, building acoustics, occupant comfort and productivity in the building environment, emphasizing for each topic computer-aided design methods. Background must include advanced academic work, preferably a PhD or eminent research and teaching experience. Detailed knowledge of heat and mass transfer mechanisms are essential. Experience with thermal comfort assignment or modeling is strongly desirable. Candidate must demonstrate achievements in developing computer design tools. The commitment to teaching and researching building-related topics must be clear. Contact Secretary, Faculty Search Committee, Department of Architecture, Berkeley, 94720, for further information. The University of California is an Equal Opportunity, Affirmative Action Employer. Application deadline is November 23, 1983.

## FACULTY POSITIONS VACANT

**Architectural Design / Preservation Position** — The Department of Architecture at the University of California, Berkeley, has a tenure track position open at the Assistant Professor level in architectural design with an emphasis on historic preservation. Teaching includes undergraduates, graduates and PhD supervision. Candidates should be able to present historic preservation in studios, lectures, seminars, and field settings. Material should include preservation technology, restoration of buildings and their environment, social, economic and political aspects of preservation action. The candidate will work with faculty in architectural history, building science, and design. Candidates must have relevant professional practice and should be designers of achievement and promise. Advanced academic work in the field of preservation is desirable. Contact Secretary, Faculty Search Committee, Department of Architecture, Berkeley, 94720, for further information. The University of California is an Equal Opportunity, Affirmative Action employer. Application deadline is November 23, 1983.

## POSITIONS WANTED

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For your convenience in locating building materials and other products shown in this month's feature articles, RECORD has asked the architects to identify the products specified.

#### Pages 86-95

Wu Hall, Princeton University by Venturi, Rauch and Scott Brown  
**Pages 86-87**—Brick: Stone Creek (dist. by O.W. Ketcham). Stone work: Nolfi Masonry. Windows: Ottie & Hoopes (Indiana limestone); ABI (Metal frames); Anthrosite Glass Co. (glazing).  
**Page 92**—Marble: Georgia Marble Co. Granite: Cold Spring Granite Co. Doors: Bailey Millwork. Door hardware: Best (supplied by Wherry).

**Page 94**—Ceiling: Rich (acoustical tiles); McHugh Inc. (plaster). Wood paneling: Bailey Millwork. Wood floor: Arthur H. Swallow Co. Tables, chairs: Oneida Co. Chandeliers: Bill Eppling (throughout).  
**Page 95**—Tile: Aries Tile Inc. Wood booths, windows: Oneida Co.

**Page 96**—All woodwork: Bailey Millwork. Sprinkler heads: Mid-State Sprinkler Co.

**Page 97**—Couch: David Edward. Table and wall seating: Custom by architects. Frame for wall seating and molding: Bailey Millwork.

**Pages 108-111**—Harbor Plaza, Stamford, Connecticut

by Yankee Planning/Do H. Chung

**Page 110**—Brick: Kushua (Rose Colonial), supplied by Belden Stark. All woodwork: Duratherm. Triple galzed glass: PPG.

**Page 111**—(bottom right) Curved wall: Forms & Surfaces, Inc. (architectural tambour). Air grilles: Tuttle & Bailey. Ceiling panels: U.S. Gypsum (Kerfflagree). Blinds: Levolor Lorentzen, Inc. Chairs: Knoll International. (top right) Flooring, security station: Travertine. Glass railings, handrails: Blumcraft. Skylights: Unistrut. Lighting: Lightolier, Inc. Fabric-wrapped soffits: Alcan Building Systems. Ceiling: U.S. Gypsum (Traverton). Drinking fountains: Halsey Taylor.



