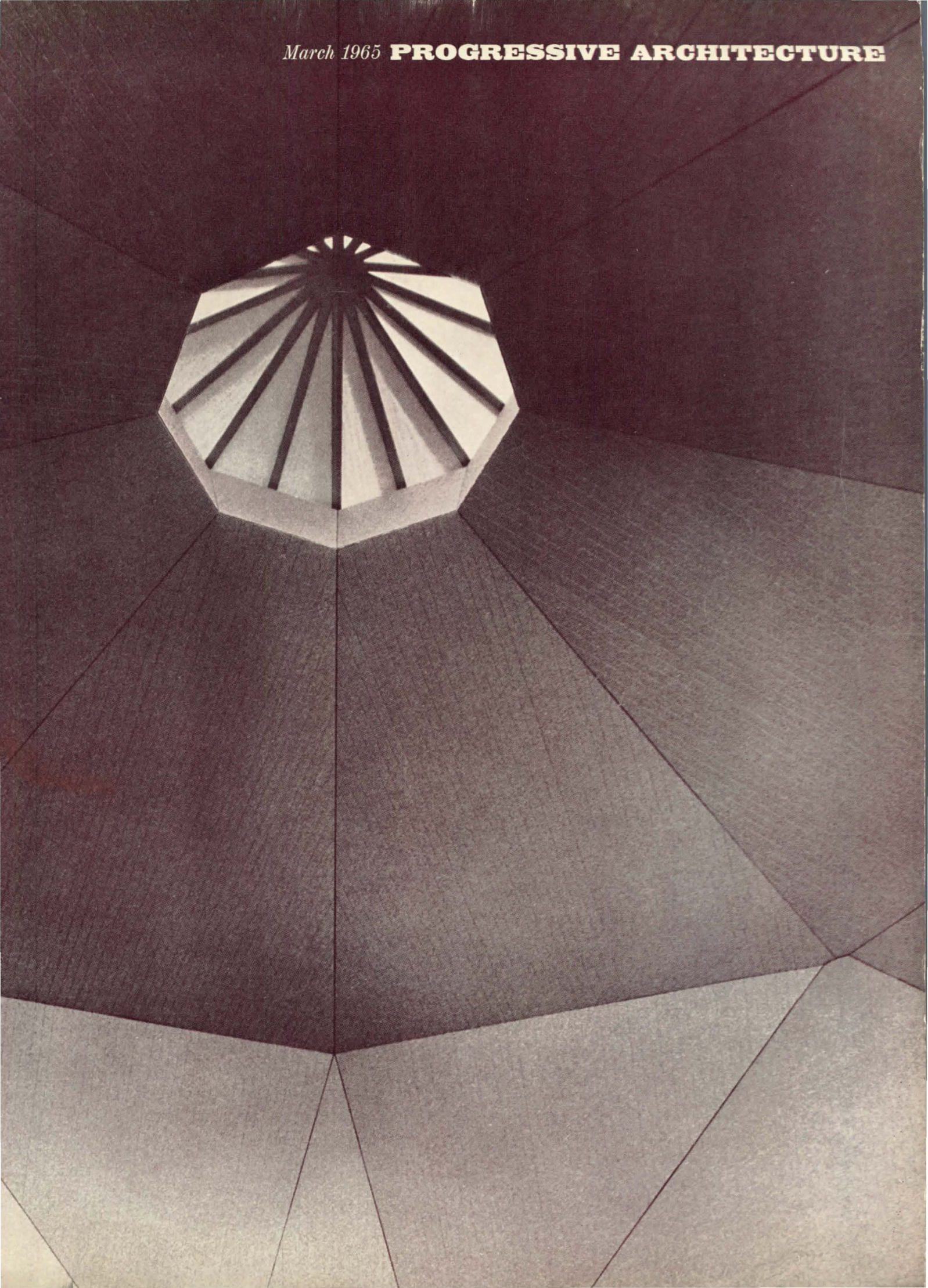
March 1965 **PROGRESSIVE ARCHITECTURE**



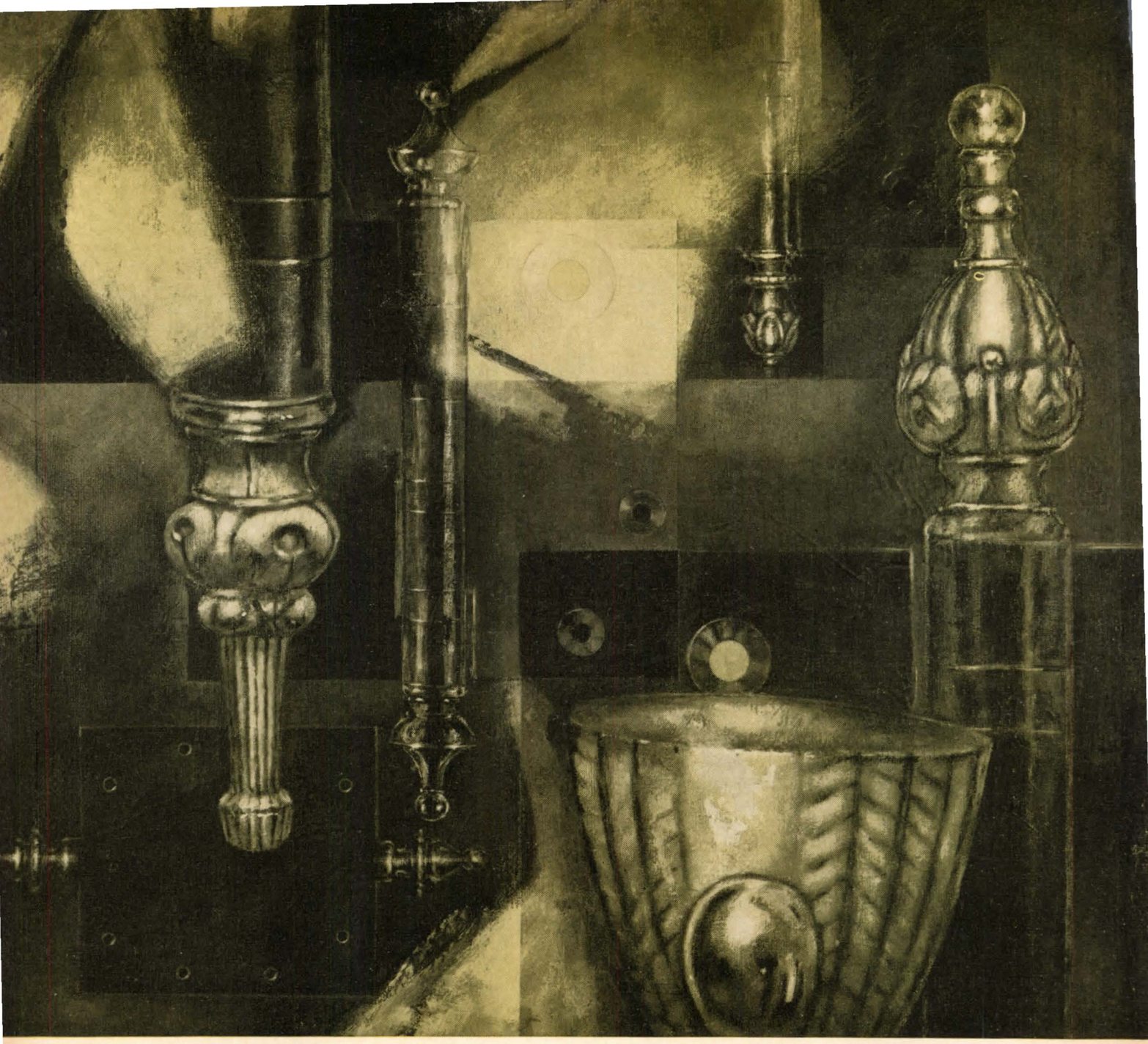
Installation:
Davison's Department Store, Columbia Mall Shopping Center, Atlanta, Georgia
Architect:
Toombs, Amisano & Wells, Atlanta, Georgia
Floor shown:
V-423 Autumn Haze

Creative styling: an inherent quality of Azrock floors.

