Progressive Architecture

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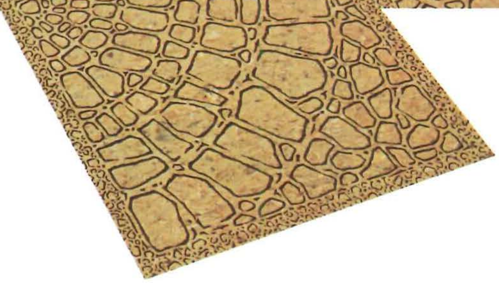

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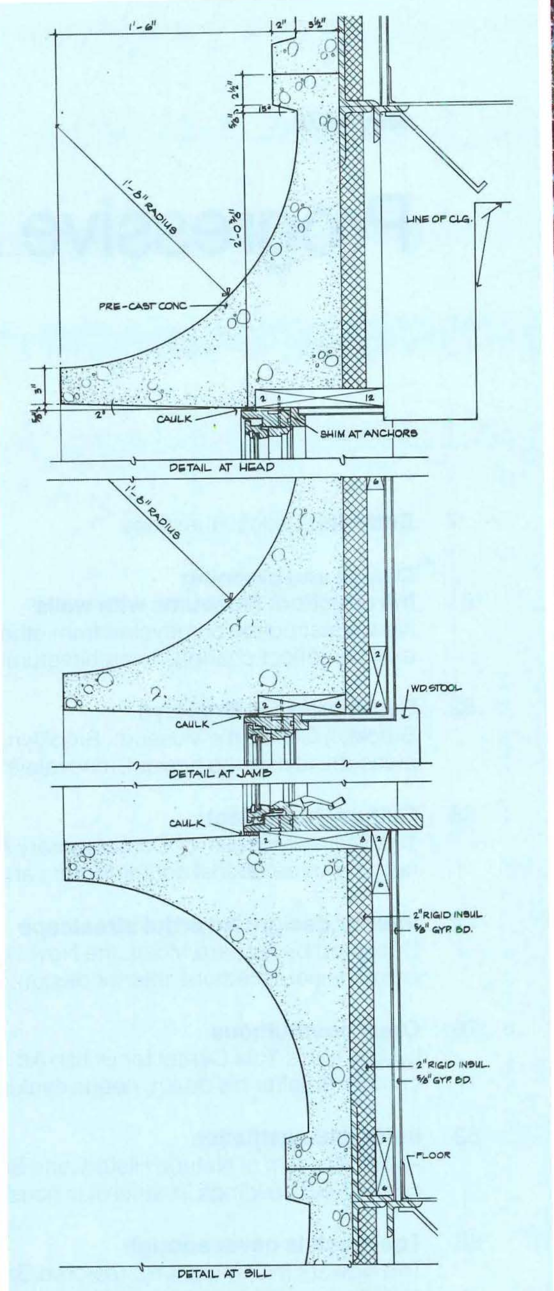
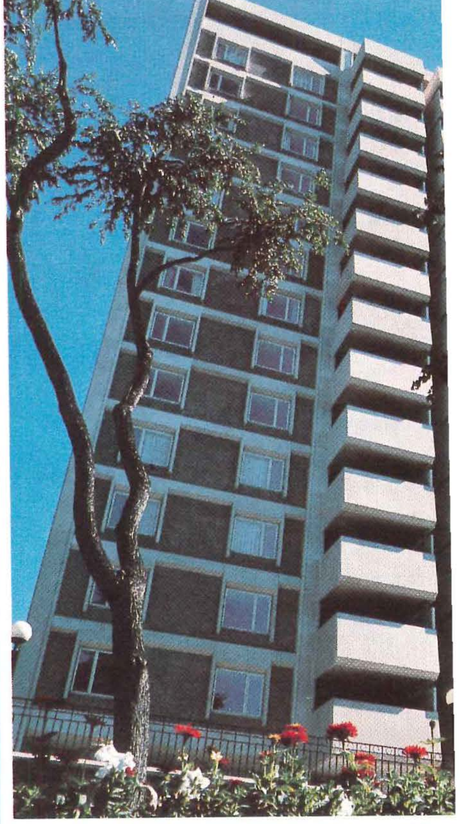
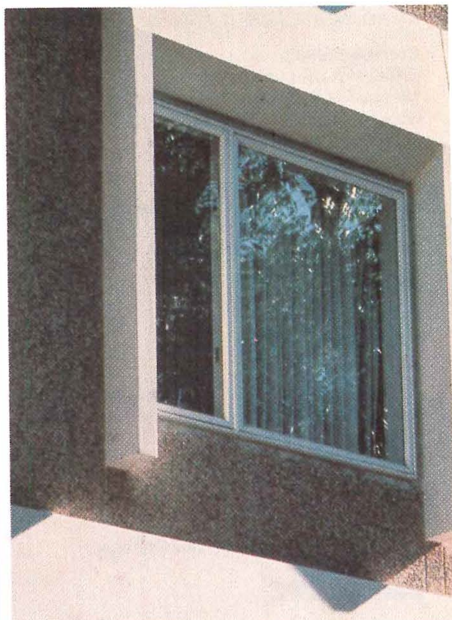
Cover: New York School exhibit (p. 72) by Richard Meier & Associates includes cylinder for di Suvero's "Martian Ears." Photo: Wolfgang Hoyt.



Columbia Court—Housing for the Elderly
Muskegon Heights, Michigan
Architect: Haughey, Black & Associates; Battle Creek
Installation: Perma-Shield Casements in precast panels





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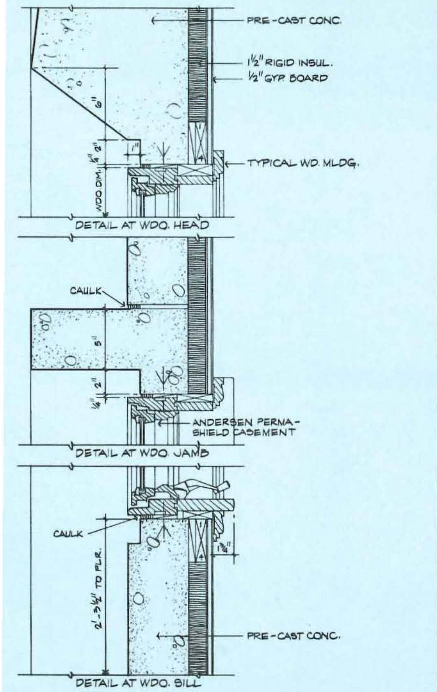
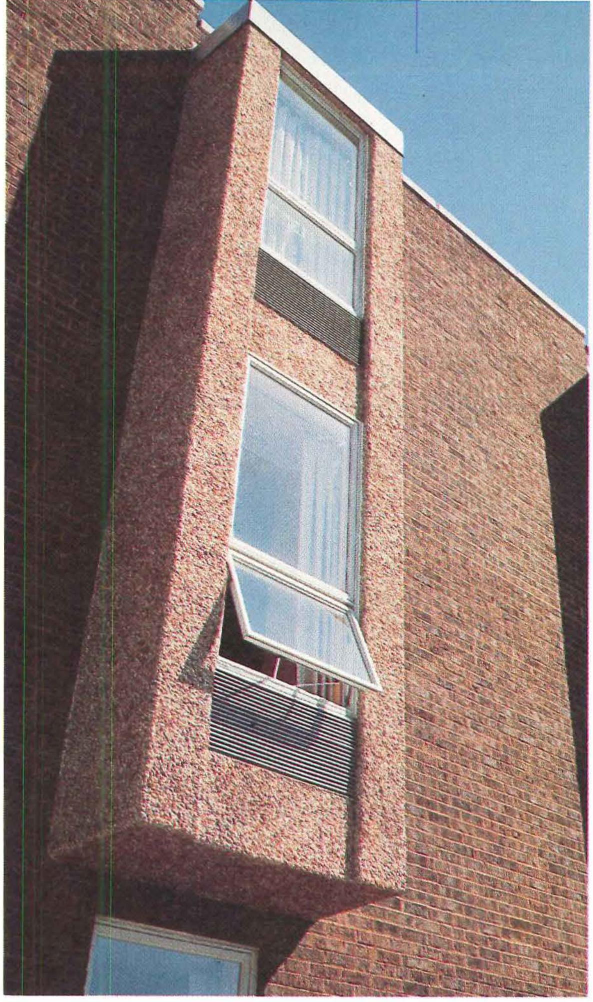
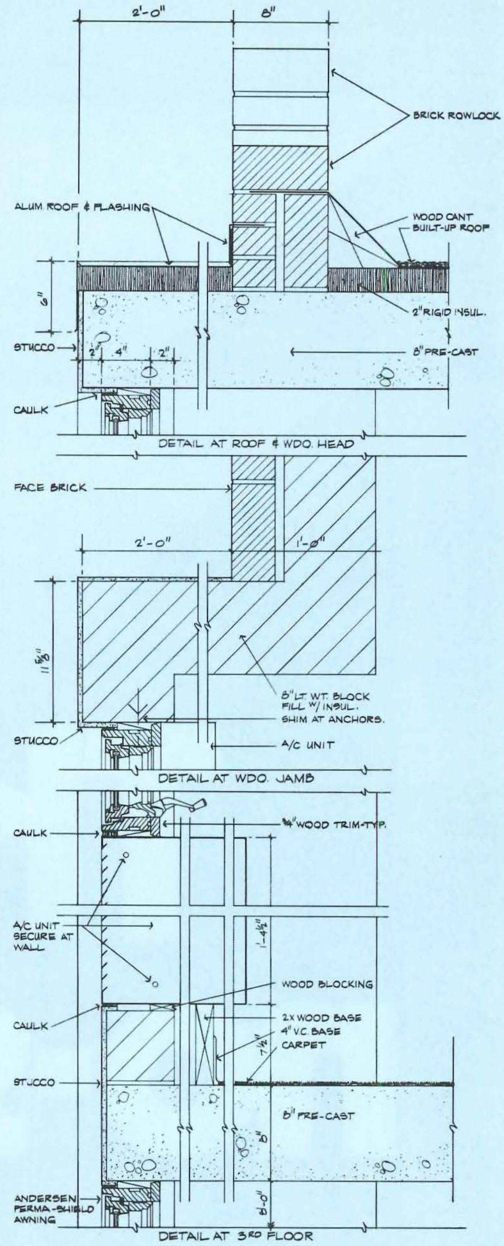


heesman Garden Apartments,
enver, Colorado
rchitect: Slater, Small & Spenst; Denver
nstallation: Perma-Shield Casement
perating and fixed units in precast frames





Shenandoah College Residence Hall
Winchester, Virginia

Architect: Keith Williams & Associates; Winchester

Installation: Perma-Shield Awning Windows in masonry frame, with stucco facing.

f Andersen beauty.

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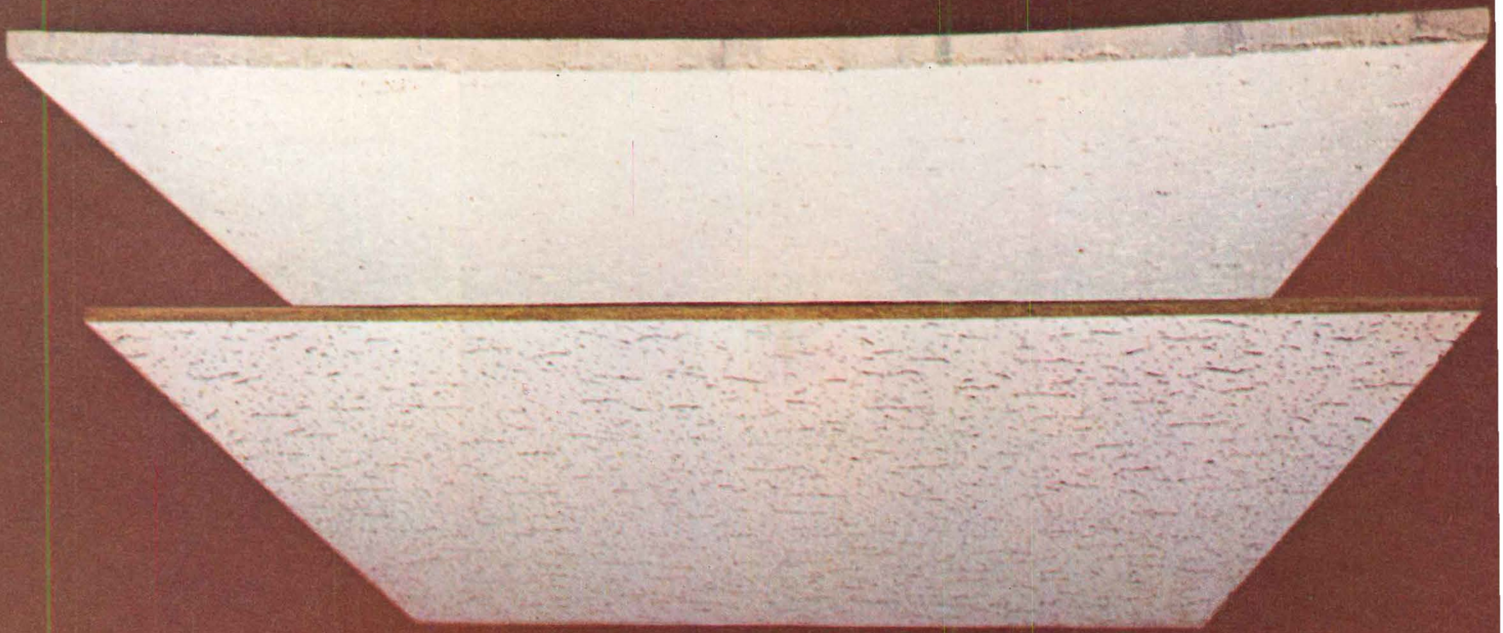


Critical questions

May 1978

Does P/A publish enough criticism of current architecture? Too much? Is it fair enough? Authoritative enough? Is our policy on criticism sufficiently consistent? How do other, comparable magazines perform in this respect? These are questions we ask ourselves here at P/A, and we would like to hear your reactions.

In this time of radical reconsideration of both design and technology, we are convinced that everything we take up in P/A's feature pages should be considered critically. That is not merely to say that the successes and weaknesses of each published work should be cited—as they should—but that the works should also be considered in relation to prevailing expectations and concerns. In that process, the importance of the work as a subject of serious consideration should be clearly established.

In addition, we believe, such an evaluation must include reference to factors influencing the solution. Such factors as program, budget, regulations, client desires, and public reactions cannot in fairness be overlooked in architectural criticism. One crucial source of such information, of course, is the architect; the key information at the architect's command, including drawings, makes his cooperation essential for an authoritative description.

That is but one aspect of the interdependence between magazines and the profession that has traditionally tended to inhibit criticism. Writers on architecture—many of them drawn from the profession itself—have learned about architecture from members of the profession and tend to identify with it; and the architects they write about also represent the loyal subscribers. Little wonder that many editors over the years have decided to publish only what they could endorse without reservation—and vice versa.

The critical independence of the architectural press over the years has varied—depending on individual conviction, of course, but perhaps more so on the solidarity of the profession. (This could be a good subject for a dissertation.) In the years when the magazines were supporting the Modern Movement's struggle for supremacy—roughly 1940–1965—each major new work was a victory to be celebrated. When some of the front-line Modernists began to stray into tedious duplication and spurious "delight," the most diplomatic thing to do was ignore them.

P/A—and its competitors—still choose to ignore many architectural disasters, almost by necessity; there are so many of them. (Unfortunately, such expressions of disdain can too easily be mistaken for neutrality.) We reserve our critical articles for buildings with enough positive quality to provide the basis for meaningful lessons.

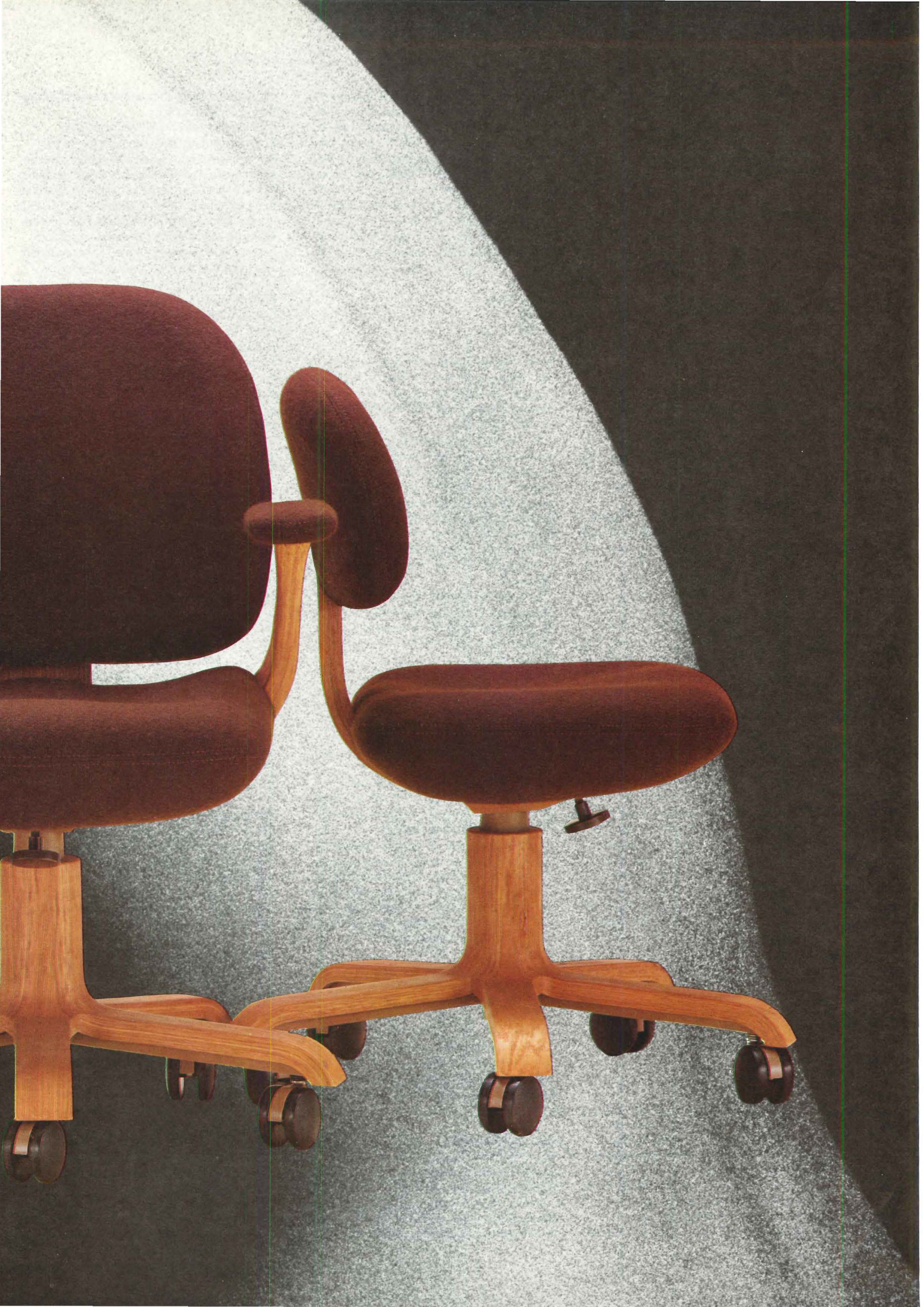
At P/A, no heroes have immunity. In the past year, we have published pointedly critical articles on the work of Eisenman (June 1977), Meier (July 1977), Pelli (Sept. 1977 Editorial), Venturi & Rauch (Oct. 1977), Netsch (Nov. 1977), Portman (Feb. 1978), and Graves (Mar. 1978) among others, all of whom we admire.

This month, we raise serious questions about the last work of the late Louis Kahn (p. 76), an architect who earned a reverence bordering on sainthood. If I myself had written a critique of his Mellon Center, I would not, of course, have made quite the same points; I consider the exterior walls superb in their texture and detail (see photos, this issue, and details, Feb. issue, p. 90), and I find the bland bulk of the building an effective response to its setting. But I agree with associate editor Martin Filler's principal conclusions: that the building is disappointing in its basic organization and in the monumental portions of its interior. This is not the first time P/A has dared to criticize Kahn; although we published a major article on his ideas and work (P/A, Apr. 1961) that contributed substantially to his rising reputation, we were by no means awestruck when we criticized the second phase of his medical labs at the University of Pennsylvania (P/A, Sept. 1964). As Filler says, it may be time for a thorough reappraisal of Kahn's momentous contributions.

Fortunately, there is room for a great diversity of opinion in this profession (considerable, even within the P/A staff). Kahn's new museum will receive an AIA Honor Award this month, along with Netsch's additions to the Chicago Art Institute, which we treated critically last November. This year's Gold Medalist, Philip Johnson, has just unveiled designs for buildings in New York and Miami that are causing widespread consternation.

More about that in next month's Editorial.

John Morris Dixon



Letters from readers

Views

House as work of art
What is being built—an *oeuvre* or a residence? Although the two are not mutually exclusive, the Snyderman House (P/A, Mar. 1978, p. 80) is a categorical fit. P/A has historically been more than supportive of this architecture, with presentations which treat the clearly positive aspects. Rarely does your magazine explore what has not been accomplished in the design.

The Snyderman House is an architectural anachronism, and not simply by the measure of seven years from design to completion. Its structural and total resource awareness were only questionably justifiable 50 years ago. Even then, some people refused to underwrite a system whose justification for improvident resource use was simply availability (even then known to be finite) and blind technophilia.

The state in which I reside, to name just one such region, is currently in the throes of reaping the real (not symbolic) benefits of the ubiquitous architecture and planning efforts in this country as manifested by the Snyderman House. This state is exporting coal ("But what 'natural-looking' reclamation!"—also a standard comment at funerals) and building power plants which transmit electricity ("Don't let those strobe lights on the stacks bother you!") to fulfill the unnecessarily exaggerated energy demands of the likes of a Snyderman House. In *Architecture without Architects*, Bernard Rudofsky categorizes the granary structures of Spain, Portugal, the Ivory Coast, and the Sudan as "quasi-sacral" architecture. The structures were venerated for their protection of a communal resource. Each of us, and especially the design professionals, must operate under a moral imperative to conserve and protect a broad spectrum of basic resources. Each of our buildings must be viewed as "quasi-sacral" in their respect for energy conservation, building materials conservation and reduced materials-manufacturing pollution. It is ironic that the man/nature relationship is panegyrized for this house. There are few more blatant examples of the Occidental condescension "giving man dominion over nature."

If this is the state of the art, bring back those "untutored builders."
William A. Baker
Architect & Assistant Professor
of Architectural Engineering
University of Wyoming
Laramie, Wy

Pink House and its neighbors
Congratulations to Natalie de Blois for having the courage of her convictions to vote against the Fulshum residence by Edward Mills as being worthy of a First Award for design excellence (P/A, Jan. 1978). I am appalled that architects of the stature of Meier and Moore could vote for this house which has about as much order as a flatcar piled with scrap iron.

The design of this house is certainly symbolic of much of the disorder, violence, tension and confusion of our times but I don't believe a relevant example of the design quality or direction of today's architecture. If the P/A design awards are truly "reflecting developments on the leading edge of architectural thinking" as your editorial stated, this house would be representative of the beginning of an era of chaos. I agree with Natalie de Blois; it marks the end of an era.

As Philip Johnson said in an interview published in a book called *Conversations with Architects*, "I'd rather be good than original." Amen!
Robert Barbal
Architect
Floral Park, NY

To give discredit where discredit is due, the Architectural Jury for the 25th Annual P/A Awards Program has finally recognized the ultimate architectural style to follow the "New Brutalism"—the "New Dysentery."

By selecting Edward Mills's onanistic exercise for first award, they have not only done a disservice to architecture, but have created a monster for Mr. Mills. The poor man has used up his entire architectural vocabulary in this capsulization of the current rehash of Corbu, Mendelssohn, Niemeyer, and Van der Vlugt/Brinkman, and is now saddled with the problem of topping his effort with even more of this gymnastic trivia.

As for the "marshalled" grandeur of the 19th-Century great house by Peter D. Rose, one can only hope the Spring thaw will put out the fire before the marshmallow is overcooked. *Marshmallowed*?

One of the entries for the Chicago Tribune Competition of 1923 by Mr. Anonymous (enclosed by writer but not reproducible here) could very well serve as a perspective view of Babylon by Arquitectonica. I think one could relate the plan of their dream to this, just as easily as to their own nostalgic rendering.

How did Chimacoff/Peterson, Mitchell/Giurgola, RIA Architects and Jorge Silvette ever get awards? Their work is much too good to have been premiated by that jury.

If, as I would like to believe, the purpose of planning and design is not to create a circus atmosphere, but a better setting for human behavior, then perhaps it would have been better to send the architectural members of your jury to Central America for the Kaopectate Festival and make the awards by drawing lots.
Richard E. Baringer, FAIA
St. Croix, USVI
[While the writer's voice is among a chorus of criticism directed against the Mills House—see previous Views columns—he apparently acknowledges the quality of some winning entries. Too bad he cannot give our jury credit for them as well. We are not sure whether the reference to the Babylon Apartments is meant to be guilt by association or praise by association.—Editors]

Solar ramifications
With reference to Mr. Alvin Newton's letter commenting on P/A's recent coverage of the SH&G experimental collector (P/A March 1978, p. 14), Mr. Newton takes issue with a statement of yours which implies that the ASHRAE Standard 93–77 does not yield a meaningful comparison of performance when collectors are used in less than optimal conditions.

Since your statement was, no doubt, abstracted from the report given to you by SH&G, I feel responsible to attempt to clear up the difficulty. The following points are germane. 1) The intent of our report is neither to condemn or condone the ASHRAE Standard 93–77; 2) Our interpretation of the data is guided by our interest in the solar collector as a system component, rather than as an isolated test component. Any departure from the ASHRAE Standard is prompted by this consideration. The report shows that the system operation may profoundly influence the performance of a solar collector. Thus, our intent was not to impugn the ASHRAE Standard 93–77, but only to state that our results concerning collector efficiency may depart from collector test performance (as measured by ASHRAE 93–77) due to the systems influence. I hope this explanation clears up any misunderstanding concerning the article.

I enjoyed reading the article and congratulate you for the factual treatment of solar energy applications.
David C. Miller
Smith, Hinchman & Grylls Associates Inc.
Detroit, Mi

Credit amplified
While Wave Hill was very pleased that Progressive Architecture awarded a citation for architectural design to Steven Holl for his gymnasium-bridge design (January 1978, p. 81), I would like to make two corrections in the credits. The consultants were not just a "Wave Hill Community Group," but were members of Community Planning Board #1 in the South Bronx. Also, the design project was made possible by a grant from the National Endowment for the Arts.
Nora L. Mandel
Assistant to the Director
Wave Hill
Bronx, NY

Credit corrected
William C. Miller, reviewer of *The New Architecture* (P/A March 1978, p. 116), is an Associate Professor in the Pre-Design Professions Department of the College of Architecture and Design, not an assistant professor of architecture at Kansas State University, as he was identified in the review.

Credit due
We regret that the name of Der Scutt, Consulting Architect, was inadvertently omitted from our News Report item on the new Hyatt Regency New York (P/A, March 1978, p. 50).

Additional credit
The winners of a P/A citation (Jan. 1978) for the Urban Street Furniture Manual, Detroit (Johnson, Johnson & Roy, Inc., urban designers; Nexus Design, associated designers, signage) wish to extend credit, as well, to George Sass of Johnson, Johnson & Roy, Inc., and to Quintus Greene and Ron Flies of the Community and Economic Development Department, City of Detroit. In addition, the support and encouragement of Ronald J. Hewitt, director, and William D. Smith, deputy director of that department, were vital to the study's success.

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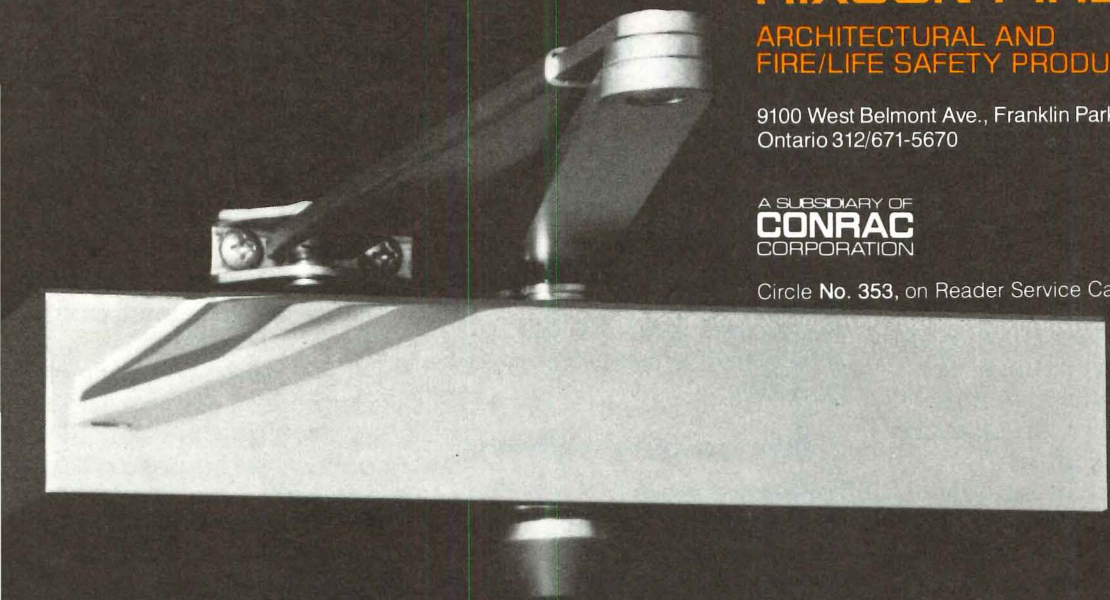

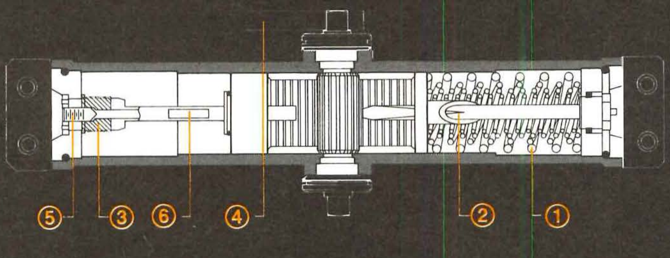

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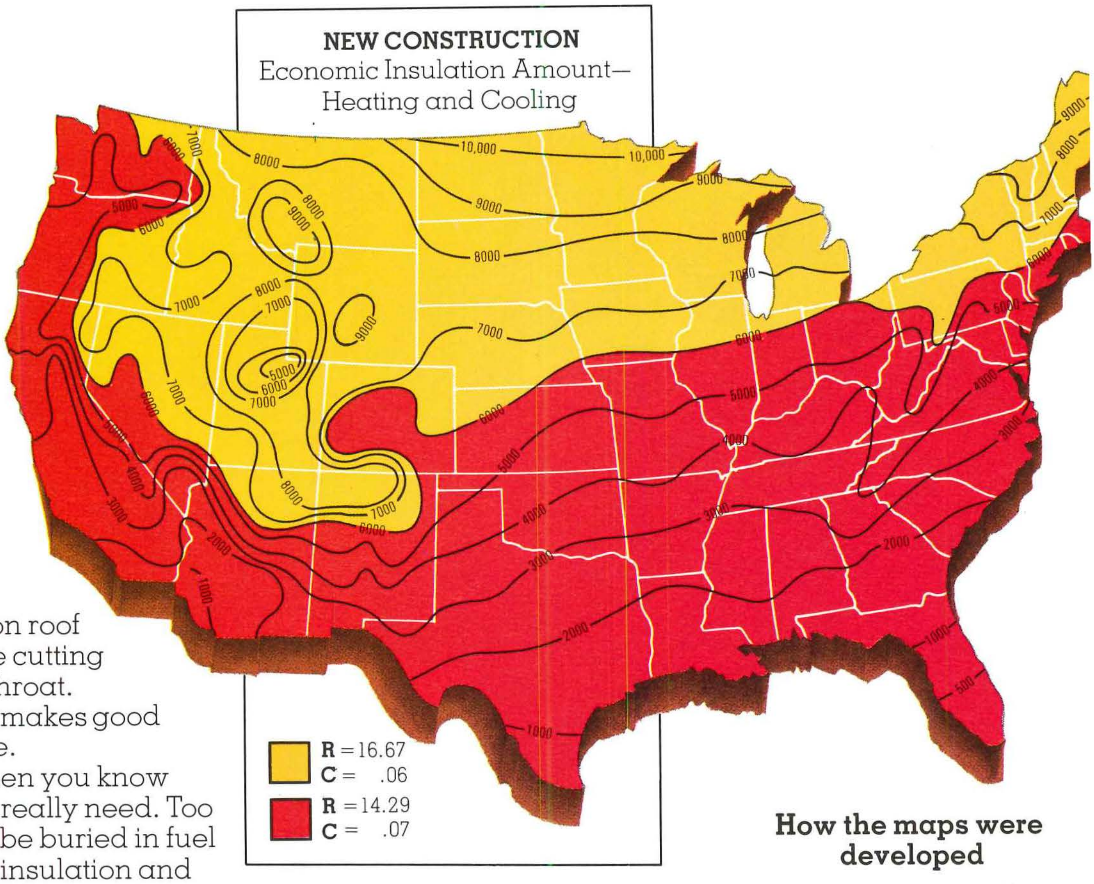
How saving money on roof insulation is a quick way to go broke



Cutting down on roof insulation is like cutting your financial throat. Roof insulation makes good economic sense.

But only when you know how much you really need. Too little and you'll be buried in fuel cost. Too much insulation and it'll seem like forever before you recover the cost.

Here's a not too farfetched example to show you what we mean: A million-square-foot (1,000,000) plant with a minimum amount of roof insulation "R" 2.77 ("C"—0.36) in the northern part of the country with 7,000 degree-days and 500 cooling hours. It can cost you $129,700 per year to heat and cool.

Assuming a 5% annual inflation in fuel costs, seven years from now the same building will conservatively cost you a whopping $208,250 to heat and cool per year.

But there's more to come. The original equipment cost for heating and cooling our not so farfetched example could run as high as $1,900,000. How's that for a quick way to go broke!

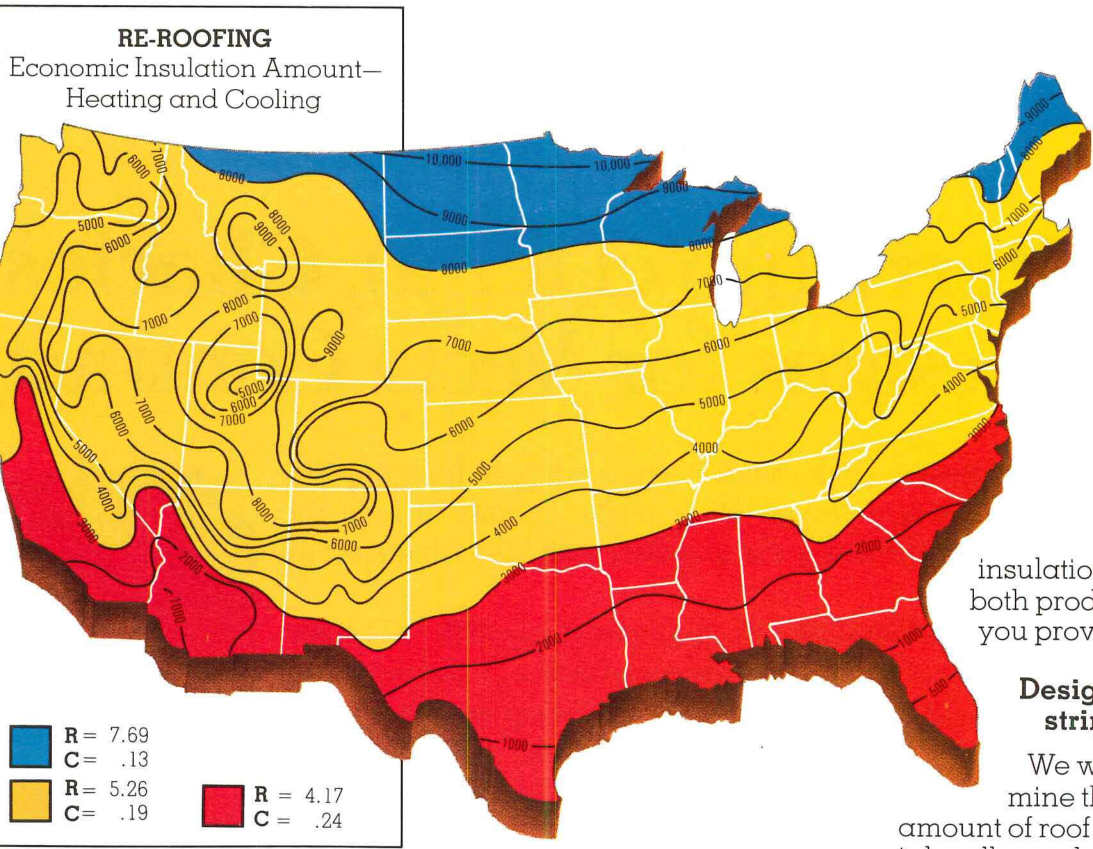
How to avoid going broke

Take a hard look at these two "Economic Insulation" maps. Using 7,000 degree-days, 500 cooling hours and 80°F temp. difference. The map for a new roof recommends an "R" of 16.67 ("C" of .06). Translated into energy costs a year, that's only $25,000 to heat and cool this building. A savings of $104,700 the first year and a possible reduction in equipment cost of $1,500,000.

How the maps were developed

Owens-Corning has taken twenty years of energy management experience and put into a computer.

We used a metal-deck commercial or industrial build- ing, with gas heat and electri cooling, as our base. We did thorough calculations for degree zones throughout the country. Then we factored in 15-year building life. A 5% annual fuel inflation estimate We put corporate income tax at 48%. Electric costs at $0.03kwh, $1.80/M cu. ft. (1 m lion btu) for gas. Equipment costs were pegged at $1000/ ton—cooling. $35/1 M btu—heating. Plus 5% equipment maintenance cost. Roof resist



nce: 1.50—summer, 1.11—
vinter. Insulation ¾″ fiber glass.
For equipment design an 0°F temp. diff. and deck ETD of 2°F were used. Allowed for 10% oof insulation cost adjustment nd 75% heating system efficien-y. The maps are the result.

If you're designing a new oof or replacing an old one, ou can tell at a glance the conomic amount of insulation ou should be using for your roject. Pure and simple.

Talk to our computer about your special requirements

Our "economic insulation" naps should cover most f new roofing and re-roofing rojects. If your roof is a spe-ial case, you can talk to our MS 3 computer by using a ouchtone telephone or com-uter terminal. Give EMS 3 the asic information about your roject and EMS 3 will tell ou the economic insulation mount based on your input. It vill also give your projected rst-year heating and cooling avings, equipment savings n new construction, and dded insulation cost. We'll end you full details so you can call EMS 3 about your special requirements.

Ask us about our roof insulation

We've got Fiberglas* Roof Insulation and Fiberglas Urethane Roof Insulation (FURI). Depending on your design and insulation requirements, both products will give you proven performance.

Fiberglas Roof Insulation Thermal Values

"R"	"C"	Nominal Thickness
9.09	.11	2-1/4″
7.69	.13	1-7/8″
6.67	.15	1-5/8″
5.26	.19	1-5/16″
4.17	.24	1-1/16″
3.70	.27	15/16″
2.78	.36	3/4″

FURI Insulation Thermal Values

"R"	"C"	Nominal Thickness
20.00	.05	3-3/4″
16.67	.06	3-3/16″
14.29	.07	2-5/8″
12.50	.08	2-3/8″
11.11	.09	2″
10.00	.10	1-13/16″
9.09	.11	1-11/16″

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We will help you determine the economic amount of roof insulation. EMS 3 is hardly a salesman. It's there to help owners, engineers and architects obtain energy-efficient roofs.

Of course we want to sell you our insulation. We believe if we help you find the economic amount of roof insulation you'll probably come to us for the right insulation for your roof.

What you should do now

Planning a new building or replacing an old roof? Incorporate the "economic insulation" amount from the maps into your specifications. If you're not directly involved in specifications, pass them along to the person who is. If there is anything that you don't understand about insulation, call your local Owens-Corning representative. That phone call might keep you from going broke.

Want more information on our roof "economic insulation" amount maps, or how to talk to our computer, drop us a line. Write to Q.I. Meeks, Owens-Corning Fiberglas Corporation, Fiberglas Tower, Toledo, Ohio 43659.

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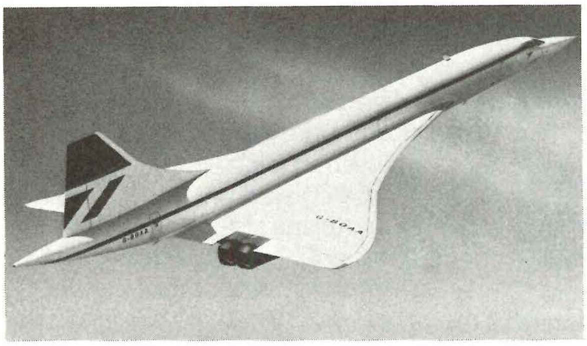
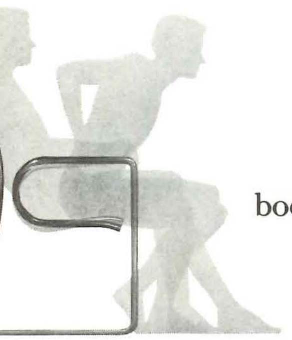
Gibilterra (jĭb′ĕl tẽr ȧ), **Charles** *n.* Designs for Vecta Contract.

Uniquely talented, Charles Gibilterra is adept in both product and architectural interior design. His interiors credits include the corporate offices for Northrop Corporation and Wilt Chamberlin's residence.

Gibilterra's association with Vecta Contract began in 1971 when he presented a totally new idea in chair construction. Until that time, chairs were either rigid or dependent on hinge/spring mechanisms for movement. Gibilterra reasoned, since the human body is highly flexible and moves multi-directionally, why shouldn't a chair react similarly? Such flexibility is absolutely essential in an airplane wing to preclude disintegration under stress. His research resulted in the application of airframe technology to chairs. Prototype testing proved the theory to be excitingly viable, and the initial model was introduced in 1972. I was evident that a family of Gibilterra chairs, all base on the same airframe principles, would naturally evolve. Patents and copyrights were grante to Vecta Contract, other patents applied for and pending on later models. An upholstered version, the Gibilterra conference/dining, with or without upholstered arms, was introduce in 1973. Capacious—a full 20 inches between arms, yet only 22 inches wide, twelve Gibilterr chairs are comfortably accommodated at a 12 foot table. Tubular side frames form a circuitous, flexible connection between seat and back, although seat and back are not directl connected. The configuration and action is such that the chair automatically and imperceptibly adjusts to the occupant's changes in seating position. Seat and back elements c steel rod and Pirelli webbing, sans rigid seat or back pans, further enhance comfort.



Eight unique floating head bolts, which permit controlled sid to-side motion, are incorporated each Gibilterra chair. When the occupant is sitting in a centered position, bolt heads are static relat to the tubular frame. Other actior occur when occupant leans or shi

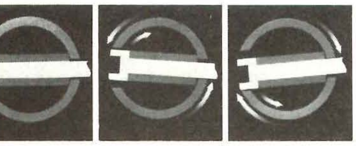


body weight to left or to the right. So each chair is also laterally flexible.

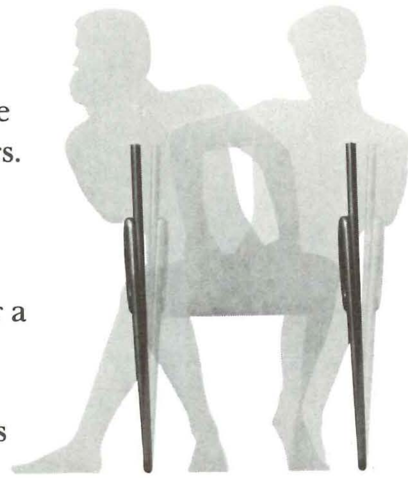
A companion chair, available only with upholstered arms, is scaled for lounge seating.

The compact side/dining chair is as conceptually related airframe construction as are the other Gibilterras.

Based on identical principles, yet distinctly different in



configuration, the executive chair is Gibilterra's most recent addition to the Vecta Contract family of flexible chairs. Although seat and back are ntiguous and appear to be joined, each moves freely and dependently of the other. With or without upholstered arms.



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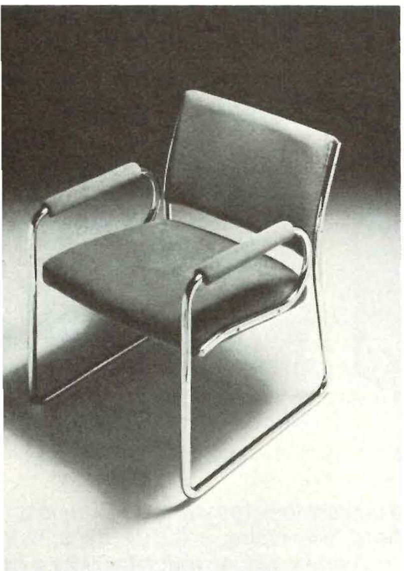
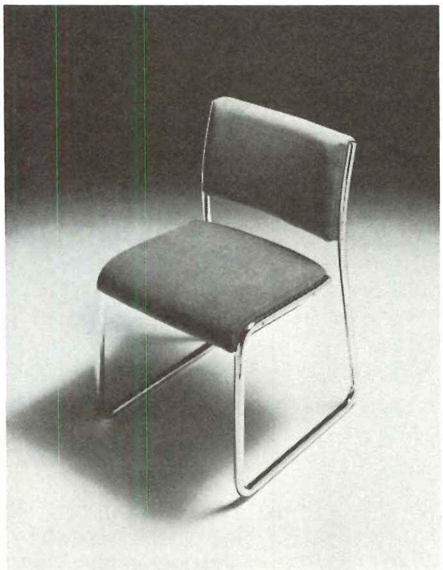
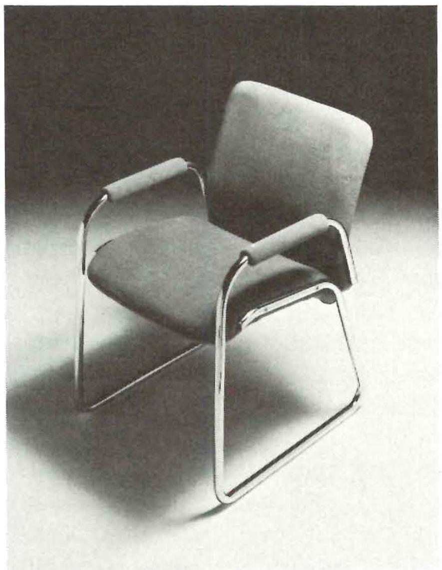

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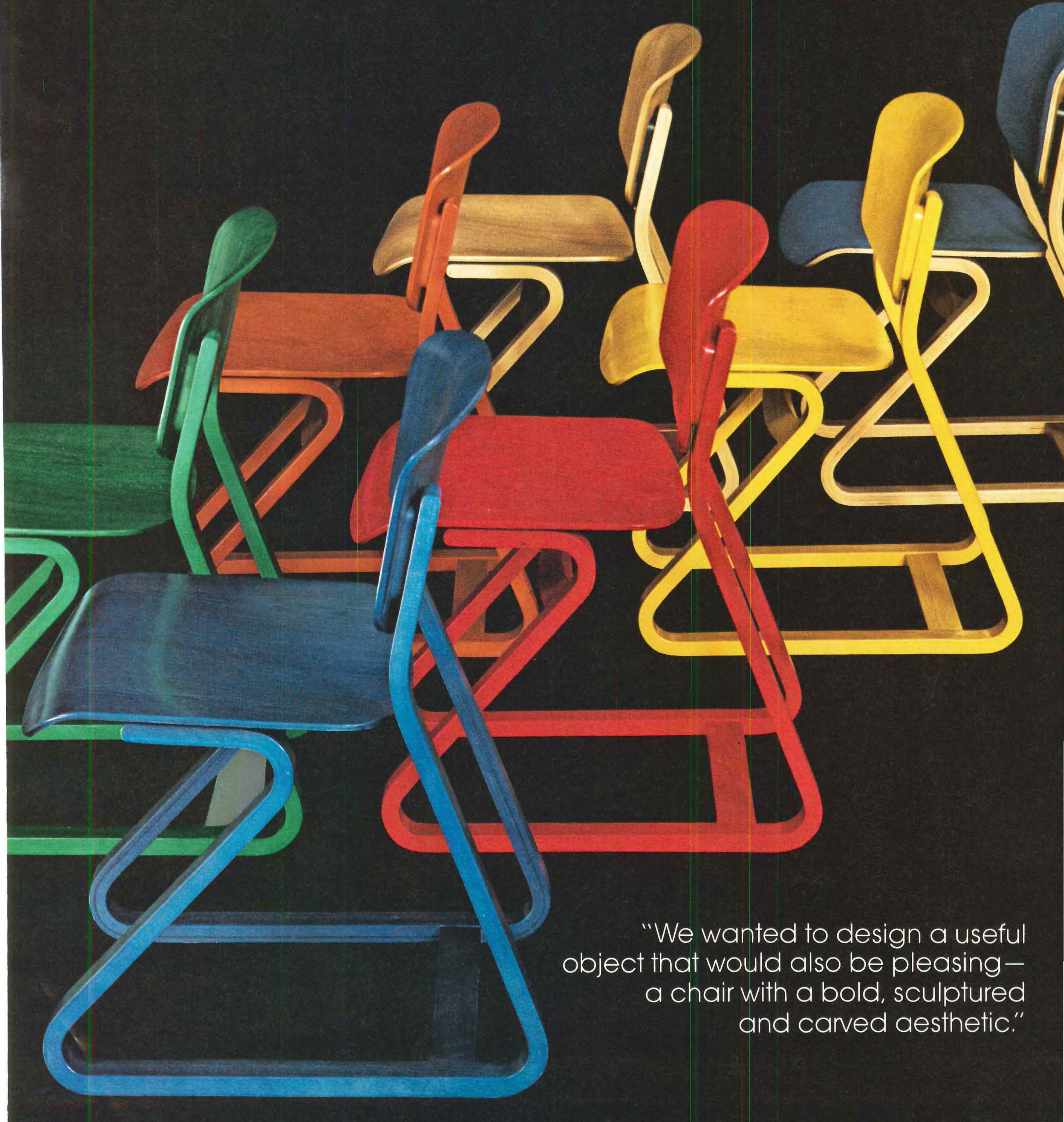
Rethink Thonet



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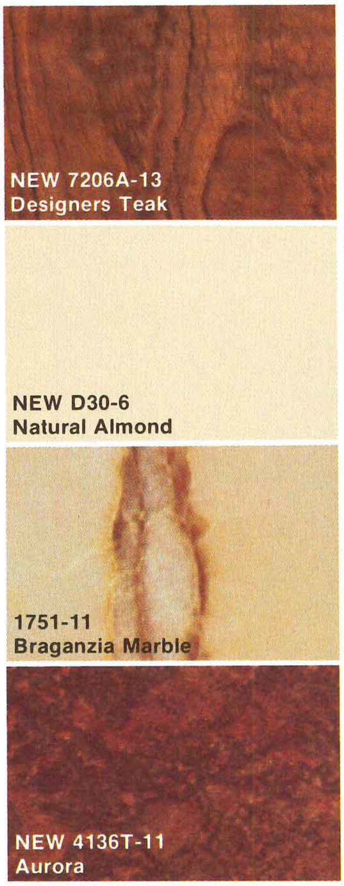

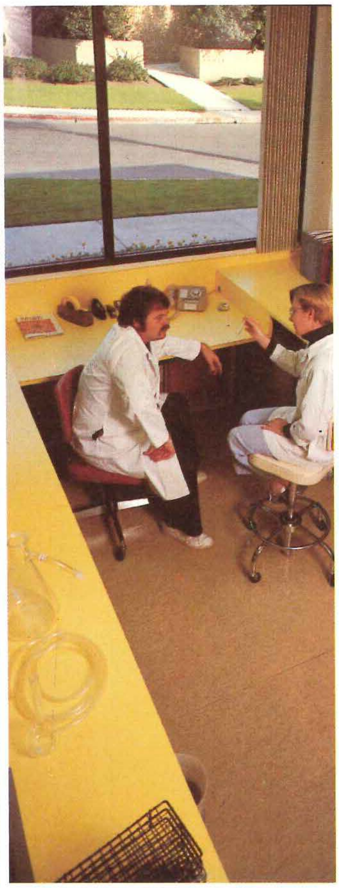

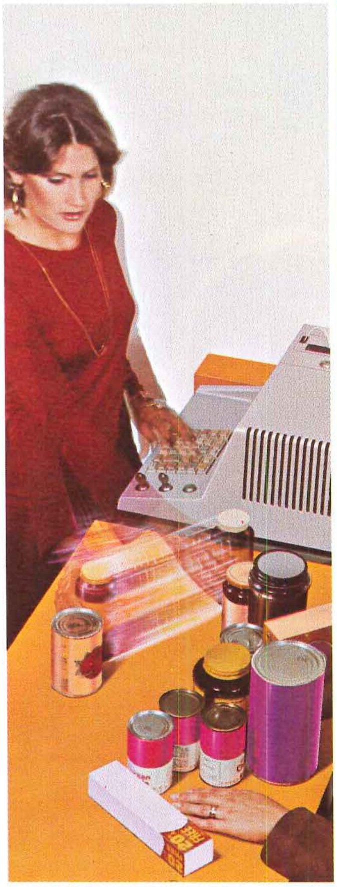

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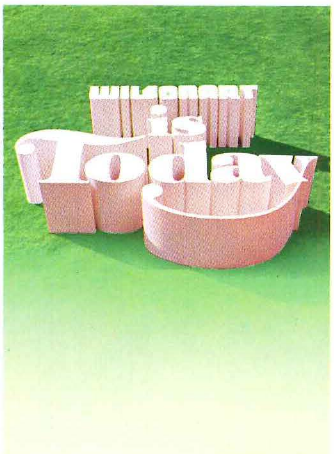

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News report

National Gallery new wing opens

The National Gallery of Art's new wing has been six years under construction, at a cost of $94.4 million. Designed by I.M. Pei & Partners, New York, it will open June 1 with a major exhibition on loan from the German Democratic Republic. The East Building is faced with pink Tennessee marble like that on the existing museum (P/A, Sept. 1974, p. 93) and is connected to the main building by an underground link. The building site is 8.8 acres, the last major undeveloped site on this portion of Pennsylvania Avenue, the inaugural route between the Capitol and the White House.

The addition was built with gifts from Paul Mellon, the late Ailsa Mellon Bruce, and the Andrew W. Mellon Foundation. Andrew Mellon was patron of the original National Gallery building, designed by John Russell Pope in the neoclassical style and completed in 1941.

The East Building site is a trapezoidal plot east of the main building. The shape dictated the form of the addition: two triangular volumes topped by a triangular space-frame skylight. In the larger triangular volume—with four-story towers at each of its points—are the exhibition spaces, two auditoriums, and the central orientation court. The smaller volume of eight levels houses offices, a research center, and a library with open reading rooms. The underground connector, completed in 1976, contains a 700-seat cafeteria and a sales area.

National Gallery of Art's East Building, view from northwest; architect I.M. Pei & Partners.

The structural system is a combination of steel frame and structural concrete. The interiors are not elaborately finished; walls are plywood-backed gypsum board, and the floors are either carpeted or finished with marble similar to the floors of public spaces in the main building. The total project adds 604,000 sq ft—450,000 of it in the East Building of which 110,000 sq ft is exhibition space. The connecting link includes a plaza landscaped by Kiley, Tyndall, Walker of Charlotte, Vt. The plaza is intercepted by a public street and includes a fountain, waterfall, sculpture display, and a cluster of tetrahedron skylights providing light for the cafeteria below.

The addition was built to display temporary exhibitions, primarily international in scope. For the opening, the exhibit, "The Splendor of Dresden: Five Centuries of Art Collecting," will remain on view through Sept. 4 after which it will be exhibited at the New York Metropolitan Museum of Art, Oct. 21–Jan. 13, and at the California Palace of the Legion of Honor, San Francisco, Feb. 18–May 26, 1979. The Metropolitan and the fine arts museums of San Francisco joined the National Gallery as co-organizers.

Among the other shows commemorating the opening will be "Piranesi: the Early Architectural Fantasies," organized by Andrew Robison, National Gallery curator of graphic arts. This exhibit will consist of prints, drawings, and some original copper plates. A scholarly discussion of the work will be published in an illustrated catalog.

Report from Dallas

UTHSC Public Information

Dallas: foreground shows University of Texas Health Science Center, a complex of buildings by Harwood K. Smith & Partners; Fisher & Spillman, Beran & Shelmire; and Ford, Powell & Carson.

Dallas sites for Dallas sights

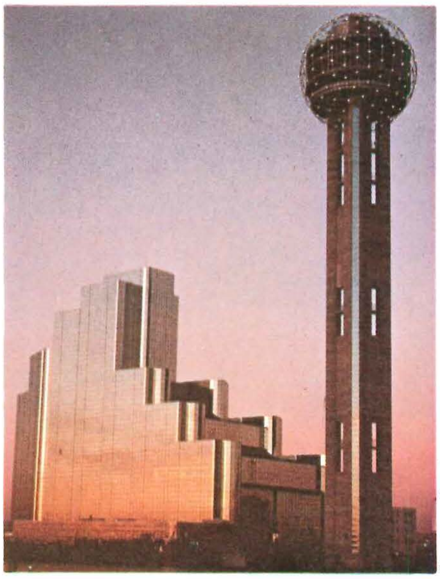
When participants arrive here for the AIA convention the latter part of May, they will not be greeted by an instant-replay of the 1972 Houston scene. They'll find a city which, for all its similarities (with evolving urbanization in the Southwest), retains its own character—"Big D."