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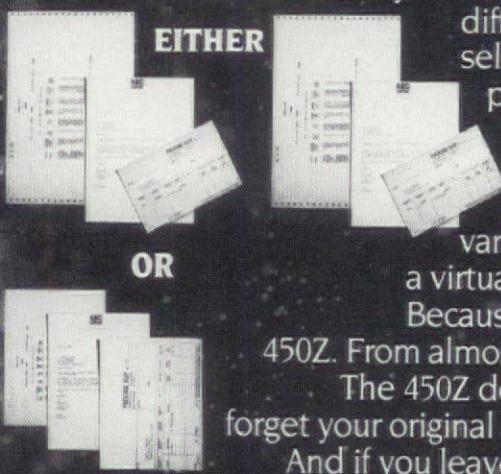
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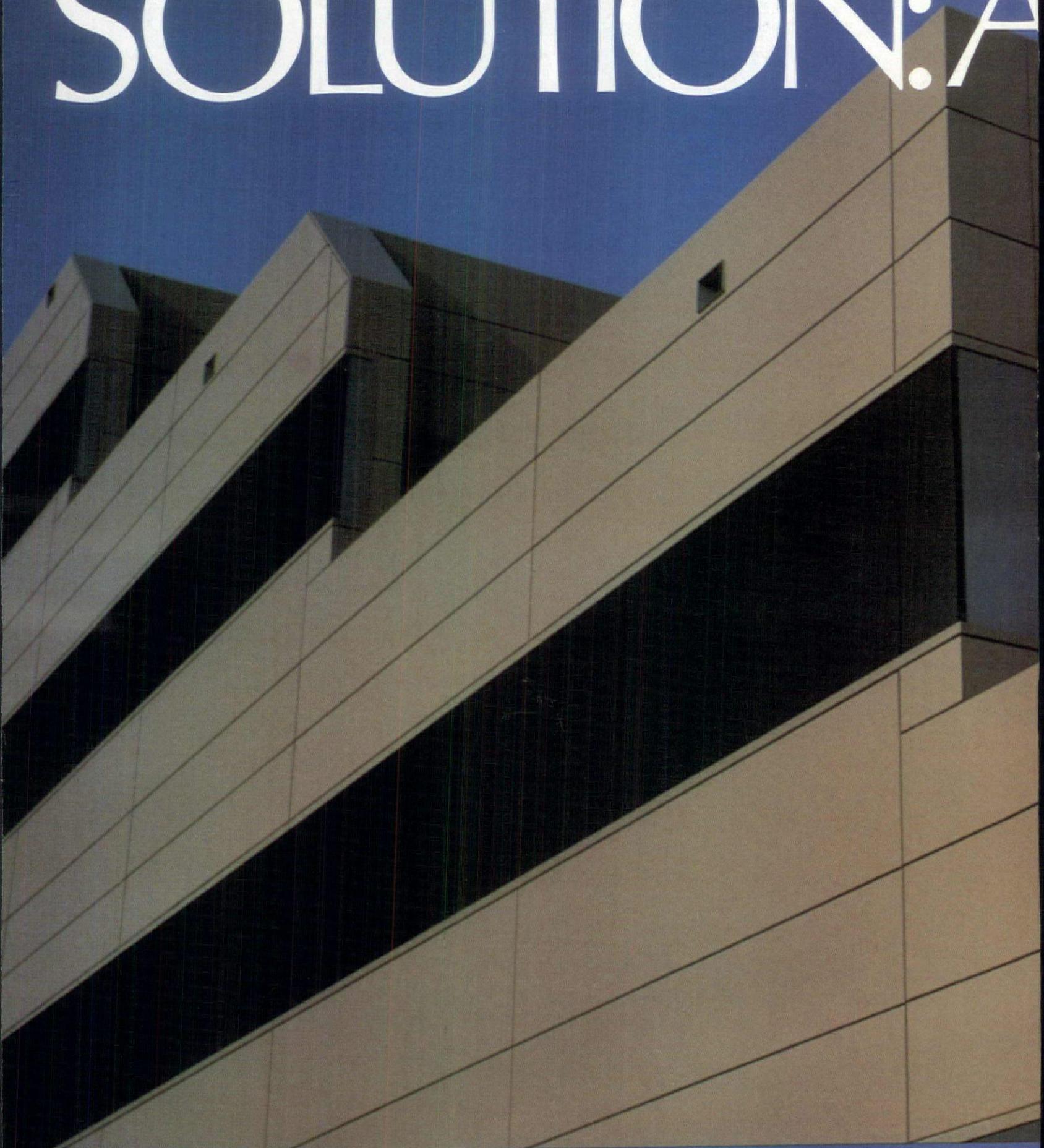