Heavy traffic means good business — and it's good business to move heavy traffic on durable, handsome floors of Azrock vinyl asbestos tile. Day in, day out Azrock's Premiere Series floors serve Davison's Department Store in Atlanta. Premiere's rich travertine styling puts beauty underfoot for extra-long service, because the patterning extends through the full thickness of the tile . . . another specific way in which Azrock imagination and resilient flooring craftsmanship serve the architectural profession.

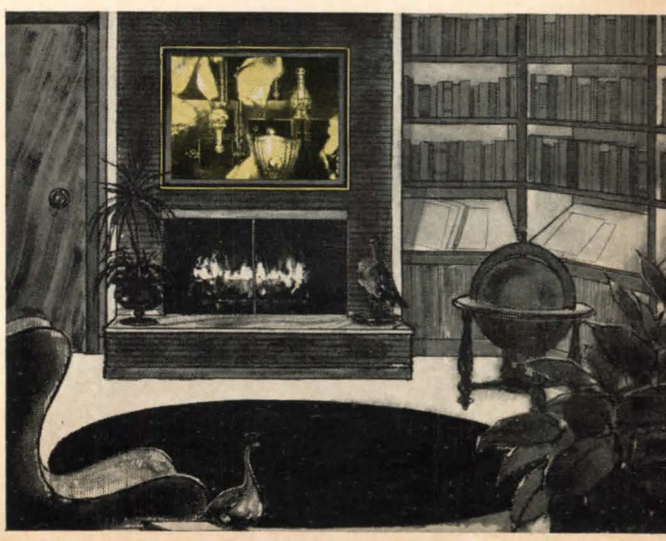
an original floor styling by **AZROCK®**

Consult Sweet's Catalog or write for samples. Azrock Floor Products, 500A Frost Building, San Antonio, Texas 78205.



STYLED TO THE VERY HINGE TIPS

Beveled leaves, bearing segments that nest neatly, finish that brings solid brass to rich luster . . . you could stop there and have a quality hinge, complete and attractive, far beyond the ordinary. But Hager carries design right out to the tips. The tips in ten different designs, from the tall Cathedral to the short Crown cap, all suggest motif that can further emphasize interior decor. May we send you more details on this special decorator hinge group? HAGER HINGE COMPANY, St. Louis, Mo. 63104. Hager Hinge Canada Ltd., 61 Laurel Street East, Waterloo, Ontario.



Hager

Everything Hinges on Hager

On Readers' Service Card, circle No. 349

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from
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the effect of monochromatic floors without the maintenance problems they cause.

If you are one of the many architects who have asked for more monochromatic effects in flooring, you may want to take a look at Dorelle Vinyl Corlon by Armstrong. Its graining is so subtle that when viewed in large areas it seems to blend into the background. Yet there is enough pattern detail to avoid the maintenance problems of perfectly solid colors.

Dorelle is well suited for use in large commercial areas for other reasons, too. Not the least of these is price. Dorelle costs only about 70¢ sq. ft. installed, far less than other commercial-weight sheet vinyl floors. Yet Dorelle is a heavy gauge material (.090″) and will outperform battleship linoleum in durability, economy of maintenance, and resistance to heel indentation, staining, and alkali. In addition, application is not limited to suspended subfloors; Dorelle's Hydrocord Back allows it to be installed above, on, or below grade*.

Because it comes in 6′ rolls up to 90′ long, Dorelle can be installed with a minimum of seams, as compared to tile, and can be curved up the wall to eliminate baseboard crevices—important advantages in hospitals, white rooms, and other interiors where cleanliness is essential.

Six of the seven Dorelle styles are shown opposite. If you would like a closer look at some actual samples and more information, call your

Armstrong Architect-Builder-Contractor Representative in the nearest District Office or write Armstrong, 303 Watson Street, Lancaster, Pennsylvania.

VINYL FLOORS BY
Armstrong

* Except where excessive alkali or hydrostatic pressure makes the installation of any resilient floor impractical.

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VIEWS

More on "Architecture without Architects"

Dear Editor: Not only did you—in your Editorial (DECEMBER 1964 P/A)—miss the point of my exhibition, you jumped to the wrong conclusions. No harm done, though. What I take exception to is your plea for censorship.

Innuendo has a function in language, and I would hate to see it go. The same is true for sarcasm, or, to use your own words, "even open sarcasm." I wrote the text and captions for "Architecture without Architects" in my capacity as director of the exhibition and not as consultant to the Museum. They needed no approval of the curator (who, by the way, was promoted to directorship some nine years ago.) Although such lack of curbs may seem deplorable to you, that is how the Museum works. The Museum's support of what you call freak shows does, if nothing else, counteract the professional dullards. Which is, I think, no mean achievement.

BERNARD RUDOFSKY
New York, N.Y.

[*It is strange that Mr. Rudofsky cannot see the difference between censorship—i.e., forced control by others—and voluntary decisions on policy, ideology, etc., of an individual or an organization.*—ED.]

Dear Editor: We are always grateful for reviews of our architecture exhibitions, but those in P/A for August and December 1964 are about an imaginary plot against architects rather than the exhibitions shown here.

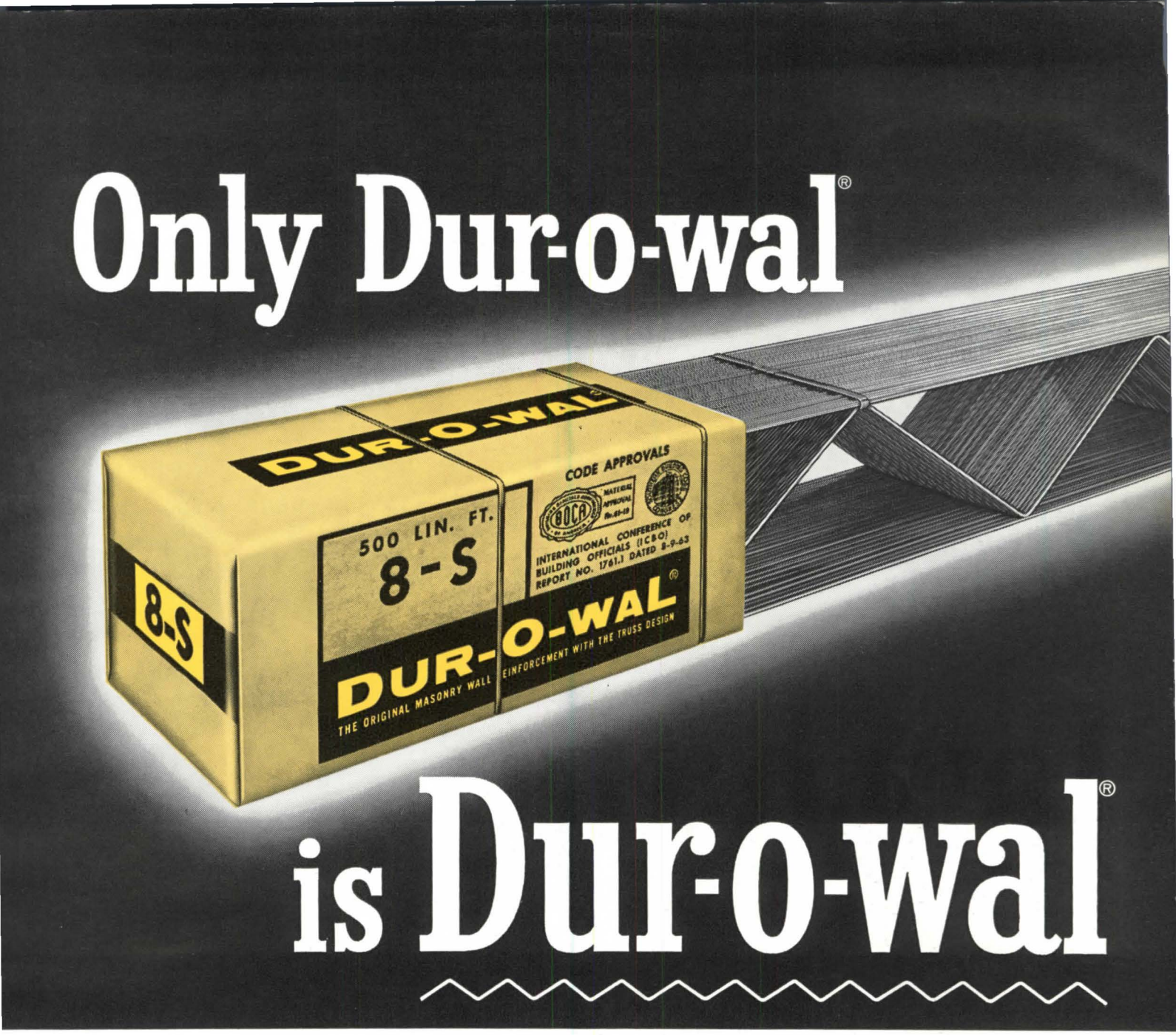
For example, it is not true that "MOMA Continues Attack on Architects," as the headline for your December news item says of Bernard Rudofsky's "Architecture without Architects." And it is not true that "20th Century Engineering," reviewed in August, shows my "creeping distrust . . . for the contributions of the architect." The only creeping distrust I feel is for your source of information.