Neighboring Fort Worth, once a day's ride westward, now is part of the "Metroplex" and is included in the planned tours and the AIA guidebook. Called *Dallasights: An Anthology of Architecture and Open Spaces,* the book was prepared by a group of architects led by Alan Sumner and including David Williams, Larry Good, Gordon Gilmore, George Cole, and Stan Haas. Each section of the guidebook is introduced by a map with the selection of buildings noted on it; no attempt was made to structure tours or to deal with the city geographically. As a result, the process of city developments is the sequential presentation of building types.

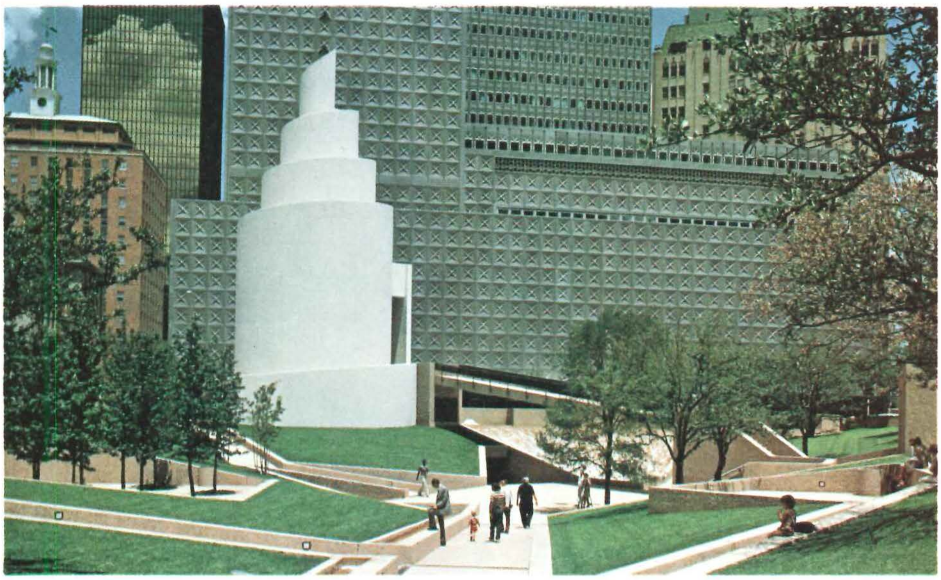
Dallas architecture is a mixed bag. It appears as though local developers have really managed to get the brightest gold-reflective glass in the country (or is it just the sun?) for a series of ho-hum office buildings. But there is also excellence from both national firms and local firms. One of the successes is the string of community colleges, generally joint ventures between both types of firms and the subject of a special AIA tour. There are things uniquely Dallas, such as the World Trade Center and the Apparel Mart (immortalized, in a way, as the set for *Logan's Run)* as well as Fair Park, one of the few surviving Art Deco/Moderne environments.

This year's Gold-Medalist, Philip Johnson, has two civic spaces in Dallas. One is the John F. Kennedy Memorial, a sort of hollow cube entered through a tight slot. The other is his recent Thanks-Giving Square, not a square but a triangle, a result of Dallas's skewed street grids. This is a somewhat scaled-down version of an earlier Ellis Island proposal. While seemingly a public space, it is totally owned by a private religious foundation and is surrounded by a wall with controlled access and limited hours of use—unfortunate constraints.

It's a toss-up as to which is Dallas's newest civic space. One might choose the recently completed (after a long and outrageously controversial history) Municipal Administration Center, otherwise known as City Hall, by I.M. Pei & Partners. However, the total effect of the plaza space awaits completion of the future Central Public Library by a local firm, Fisher & Spillman. As the Pei building leans forward, the library will step back, creating a dialogue which will activate the space between. Others might propose, as an alternative nomination, "Reunion," a 50-acre development by the Woodbine Corporation. It includes a 965-room Hyatt Regency, by Welton Becket & Associates. The hotel steps



Courtesy: Reunion



Peter Papademetriou

Courtesy: Reunion

back in silvery glass planes from its atrium. That space in turn is punctuated by Reunion Tower, topped by geodesic lace-work. There is also a new regional transportation center, which was created from the 1914 Union Terminal, and a sports center, which recently entered construction.

These two projects may characterize Dallas's future growth and change. On one hand, government is actively engaged in the promotion of quality in design even to the extent of its recently established urban design staff. On the other, the thrust of this will come through private development. As the pieces begin to fit together, they promise to put the "go" back in the benchmark effort of 1966, Goals for Dallas. [Peter Papademetriou]

Photos: Peter Papademetriou

Welton Becket Associates' Reunion by day (center) and at dusk (top, left). Thanks-Giving Square by Johnson/Burgee Architects (top, right). City Hall by I.M. Pei & Partners (above). Interior of City Hall (left) shows a linear atrium and exposed public corridors.

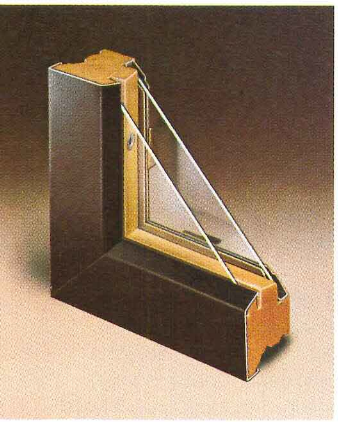
[News report continued on page 30]

When all of the various window requirements for this project were taken into consideration...

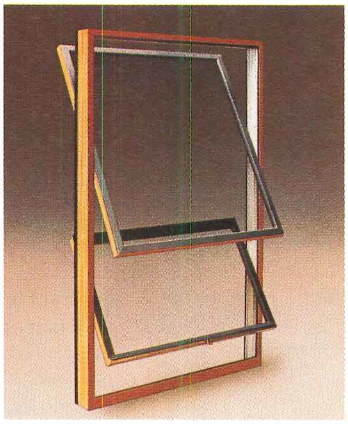
a Pella package was the only logical choice

Vhen this student housing facility for Hahnemann Medical College was built, Pella windows were specified for some ery sound, practical reasons. For example, a complete clad ystem was needed because the architect wanted matching lad panels below the clad windows. This allowed him to onfine the masonry panels to vertical shapes, thus achiev-ng the desired visual effect.

The need to keep maintenance costs at an absolute min-mum called for windows that could be washed easily from inside. Further, they had to be equipped with locks to prevent them from being opened during the air conditioning season. Pella Contemporary Double-Hungs with optional keylocks met these requirements beautifully, while their all-wood interiors provided a warm, home-like environment for the student apartments. Pella's Double Glass Insulation System was chosen for its superior insulating value. Add it all up and you have a package of features and options that are exclusive with Pella.



Pella's tough aluminum exterior ladding is first cleaned and etched, hen coated with a baked-on acrylic olymer. It won't chip, crack or eel. Available in three standard olors, and 8 extra-cost optional olors.



Pella's Contemporary Double-Hung Window pivots for quick, easy washing of outside glass surfaces from inside the building. Can be equipped with optional keylocks to prevent unauthorized opening.

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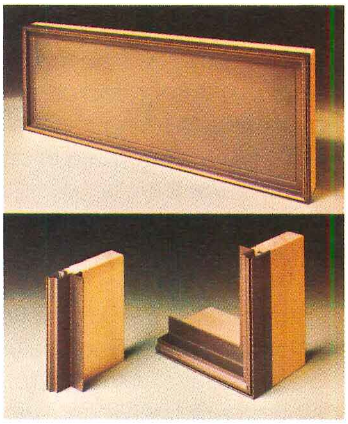

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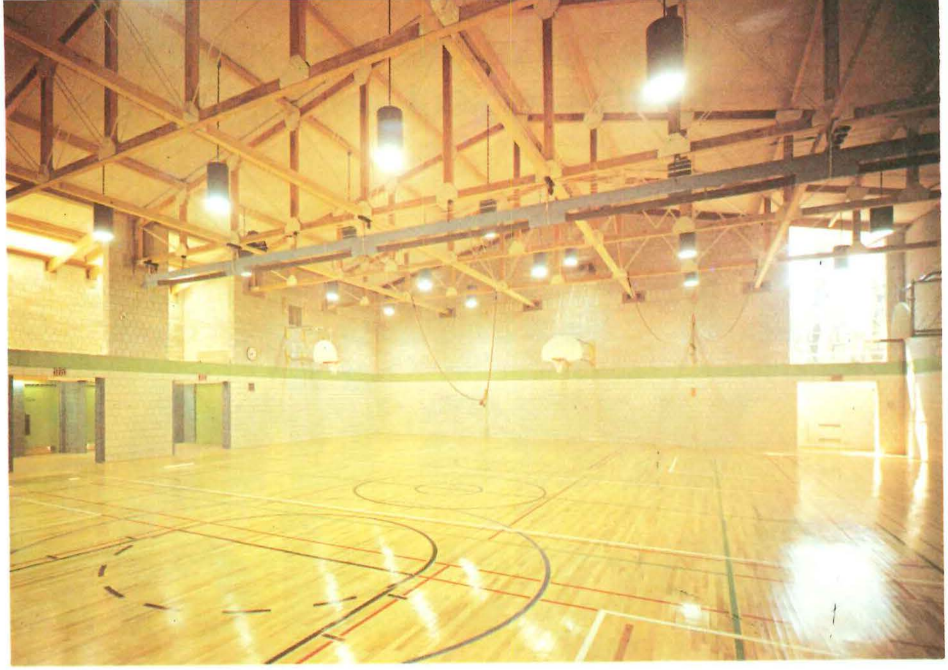


Opportunity is a small gymnasium

A gymnasium addition to an elementary school is hardly a dream commission, yet for architects Roth & Moore of New Haven, such a commission was the basis for a distinctive design statement—a soft-spoken statement, cognizant of client needs, yet by no means prosaic.

The Dundee School in Greenwich, Ct (Perkins & Will, Architects, 1962), is to begin with a contextual building, with gabled roofs and walls of fieldstone and vertical metal siding, painted soft brown. Roth & Moore's addition uses similar roof and siding; only the streamlined concrete canopy bracketed between makes pointed reference to the mechanized world.

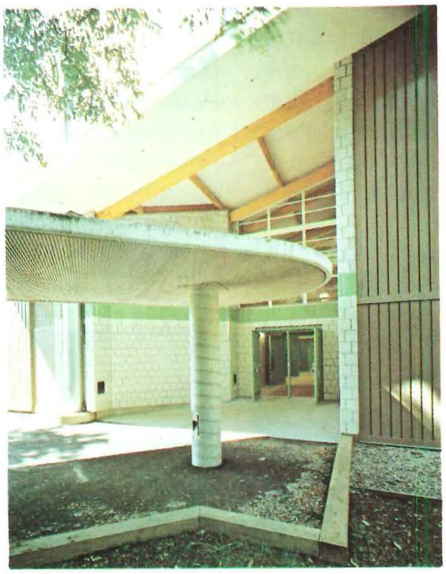
Given the obvious needs of a gym, the architects brought each to life, visually. Spanning the big interior are trusses (Speigel & Zamecnik, engineers) resting on articulated concrete impost blocks, with white-painted steel tension rods interlaced among natural wood compression members. Markings on the gym floor have been elaborated in several colors to make a festive design.

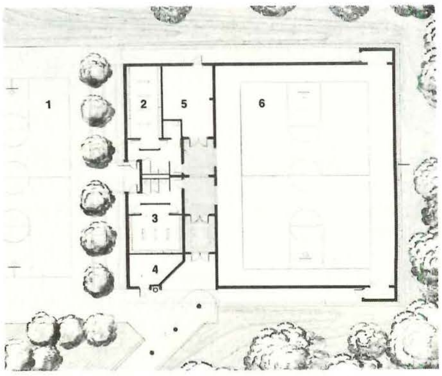
And given the need for impervious lower wall surfaces—the downfall of so many old school interiors—the architects used a simple scheme of off-white glazed block below, unglazed above, with an apple green stringcourse between. This scheme is maintained in the main entry recess—and the secondary one linking locker rooms to outdoor play—identifying as "interior" everything inside the metal siding plane. An exception is the central lobby, where a rich blue-green takes over the lower walls.

Like any good "decorated shed," this one has thoughtfully modulated spaces and lighting. Worth noting is the way light introduced through tall windows at the northerly corners of the space, which can never shine in players' eyes, is balanced by diffusing skylights over the lobby. A physical education teacher, asked for an impromptu critique during an indoor hockey match, spoke warmly about how the architects listened to users, providing the solid walls a gym needs, for instance, yet with openings to the outdoors that keep the interior from "looking like a barn."

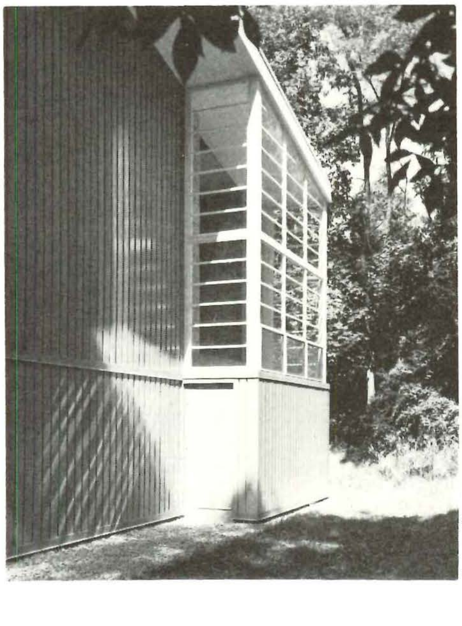
The gym was completed in 1975, at a cost of $466,000. And for this the clients got design distinction, without the hidden cost of functional drawbacks. [JMD]

[News report continued on page 34]





Bands of glazed and unglazed block continue from recessed entry (above left) through to gym interior (top), with substitution of blue-green block in central lobby (above). Legend for plan (left): **1** outdoor play, **2** boys, **3** girls, **4** mechanical, **5** storage, **6** gym.



Robert Perron

How Mannington solved a flooring dilemma – moisture and its effects.

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Classicon. It goes where the others can't.

Woodland Country Day School in Jericho, New Jersey, had a moisture problem. Every time it rained, water seeped through the walls and across the floor. Headmistress of the private school, Gail Stanley, elaborated. "The tiles we had put down were coming up and we had constant mold and mildew on the floor.

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Eugene Dietman, building manager of a New Jersey Masonic Temple, had a moisture problem in the banquet room that made it practically unusable. After Classicon had been installed for 18 months, Mr. Dietman said, "We've had no water problems. It has proved easy to clean and keep in good shape. An adjacent banquet room still has water problems and we plan to install Classicon in there, too."

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Complicated framing problem?

That's what the designers of Columbus County Hospital did. And it paid dividends in reduced construction time and foundation costs.

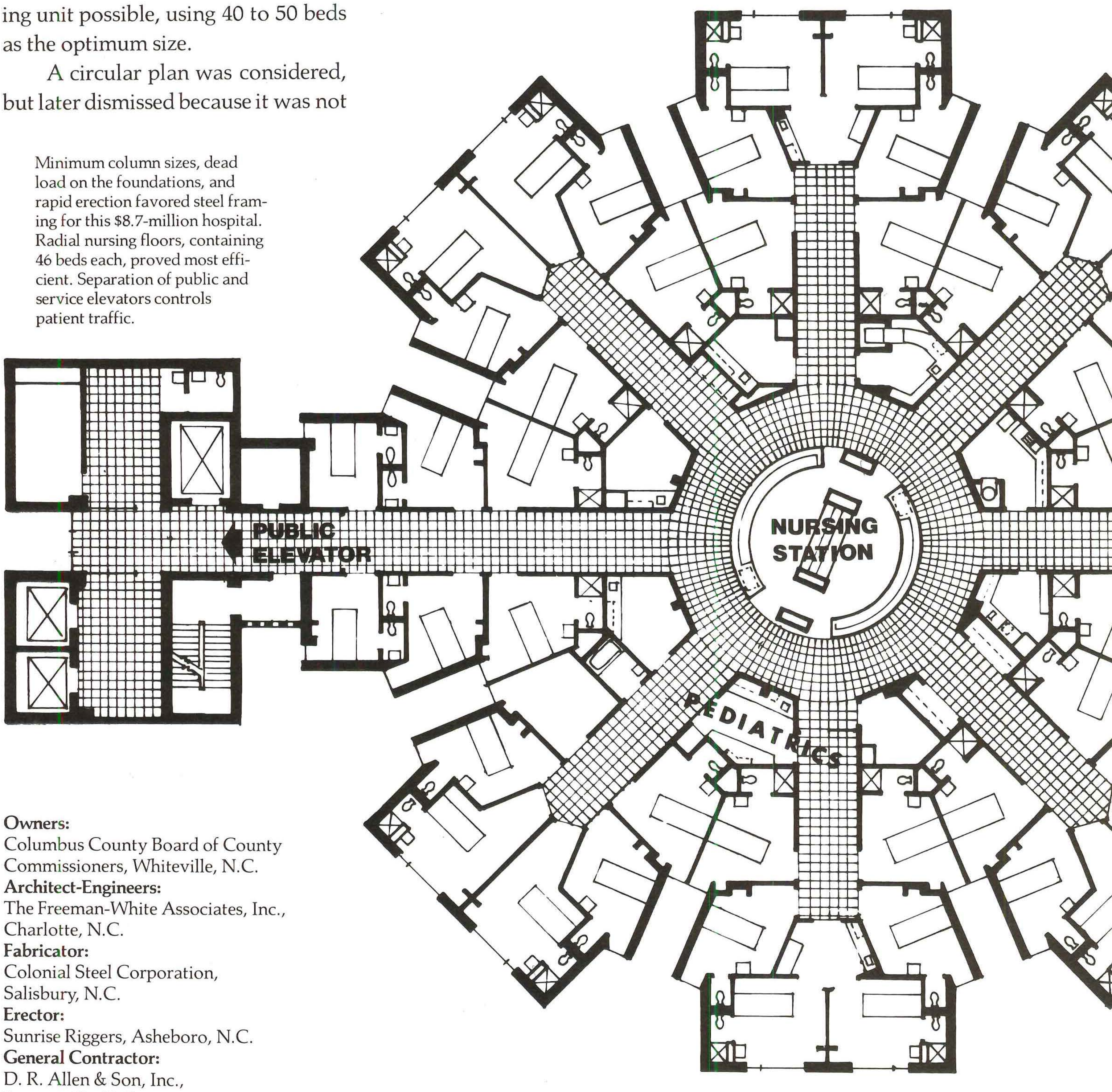
Columbus County hospital is a 166-bed (all private) acute care general hospital in Whiteville, N.C. The hospital planners conducted a study to determine the most compact nursing unit possible, using 40 to 50 beds as the optimum size.

A circular plan was considered, but later dismissed because it was not space efficient. Too much space was created for support functions in the center portion of the circle for the number of beds desired.

Radial plan selected

By compressing the arrangement of patient rooms around a central nurses' station, the radial plan succeeded where the circular plan failed. Distance from nursing personnel is greatly reduced. It's only 38 ft from the nurses' station to the most remote patient bedroom.

Furthermore, the undulating exterior walls make it possible to provide windows for all patient rooms,



Minimum column sizes, dead load on the foundations, and rapid erection favored steel framing for this $8.7-million hospital. Radial nursing floors, containing 46 beds each, proved most efficient. Separation of public and service elevators controls patient traffic.

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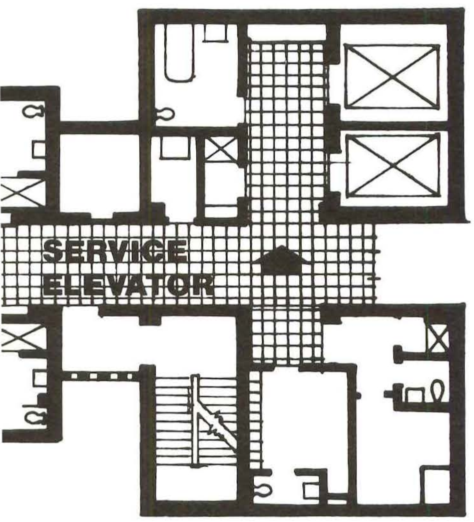
Solve it with structural steel.

ven those located on the interior of 1e circle.

Only steel could handle the job

The architects first investigated concrete framing system, but found wasn't feasible because of the awk-ard convergence of beams and rge, erratic bay sizes. And because f the configuration of the plan, olumn locations did not permit the se of a continuous concrete frame. hey also found that concrete olumn sizes were too large for the mited column space available in the adial plan.

John H. Bennett, A.I.A., Free-1an-White Associates commented, Due to the nature of the radial plan, eel framing proved to be more dvantageous than concrete. It re-

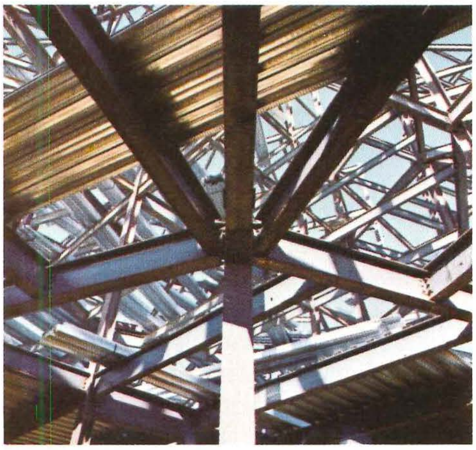


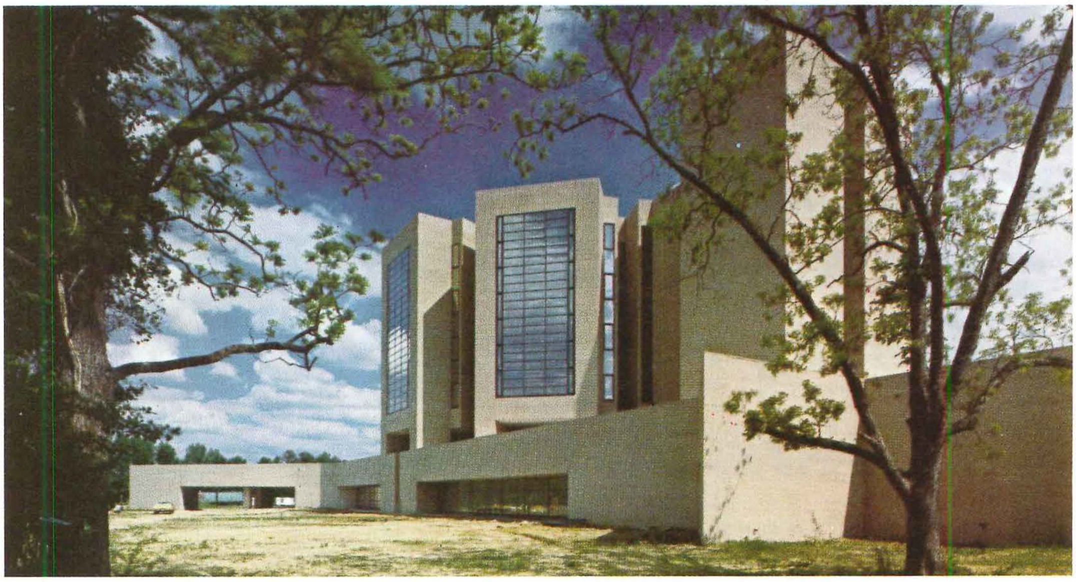
.lted in reduced column sizes, as ell as substantial dead load reduc-on for the foundation."

The combination of high-rength steel and composite design sulted in material savings and re-uced live load deflection. The fire-sistant floor system consists of 3-in. mposite steel floor deck topped ith 3-1/4 in. of lightweight con-ete. Welded moment connections e used to resist lateral forces.

Columns are fabricated of ASTM A572 Grade 50 high-strength steel; the balance of the frame is A36. Bethlehem supplied 950 tons of steel for the 152,000 sq ft facility.

Web of steel illustrates framing complexity of the octagonal nursing tower. A future tower can be added to the east wing.





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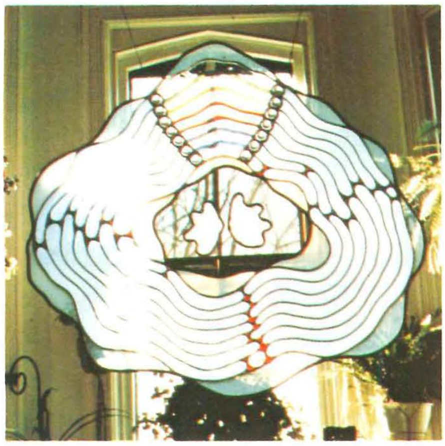
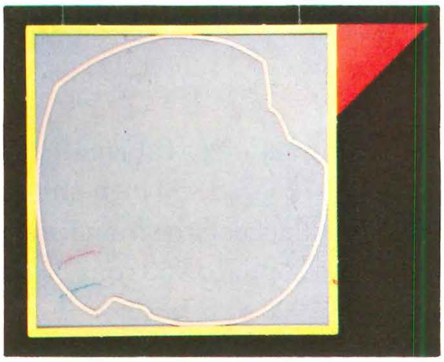
News report continued from page 30





'Harpo Marx 1976,' (above) composition of glass, lead, steel, acrylic paint, by Casey Lewis, shown in 'New Stained Glass' exhibit. Hanging stained glass sculpture (left) by Ray King.

Stained glass and architecture

Artists/craftsmen working with stained glass are eager to join with architects in exploring the possibilities of their fast-growing craft and to enrich the built environment. An exhibition called "New Stained Glass" organized by the Museum of Contemporary Crafts of the American Crafts Council, New York, calls attention to what these artists are inventing in terms of color, form, and fabricating techniques. The show recently closed in New York and will reopen Sept. 29 at the Renwick Gallery, Washington, DC, where it will remain on view through Feb. 19, 1979.

The 33 works in the show demonstrate how the artists are as much concerned, for example, with the linear qualities of the lead lines as with the transparency/opacity of the glass. Some pieces are designed for the traditional back lighting; others are front lit. Some are commentaries, as Richard Posner's symbolic recall of Watergate or Paul Marioni's portrait of Surrealist artist Salvador Dali. There are equally as many pictorial works as nonobjective compositions. Diversities of materials are incorporated: X-rays, photographic transparencies; mirrors. The surfaces are painted, etched, sandblasted, and otherwise worked. Among the architectural uses mentioned for stained glass are wall illuminators in windowless rooms and space partitions. The designers consider themselves artists rather than craftsmen and employ such terms as "glass drawings" when describing their work. Several have backgrounds as painters; others began as apprentices both in the United States and abroad—several were students of the master Ludwig Schaffrath of England.

Until the Renwick show opens, those interested in seeing the state of the art may catch an exhibition of winners in the Fragile Arts Competition, through May 13, at Glassmasters Guild, or see Ray King's work at Contemporary Art Glass Gallery, May

[News report continued on page 38]

"An efficient building... a great building"

ELEVATORS BY DOVER

The quotation above is from Armand C. Stalnaker, chairman and president of General American Life Insurance Co., describing his company's new headquarters building in downtown St. Louis.

Two giant triangles, housing offices for 400 people, are joined by a central rotunda rising the full height of the building. In the center of this unifying core are three pentagonal elevators with glass walled cabs. Bridges lead from the elevators to curved halls opening onto the offices.

Dover Geared Traction Elevators were selected for this unusual building whose geometry makes it both distinctive and functional. For complete information on Dover Elevators write Dover Corporation, Elevator Division, Dept. B, P.O. Box 2177, Memphis, Tennessee 38101.

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Architects: Johnson/Burgee Architects
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Dover Geared Traction Elevators installed by General Elevator Engineering Co.

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News report continued from page 34

5–26, both in New York. Work by Albinas Elskus will be included in a major contemporary crafts exhibition organized for and to be displayed by the Vatican, Rome, this summer.

The 35-year-old American Crafts Council, headquartered in New York, has 35,000 members and offers a number of services of benefit to architects. One is a conveniently organized national clearinghouse of information on the work of individual craftsmen listed by name and by medium. In addition, the Council offers information on a new program called Liaison in which juried crafts are made available to architects, interior designers, and landscape designers seeking handmade works or decorative skills.

Energy budgets forthcoming

The AIA Research Corporation of the American Institute of Architects has received government contracts to develop "energy budgets" that will tell how much energy a building uses as well as how to design buildings to achieve certain energy-consumption levels. In Phase I of the project, already completed, information was obtained from more than 1500 buildings on their energy consumption levels; Phase II, about to begin, involves 175 of these buildings for which their architects are being asked to redesign the building, in theory, to achieve maximum energy conservation using existing technology thereby producing trial energy budgets. Phase III will include testing these trial standards on actual building projects. By 1980, energy performance standards should be fully developed and implemented, as required by Title III of the Energy Conservation Standards for New Buildings Act.

Assisting architects in Phase II will be AIA Research Corporation subcontractors: the Ehrenkrantz Group, Architects, and Syska & Hennessy, Engineers, both of New York; NAHB Research Foundation, Rockville, Md; Heery & Heery Architects, Atlanta; and T.R. Arnold & Associates, industrialized housing advisors, Elkhart, In. The federal contractor is the Department of Housing and Urban Development in cooperation with the Department of Energy.

Reflections on energy and materials

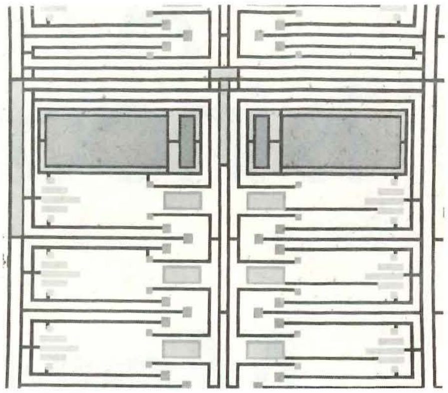
Aspects of the architect's responsibility for energy conservation were aired at a recent meeting of the Flat Glass Marketing Association. Addressing the popular image of glass walls as energy wasters, the group opened its annual convention in Hawaii with a forum moderated by Ron L. Warwick of Amarlite Anaconda.

While thermal-break framing and high performance glass can raise the insulating value of curtain walls to a high level, panelists pointed out, there are situations where easy dissipation of heat through walls can help by reducing air-conditioning load. Architect Stanley P. Steinberg of John Portman & Associates, Atlanta, explained the profession's objections to *prescriptive* energy regulations, vs. controls over building *performance;* California's new Title 24 law, he pointed out, encourages simplistic, prescriptive solutions because the alternative performance analyses allowed under the regulations are more costly.

As for the high energy demand often cited for aluminum production, industry spokesmen pointed out that energy input per pound could be misleading, since aluminum outperforms other construction metals by weight. Aluminum plants, moreover, are generally located at sources of hydroelectric power or coal, hence using these resources with exceptional efficiency. Then, too, energy requirements for *recycling* aluminum are exceptionally low. Arguments such as these should be explored before energy policies—or prejudices—regarding any building materials become too rigid. [JMD]

Frank Lloyd Wright decorative designs

While many people are aware of Frank Lloyd Wright's talents as an architect, few know of the tremendous range of design work he did to complement his buildings. An exhibit on display in Washington, DC (which will also travel to New York and Chicago) is the first comprehensive survey that demon-



Wallpaper 'Design 105' by Frank Lloyd Wright.

strates Wright's concern for the completeness of design.

"The Decorative Designs of Frank Lloyd Wright," researched and planned by David A. Hanks, shows not only Wright's buildings, but also the furniture, rugs, lamps, ceramics, windows, curtains, and even dinner napkins and dresses he designed for his clients. As Hanks, a former curator at the Art Institute of Chicago and the Philadelphia Museum of Art, writes in an illustrated checklist (a full catalog is to be published by E.P. Dutton this spring), "The furnishings of Wright's houses complemented the architecture . . . through the use of similar materials and form, so that there was a pervasive unity, harmony, and repose." The show includes photographs of the original building exteriors and interiors—many destroyed or altered—along with the objects.

The furniture presented a wide variety, among them an oak print table (1903) and a magnificent oak dining table with six chairs (1908). The 69 works in the show displayed as much diversity in form and style as did Wright's architecture. There are cast-iron andirons (1903), leaded glass windows (1904), rare ceramics from Midway Gardens (1914), a silver cream pitcher (1916–22) from the Imperial Hotel in Tokyo, and a perforated wood panel from a Usonian house.

Wright also did graphic design including covers for *Liberty*, *Town & Country*, and *The Architectural Forum* as well as designs for fabrics and wallpaper. All have an architectural quality that relates to his architecture of that period. The patterns in the fabrics, for example, are similar in form to two houses he did for his sons.

Unfortunately, all that remains from much of Wright's work are these ob-
[News report continued on page 42]

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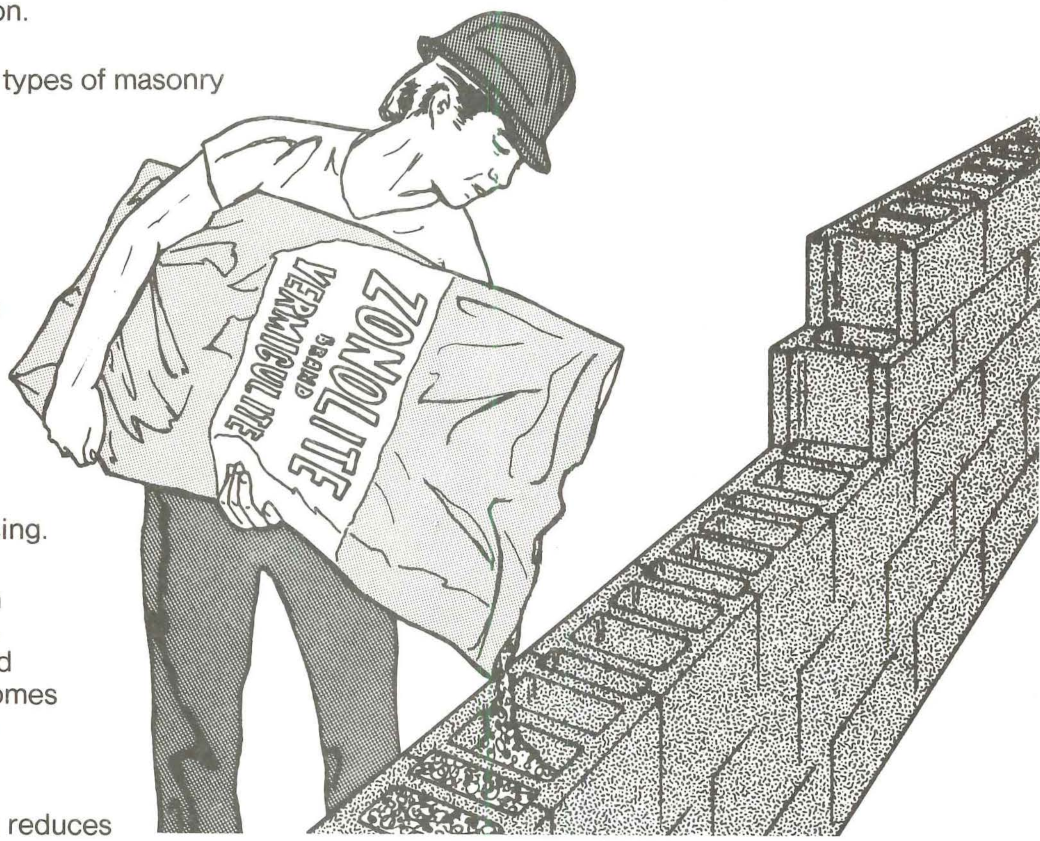

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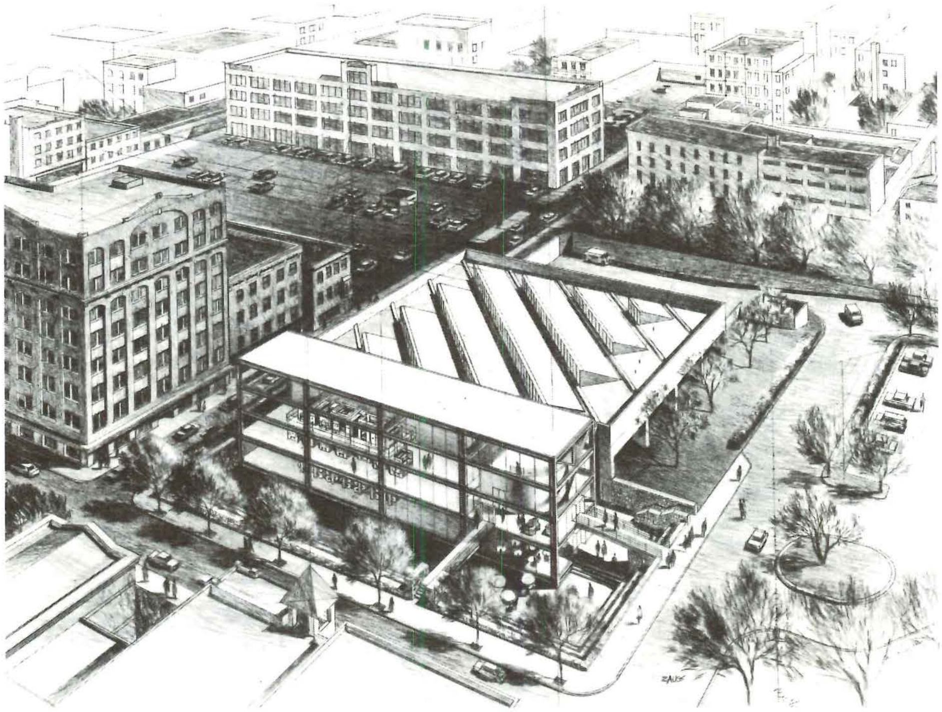
News report continued from page 39

jects, but Hanks's excellent show helps us to better understand Wright and the unity of design he achieved.

The show is at the Renwick Gallery of the National Collection of Fine Arts until July 30. It will be at the Grey Art Gallery and Study Center of New York University, Sept. 26–Nov. 4, and at the David and Alfred Smart Gallery of the University of Chicago, Jan. 10–Feb. 25, 1979. [Carleton Knight]

Venturi and Rauch among 66 Fellows

The American Institute of Architects' College of Fellows has elected 66 new members, selected for their outstanding contribution to the profession. Among the new Fellows are Robert Venturi and John Rauch, Jr., partners in the firm of Venturi & Rauch of Philadelphia. Two years ago Venturi's nomination to the College of Fellows made news (P/A, June 1976, p. 36) when the College jury failed to include him among the 71 new members. In protest, architectural historian Vincent Scully refused to accept two honorary AIA awards. Current members of the Jury of Fellows are Herbert Duncan, Jr., Lewis Davis, Raymond Kappe, William Muchow, Vladimir Ossipoff, and Bernard Rothschild.



The Herald-Mail Building, Hagerstown, Md, by William L. Pereira Associates.

Pereira's press showcase

It won't equal the Battle of Antietam Creek, but Hagerstown, Md, anticipates quite a show—two runs daily, an hour each. The façade of William L.

Pereira Associates' *Herald-Mail* Building is a 44-ft-high glass cage with a 253-ton high-speed off-print press in plain view, and below it for any and all of the 36,000 citizens to see are 18 reels of newsprint feeding into the press. At 1 a.m. 35,000 copies of the *Morning Herald* are run, and at 1 p.m. the machine sculpture turns out the *Daily Mail*.

The project designer for the 52,000-sq-ft building (cost: $3.4 million) is Arthur Golding. The *Herald-Mail* followed the lead of Columbus, In, in staying downtown rather than pursuing the two shopping centers to the suburbs. The decision has perked up Hagerstown, whose two large industries are Mack Trucks and Fairchild. The site, a railroad yard a block from the main street, is large enough to return many small gifts of landscaped space on three sides to the pedestrian—one being the depressed garden below the stage for the daily one o'clock shows.

The entrance to the building is over a ramp at an end of the cage, and a lunch room below opens to a paved court—loge seats. Back of the glass cage is a two-story concrete building whose upper level houses editorial and advertising offices, with folded roof to take the north light. Mail room, storage, and loading are on the ground level, the materials flowing in a U-pattern beginning and ending at the recessed loading dock running across the end of the building.

[Esther McCoy]

Calendar

Through May 30. "Immanent Domains," AIA Headquarters, Philadelphia. Exhibit consists of houses designed by Amsler, Bakanowsky, Lyndon, Machado, McGuire, Schwartz, Silver, Silvetti, and Wampler.

May 17–20. International Federation of Interior Designers World Congress, Washington, DC.

May 21–24. American Institute of Architects annual convention, Dallas.

May 28–30. Urban Land Institute spring meeting, New Orleans.

June 1–Oct. 1. "Piranesi: The Early Architectural Fantasies," National Gallery of Art, Washington, DC.

June 11–16. International Design Conference in Aspen.

June 14–16. NEOCON, National Exposition of Contract Interior Furnishings, Merchandise Mart, Chicago.

June 17–July 1. Architectural tour to Finland and Leningrad, led by Paul David Pearson. For information contact Architectural League of New York, 41 E. 65 St., New York 10021.

June 18–21. Construction Specifications Institute annual convention, San Antonio.

July 22–25. American Society of Interior Designers national conference, Washington, DC.

Aug. 10–12. International products display and seminar for disabled persons, O'Hare Trade and Exposition Center, Chicago.

Aug. 21–23. International conference on durability of building materials and components, Ottawa, Canada.

Aug. 31. Deadline for entries to P/A Awards program.

Sept. 9–12. International Interior Design Exhibition and Symposiums, sponsored by Resources Council Inc., New York.

[News report continued on page 46]

Spotlight on achievement.

The 1977 CRSI Desig

The Fourth Annual Concrete Reinforcing Steel Institute Design Awards Program produced excellence in abundance. The wealth of entries, covering the full spectrum of design problems, made our jurists' decisions difficult. They gave high marks to sensitivity in the use of materials, to successful solutions of environmental problems, with emphasis on energy conservation, and to the harmony of design with function. The 1977 CRSI Design Awards go to these five exceptional structures. All winners share equally in the Awards. There are no specific categories.

The 1977 CRSI Design Awards Portfolio is available. This fully illustrated publication describes structural systems and specific design features of all winning structures. For your copy, write to Concrete Reinforcing Steel Institute, Attention: Victor A. Walther, Jr., Director of Marketing.

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The McGinty Partnership, Inc., Houston, Texas

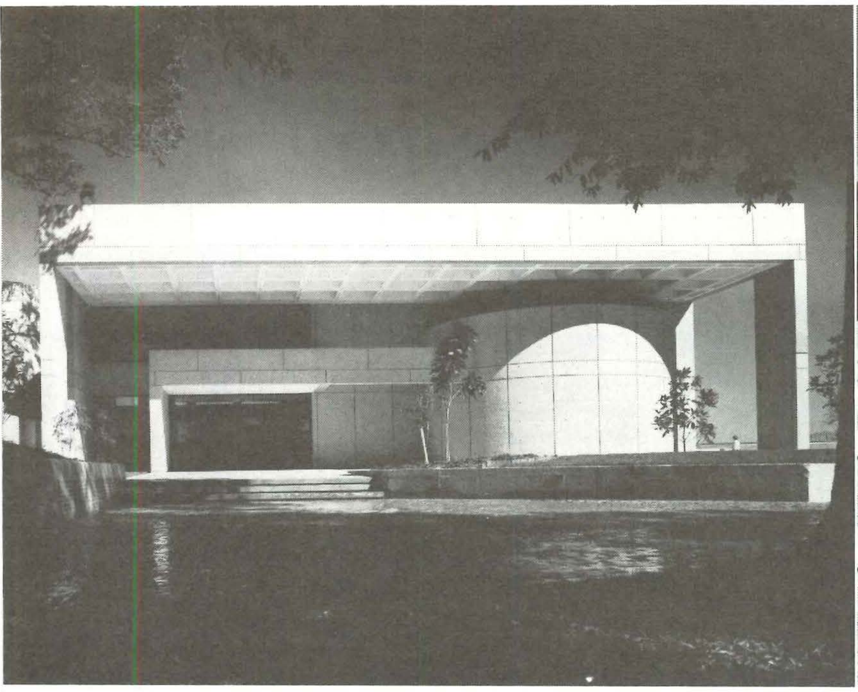
James S. Polshek
Dean of the Graduate School of Architecture,
Columbia University, New York, New York.

Leland J. Walker, FASCE, 1977 President of ASCE,
Northern Testing Laboratories, Inc., Great Falls, Montana

Russell S. Fling, P.E., President,
R.S. Fling & Partners, Inc., Columbus, Ohio

Gordon G. Wittenberg, FAIA, Chairman,
Wittenberg, Delony & Davidson, Inc., Little Rock, Arkansas

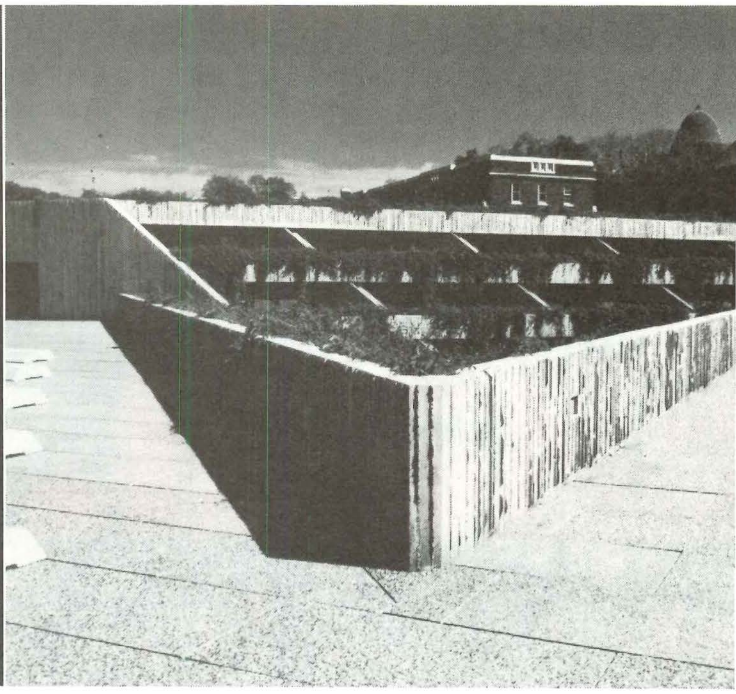
A.I.A. Representative:
Mrs. Maria F. Murray, Director, Awards Program,
The American Institute of Architects, Washington, D.C.



Hunter Museum of Art, Chattanooga, Tennessee.

Jury Comments: "Excellent juxtaposition of a new building to an old museum...honestly expresses concrete technology in twentieth-century terms, made possible by intelligent site analysis."

Owner: Board of Trustees, Hunter Museum of Art, Chattanooga, Tennessee.
Architect: Derthick & Henley, Architects, Chattanooga, Tennessee.
Structural Engineer: Bennett & Pless, Inc., Atlanta, Georgia.
General Contractor: Raines Brothers, Inc., Chattanooga, Tennessee.

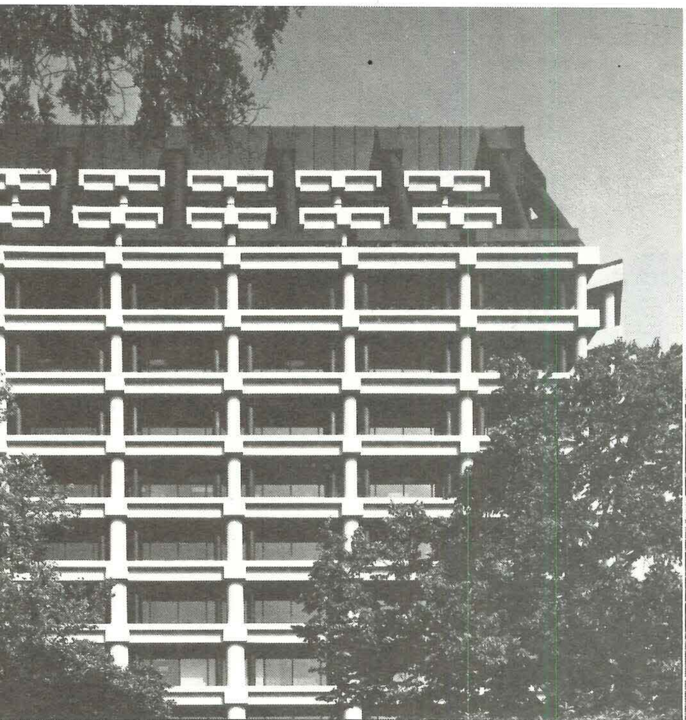


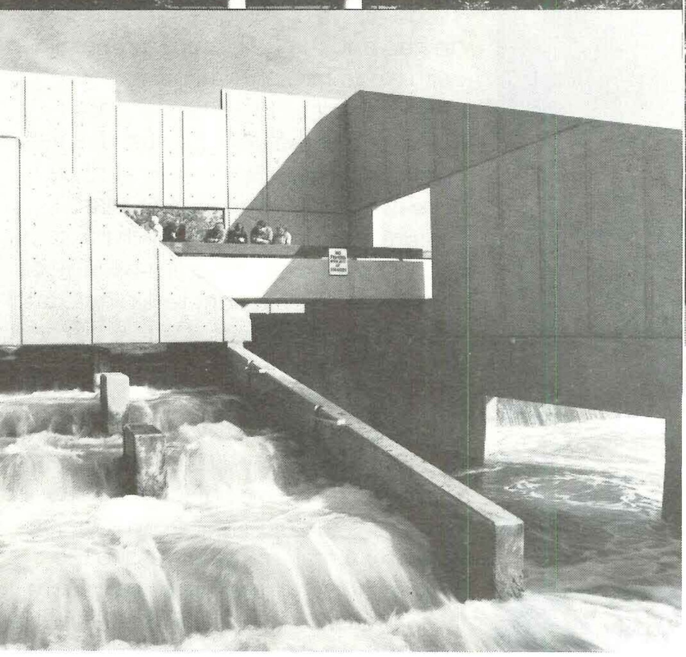
Williamson Hall, Minneapolis Campus, University of Minnesota.

Jury Comments: "The use of reinforced concrete made possible a sensitive solution...The underground building provided an opport to enhance a campus open space."

Owner: University of Minnesota, Minneapolis Campus.
Architect: Myers and Bennett Architects/BRW, Edina, Minnesota.
Structural Engineer: Meyer, Borgman and Johnson, Inc., Minneap Minnesota.
General Contractor: Lovering Associates, Inc., St. Paul, Minnesota.

ward Winners.





ver Fish Ladder, Grand Rapids, Michigan.

ments: "A unique project...designed as an art form to enrich
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ty of Grand Rapids, Michigan.
and Structural Engineer: W.B.D.C., Inc., Grand Rapids, Michigan.
Joe Kinnebrew, Grand Rapids, Michigan.
ontractor: Triangle Associates, Inc., Grand Rapids, Michigan.

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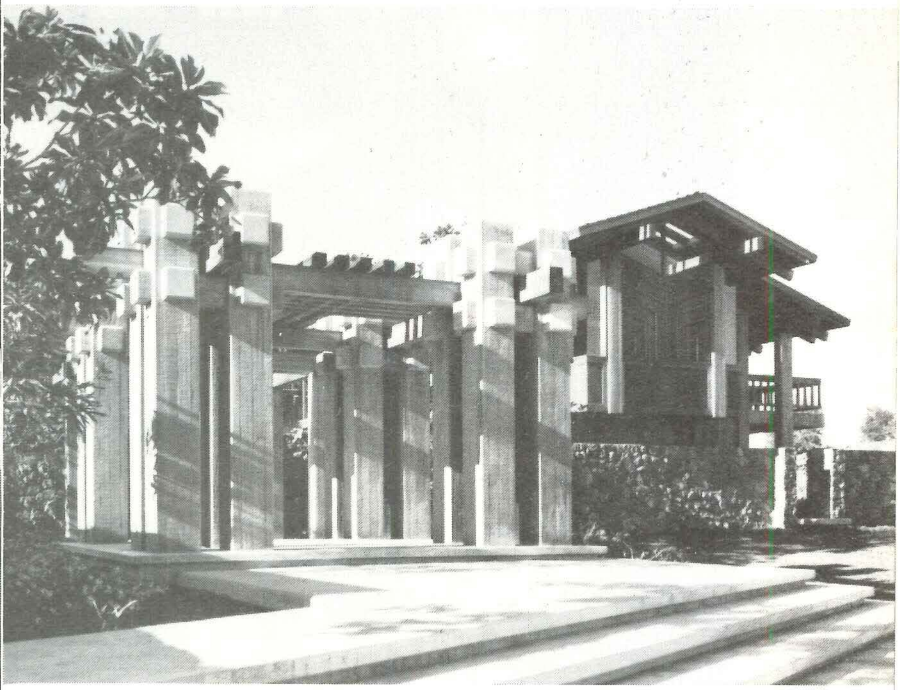
National Permanent Building, Washington, D.C.

Jury Comments: "A tour de force of intricate detailing of structural and mechanical systems creates a facade of great interest...A spectacular success as a speculative office building."

Owner and General Contractor: The Lenkin Corporation, Bethesda, Maryland.
Architect: Hartman-Cox Architects, Washington, D.C.
Structural Engineer: KCE Structural Engineers, Washington, D.C.



A Country Estate, Rancho Santa Fe, California.

Jury Comments: "The clear expression of the primary concrete structure is further reinforced by its juxtaposition to elegant wood...The proportioning of individual concrete structural elements and the decorative concrete details are handled in an exceptionally sensitive manner."

Owner: Roland Sahm, Rancho Santa Fe, California.
Architect: Fred M. Briggs AIA, Laguna Beach, California.
Structural Engineer: Richard L. Foley, Newport Beach, California.
General Contractor: Harry Wanket Construction, Inc., Carlsbad, California.

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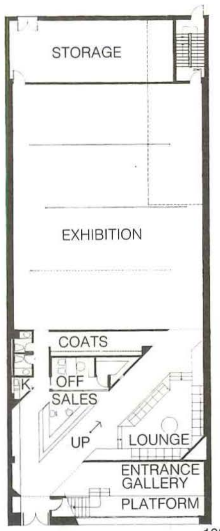
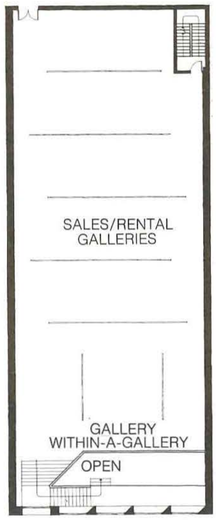
In perspective

A former bowling alley in Pittsburgh becomes PPA Gallery 407; the transformation, by architects Damianos & Pedone. Shown (below) are the exterior, the sales and lounge area, and the first floor exhibition space.



FIRST FLOOR PLAN



SECOND FLOOR PLAN

Photos: Harold Corsini

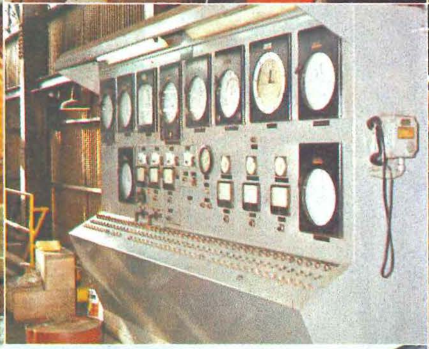
Strike! It's a gallery

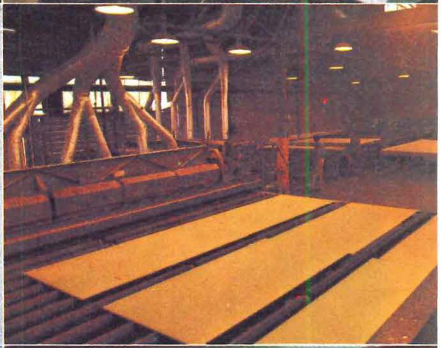
This spring was a memorable time in the 23-year history of the Pittsburgh Plan for Art (PPA), an organization promoting and exhibiting the work of its members, 70 artists. In March, PPA's own 12,000-sq-ft gallery opened at 407 S. Craig St in what once was a bowling alley and before that a parking garage. Damianos & Pedone of Pittsburgh was the architect for PPA Gallery 407, an instant design success in the opinion of local critics. Sylvester Damianos, the architect, is president of PPA and a sculptor.

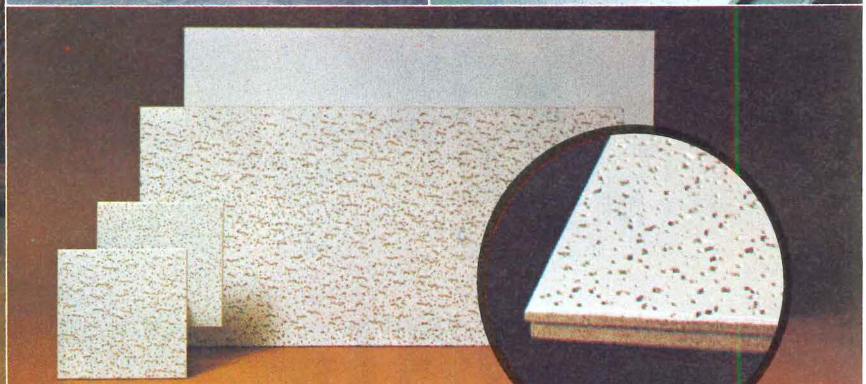
Much of the old bowling alley was recycled. The maple and yellow pine wood alleys on the first floor were retained and the ball return gutters filled with wood from the second-floor alleys. The glass block of five upper windows on the front façade was reused to create a large rear window. The major finishing material was natural cement stucco which made a good uniform cover for a multitude of materials—brick, concrete block, and steel, said Damianos. He moved the entry off center and created a double-height foyer by removing the front second-floor bay.