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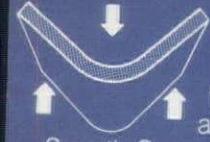
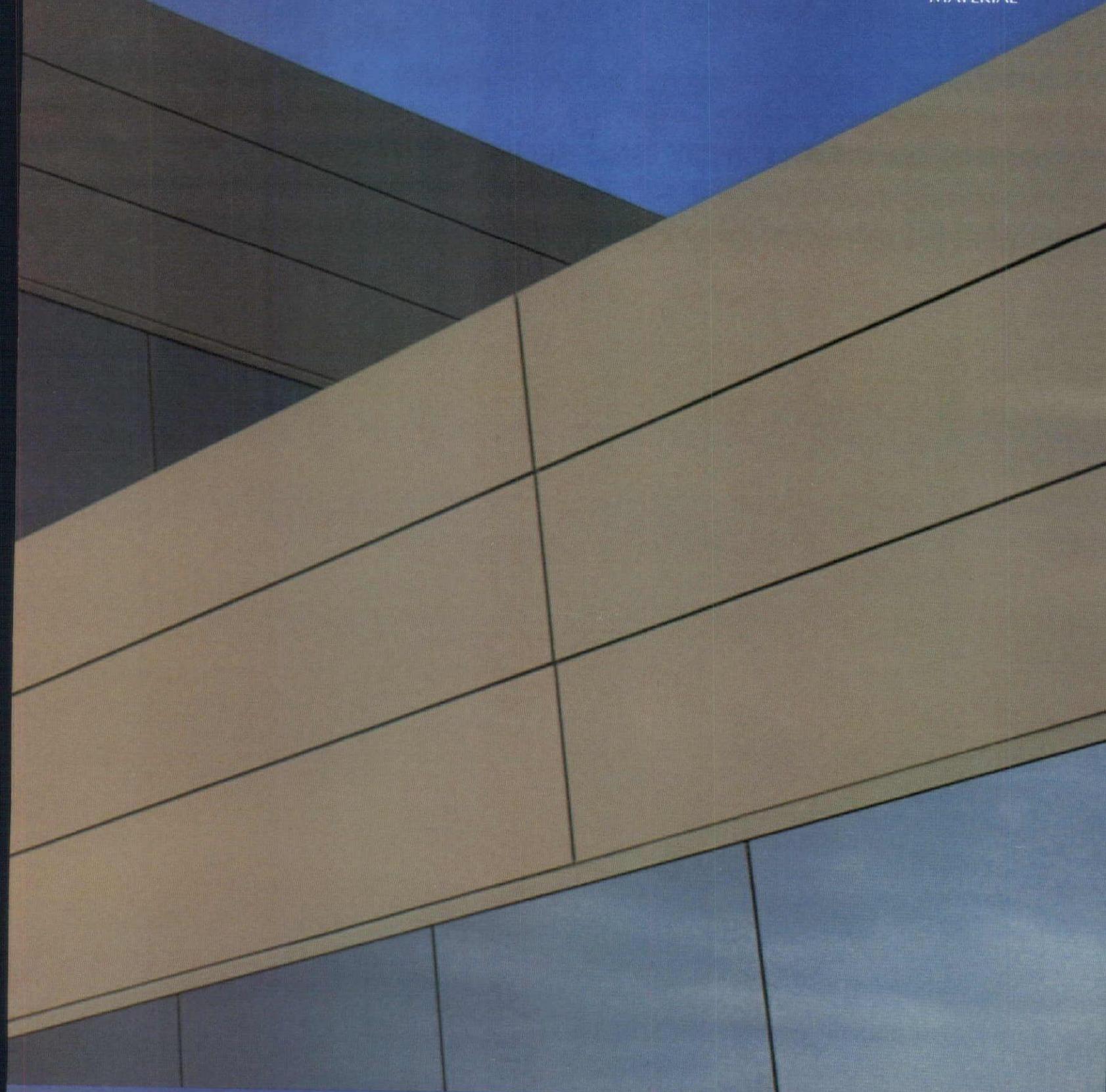
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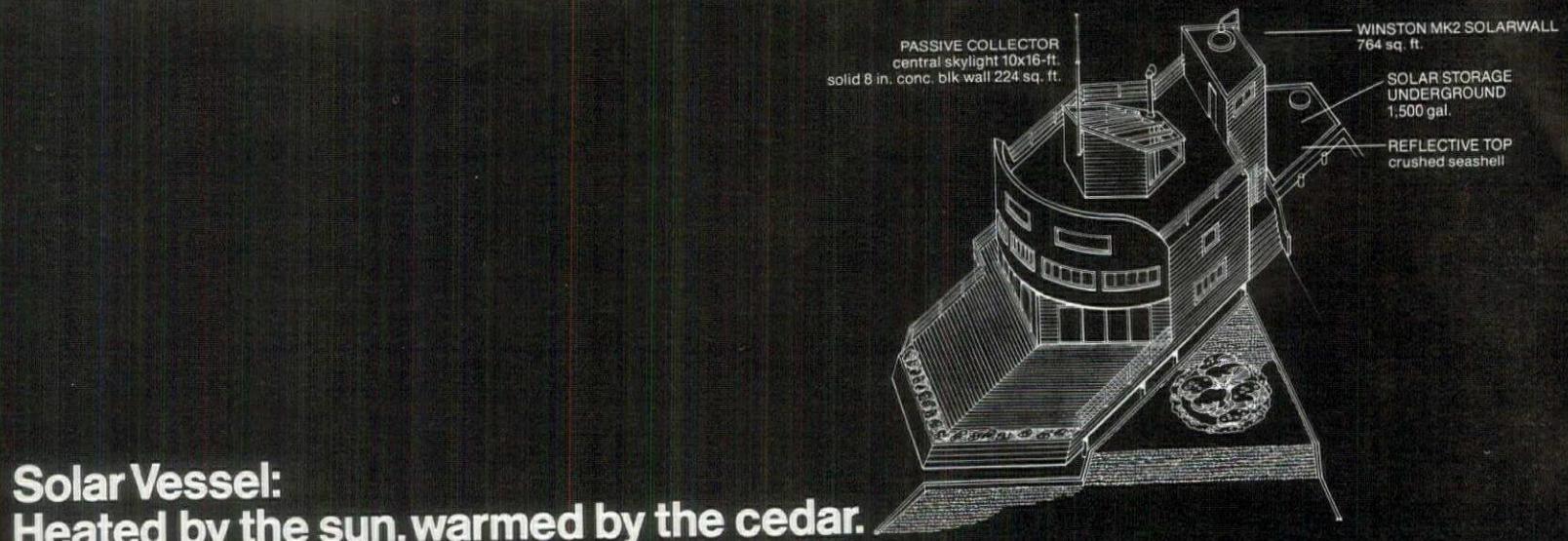