Since 1932, the Museum has presented 73 architecture exhibitions. Why should these two be interpreted as an attack on architects? Is it because both exhibitions explore less familiar aspects of the building art, or because you think architects have done something that deserves attack? Why is P/A so nervous?

Surely you cannot believe that engineering has had no influence on the forms used by modern architects, or that

Continued on page 14

Only Dur-o-wal®



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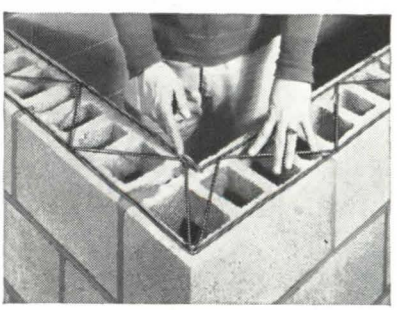

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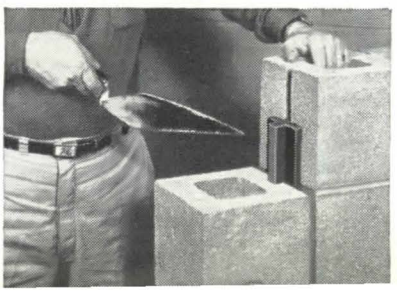

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Here, the first totally integrated ceiling system cost $1.50 per sq. ft. less than a conventional acoustical ceiling with recessed lighting.

Increased efficiency is an obvious advantage of a ceiling that integrates lighting, air distribution and acoustical control. Not so obvious is the fact that Luminaire can also achieve significant savings.

Take the new Magic City Ford showroom in Roanoke, Va., for example. Luminaire cost $1.50 sq. ft. less than acoustical tile with recessed lights; 43¢ sq. ft. less than acoustical tile with surface-mounted lights; 3¢ sq. ft. less than a luminous ceiling with no acoustical control. (All three alternative ceilings required separate air-distribution systems.)

The architect chose Luminaire primarily for its cost advantage, and because it provides the striking appearance and dramatic lighting he wanted for a showroom of new automobiles.

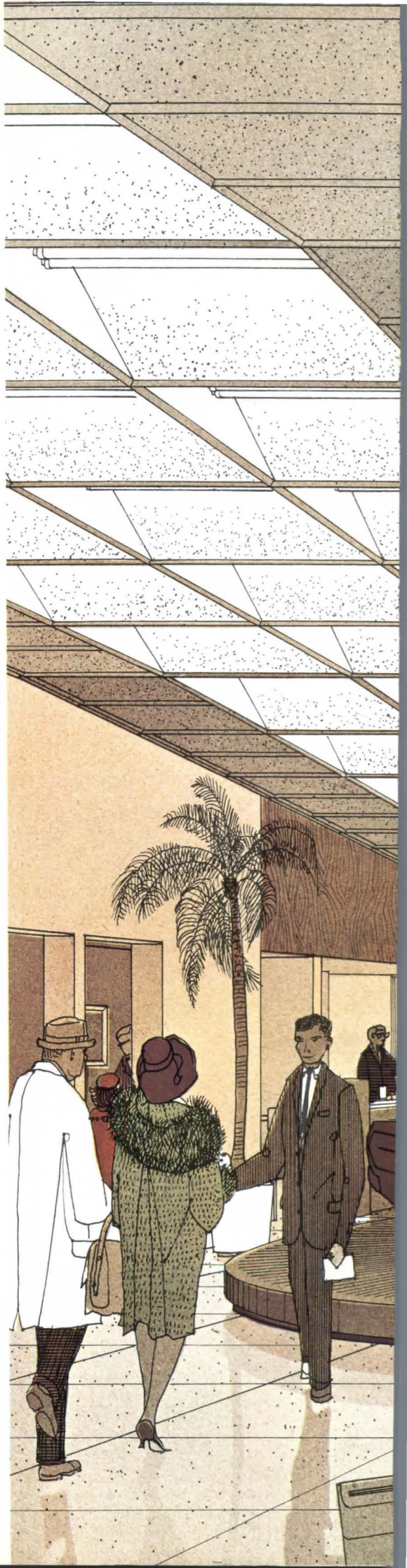
There were other reasons, too. Luminaire delivers uniform, draft-free air. Each 50″ module is its own light and air-distribution source. All components are available from one supplier. Installation is fast. Maintenance is virtually nil: air movement through the ceiling makes it, in effect, self-cleaning.

Here, the system is designed to maintain 130 footcandles. In other installations, it can provide from 50 to well over 200 footcandles—with lower wattages than conventional lighting.

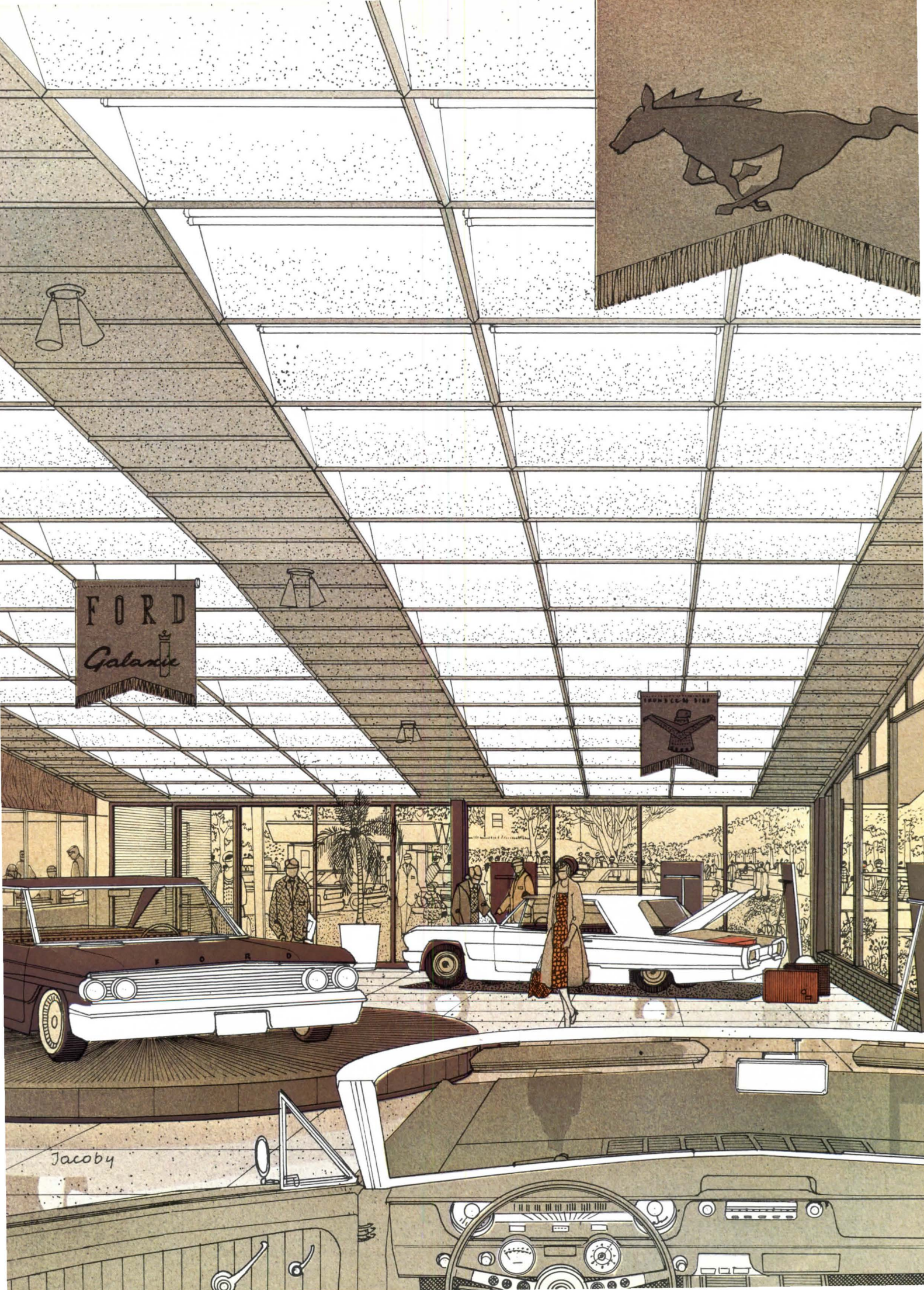
Horizontal ceiling panels allow the system's adaptation to any size or shape room. At Magic City Ford, the system is installed on different planes to conform to the shape of steel frames. Because it can accommodate ceiling-high partitions, the system offers limitless layout flexibility. Further design variation is possible with the new B-48 modification. (This system achieves an open, folded-plate effect; creates continuous bands of light.) For complete information on both systems, write to Armstrong, 4203 Watson St., Lancaster, Pa.