A slightly inclined ramp leads past carpeted sales and office areas and a sunken screening lounge to a major gallery. A stair gives access to the second floor where there is a gallery-within-a-gallery and also a sales/rental exhibition area. PPA is self-sustaining with income from rentals and sales commissions. The $500,000 budgeted for the renovation, however, included gifts from outside sources; the sum covered property acquisition, rehabilitation, and furnishings.

[News report continued on page 51]







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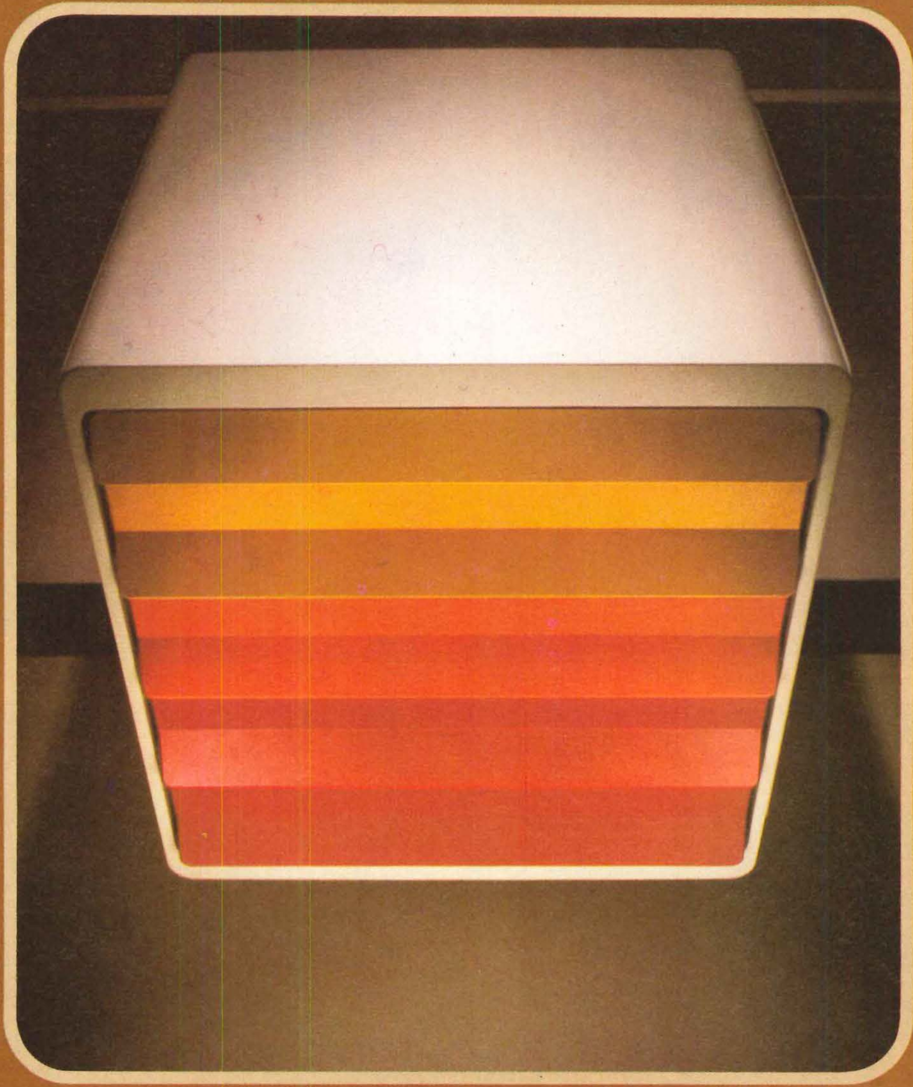

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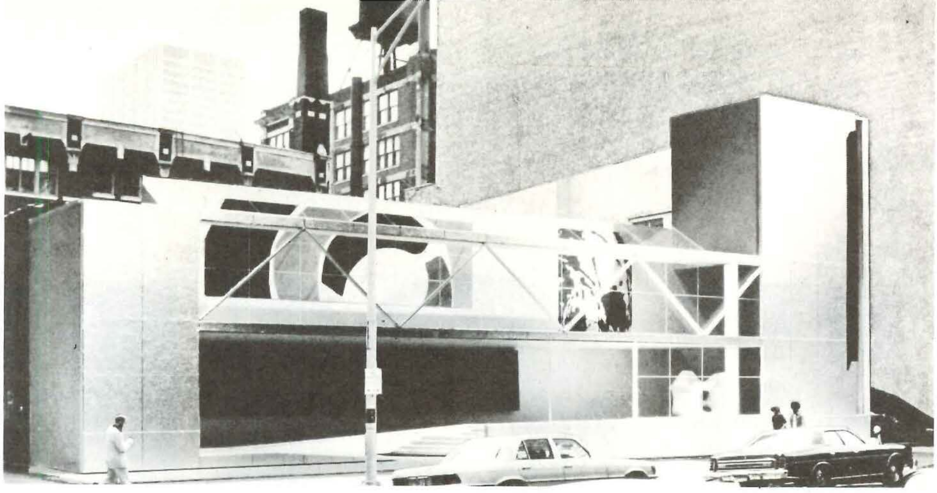

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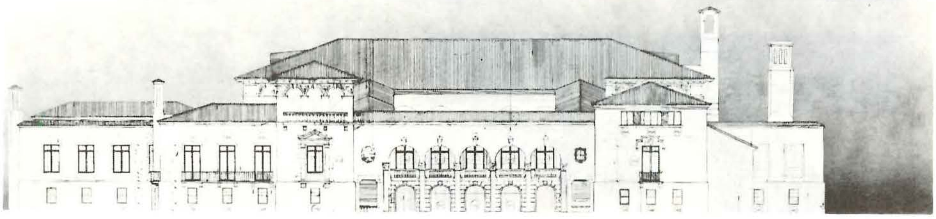

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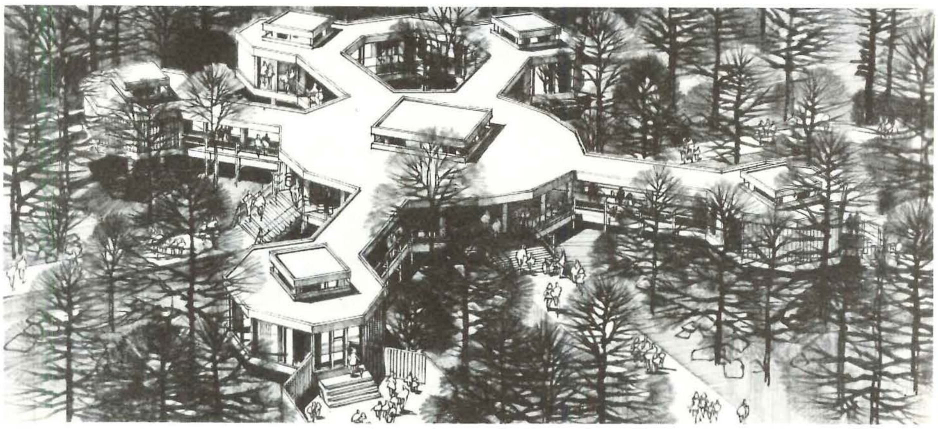

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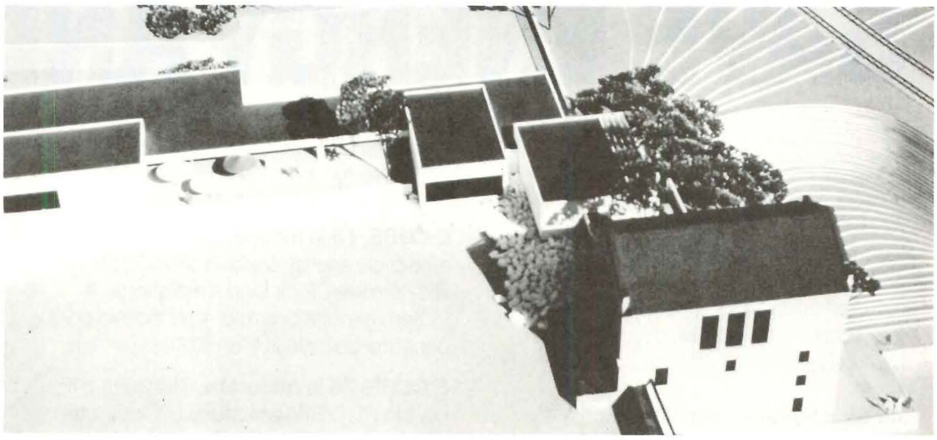


5

1 Red Barn—The Pacific Northwest Aviation Historical Foundation is seeking the necessary funds—$4 million—to create the Red Barn Air Park in Seattle. The project architects are Ibsen Nelsen & Associates of Seattle. Central to the project is the relocation and restoration of the Red Barn, a National Register building where W.E. Boeing pioneered his airplane company. A 70,000-sq-ft addition would complete the museum facility and house major exhibition spaces, a restaurant, and a 250-seat auditorium. The 11-acre site is part of King County Airport.

2 Chicago expansion—The 11-year-old Museum of Contemporary Art in Chicago, occupying space in a former bakery, is expanding its facilities with the acquisition of a neighboring three-story brownstone house and the construction of a unifying façade. The façade will contain a second story glass bridge doubling as gallery space visible from the street, barrier-free access, and a sidewalk showcase for sculpture. The work is by Booth, Nagle & Hartray Ltd. of Chicago. Interior renovation will increase gallery space to 16,350 sq ft and provide additional staff areas, a video center, and projects space. Completion of the work will be early fall, in time for the season's opening exhibit in October: "The Reborn Building: New Uses, Old Places."

3 Miami museum/art center—Restoration work financed by $3 million in federal grants from the Economic Development Administration is underway converting a country clubhouse into the Miami Metropolitan Museum and Art Center (P/A, Nov. 1976, p. 24). Completion will be April, 1979. The Mediterranean style building is on the grounds of the former Biltmore Hotel, Coral Gables, completed in 1926 by Schultz & Weaver. Architectural work on the renovation is by Ferendino/Grafton/Spillis/Candela of Coral Gables which recently acquired original construction documents to aid the restoration work. The museum portion, including teaching facilities, will occupy 80 percent of the building. The remaining space will house a restaurant and a pro shop for the adjoining golf course, all city-owned.

4 Fallingwater pavilion—A structure for visitors waiting to see the 'Fallingwater' residence by Frank Lloyd Wright is under construction and will be ready for use by summer. The open-air pavilion was designed by Paul Mayén of New York; on site supervisory architects are Curry, Martin & Highberger of Pittsburgh. Fallingwater, in Bear Run, Pa, was built in 1936 for the E.J. Kaufmann family; it was opened to the public in 1964, and attendance is now some 70,000 visitors annually. The orientation center will not be visible from the house at any season and its materials—treated wood, glass, and concrete—will blend with the natural setting.

5 Barton Dam museum—Restoration work is about to begin on an early 20th Century structure once housing turbines for a power dam along the Huron River near Ann Arbor, Mi. The refurbishing will be the first step in converting the building into a museum for the Washtenaw County Historical Society. Later, an addition of 10,000 sq ft will provide three galleries, a restaurant, offices, and a sales shop, all with exquisite views of Barton Pond behind the dam. The work is by David W. Osler Architect of Ann Arbor; a model for the progression and orientation of spaces was the Louisiana museum by Jørgen Bo and Vilhelm Wohlert in Denmark.

The Winners:
1978 Plywood Design Awards

Bruce Ross
Howard Backen
Bob Arrigoni

Tom Collum
Jim Williams
Richard Taylor

Residential/ Single Family

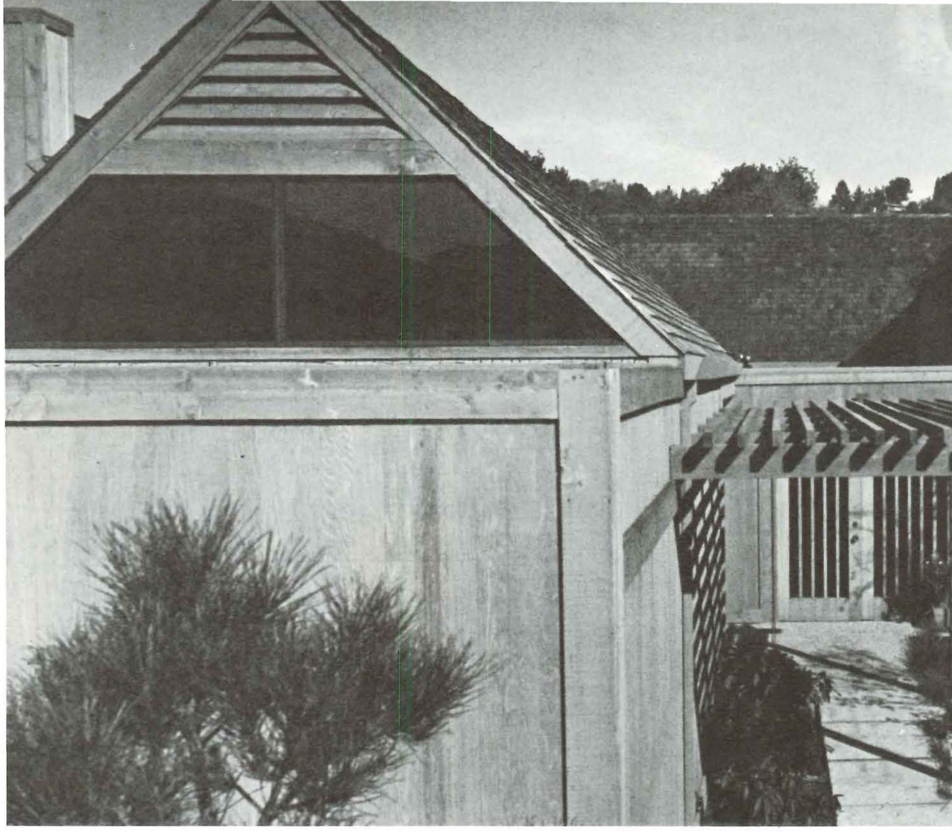
FIRST AWARD: Backen, Arrigoni & Ross, Inc., Architects, AIA. LOCATION: Orinda, California. JURY: "We like the simplicity and the unpretentious, straightforward buildability of this project. It's not manneristic. The sense of privacy from the street and the openness from the main living spaces to the decks would make it a very pleasant place to live. It's a re-emphasis of the atrium." 1

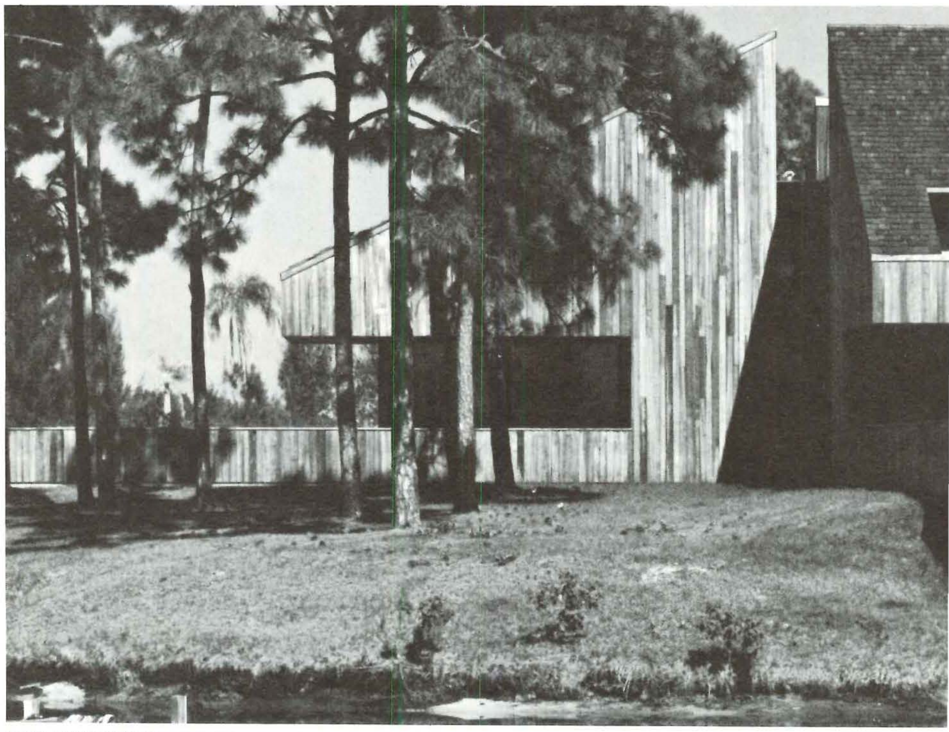
CITATION: Steven H. Packwood, Architect. LOCATION: Stuart, Florida. JURY: "A very elegant spatial enclosure." 2

CITATION: Paul Marti, Architect. LOCATION: Chesterfield, Missouri. JURY: "A balance of curved shapes and linear form, well detailed." 3

CITATION: William U. Donald, Wittenburg, Delony and Davidson, Inc. LOCATION: Little Rock, Arkansas. JURY: "A handsome structure, one that uses its small spaces creatively." 4

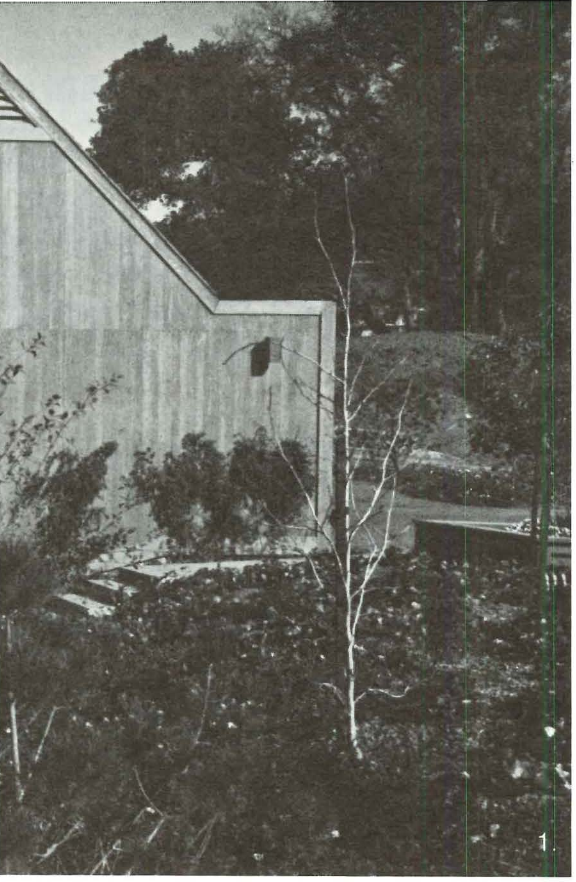
CITATION: Roland/Miller/Associates. LOCATION: Napa, California. JURY: "A light and airy wood form among the redwoods." 5





RESIDENTIAL/MULTIFAMILY: No award or citations presented.

JURY: John D. Bloodgood, Chairman, Des Moines, Iowa; Victor Christ-Janer, New Canaan, Connecticut; Sherwood Stockwell, San Francisco, California.



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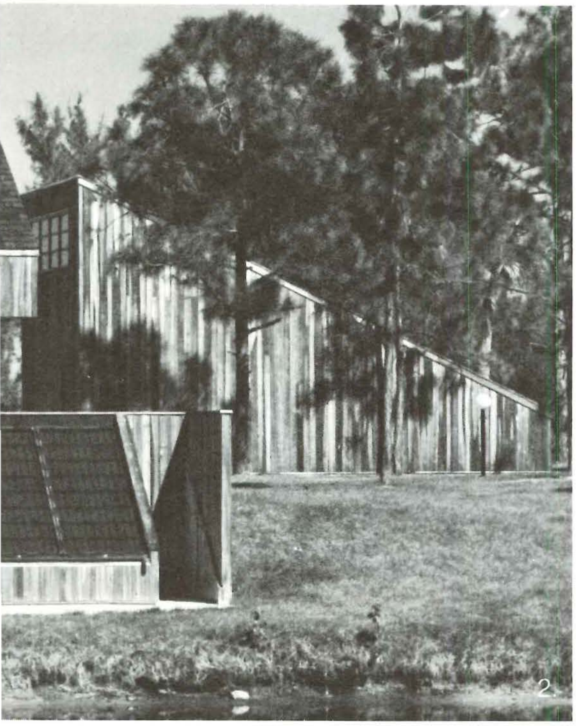

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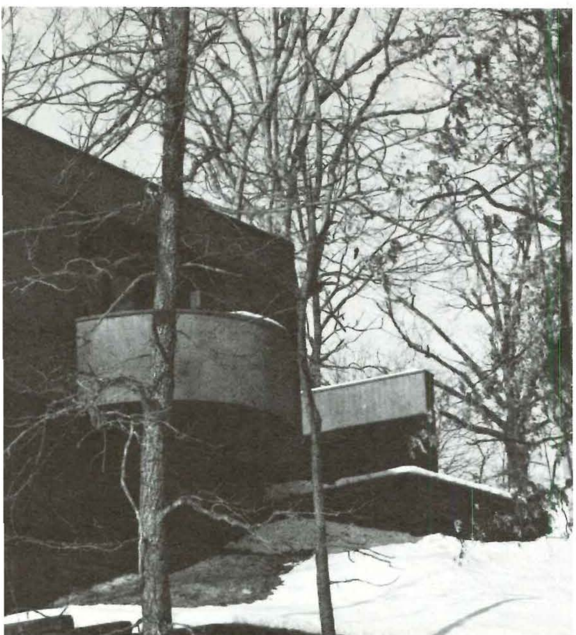
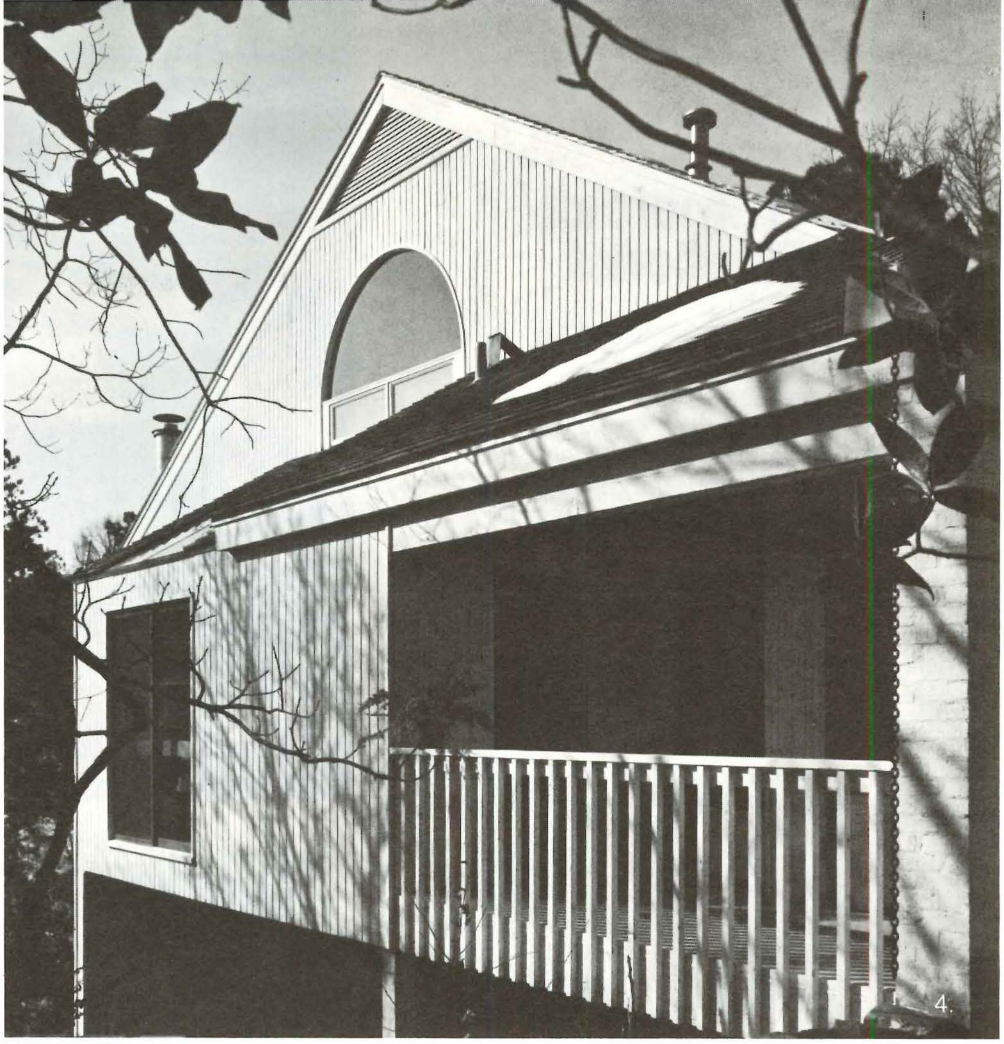




4.

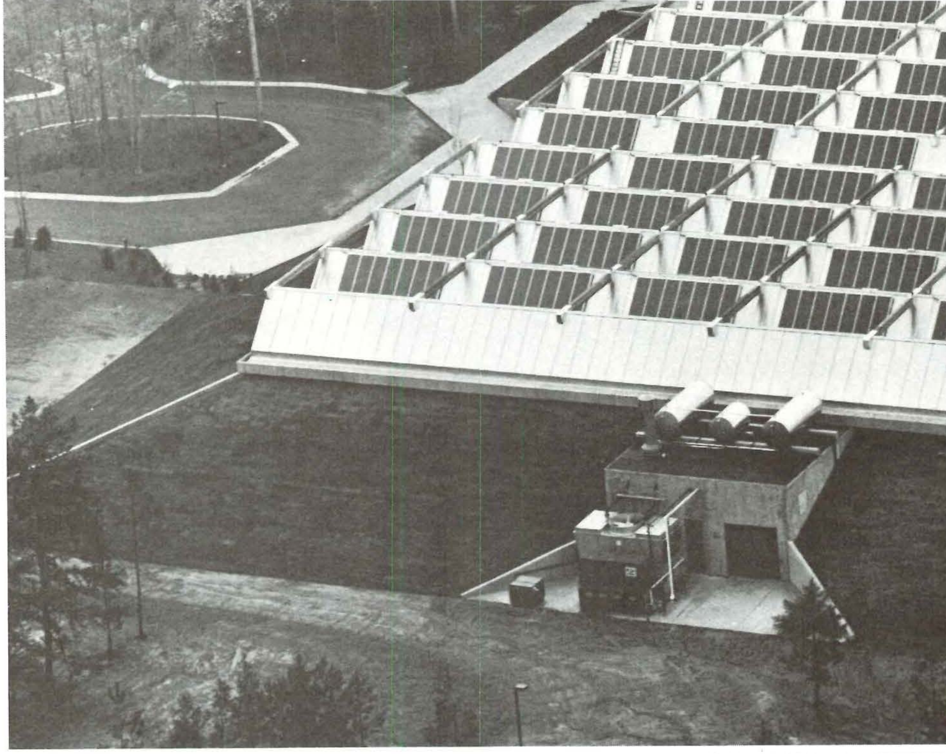
Commercial/ Institutional

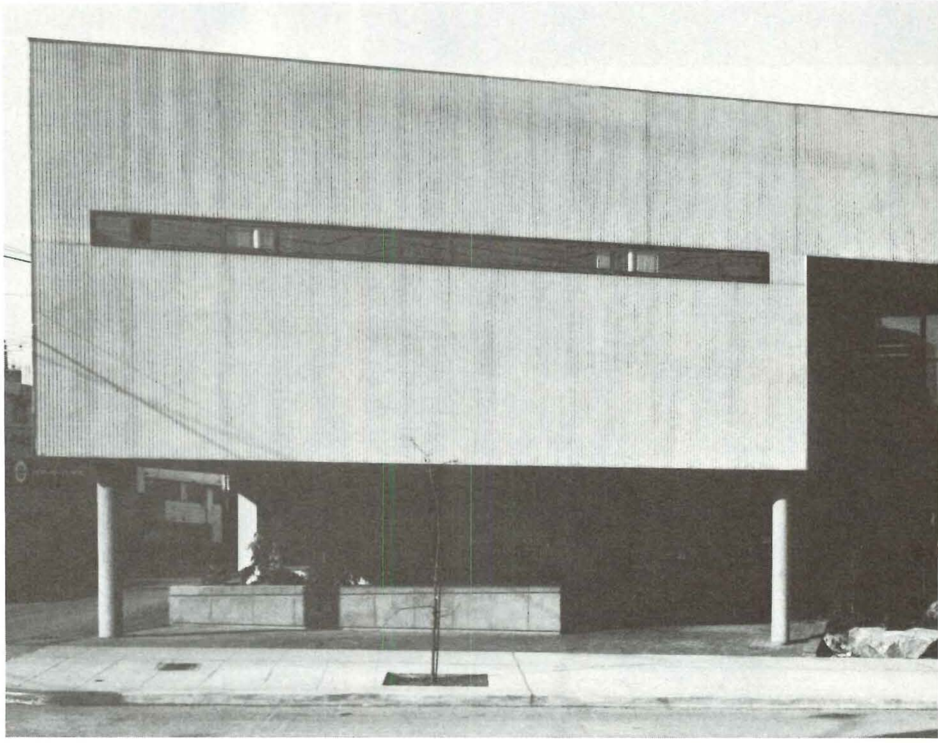
FIRST AWARD: Taylor & Collum, Inc. PROJECT: Shenandoah Solar Recreation Center, Shenandoah, Georgia. JURY: "An excellent integration of structural and energy considerations through the use of plywood. This is united with the landscape more successfully than most." 1

CITATION: Aaron Freed, FAIA, Durham Anderson Freed/HDR. PROJECT: Otto M. Miller Science Learning Center, Seattle Pacific University, Seattle, Washington. JURY: "A building that merits commendation, especially with its warehouse beginnings." 2

CITATION: Walz and MacLeod, Architects, AIA. PROJECT: Office Building, Mill Valley, California. JURY: "A simple barn in the trees—a pleasant environment for professionals. It doesn't intrude its own presence on the site." 3

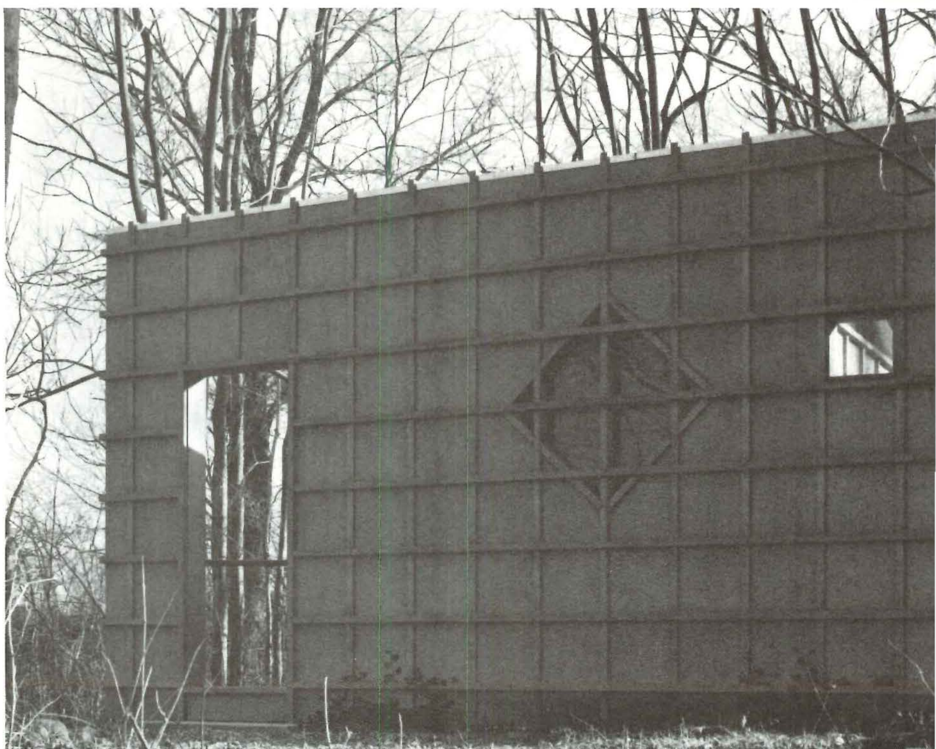
CITATION: Alan Hansen, Swaney Kerns Architects, Ltd. PROJECT: Chairs and Company, Inc., Washington, D.C. JURY: "The plywood allowed the concept to be effectively realized. The marketing point of the store is enhanced by the simplicity of the background." 4

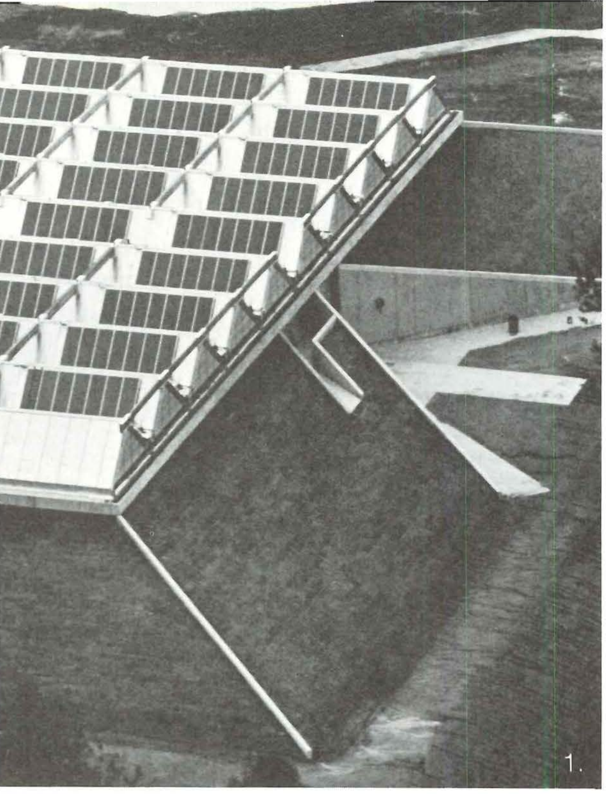




Vacation Homes

CITATION: Timothy Wood, Architect. LOCATION: Stillwater, New Jersey. JURY: "The most imaginative structure submitted. The facade makes it become an important place."





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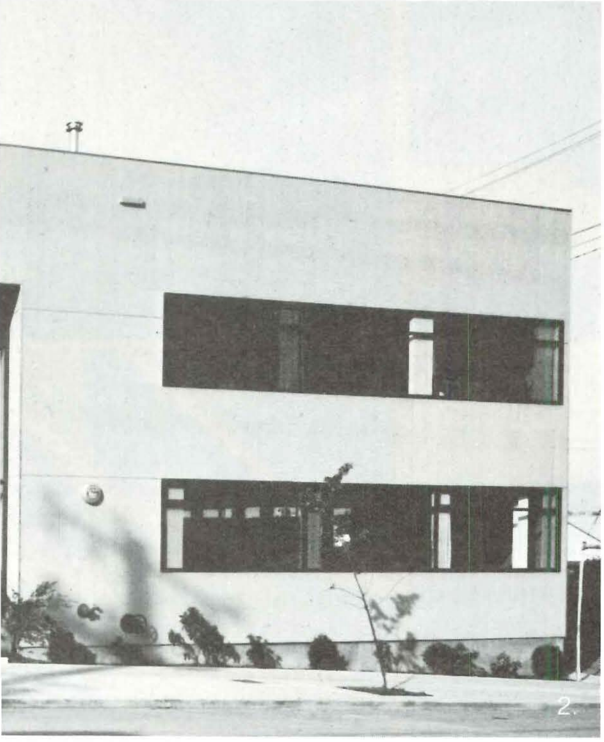

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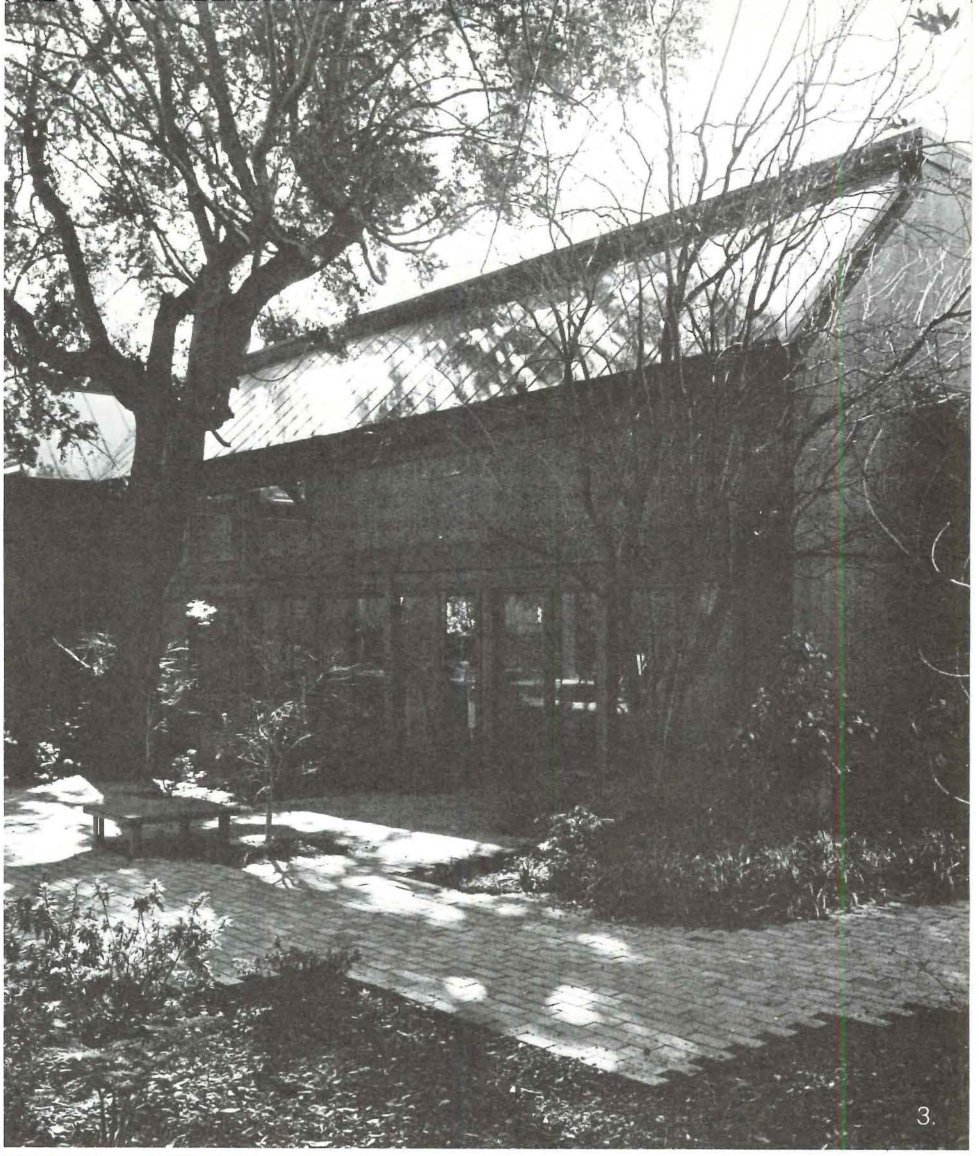

3.

More Ideas

1. Architects/Planners of the William A. Bibo Corp., Leiter duplex, Peoria, IL.

2. Wittenburg, Delony and Davidson, Inc., Donald residence, Little Rock, AR.

3. Allan M. Walter and Associates, Inc., Andres Castillero Junior High School, San Jose, CA.

4. Paul Marti, Architect, Andrews residence, Chesterfield, MO.

5. Burke Nicolais Archuleta, Montgomery Ward Retail Store & Offices, Beaverton, OR.

6. Riggi Architects, Finch Hill County Park, Fell Township, Lackawanna County, PA.

7. Donald Sandy, Jr., FAIA, James A Babcock, Architects and Planners, Kitowski house, Fair Oaks, CA.

8. Armen Dervishian and Associates, Penny Candy Store, Fresno, CA.

For even more design ideas using plywood and plywood systems, please write the American Plywood Association, P.O. Box 2277, Tacoma, WA 98401.

AMERICAN PLYWOOD ASSOCIATION

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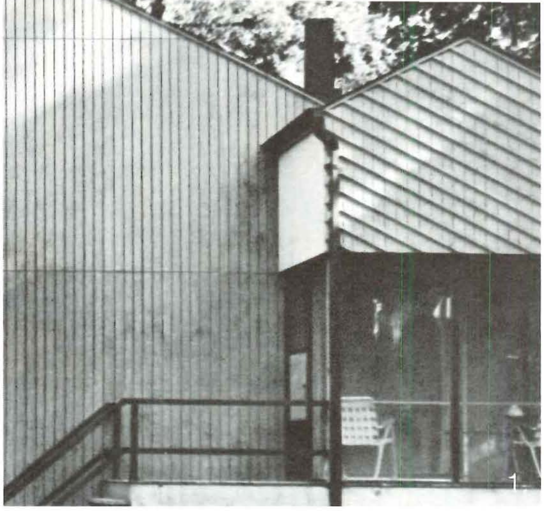

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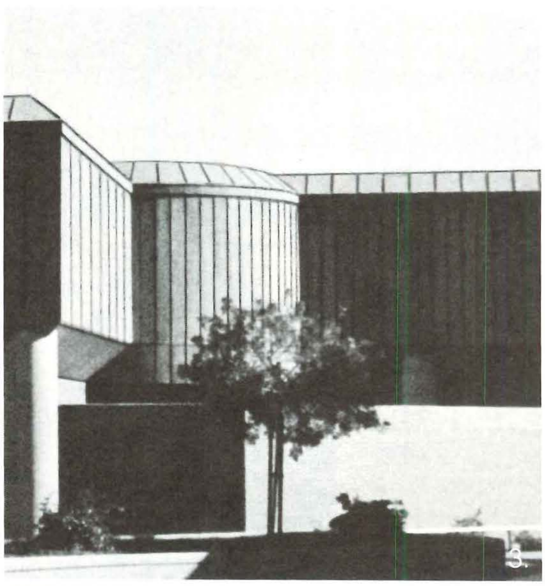

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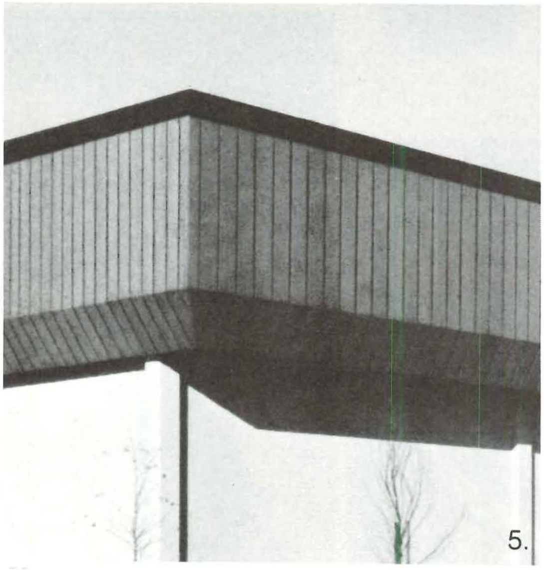

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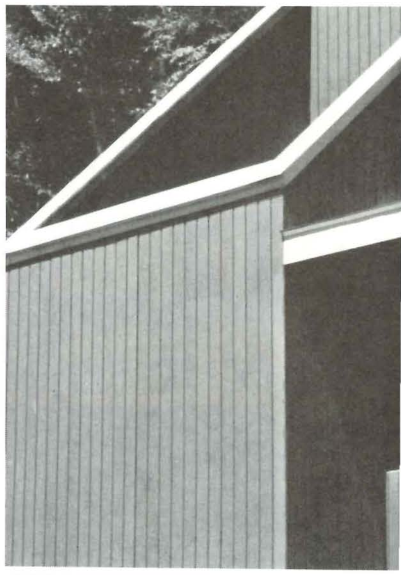

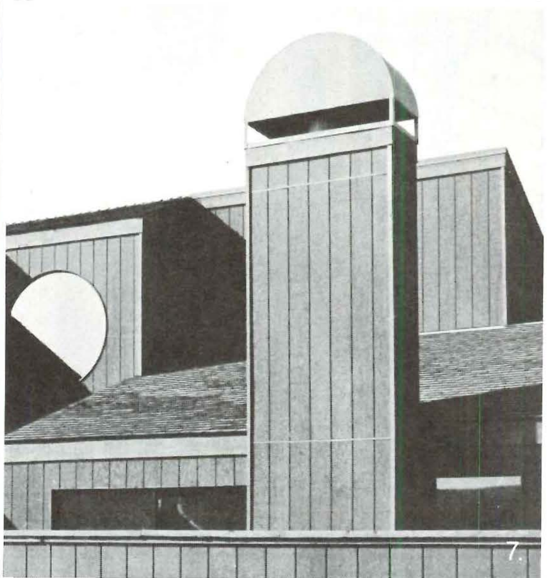

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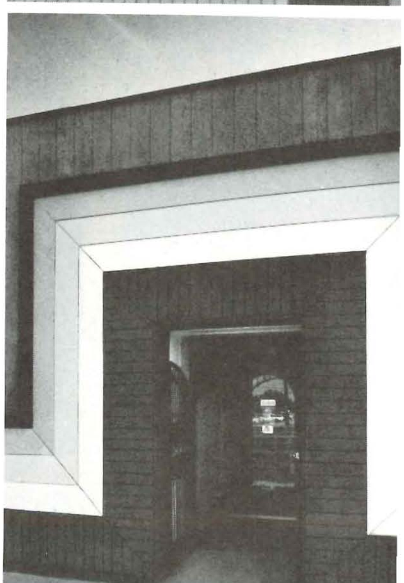
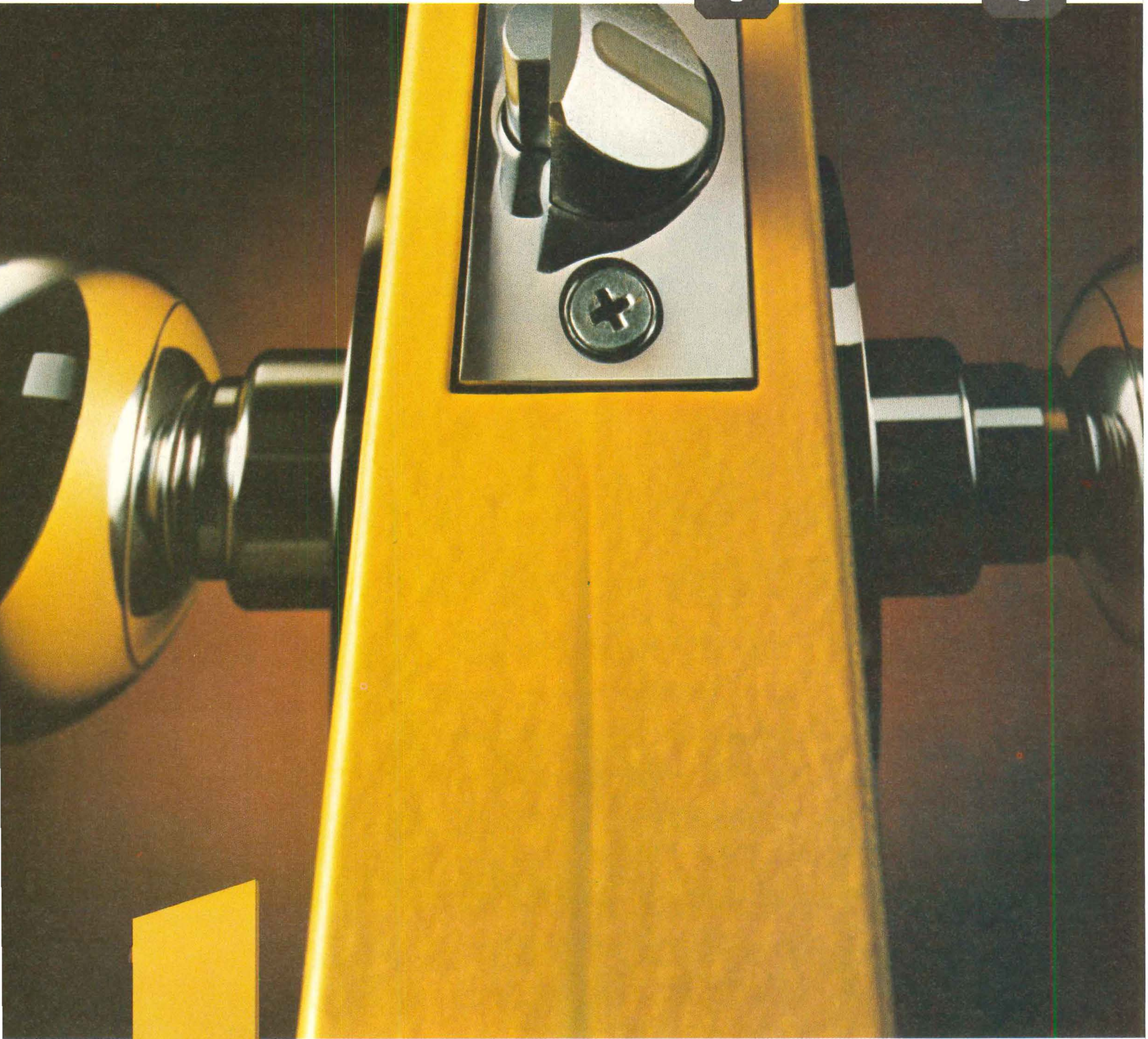


he Winning Edge



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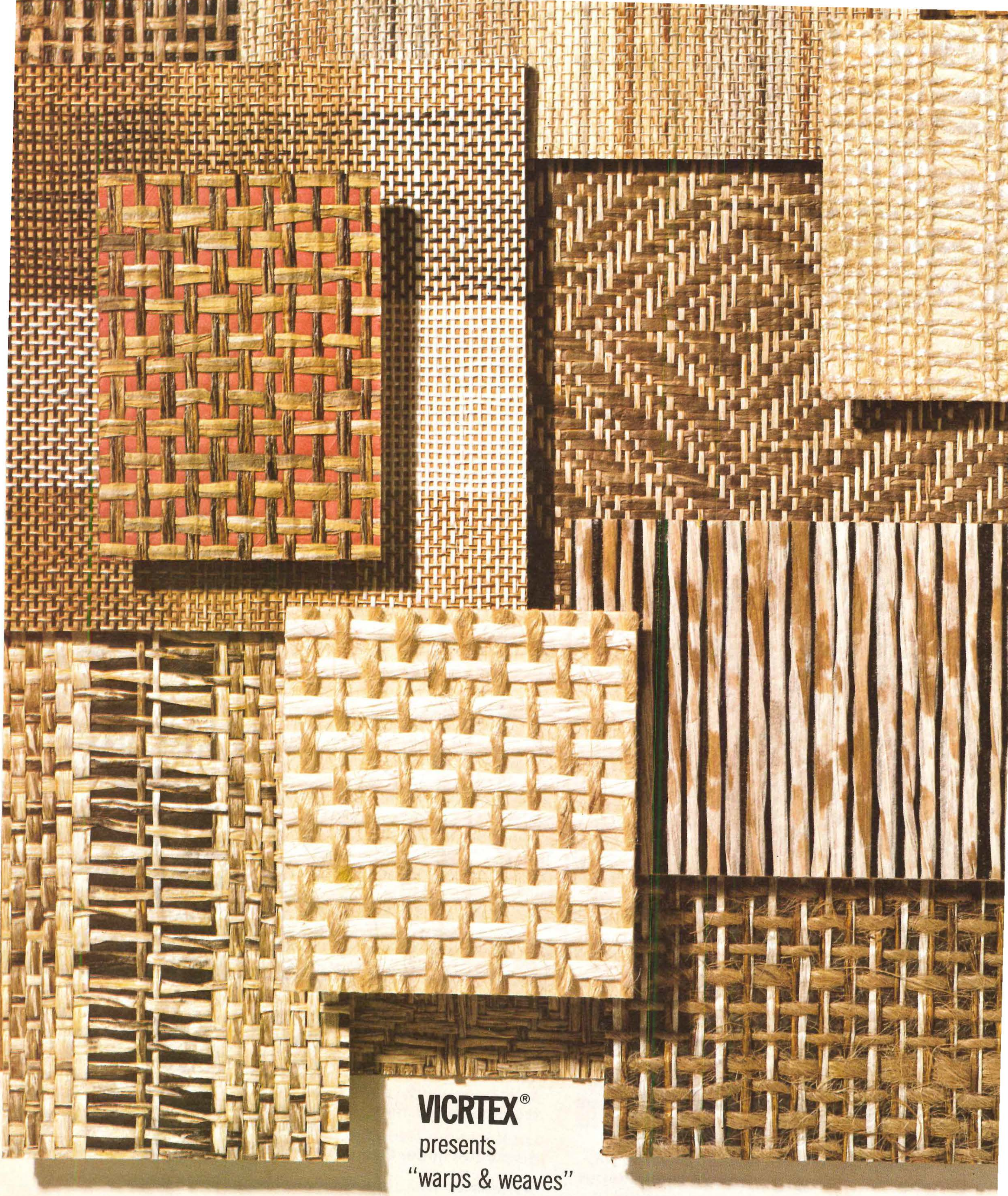

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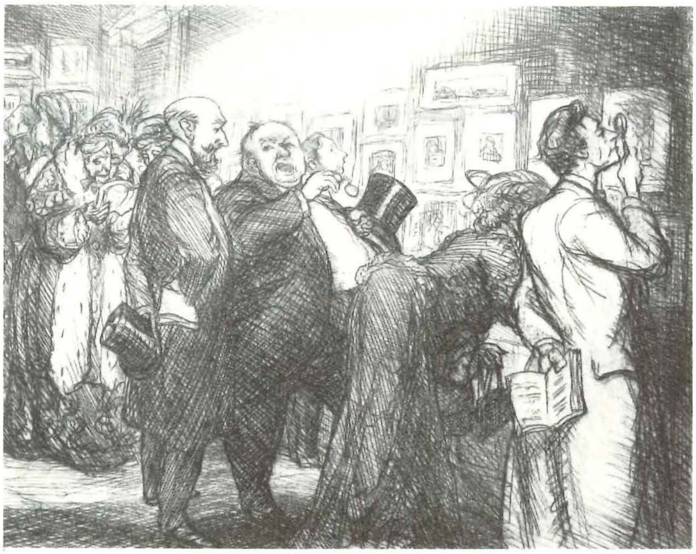
Museums with walls



Courtesy, Whitney Museum.

"Connoisseurs of Prints" etching by John Sloan, date obscure.

They still get built, but the walls are shorter, and sometimes older—or even buried below ground. And the architectural experience is not less intense or any less meaningful, as these responses show.

In March 1975, when P/A assembled a group of recently completed museums, the values and attitudes reflected in the architecture were quite different from this grouping. Large monolithic museum buildings or artful isolated objects—both meant to convey an instant image of culture—generally characterized the lot. The situation now before us, represented partially by these examples, indicates a rather marked divergence. The tendency currently is to keep a low profile (literally, in one case), to build within the existing physical context, or to recycle—a tendency reflecting values that are part of the broader architectural belief system. Underground museums, museums in renovated loft spaces or gymnasiums, and even museums within museums, as one exhibition installation demonstrates, give testimony to a different attitude. These museums do not aspire to project grand statements about cultural status; they exhibit less concern about monumental imagery than their 1975 predecessors. They may be less expansive than earlier models, but they are less overblown.

Two examples, however, very much continue the tradition of the museum as a paradigm: one that seeks to refine museological solutions for circulation, lighting, and installation techniques, as well as make a significant cultural statement. The Yale Center for British Art in New Haven, (p. 76), which opened in May of 1977, and the Museum of Contemporary Art in Tehran, which opened in August 1977 (p. 68), are examined within that context.

The museums in reused buildings shown in this group, such as the Southern Alleghenies Museum of Art in Loretto, Pa (p. 90), the Ballantine House of the Newark Museum (p. 86), or the Museum of Natural History and Science in Louisville (p. 82), do not necessarily explore any uncharted territory in museological problem-solving. They represent very specific localized types of the museum design, geared to often already-determined types of displays. The reason they succeed as well as they do is that the architects have brought to the situation not only a strong sense of realism vis à vis the problems at hand, but an imaginative understanding of the nature of the art experience and how a particular place can extend that experience.

One example, the Brooklyn Children's Museum (p. 62), pushes beyond the boundaries of the conventional museum experience. A buried shed-like space, the museum has been designed as both a learning tool and "fun" house. How successfully the intended purpose is realized in involving the children in the exhibit has to be evaluated after a period of use, when the novelty of this kind of solution diminishes. Nevertheless, the experiment is important. The architects were using a particular kind of architectural vocabulary to devise unique interactions between the exhibited work and the perceiver, seeking to revolutionize rather than refine traditional modes of museum communication.

A similar perceptual intent would be said to govern the installation of a painting and sculpture exhibit (p. 72) in the New York State Museum on the Albany Mall. The concept is clearly architectural: the disposition of spaces based on the urban streetscape creates new, arresting ways of apprehending the exhibited works, whether as fragments, as whole units, or as contextual groupings juxtaposed for spatial and visual effect.