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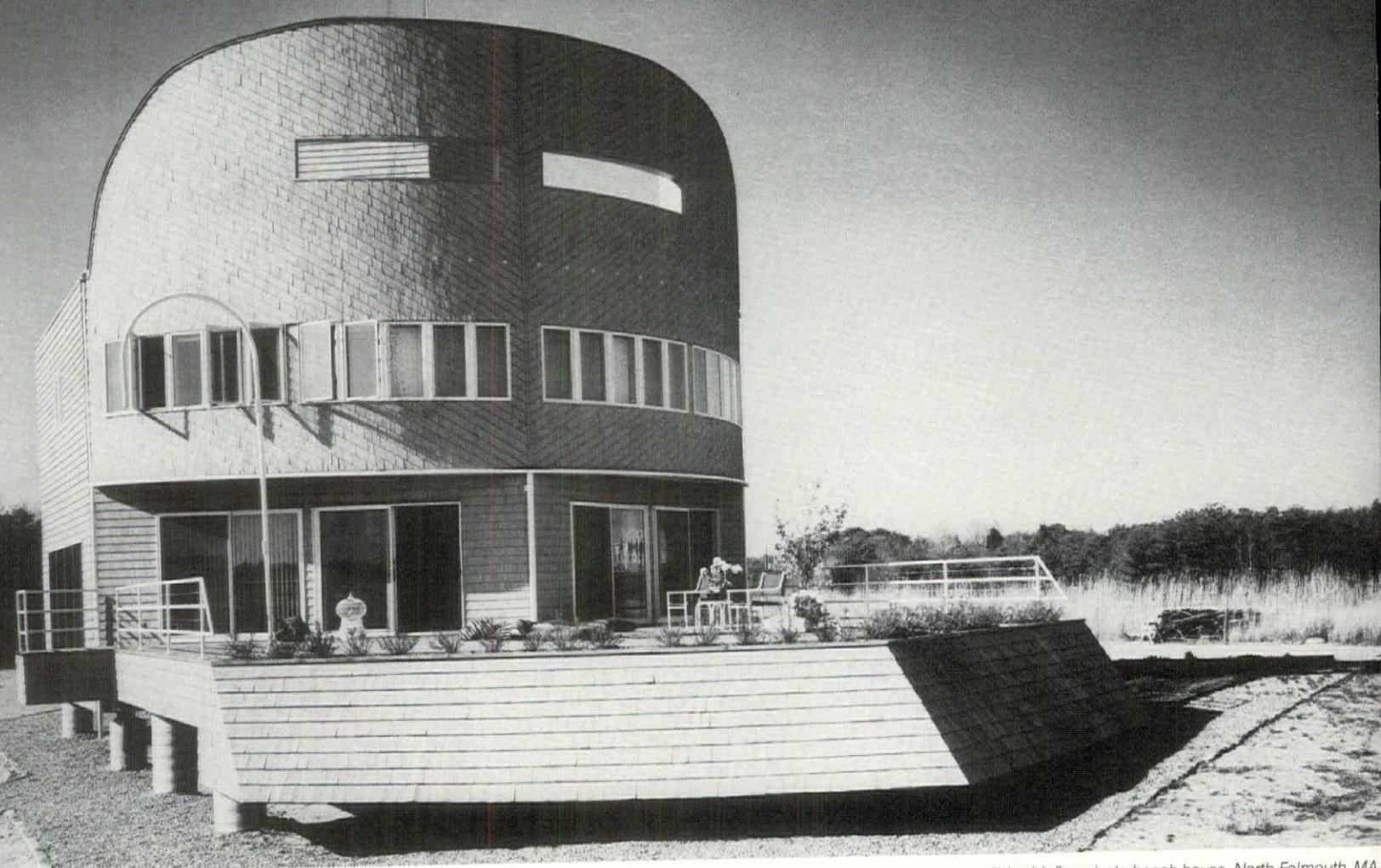
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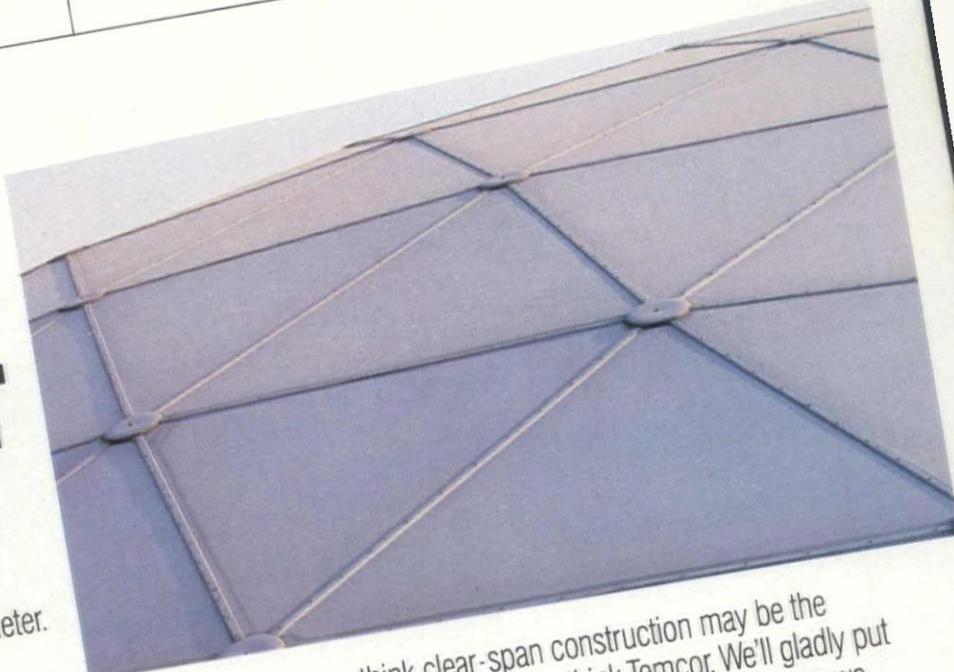
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