Magic City Ford Corporation, Roanoke, Virginia.
President: Mr. Harry G. Johnson, Roanoke, Virginia.
Architect: J. Garry Clay, A.I.A., Roanoke, Virginia.
General Contractor: J. M. Turner & Co., Inc., Roanoke, Virginia.
Ceiling Systems Contractor: Shields, Inc., Roanoke, Virginia.

Ceiling Systems by Armstrong



For more information, turn to Reader Service Card, circle No. 300.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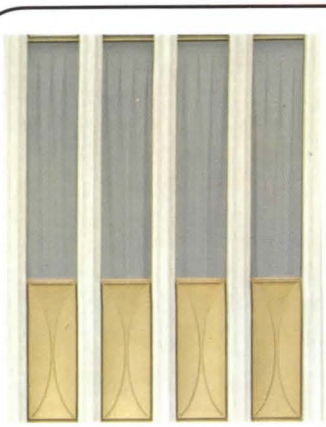
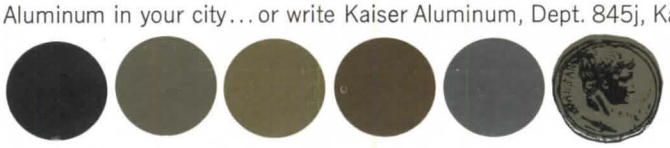


Between the new IBM Building's bold mullions you'll see a rich example of sculptured KALCOLOR aluminum—amber colored spandrel panels formed to the architect's design. KALCOLOR anodizing provides superior color uniformity and endurability for this application. KALCOLOR is sunfast, highly corrosion resistant, twice as resistant to abrasion as ordinary anodizing and may be applied to almost any aluminum building product. Most important, only KALCOLOR can be specified in ten color values—in the wide range represented by the circles below. See Sweet's File 6a/Ka for technical information on KALCOLOR aluminum. To locate KALCOLOR products of our fabricator customers, call Kaiser Aluminum in your city... or write Kaiser Aluminum, Dept. 845j, Kaiser Center, Oakland, Calif. 94604.



KAISER ALUMINUM

COLOR IN ARCHITECTURE...ACHIEVED WITH ALUMINUM

Continued from page 8

there is no work by engineers that merits exhibition. "Architecture without Architects," according to your December Editorial, provides wonderful lessons in the basic tools of architectural design, and your news item describes the show as "a good refresher course for architects and the general public on the wellsprings of architecture and planning." Rudofsky's prose style distresses you, but why do you imagine it will confuse the public? Indeed, what makes you think the public is "already confused"? We see quite a lot of the public and find them clear-headed. If they are not always prepared to endorse ideas you and I admire, that is not necessarily a sign of confusion.

It may well be that a sense of humor has no place in today's architectural milieu, which is very elevated, but I doubt that dignity requires us to interpret criticism as an attack on the profession. In any case, I want to assure you that this Department of the Museum remains dedicated to the Art of Architecture, and as devoted to architects as we are to P/A.

ARTHUR DREXLER
Director, Department of Architecture and Design
Museum of Modern Art
New York, N.Y.

Dear Editor: In your last Editorial, you are apparently puffing into the ugly horn the insipid old message of the junkyard, of the blight caused by others, painstakingly highlighting dirt and trash, unwilling to recognize potential valid forms in an exclusively American situation. The highly trained and intellectual minds you say are the only ones who can cope with the present chaotic abundance. One should think that if these are splendid minds they would really use their abilities effectively and they could set an example. But are they really? Are they offering articulations of truly modern concepts? Are they manifesting the lucidity and the flexibility necessary to recognize the changing forces that are rapidly and constantly altering our environment? And if they showed sufficient perceptive ability to recognize these facts, would they demonstrate innovative capacities worthy of intellectuals?

Are they not generally rather complacently accepting what is presently in vogue instead, using old tricks and gadgets, at best jazzed-up a bit to fit the latest P/A discoveries, happily, jovially backslapping each other, floundering in smug pretentious professionalism, catering to a few?

I did not see the exhibition, nor was I

Continued on page 18

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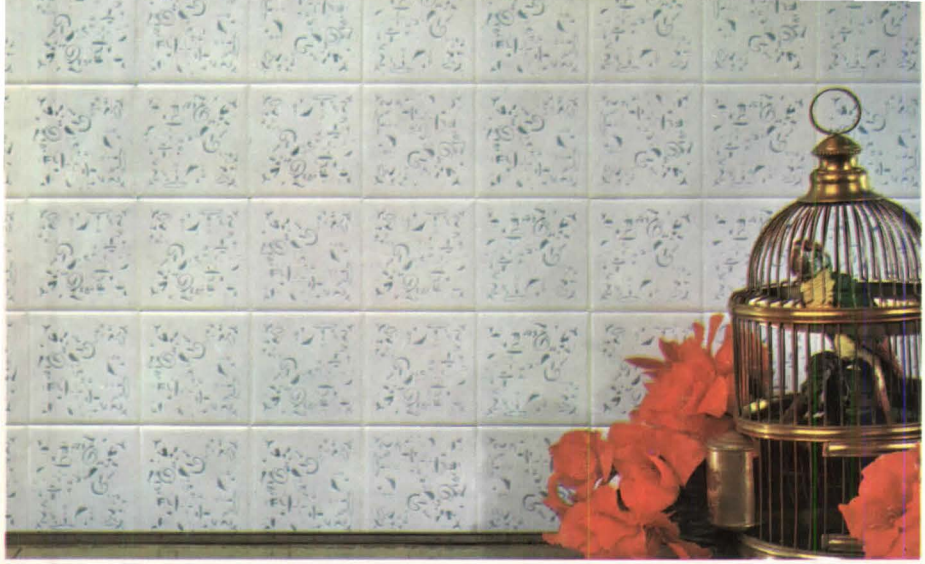