Loft space or period room, light monitors or spots on tracks, circulation achieved by crawling through culverts, crisscrossing space or moving in linear sequence, diverse elements of museum architecture can be found in this group. No one solution is intended to be seized upon as the "right" prototype. Thus each one is discussed as it is individually and subjectively perceived by the particular writer/observer. What a museum communicates to the public in terms of its overall image, what it conveys in terms of a play of space, light, volume, and plane while moving through the building are all-important. But most important is the primary communication between perceiver and perceived. That communication is enhanced not only through functional, technical, and formal considerations, but through the vitality with which the architecture is able to capture the essence of the program as well as the spirit of its time. [Suzanne Stephens]

Brooklyn Children's Museum, Brooklyn, NY

Esprit grows in Brooklyn

Legend

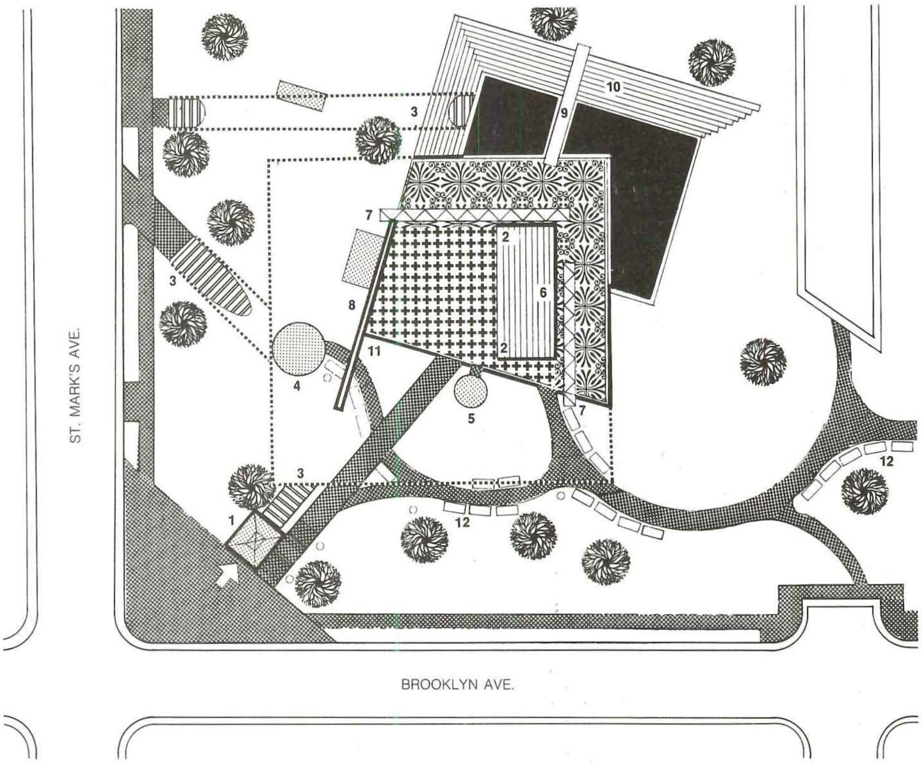
1 Entry Kiosk
2 Amphitheater
3 Service Tubes
4 Silo Exit
5 Storage Dome
6 Clerestory
7 Sign-Light Grid
8 Skylight
9 Bridge
10 Exterior Exhibit
11 Whale Wall
12 Seating

The world's oldest children's museum has a new home that is as innovative as the programs housed within its walls.

In childhood, if you ever discovered a lost or forgotten place—a wonderful old abandoned house or an attic that had not been entered for years—and if you then experienced the thrill of exploring that place, of looking behind every corner and into every nook, you would have some idea of what the new Brooklyn Children's Museum is like. It shares a quality with those special childhood places that compels you into it to look around and to investigate until your curiosity is exhausted. The difference with this museum, though, is that the desire for that quality was implied in its program from the beginning, and the extraordinary degree to which Hardy Holzman Pfeiffer Associates was able to bring that character to the actual building reveals the architects' understanding of and sensitivity to the museum's needs.

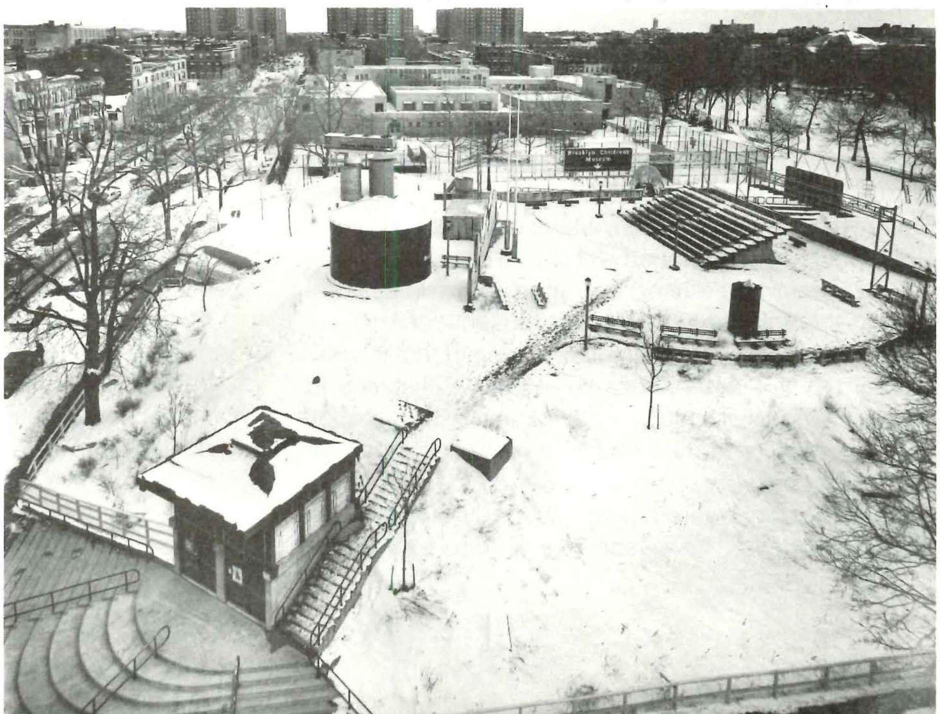
It is easy now to look over HHPA's past work and see it as a logical choice for the design of such a building. That probably would not have been so obvious, however, when it was commissioned ten years ago; at that time, the architects' only major completed project was Cincinnati's Playhouse in the Park.

Like most of HHPA's work, there is little that is conventional—but much that is ordinary—about the Brooklyn Children's Museum. In order to preserve Brower Park, which has been the site of the museum since its founding in 1899, the 30,000-sq-ft reinforced concrete building has been buried 40 ft into the ground, with only one corner exposed to a sunken courtyard. In the park, above the museum, an assemblage of freestanding urban and rural structures used in agriculture, industry, and transportation have been taken from their usual surroundings and incorporated as integral parts of the building. At one corner, a 1907 New York City subway kiosk serves as an entry pavilion for the building, while nearby, a grain silo is used for a rooftop fire exit. A highway pedestrian



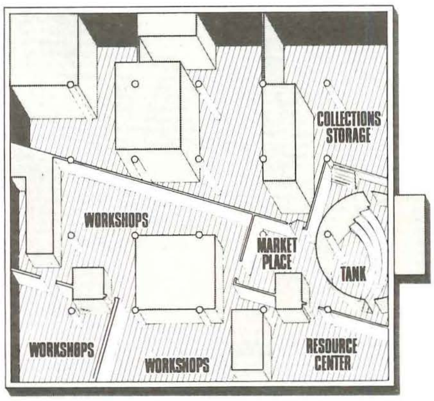
SITE PLAN ←N

Underground museum uses materials and equipment from industry, agriculture, and transportation.

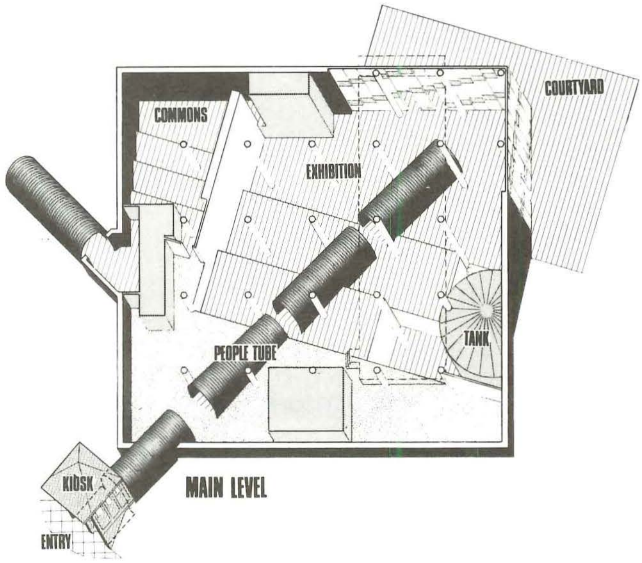



STEAM RAILWAYS

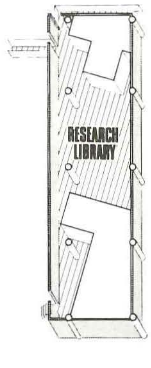
Brooklyn Children's Museum



LOWER LEVEL ←N 0' 5' 10'



MAIN LEVEL



MEZZANINE

Inside, corrugated steel culvert with neon helix (below and facing page bottom) surrounds circulation ramp that has a flowing stream.

bridge spans the sunken courtyard joining the rooftop play area to the rest of the park, and highway signs are used to announce the museum's presence. For seating, traditional park benches, a grandstand, and steel I-beams are used.

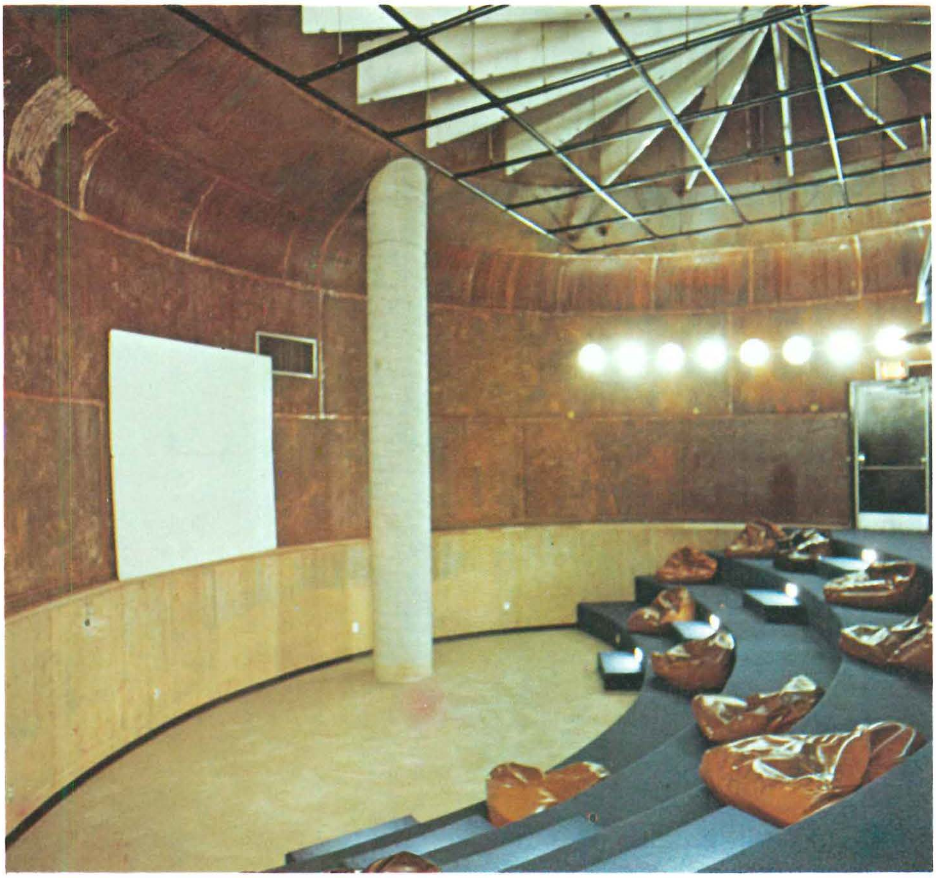
Inside, where three main levels are framed with laminated wood beams and timber decking, four separated sections of corrugated steel culverts diagonally bisect the main exhibition floor to enclose a circulation ramp that extends 180 ft from the entry kiosk through the open-plan terraced exhibition area. Near one corner, a small theater is hidden inside an oil storage tank that rises through the building.

While all of this may sound like nothing more than fun and games, these elements, both inside and outside, have a serious side to them, as does everything in the building. The museum has been conceived as one large, open-plan participatory learning environment that takes advantage of the child's natural curiosity to pull him into a kinesthetic involvement with it. In recognizing the educational value of the concept of discovery, the museum has made its 20,000 artifacts, machinery, devices, and equipment readily available to the child in a "hands-on" situation where every object becomes irresistible. In this setting, where everything is approached in terms of how the child interacts with the world, even the physical and mechanical properties of the building itself have been made obvious in order to be used for teaching concepts such as structure, gravity, and electricity.

The museum's teaching collection of artifacts is particularly strong in the areas of ethnology, natural history, and technology, and objects relating to these fields are organized according to the historic physical divisions of fire, air, earth, and water. In this environment, every attempt has been made to interrelate objects and systems. A child, for instance, can take grain from the greenhouse and grind it with power taken from the windmill or with water power taken from the stream that runs down the middle of the culvert passageway. Or, water from the stream can be diverted to nourish a botanical garden at the bottom of the stream. In essence, the museum is based on a concept that departs completely from the sit-down lecture situation. It gives the child, instead, an opportunity to choose and pursue independently any number of diverse interests simultaneously, and to spend as much time as he or she wishes with any particular activity.

The museum was founded in 1899, on the same site in the Crown Heights section of Brooklyn where the new building stands today. In the 1890s, though, two Victorian mansions stood in what was then known as Bedford Park. The museum first occupied two rooms in the Adams house, but it soon took over the whole building and then spread into the adjacent Smith house. Over the years both of the houses deteriorated so badly that they were condemned for public use by the city in 1967 and demolished shortly after that. In 1968,

At corner facing sunken courtyard (above), huge plastic protein molecule is teaching device.



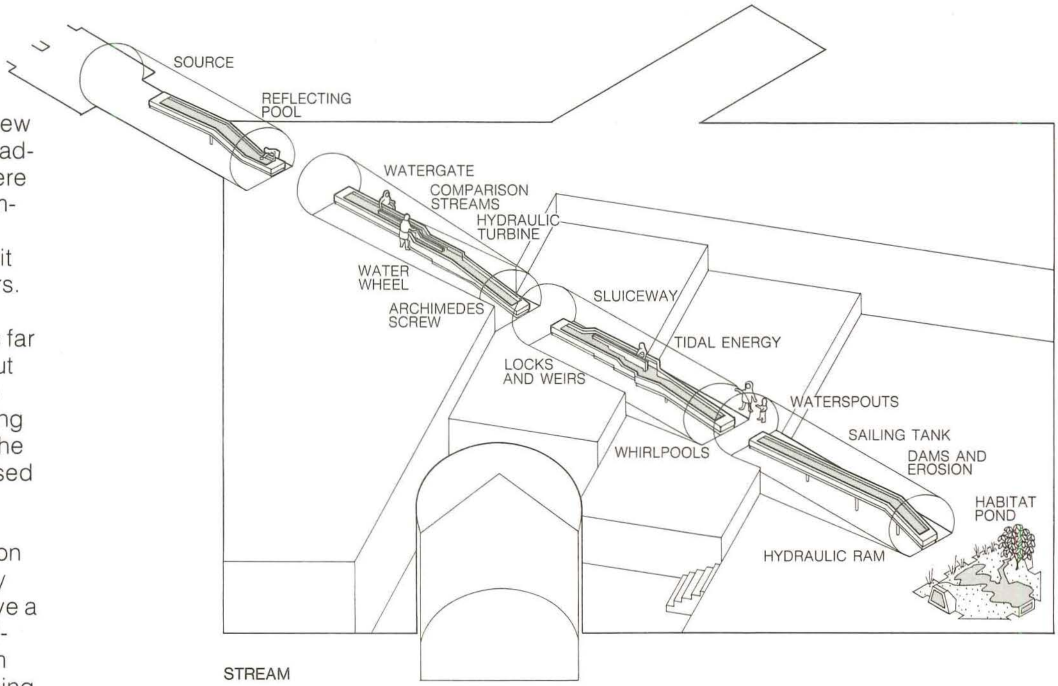
Small theater (above) is part of an oil storage tank with acoustical baffles hung from ceiling.

Brooklyn Children's Museum

A highway pedestrian bridge spans the sunken courtyard to join museum rooftop to Brower Park (right); a highway sign atop museum announces its presence in neighborhood.

HHPA was commissioned to design a new museum and to convert a pool hall and adjoining automobile showroom, which were nine blocks from Brower Park, into a temporary facility, called Muse, for the museum (P/A, Dec. 1968, p. 122) while it awaited construction of the new quarters. The wait, however, took longer than expected. By early 1975, the building was far enough along for the staff to move in, but by that time New York City's fiscal crisis had also become serious enough to bring any further work to an immediate halt. The building remained incomplete and unused until it finally opened last May.

The oldest children's museum in the world is now the newest, but appreciation of this innovative facility is not shared by all its neighbors. Its users, however, have a different attitude altogether. Museum director Lloyd Hezekiah says the museum makes use of "things one is used to seeing in society as a catalytic departure for learning." If the degree of activity in the museum has anything to do with the amount of learning acquired, one can only assume there are going to be some awfully bright kids coming out of Brooklyn. [David Morton]



STREAM

Stream flowing down circulation culvert (above) is used to illustrate the nature and uses of water. The terraced exhibition area (below) is organized into six major areas that constitute the most important part of the museum, its open-plan participatory learning environment on the four connected levels.

LEGEND

SELF
1 Self identification
2 Body tracing
3 Sum and substance
4 Random access resources

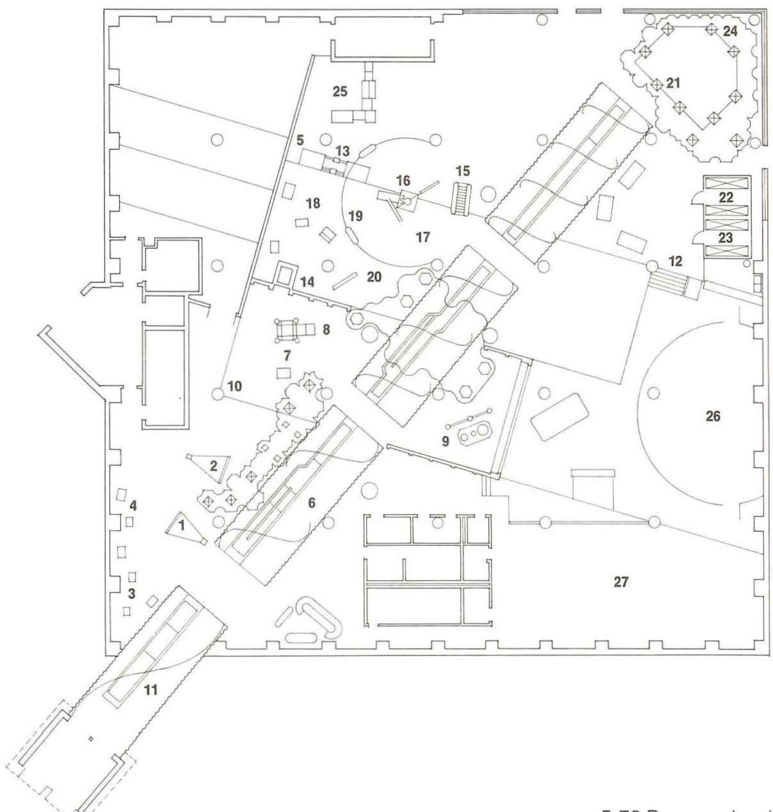
FIRE/LIGHT
5 Solar cells
6 Neon helix
7 Ripple tank
8 Portable freezer
9 Steam engine
10 Light theater

WATER
11 Stream
12 Hydraulic lift
13 Counter balance life

AIR
14 Air pressure lift
15 Air slide
16 Windmill
17 Calliope
18 Piper, Harp, Piano
19 Wind generators
20 Aquarium

EARTH
21 Habitat
22 Greenhouse
23 Soils mixture area
24 Curved space

CULTURAL LINKS
25 Collections cupboard
26 Theater
27 Orientation

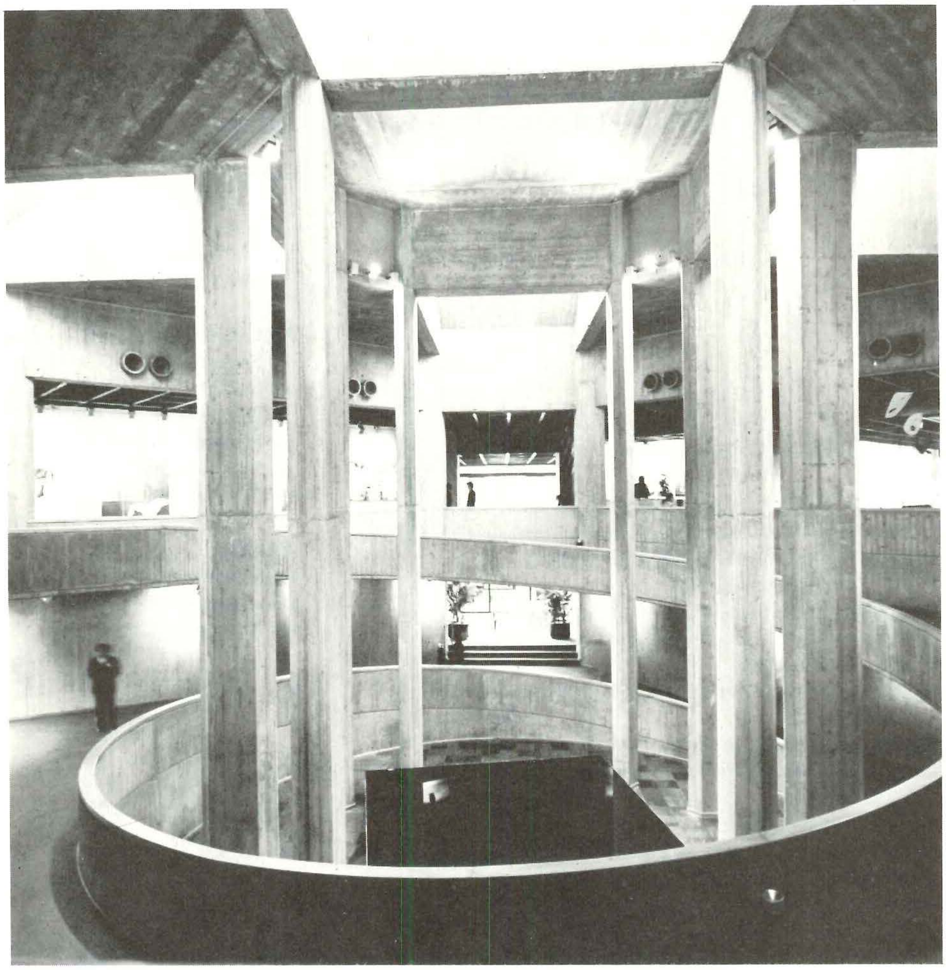


Data
Project: Brooklyn Children's Museum, Brooklyn, NY.
Architect: Hardy Holzman Pfeiffer Associates; HHPA team: Patrick Stanigar, M. Herbert Staruch, Marvin Wiehe, James W. Rhodes, Robert York, Theron Grinage.
Program: a 30,000-sq-ft open-plan facility for a children's museum which is a participatory learning environment.
Site: an urban park in the Crown Heights section of Brooklyn.
Structural system: reinforced concrete and steel, with four levels framed in heavy timber and wood decking.
Mechanical system: forced-air heating system with hot water coil heated by gas-fired boiler; supplementary system of fin-tube radiation; thermostat controlled. Remote air-cooled condensor with direct expansion cooling; condensor mounted on I-beams above rooftop play area.
Major materials: reinforced concrete, steel, heavy timber, wood decking, and various industrial, agricultural, and transportation structures.
Consultants: Hannaham & Johnston, mechanical; Goldreich Page & Thropp, structural; Robert A. Hansen Associates, acoustical; Edwin Schlossberg, exhibition conceptualization; Saville Design, exhibition installation; Edwin L. Marshall, PE, special mechanical.
General contractor: D. Fortunato, Inc.
Client: The City of New York, Department of Parks and Recreation. Lloyd Hezekiah, Director, Brooklyn Children's Museum.
Cost: $3.25 million.
Photography: Norman McGrath.

Tehran Museum of Contemporary Art, Tehran, Iran

Cultural hybrid

A comprehensive modern art museum, swiftly assembled for oil-rich Tehran, is housed in a straightforward structure designed by Iranians for Iranians.



Bijan Zohdi

At base of central well in lobby is sculpture by Hariguchi in the form of a rectangular pool of oil.

Complete from the earliest brushstrokes of Impressionism to an opening show of the latest sharp-focus realism, the Tehran Museum of Contemporary Art was born last fall as a full-blown Western institution in the Middle East. Included among its holdings is a full range of international contemporary arts, including photography and graphic arts (an especially vigorous field in Iran). Not least among its components is a department of architecture, directed by Yale-educated Nasrine Faghih, with an ambitious exhibition program (see P/A, Jan. 1978, p. 27–28). And appointed first director of the museum is its principal architect, Kamran Diba.

For a bustling city that already has the requisite high-rise offices and apartments, freeways, bosky suburbs, and *plans* for rapid transit, this museum could be seen as one more essential of world-class status. Not that Tehran would be culturally impoverished without Western institutions. Though a relatively new city—looking very much like a Houston transferred to the high desert setting of Albuquerque—it already has rich collections of antiquities.

This museum, first proposed a decade ago, languished for years in the cultural ministry, which understandably saw more urgency in archaeology, handicrafts, and folklore than in collecting Braques and Rothkos. It took the personal effort of the empress—and the support of a foundation she sponsors—to make the contemporary art museum a reality.

Sprouting from the park

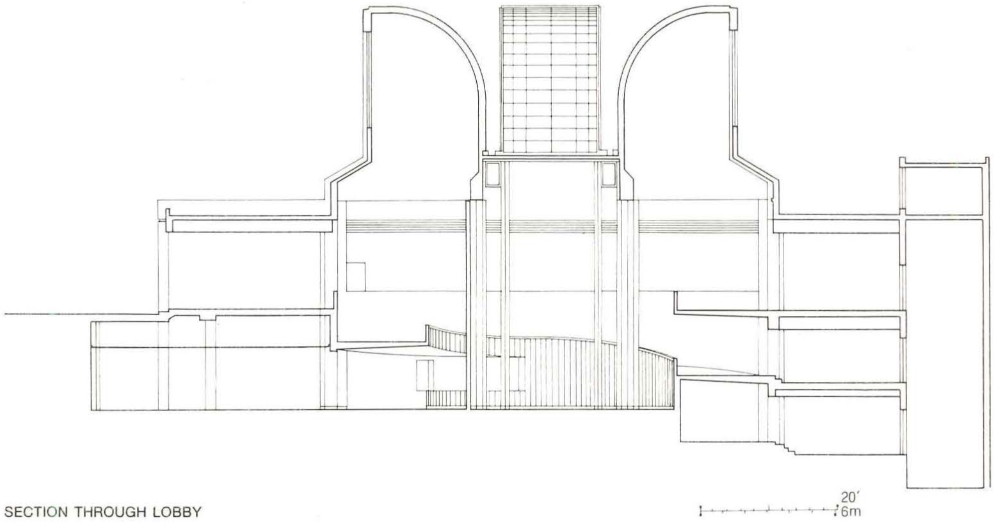
Constructed to designs drawn up ten years ago by Kamran Diba, in association with Nader Ardalan—both young Iranian graduates of U.S. architectural schools—the building looks less dated than one might expect. Set at the edge of the spacious Park Farah, along a sloping avenue, the building has an entrance at the downhill end, then burrows into the terrain. Its presence is proclaimed by its low but vigorous silhouette of light scoops; only the crown of higher monitors above the entrance lobby rises above treetop level.

From the top-lighted entrance lobby, a sequence of seven more or less modular galleries is laid out in a loop, linked by gradually ramped passages, so that the circuit rejoins the lobby one story below. There, at the foot of a helical ramp, are entrances to an auditorium, a library, offices, and workrooms. (Lectures, teacher training, and publication are major parts of the museum's comprehensive program.)

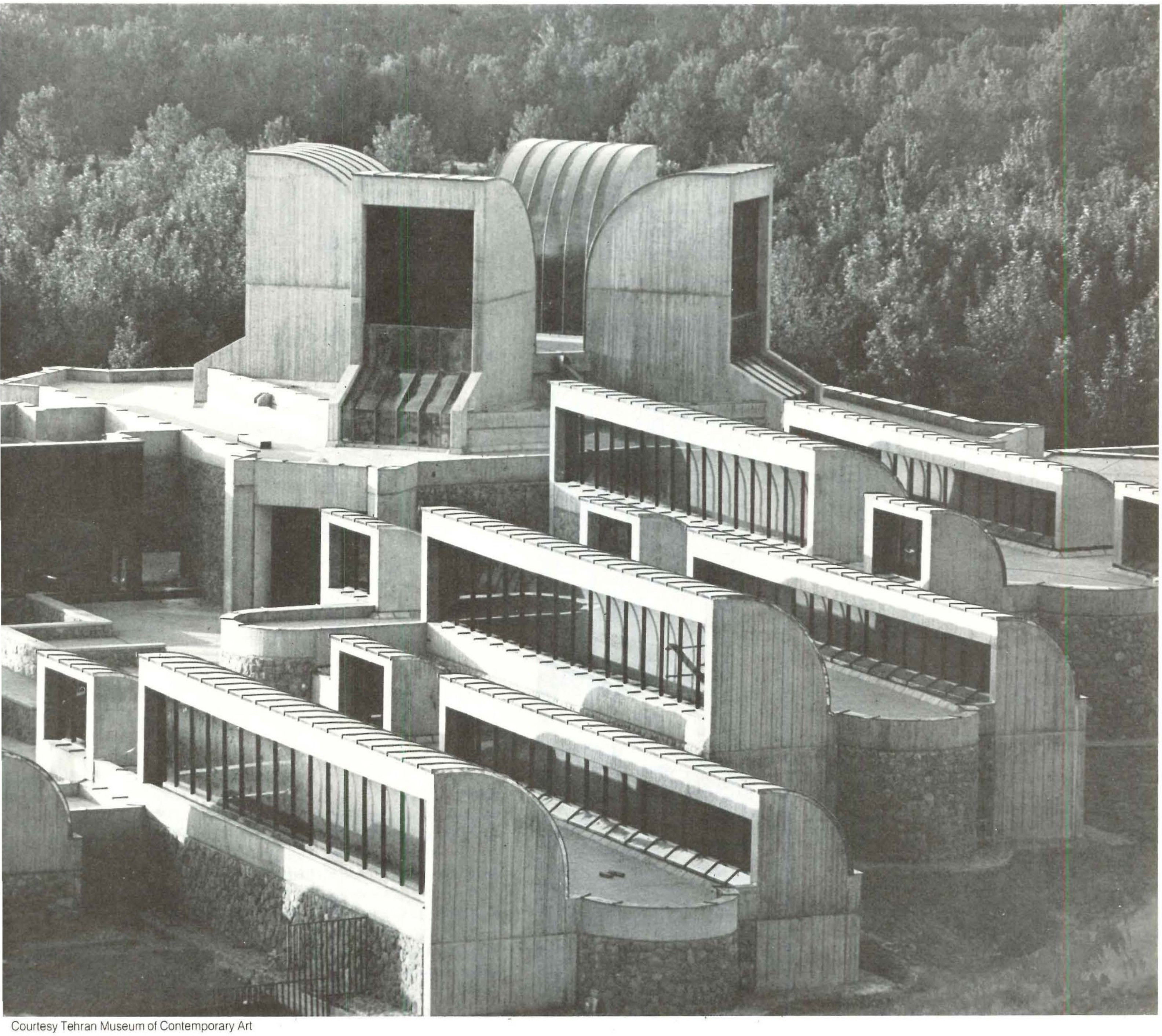
The sequence of rectangular galleries, interspersed with apsidal alcoves for smaller works or single large pieces and connected by low passages wide enough for display, is quite effective as a museum-visiting experience. In its variations on a repeating structural-spatial module, and in its distinction between rooms and circulation spaces, the scheme reveals the influence of Louis Kahn in the 1960s.

Kahn's influence is also felt in the basic premise of the typical gallery design: the natural lighting through north-facing

Center of circulation is rotunda-like lobby (facing page, section right) with ramp linking street level entrance to lower-level galleries, auditorium, and other facilities. Four tall monitors lighting this lobby rise above low gallery light scoops (below) to identify location of museum over treetops of park.



SECTION THROUGH LOBBY

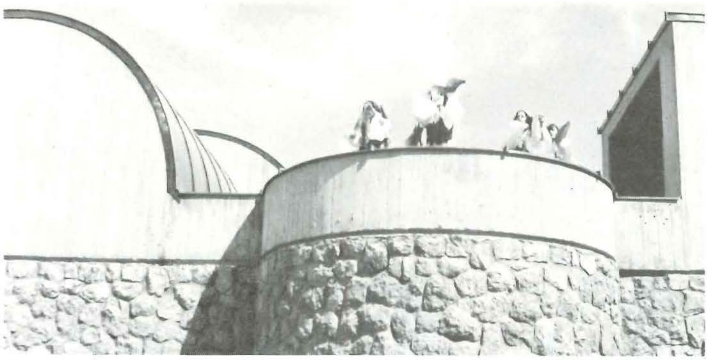


Courtesy Tehran Museum of Contemporary Art monitors. The form of these monitors—which Diba says is common in Middle East factories—inevitably recalls, to our eyes, José Luis Sert's museums in Provence and Catalonia. But Sert faced his light scoops inward across the low central portions of his galleries, so that light is deflected down along the walls from an invisible source. Here one of the monitors is made larger, in an effort to bounce light onto the facing wall; but north light does not bounce well. Even at midday, under Tehran's brilliant sun, artificial lighting is required; with strong track lighting turned on, the monitors provide a pleasant frieze of sky, but with the lights off, the display walls become relatively too dark.

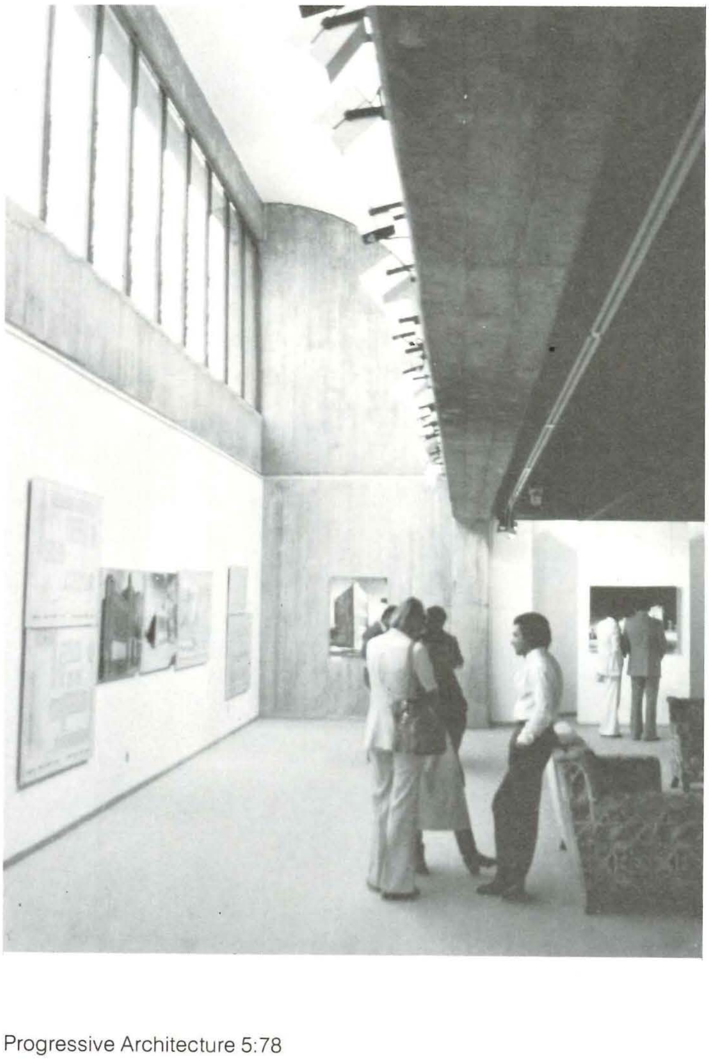
The galleries, in their meandering circuit, enclose a courtyard intended for smaller sculptures. (Large ones stand on the lawn outside). Terracing down from entry level, the courtyard meets the level of the descending galleries at midpoint, where a generous opening gives the visitor an orienting view out. The terracing extends upward as well, the first few steps leading to a dining terrace located—as is the glass-walled restaurant pavilion—on the roof of the lowest gallery. Roof levels ascending from there are not accessible to the public, but provide platforms for performers, surrounding the amphitheater-like courtyard. (At the opening festivities, Iranian performers alternated with a troupe assembled by Marilyn Wood, winner of an AIA medal this year for her effective mixing of dance with architecture.)

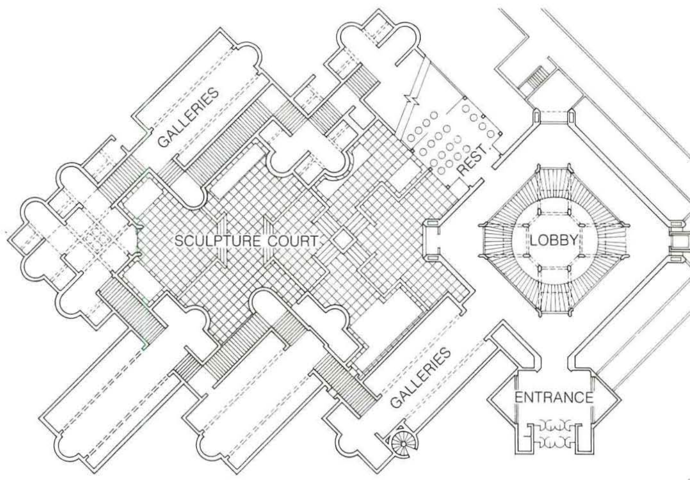
In contrast to the galleries and courtyard, the museum's main lobby seems oversized and overdone. The few works it can accommodate are lost in its volume and overwhelmed by the clashing concrete forms of roof, columns, and ramp. Entering it, one faces across the central well toward an exposed freight elevator door, and the route to the galleries—or any destination—is far from obvious.

With that exception, however, the building deserves praise as a sympathetic environment for both art works and visitors. As an architectural statement, moreover, its low profile and its use of nonmonumental construction and materials make a polemical point, which the museum's architecture department is likely to support: by looking to indigenous forms and familiar technology, the Middle East could still manage to wrest a humane environment from the jaws of economic development. [John Morris Dixon]

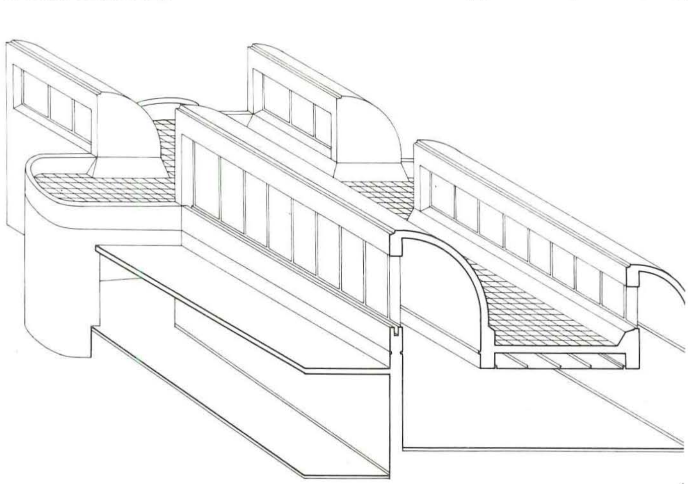


Gallery roofscape is setting for ritual (above); light scoops, shown in architecture gallery (below), look pleasing but do little functionally.



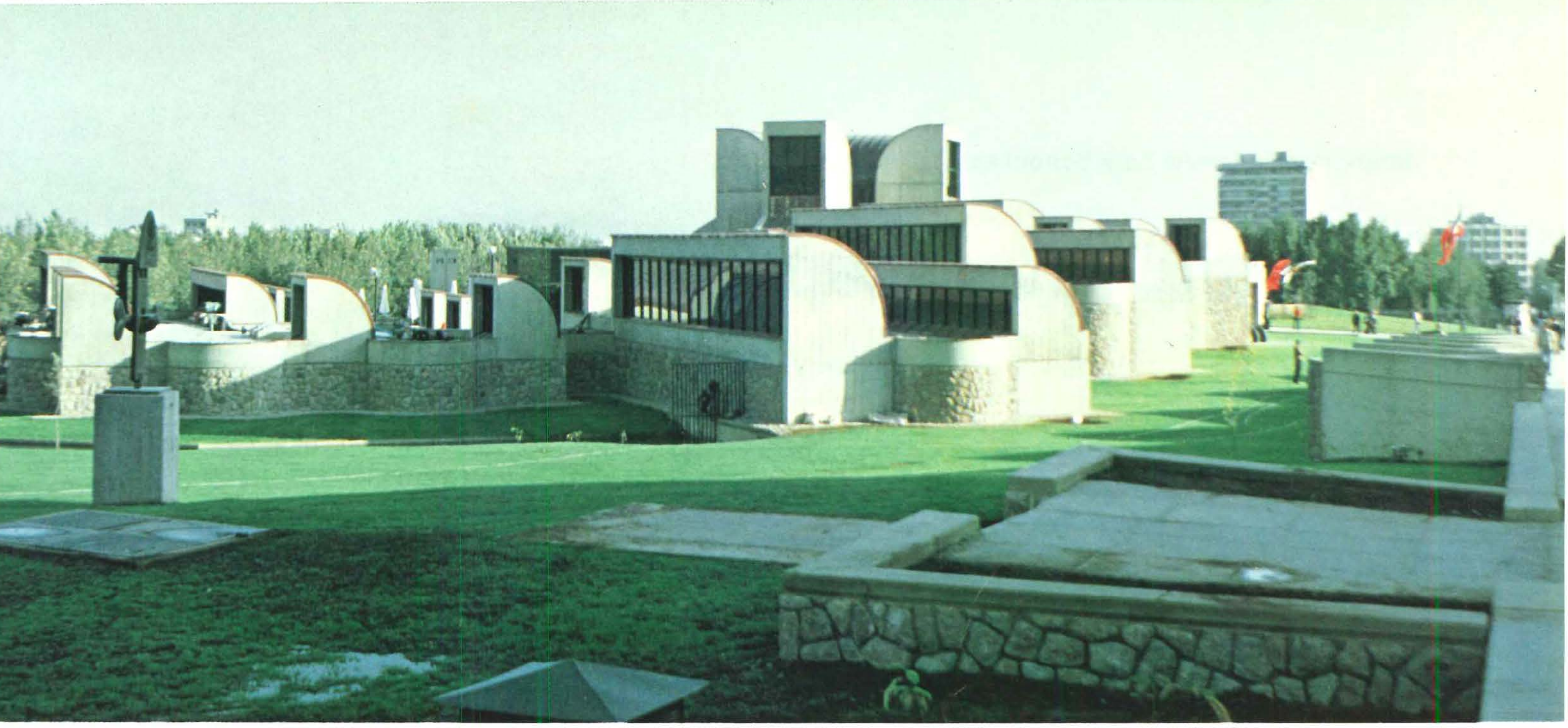


GALLERY LEVEL PLAN ←N

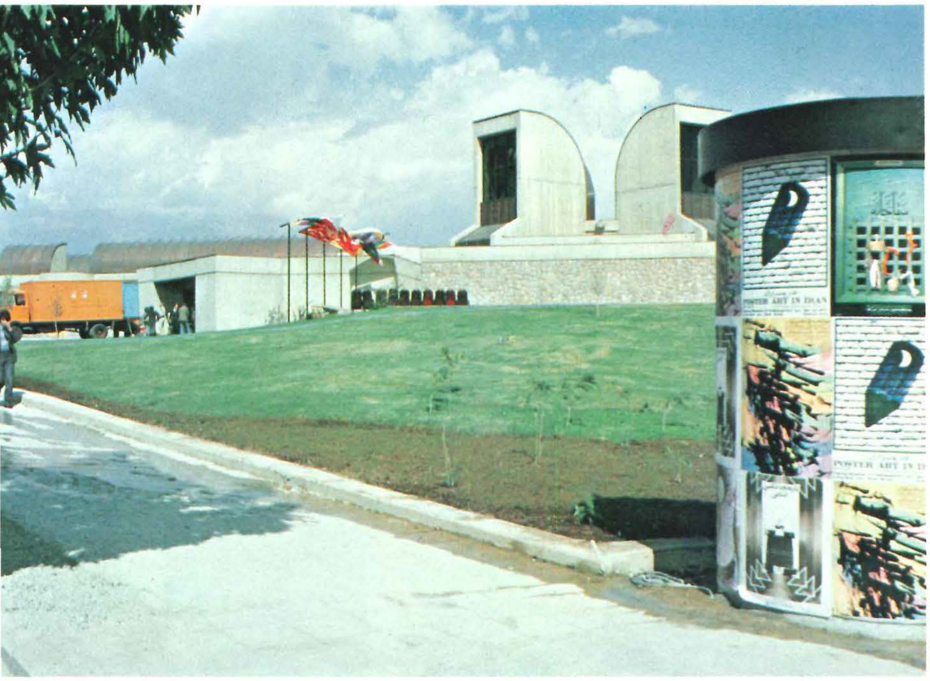


SECTION

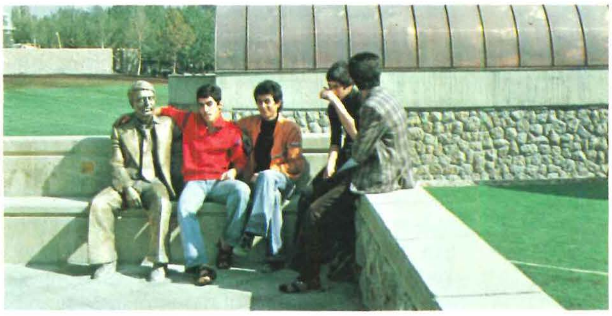
Data
Project: Tehran Museum of Contemporary Art, Tehran, Iran.
Architects: Kamran Diba, of DAZ Architects, Engineers, Planners, Tehran; associate architect, design phase, Nader Ardalan.
Site: west edge of 31-hectare (about 75-acre) Park Farah; site and adjoining Amirabad Avenue slope gently down to south.
Program: galleries, small restaurant, library, workrooms, offices, auditorium; total area: 7000 sq m (about 70,000 sq ft).
Structural system: poured-in-place concrete frame, floors, and roof.
Major materials: exposed concrete, native stone on exterior walls.
Cost: about $7.2 million, building construction only.
Photos: John Morris Dixon, except as noted.



Toward avenue (above) museum presents sawtooth façade of local stone walls faced by sawtooth seating areas along sidewalk.



View from downhill (above) shows berming and poster kiosk. (Truck at entrance was expedient for opening.) Terraced court, with view of mountains, is designed for sculpture and ceremony.



One sidewalk seating area (above) includes life-size sculpture of architect-director Diba. On roof of lowest gallery are restaurant in form of dark glass cube (bottom), contrasting strongly with surrounding structure. Adjoining terrace (below) overlooking park, is shaded by large wood and white canvas umbrellas.

An artful streetscape

An unusual commission yields superb combinations of architecture, interior design, and art on an amazing timetable.

What should a museum be? That was one of the primary questions Richard Meier investigated when asked to design a museum-within-a-museum in Albany, NY. Specifically to house works by recent New York School painters and sculptors, the structure is an elegant piece of indoor architecture, and more. Even without looking at its context, it is a gem; but its surroundings are hardly inspiring.

Widely considered to be a monument foisted on the public by former New York Governor Nelson Rockefeller, The Albany Mall complex in general is an astounding production combining banality with echoes of fascism. One part of the nearly unbelievable complex is the Cultural Education Center, containing the State Museum. An uninspired 42,000-sq-ft hall in the bowels of the pretentious Center was the setting given to Meier. That debit failed to block the creation of a series of exceptional spaces and experiences, however.

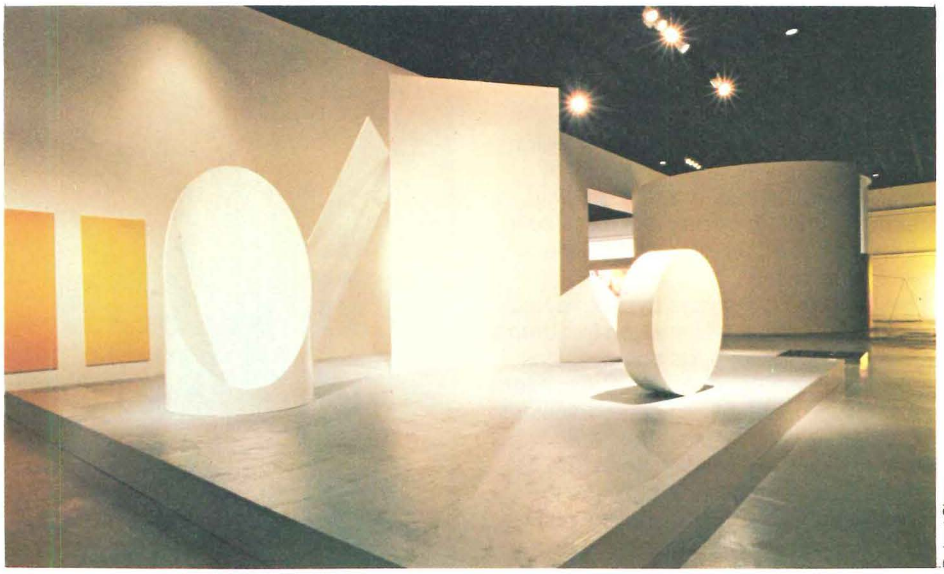
For most of his life, Richard Meier has been close to the New York School art scene. He started in painting early himself, and either knows or admires the artists for whose works he was designing the exhibit area. The overall effort at Albany, "New York: The State of Art," actually comprised three distinct exhibitions; besides The New York School, there was a section each for "The Hudson River School" and "Folk Arts In New York State." In the words of John Russell of *The New York Times*, ". . . every one of which would have done credit to a major city." While Meier's segment was designed for specific works by names he knows, the structure remains in place even after the show has completed its run.

In thinking about what the spaces housing these works should be like, Meier was simultaneously considering the viewing experiences and an appropriate design representing the New York School artists. "These people are, in essence, 'street' people, people of the city, with city involvement," Meier says. "They live in an environment of streets, alleys, and windows; this design is, therefore, a 'city' metaphor."

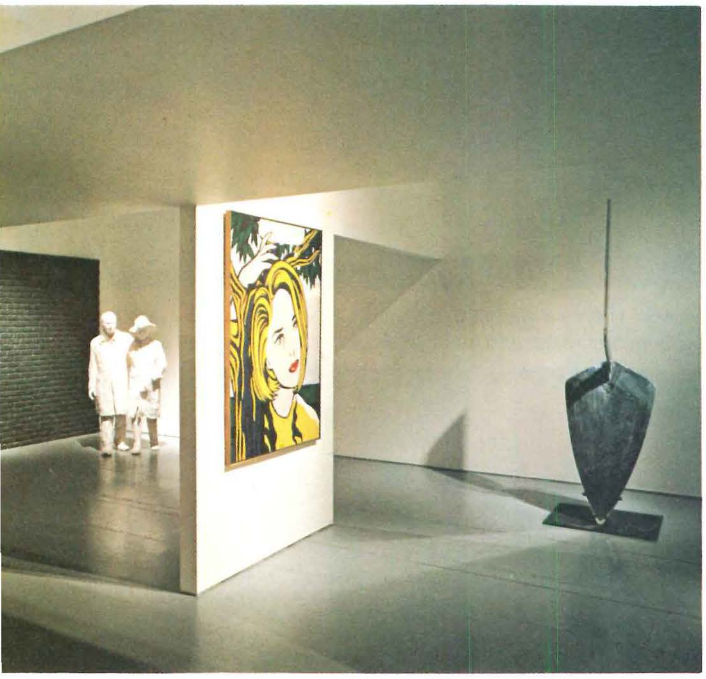
Returning to questions about what a museum should be, and how best to make the specific objects—some of them huge—visible, Meier sought the ideal in visual experiences. The best possible way to see these pieces, he feels, was not one way, but many. "You have to be able to see the work from near by, then move away, see it again in a different context, and then resee it from many perspectives," he explains. For that show in particular, the resulting structure was spectacular. Whether it will ever again achieve such brilliant heights will, of course, depend on the specific designer of ensuing shows. Even though Meier had the advantage of working with known items, and even if the city metaphor will mean little to other exhibitions, the spaces, planes, and experiences will be available, if handled correctly.

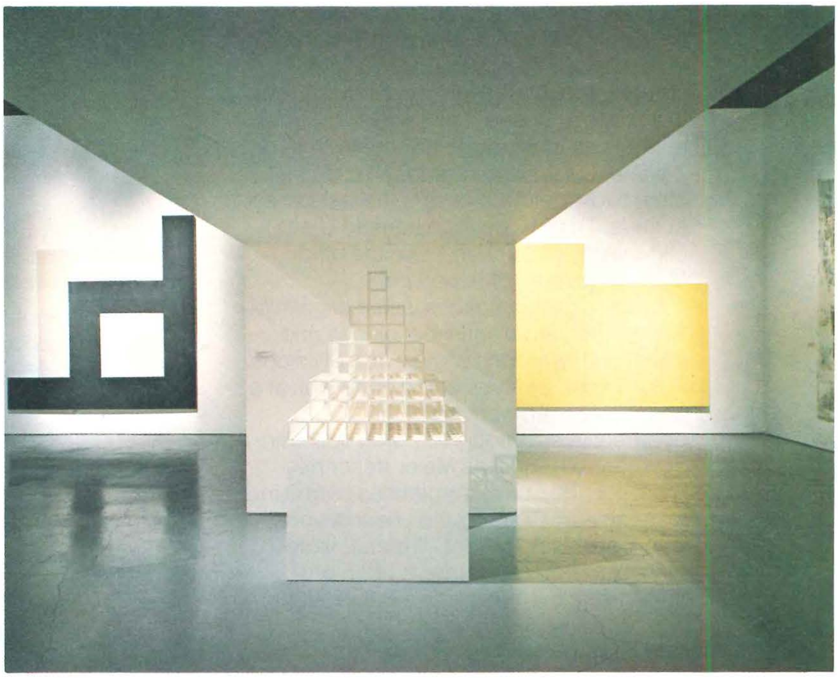
One blessing the large, undifferentiated, enclosing space brought with it was, to be sure, the capacity for really large works. Meier capitalized on this, naturally, using

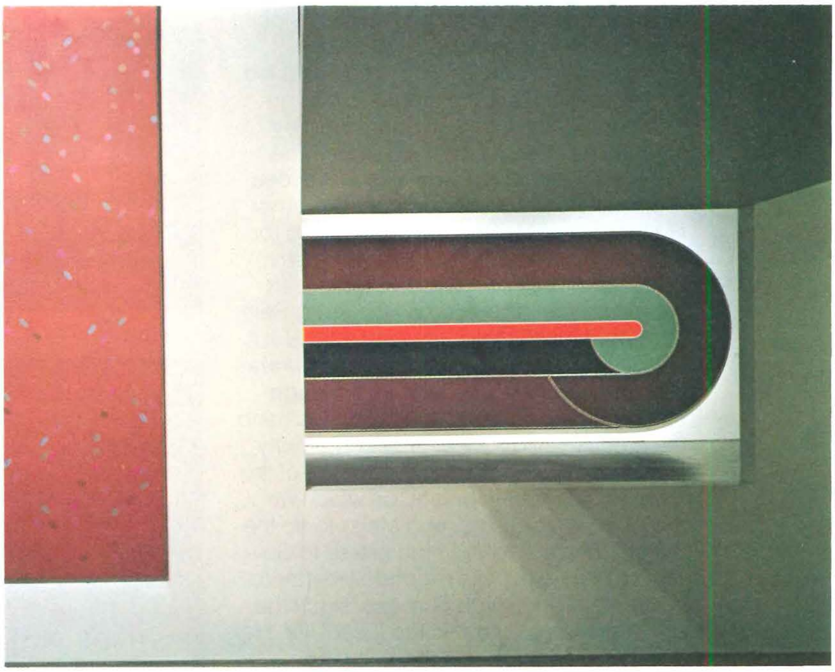
Open-top cylinders contained single pieces of sculpture; Mark di Suvero's "Martian Ears" in one (opposite page), Claes Oldenburg's popular work, "Soft Fan" in the other. Between the two were varied other pieces such as the Liberman sculpture (right). Juxtaposition of compelling individual subjects, along with the skillfully placed wall and canopy planes, made surprising and dramatic new compositions everywhere. In the smaller exhibit spaces, items by Oldenburg, Lichtenstein, and Segal (below), or Heizer and Mangold with Lewitt (below, right) could be viewed at close range or through "windows" from outside the space. Stella's long geometric was visible from one angle (bottom, left) with Oldenburg through the opening at the left, Al Held across the corridor, and Kenneth Noland farther down. Another view frames the same Stella through a portal next to a work by Larry Poons (bottom, right).