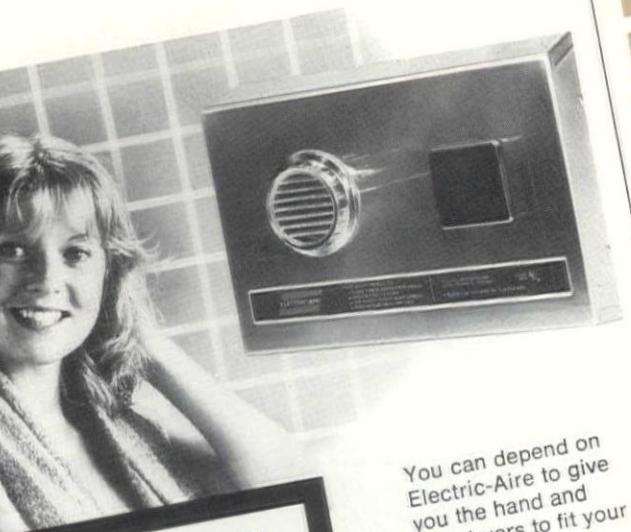
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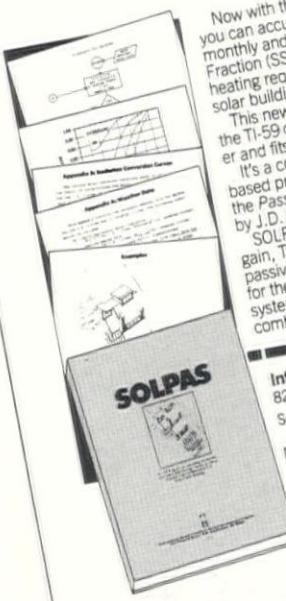
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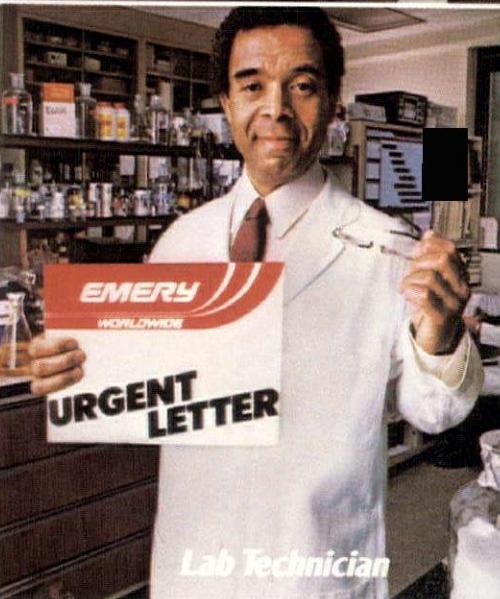