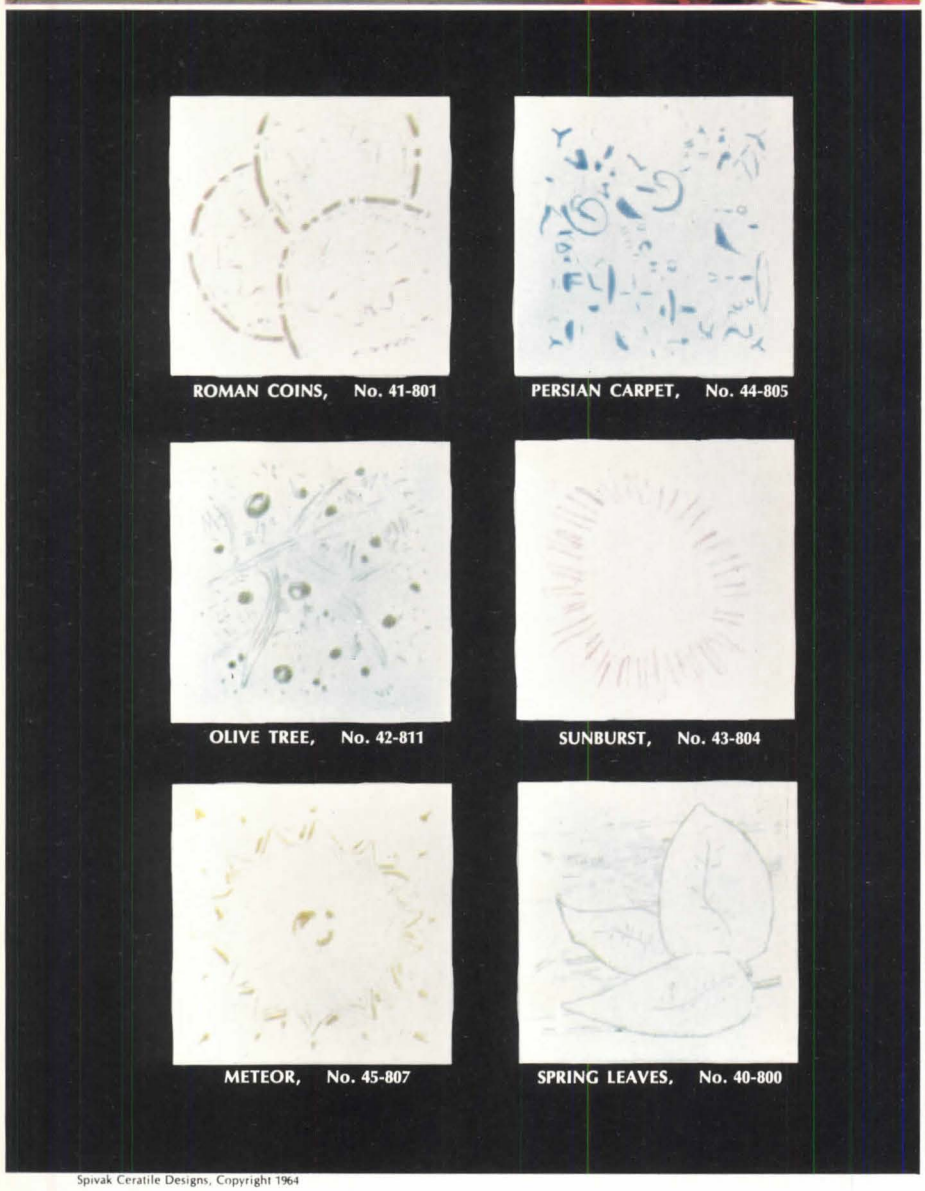

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CERATILE DESIGNS

Continued from page 14

at any time engulfed by Mr. Rudofsky's theories, but I believe this is precisely what he is referring to when he mentions the architects' casual regard for real problems of living and their major concerns for business and personal prestige instead. He apparently did not address himself to "native anonymous talent"; his concern was the performance of the educated and trained professional.

He *is* wrong, of course, when he uses the vernacular of past indigineous architecture in comparison with present architectural ambiguities; this puts him dangerously close to the camp of those dubious eclectics who are turning urban metropolitan housing into Norwegian fishing villages or Mediterranean hill settlements. But he has my full support in his criticism of the narcissistic delight and disregard for public concerns of those who, thanks to their intellectual background, should know better. I disagree with you that the profession should be shielded from public criticism. Are you striving for mediocrity for the sake of the profession? I believe we should have the courage to stop praising the entire professional crowd for innovative thinking as long as this laudation is truly appropriate for a very small minority only.

PETER W. GYGAX
School of Architecture and Allied Arts
University of Oregon
Eugene, Ore.

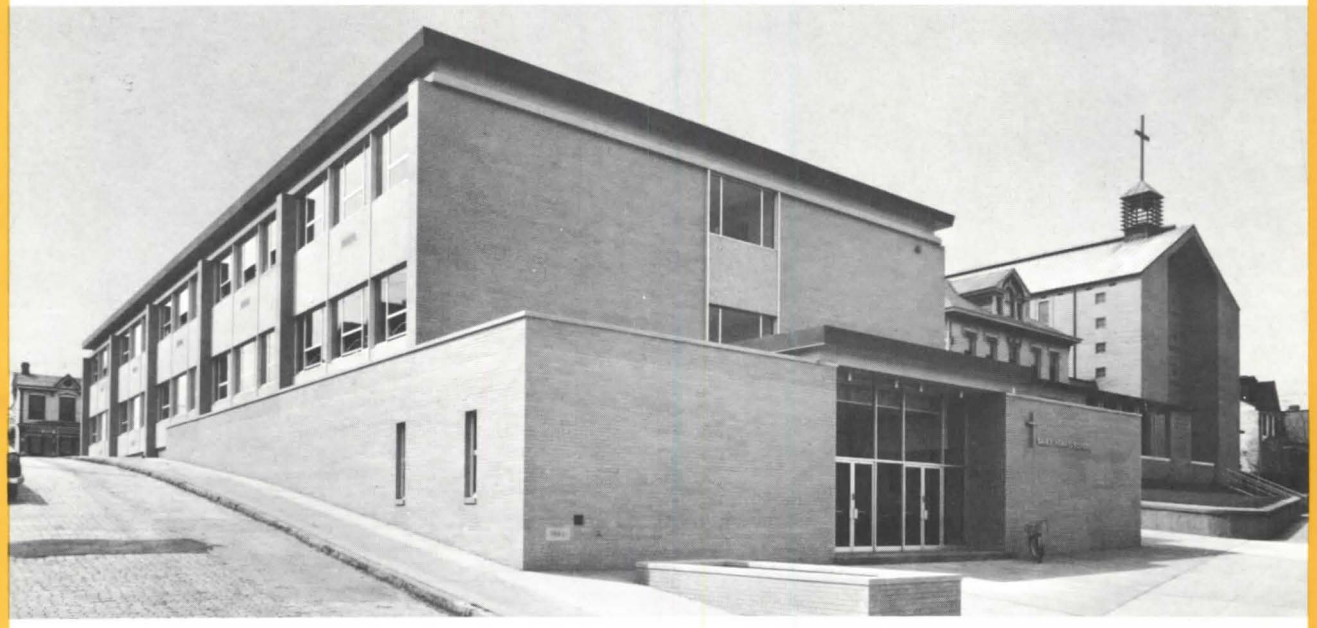
Dear Editor: I want to commend you for the position you have taken on the "Architecture without Architects" show at the Museum of Modern Art. I looked at the exhibit last month and was frankly appalled. It seemed to me one of the few shows I have ever seen which could truly be labelled "subversive." When an institution with the prestige of the Museum of Modern Art puts on this sort of spiteful exhibition, it is incumbent on the profession to point it out. P/A has done a real public service.

LEONARD K. EATON
Professor of Architecture
University of Michigan
Ann Arbor, Mich.