Robert Shaw







New York School exhibition

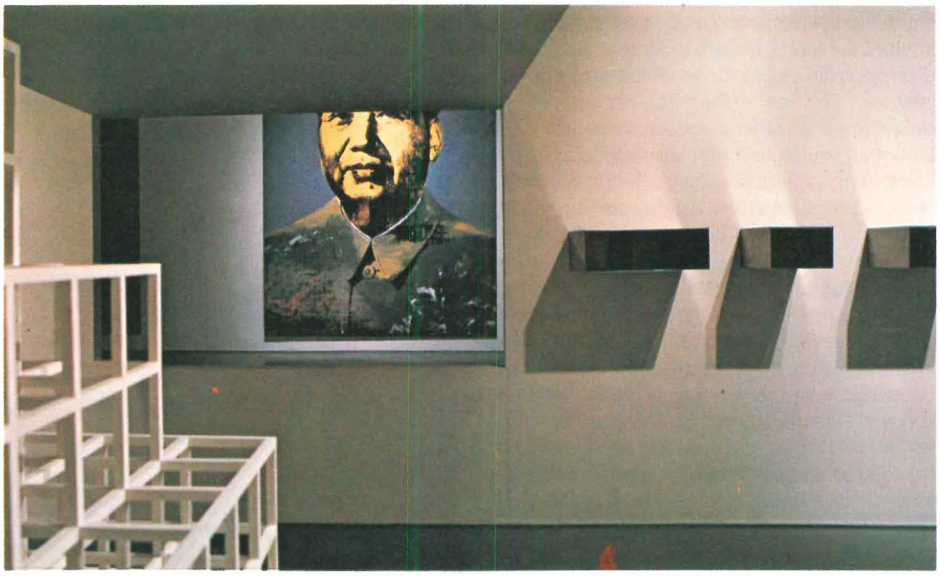
the envelope as a neutral backdrop for such pieces as James Rosenquist's 86-ft-long "F-111" or Nancy Graves's "Hegira," 132 ft long. Still others, smaller only by comparison, line these outer walls, with standing or hanging sculpture installed in the spaces between the walls and the Meier structure.

Inside the wood framed gypsum board construction, Meier has created two broad through avenues for large compositions and some standing sculpture. Cross axes, either visual or actual, run perpendicular to the wide "streets"—"alleys" or "windows" in the abstract "cityscape." There are no ceilings in the exhibit structure, and the "sky" is the black underside of the enclosing space. Only in the cross alleys do horizontal planes slice through the spaces in canopylike fashion. Of these passages, all four may be entered from the outer corridor on the entrance side, but only the outer canopy opposite "F-111" goes straight through to the cylindrical pavilion at the opposite end. The second cylinder accepts an implied intersection with such a plane, but it actually stops—as do the other two—before crossing the last broad avenue. The first pavilion housed Claes Oldenburg's "Soft Fan," and the other Mark di Suvero's "Martian Ears."

Smaller gallery spaces within the exhibition are defined by minimal planes and abound in variations of view and divisions. From inside, a viewer could often look at a previously seen work from new perspectives—through a portal or a "window" or both—just as Meier described. From outside, it was sometimes surprising to come across a long look past several layers of striking pieces. Careful placement of individual elements often produced very dramatic long axial views.

The cast

If Meier has created a truly fine exhibit environment—and he has—who else was involved? One of the astounding facts of this show is that it was conceived, designed, assembled, constructed, installed, and opened in only *eight weeks* (design was completed in three). Sponsored by the State of New York, Office of General Services, Executive Department, the idea received vigorous support from Governor Hugh Carey. The Governor had asked for an idea to commemorate 200 years of government in New York. The three-part exhibition was proposed by Courtney Sale, accepted enthusiastically, and built. But it wasn't that simple, obviously. Ms. Sale was the director of the whole effort, although she is quick—probably too quick—to hand the credit to everyone else. She promptly asked Thomas B. Hess to be curator of the New York School segment, on which we are primarily focusing, and Meier to do the design. She also gives high praise to Governor Carey, who was reportedly eager to *use* the mall for a high purpose, since the scheme is an accomplished fact of life. He also felt, obviously, that this show was



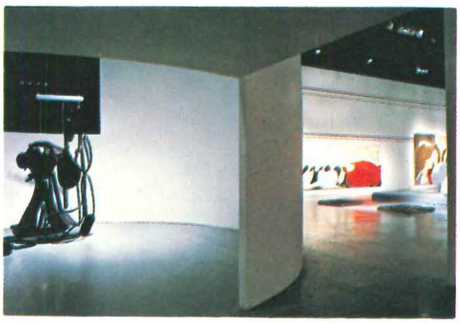
Robert Shaw

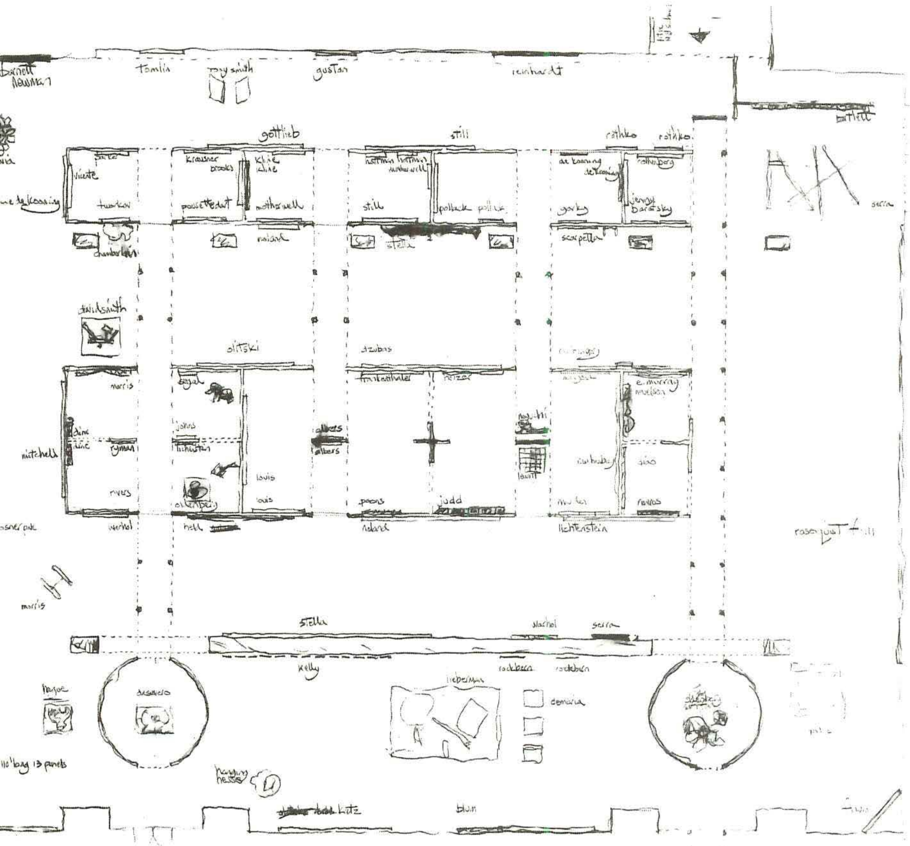
Robert Shaw

From one point (top), viewers could frame a Warhol with a Lewitt, a "window," and a Judd. Near the entry (above, left), around perimeter and main "avenues," long views also abound.

Richard Meier

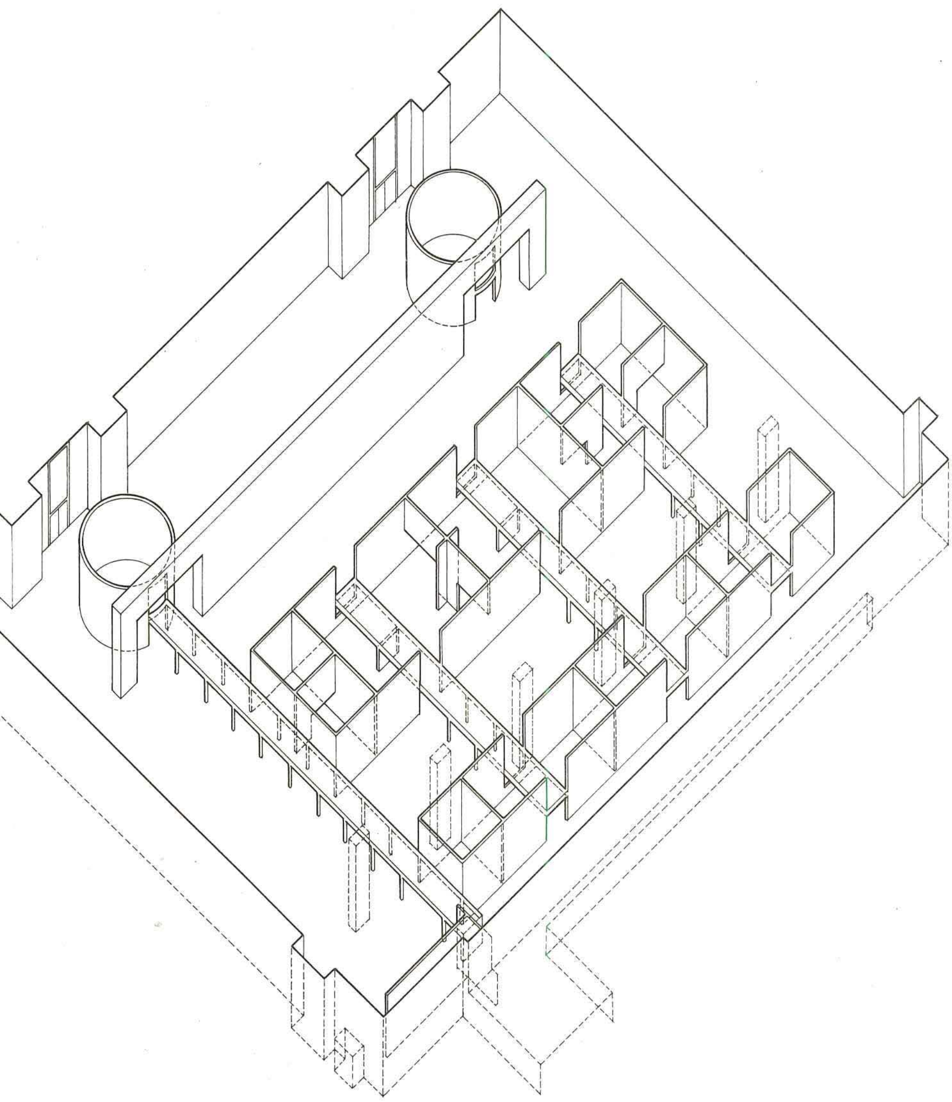
Richard Meier





exhibition of
the new york school
at the
albany mall state museum

opening
october 8, 1977.



METRIC

such a purpose, and that it was an ideal way to commemorate New York in an historic fashion.

For the office of General Services, Ms. Sale has extremely high praise. "Would you believe, they actually had 40 carpenters out there (building the Meier structure) one day?" she marvelled. She also is outspoken in her thanks for the support from the New York Council on The Arts, to the museums throughout the state that willingly (and quickly) responded to the call for display material, and to the Public Broadcasting Service. Although the NY Department of Education will support the Meier exhibit space for approximately 1½ years (until stuffed birds are scheduled to take over the space), Ms. Sale hopes that it can and will be seen as a prototype for public education uses. To that very worthwhile end, she sought a corporate patron to film the exhibit while it was open. Philip Morris, Inc. came through instantly. She approached them on Monday, received a grant on Wednesday, and was filming by Friday, the end of the show.

The effort *should* be used by others as a prototype from which to learn. It is a perfect combination of governmental, institutional, educational, and corporate support, with the arts and architecture. Of Richard Meier, Ms. Sale remarks, "He was the perfect choice, not only for his background, but he just went right to work and did this scheme for us." It appears to P/A that the whole team was the right choice. The State of New York would deserve kudos if this tremendous effort had taken eight *months*. But Meier, Sale, et al pulled it off in one and one-half. The result, as we said, was a rare and inspiring gem. Admire it yourself if you get a chance to see the upcoming Philip Morris film. [Jim Murphy]

Credits

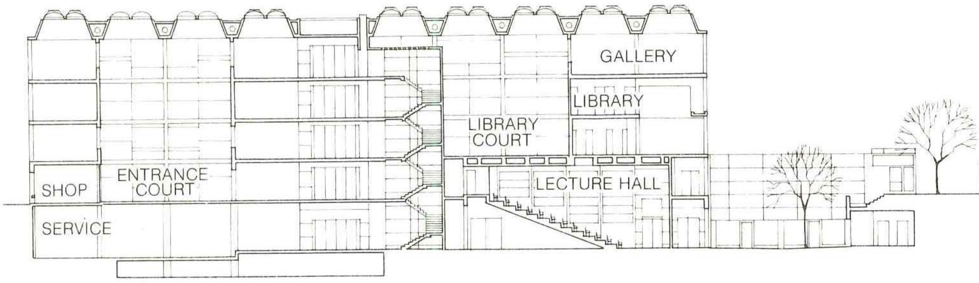
Project: exhibit structure for New York School art works, State Museum, Albany Mall, NY.

Architect: Richard Meier & Associates, NY. Assistants, Paul Aferiat and Henry Smith-Miller.

Client: State of New York, Offices of General Services; Director, Courtney Sale; Curator, Thomas B. Hess.

Photographs: copyright Wolfgang Hoyt, except as noted.

Opus posthumous



SECTION B

Louis Kahn's last work, finished after his death by Pellecchia & Meyers, ends his career on a disquieting chord, and points up the weaknesses in an oeuvre that awaits a less reverent evaluation.

Louis Kahn, America's most influential architect since Frank Lloyd Wright, died in ironic anonymity on March 17, 1974. At the time of his death, Kahn was the true inheritor of the mantle of the Great Maker of Architecture, and was the most recent example of that rare species whose extinction has been proclaimed with the death of each previous claimant—only to be discovered in a new, and presumably improved, version in the generation that succeeds the last. But Kahn was a law unto himself.

Though architects rarely obtain the kinds of commissions that command widespread attention before the age of 40, Kahn was a late bloomer even by the standards of his profession. His first important building, the Yale Art Gallery of 1953, was completed when he was 52, but for the rest of that decade he remained unknown to the world at large. Though Kahn slowly became a cult figure among architectural cognoscenti (P/A, April 1961, p. 130), his leap into prominence came about in a rather unorthodox way. For it was a book, not a building, that launched Kahn on his international career. That book was *Louis I. Kahn* (George Braziller, 1962), and its author, Vincent Scully, performed a feat almost unrivaled in the annals of architectural criticism: the making of a reputation in one easy, if belated step. Kahn's name was quickly and widely established, and Scully's landmark book correctly discerned, as it simultaneously created, the true course of architectural development in America for the next decade.

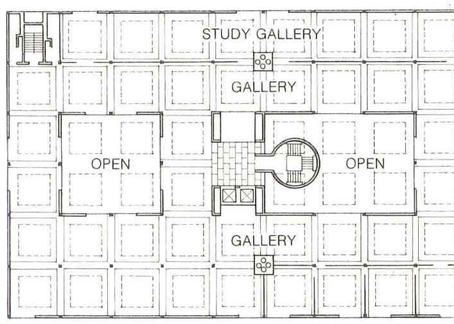
False gods, real men

There is no doubt of Kahn's influence among his fellow architects. A whole generation of important figures, themselves now approaching middle age (or already into it), looked to Kahn as their master, and Kahn's undoubtedly charismatic personality was fervently impressed upon a generation of graduate students now just beginning their careers. Kahn's impact is certain, his central place assured, yet the heavy incense of idolatry hangs about his memory and obscures an objective assessment of his work.

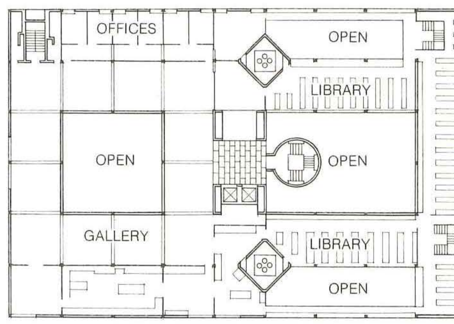
This is especially true in the case of the Yale Center for British Art, the most important work (save for the instant ruin at Dacca) left incomplete at the time of Kahn's death. Let it be said from the outset that this problematic building presents pitfalls to anyone who would try to stem the tide of prevailing opinion on Kahn. The mere fact that the British Art Center was completed after his death by other architects—Anthony Pellecchia and Marshall Meyers—leaves the dissenter open to the predictable rebuttal that Kahn cannot be faulted for its ultimate execution, that if he had lived it would have surpassed whatever specific fault can be found with this or that element of its design. But the evidence quite clearly indicates that Louis Kahn was very much the author of this work, even down to some of its detailing, and that Pellecchia & Meyers carried out his full intentions in a respectful manner that is as blameless as it is thankless.

For what is most wrong with the Yale Center for British Art is not in its details and its finishes, but in its very conception. Thus, the fault lies not in its harking back to an aesthetic that has of late come under increasing criticism (for in many respects the British Art Center is a throwback to Kahn's earlier Brutalist phase), but in its basic imagery. If we are to believe Vincent Scully's characterization of this building (see *Architectural Record,* June 1977, pp. 95–104) as Kahn's "classic tomb," "a sarcophagus at architectural scale," then it is a container particularly ill-suited for the lively and surpassingly humane collection of art it was built to house.

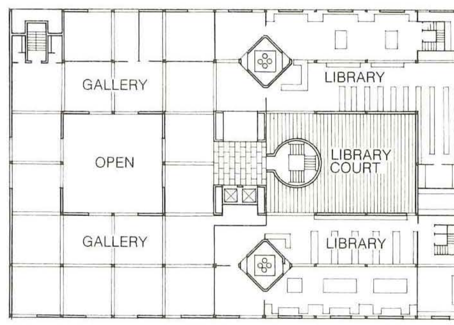
In assembling his collection of British art, Paul Mellon and his advisors constructed a sound refutation to the notion that great painting during the 18th and



FOURTH FLOOR

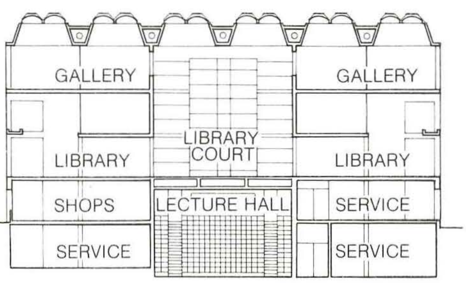


THIRD FLOOR



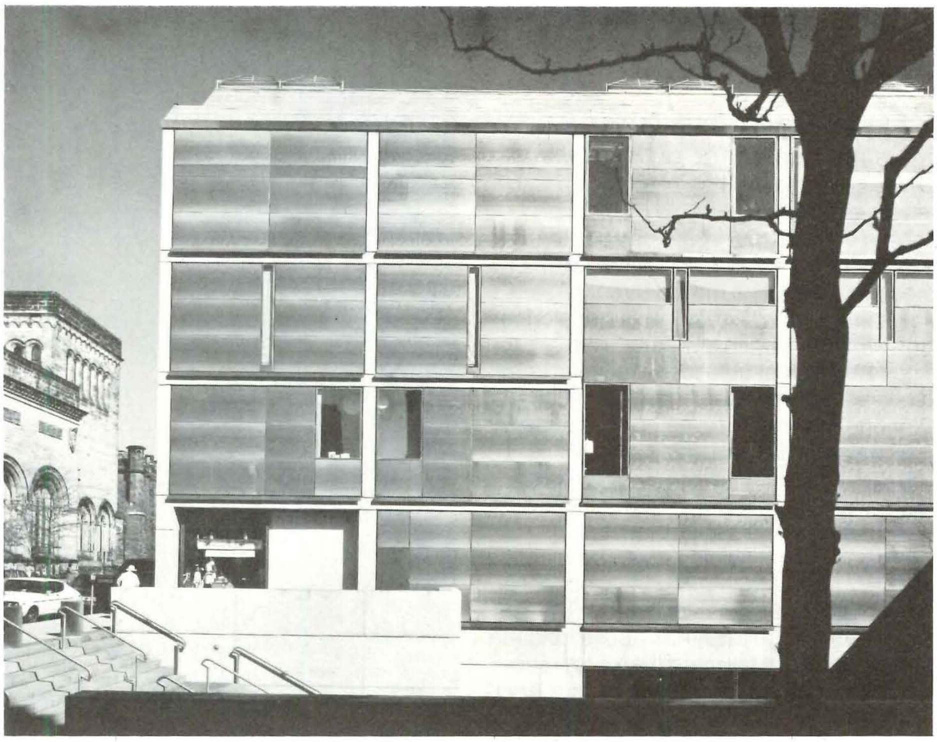
SECOND FLOOR

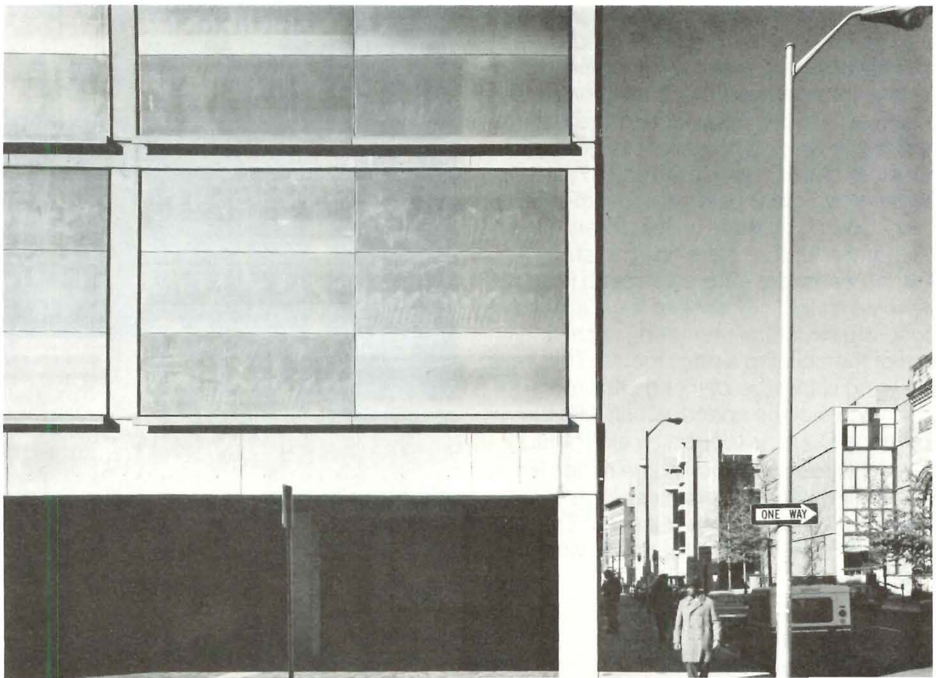
FIRST FLOOR PLAN N 20' 6m



SECTION A


Chapel St. façade of Yale Center for British Art (above) contains row of shops at street level.


Side elevations show relationship to old Swartwout gallery (above), while recessed entry arcade (below) is juxtaposed with Art and Architecture building and earlier Kahn gallery.



early 19th Centuries dwelt only on the Continent. They rightly discerned that British art was at its best when it centered on men and women, their occupations and diversions, and was at its worst when it pretended (as Reynolds and West were wont) to mythology and mythologized history. As a result, the imagery of the building in which that art is now housed at Yale is in many respects far off the mark in providing a sympathetic surrounding for an art that centered on real people, not imagined gods.

Boulevard of broken dreams
From the university's standpoint, Kahn seemed a most logical choice for architect of the new museum. Kahn was a Certified Important Architect, guaranteed to produce a work of art to hold works of art. What's more, the architect's first Yale Art Gallery was directly opposite the proposed site, a bracketing of Kahn's career that turned out, in the end, to have been all too prophetic. The selection of Kahn was likewise in keeping with Yale's attempts to commission the "best" contemporary architects. But even a cursory look at that stretch of Chapel St. reveals how inadequate have been the results of that program. Kahn's first gallery, its blank, string-coursed façade staring mutely at Chapel St., resists more strongly than ever its persistent interpretation as significant architecture. Diagonally across the street from the British Art Center, Paul Rudolph's jinxed Art and Architecture building of 1963 stands as a reminder of earlier turmoils in American architecture, and none of the three comes close to the vigor and imagination of Addison Swartwout's Art Gallery of 1928, which continues to dominate that part of the campus, not merely by its size, but by its quality.

The British Art Center is essentially a Miesian box, ten bays wide along Chapel St., six bays wide along High St. From a short distance away, it reveals what looks at first to be a little mansard roof (invisible in most close-up photos), but which actually are terne-clad portions of V-beams that are exposed above the roof line. The exterior is clad in pewter-finish stainless steel panels, framed in the exposed poured-in-place concrete of the building's structural system, and restating a frequent theme in Kahn's work: infill of one material within framing of another. The panels are rhythmically interspersed with windows (not so reflective either of sky or surroundings as earlier reports would have it), but the variety of those glazed interventions is lost in the bay system's uncompromising dominance.

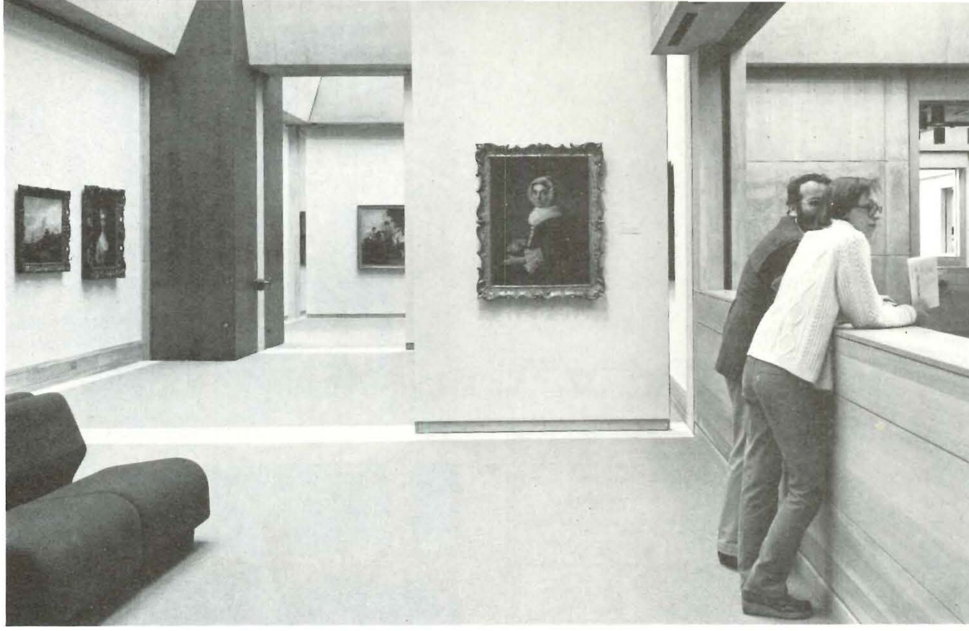
At the insistence of students and the city of New Haven, the university called for shops to be placed along both street façades of the building. This fortunate addition was not included in Kahn's original plans, and though the design of the shop fronts is conventionally tasteful, the presence of the stores brings a desirable liveliness to the street. In the best Renaissance tradition, people are accorded their scale, and the monument is accorded its own.

The hollow crown

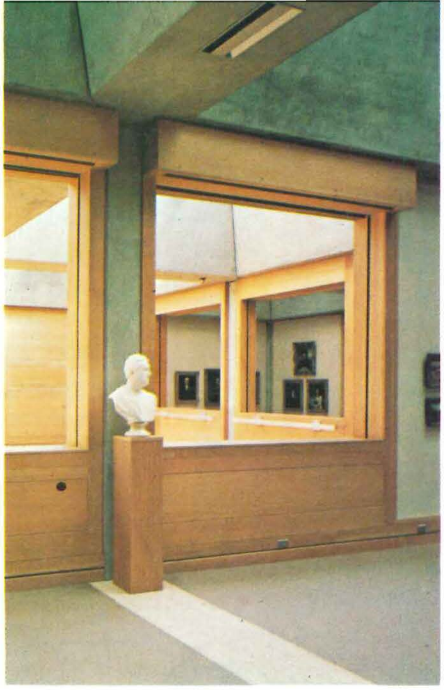
The arcade of shops gives way, at the northeast corner of the building, to a recessed space that forms, in plan, a square equal to four of the bays on the floors above. From this low, dark, unimpressive space one moves through glass doors into the Entrance Court, four stories high and roofed with skylights. This monumental vestibule to the museum sets itself up as a significant space, but soon after one's entry it is revealed as a portentious prelude to the building as a whole. The low, dark entry, followed by the high, light space, is supposed, one assumes, to fill the visitor with a sense of awe and majesty. But light shining down from above does not equate with profundity, nor can the vantage points that look out on the Entrance Court from the floors above hold the visitor's attention for more than a few seconds. The space is useless (both in a practical and in an imagistic sense) and it is lifeless, and above all wasteful, given its lack of purpose beyond its overblown gesture.

The second floor of the British Art Center is reached by a stairway (an elaborate design by Pellecchia & Meyers) concealed in a brutal concrete silo that is hammered like a stake into the heart of the building. This massive cylinder rises upward to the third and fourth floors, and makes its presence felt most profoundly in the second of the center's two great open spaces, the Library Court. The walls of the Library Court (so named for the reference and study libraries which are entered through it) are paneled in light oak set into the exposed concrete structural members, repeating one of the building's main motifs. The walls are hung with large paintings appropriate to the scale of the space, which, like the Entrance Court, is topped by skylights.

It is this room to which some critics have referred in likening the atmosphere of the British Art Center to that of a great English country house. It is a comparison which,



Entrance Court (below) with statue of William III. Fourth floor gallery (above) is lit by skylights, overlooks Library Court. Openings had to be detailed to accommodate automatic fire closures.



Library Court (above right, below) is paneled in light oak, and is dominated by concrete silo (below) concealing stairway. Gallery overlooking Court (above left) has bust centered on marble strip.

as one stands in this space, seems as misinformed as it is inexplicable. The concrete bay system imposes an intrusive monumental scale that might be appropriate to Castle Howard, but not to Chatsworth or Chiswick. Once again, as in the Entrance Court, we have Kahn straining after the grand gesture, and once again, he fails. The Library Court exposes one of Kahn's major weaknesses as an architect: his difficulty in handling the organic development of space, his habitual choice of the conceptual gesture at the expense of spatial realities. The gigantic form of the silo not only eats up a good third of the space in the Library Court, but is also responsible for the awkward dribbling away of space at its sides, which looks for all the world like the afterthought of a poor design decision. By the end of his career, Kahn's diagrammatic tendency had rigidified to an extent that this stairway and its housing remind us that a "servant" cannot serve two masters—in this case, function vs image—without the danger, as happened here, of having the servant become the master.

The libraries that flank the court are entered through it, their doors next to the meniscus of space left to the sides of the silo. Both rooms use the same materials seen elsewhere in the building, and have modern versions of the classic Windsor chairs in a harmonizing light finish. The two-story Art Reference Library houses the Photograph Archive in its balcony area, and the Print, Drawing, and Rare Book Study is similar in size and feeling. Their appealing scale is somewhat marred by the omnipresent reminders of the silo in the court: aggressive ducts race through the interiors, and oppressively oversized cylindrical reading lamps hover heavily over the study desks.

There is an auditorium at the British Art Center, too, part of the scheme to have this institution function as more than a picture gallery. Though less claustrophobic than the auditorium at his Kimbell Art Gallery of 1972 in Fort Worth (which is jammed into one of that building's long, vaulted, classicizing modules), the atmosphere within this exposed concrete box is bleak. But this presents more of a problem during a lecture than during a movie or a slide presentation, when the room is darkened, and, as the French say, all cats are gray.

Sunlight and shadow

Far more successful are the smaller galleries ranged around the perimeter of the second, third and fourth floors of the British Art Center. They are, by contrast to the courts, human in scale, and are a welcome respite from the atmosphere that prevails elsewhere in the building. The galleries on the second and third floors are used for changing exhibitions, those on the fourth to house the permanent collections. The two lower gallery floors differ from those on the fourth floor mainly in their means of lighting: the former are lit by track spotlights, the latter through the skylights that have earned their designers a great deal of praise.

Kahn frequently used skylights, but he did not, after all, invent the concept. Skylights were commonly used in 19th-Century galleries largely because a satisfactory artificial alternative did not exist. But natural light is not inherently superior to artificial light for viewing paintings, and it can, in fact, be distinctly inferior. Admittedly the Canalettos and Turners glow with a supernal radiance when lit by the sun above, but let the sun slip behind a cloud halfway through one's contemplation of these joyous outdoor scenes, and it is like the first drop of rain at a picnic.

There is no quality of light which the skilled designer cannot reproduce quite adequately enough for the needs of a picture gallery, and this heedless enthusiasm for Kahn's skylights as a measure of his supposedly profound art is, like many other aspects of his design, rather quickly disposed of in the light of human experience. The skylights (or, at least, the clear ones of the Entrance Court, as opposed to the translucent ones of the Library Court and small galleries) perform a valuable function, however. For, with the windows in the peripheral galleries, they open vistas to the outside world and break the hermetic spell of Kahn's two courtyards.

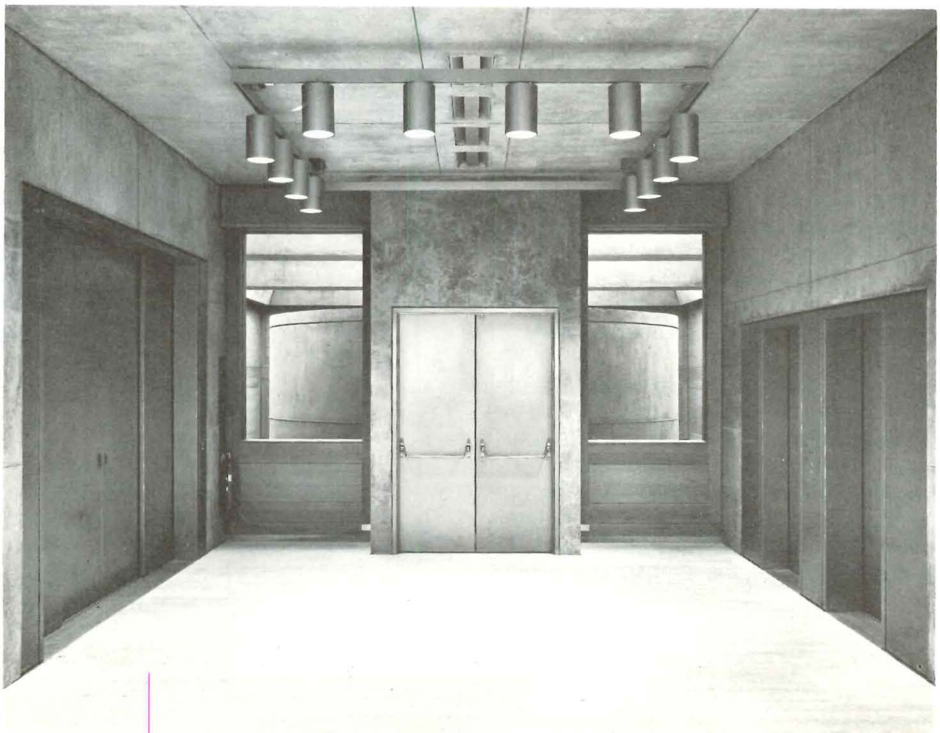
Art for art's sake

The general appointments of the small galleries are entirely satisfactory, and help establish that welcome return to a domestic scale. The walls are covered handsomely in unbleached Belgian linen, floors are carpeted in neutral beige, and travertine strips, corresponding to the concrete members exposed along the walls, interrupt the flooring and reiterate the modular bay system. Seating is plentiful and comfortable, and the contemporary modular units designed by Don Chadwick are far preferable to the contemporary Chesterfield sofas in the Library Court.

Unlike the two courts, the small galleries do not drain one's enjoyment of the art within them. There we can fully appreciate

Print study room (above) is reached, like reference library (below), through Library Court.

Doors to stairs in concrete silo (below) are flanked by openings that look down on Library Court. Openings show top of silo, which stops short of Library Court's skylit ceiling.

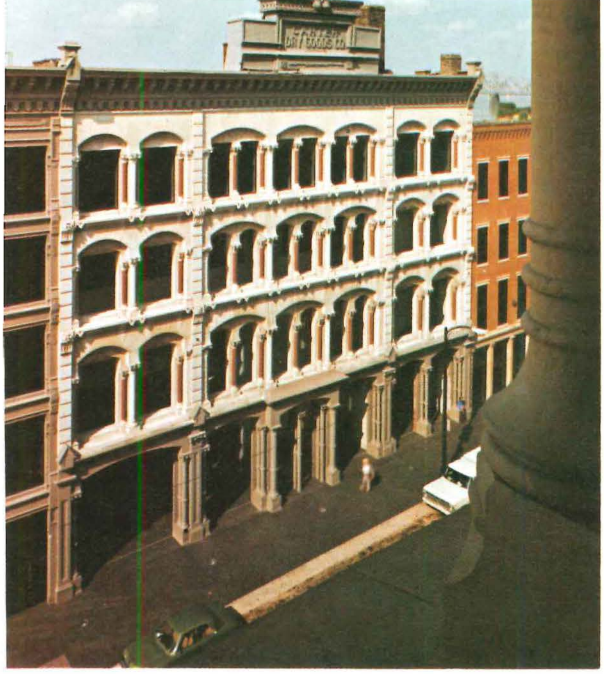


such works as Samuel Palmer's powerful little *Harvest Moon,* or a luminous small view of Venice by Richard Parkes Bonington, or a dozen of John Constable's remarkable cloud studies. That saving grace having been won from the hand of the architect, little else matters. The day is saved as the humanity of these pictures survives the onslaught of a conception that at times comes perilously close to smothering that which this building was built to vivify.

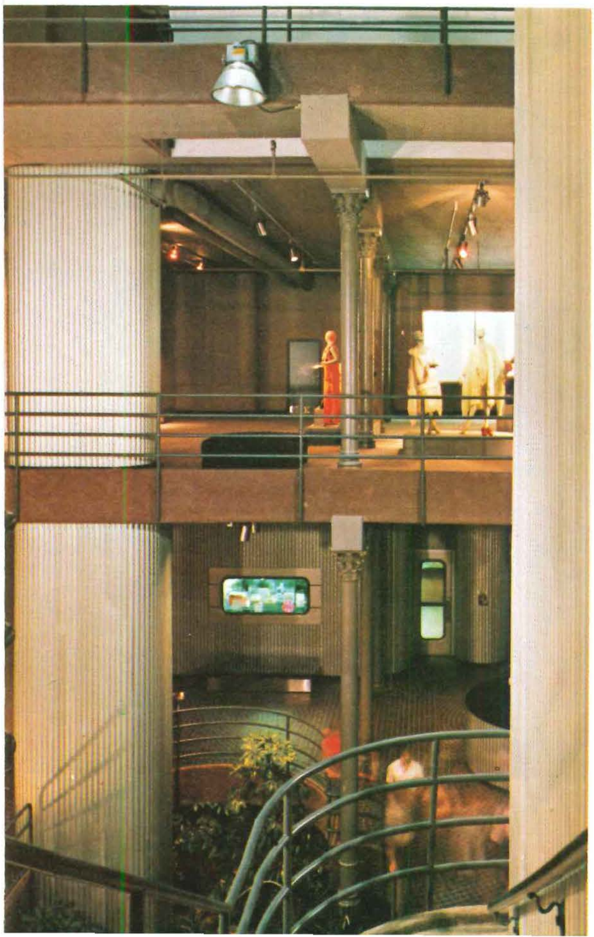
The British Art Center, as one of Kahn's less satisfactory efforts, cannot in all fairness be the starting point for a reevaluation of a career that calls out at last for a more critical analysis. Just as a case history will be studied by doctors for its lessons of demonstration, so can this building be used to illustrate, if not typify, some heretofore unexamined questions in Kahn's architecture. The almost universal praise which has greeted the Yale Center for British Art should sound an alarm that our view of the recent past in American architecture has been at variance with its physical reality: that the need for heroes and myths has superseded, for whatever reason, the need for buildings that react to human needs. If the purpose of the Yale Center for British Art is to help us see the art within it with fresh eyes, let us expect the building that houses it to do no less for our view of architecture. [Martin Filler]

Data
Project: Yale Center for British Art, New Haven.
Architects: Louis I. Kahn; completed after his death by Pellecchia & Meyers, Architects.
Program: museum and study center at a large urban university, containing galleries, study galleries, libraries, a lecture hall, offices and shops.
Site: corner lot, approximately 120′ x 200′, on university campus.
Structural system: poured-in-place concrete frame, with hollow structural slabs for floors above street level, and precast V-beams supporting roof and skylights.
Mechanical system: high-pressure steam from university boiler plant.
Major materials: pewter-finish stainless steel panel and glass exterior walls; terne roofing (mansards); acrylic dome skylights; gypsum board interior walls; unbleached Belgian linen wall covering; white oak veneer and solid paneling; white oak, travertine, and wool carpeted floors. (See Building materials, p. 136)
Consultants: Pfisterer, Tor & Associates, structural engineers; van Zelm, Heywood & Shadford, mechanical engineers; Harold R. Mull, Bell & Associates, acoustics; Richard Kelly, lighting; Benjamin Baldwin, interior design; Robert Zion, landscaping; Dan Kiley, interior planting; International Consultants, Inc., costs; Joseph M. Chapman, Inc., security.
General contractor: George B.H. Macomber Co.
Client: Yale University.
Costs: Approximately \$9.6 million; \$82.20 per sq ft.
Photography: Cervin Robinson (black and white); George Cserna (color).

Busts flank emergency exit on fourth floor (above). View into Library Court from fourth floor (below).



In five-building complex of Louisville's Museum of Natural History and Science (top), aluminum facing is used in lobby (above), lobby atrium (below and facing page), and entry plaza. Exhibit areas (top right) are in shades of gray.



Museum of Natural History and Science, Louisville, Ky

Industrial aesthetics

Five century-old warehouses are being revitalized as a museum, and a main attraction is the buildings themselves.

If ever proof were needed of the benefits of reusing old buildings, the Museum of Natural History and Science in Louisville, Ky, offers some of the best evidence one could hope for. On at least three counts, the museum's move into a 100-year-old complex on West Main St. next to the Ohio River proved to be a move in the right direction. With ten times more space than in the old quarters, museum attendance has soared. The renovated buildings are the catalyst planners hoped they would become for the renewal of Louisville's historic, but on-the-skids, cast-iron waterfront district—although one whole block may still come down for a parking garage. And the space that has been converted so far has cost just $29 a sq ft.

The museum comprises five buildings. Three are distinguished by the red, white, and gray cast-iron façades of the Carter Dry Goods Company; the other two are the flanking gray cast-iron structure to the west and the red brick building to the east. In renovating the complex, a 25-ft-deep space has been cut away immediately behind the front of the Carter group at ground level, but extending up three floors in the middle (three-bay) building. This space forms a sheltered plaza for the museum's main entrance, and it also exposes a large part of both sides of the original façade, which is a registered National Historic Landmark. That part of the building is now isolated as an important exhibit in itself.

Inside the middle building, another space has been cut away, but this time as a five-story-high atrium that runs from a basement level botanical exhibition to the skylighted roof. Its purpose and that of the front sheltered plaza are essentially the same: to provide organization points, focal areas, and lobby spaces for the entire complex. With renovation of only the middle and east Carter buildings completed, these spaces seem excessive. But when the whole five-building complex is com-

In atrium, existing cast-iron columns were used as vertical elements for new trusses.

Museum of Natural History & Science

pleted, these areas will tie together a total of 18 existing levels to give the public immediate access to all parts of the museum, including its restaurant, library, auditorium, gift shop, museum school, hydro-sphere, and some municipal offices that are presently located on the top floor.

Except for the atrium and sheltered plaza, the two finished buildings have been left relatively untouched inside, other than where doors have been cut for circulation in existing bearing walls. The interior is painted shades of gray to create a neutral background for exhibits, and this concept of neutrality is carried through in the gray paving brick at ground level, the gray carpeting, and the gray and black furniture and black display cabinets. All other new elements, such as the elevator and mechanical shafts, gift shop and cloakroom, reception desk, and new front enclosing wall are clad in what appears to be corrugated aluminum industrial siding. These elements are curvilinear in design to help soften circulation patterns, but the curvilinear design and the aluminum siding are also intended to provide contrast to the rectilinearity of the 1878 structures.

The extravagant use of corrugated aluminum siding in these 100-year-old buildings was as bold a choice as it was inspired, and it shows that Louis & Henry's project architect R. Jeffrey Points had the perception to treat the buildings exactly for what they are. By shunning the more popular approach to the renovation of structures such as these, which strives to create a sense of nostalgia and relaxed atmosphere by using a standard formula of devices such as exposed brick, ferns, and butcher block, Points has avoided one of the more insidious clichés of the day. Instead, he has used a modern industrial material in the old industrial spaces, thereby creating an ambience of great sophistication that shows as much concern for the past as it does for the present.

There are aspects about the renovation, however, that could be questioned. The corrugated aluminum facing material is not the inexpensive, off-the-shelf industrial siding it appears to be. Instead, it is custom-fabricated, fluted, and interlocking 16-ft-long strips of 3-in.-wide anodized aluminum. It is installed in single pieces where heights are less than 16 ft, and installed in random lengths in areas of greater height. If it could be argued that there is a tinge of deception in the use of materials here, it could also be argued that the use of the strips is wholly justifiable. Because of the height of some areas where the material is applied, the use of conventional aluminum panels would have resulted in wall surfaces marred with horizontal seams, both unsightly and out of keeping with the sleek aesthetics.

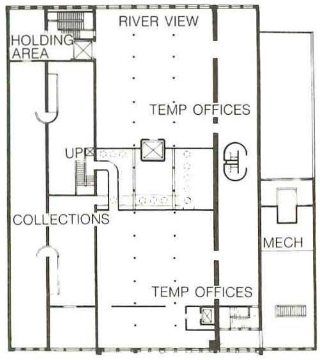
If the architects wanted to create an elegant and high-style space—which they certainly have—one must wonder why they chose the gray paving tile for the ground level. Of course, this material is durable and easy to maintain, and it has been intelligently used to form an inviting and continuous surface from the street line directly into the museum. Like all other new elements, it also has been employed in a curvilinear design. But the problem is that its effect is to introduce a casual element into a space that is otherwise not casual. Although the interior is basically monochromatic, the spaces are powerful and consistent in their combination of 19th- and 20th-Century industrial aesthetics, which makes one wish for a simpler ground-floor material contributing to that quality rather than eroding it.

All of the windows have been reglazed with single panes of glass and are no longer fragmented with mullions as they were formerly, and as is typical for such buildings. The combination of the deep window recesses of the original building and the single-pane bronze solar glass now emphasizes the void of the windows and changes the rhythm of the façade. But while this may emphasize the negative space of the windows, it also pushes forward the handsome façade which, although not accurately restored to its period because of this treatment, now stands out more forcibly than before.

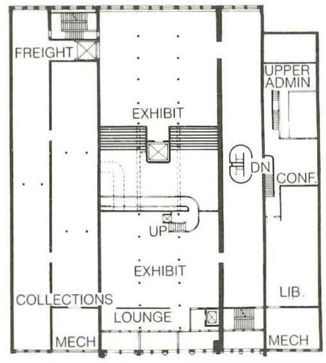
In this renovation, the architects have taken liberties, and some of them have been quite daring. That almost all of their decisions have been right illustrates that when properly handled, a radical step can sometimes be the best one. The risks are greater, but this project proves that those risks are worth taking. [David Morton]

Data

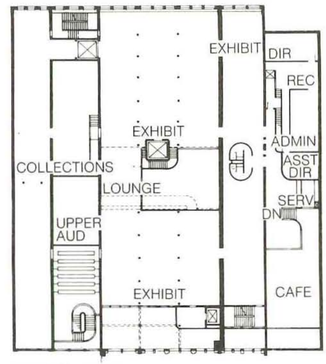
Project: Museum of Natural History and Science, Louisville, Ky.
Architect: Louis & Henry, Inc., Louisville, Ky; R. Jeffrey Points, project architect.
Site: West Main St., in old cast-iron industrial district of Louisville on Ohio River.
Program: renovate five 100-year-old cast-iron industrial buildings for museum use, with all spaces having easy access to all others.
Structural system: existing cast-iron columns, masonry walls, timber roof and floors. Demolition was unique in that existing columns on fourth level were maintained in place and used as vertical elements of the present trusses; later, structure was removed beneath them to create atrium.
Major materials: aluminum walls, insulated glass, acrylic carpet, and stainless steel doors are used in direct contrast to existing structure. (See Building materials, p. 136.)
Mechanical system: heating: hot water/forced air; hydronic unit. Air conditioning: chilled water, forced air.
Consultants: E.R. Ronald & Associates, mechanical and electrical engineers; Senler, Campbell & Associates, structural engineers; Joseph Wetzel Associates, exhibit designers.
Construction manager: Dahlem Construction Co.
Costs: $5.3 million; $29 per sq ft.
Photography: Michael Webb.



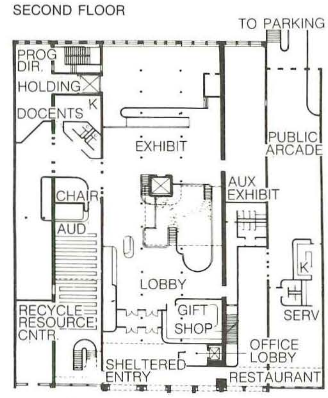
FOURTH FLOOR



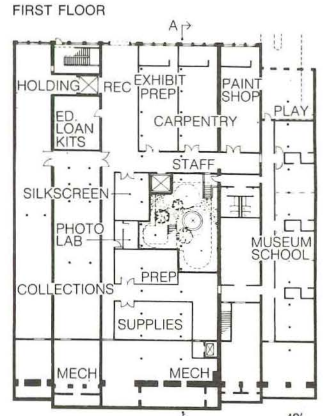
THIRD FLOOR



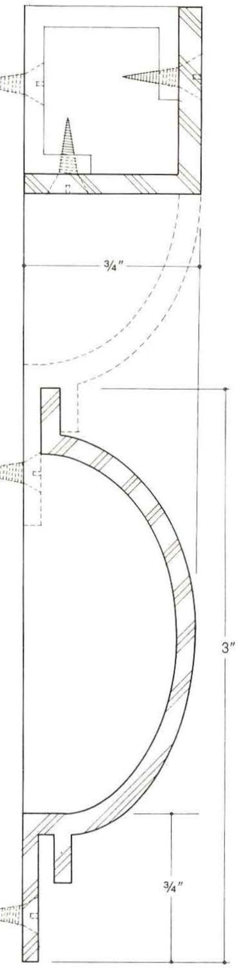
SECOND FLOOR



FIRST FLOOR

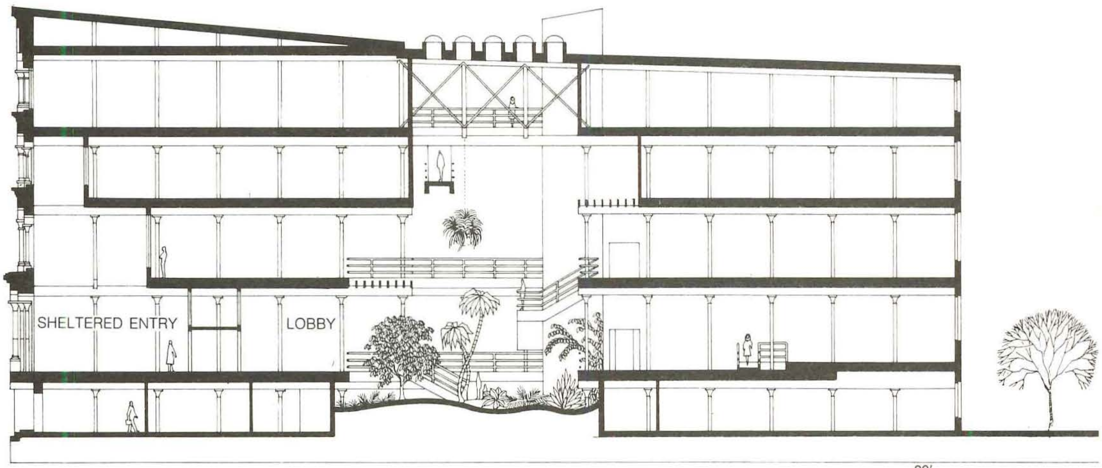


BASEMENT N↑ A 40' 12m



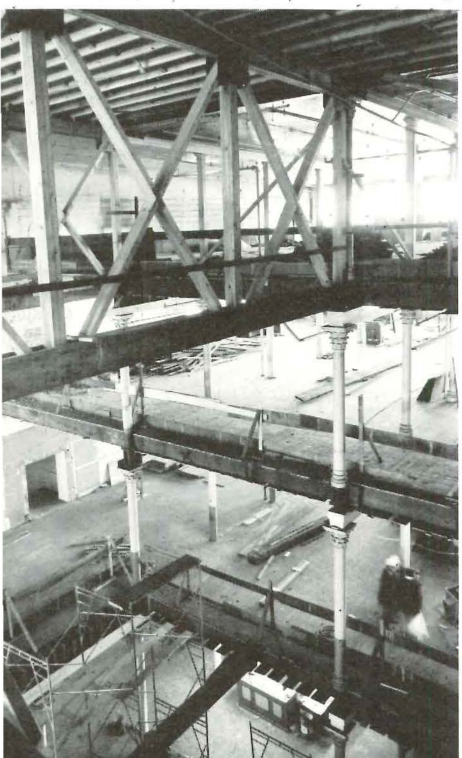
TYPICAL ALUMINUM WALL SECTION

Install "x" aluminum trim closure at corner, at irregular edge situations, and at top and base of installation. Install in single pieces in heights less than 16′-0″. Install in random lengths if height exceeds 16′-0″, using minimum 90% 16′-0″ lengths. Thickness of aluminum: .125″. Finish: natural anodized. Process: extrusion.



SECTION A

Truss over atrium (below) re-used heavy timber joists for upper and lower chords as well as existing columns for vertical elements. In second floor lounge (right) and in exhibit areas (bottom right), a clear distinction is made between old and new elements of the building.



Ballantine House, Newark Museum, Newark, NJ

Too much is never enough

Not too long before "less is more" we had "too much is never enough"—and the Victorians weren't kidding.

"Too much is never enough" sounds suspiciously like the title of a Jacqueline Susann novel, but in truth, phrases like that and "next to bareness, whiteness is most objectionable," were used during the Victorian era "as serious goals for both the patron and the decorator," according to Newark Museum's Curator of Decorative Arts Phillip H. Curtis. Such ideas were also serious goals for Mr. Curtis in the Museum's recently completed restoration of the National Landmark John H. Ballantine house as a receptacle for its extensive and outstanding collection of 19th-Century decorative arts and furnishings.

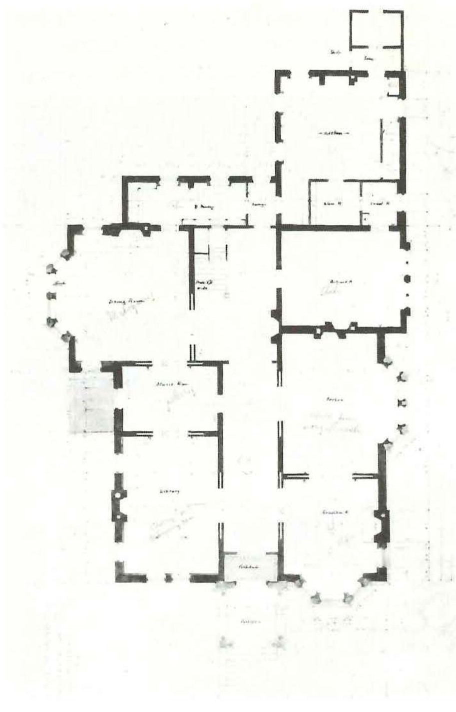
As houses of the late 19th Century go, the Ballantine house is not a particularly great one, and its preservation and restoration could never have been justified on terms of its architectural brilliance. But with regard to the economic development of America and to the social history of Newark, it offers an unparalleled record of the living habits of a family that rose to prominence when this country's great fortunes were being amassed.

The Ballantine house is special because it is the sole surviving example of its type in Newark, and also because it is to this day almost completely intact. It is so intact that much of its original furnishings, which had until recently been in the hands of the family descendants, have been returned to the house. But in addition to that, an unusually complete set of documents pertaining to the house have come down to us, including the original floor plans and architect's sketches with detail notations, the original carpenter's, mason's, and plumber's specifications, as well as the builder's documents—which call for lumber and stonework from the two houses previously on the site to be reused! The bills from the original interior decorator survive, including a complete listing of the furnishings, and in addition, interior and exterior photographs exist today that were taken upon completion of the house in 1885 and at subsequent intervals.