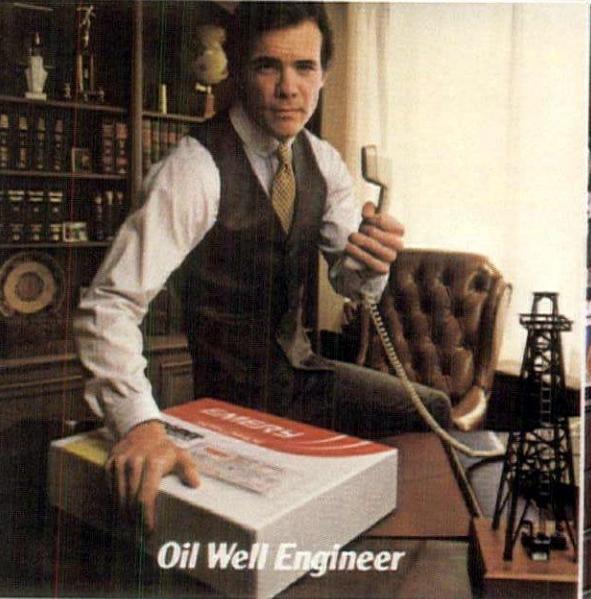
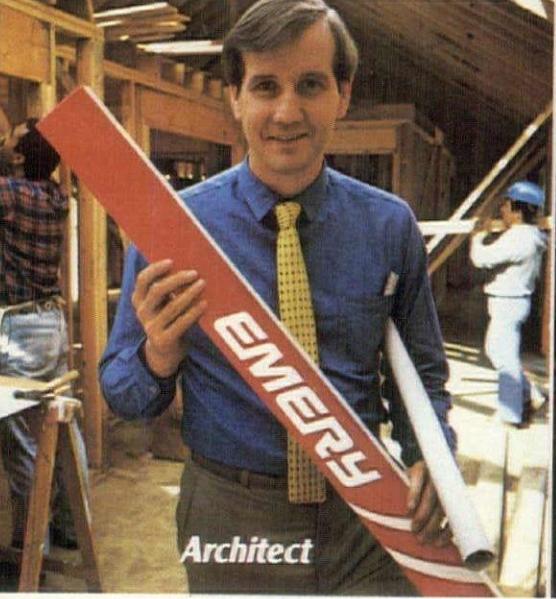
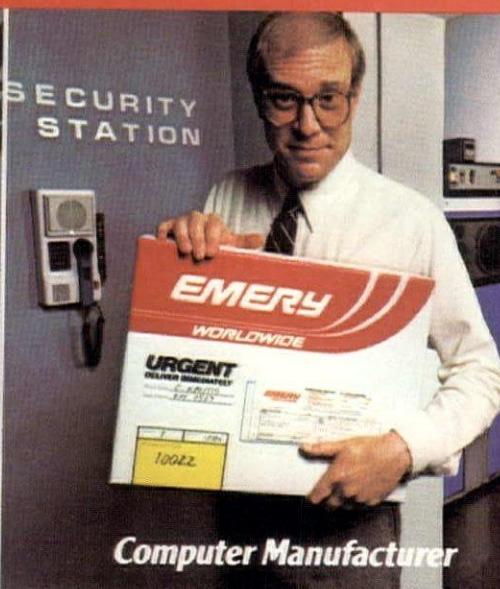
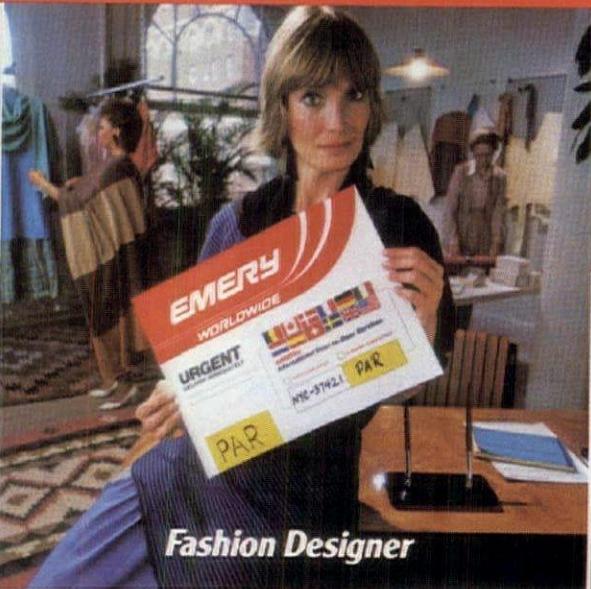
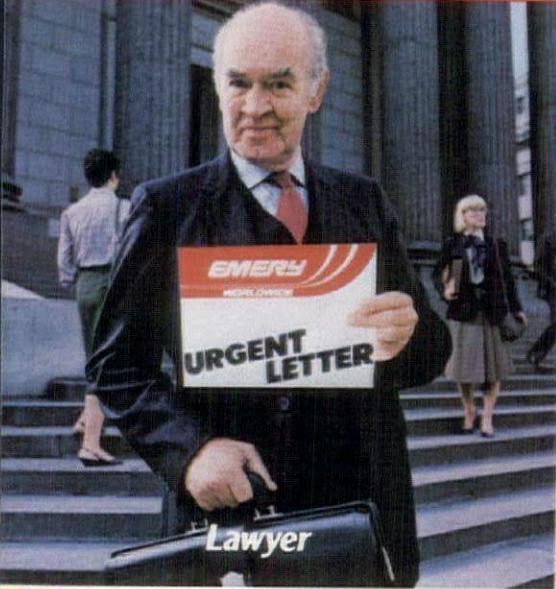