Dear Editor: Your Editorial in the December issue of P/A expressed a sentiment that most architects, and in fact most human beings, would heartily applaud. It is indeed only destructive to criticize without offering alternative solutions. And sarcasm added to such criticism does inevitably create confusion. There is only one higher crime in the field of journalism: the brief, malevo-

Continued on page 26

St. Henry's Grade School Is One of 63 Electrically Heated Schools in Pennsylvania—and 43 More Are Now Underway



PITTSBURGH, PA.—St. Henry's Parochial Grade School here selected electric heating because it offered superior benefits in cleanliness, safety and comfort. Low installation and operating costs were added inducements.

Reverend Wendel A. Wuenstel, Pastor of St. Henry's, has this to say about electric heating:

"Our first year's experience with electric heating has fulfilled every premise on which we made our decision. Best of all our actual costs were less than the Duquesne Light Company's original estimates. Yes, we are quite happy and satisfied that our decision in 1962 to install electric heating was the correct decision."

In Pennsylvania, as of January, 1965, there were 63 elementary and secondary schools heated with electricity and 20 more under construction. Another 23 were in the design stage. There were also 10 colleges in the state using electric heating in one or more new buildings.

At St. Henry's Grade School, wall-type convection heaters are used in the corridors and offices. Baseboard units with built-in ventilators are used in the classrooms. At the main entrance to the building, 15 KW of radiant cable is used for melting snow and ice. A small utility room contains the entire supply and control system for heating, lighting, water heating and other power needs. The controls, switchgear and meter equipment are strapped to the walls for maximum utilization of space.

Details of St. Henry's Grade School are listed on the following page. The categories of information were developed by the Electric Heating Association with the assistance of editors of leading trade and technical journals. These categories have been reviewed by the Consulting Engineers Council USA, Washington, D.C., and the Council agrees that the information provides a thorough evaluation of this project.

SEE REVERSE SIDE FOR DETAIL INFORMATION

Gentlemen:
Please send the complete series of Electric Heating Case Histories as they become available to me at the following address:

Name: _____
Firm: _____
Address: _____

A A A

1 CATEGORY OF STRUCTURE:
Educational—Parochial Grade School

2 GENERAL DESCRIPTION:
Area: 27,300 square feet
Volume: 232,316 cubic feet
Number of occupants: 540
Number of floors: three
Types of rooms: 16 classrooms, 1 multi-purpose room, library, offices, etc.

3 CONSTRUCTION DETAILS:
Glass: double
Exterior walls: precast concrete panels, brick and block back-up, double glazing, 3″ wall insulation (R/11). U-factor: .15
Roof or ceilings: 6″ ceiling insulation (R/19). U-factor: .08
Floors: perimeter insulation 4′ wide of 2″ urethane, 1″ vapor barrier under floor.
Exposed wall area: 10,760 square feet
Glass area: 3,050 square feet

4 ENVIRONMENTAL DESIGN CONDITIONS:
Heating:
Heat loss BTUH: 107,5000
Normal degree days: 5,885 (airport)
Ventilation requirements: 10 CFM per pupil
Design conditions: 0°F outdoors; 70°F indoors
Cooling: none

5 LIGHTING:
Levels in footcandles: 50
Levels in watts/sq. ft.: 2.35
Type: Fluorescent

6 HEATING SYSTEM:
Wall type convection heaters in hallways and offices. Classrooms use supplemental baseboard units with built-in ventilation utilizing air intake on an outside wall to provide a circulating flow of fresh air. Classrooms are zoned for individual temperature control.

7 ELECTRICAL SERVICE:
Type: primary underground
Voltage: 120/208V, 4-wire
Metering: secondary

8 CONNECTED LOADS:

Heating & Ventilation	365 KW
Lighting	60 KW
Water Heating	30 KW
Snow Melting	15 KW
TOTAL	470 KW

9 INSTALLED COSTS:

General Work	$340,300	$12.50/sq.ft.
Plumbing	27,500	1.00/sq.ft.
Heating & Ventilation	60,400	2.21/sq.ft.
Lighting & Water Heating	41,200	1.51/sq.ft.
TOTAL	$469,400	$17.22/sq.ft.

10 HOURS AND METHODS OF OPERATION:
7 hours per day, 5 days per week. Setback to 55°F. Automatic 7-day clock with override for irregular hours of operation.

11 OPERATING COSTS:
(Total Electric Bill)*
9/1963 to 8/1964
Actual Degree Days: 5808
Actual KWH: 254,700
Actual Cost (total): $5,027.58*

Billing Period	KVA Demand	KWH	Billing
9/16/63	50	2,250	$ 96.00
10/16/63	60	5,400	121.50
11/15/63	50	15,750	239.08
12/13/63	297	31,500	708.75
1/14/64	320	59,400	985.19
2/13/64	311	50,850	917.72
3/16/64	284	45,900	845.96
4/15/64	315	30,150	678.38
5/14/64	45	5,400	121.50
6/15/64	81	5,400	121.50
7/15/64	18	1,350	96.00
8/14/64	23	1,350	96.00
TOTAL		254,700	$5,027.58*

*Of this, water heating and space heating are as follows: Space heating: $3,666.55 and water heating: $638.30.

12 UNUSUAL FEATURES:
15 KW of radiant cable used for melting snow and ice at main entrance of school.

13 REASONS FOR INSTALLING ELECTRIC HEAT:
Low installation costs and downward trend of electric rates. Superior comfort, convenience, safety and health were added reasons for selecting electric heat.

14 PERSONNEL:
Owner: Catholic Diocese of Pittsburgh
Architects and Engineers: Gerard & McDonald
Heating Consultant: A. C. Schock
General Contractor: Frank J. Busse, Inc.
Electrical Contractor: Martin Electric Co., Inc.
Utility: Duquesne Light Company

15 PREPARED BY:
Lucien T. Kight, Director, Commercial Sales, Duquesne Light Company

16 VERIFIED BY:
Edwin J. Gerard, Architect

NOTICE: This is the seventh in a series of case histories which will cover all categories of buildings. Some of these histories will be published in leading trade and technical journals and some will not. If you wish to receive all histories as they become available, please fill out the strip-coupon at the left and mail it to Electric Heating Association, 750 Third Avenue, New York, N. Y. 10017.

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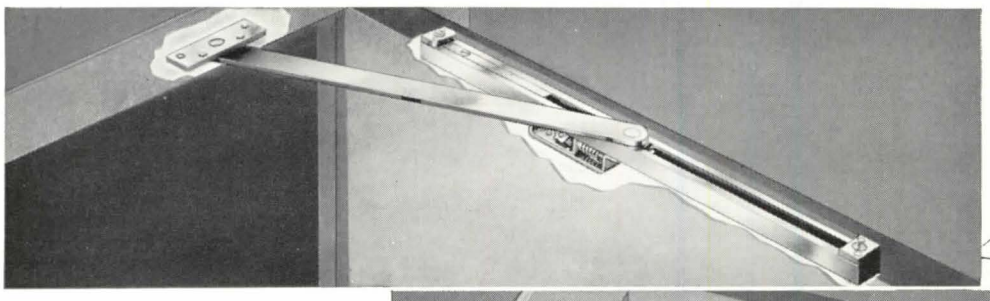

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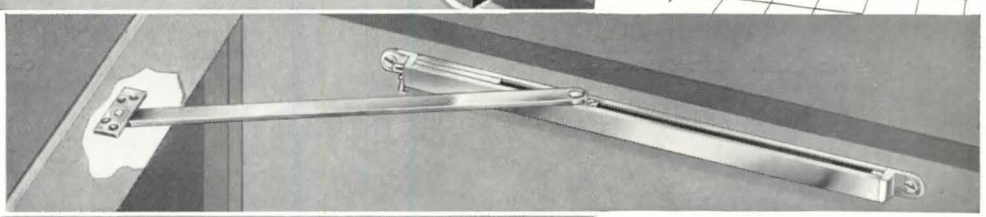
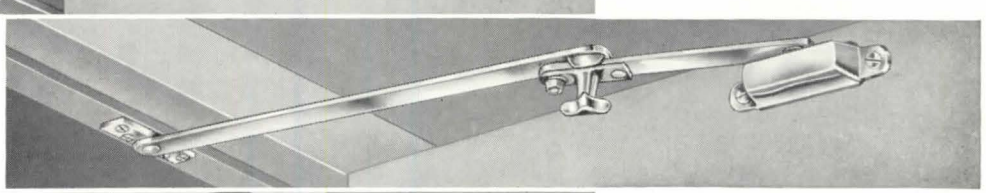
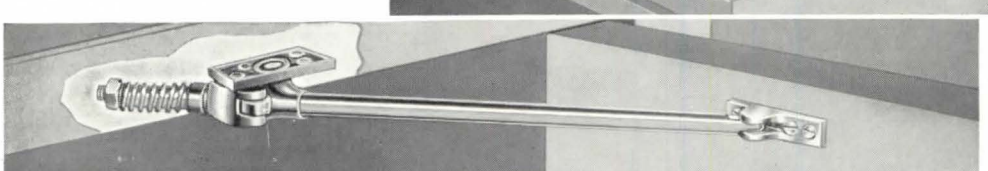
GJ 90▶ surface type (handed)



◀GJ ARISTOCRAT (non-handed) for single acting doors. Ruggedly built for hard, practical usage.