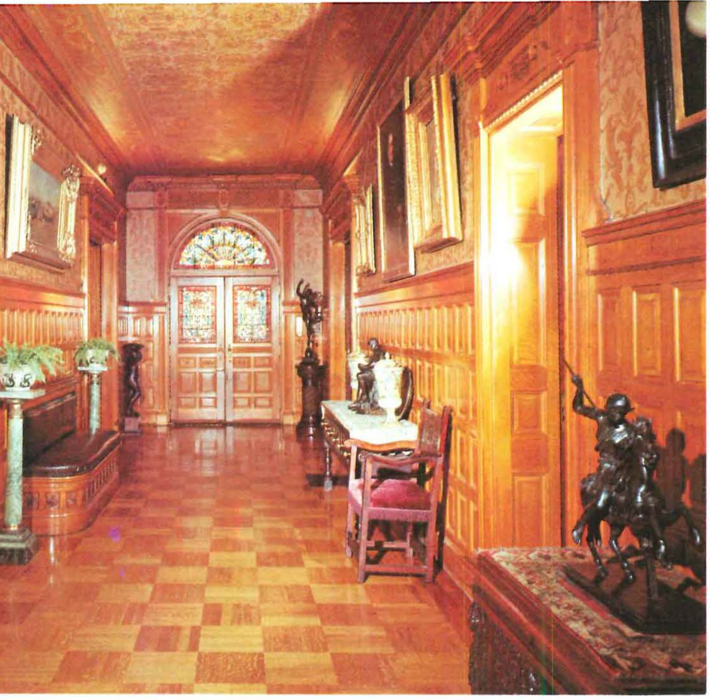
When John H. Ballantine assumed the presidency of the Ballantine Brewery in 1883 upon the death of its founder, his father, he immediately started planning to build a new house that would reflect his new position. Since 1878 he and the family had lived in a house on fashionable Washington Park, but in 1883 he purchased the house next door and hired New York architect George Edward Harney to demolish the houses and build a new one.

Harney designed a three-story, 17-room house with full basement and attic which, as Phillip Curtis points out in the Fall, 1976, *Newark Museum Quarterly,* has a "basically flat façade [that] relates to the typical city row house and presents a solid appearance of stability and permanence." The house is constructed of Philadelphia pressed red brick and gray Wyoming sandstone. It is generally identified as a combination of Renaissance and Romanesque Revival styles, but if one is satisfied with that description, it seems that at least Georgian and Gothic Revival would have to be added to the nomenclature. In any case, the house is highly eclectic, especially on the inside.

It is on the interior that the idea of too much never being enough really comes through, almost with a vengeance. But what is surprising about these rooms is that if they are met on their own grounds they are exceptionally handsome, and must be counted among the finest and most authentic Victorian spaces in America. In the furnishings and in wall and ceiling treatments, almost every conceivable revival style is represented, including Elizabethan, Gothic, Rococo, Renaissance, Adam, Moorish, and Eastlake. With this melange, one also finds period Jacobean, Queen Anne or Hepplewhite furniture, along with antique Persian and Chinese carpets. For the rich, the idea of "collecting" things for the home became not only a favorite pastime, but one of the best ways to let the rest of the world know just how rich you were. Old traditions and rigid ideas about how a house should look



The Ballantine house was built in 1885 and was recently restored for the display of Newark Museum's 19th-Century decorative arts. Architects original plan (above) shows notations for woods to be featured in each room. Materials used were the finest available for the time.



In front hall (above), the bench, most paintings and bronzes are original to the house, as are vases and corner table in the reception room (right).

In drawing room (below), the center table, chandelier, mantle clock and candelabra, side chairs and French Empire armchair are original pieces.

were discarded in favor of a new, fashionable informality that preferred an eclectic mixture of individualistic pieces over a careful arrangement of things that matched.

Restoration of the Ballantine house took two years—the same amount of time that was required to build it originally. The house, however, was not in bad condition, but most of the restoration needed was of the type that required untold hours of painstaking, detailed labor. The exterior work, which was done by Universal Restorations, Inc., of Washington, DC, essentially called for cleaning off 90 years of accumulated grime, repointing the brick, reconstructing broken or badly worn stonework, and stabilizing other stone surfaces against further deterioration.

For the interiors, Rambusch Co. of New York had to clean and inpaint the stencilled canvas ceilings and walls of several rooms and also refurbish plaster and woodwork and add new gold leaf, silver leaf, and Dutch Metal (brass and gold) highlights where needed. In the dining room the rare and valuable Lincrusta-Walton wallpaper (a material composed primarily of solidified linseed oil that gives the appearance of hand-tooled leather) was cleaned and highlighted with Dutch Metal. Throughout the house, woodwork was cleaned, recolored, and waxed, and floors were refinished.

The house remained in reasonable condition throughout the years because owners subsequent to the Ballantines recognized its quality and maintained it adequately. The house was owned by Commercial Casualty Insurance Company from 1920 to 1937, and by the museum since 1937. Both organizations used it as offices but the museum also used some spaces for receptions. The only alterations the house has seen other than Mrs. Ballantine's 1891 redecoration of the front hall, reception room, drawing room, and music room—to make them even more "elegant"—were the other owners' replacement of the butler's pantry by restrooms and the kitchen and billiard room by a lecture hall. Except for those and other minor alterations, the house is restored to its 1891 condition.

In the restoration, the philosophy of the museum has been to restore the exterior so that it "looks its age," and to refurbish and refurnish the interiors as accurately as possible, but also to make them "look lived in." The happy result of this attitude is that Newark now posesses one of the rare

examples of museum houses in the country that does not have the onus of being a museum house.

The question could be raised, however—and it increasingly is in preservation circles—if public funds should be used for projects such as this. Is the restoration of another millionaire's house really necessary, or could the money be more wisely and equitably spent elsewhere, such as for the restoration of a rundown public park, or for the conversion of a closed movie theater into a needed community center. It could also be asked if the architectural quality of the Ballantine house justifies its perservation. The answer to both of these questions could be no, except that in the case of the Newark Museum a valid use has been found for the house, which illuminates that vital part of the city's history when it was "the third city of the Union in manufacturing importance." As spectacular as the house's interiors are, some say there are still few reasons to save buildings such as this. But without this one, Newark would be much the poorer. [David Morton]

Data

Project: John H. Ballantine house restoration, Newark Museum, Newark, NJ.

Original architect: George Edward Harney (1840–1924).

Interior designer: Phillip H. Curtis, Curator of Decorative Arts, Newark Museum.

Exterior restoration: Universal Restorations, Inc., Washington, DC.

Interior restoration: Rambusch Co., NY, NY.

Site: next door to Newark Museum in downtown Newark, NJ.

Program: to restore Victorian house of 1885 for use as repository of museum's extensive collection of 19th-Century decorative arts.

Structural system: brick bearing walls, wood floors.

Major materials: Philadelphia pressed red brick, gray Wyoming sandstone; various kinds of hardwood and pine for floors and paneling.

Mechanical system: thick walls required only two new window air conditioners.

Consultants: Gail O'Neil Duffy Assocs., draperies.

Costs: $421,236.

Photography: Armen Photographers.

In dining room (facing page), dining chairs, china, mantle garniture and buffet are original to the house, while in library (below), some paintings, Morris chair, and desk (not shown) are Ballantine pieces. Library has Dutch Metal ceiling; dining room, Lincrusta-Walton wallpaper.

One enters museum via courtyard (above left) then foyer (above right), antechamber (rear below) before reaching exhibit hall.

Southern Alleghenies Museum of Art, Loretto, Pa

Simply sensuous

An old gym building converted into an art museum in the rural reaches of the Alleghenies: an effort with crippling constraints? Not so, on several counts.

The most unlikely union to be seen in architecture these days might be the adherence to the Modernist notion of economy of means along with the espousal of the Post-Modernist belief in richness of meaning. Economy of means has never lost its validity and necessity as an ingredient of the architectural solution—even if the budget does not call for it. The characteristics that enrich architecture with its poetic, evocative, and meaningful qualities, however, suggest elements often construed as superfluous to structure and function. Unfortunately, the specter of conflict too often results in the absence of any attempt at the conjunction of the two. Thus, the public finds Modernist architecture often drained of any aura that seizes the imagination, or Post-Modernist architecture suffering from an overload of polyglot details or wasted space.

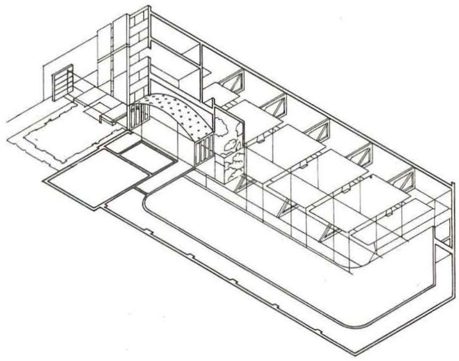
Yet the fortuitous combination of economy of means and poetic expression does happen in the Southern Alleghenies Museum of Art executed by a young unknown architect, Roger Ferri. The program called for converting a former college gym built in the 1920s into an independent museum. It is situated on the central mall of St. Francis College campus in the Western Pennsylvania town of Loretto. Like many other 1920s school buildings, this one was executed in a Gothic idiom at ten times removed. Yet the color and texture of its aged brick and mortar and its limited detailing do lend it a certain character Ferri wisely retained. Since the building sits on the mall along with other anonymous brick structures, its new visage still respects this context.

Although budget and programmatic constraints were stringent, it is clear that the architect did not view the project as simply getting rid of the smell of dirty sneakers and installing modular panels and spots on tracks. On one hand, he attempted to create a special sense of place built around the experience of visiting a museum. On the other hand, he has done so without masking the actual shell and robbing it of its own architectural identity. In other words, the symbolic task presented itself as the unloading of the building of its former sports-oriented content, retaining something of its architectural identity, while instilling it with cultural content. On the strictly functional level, other issues needed to be dealt with: a space had to permit different types of installations for exhibits and other functions, such as storage, lighting, and so on.

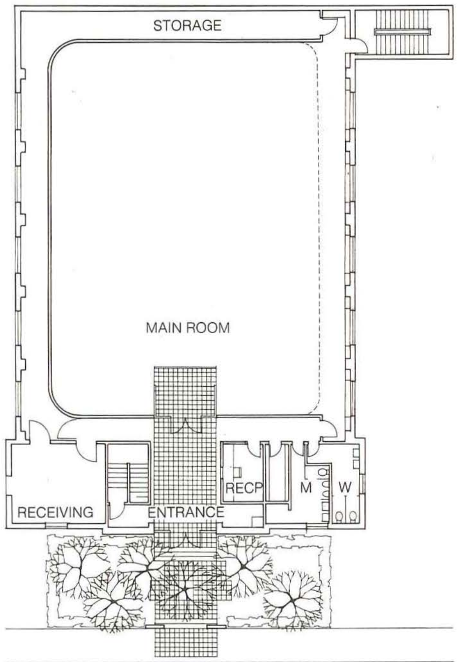
Pragmatic and poetic concerns were addressed with frugality, sensitivity, and consistency. Steel pieces, translucent or reflective glass windows or panels, and painted gypsum board provide the basic elements for the transformation of the building. These elements act as design motifs that are continued throughout in various functions or roles. Though they are not always *necessary* in the strict sense of the word, there is still a sense of economy about their usage even in the progression, for example, from a signifying role to a structural one.

Line and light

At the entrance court to the building, steel framing members extend from the sidewalk to the entrance to delineate a "gate," then a "canopy" over the small gardenlike courtyard. Inside the building the black framing members continue through the foyer, edging an arched indoor "canopy" suspended below the regular ceiling. The black steel members then frame a one-story-high antechamber through which the visitor must pass before entering the two-story-high 5900-sq-ft main space. In this exhibit hall, one sees the black steel lines functioning ever more structurally—here as trusses from which a partially open ceiling is suspended. Visual consistency is maintained by the use of thinner black lighting rods and tracks hanging from the trusses, and in the handrailing bordering the mezzanine (formerly a jogging track).



ISOMETRIC SECTION



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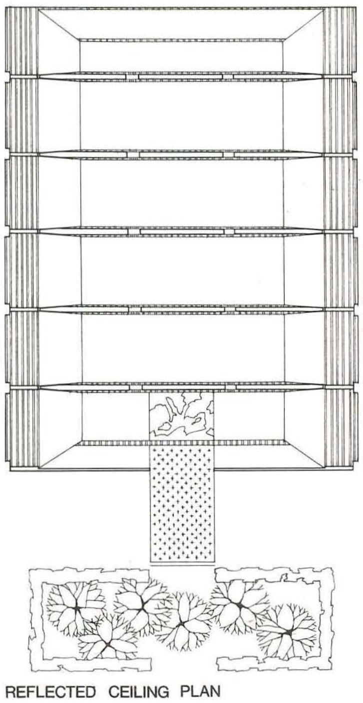


REFLECTED CEILING PLAN

Southern Alleghenies Museum

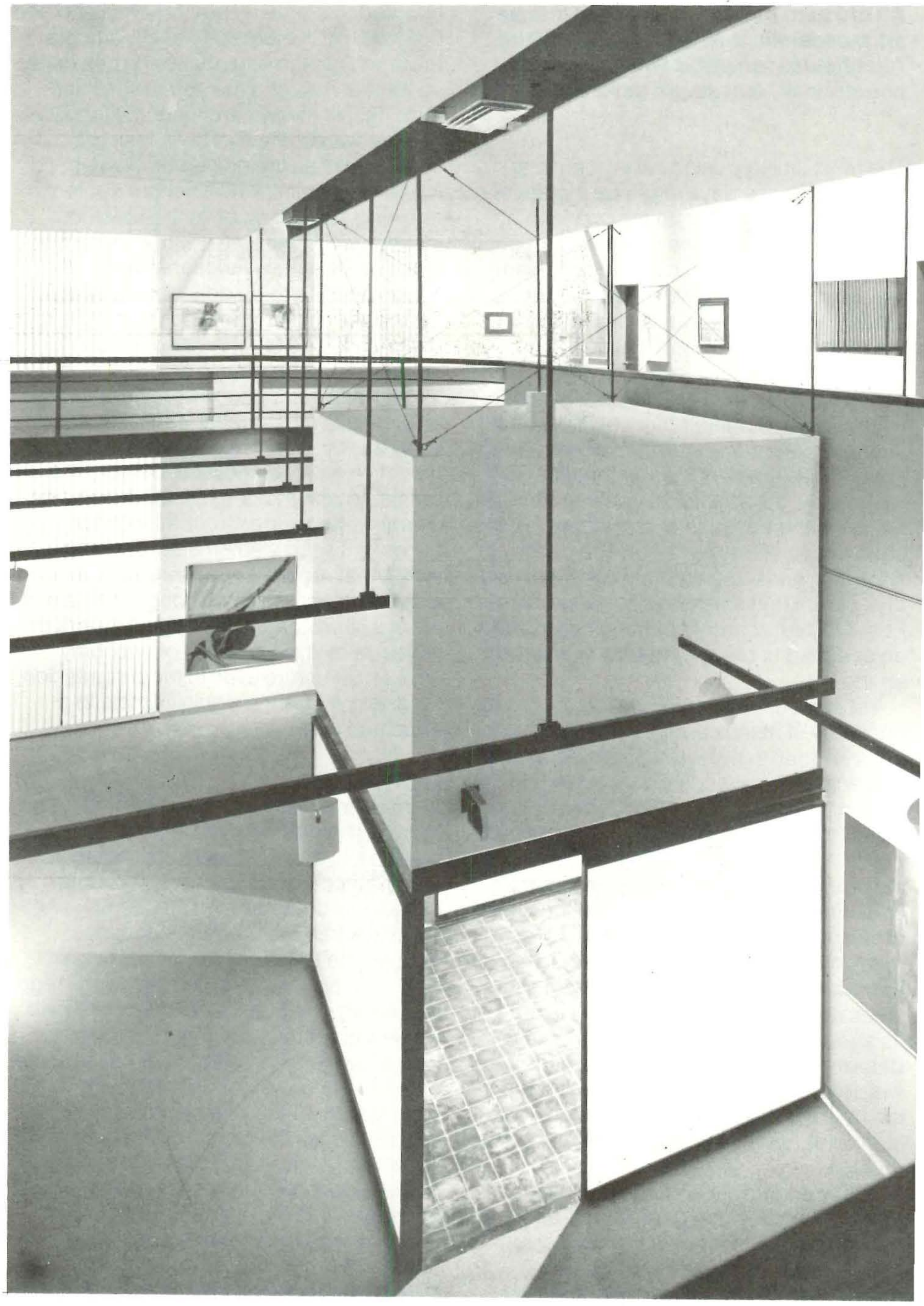
The use of reflective or translucent glass and acrylic panels establishes another motif. The façade (which has gone through several modifications in its lifetime, including a 1950s knockoff of an Edward Durell Stone screen) has been filled in with semi-reflective glass. The central glazed panel's distinctive subdivision into mullions and muntins of a brick pattern blown up to a large scale recedes behind brick flanking walls as if to point out that the old skin (brick) is being ruptured to reveal the new presence within. Although transparent glass occurs at the entrance, in the antechamber beyond the foyer translucent panels effectively diffuse daylight and glare emanating from the entrance. In the main exhibit hall Ferri installed ultraviolet-filtering translucent acrylic sandwich panels in the north-facing windows to block the view but allow light to permeate the space. Vertical jalousies installed in front of the windows further regulate light.

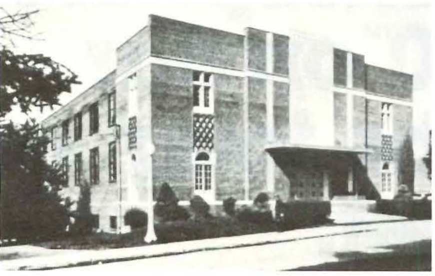
Spatial manipulation
Spaces are modulated by walls and ceiling heights, from the long narrow entrance foyer with its low arched ceiling to the even narrower but taller cubicular antechamber, and finally to the expansive two-story-high hall. In fact, from a rather conventional plan Ferri has not only differentiated spaces but in effect created two additional ones—the garden court and the antechamber—for the entire process of entering the museum and viewing its contents. Thus the progression takes the visitor up the tile path through an outdoor garden into the 14′ x 22′ foyer. Here the natural world is evoked by the extension of the path under the arched ceiling painted midnight blue and flecked with stars. From there, the visitor proceeds into the 10′ x 13′ antechamber, 15 ft high, where, deflected from the axial entrance way, viewers may pause before entering the main hall. In the narrow but high antechamber the gaze travels naturally upward to the refulgent hues of a Tiepolo-like morning sky painted on the plastered ceiling above.

By contrast, the space of the 66′ x 89′ main hall expands outward in a light but measured way due to controlled rhythms of the rectilinear lines, the ambient light, and delicate mauve color. Windows were blocked on both levels of the south and west walls to add extra display area. The jogging track, kept to provide a mezzaninelike area for viewing small-scale art works, is left open on the north wall. It is filled in underneath elsewhere and contoured at the corners to repeat the curve of the track itself—a nice counterpoint to the strong emphasis on straight lines and flat planes in the hall.

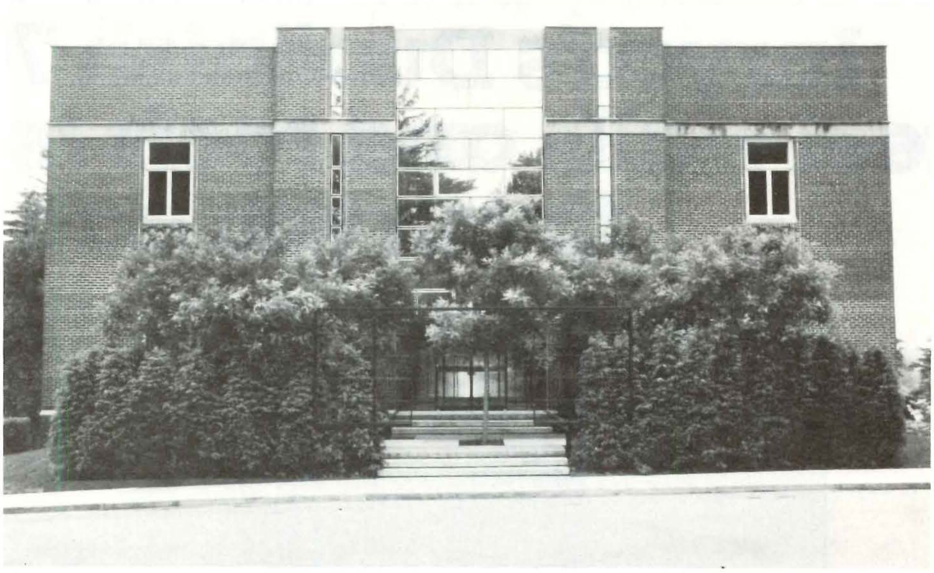
The use of wall planes to conceal and reveal the underlying shell establishes a clear dialogue between the new and old elements. The solid south wall conceals storage space for paintings behind it; the

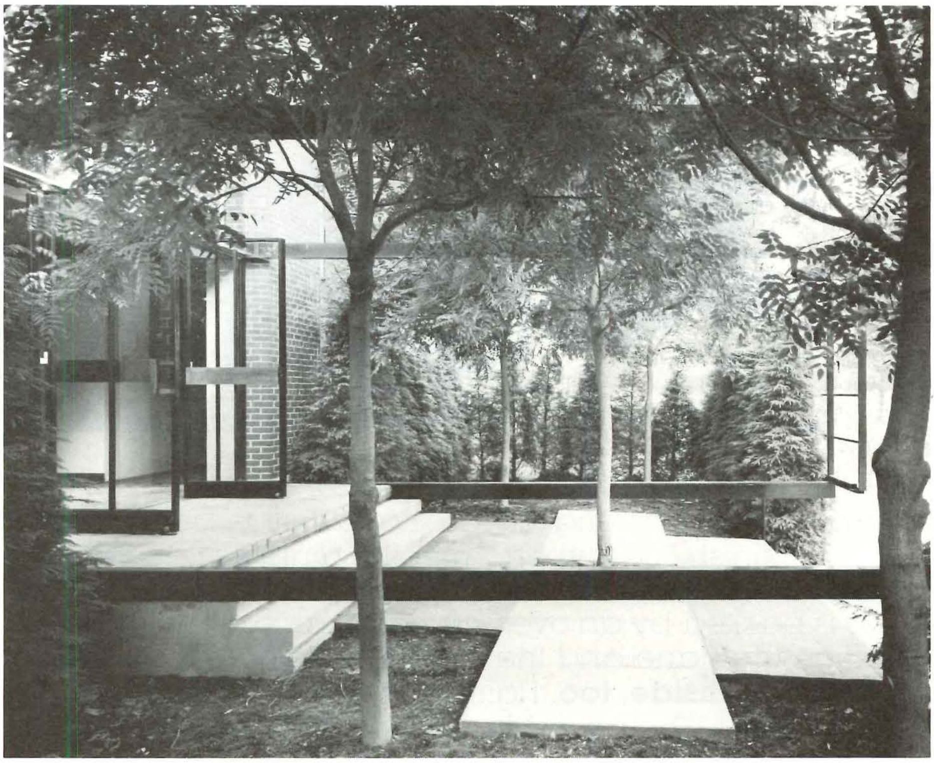
The exhibit space (above) contains one-story-high antechamber with ceiling inside painted.





Exterior changes involved removing the grill and installing reflective glass. A courtyard defined by black steel latticework creates a distinctive entrance fronting campus mall.





gypsum board on the north wall of windows, however, is cut away above and below window perimeters to reveal the pink-painted brick outer wall. Similarly, the suspended ceiling, treated as a series of stiffened "swags," yields glimpses of the older outer shell of the structure. Pulled away from the sides to expose the new black trusses, each "swag" is separated from the next one to make room for the air diffusers and lighting tracks, at the same time disclosing the old wooden rafters and joists, painted white, above.

In creating this quiet but sensuous environment, Ferri explains he was trying to establish a transition from the exterior of the building to the interior by mingling ingredients of the real context, natural and man-made, with ones that are "independently allusive." Thus "elements of nature merge with their quintessential abstraction . . . (and) architectural elements are dematerialized to allow their symbolic nature to predominate."

As museum director Michael Streuber points out, people visiting the museum do not frequently notice these symbolic and metaphorical devices. Nor do they often know what it is that makes the place special. But they are drawn to it. Not only does the museum attract 10,000 visitors annually (a large number considering the population of the college itself is only 1300), but the museum has become very popular as a cultural center. The flexibility of the main space, with its movable partitions, lends itself well to concerts, plays, meetings, dinners, and lunches. Events may not always relate directly to the art on display, but Streuber recognizes the value in exposing various organizations who want to hold a lunch there to the museum collections.

While the museum leases the building from St. Francis College, it is an independent entity with its own small permanent collection, supported by benefactors and a consortium of five colleges. Isolated in a rural area, the museum has a philosophy demonstrating the same daring and sense of realism about its image and role in the community that the architectural solution displays. There is an honesty and lack of pretentiousness apparent in both container and contained, a satisfying reassurance that art and architecture have been able to come together so elegantly and simply despite the constraints and exigencies of the situation. [Suzanne Stephens]

Data

Project: Southern Alleghenies Museum of Art, Loretto, Pa.
Architect: Roger Ferri, architectural designer (since registered), L. Robert Kimball, coordinating architect and engineer (architect of record).
Site: on the grassy tree-lined central mall of campus belonging to St. Francis College in rural area near Pittsburgh.
Program: convert a 1920s brick gymnasium into a museum. Only 10,200 sq ft were renovated in the first phase, including entrance foyer, kitchen, restrooms, cloakroom, exhibit hall, upstairs display and administrative offices. Still to be done are additional offices upstairs, basement workshops downstairs. A new fire stair tower also had to be built at the rear, though main stair to second floor remains unchanged.
Structural system: existing masonry bearing walls with wood roof; new structure included steel trusses spanning exhibit space, metal framing for antechamber, plus nonstructural custom steel to delineate spaces.
Mechanical system: existing steam radiator heating, supplemented by air-handling units, package air conditioning.
Major materials: steel trusses and members, gypsum board on metal studs, paint, quarry tile, carpet (in main hall), translucent acrylic panels with ultraviolet filtering, transparent glass, reflective glass. (See Building materials, p. 136.)
Consultants: Carroll Cline, artificial lighting; Isaac Goodbar, natural lighting; Acoustics and Noise Control, Inc., acoustical.
General contractor: Berkebile Brothers, Inc.
Client: Board of Directors, The Southern Alleghenies Museum of Art, Inc., Michael Streuber, director.
Cost: $365,000, overall cost; $41 per sq ft.
Photographs: Cervin Robinson.

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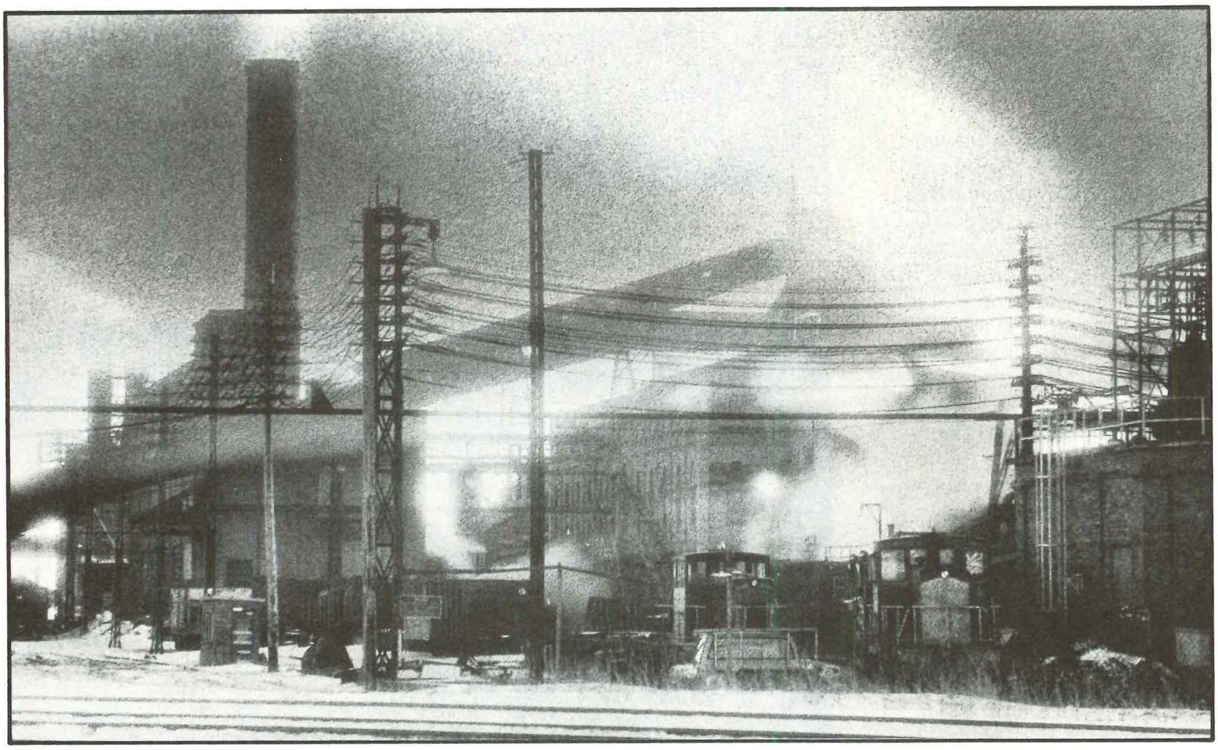

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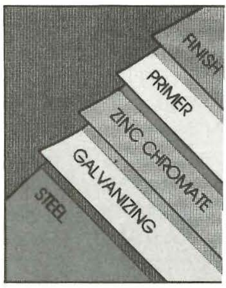

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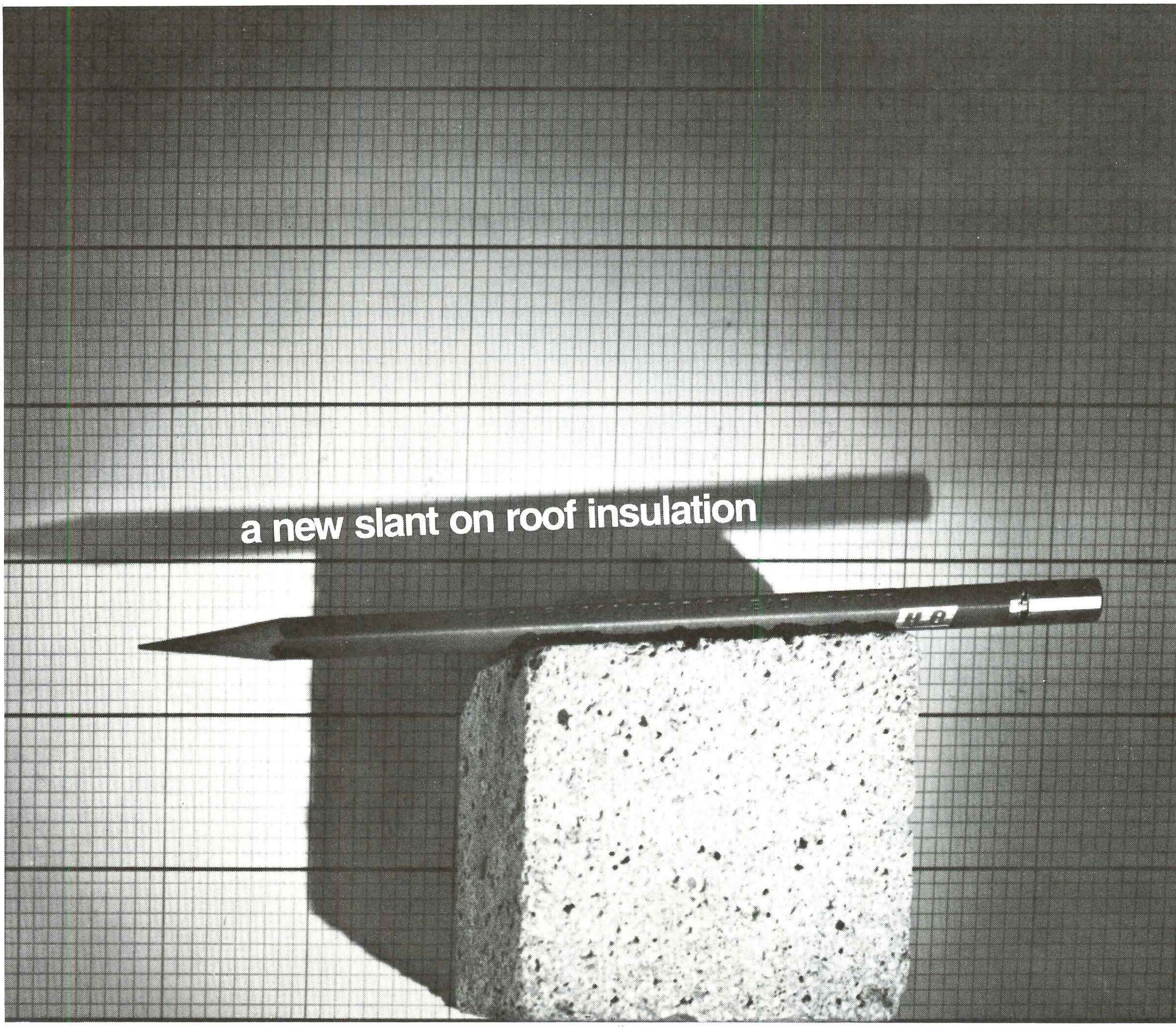

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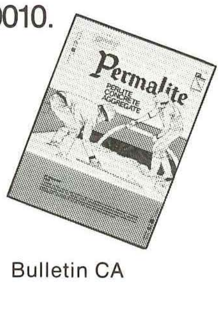


Bulletin CA

Circle No. 332, on Reader Service Card

Does CSI Division 3 really work?

William T. Lohmann, AIA, FCSI

Despite minor difficulties, the author finds CSI's format for concrete specifications readily adaptable for projects as varied as dams, highways, and buildings.

When the CSI 16-division format for construction specifications was established in 1963, some division titles were hotly debated. "Carpentry" became "Wood and Plastics." "Special Construction" was considered vague. Division 15 "Mechanical" was (and still is) constantly threatened by efforts to split it up.

"Concrete" was a logical entity, however. It encompassed several related trades and transcended regional differences. Consistent terminology had already been established by strong concrete industry associations. With proper subdivision, it could function equally well for architectural and engineering specifications. Consequently, 15 years later, Division 3 "Concrete" survives with relatively few scars.

The CSI concept of broadscope and narrowscope section titles was developed at the same time. Broadscope headings were assigned for comprehensive specification sections on normal projects. Narrowscope subheadings were added for special applications. Thus sections can be written for unique aspects of the work, special trades, separate contracts, or work that is unusually extensive in its scope. In practice, the concept allows great flexibility in use of the division breakdown.

Under Division 3, the broadscope titles reflect varying emphasis. Some titles are clearly trade-oriented: "Concrete Formwork," "Concrete Reinforcement," "Specially Finished Concrete." Some are determined by common subcontract packages, such as "Precast Concrete" and "Cementitious Decks." Others, like "Grout," are simply materials. Together they represent all aspects of concrete construction in broad terms.

The narrowscope titles in Division 3 give added dimension to the broadscope headings and a clue to some of the work normally specified under them. Reinforcing steel, welded wire fabric, and stressing tendons are narrowscope subheadings under "Concrete Reinforcement." "Concrete Accessories" includes expansion and contraction joints, anchors and inserts, and waterstops. "Specially Finished (Architectural) Concrete" covers exposed aggregate, tooled, blasted, and grooved surface finishes. The narrowscope designations also serve as section titles, although the breakdown under "Forms" is perhaps too narrow and contradictory (prefabricated forms, pan forms, steel forms) for effective use.

The distinction made throughout the division between structural and architectural concrete also shows up in the narrowscope titles assigned for formwork and cast-in-place concrete. It becomes somewhat nebulous when applied to precast work, however.

If used properly, the many titles have a particular advantage. By specifying all types of concrete in Division 3, it is only necessary to cross-reference that information in Division 2 sections for site concrete work or in Divisions 15 and 16 for related mechanical and electrical work, such as equipment pads and conduit encasement. Duplication is eliminated, thereby avoiding possible ambiguities and reducing time for specification preparation. The same advantage accrues within the division as well. By specifying all reinforcement under a separate section, only cross-references and description of related work are needed in the sections on structural, architectural, and precast concrete construction.

Division 3 titles are as applicable to heavy engineering projects, such as dams and highways, as they are for buildings. Separate sections can be written on hot and cold weather requirements for placing mass concrete. The specifier can also make effective use of narrowscope headings for special emphasis on admixtures, curing procedures, and finishing techniques. Those sections are then cross-referenced in the broadscope sections, which are usually the basis for measurement and payment provisions. Engineers are also discovering the advantages of utilizing the consistent CSI 5-digit system of numbering the systems.

In June of this year, CSI will issue revisions to the entire 16 divisions of the Format for Construction Specifications. It is the first major overhaul since 1972. Division 3 will be expanded by adding narrowscope titles for concreting procedures, concrete finishing, storage tanks, and precast gypsum plank and tile. More extensive changes are obviously not needed. Division 3 works. □

Author: William T. Lohmann, AIA, FCSI, is Chief Specifier for C.F. Murphy Associates, Chicago, Illinois.

Technics: Reinforced concrete

Innovation in concrete

Water Tower Place: Chicago's high strength concrete highest rise tower.

Reinforced concrete is a humble and obedient servant. It reflects the mind of the person who commands its act. It can rise into the sky, bridge two distant continents, nuzzle into the earth, or simply help to keep us warm.

Reinforced concrete is the only major structural material whose effective designed use always necessitates choosing its material properties as well as its mode of manufacture. It can be cast in place or precast, pumped, conveyor belted, sprayed or shoveled, wood formed, metal formed, plastic formed, rubber formed, or earth formed, shrinkproof, bleedproof, air entrained, high strength, early set, retarded, heavy- or light-weight, colored, faced, weather resistant, chemical resistant, pretensioned, simply reinforced, post-tensioned, fiber reinforced . . . have we left anything out?

The concrete industry is therefore composed of people who manufacture the material, people who manufacture the materials to manufacture it, people who handle it, and those of us who make designs for its use. The material itself and its uses are constantly undergoing innovation and change. The task of coordinating all of this information is, to be sure, a difficult one. The many trade organizations which exist in the concrete industry often seek the aid of architects to help complete this task. Both the American Concrete Institute and the Prestressed Concrete Institute encourage the participation of architects. All of the concrete-related organizations supply information valuable to designers.

The new ACI publication, *Building Code Requirements for Reinforced Concrete (ACI 318-77)*, and its accompanying commentary will soon replace the 1971 version as the code adopted by municipalities for the design of concrete structures. The new ACI *Design Handbook,* when completed, will be of particular use to architects for simplified design procedures. The changes in the new code do not represent a striking divergence from the old 1971 version. The recent trend has been toward performance codes in general. As the knowledge of structural behavior becomes more and more precise, the code must at the same time be more rigorous and allow greater design freedom. A new code must also accommodate new directions in the strength of concrete.

Until shortly after World War II, the construction industry considered 3500 psi to be high-strength concrete. This compressive strength was commonly specified for such applications as high-rise building columns and long-span beams.

In the late 1940s and early 1950s prestressing crossed the Atlantic and began appearing throughout North America. Since prestressing is dependent on high-strength concrete to realize its structural potential, much experience was acquired in achieving the 5000 psi compressive strength commonly used in prestressed work.

Important improvements in the equipment and materials used to manufacture concrete made it possible to achieve high-strength concrete on job sites, as well as in casting yards. The acceptance of ultimate strength design in building codes throughout the country brought about the liberation of concrete from the traditional 20-story height limitation.

For years concrete frames cut down on usable floor space because of larger columns, reduced partition flexibility due to smaller bay sizes, and increased building height because of deeper floor cross sections. The use of shear walls, ultimate strength design and, to a lesser extent, load-bearing periphery walls, increased the usable floor area in a concrete-framed building. New design techniques and higher-strength concretes reduced column size to comparable dimensions of steel frames, and frequently less where fireproofing was required in steel. These factors, coupled with the use of lightweight structural concretes, significantly widened bay sizes in concrete building frames.

The key to many of these advances was uniform-high-strength concrete. Year by year, strengths increased. When 1000 Lake Shore Drive and Lake Point Tower were built in Chicago, 7500 psi compressive strength concrete was used for the lower columns. Then came Water Tower Place at 559 ft and 64 stories. Five different concretes were used and 24 design mixes. 9000 psi ready-mixed concrete was used in all of the columns from the foundation to the 25th floor. The vertical column size changed four times. They carry loads that reach almost 15 million pounds.

Constructability

Constructability refers to a highly important group of performance characteristics of plastic concrete, including such matters as rate of set and strength gain, pumpability, workability, and finishability. Contractors are coming to realize that constructability of concrete has an important bearing on the hours their crews take to place concrete, and the length of time expensive equipment must be held on the job. These matters have great effect on the profit a contractor will realize on a project.

Rate of set and strength gain are determined not only by the ingredients in concrete but also by placing conditions. Ready-mix producers might incorporate ice into the mixture on hot days, or they might use heated water during cold days. The most commonly used technique to customize concrete set and strength gain to job needs is through admixtures.

Acceleration of concrete set and strength was for years accomplished with calcium chloride. This material is low in cost, readily available, and did the job. However, recent construction technologies and laboratory findings have limited its applications. It cannot be used in prestressed concrete because of corrosion problems of aluminum, magnesium, and galvanized steel. It also aggravates deterioration of concrete subjected to sulfate attack and can increase alkali-aggregate reactions. Sometimes spotting of finished flatwork can result.

Fortunately, compounded admixtures have been developed that do an even better job of controlling rate of set and strength gain. They are available either in formulations that use minuscule amounts of calcium chloride that suit the great majority of jobs, or in formulations for especially exacting applications that contain no calcium chloride at all.

Workability and the allied matters of pumpability and finishability are also dependent on many factors. Aggregate gradation, particle shape, and texture are critical in achieving concrete that will not clog pump lines and that will be easy to consolidate around dense reinforcement.

Water content has a bearing on the flowability of concrete. The setting characteristics of a cement will determine how much time one has to handle concrete. A new generation of admixtures was introduced about ten years ago that not only increase early and ultimate strength, but also give concretes greater workability, pumpability, and flowability.

Super fluid concrete

The eternal tug-of-war on construction jobsites has been the call by the contractor for as fluid a concrete as possible to make placement easy, and the demand by the inspector for as stiff a concrete as possible to keep hardened concrete properties up to specification. In the last couple of years a new admixture has been tried on several jobs in the U.S. that suggests it may be the answer to pleasing both contractors and inspectors. It is the super-plasticizer.

There are two or three organic compounds that are used for super-fluidifiers or super-plasticizers; and there are several proprietary admixtures available. Characteristically, they greatly increase slump for a limited length of time, changing a concrete mixture, for example, of 3-in. slump to a slump of 8 in. or more. Despite this great flowability, they can ideally result in concrete in place with little segregation, and good strengths.

Many sizable advantages are immediately apparent. Good consolidation can be achieved even in structural members densely packed with reinforcement. Architectural detail in concrete surfaces can be much sharper. Jobsite manpower and equipment can be reduced. Time to get concrete in place may be shortened. Formwork costs may be cut since vibrator access is reduced and the damage to form faces by vibrators is lessened.

Super-plasticizers have been used in the construction of precast elements for the Olympic Stadium in Montreal and precast railroad ties for the high-speed "bullet" train in Japan. They have also been used by a few American manufacturers.

Demonstrations and attempts to use super-plasticizers in the U.S., however, have found mixed success. In the highly controlled environment of precasting yards there have been failures because of the demanding, interconnected complex of materials-handling-environmental criteria that must be met.

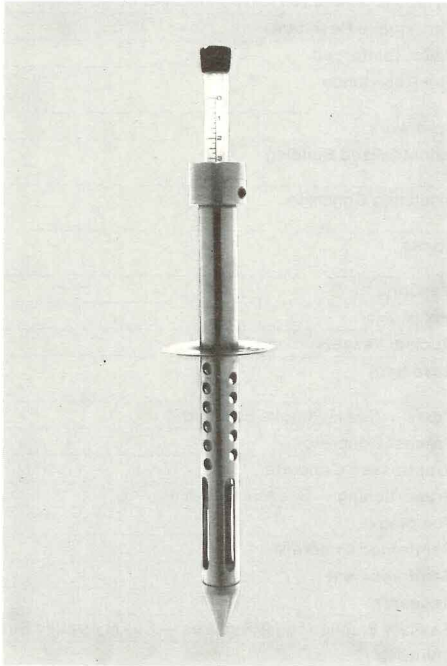
Care must be exercised if superfluidifying admixtures are introduced into the concrete mixture at the jobsite. Experience has shown that rapid set can occur in less than 30 minutes and, under other circumstances, set can be delayed for hours.

Unless sand content and gradation are carefully selected and controlled, bleeding can be aggravated greatly. In addition, severe segregation can occur with some aggregates and also under some mixing or placing conditions.

Results of durability tests of hardened concrete with super-plasticizers have been irregular. Tests by the U.S. Army Engineers Waterways Experiment Station and the German Cement Research Institute on freeze-thaw resistance of saturated concretes made with super-plasticizers have caused these agencies to caution in their use. Other laboratories have found them to be durable.

The appeal of super-plasticizers to people on jobsites who must move or consolidate concrete is undoubtedly considerable. The bulk of experience at this point indicates that these new admixtures await further development before they are ready for general application. There is a need to develop products that can be introduced into the mixture at the batch plant and still provide adequate time for transportation to and handling on the jobsite. They must not bleed or segregate excessively, and they must result in durable, high-strength hardened concrete with a high degree of reliability. There is every reason to believe that such products are being developed.

As if to match the increased interest in slump, a new device has been invented to measure it. Professor K.W. Nasser of the Department of Civil Engineering at the University of Saskatchewan has invented a device similar in appearance to a hypodermic needle which can measure the slump of concrete in place, or in a wheelbarrow for that matter. The gauge is stuck vertically to its hilt in fresh concrete and 60 seconds later the slump is read on the plastic calibrated scale. A bonus application of the instrument is its ability to judge workability. The device is called a "K-Slump Tester" and is manufactured in Canada by Smith-Roles. It has not been officially accepted as yet by U.S. codes, but its use grows daily. The advantage, of course, over the traditional slump testing cone is in being able to accurately test the mix directly and not a small controlled batch set aside for that purpose.



Smith-Roles

Shown above is the new slump testing device.

Prestressing

One important option in the manufacture of reinforced concrete today is the use of prestressing. An initial tensile force is applied to the reinforcing tendons prior to the concrete pour. When the concrete has set, the tension is released, causing the concrete in the area surrounding the steel to compress. In the normal bending of a beam (or slab) the bending load must assume cracking in the tensile section of the beam. The prestressed beam initiates compression of the entire section and the compressive force must be overcome in order to produce this cracking. Prestressing allows the use of higher strength steel as well as high-strength concrete. The savings in concrete weight can approach 30–50 percent, and the steel reinforcement can be less than 20 percent of the normal requirement.

Thirty years ago, the possibility in this country was barely a reality. Its develop-

Technics: Reinforced concrete

Chart indicating the organization to be contacted to obtain information on the items listed

(The numbers at the intersections of lines and columns represent keyed organizations — See list of national organizations and key numbers below.)
Prepared for P/A by American Concrete Institute

	Codes	Specifications	Recommended Practices	Guides	Handbooks (Design Aids)	Detailing Manual	Supply
Accessories							9,10,11,16 30,31,32
Admixtures	1	1,7	1,26	1,26			9,14,26
Aggregates	1	1		1,4,17,19,20 22,28			15,17,19,20 22,23,24,28
Architectural Concrete				1,8,14,21 26,27,29			8,14,21,24 27,29
Coatings (Sealants)		1,7,14		1,26,31			
Cold Weather Concreting	1	1,14		1,22,26 27,29			
Columns	1	1			1,12	1,12	
Composite Construction	1	1			1,12	1,12	
Consolidation (Placing-Vibrating)	1	1,7,14		1,4,22,26			4,9,10,22 26,27,29
Curing - Durability	1	1,7,14		1,22,26			9,10,22,26
Hydraulic Structures (Storage, Treatment, Distribution)	1	1,7		1,3,14,22			3,14,22,29
Earthquake Resistance	1						
Fiber Reinforced				1,22,26			
Fire Resistance				7,22,26 27,29			
Formwork	1	1,14	1	1,26,30			6,9,10,30
Industrialized Building				1,26,27 29,21			21,26,27 29
Insulating Concrete				1,7,8,11			8,11,15 17,21,23,25
Joints				1,2,14,13,26			2,13,14,16 31
Masonry		1,18,33		1,18,33			18,33
Mix (Mixing)	1	1	1	22,26			22,26
Nuclear Vessels	1	1					
Pavement				1,2,19,22 26			2,19,22,26
Pipes — See Hydraulic Structures							
Precast Concrete	1	1		8,21,29			8,21,29
Prestressed Concrete	1	1		1,27,29	27,29		27,29
Proportioning — See Mix (Design)							
Pumping	1	1		1,4,22,26			4,22,26
Reinforced Concrete	1	1	1	1,12,22,26	1,12,22,26	1,12	12,22,26
Reinforcement	1	1		1,12,22,26			12,22,26
Research*							
Sanitary Engineering Structures — See Hydraulic Structures							
Shells				1,12,22,26 27,29			
Shotcreting	1	1		1,26			1,26
Silos			1	1,22,26			22,26
Temperature (Hot Weather Concreting)	1	1		1,22,26			
Testing	1	1,7	1	22,26			5

1 American Concrete Institute
Box 19150
Detroit, Michigan 48219
Phone: 313-532-2600

2 American Concrete Paving Association
1211 West 22nd Street, Suite 727
Oak Brook, Illinois 60521
Phone: 312-654-4330

3 American Concrete Pipe Association
8320 Old Courthouse Road
Vienna, Virginia 22180
Phone: 703-821-1990

4 American Concrete Pumping Association
404 West Jacaranda Place
Fullerton, California 92632
Phone: 714-879-7759

5 American Council of Independent Laboratories
1725 K Street, N.W.
Washington, D. C. 20006
Phone: 202-659-3766

6 American Plywood Association
1119 A Street
Tacoma, Washington 98401
Phone: 206-272-2283

7 American Society for Testing and Materials
1916 Race Street
Philadelphia, Pennsylvania 19103
Phone: 215-299-5474

8 Architectural Precast Association
825 East 64th Street
Indianapolis, Indiana 46220
Phone: 317-251-1214

9 Associated Construction Distributors International Inc.
6520 Powers Ferry Road, N. W., Suite 200
Atlanta, Georgia 30339
Phone: 404-955-2405

10 Associated Equipment Distributors
615 West 22nd Street
Oak Brook, Illinois 60521
Phone: 312-654-0650

11 Cellular Concrete Association
715 Boylston Street
Boston, Massachusetts 02116
Phone: 617-266-6800

12 Concrete Reinforcing Steel Institute
180 North LaSalle Street, Room 2110
Chicago, Illinois 60601
Phone: 312-372-5059

13 Concrete Sawing & Drilling Association
606 North Larchmont Boulevard, Suite 4A
Los Angeles, California 90004
Phone: 213-467-1158

14 The Construction Specifications Institute Inc.
1150 17th Street, N.W., Suite 300
Washington, D. C. 20036
Phone: 202-833-2160

15 Expanded Shale Clay & Slate Institute
7401 Wisconsin Avenue, Suite 414
Bethesda, Maryland 20014
Phone: 301-654-0140

16 Expansion Anchor Manufacturers Institute Inc.
331 Madison Avenue
New York, New York 10017
Phone: 212-661-2050

17 Lightweight Aggregate Producers Association
546 Hamilton Street
Allentown, Pennsylvania 18105
Phone: 215-435-9687

18 National Concrete Masonry Association
Box 135
McLean, Virginia 22101
Phone: 703-790-8650

19 National Crushed Stone Association
1415 Elliot Place, N.W.
Washington, D. C. 20007
Phone: 202-333-1536

20 National Limestone Institute
3251 Old Lee Highway, Suite 501
Fairfax Virginia 22030
Phone: 703-273-8517

21 National Precast Concrete Association
825 East 64th Street
Indianapolis, Indiana 46220
Phone: 317-253-0486

22 National Ready Mixed Concrete Association
900 Spring Street
Silver Spring, Maryland 20910
Phone: 301-587-1400

23 National Slag Association
300 South Washington Street
Alexandria, Virginia 22314
Phone: 703-549-3111

24 National Terrazzo & Mosaic Association Inc.
2-A West Loudoun Street
Leesburg, Virginia 22075
Phone: 703-777-7683

25 Perlite Institute Inc.
45 West 45th Street
New York, New York 10036
Phone: 212-265-2145

26 Portland Cement Association
5420 Old Orchard Road
Skokie, Illinois 60076
Phone: 312-966-6200

27 Post-Tensioning Institute
1701 Lake Avenue, Suite 375
Glenview, Illinois 60025
Phone: 312-729-9660

28 National Sand and Gravel Association
900 Spring Street
Silver Spring, Maryland 20910
Phone: 301-587-1400

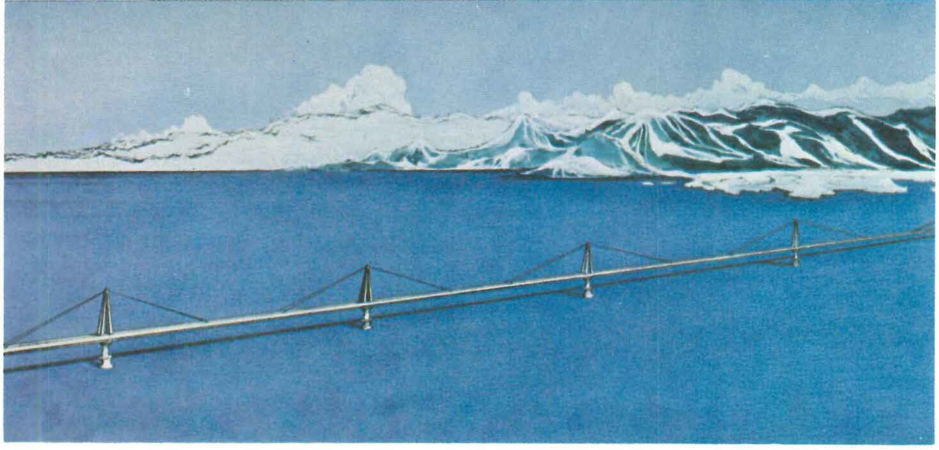
29 Prestressed Concrete Institute
20 North Wacker Drive
Chicago, Illinois 60606
Phone: 312-346-4071

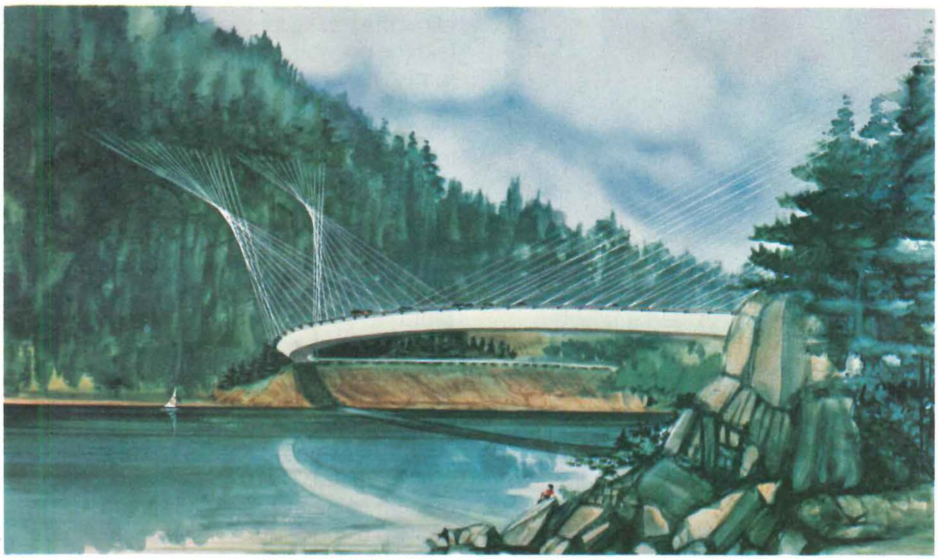
30 Scaffolding and Shoring Institute
1230 Keith Building
Cleveland, Ohio 44115
Phone: 216-241-7333

31 Sealant & Waterproofers Institute
1800 Pickwick Avenue
Glenview, Illinois 60025
Phone: 312-724-7700

32 Wire Reinforcement Institute
7900 Westpark Drive
McLean, Virginia 22101
Phone: 703-790-9790

33 Brick Institute of America
1750 Old Meadow Road
McLean, Virginia 22101
Phone: 703-893-4010





Two cable-stayed bridge proposals by modern day concrete master T.Y. Lin, the Peace Bridge (top) and The Ruck-A-Chucky Bridge (bottom).

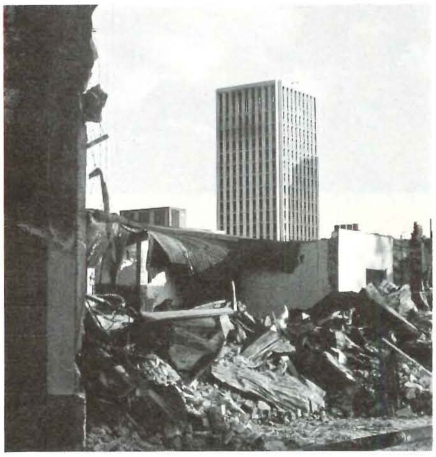
ment is due primarily to the work of three engineers, Eugene Freyssinet, Gustave Magnel, and T.Y. Lin. The man to develop the idea first was the Frenchman, Freyssinet. A contemporary of Le Corbusier, Freyssinet saw the great potential of the idea and risked his professional career to prove this theory. The technology in the U.S. began in Philadelphia with the Walnut Lane Bridge (1950) by Gustave Magnel, a colleague of Freyssinet. It remained for Lin, who worked with Magnel, to assemble the definitive text on the subject and simplify the design methodology. Since the early 1950s, Lin has played a distinguished role in the history of concrete construction. Parallel to his work, the use of pretensioning has grown until the use of precast pretensioned hollow core slabs has reached "boom" proportions.