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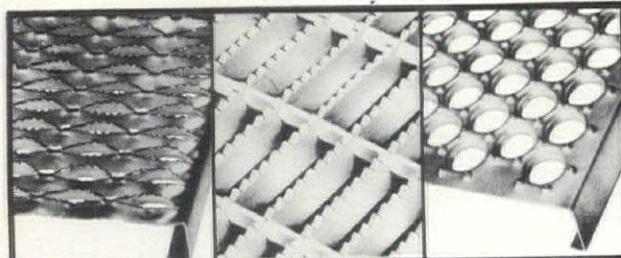
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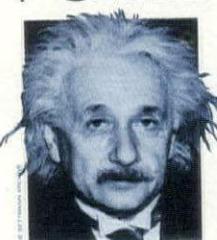
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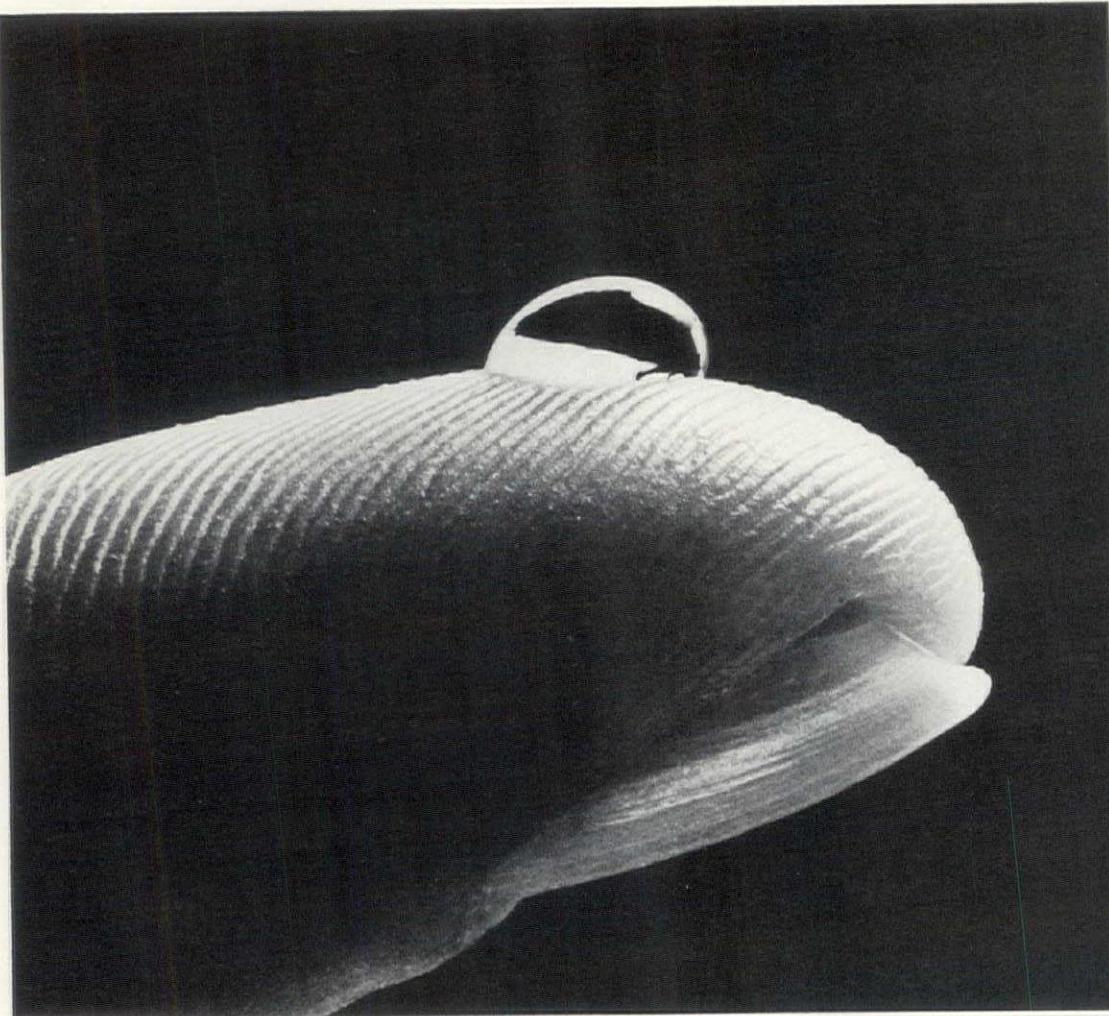
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Architectural Record Interiors of 1983 159



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