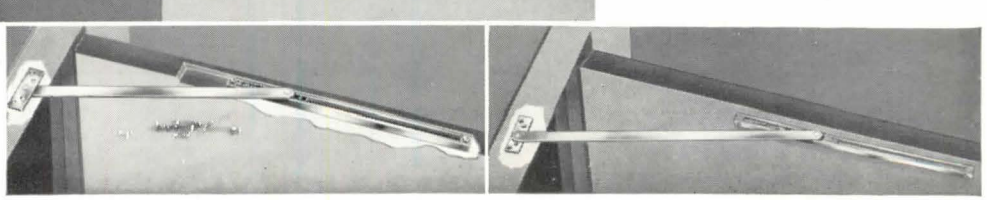
GJ 80▶ (handed) for single acting doors. For moderate cost installations.





◀ GJ 70 (non-handed) for single acting doors. Inexpensive for low-cost installations.

GJ 300 and GJ 500 series▶ (non-handed) concealed for single and double acting interior doors. Surface type for single acting doors. Spring cushion types and friction holder type.



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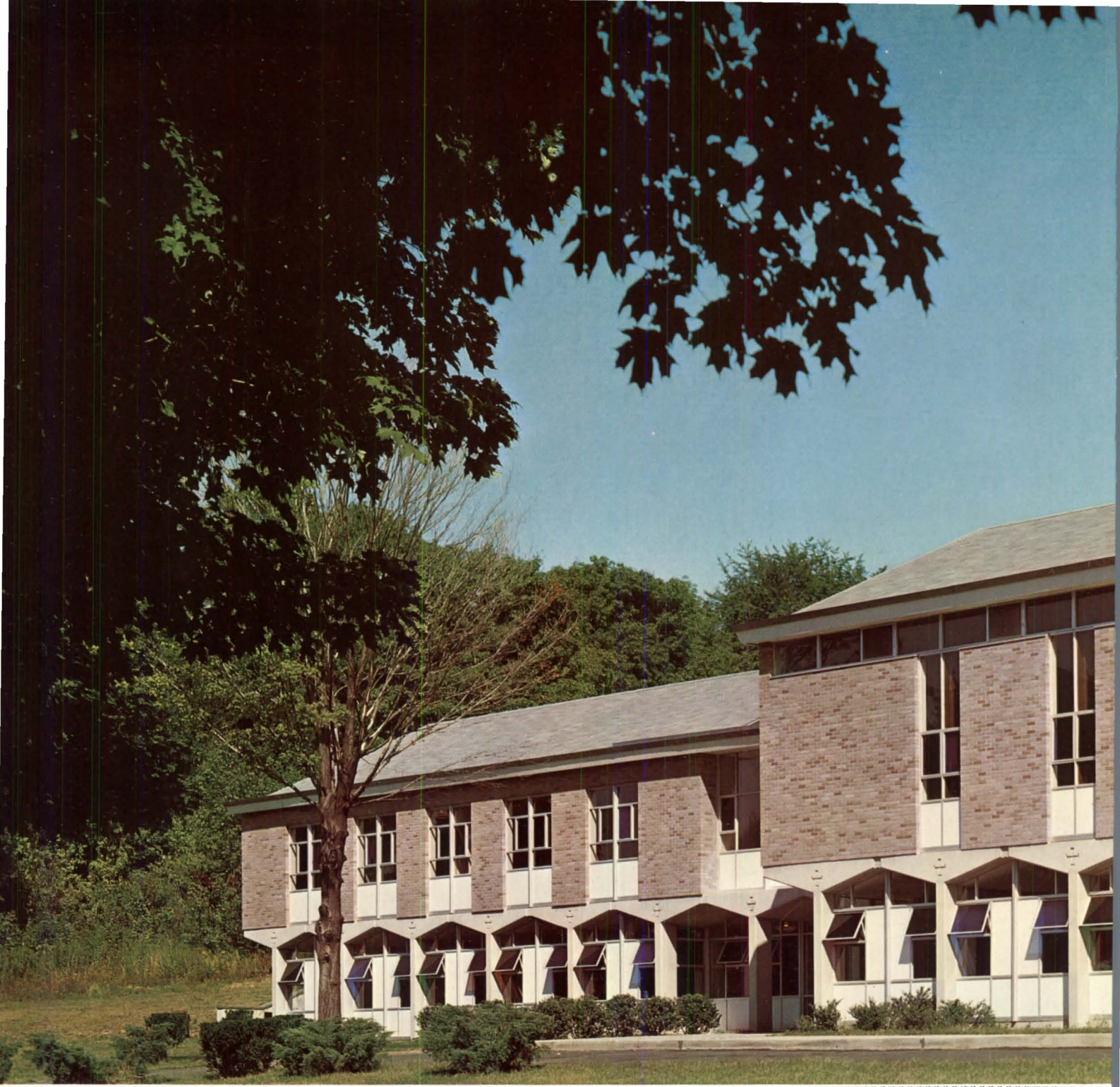

Methodist Church School, Pleasantville, N.Y.; Architect: Gibbons-Heidtmann, White Plains, N.Y.; Contractor: James Oehmann, Inc., Bronx, N.Y.

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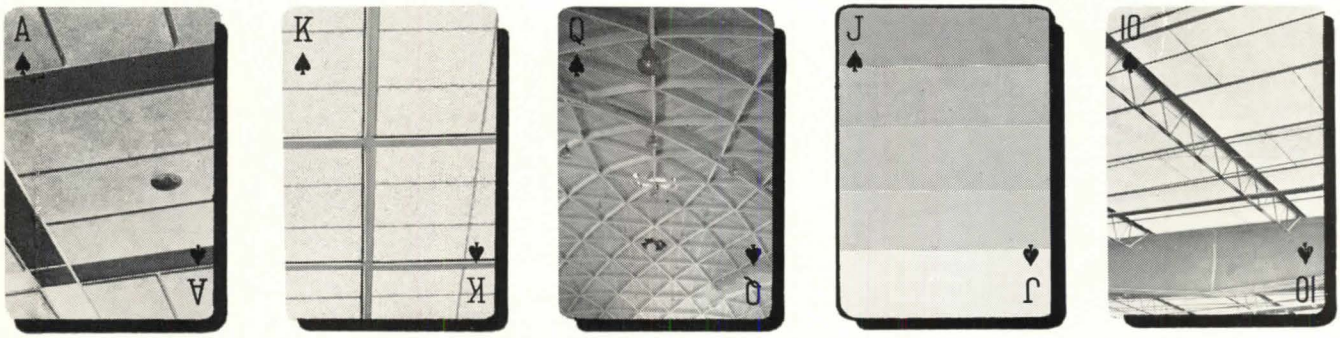

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Continued from page 18

lent stab.

The final paragraph of your Editorial begins with the sentence, "The Museum of Modern Art has generated and supported enough freak ideas that permeate the world of art today." This single, unexplored statement, defensible or not, placed you in the very camp you were attacking; in one stroke it negated whatever value your criticism of the Museum show might have had.