T.Y. Lin

One of the recent projects of T.Y. Lin is a collaboration with SOM of Chicago called the Ruck-A-Chucky Bridge in California. The new bridge replaces an old one, thought to be named after the bubbly rapids of the American River below. The award-winning bridge design is unique in its curved geometry and cables lodged into the mountain side. The curve allows the bridge to avoid tunneling into the mountain, and takes advantage of the existing feeder roads running along the mountain slopes. A cable-stayed bridge allows the cables to serve as exterior post tensioning for the concrete. One end of the cable is grouted into a 100-ft-deep hole drilled into the rock, as a rock anchor. The other end of the cable is attached to the concrete as it is slip-formed into place. Two wagon-type slip-forms will start at the opposite ends of the bridge and meet at the center. The bridge itself is uniformly trapezoidal in cross section and constant in curvature to allow the wagon forms to remain unchanged along the run.

Another famous cable-stayed bridge by Lin is the International Peace Bridge designed to cross the Bering Strait from Alaska to Siberia. The bridge would span the 50-mile-wide strait with a hollow concrete box girder on piers every 1200 ft. The tube would be built from 20-ft prestressed sections strung together and post tensioned into longer 2400-ft lengths. The bridge piers would also be precast but as huge hollow "bottle" shapes which would be floated to the site, filled, and sunk. Each 2400-ft section is supported twice, becoming a long overhanging beam. The cable stays are positioned to minimize the deflection and allow expansion joints at the free ends of the beam. Lin heads a nonprofit organization to raise the estimated billion dollars to build the bridge.

The rare mix of engineering intuition, knowledge, and imagination has led us to expect innovation in every building engineered by Lin. The office of T.Y. Lin has brought so many innovations into the field of architectural engineering that an entire issue of the magazine would hardly suffice to do justice to them. A striking achieve-


Jorge Lee

Banco de America, Managua, after quake.

ment has been the behavior of the Banco de America building in Managua, Nicaragua (on which Lin was consulting earthquake engineer) during the earthquake of December 23, 1972. A ½-in. fault occurred outside the building along the street, but structural damage was limited to minor cracks in beams connecting the shear walls. Equally impressive to the owners of the building, the nonstructural damage consisted of rehanging some marble facing and restoring bookshelves.

The core of the building was designed to behave both as four individual cores and as an ensemble. Beams connecting the cores made this system work. Columns around the exterior of the building helped support the concrete flat slab. Analysis of this building, as well as others which successfully weathered the quake, has led engineers to believe that a building must be ductile enough to absorb the earthquake shock but rigid enough to avoid nonstructural damage. A monolithic core would have been too stiff; independent, unconnected core sections, probably too flexible. The connecting beam allowed a hinge to form which kept the cores acting together.

Prior to the Managua quake, earthquake design in concrete emulated steel frame design reasoning that seismic forces could best be absorbed in a flexible frame. Shear walls are now being tested at Portland Cement Association laboratories and their ductile properties explored. Experiments have convinced engineers that structural systems combining shear walls with frame construction will prove an excellent solution to high-rise buildings in seismic zones three and four. Should a seismic code change permit wider use of such a system in taller buildings, the result would mean great economy of construction and improved life safety and damage control.

Construction techniques

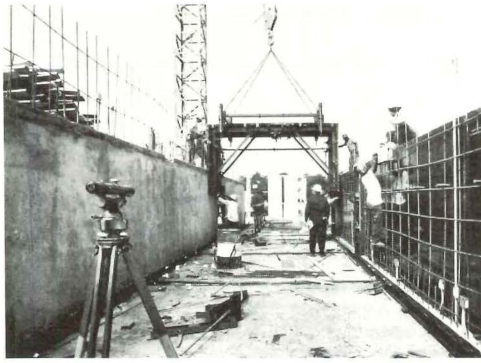
Tunnel forms: After World War II, concrete was a commonly used reconstruction material. The need was great for a rapid, inexpensive system to produce housing at a large scale. Several techniques emerged during that time in France and have since migrated to this country. These systems tried to take advantage of factory precasting techniques without the disadvantage of traveling range limits of the precast members, from the factory. One of these solutions is tunnel forms.

As the name implies the form is shaped like a squared tunnel. It rolls on a track on the floor slab and serves as the inside form for the ceiling and walls. Each "portico" has a heating system allowing rapid curing.

Two sets of tracks and one set of forms allow the tracks for the day's pour to be laid the previous day. When the tunnel form is removed in the morning it is rolled out of its completed bay, lifted to the next bay, and rolled to its new position. Reinforcing, wiring, and door cutouts are ready to position. The walls and floor slab are poured and the slab is finished. The tracks are removed from yesterday's pour, and so on. The heating device is activated and the curing process begins.

Multi-leveling component system: Lift slabs were invented in Texas and in use by the early 1950s. The system consists of casting several floor slabs directly on top of each other and lifting them, using jacking devices located at the top of the column sections. The first and second floor column sections are installed prior to the casting of the floors. The slab jacking devices at the top of each column section must be disassembled and removed before the next column section can be attached. The columns sometimes require additional lateral restraint once the slabs are lifted into place. The MLCS System was developed by engineer Kolbjorn Saether, and Telander Bros., a Chicago contractor. The new modified lift slab system allows all of the slabs to be poured before the first columns and lifting tracks are installed. Once the columns are in place, lifting shores are installed and two jacks are mounted, one on either side of the column. All of the slabs are then lifted simultaneously to a position just above the level of the first slab position. At this position, "wall columns" are inserted as vertical supports and eventual lateral support. The bottommost slab is then separated from the others and rested in place. Additional floors are erected until more column length is needed. The jacks in their side location permit connection of the next column section while they remain in place. When the building reaches full height, dowels are passed through the wall columns to give them integral action. All lift-slab systems eliminate shoring and extensive formwork. The floor area of the slab can take advantage of precasting control and consistency but also have the structural continuity normally associated with cast-in-place structures. The inventors estimate the system can save $1/sq ft over regular construction.

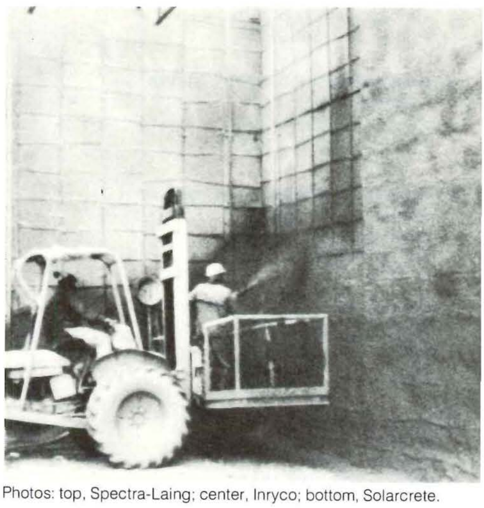
Solarcrete: Seven years ago, two Indiana brothers, Douglas L. Graham, PE, and Mark L. Graham, Contractor, began thinking about the energy problem. They decided to research the existing solutions to an energy efficient house design. Dissatisfied with what they found, they built the first prototype of their own solution. The result was an innovative use of concrete called Solarcrete. Solarcrete is a building system which consists of 4 in. of polystyrene covered and sealed on both sides with a 2-in. layer of concrete. The concrete is an especially dense mix, sprayed on. The resulting structure is air and water tight. On the south side of the building, in addition to the polystyrene layer, an optional array of polyvinyl chloride piping can be imbedded in the wall. Water is pumped through the pipes and the heat is stored in a large insulated concrete tank beneath the building. The wall acts virtually as a solar collector furnishing space heat to the building. The Solarcrete people claim a 75 percent reduction in energy requirements over conventional design. In their words, "If you can make it work in Northern Indiana, you can make it work anywhere."



A tunnel form shown being lifted into place.

The MLCS lifting slabs by double jacking.

The shotcreting nozzleman builds a solar wall.



Photos: top, Spectra-Laing; center, Inryco; bottom, Solarcrete.

Sepp Firnkas

In 1963, architect Carl Koch collaborated with Boston engineer Sepp Firnkas on a research project for the Boston Redevelopment Authority. The purpose was to develop a low-cost housing system for the Roxbury area of Boston. The structural system was an innovative solution in concrete (P/A Citation, Jan. 1965, pp. 158–159; Nov. 1971, p. 100). It consists of precast wall panels and pretensioned floor panels which are strung together and post tensioned vertically. Use of post tensioning allows the Firnkas system to be rapidly assembled without welding, bolting, or leaving a pocket around the connection which must be patched afterwards. Firkas continues today to improve and perfect the system with craftsmanlike patience and precision.

One task was the refinement of connection details. The joints had to be easy to fabricate, rapid to assemble, and watertight. The post tensioning solution solved many problems from the start but the early horizontal wall joints leaked.

The next task was to explore the flexibility of the system. If the system was to be versatile it had to adapt itself to high-rise as well as low-rise buildings, variations in climate as well as in seismic and hurricane load. Another consideration was site planning and building plan variations. To solve these problems, Firnkas has the aid of inhouse architect Ulrich Boehlke.

To be able to compete with conventional structural systems, Firnkas found that he needed a rapid method of cost estimation. "It took three years to find out what costs money," Firnkas explains. The solution was a simple graph. The in-place cost of the structure is plotted against the floor-to-wall ratio of the building in question. Two curves were developed, one for southern building costs and one for northern costs. The correct costs usually have a very accurate correspondence to the graphs, and fall between the two. The curves were completed in 1970, and in spite of the inflation rate, have been modified only once for greater accuracy. The reason for the continued precision in spite of rising costs is that the Firnkas system itself is constantly undergoing improvement which progressively reduces the cost.

The other major area of design improvement has been in the area of energy. In the early days, Firnkas had difficulty finding mechanical engineers who were sensitive to the energy-conserving qualities of concrete. Says Firnkas: "When it comes to energy, I get into it from the design and materials aspect. I am very much involved and conscious of the influence that a method of construction and the materials used have on energy."

The influence of Firnkas' interest in energy is clear in the variation which has taken place in the nonstructural wall panels on the exterior of the building. The most recent area of interest has been the use of fiber-reinforced concrete sandwich panels which are filled with expanded polystyrene and gypsum board interiors.

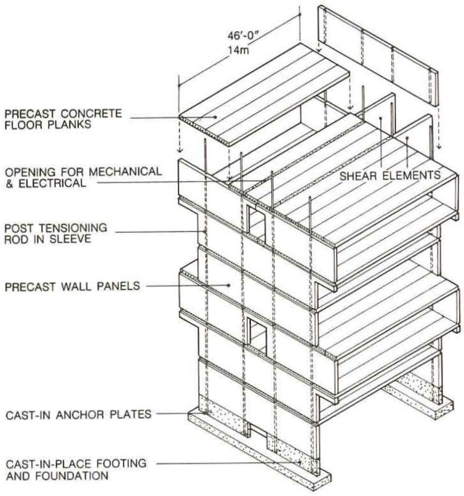
In 1971, Firnkas began work on a second precast building system. The system differed from the first in that it is designed solely for a low-rise, maximum height of three stories. In working with his original system, Firnkas discovered that small-scale contractors differed greatly from contractors of large projects. He found that residential contractors were limited to lightweight construction, small crews, and small financial resources. The new system needed to be simple, self-supporting, and rapid.

A special concern was the energy demands made of the building. To solve the problem, he constructed a large "vacuum bottle." The precast vertical elements are L-shaped, and use expanded polystyrene pellets instead of coarse aggregate. Originally conceived in Europe, the pellet system reduces the compressive strength of the concrete to 700 psi but increases the U-value to the required .10 for an 8-in. concrete wall. The only problem with the expanded polystyrene concrete is the rather irregular surface, which needs waterproofing.

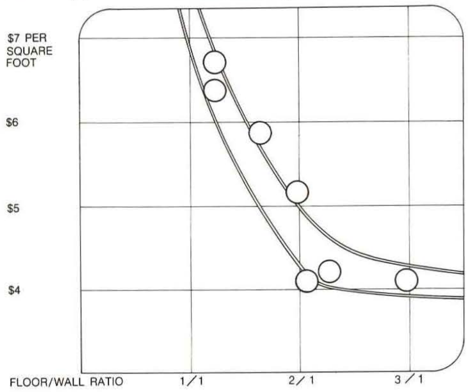
Firnkas' solution to the waterproofing of the concrete L's is a typical innovative approach. When the system was in the developmental stages, he was giving a lecture to a group of students in Cambridge. A member of the audience informed him of a paint invented in Poland which had thermal insulative properties. The paint's nickname was "liquid wallpaper." Firnkas' curiosity soon led him to Warsaw and a meeting with the paint's inventors. The paint is actually made of refuse—shredded paper. The paper is the filler material suspended in a polymer solution. It is applied with standard spraying apparatus and renders the concrete surface impervious to water. The final surface resembles stucco in appearance and is a good insulator. The paint is permanent and comes in an assortment of colors. Firnkas brought the paint to this country and is fabricating it in a plant in New Jersey. It is called ICOAT after the name of the Firnkas organization which is called ICO Systems Inc., International Construction Corporation. The rest of the L system is composed of standardized precast slab elements. The system called the ICO-L uses the inverted extruded polystyrene roofing method which completes the vacuum bottle.

It is Firnkas' interest in energy consumption which has led to participation in the AIA Research Corporation project to determine Energy Performance Standards for the Design of New Buildings. In 1976, the U.S. Congress directed HUD to develop and implement energy performance standards for the design of new buildings. HUD turned to the AIARC. Hundreds of buildings were selected and recorded by a computer program as part of the first phase of the study. For phase two, approximately 150 buildings have been chosen to be thoroughly analyzed and redesigned. A Firnkas building was one of those chosen for this phase of the project. The third

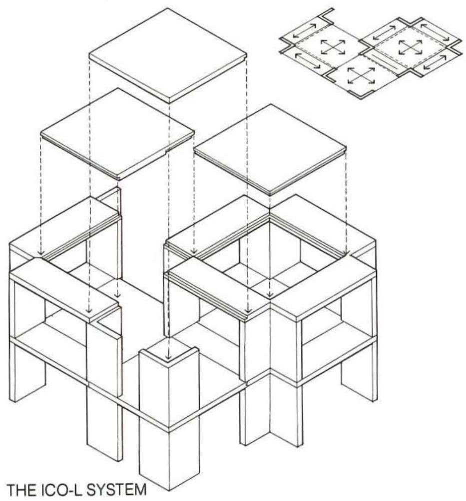
ICO Systems' Hillsborough, NJ apartments.



The Sepp Firnkas Structural System.



The ICO System curve quickly estimates cost.



THE ICO-L SYSTEM

phase of the project will entail the construction of new buildings following the suggested guidelines which emerge from the project. By late 1979, a cohesive performance standard for new buildings should emerge.

Thermal mass

Prior to the energy crisis, mechanical systems for buildings were designed using a "steady state" understanding of heat loss and heat gain for a building. The basis of this design is the existence of a steady one-way heat flow through a material. The amount of heat which can penetrate a wall is dependent upon the resistance that the wall maintains to that heat flow.

Peak load conditions are always the basis of sizing the equipment for a given space. The coldest temperatures of the year usually are used to estimate the heating equipment size and the hottest temperatures or occupancy loads usually are used to size the cooling equipment.

The result of the traditional methods was to oversize the HVAC equipment, waste energy, and penalize buildings of heavyweight materials. One reason for the error is the fact that heat flow is not always in the same direction. The direction of heat flow is always from hot to cold, but at times directed into a wall and other times out from a wall. When heat flow changes direction another characteristic of material plays an important role, thermal mass.

The classic example of thermal mass is the thick-walled adobe dwellings of the Southwest. During the day, the heat is on the outside, passing into the house. At night, the heat is on the inside, passing out of the house. If the material is heavy, like adobe, it takes a long time to heat up and a long time to cool down. The heat in a heavy material is thought of as having an inertia analogous to the inertia of a heavy body that resists movement. To use electrical terminology, we can say that the material has capacitance. Materials of low density generally have higher resistance to heat flow than those of high density. The heavier a material, the greater its capacitance.

What isn't so obvious is that even northern climates are affected by thermal mass. The thermostat on the heating equipment is adjusted so that when it is set at a particular temperature, it kicks on a few degrees below that setting and kicks off a few degrees above it. When the heater is on, the heat is flowing into the space and into the materials in the space. When the heat is off, the heavy material uses its capacitance to retard the loss of heat. The result is that the heating equipment for a massive building cycles on and off less frequently and uses less energy.

The peak load characteristics based upon only resistance factors for heavy materials were overestimated. When energy became an issue in buildings, annual operations costs were also taken into account. The materials began to take on new meaning.

The ASHRAE design procedure for estimating the air conditioning load on a building has now recognized thermal mass in its design method for cooling design. The method of calculating heat gain in a space uses the Equivalent Temperature Differential instead of actual temperature difference between the air temperatures on either side of the wall. In other words, the Equivalent Temperature Differential is higher if the wall is light in weight. The system favors the heavy materials.

Unfortunately, ASHRAE Standard 90–75, which is the current code requirement for building mechanical system design, permits taking the thermal lag into account for walls only, and only in cooling design. The peak cooling effect of a wall may be adjusted for thermal mass, but roofs cannot.

What is even more startling is that thermal mass is not considered at all for the determination of peak heating loads for a building.

In this age of energy consciousness, the structure of a building is rarely determined from a purely structural consideration. Reducing the height of the building could increase the structural material used but reduce the volume of the building, and therefore the energy consumption in heating and cooling it. When life cycle considerations enter the picture, materials are sought which will be energy conserving.

The concrete and masonry industry can benefit greatly from design consideration of thermal mass. Therefore, in 1974 a Masonry Industry Committee selected the firm of Hankins & Anderson to study the effect of thermal mass on heat transfer. The result of that study was the concept of the "M" factor.

M Factor

In January of 1976 Hankins & Anderson submitted their proposal to the committee. The report had used computer simulation to analyze ten wall types in ten different cities over a period of ten years for 24 hours a day. The cities included Chicago, Washington, Boston, Forth Worth, Los Angeles, Seattle, Atlanta, Jacksonville, Minneapolis, and Denver. The attempt was made to relate the weight of the wall material to the hourly heating load and had the goal of a more realistic method of building design. Another goal was to provide a method which was simple enough to use without the aid of a computer.

The result is ingeniously direct. All the designer must know is the weight of the building material he is using in the wall and the yearly total of degree days for the climate where the building is. Recall that a heating degree day exists for every degree below 65F that the mean daily temperature reaches. If the mean daily temperature on December 25 in your city is 30F, that day's record is 35 degree days. The yearly count is totaled for the annual degree day total. This concept is not new to mechanical engineering and is quite commonly used to estimate heating load.

To find the correction factor "M" for the wall system being used, we simply match the degree day count for the year with the weight of the wall. The vertical coordinate of the graph will yield the M Factor. The M Factor, therefore, is the ratio of the more accurate heat flow value considering mass to the value of heat flow by the old resistance method. The new equation is:

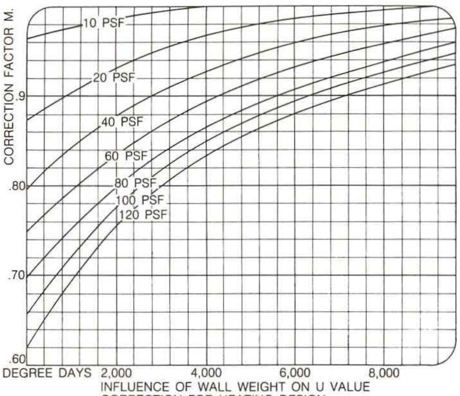
$$Q = A \times U \times (t_i - t_o) \times M$$

Q = Heat flow through the wall.

U = The amount of heat that flows through a given square foot area of wall per degree Fahrenheit difference between the two surfaces per hour.

$(t_i - t_o)$ = The temperature gradient between inside and outside.

$M = \frac{Q'}{Q}$ (Q′ is the heat flow through the wall as determined by the new study)



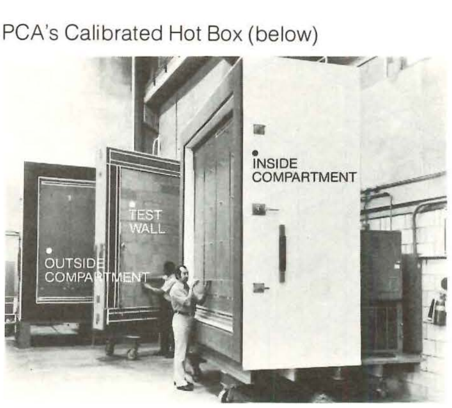
CAPACITY INSULATION CORRECTION GRAPH

Yearly Degree Days For Selected U.S. And Canadian Cities

City and State	Yearly Total	City and State	Yearly Total
Birmingham, Alabama	2551	Omaha, Nebraska	6612
Anchorage, Alaska	10864	Las Vegas, Nevada	2709
Phoenix, Arizona	1765	Reno, Nevada	6332
Little Rock, Arkansas	3219	Concord, New Hampshire	7383
Los Angeles, California	2061	Trenton, New Jersey	4980
Sacramento, California	2502	Albuquerque, New Mexico	4348
San Diego, California	1458	Buffalo, New York	7062
San Francisco, California	3015	New York, New York	4871
Denver, Colorado	6283	Raleigh, North Carolina	3393
Hartford, Connecticut	6235	Bismarck, North Dakota	8851
Wilmington, Delaware	4930	Cleveland, Ohio	6351
Washington, D.C.	4224	Oklahoma City, Oklahoma	3725
Miami, Florida	214	Portland, Oregon	4635
Atlanta, Georgia	2961	Philadelphia, Pennsylvania	5144
Honolulu, Hawaii	0	Providence, Rhode Island	5954
Boise, Idaho	5809	Charleston, South Carolina	2033
Chicago, Illinois	5882	Sioux Falls, South Dakota	7839
Indianapolis, Indiana	5699	Dallas, Texas	2363
Des Moines, Iowa	6588	Houston, Texas	1396
Topeka, Kansas	5182	Salt Lake City, Utah	6052
Louisville, Kentucky	4660	Burlington, Vermont	8269
New Orleans, Louisiana	1385	Richmond, Virginia	3865
Portland, Maine	7511	Seattle-Tacoma, Washington	5145
Baltimore, Maryland	4654	Charleston, West Virginia	4476
Boston, Massachusetts	5634	Milwaukee, Wisconsin	7635
Detroit, Michigan	6232	Cheyenne, Wyoming	7381
Minneapolis, Minnesota	8382	Quebec, Canada	8937
Jackson, Mississippi	2239	Toronto, Canada	6827
Kansas City, Missouri	4711	Vancouver, Canada	5515
Great Falls, Montana	7750		

(Data drawn from a publication of the U.S. Weather Bureau, covering the period from 1931 to 1960.)
(Building designers, owners and managers are urged to obtain data for their specific location from the U.S. Weather Bureau since the degree days may vary considerably within a state, and within a metropolitan area.)

PCA's Calibrated Hot Box (below)



A wall weighing 40 pounds per sq ft in a climate which has 2000 degree days per year can use an M Factor of approximately .88 (see the accompanying graph). It is easy to see that in such a case the estimated heat flow through the wall has been reduced by over 10 percent.

Although the M Factor was determined for heating as well as cooling, the report has chosen to restrict its use to heating calculations. The Equivalent Temperature Differential is recommended for the cooling load for walls.

M Factor has not yet been accepted by ASHRAE as a legitimate method of calculating heat load. Its use is now under study. In the meantime the computer simulation used in the report is being meticulously verified by empirical testing by members of the Masonry Industry Committee. The Portland Cement Association has built what they call a "Calibrated Hot Box" which tests wall mockups full scale. The important innovation here is that the wall is tested in a dynamic state as well as the constant flow of heat from one side to the other.

PCA has also issued an Engineering Bulletin entitled: *Simplified Thermal Design of Building Envelopes for Use with* ASHRAE *Standard 90–75* written by Stanley E. Goodwin and Mario J. Catani. The bulletin clearly explains how to use M Factor in heating design and even goes on to suggest a method for using Equivalent Temperature Differential for more accurately calculating the cooling load for the roof of a building. Use of this bulletin, therefore, in conjunction with the ASHRAE *Standard 90–75* takes thermal mass into account for both heating and cooling design for the first time. The appendix of the Standard Building Code of the Southern Building Code Congress allows use of the PCA Bulletin. Use of M Factor for the moment is restricted to meeting the code requirements for U Factors in building design. Sizing of mechanical equipment involves a complex contribution by many other factors which require further study.

Fred Dubin

The increased understanding of thermal mass on the part of manufacturers has been accompanied, and even stimulated, by an awakening on the part of the building professional. The way has been guided by an enlightened few. Many of these experts have also found ready use for their understanding in the accompanying field of solar energy. Fred Dubin, of Dubin-Bloome, was one of the first mechanical engineers to recognize the importance of thermal mass. It is no surprise. Dubin's multifaceted talents and ready curiosity seek the challenge of new ideas. (Guest editorial, P/A, Oct. 1971, pp. 68–69)

Concrete is not a new material for Dubin. He was Nervi's mechanical and electrical engineer for the Dartmouth Field House, as well as Louis Kahn's mechanical engineer for the revolutionary Salk Institute. As a result of his project with Nervi, Dubin opened an office in Rome. As a result of his alliance with Kahn, Dubin can quote Kahn line for line.

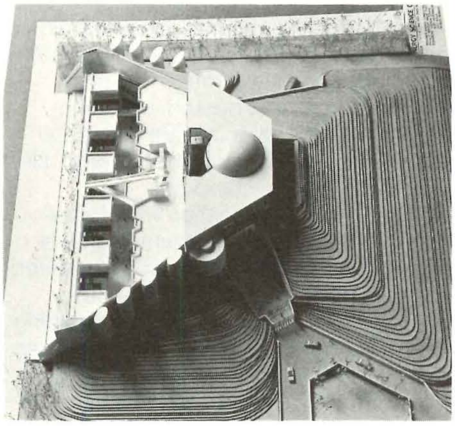
Dubin refers to Kahn's ideas when expressing his own attitude towards the passive solar design of buildings. "One starts with an immeasurable, a feeling, an idea, or an emotion. You convert this to measurables, feet, inches, centimeters, meters, and end up with a building that evokes a feeling. This is how we approach passive design. It is a deceptively simple concept with a very, very sophisticated engineering approach to accomplish what in the end will be a simple, operating system."

Perhaps the key to Dubin's energy work was the recent Federal Office Building in Manchester, NH, for the General Services Administration. The building had already been blocked out when Dubin was called in as an energy consultant. By the end of the design process, the building was probably the most heavily studied, energy-conserving prototype in history. The client, along with architects Nicholas and Andrew Isaak of Manchester, decided at the encouragement of Dubin to make the GSA Building a showplace for energy conservation design. The National Bureau of Standards was brought into the project and the National Bureau of Standards Load Determination, NBSLD, computer program was used to analyze the design parameters.

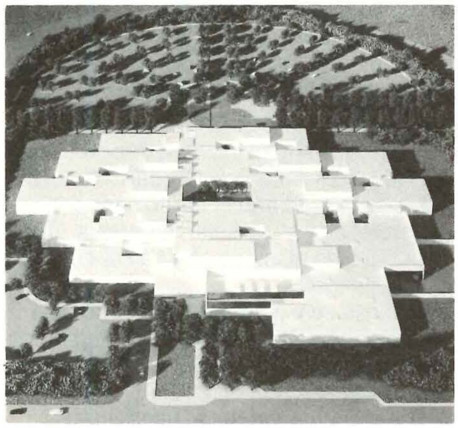
Dr. Tamami Kusuda is a senior research mechanical engineer at the National Bureau of Standards and wrote the program for NBSLD. The weather and building characteristics are described. The program can produce heating and cooling load predictions on a hourly, daily, weekly, monthly, seasonal, or yearly basis. It is possible using this program to evaluate quickly possible changes in traditional mechanical design which could have a significant effect on energy consumption. It is possible, for example, to hold the heating input constant and vary the temperature of a building, rather than holding the temperature fixed as is common practice.

One of the important relationships studied in the GSA building was the interrelationship of mass and insulation. The building uses insulation on the outside of the wall and not on the inside. Dubin be-

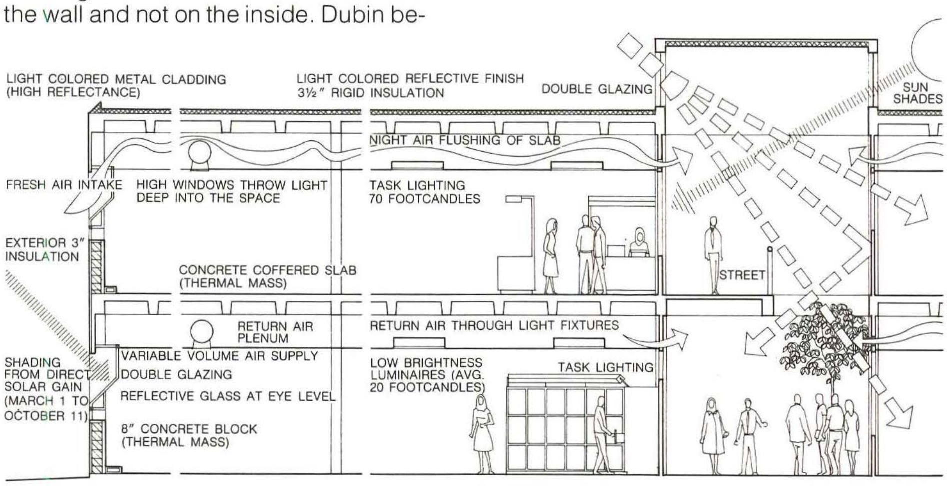
The GSA building uses its thermal mass.



Pratt project for an Energy Science Center.



The Justice Department Building for Sacramento will use nighttime cooling of ribbed slabs.



TYPICAL SECTION

lieves that in most climates and building types, the insulation has more value outside the wall mass.

Reducing the window size and increasing the mass of the walls also entailed an accurate study of sunshielding to take prime advantage of the sun's heat in winter. There are no windows on the north side of the building. Obviously, the traditional search for the lightest structure was dropped for energy efficiency.

The building has been in use less than one year, and is being closely watched and instrumented by the National Bureau of Standards. The design prediction was 55,000 Btu/sq ft energy consumption on a yearly basis. A traditional design would have required 126,000 Btu/sq ft/year. The actual figures show a range closer to 75,000, due to unexpected infiltration losses. Monitoring points are located at 700 different positions in the building, all of which are tied to a computer.

For Dubin, the education was invaluable. He produced two volumes of do's and don'ts for energy consumption based on the investigations for the Federal Energy Administration. One is for building users, the other for building professionals. The essential lesson is use of building mass. "In every building that we have anything to do with today," says Dubin, "we look for a material which will produce thermal mass."

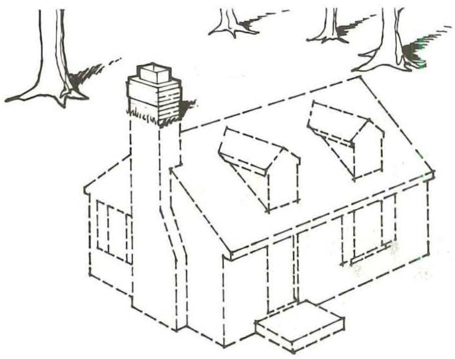
Since GSA, Dubin has done extensive work with solar energy, both passive and active. Along with underground architect Malcolm Wells, he engineered the Plant Science Building of the Cary Arboretum of the New York Botanical Garden. The building takes advantage of earth mass and concrete, as well as solar collectors. (The GSA building also has an array of collectors on its roof.)

Dubin is very clear about the principle he feels should be dominant in mechanical system design. The building itself does not consume energy. It only serves to control the heat flow into or out of the building. Whether it is designed with this concept in mind or not, the principle will apply. For Dubin, of course, it is a conscious effort. The building must be designed as a "heat exchanger." The building must be adaptable to the changes in the climate seasonally as well as daily.

Dubin's most recent work is the new Justice Department Building now being constructed in Sacramento, Ca. Marquis Associates of San Francisco is the architect. The complex consists of seven additional buildings connected by atrium streets, a total area of 325,000 sq ft. The energy goal this time is 35,000 Btu/sq ft/year.

The large diurnal temperature swing was a natural for use of the thermal mass advantages of concrete. In the summer the days in Sacramento are blistering hot. The nights are cool. Dubin and the architects have chosen a solution to take advantage of this condition. The floor structure will be coffered two-way reinforced concrete slabs. Nothing new so far. The innovation is to cover it all with a hung ceiling! Large 8-ft propeller fans will draw the night air through the ceiling space. The coffers are used to increase the surface area to bring the concrete into intimate contact with the air. When morning comes, the slab temperature will drop to the point where it can actually help refrigerate the space. Dubin wants to use carpet on the floor to allow each slab to help cool the space below it.

Believe it or not, Dubin is not satisfied with the role of an internationally acclaimed mechanical engineer. He is presently completing a Master of Architecture degree at Pratt Institute's School of Architecture. One design instructor, recognizing the gold mine of knowledge which walked into his class, has used one of Dubin's building designs for an Energy Science Center as a year-long project for his regular students. Professor Brent Porter is running the project; the students are Andrew Cohen, Kurt Bedenbaugh, Lucy Kelly, and Patrick Murphy. Engineer Lev Zetlin is the structural consultant.



Common perception of underground building by others, according to Malcolm Wells' sketch.

Underground architecture

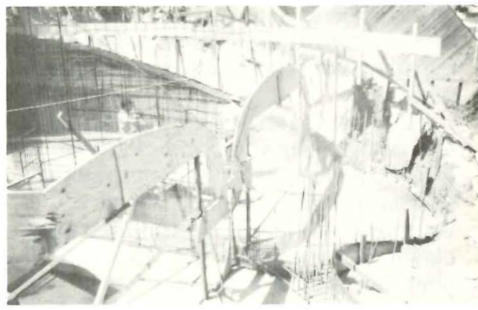
Parallel to the increasing interest in thermal mass above ground has been a renewed interest in using the earth's mass to help save energy below ground. The deeper we dig into the earth, the smaller the temperature gradient becomes between day and night. In some climates the mean earth temperature will approximate the temperature sought in the building. In colder regions, the earth will draw heat from the building but at a much slower rate than above ground. Infiltration problems are practically eliminated. The wind can have no effect on heat loss. Architects are turning to the earth and using its natural partner, concrete, to create an underground architecture.

Designer-builder Jay Swayze built his first underground home in 1961. In those years of nuclear saber rattling, a prime justification was the underground bomb shelter. Swayze's success with his own house led to the construction of his elaborate underground house at the New York World's Fair of 1964. He has been working underground ever since. He calls his company Geobuilding Systems.

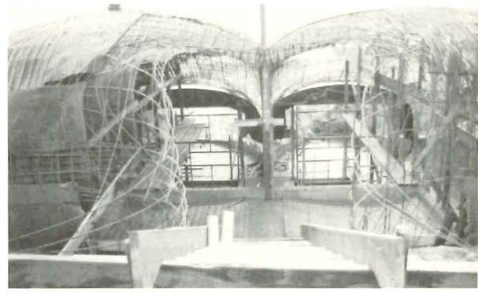
For Swayze we "have to at least equal

Batter boards are set for excavation.

Excavation is complete and floor slab is poured.



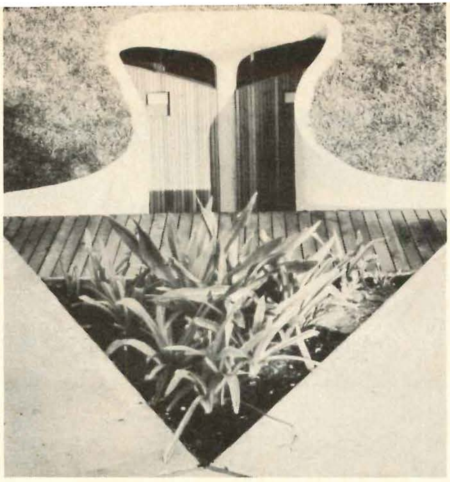
Number 3 rebars are woven into a shell form.



Entry during spraying sequence.

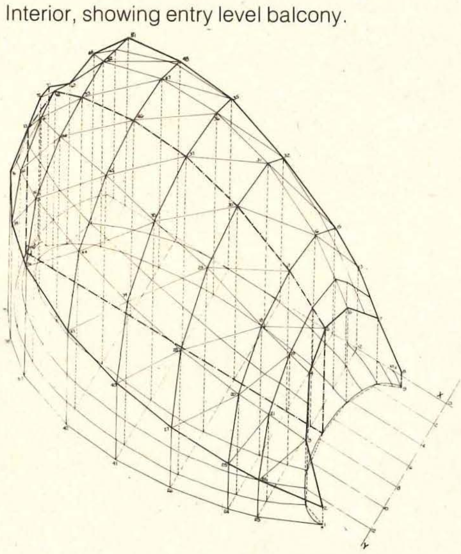
Shore side of Dune House after spraying.

Shore side of the finished house.



Entrance of the finished Dune House.

Interior, showing entry level balcony.



Computer isometric showing X, Y, Z plot points.

Part of computer analysis

Node Number	Coordinates of the first node X1-ORD (X) E-W	X2-ORD (Y) N-S	X3-ORD (Z) Elev.
1	3.700	13.800	0.000
2	3.700	13.800	1.700
3	5.700	13.200	5.300
4	7.000	10.600	7.900
5	7.500	7.500	8.700
6	7.000	4.400	7.900
7	5.700	1.800	5.300
8	3.700	1.200	1.700
9	3.700	1.200	0.000
10	5.300	0.000	0.000
11	5.300	0.000	3.100
12	8.500	0.000	0.000
13	8.500	0.000	6.400
14	11.000	0.000	0.000
15	11.000	0.000	8.500
16	11.000	3.400	10.800
17	11.000	7.500	11.300
18	11.000	11.600	10.600
19	8.500	11.100	9.000
20	11.000	15.300	8.100
21	8.500	14.500	7.000
22	8.500	16.000	3.000
23	8.500	16.000	0.000
24	11.000	16.700	0.000
25	11.000	16.700	3.700

Input Node data
Dune house shell analysis full symmetric load case
Coordinates to outer surface of shell

or improve our standard of living underground or people won't build underground." He believes that living underground is healthier, cheaper, and more secure than living above ground. Having people live underground leaves the land above to take care of itself. "Ninety-eight percent of the world population loves nature," says Swayze. "Ninety-eight percent of the world population doesn't want to take care of it." Today, Geobuilt homes are under construction in Texas, Oklahoma, Illinois, and Missouri. Life cycle costing buffs may find it interesting that Swayze's current estimate predicts the life of a Geobuilding at 4000 years.

Malcolm Wells is a more conventional architect who gave up his practice above ground in the mid-1960s. (Guest editorial, P/A, June 1974, p. 59). Wells toured the country in those early days trying to encourage underground building. He set an example and gained valuable experience from constructing his own underground house and office.

Recently, his Plant Science Building of the Cary Arboretum was completed. The building is resplendent with solar collectors and ingeniously conceived for energy conservation with Fred Dubin. He supports "sky mining" as opposed to strip mining, and has recently published a book himself, *Underground Designs*, cataloging his work (available from him for $6 at Box 183, Cherry Hill, NJ 08002).

A valuable section of Wells's book shows details of walls, roof, and floor, all in concrete. Wells prefers rigid expanded polystyrene insulation on the outside surface of the structure. He shows a 1/32-in. layer of butyl sheeting between expanded polystyrene and concrete as a water barrier on the roof slab. On the walls, the butyl sheeting can be replaced by troweling with mastics or spraying the concrete with elastomeric coating.

Architect William Morgan's office is located in Jacksonville. His Florida State Museum at Gainesville took advantage of a 72-degree ground temperature by hugging the hillside and terracing with concrete and earth cover. Built in 1970 before the energy crisis, the energy performance of this building has helped set energy standards for the 1970s. It also set the tone for an impressive array of earth-integrated buildings by Morgan.

An inspiring sight for Morgan as a young navy man was the inside of an atomic submarine. The spatial clarity and structural logic of the shell for underwater living came to mind in the design for a pair of beach houses in the Florida Dunes. Indeed, the structuring problems of underground buildings often entail keeping the building from obeying a tendency to float up from soil and water pressure. One would certainly not expect a house below ground to take the same shape as its counterpart above the ground plane.

The Dune House was originally intended as a prototype for a group of houses. A large balloon was to serve as a form for a glass fiber-reinforced concrete shell. The air bag cost was prohibitive.

The Dune House was designed with the aid of Engineer Horst Berger of Geiger-Berger Associates, New York. The first designs were simple dome shapes. The shape wasted valuable floor space and the structure required greater curvature to resist load. A computer was programmed to designate the performance necessary to meet the complex structural requirements of the shape. Concrete was the best solution.

The next question was how to get the shape requirements from inside the computer onto the drawing board. The answer was a three-dimensional grid system. A two-dimensional grid was laid with chalk lines on the building floor and a story pole system was devised to check the heights. The computer printout could designate the "Z" coordinate at any point on the plan. The shell therefore was constructed without working drawings!

Careful records of the dunes were made prior to excavation. When the floor slab was poured, its edges were left turned up with rebars sticking up. The bars were then bowed over the space like the ribs of a Conestoga wagon.

The heights were checked vertically with the story poles. A steel fabric was woven from #3 rebars, and plaster mesh was used as infill. A ½-in. layer of concrete was sprayed on the first day and left overnight to cure. On successive days, a 2-in. covering of concrete was sprayed, first on the inside, and then the outside surfaces to give the shell an average thickness of 5 in. The new dune resembled the old dune to such a degree that at one point in the backfilling sequence, the bulldozer blundered up on the shell itself.

Conclusion

Concrete is alive and well. Each year, two cubic yards of concrete are used for every man, woman, and child in America. Advances in concrete technology have taken it higher and probably deeper than ever before. Daily it gets stronger, faster, easier to use. Try some. [Richard Rush]

Acknowledgments

We wish to thank the following architects, engineers, institutions, and manufacturers for their help in preparing this article: ACI; Aluma Systems; ASHRAE; Battelle Laboratories; Bethlehem Steel; CECO Corp.; CRSI; Fred Dubin; Duwe Precast; Economy Forms Corp.; FABCON; Sepp Firnkas; GSA; Hankins & Anderson; INRYCO; John Laing America; T.Y. Lin; Dr. Le-Wu Lu; Robert Marquis; Master Builders; Medusa Cement; Mid-Atlantic Solar Energy Assoc.; Miller-Valentine Corp.; Molded Fiber Glass; William Morgan; Dr. K.W. Nasser; National Bureau of Standards; Mario Nervi; New York Concrete Construction Institute; PCI; Prof. Brent M. Porter; PCA; Precise Forms Inc.; Kolbjorn Saether; SIKA; Smith-Roles; Solar Crete Corp.; Superior Concrete Accessories; Jay Swayze; U-Bahn Earth Homes; Dr. Donald Watson; Malcolm Wells; Dr. Harry T. Whitehouse.

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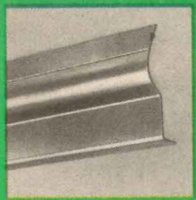

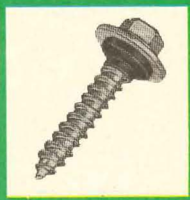

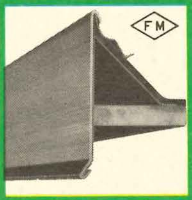

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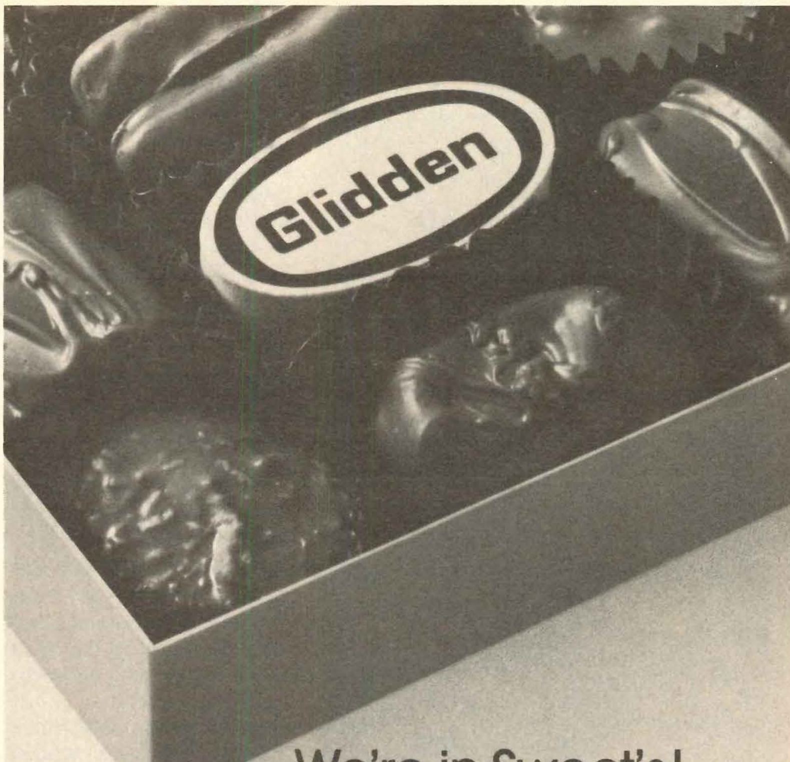

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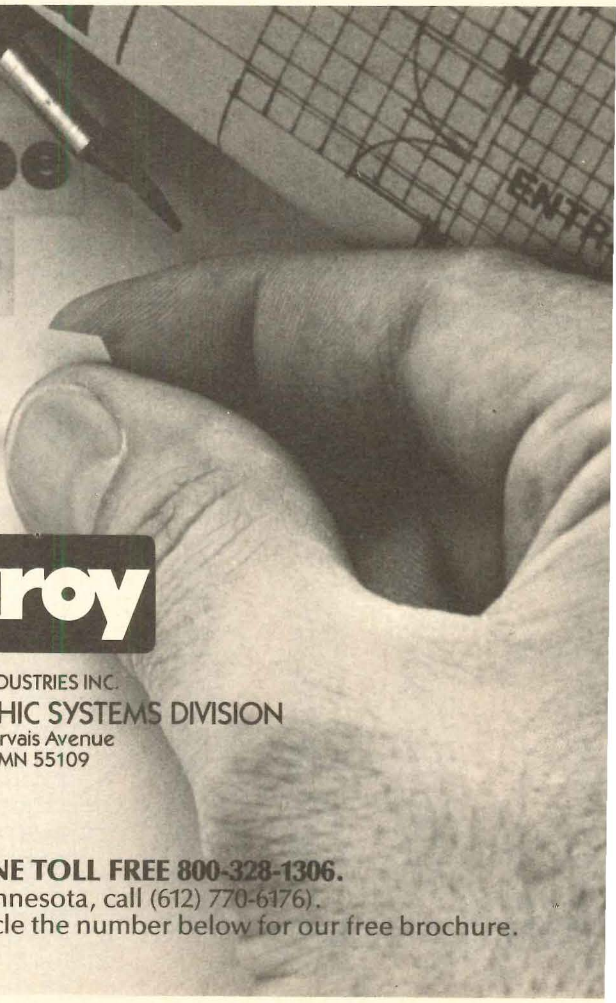

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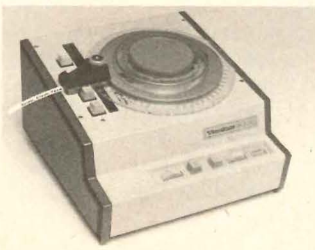

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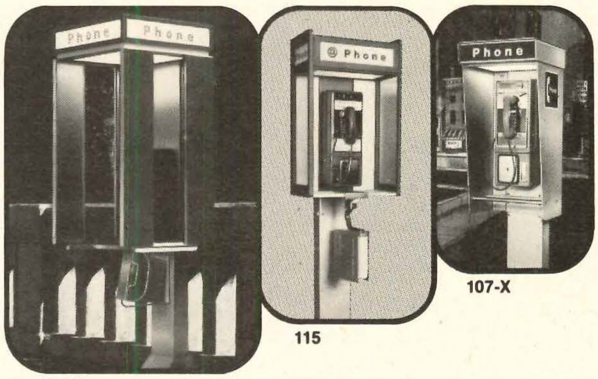

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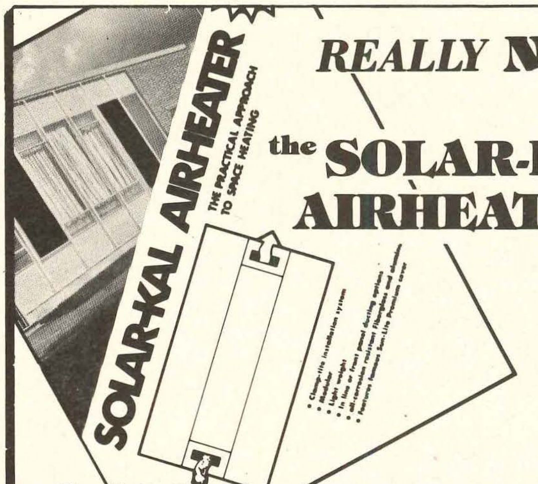

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Stemming architects' expanding liability—part II

Bernard Tomson and Norman Coplan

The authors continue this month to discuss architects' potential liability as a result of recent judicial decisions, and measures to be taken to stem this trend.

In last month's column we discussed a recent decision of the New York Court of Appeals holding that in New York, an owner could institute a legal action against an architect arising out of alleged errors or omissions within six years after the project designed by the architect was completed. This decision was not only precedent-shattering, but was reached despite the fact that the statutory law of New York expressly provides that "an action to recover damages for malpractice . . . must be commenced within three years." The rationale of the decision was that the failure of an architect to exercise due care in the performance of his profession constitutes a breach of his contract with the owner and, therefore, the six-year statute of limitations provided for contract actions would be applicable.

It was suggested that to avoid the expansion of the architect's potential liability as reflected in this and other decisions, consideration should be given to the feasibility and legality of incorporating into the owner-architect agreement a time limitation within which a legal action could be instituted by the owner against the architect. Such an approach would in effect provide a private statute of limitations, and if valid, would limit the time during which the architect might be at risk.

The first question to be considered, therefore, is whether the validity of such a contractual limitation would be upheld. Under the statutory law of New York, it is provided that an action must be commenced within the time specified under the applicable statute of limitations unless "a shorter time is prescribed by written agreement." However, such an agreement must be in writing and the shorter period must be reasonable. Contractual provisions of this type are viewed with caution by the courts and are construed strictly against the party invoking the shorter period. For example, in an action against a subcontractor's surety instituted by an indemnitee under a performance bond where the bond provided that any action must be instituted within two years after final payment was due (*Stanley R. Benjamin, Inc.* vs *Fidelity & Casualty Co. of N.Y.* (340 N.Y.S. 2d 578), the Court, in considering the validity of the time limitation, said:

"Parties by written agreement may provide a shorter time for the commencement of an action than is prescribed by statute. . . . However, such 'limitations are not looked upon with favor, since they are in derogation of the statutory limitation. Hence, they should be construed with strictness against the party invoking them.' "

A contractual limitation of time in which suit can be instituted may raise questions in addition to the primary question as to its reasonableness. For example, it is an established principle of law that a municipality may not waive its right to enforce a statute of limitations. Would such doctrine apply to a claim of waiver in respect to a time limitation contained in a contract? On this subject, the Court, in *Planet Construction Corporation* vs *Board of Education of the City of New York* (7 N.Y. 2d 381), in considering an action by a contractor to recover from the City Board of Education a balance allegedly due for labor and materials where the construction contract provided that any legal action must be commenced within one year from the date of the acceptance of the work by the owner, said:

"A shorter limitation by written contract may be examined as to whether it is unreasonably short. Of course, a statute may not be subjected to such an examination. . . . The prohibition contained in . . . the general City law against a municipality's waiving a defense of limitation applies, in our opinion, only to statutes. In other words, a limitation clause in a contract stands on no other or different footing than any other clause, and may be waived in a proper case."

A provision in the architect-owner contract which limited an owner to a three-year period within which to institute suit against an architect arising out of the architect's performance may be valid and enforceable. A three-year time limitation would be consistent with the malpractice statute of limitations of New York and thus might be considered reasonable. A contractual provision limiting the time within which suit could be instituted against the architect by an owner might read as follows: "Any action or proceeding instituted by the owner against the architect for breach of contract or malpractice must be commenced within three years from the date that the breach or malpractice occurred."

It may be difficult for an architect to obtain the consent of his client to the inclusion in the owner-architect agreement of a contractual time limitation which provides the owner a shorter period of time than the statute of limitations which would otherwise be applicable. The best solution to this problem would be the modification of the AIA forms to include such a provision. A form is more readily acceptable by the client and such a provision, if so included, need not be separately pinpointed and discussed during contract negotiations. □


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By Richard Untermann & Robert Small
306 pp., illus. . . . $22.50

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By Marc Szabo
251 pp., illus., . . . $12.50

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By Robert C. McHugh,
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21 Rendering With Pen and Ink

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368 pp., illus., . . . $7.50

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Includes the full texts of Part I of the original, on the Las Vegas Strip, and Part II, "Ugly and Ordinary Architecture, or the Decorated Shed" This book created a storm of controversy in its original edition, calling on architects of be more receptive to the tastes of common people.
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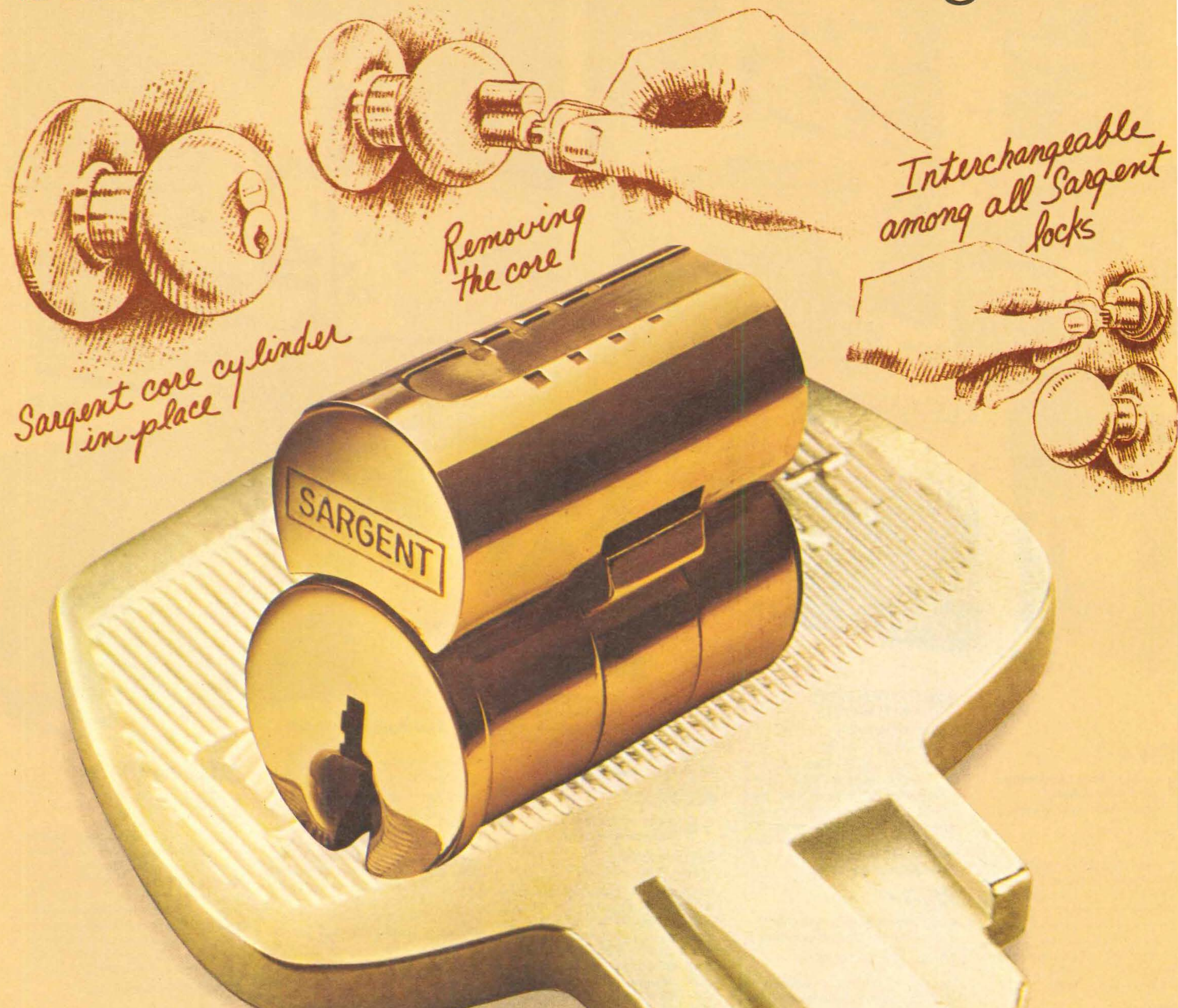

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Arcadia West?

John Hudson Thomas, Dungan house, Berkeley, Ca, 1915.

Bay Area Houses, *edited by Sally Woodbridge with introduction by David Gebhard. NY, Oxford University Press, 1976, 329 pp., illus., $29.95.*

Reviewed by Thomas S. Hines, who teaches in the history department and school of architecture at UCLA.

"If 'human' is considered identical with redwood all over the place . . . I am against it," Marcel Breuer declared in 1948 during a heated discussion of Bay Area architecture at New York's Museum of Modern Art. In much of the best architecture of the San Francisco region, there has indeed been redwood aplenty, but there have also been other equally significant ingredients. Lewis Mumford believed that somehow they added up to a "Bay Region Style," though the authors of this book have agreed with most architects of the region that "Bay Area Tradition" is a safer and truer label.

"Though the term is imprecise," as David Gebhard acknowledges in the Introduction, "we do tend to conjure up certain specific images when we are confronted with it—perhaps a narrow high-pitched gable-roofed house in the Berkeley hills, designed in the early 1900s by Bernard

[continued on page 120]

Books continued from page 119

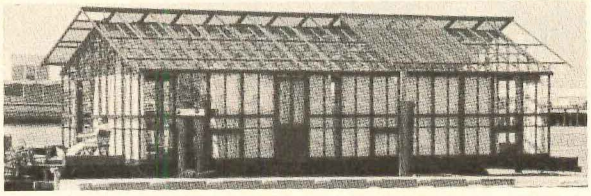

Photo: Joshua Freiwald.

John Garden Campbell, Campbell boathouse, adrift, 1965.

Maybeck, or a boxy wood-sheathed city or suburban house of the late 1930s produced by William W. Wurster. Whenever we think of these characteristic buildings we end up with certain common denominators: they are always houses, they are almost always small in scale, they are above all woodsy . . . they suggest a visual mode which is vernacular and anti-urban, they seem to be related to their respective 'place' in the landscape (urban or suburban), and they are generally filled with visual and ideological contradictions."

This collection of six essays describes and explicates the development of that tradition. Though such jointly authored collaborative efforts inevitably lack the tautness and symmetry one would expect of a monograph, the interweaving of themes and viewpoints offsets the topical and chronological overlapping and compensates for the occasional looseness with an overall richness of detail and effect.

John Beach traces the origins of the tradition to the various Shingle Style and Craftsman designs of Ernest Coxhead, Willis Polk, Bernard Maybeck, Julia Morgan, A. C. Schweinfurt, and A. Page Brown, who, between 1890 and 1918, encountered "a society with adequate means just beginning to realize a desire for more permanent buildings, a clientele with aspirations but without aesthetic prejudices. These designers brought with them stylistic and philosophical luggage from a wide range of backgrounds. They used fragments of the past as well as fragments of the present and juxtaposed them in a manner which expressed the complexities, the myths, and the realities of the California experience. The local building vernacular, the straightforwardly utilitarian wood frame buildings of the mining and boom towns . . . provided the ideal neutral base upon which to impose preferences of space, style, and form." Beach's otherwise convincing and engaging essay is marred only by an inexplicable absence of documentation.

In "Life in the Dollhouse," Gebhard analyzes the historicist and revivalist confections of the 1920s, which, though dwarfed in scale, still imbibed much of the distinctive regional flavor. Work by John Hudson Thomas, W.R. Yelland, and Carr Jones epitomized the mode, though such established high practitioners as Maybeck were also able to build in the Hansel and Gretel idiom.

Richard Peters' pivotal essay on William Wurster, the only figure in the book who is given a whole chapter, focuses on that architect's fetchingly simplified plans and multi-functional spaces: the living porch, the glazed gallery, the garden living room, the kitchen cave, and the "room with no name." Particularly in the 1930s, Wurster [continued on page 122]

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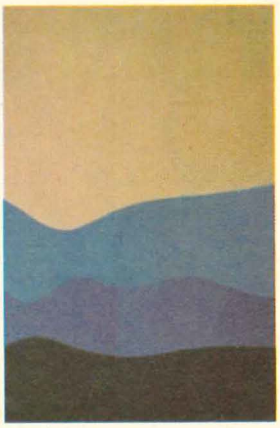

Books continued from page 120

drew heavily on the ethic and aesthetic of the rough, inexpensive vernacular, achieving extraordinary effects via subtle juxtapositions and "off-scale" proportioning.

Wurster and his contemporaries Gardner Dailey, John Dinwiddie, and Mario Corbett were major influences on the generation of the 1940s and 1950s, especially on such figures as Henry Hill, John Funk, Ernest Born, Joseph Esherick, Jack Hillmer, Warren Callister, and Frederick and Lois Langhorst. The architecture of this significant but elusive post-war period is expertly captured by Sally Woodbridge, who broadens the scope of her architectural coverage to include the work of landscape designers Lawrence Halprin, Robert Roysten, Garrett Eckbo, and Thomas Church.

A perceptive essay by Roger Montgomery studies the social and aesthetic impact of Bay Area high architecture on mass-produced housing, particularly the public projects of the 1930s and 1940s. Charles Moore's "The End of Arcadia" surveys the Bay Area legacy in the 1960s and 1970s and is especially enlightening in its autobiographical ruminations on the work of his own firm. Though he "belongs to the world more than the Bay Area," as Montgomery asserts earlier, Moore convinces us here of his debts to his Bay Area predecessors.

What one misses most in this generally excellent book are more comparative connections with the outside world. How, for example, did the work of Bay Area architects change as they ventured afield? In addition to the crucial indigenous sources and materials, what did Bay Area designers learn from and contribute to the world beyond the San Francisco Bay? Woodbridge and Montgomery allude to these connections and Moore acknowledges his generation's debts to Louis Kahn, but our appreciation of the earlier generations would have been greatly enhanced by more comparative allusions to the East Coast, the Middle West, and to Southern California.

A related example of Bay Area insularity is even more puzzling. Why did the authors so systematically exclude examples of Bay Area work *in the Bay Area Tradition* by nonresident architects, particularly the Auslanders from Southern California? The *dominant* image of Richard Neutra's work in the 1930s is indeed *echt* International Style (Kahn House, San Francisco; Scioberetti House, Berkeley) and, as such, is clearly beyond the purview of this book; but even Neutra, on occasion, got the redwood message and responded sympathetically to the regional idiom. If his Darling House (San Francisco, 1936) is not entitled to "Bay Area" status, then Woodbridge, *et al.*, should have attempted to explain why. And the same applies even more obviously to the work of Harwell H. Harris. If his noted Weston Havens House (Berkeley, 1941) doesn't qualify as "Bay Area," then the subtle distinctions between it and its certified contemporaries should have been seized upon as major teaching points.

Much of the success of *Bay Area Houses* lies in the quality of its generous illustrations—a tribute to such architectural photographers as Morley Baer and Roger Sturtevant. All in all, it is a beautiful book, as rich and provocative as the region it celebrates. □

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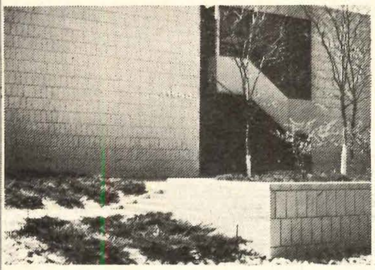

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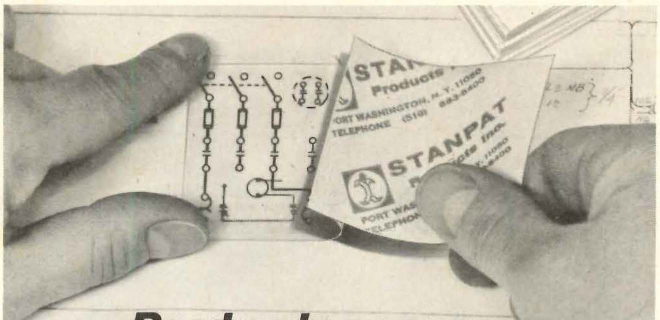

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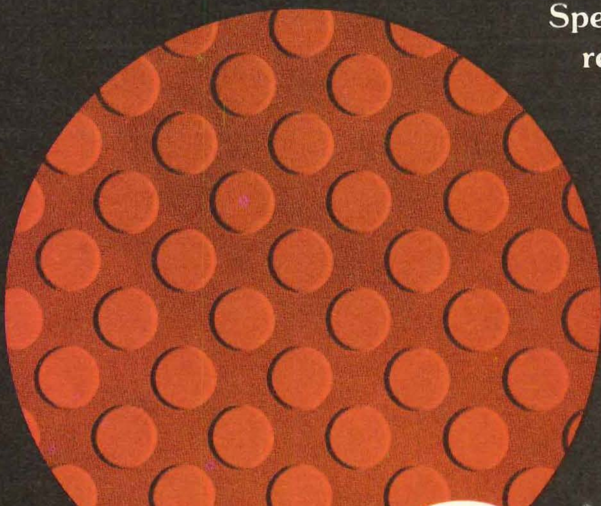

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The following items relate to the concrete article beginning on page 100 and are grouped here for reader convenience.

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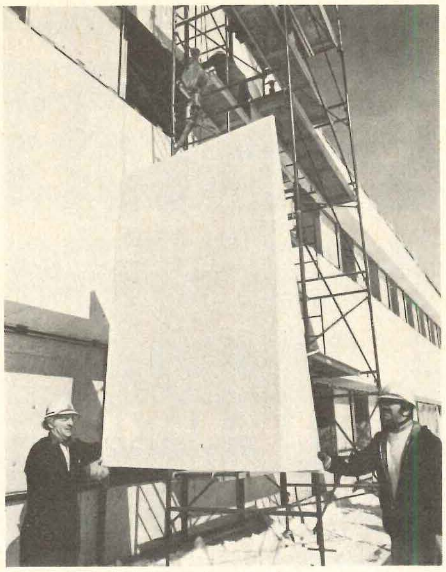

Fiberglass-reinforced concrete

Literature

Masonry reinforcing guide for architects, builders, and engineers. Correct reinforcing is illustrated for all types of masonry walls. Specifications on many new wall ties are included, new products are shown and discussed. AA Wire Products Company.
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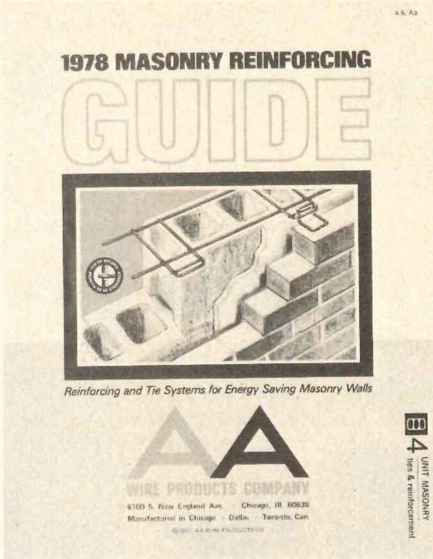

Masonry reinforcing guide

'Architectural and Engineering Concrete Masonry Details for Building Construction,' is a new 112-page design aid for architects and engineers. It covers reinforced and nonreinforced masonry wall construction details. Available for $7 ($6.50 plus 50¢ postage allowance) from National Concrete Masonry Association, 6845 Elm St., McLean, Va 22101.

'Recommended Practice for the Use of Shrinkage-Compensating Concrete.' This recommended practice sets forth the criteria and practices necessary to insure that expansion occurs at the time and in the amount required. The recommended practice is directed mainly toward the use of shrinkage-compensating concrete in structures, precast concrete products, slabs on grade, structural slabs, and pavements. Recommendations are included for proportioning the mixes, mixing, placing, finishing, curing, and testing. The 21-page standard is available at $5 per copy to ACI members, and $8.50 to nonmembers of ACI. American Concrete Institute, P.O. Box 19150, Bedford Station, Detroit, Mi 48219.

'Steel-Ply® Concrete Forming System.' 36-page four-color brochure covers services to contractors, forming details for handsetting, gang-forming, curved walled forming, as well as odd shape forming such as culverts, columns, and battered walls. Symons Corporation.
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'Polymer concrete 1978 specifiers' guide. Ceramic tile, brick, paver, and stone installation catalog is available to architects, builders, and designers and other qualified specifiers. It contains specifier information, displays several installation techniques, and illustrates past installations. It also contains information about company's technical design service which offers architects and specifiers personalized assistance on job planning. Laticrete International.
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Concrete Technology Publications. The 1977 American Concrete Institute catalog lists more than 150 publications on concrete technology, structural design, and construction. The catalog lists ACI standards, codes, specifications, bibliographies, handbooks, monographs, symposia, and special publications. American Concrete Institute.
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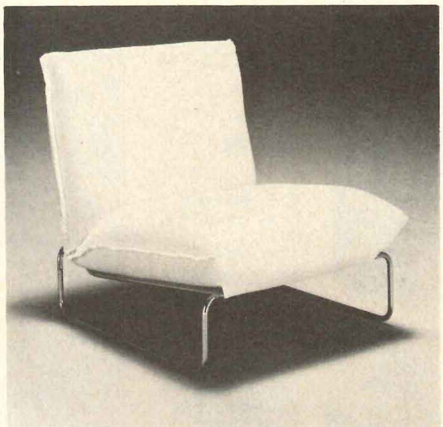

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Acrivue®. A cast acrylic sheet material which is available in many thicknesses, tints, and sheet sizes. According to the maker, because of the material's clearness, transparency, and great impact resistance, it lends itself to zoological requirements. Acrivue A is said to test an average of eight times stronger than glass, and Acrivue SA, which is biaxially stretched, an average of 18 times stronger than glass. Acrivue ASG is a specially formulated security glazing cast acrylic material. Swedlow, Inc.
Circle 102 on reader service card

'Craftique' carpet is made of 100 percent Antron® III Berber, continuous filament nylon in multi-level loop construction. It is offered in ten color blendings and a geometric design pattern. Patcraft Mills.
Circle 103 on reader service card

Flexible panels for use as proscenium acoustical tormentor panels provide high sound-retarding qualities. Various face coverings are available. Panels can be constructed to fit any size opening for either manual or electrical control. Richards-Wilcox Manufacturing Co.
Circle 104 on reader service card

Code Checker is a precision instrument said to be capable of checking and verifying over 40 different code requirements. One feature is adjustable gauge for checking and verifying gradients and floor levels. Others include those for checking and verifying clearances, distances, and dimensions. All calibrations are pre-set to [continued on page 130]

NEW HEAVYWEIGHT CHAMPION

Heavier than any overhead door closer will probably ever be...and stronger, by far.

How it might look or fit on a door frame was irrelevant. Rixson's floor closers conceal in the floor, out of sight and harm's way. Our only concern was performance, long term economy.

- Controls heavy traffic doors better, more reliably, longer than *any* other closer.
- Provides *true* fast latch, or slow latch, and more efficient door control than *any* other closer.
- Warranty is for 10 years, longer than *any* other closer.
- Mechanical efficiency and shock resistance unsurpassed by *any* other closer.

And an exclusive combination of many, many important advantages: Unique long-life iron closer body...double sealed unit...standard all temperature hydraulic fluid...delayed action capability...vertical adjustment for uneven door conditions...and available with coordinated holder/stop and/or with electric pivot. Prohibits removal of closer or door when locked. But can be removed for service without door takedown.

Ask the door control specialists:

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Circle No. 374

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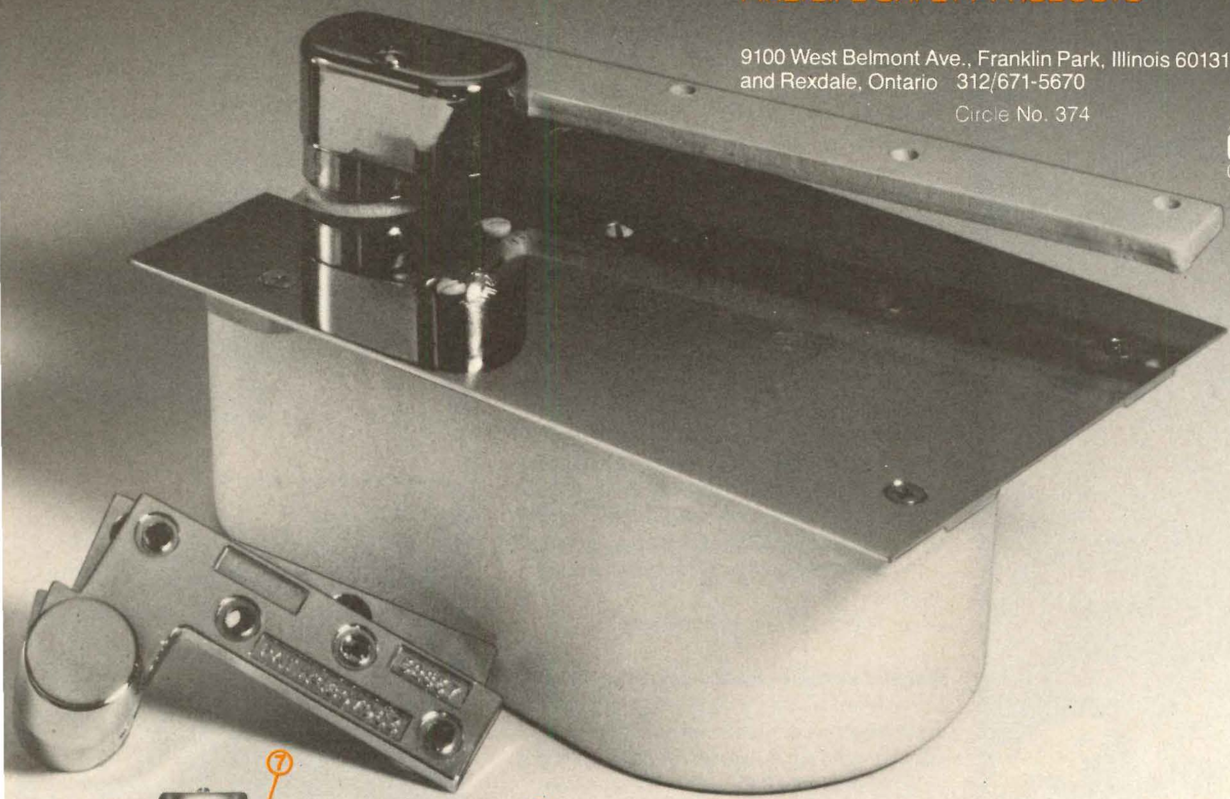
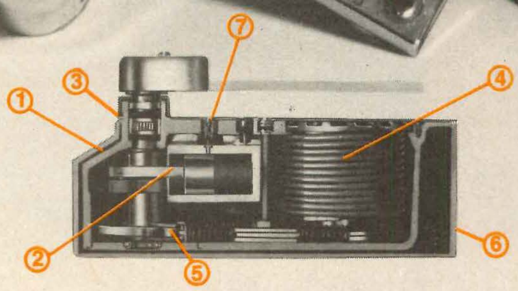




Exclusive Rixson-Firemark

1. Cast iron closer body
2. Stainless steel valves (non-removable)
3. Teflon, urethane and steel seals (5 total)
4. High efficiency torsion spring
5. Direct loading link and pin assembly
6. Heavy duty Cycolac® cement case
7. Full control panel

Literature continued from page 128

correspond with the standards established by the American National Standard Institute, Inc. (ANSI). It is marketed by a nonprofit organization under license with the State of Michigan. Group Six Sales.
Circle 105 on reader service card

'Manhattan' club chair. Designed by John Saladino, it has softened edges emphasized by the smooth weltless wrapping of the leather over the arms and cushion edges. Envelop-lip arm seams and bull-nose cushions are filled with poly and dacron; back pillow is all dacron. It comes in fabric as well as leather. Dunbar.
Circle 106 on reader service card

Caribe table, designed by Finnish architect Ilmari Tapiovaara, and first introduced 15 years ago, has been made maintenance free. This version, to be introduced at Neocon 1978, has a butcherblock top with a full bullnose edge. Top has a finish that is said to look natural and is impervious to alcohol, nail polish remover, blueprint ammonia, lighter fluid, etc. Base is oxidized bronze hobnail. International Contract Furnishings, Inc.
Circle 107 on reader service card

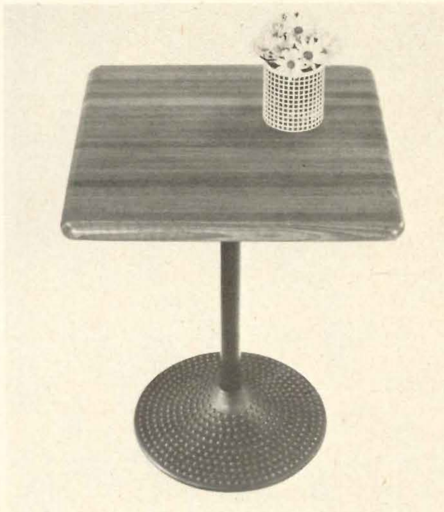
Contemporary Italian furniture. Two new designs by Mario Bellini are Giunca, available as an armchair and settee and Papiro, also available in a small armchair and settee. Both have frames of natural beechwood with straw and sea grass and down cushions with fabric or leather upholstery. Giunca has a cushion folding over both arms; Papiro (shown) does not. Atelier International, Ltd.
Circle 108 on reader service card

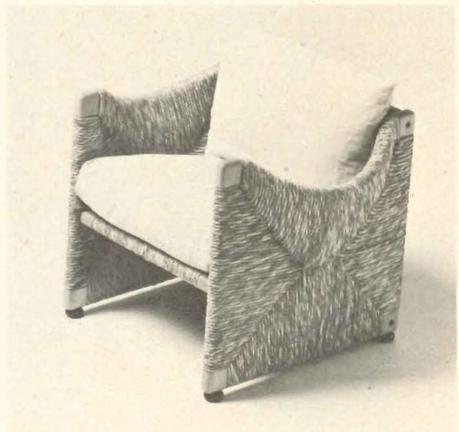
Modular drawer system. Offered in three stacking drawer/case modules, the system is said to provide for virtually any combination of 3-, 6-, and 12-in. drawers. Six- and 12-in.-drawer cases are available with any combination of smaller drawers. The modules can be suspended beneath any UniGroup work surface or, with optional castored base, they can be made mobile. Units have all-steel construction, ball-bearing slides, and powder-coated finish. The drawers feature radiused corners and drawer-width pulls. Options include stationary or castored bases, taboret top, a full range of drawer organizer inserts, individual or gang locking and a choice of neutral or brown tone colors. Haworth, Inc.
Circle 109 on reader service card

Graphic storage system. Called the "Superfile," it permits use of binders, tubes, drawers, and envelopes within a single cabinet. Five cabinet sizes are available: two for sheet sizes ranging from 18" x 24" to 42" x 60" and three, which also accommodate drawers, for sheets 24" x 36", 30" x 42" or 35" x 48". Plan Hold.
Circle 110 on reader service card

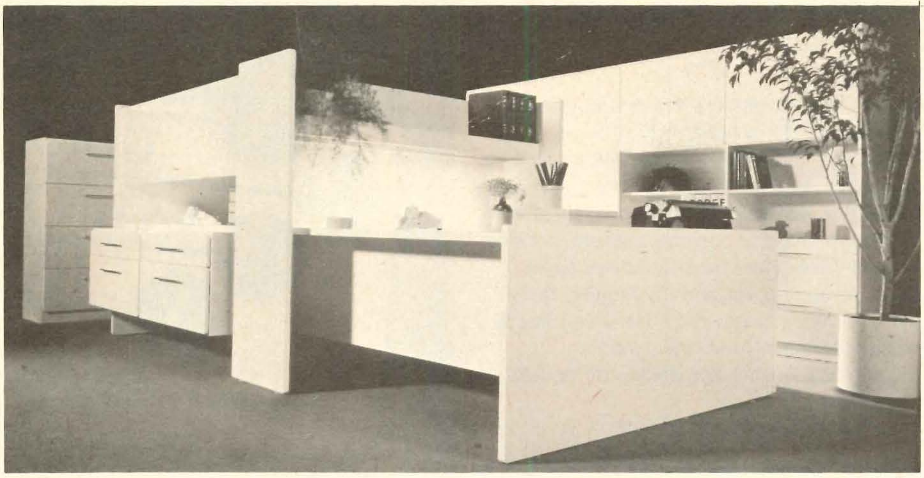
Costumers. A collection of coat hooks finished in polished chrome have inner casting for attachment to all wall surfaces. Architectural Supplements.
Circle 111 on reader service card


'Manhattan' club chair

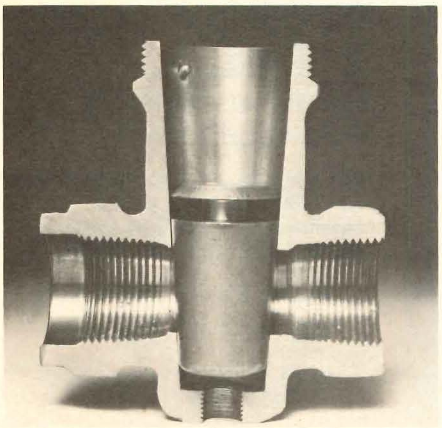

Caribe table


Contemporary Italian furniture

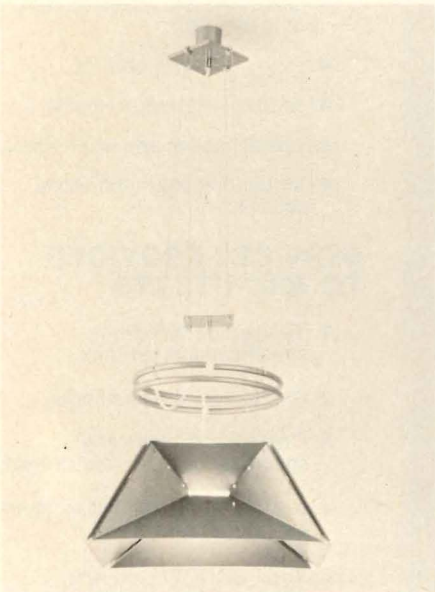

Modular drawer system



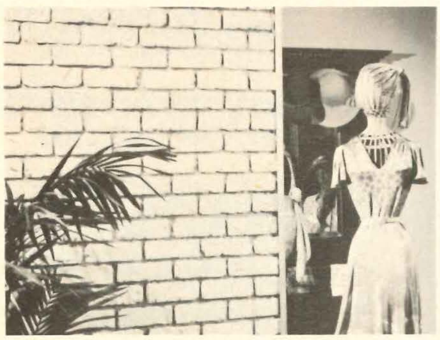
Office work stations



'Plumbgate valve'



Lighting collection



Reinforced brick

Office work stations, walls, and partitions, desks, and other furniture is totally integrated, interchangeable, and flexible. All parts, including drawers, doors, shelves, etc. are completely interchangeable. The Discovery system can be put together, taken apart, added to, subtracted from, ganged together with common parts easily and quickly, says maker, by anyone who can use a screwdriver. Colors and finishes are coordinated. Discovery Concepts, Inc.
Circle 112 on reader service card

'Plumbgate valve' for earthquake protection. Valve closes gaslines in event of earthquake. It is cast in bronze and contains only one moving part, a precision "plumb" which falls into sealed position to close gaslines whenever shaken from its support by earthquake vibration. Company states the valve can be installed in residential or commercial building next to the gas meter in 30 min. According to testing facilities, the valve has been found "insensitive to vibratory motion at high frequencies, which are typical of daily occurrences such as vehicular traffic, etc. . . ." Quakesafe, Inc.
Circle 113 on reader service card

Lighting collection. The Francesconi Collection of contemporary lighting consists of a wide selection of hanging fixtures and floor, table, and wall lamps. All ceiling fixtures feature built-in pulleys while some table and floor lamps have built-in dimmers. Most fixtures come in white lacquered metal, black, or matte silver-gray. Some are also available in red. Shown is Telescopio, a pendant lamp with built-in pulley. In lacquered aluminum and chrome plated brass. Venini Ltd.
Circle 114 on reader service card

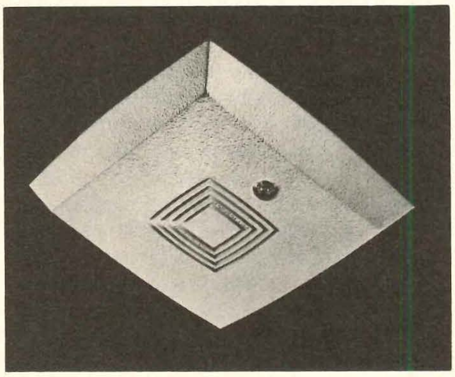
Reinforced brick. Made from crushed limestone reinforced with fiberglass, the 12-brick panels can be installed as a unit, or the individual "bricks" can be snapped off and applied one by one. Marlite Division, Masonite Corporation.
Circle 115 on reader service card

All-weather recreation surface. Nonslip, nonabrasive, resilient recreational surface is a patented formulation of rubber and cork blended with hot asphalt and fine mineral aggregates. Available in hot or cold mix, Rub Kor® is installed on top of an asphalt binder course. Rub Kor® America, Inc.
Circle 116 on reader service card

Circle No. 335, on Reader Service Card

Products continued from page 131

Shower pans. Compotite is laminated asphalt prefabricated of eight plies of kraft paper bonded and saturated by seven layers of asphalt and polyethylene reinforced with three layers of glass fibers, with polyethylene facing sheet. It is for use under tile and concrete floors in kitchens and food-serving locations, laundries, janitor closets, lavatory, toilet, and washrooms, bathroom and drying areas, and boiler-water-heater and air conditioning machinery rooms. Brochure gives installation details. Compotite Shower Pan.
Circle 117 on reader service card

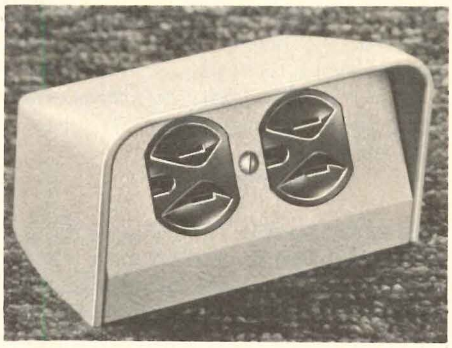

Mini-detection system

Mini-detection system. Designed for security applications, it is both a smoke detector and remote monitoring device. The model No. 778 can connect to as many as five other 778's, can monitor any number of heat sensors, and can turn on or off auxiliary devices such as horns, bells, and door closers. It can be connected to a control panel or wireless alarms, and contains separate alarm and trouble circuits to prevent unnecessary false alarms. BRK Electronics.
Circle 118 on reader service card


Elevator control security system

Elevator control security system. Working in conjunction with a controller, the system, with reader and keyboard in the elevator cab, can limit access on any or all floors at any hour on any given day, states manufacturer. The system controls only those floors where a person may go. Where the elevator returns, or rests, the closing of the cab doors and emergency control remains under the control of the company elevator system. Rusco Electronic Systems.
Circle 119 on reader service card

Circle No. 339, on Reader Service Card



Plastic floor service fittings

Plastic floor service fittings are molded from polycarbonate. The high potential fitting is available less receptacle or with standard 2-pole, 3-wire, 15 amp, 125 v grounded receptacle. Telephone and signal service fitting has a ¾" x 1½" opening and accommodates service up to 26 pair cables. Fittings are only 2⅝ in. high in silver or gold permanent color. Midland Ross Corporation.
Circle 120 on reader service card

Other literature

Sanspray siding is an engineered panel siding consisting of natural stone chips adhered to exterior grade plywood with pure epoxy resin. In addition, other panel materials such as mineral fiber board are available. Maker states product can be used wherever plywood is used in construction or where accent is desired: as sidings, fascias, soffits, accent panels, modular structures, remodeling material or decking. Brochure contains general information including colors, sizes, application ideas, and installation details. Sanspray Corp.
Circle 204 on reader service card

MAC520 Cardentry is a microprocessor-controlled card access system. The single compact unit provides an ID card reader and a solid-state, reusable memory for storage of valid card data. The time-zone option limits access privileges to specified time periods during the day. Up to three arbitrary time zones can be defined, and each cardholder may be granted access during any combination of the three, or during the "master" (24 hr) zone. Rusco Electronic Systems.
Circle 205 on reader service card

Sheet vinyl flooring. Four-color, eight-page brochure describes major products in detail, which include Multiflor, Conductiflor for operating rooms; Gymflor and Gymflor II for sports surfaces; Acoustiflor. Information is provided on heat welding features. Tarkett.
Circle 206 on reader service card

Perforated metal. 1978 catalog features company's complete line of perforated metal, expanded metal, wire cloth, bar grating, and grip strut safety grating. New items include fiberglass bar rating, perf-grate and expangrate. Typical applications in pollution and noise control and people protection, new specifications, and illustrations are included. McNichols Co.
Circle 207 on reader service card

Literature continued from page 133

Windows. Catalog No. 5 contains illustrations, features, and specifications of company's complete line of windows. It also includes options and installation details. Marvin Windows.
Circle 208 on reader service card

Korad is a factory-bonded film coating that has been developed especially for use as prefinished metal roofing and siding. This acrylic plastic is said to stretch over panel bends without fracturing and will not chalk, fade, chip, or peel. Brochure contains product data. Korad Incorporated.
Circle 209 on reader service card

Resilient flooring. This 112-page four-color catalog illustrates complete line of floor covering for commercial and residential use. Catalog is heavily illustrated in color, and includes technical and product information, as well as architectural specifications. Mannington Mills, Inc.
Circle 210 on reader service card

'Siding 1978.' Four-color brochure contains photos of exterior siding, the various types and color choices available and illustrates its application. Installation details are included. Georgia-Pacific.
Circle 211 on reader service card

Alarm screen. A window screen that is designed to prevent entry through a window by triggering the alarm when an attempt is made to cut or move the screen. Technical manual 169 illustrates and explains screen's use with different kinds of windows, installation details, attaching hardware, and gives general information. Imperial Screen Company Inc.
Circle 212 on reader service card

Slide Gate Operator. The SL-40 unit is designed for heavy duty, continuous use. Maker states operator has low maintenance requirements, and is simple to install. Brochure contains diagrams of typical installations. Access Controls, Inc.
Circle 213 on reader service card

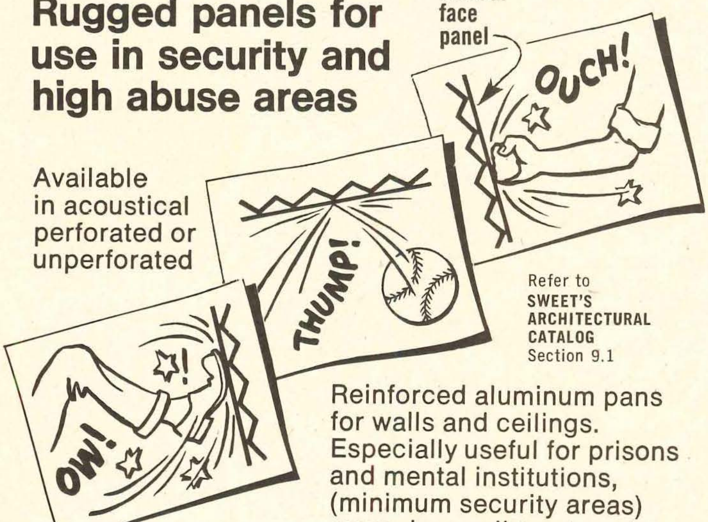
Quasal exterior building panels are machine-made from white Portland cement. Color brochure illustrates uses, contains cutaway drawings which show methods of hanging, and includes technical data and specifications. Glasweld International.
Circle 214 on reader service card

Baseboard radiation heating. Brochure discusses features, has water rating chart, dimensional drawings, and general layout and specifications. Sterling Radiator.
Circle 215 on reader service card

Window treatment. Four-color brochure depicts company's capabilities for providing architects, owners, and interior designers with complete window treatments. This includes aluminum pocket systems and architectural drapery hardware, and draperies. In addition, the company can provide upholstered walls and panels, demountable partition systems, and a knockdown aluminum door frame. Many of the company's installations are illustrated. Master Recessed Systems, Inc.
Circle 216 on reader service card

HydrEpoxy 104 has been formulated especially for bonding exposed aggregate to all types of vertical surfaces or factory fabricated panels. It comes in wide range of colors. It can be applied in damp weather to wet masonry surfaces using wet aggregate and also at temperatures as low as 32F, when mixed with portland cement. Clean-up is with soap and water. It is odorless, nonflammable, relatively nontoxic, states maker. Literature provides technical data, illustrates colors. Acme Chemicals. Division of Allied Products Corporation.
Circle 217 on reader service card

Electric radiant heating panels and systems are designed for primary and supplemental heat for office buildings, schools, hospitals, clinics, hotels, motels, condominiums and residences. A unique rough surface is said to make panels efficient way to provide heat. Panels can be silk screened to blend with acoustical tiles. Applicable for all dimensions T-bar, concealed spline, and regular ceiling systems. Brochure shows cutaway drawing of heating panel, mounting details, and gives product information. Aztech International, Ltd.
Circle 218 on reader service card



Building materials

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

Yale Center for British Art, Yale University, New Haven (p. 76). Architects: Louis I. Kahn, completed after his death by Pellecchia & Meyers, Architects, Philadelphia. Metal panels: Trio Industries. Elastomeric sealants: Pecora. Built-up roofing: Celotex. Terne roofing: Fishman & Sons. Aluminum flashings: Fishman & Sons. Acrylic dome skylights: Hillsdale Industries. Entrance doors: Trio Industries. Hollow metal doors: Williamsburg Steel. Fire-rated shutters: North American Door. Oak doors: Hartman-Sanders. Stainless steel windows: Trio Industries. Insulating glass: Superseal of Canada. Dark blue interior glass: Glaverbel. Herculite glass: PPG. Hardware: Eaton; Rixon; Sargeant; Soss; Stanley; Von Duprin, Inc. Metal studs: Marino. Partitions: A.H. Leeming. Partition covering: Belgian linen from Hamilton-Adams. Toilet partitions: Global Steel Products. Tackboards: A.H. Leeming. Cabinet work and custom woodwork: A.H. Leeming and Yale University Wood Shop. Paints: Sherwin/Williams. Stains: Pratt and Lambert. Wallcoverings: unbleached Belgian linen from Hamilton-Adams. Wood paneling: A.H. Leeming. Countertops: Formica. Ceramic tile: American Olean. Wood flooring: Bruce. Travertine marble: Marble Shop, Inc. Carpeting: Magee Carpet Co. Signs and directories: Colorgraphics, John Stevens Hop. Bathroom accessories: Bobrick. Library equipment: Library Bureau. Fume hoods: Fisher Scientific. Sinks and countertops: Emerson-Sack-Warner Corp. Dishwashers: Kitchen Aid. Ovens and ranges: Themador. Metal office furniture: Steelcase. Upholstered modular seating: Herman Miller. Wood chairs: Claud Bunyard. Oak trestle tables: Majestic Furniture Co. Cotton drapery: Homecraft Drapery Co. Auditorium seating: JG Furniture Co. Chairs and sofas: Brickel.

Museum of Natural History and Science, Louisville, Ky (p. 82). *Architect: Louis and Henry, Inc., Louisville, Ky.* Aluminum strips: Penco, Inc. Woven acrylic carpet: Mohawk. Quarry tile: American Olean. Roof surfacing: Owens-Corning Fiberglas. Skylights: Naturalite, Inc. Windows: Penco, Inc. Entrance doors: Forms & Surfaces. Hardware: Sargent, LCN Closer Co., Stanley, Von Duprin. Paint: DeHart Paint Co. Elevators: Murphy Elevator Co. Lighting: Prescolite, NL Corp. Sanitary equipment: American Standard. Heating: Trane, Burnham. Air conditioning: Trane.

Southern Alleghenies Museum of Art, Loretto, Pa. (p. 90) Architect: Roger C. Ferri, Museum design architect; L. Robert Kimball, coordinating architect and engineer. Exhibition walls: U.S. Gypsum. Carpet: Bigelow. Quarry tile: Elon, Inc. Window frames: Winco Ventilating Co. Ultra-violet filtering plexiglass: Rohm and Haas. Solid core wood doors: U.S. Plywood. Hollow metal doors: Steelcraft Mfg. Co. Custom fabricated steel shapes: M.J. Kovach & Sons, Inc. Glazing: Libbey-Owens-Ford Co. Locksets: Corbin. Closers: Rixson Firemark, Inc. Hinges: Henry Soss, Co. Exits: Sargent & Co. Paints: Benjamin Moore Co. Track lighting, pendant mount: Edison Price, Inc. Plumbing fixtures: American Standard. Flush: Sloan. Pipe: U.S. Steel Corp. Heating system: ITT-Nesbitt. Package air conditioning: Lenox Co.; Barber-Colman Co.

Notices

New addresses

Eugene D. Sternberg & Associates, 4200 S. Meadowbrook Lane, Upper Bear Creek, Evergreen, Co 80439.

Donald Wayne Shuey & Associates, Architects, PA, 2300 S. Dixie Highway, Miami 33133.

Burt Hill Kosar Rittelmann Associates (formerly Burt, Hill & Associates), 400 Morgan Center, Butler, Pa 16001.

Donal Simpson Associates, 135 Pelham St., Newport, RI 02840.

Goody, Clancy & Associates, 334 Boylston St., Boston 02116.

Leon K. Lauver & Associates, 1217 Washington St., Waterloo, Ia 50702.

Michael Graves Architect, 34 Witherspoon St., Princeton, NJ 08540.

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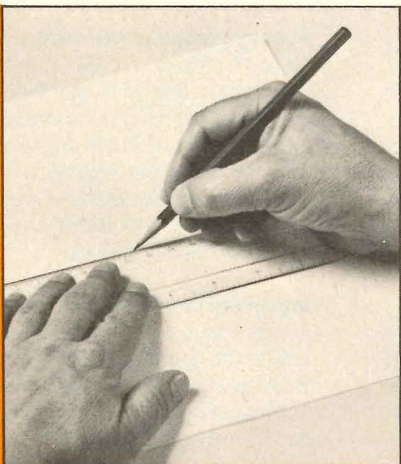

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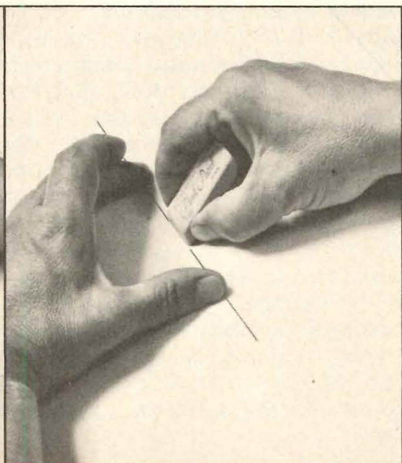

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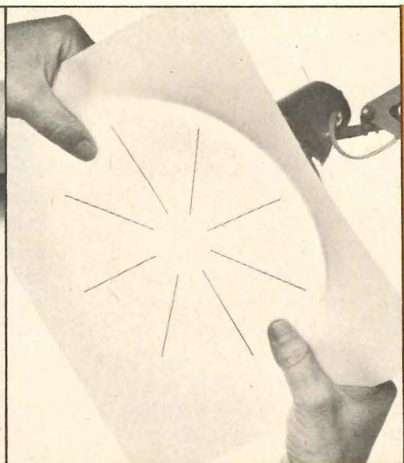

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Architectural Graduate: Small growing firm in Medford, Oregon with branch office in Pendleton, Oregon. Minimum 3 years experience in drafting and design. Ability to carry small to medium sized projects from design through construction. Broad scope of experience available including client contact. Afseth, Jacobs & Schmitz, Architects 2950 East Barnett Road, Medford, Oregon 97501.

Assistant Professor: The University of Colorado at Denver, College of Environmental Design, Division of Architecture, seeks an Assistant Professor starting Fall 1978 to teach Graduate Design Studio plus courses in Architectural Theory, or in Historic Preservation, or in Architectural Technology, or in Architectural Graphics. Closing date for applications—June 15, 1978. Second Professional Degree, Architectural Registration and teaching experience preferred. Send Design Portfolio, Resume, Statement of Interests and Expectations in Studio Teaching, and Two Preferred Seminar/Lecture Course Descriptions to: Robert Utzinger, College of Environmental Design, University of Colorado at Denver, 1100 14th St., Denver, Co 80202. The University of Colorado at Denver is an Equal Opportunity Affirmative Action Employer.

Assistantships: The University of Nebraska–Lincoln College of Architecture has a number of assistantships available for the next academic year for graduate students in the Department of Architecture and the Department of Community and Regional Planning. Acceptance of an assistantship requires a time commitment by the student to the College as a teaching assistant or as an assistant in the research or public service activities of the College. Send inquiry letter to the Chairman of the department of your interest, College of Architecture, University of Nebraska–Lincoln, Lincoln, Nebraska 68588. Affirmative action/equal opportunity employer.

Assistant or Associate Professor: Position requires teaching building technology, mechanical and electrical systems, construction management and normal academic committee responsibilities. Position Available: August 1, 1978. Starting Salary: Commensurate with qualifications and experience. Appointment Conditions: Full-time, ten months. Qualifications Required: Applicant should be a registered professional engineer or have a broad background in construction technology and architectural construction. Degree in building science architecture or engineering and a minimum of 3 years practical experience required. Some teaching experience is desirable. Application Procedure: Applicants should submit resume, references and brochure to: Appointments Committee, Department of Architecture, Tuskegee Institute, Tuskegee Institute, Alabama 36088. Application Deadline: May 10, 1978. An equal opportunity/affirmative action employer.

Assistant or Associate Professor: Position requires teaching Construction Technology and Administration such as specifications, office practice and possible design studio, plus normal academic committee responsibilities. Position Available: August 1, 1978. Starting Salary: Commensurate with qualifications and experience. Appointment Conditions: Full-time, ten months. Qualifications Required: Applicants must be highly qualified in construction administration and technology with architectural design capability. Should have terminal architectural degree, architectural registration and a minimum of 5 years experience in practice and/or teaching. Application Procedure: Applicants should submit resume, references and brochure to: Appointments Committee, Department of Architecture, Tuskegee Institute, Tuskegee Institute, Alabama 36088. Application Deadline: May 10, 1978. An equal opportunity/affirmative action employer.

Assistant or Associate Professors: The Graduate School of Architecture and Planning of Columbia University anticipates openings for full-time and part-time adjuncts to teach at the Assistant or Associate Professor levels during 1978–79. Applicants should have experience both in teaching at the graduate level and working in a professional architectural capacity. Expertise in the following areas is sought: design studio; solar energy & technology; environmental systems; site development & landscape architecture; history & theory of architecture. Please send resume to: Dean James Stewart Polshek, Graduate School of Architecture & Planning, Columbia University, New York, NY 10027 by May 31, 1978. Columbia University is an affirmative action/equal opportunity employer.

College of Architecture: University of Nebraska–Lincoln is seeking candidates for the position of Coordinator of Community Development/Education. Master's required, Ph.D. desirable i community development or allied fields. Detaile job description is available. Salary and rank co mensurate with qualifications. Tenure track. Ap cations by June 1, 1978 to: Ted Wright, Directo Community Resource and Research Center, Ar chitecture Hall 107, University of Nebraska–Lincoln, Lincoln, Nb 68588 (402) 472-3592. Affirmative action/equal opportunity employer.

Director of Inspection Services: $22,854–$26,312 annually, plus comprehensive fringe package. Salary will be negotiated based upon background and experience. Director of Inspec tional Services as part of the Community Develo ment Department to assure adherence to vario codes and ordinances. This position provides a ministrative opportunities in directing a technica clerical staff of 32. The Director is responsible f interpreting, analyzing, developing and implem ing policies, rules and regulations. Peoria is the core city of a metropolitan area in excess of 350,000 population, the second largest metrop tan area in the State of Illinois, and Peoria has a number of downtown development projects underway, both public and private. Downtown r vitalization involves substantial structural chang new construction and a civic center at an estimated cost of $50 million. Requires: Graduatio from a four year college in Architecture, Structu Engineering, Construction Management, or clo related subjects and thorough experience in bu ing construction, architecture, structural engine ing or construction administration, including considerable administrative or supervisory exp ence. In lieu of the above, extensive experience a building contractor constructing moderate to large size buildings or construction projects. A plicants should submit a brief synopsis about c struction projects for which they have been responsible. Apply: Personnel Office, City Hall, 4 Fulton Street, Peoria, Illinois 61602. An affirmati action employer.

Faculty Position: Assistant Professor/Landsca Architecture Appointment anticipated for September 1978. A well-rounded, registered L.A. is needed to teach primarily site engineering, des and other technical subjects in a developing M program. Closing date for applications—June 1978. Send vitae to: Director, Landscape Archi ture, University of Colorado at Denver, 1100 14 Street, Denver, Colorado 80202. The University Colorado at Denver is an equal opportunity/ affirmative action employer.

Faculty Position Fall—1978: Interior Design A sistant Professor first year Architecture and upp level Interior Design Studio. Program emphasis Interior Architecture leads to Bachelor of Interio Design. Terminal Studio degree in Interior Desi required. Reply with resume to Faculty Search Committee, Interior Design Program, 104 Dudl Hall, AU, Auburn, Al 36830. Auburn University i equal opportunity employer.

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[continued on page 140]

Job mart continued from page 138

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New Faculty Positions: For the division of Architecture and Environmental Design, College of Architecture and Urban Studies, Virginia Polytechnic Institute and State University. Senior Faculty in History/Theory: To teach history/theory of architecture in both graduate and undergraduate programs using non-traditional pedagogic strategies. Terminal degree and accomplishments in scholarly work required. Junior/Senior Faculty in Architecture—Industrialized Adaptive Technology: To develop building prototype research, fabrication, and testing integral with teaching architectural design at graduate and undergraduate levels. Terminal degree and experience in education/practice (preferably in industry) required. Junior/Senior Faculty in Structures: To teach and develop research in theoretical and applied structural design in both graduate and undergraduate programs. Terminal degree and experience in education/practice required. Junior Faculty in Environmental Control Systems: To teach theory and application of integrated climate control technology. Terminal degree and experience in education/practice required. Junior/Senior Faculty in Architectural Design: To teach architectural design in graduate program. Terminal degree and experience in education/practice required. Address inquiries to: John T. Regan, Assistant Dean, Division of Architecture and Environmental Design, College of Architecture and Urban Studies, 201 Cowgill Hall, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061.

Opening Available: For Project Architect, Job Captain or Senior Architectural Draftsperson. Minimum five (5) years experience required. Degree preferred but not necessary. Excellent opportunity, located in fast-growing Beckley, West Virginia. Contact: Michael Daniel Lovallo, AIA, Chief Architect, Holley, Kenney, Schott, 305 Reservoir Road, Beckley, WV 25801, (304) 252-5371.

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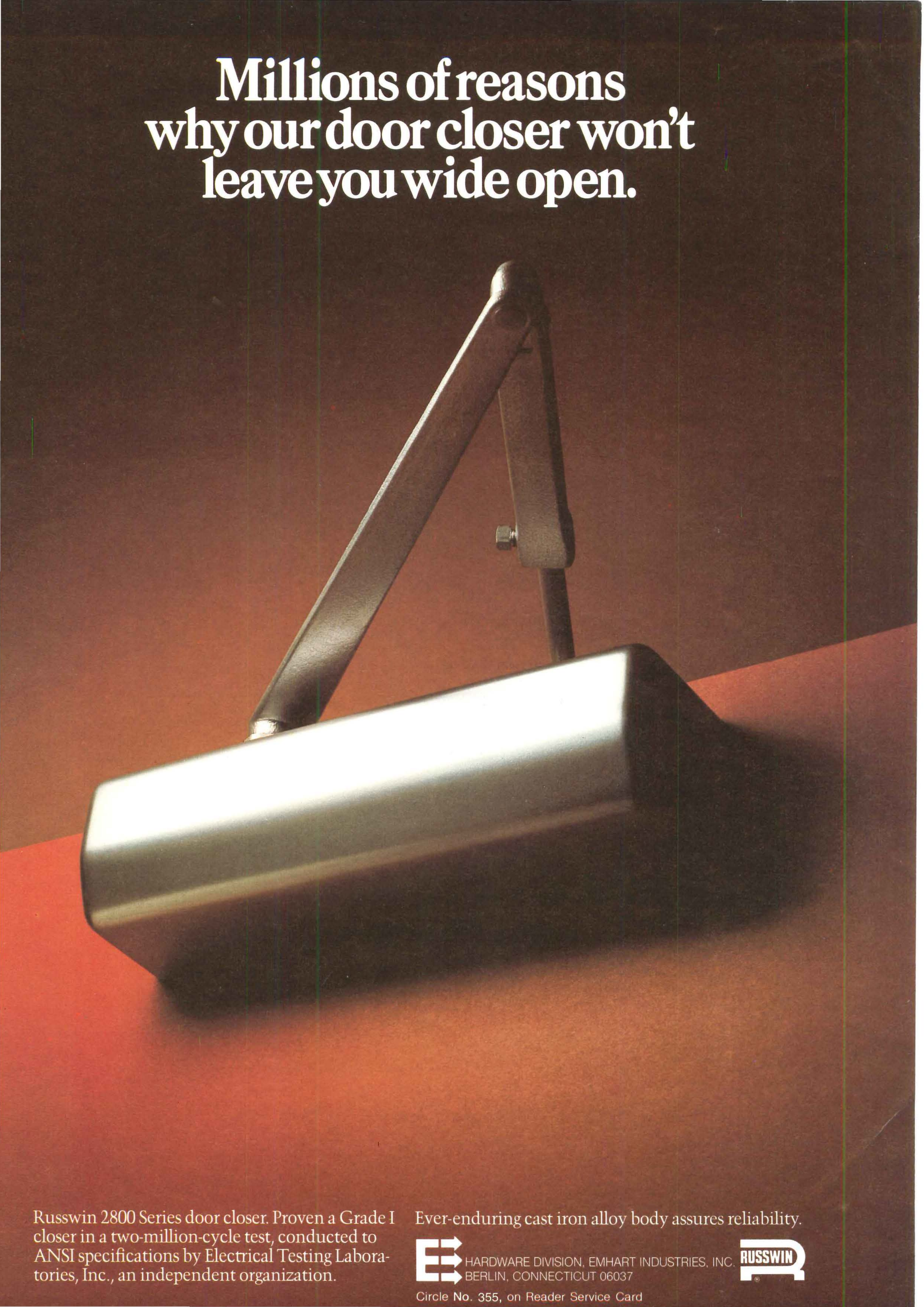
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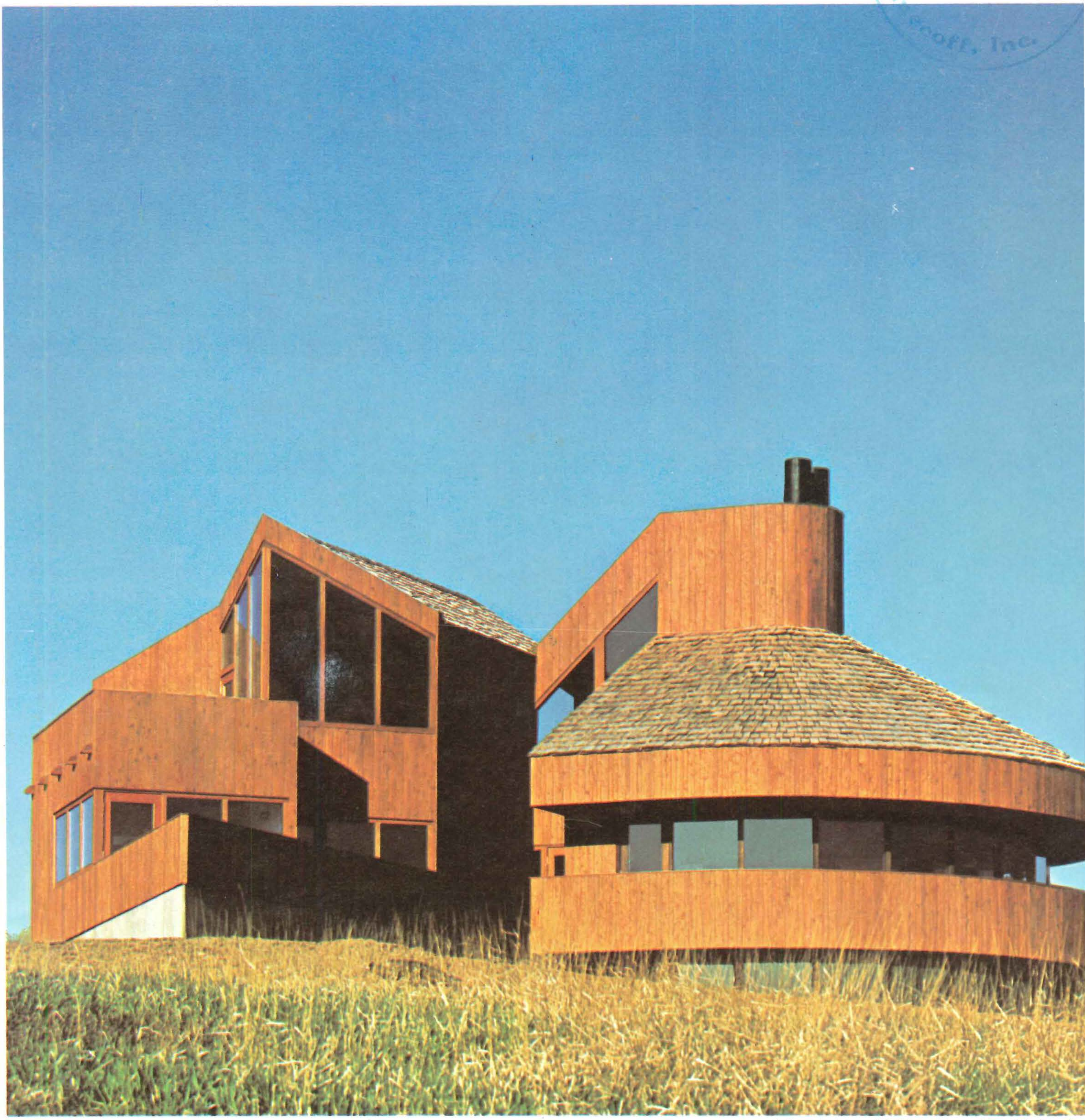

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