Defense of one's profession is a noble cause. But when it can only be achieved through questionable attack on the profession of another it harms us all.

DAVID E. COLDOFF
Atherton, Calif.

Dear Editor: Having recently acquired Bernard Rudofsky's book based on the exhibition at the Museum of Modern Art, "Architecture without Architects," I am very surprised at your Editorial attacking the exhibition. Some of the wording of the captions might have seemed insulting to many architects, but surely any serious architect would be enormously stimulated by the fantastically varied collection of photographs. You mention that the exhibit does not "point out a constructive path for the future." I disagree. As important as the annual P/A Design Awards Program is, the premiated projects seem pale and insubstantial compared to the average building complex chosen for illustration by Rudofsky. Judged by the same standards as those of the Awards jury, including an emphasis on mass housing, the anonymous architecture comes off better. Each selection of Rudofsky shows greater "simplicity and directness," which the Awards jury found so lacking.

HENRIK BULL
San Francisco, Calif.

Journey to the East

Dear Editor: I wish to express appreciation for the inclusion of Victor Lundy's sketchbook portfolio, "Journey to the East," in the DECEMBER 1964 P/A. Both Mr. Lundy's comments and the editorial commendation give good reasons for the future appearance of similar material.

R. HARMER SMITH
Jersey City, N.J.

Society Hill: Felicitations and Facts

Dear Editor: Enjoyed your critique of the Society Hill Towers very much. (DECEMBER 1964 P/A). You were extremely

Continued on page 30

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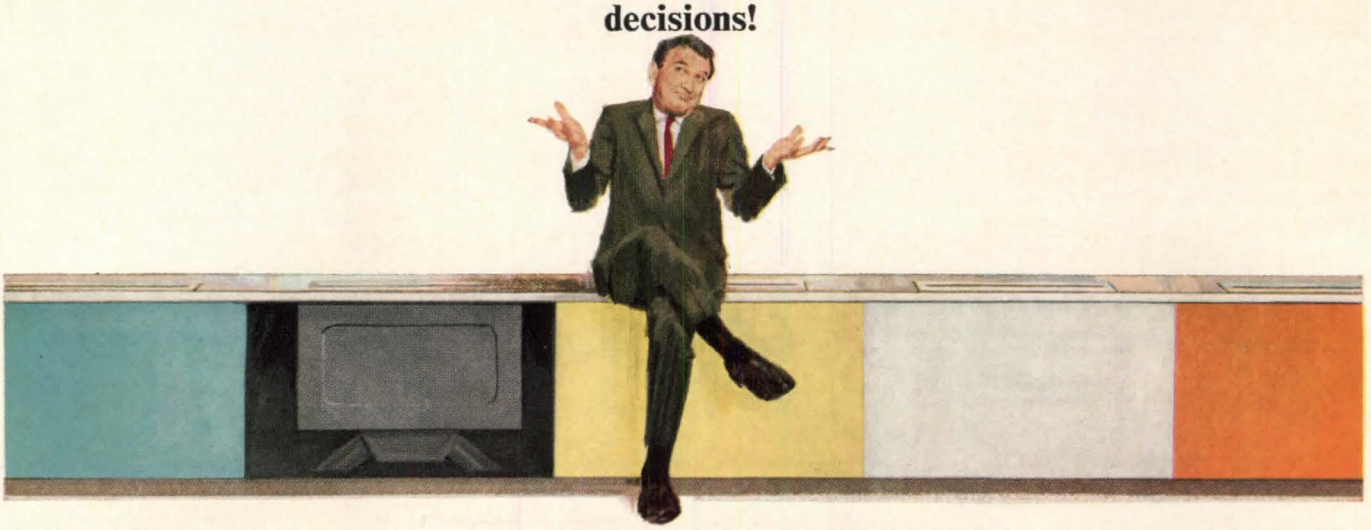

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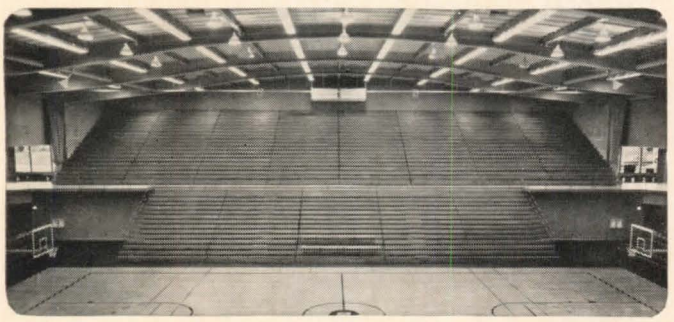

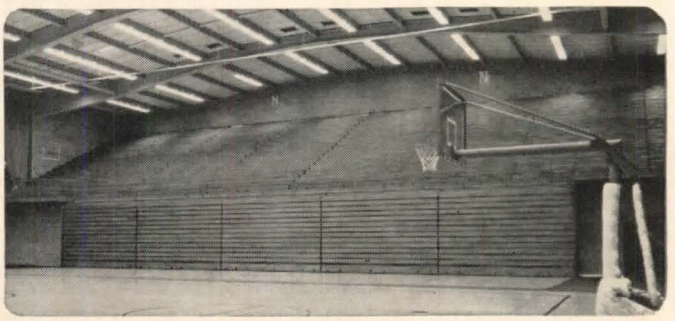

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Continued from page 26

fair in your comments, capturing the essence of both "pros and cons."

A. BRY
Philadelphia, Pa.

Dear Editor: Your article on the Society Hill Apartments contains a number of statements that warrant correction from a purely factual point of view.

The apartments are compared unfavorably with Kips Bay as having smaller windows, lower ceilings, and smaller rooms. It is also stated that tower residents may feel that the designer did not recognize the potential of the panoramic views.

The facts are that the very shape of the towers makes most of the views possible, with four out of eight apartments containing corner living rooms and outside kitchens. The column module is 5′-10″ versus 5′-8″ in Kips Bay; thus the majority of rooms are wider and deeper than at Kips Bay. This larger module also results in a window opening slightly larger than Kips Bay, and as a result of an investment in central air conditioning, the vertical dimension of the windows is also greater than that at Kips Bay, with the elimination of the "thru-the-wall" unit.

The typical ceiling height is also slightly greater than at Kips Bay, not lower as stated. The question of whether ceilings should be higher is, of course, bound up with the over-all economics of this type of apartment building.

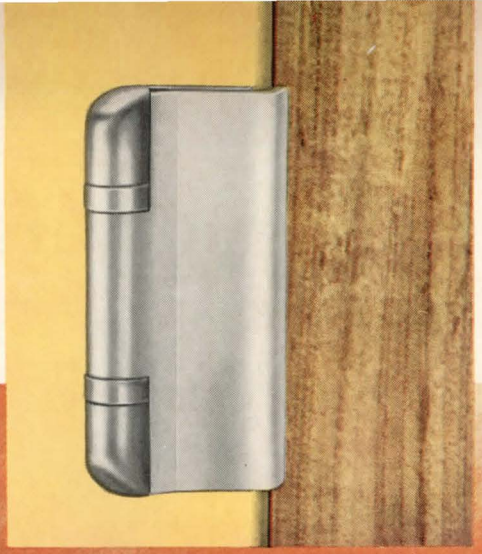
LEONARD JACOBSON
I. M. Pei Associates
New York, N.Y.

[*The author pleads guilty to not checking dimensions. As a tenant of Kips Bay, he was struck by the* apparent *smaller apartment and window dimensions vis-à-vis his residence and let this feeling color his attitude. Intention was not to imply that the architect did not "recognize the potential of the panoramic views," but, once again, that the visual feel—to this writer, at least—was more constrained than the one he experiences at Kips Bay. As urban architecture, he feels that both complexes are among the best examples today.*—JTB, JR.]

The New York Civic Center

Dear Editor: "New York's Civic Center Takes Form" (pp. 180-183, JANUARY 1965 P/A) adds impetus to our five-year-old battle for a rational, comprehensive master plan. The corroborating power is in the second statement by the "Committee of 12" assembled under the

Continued on page 258



HT BB641

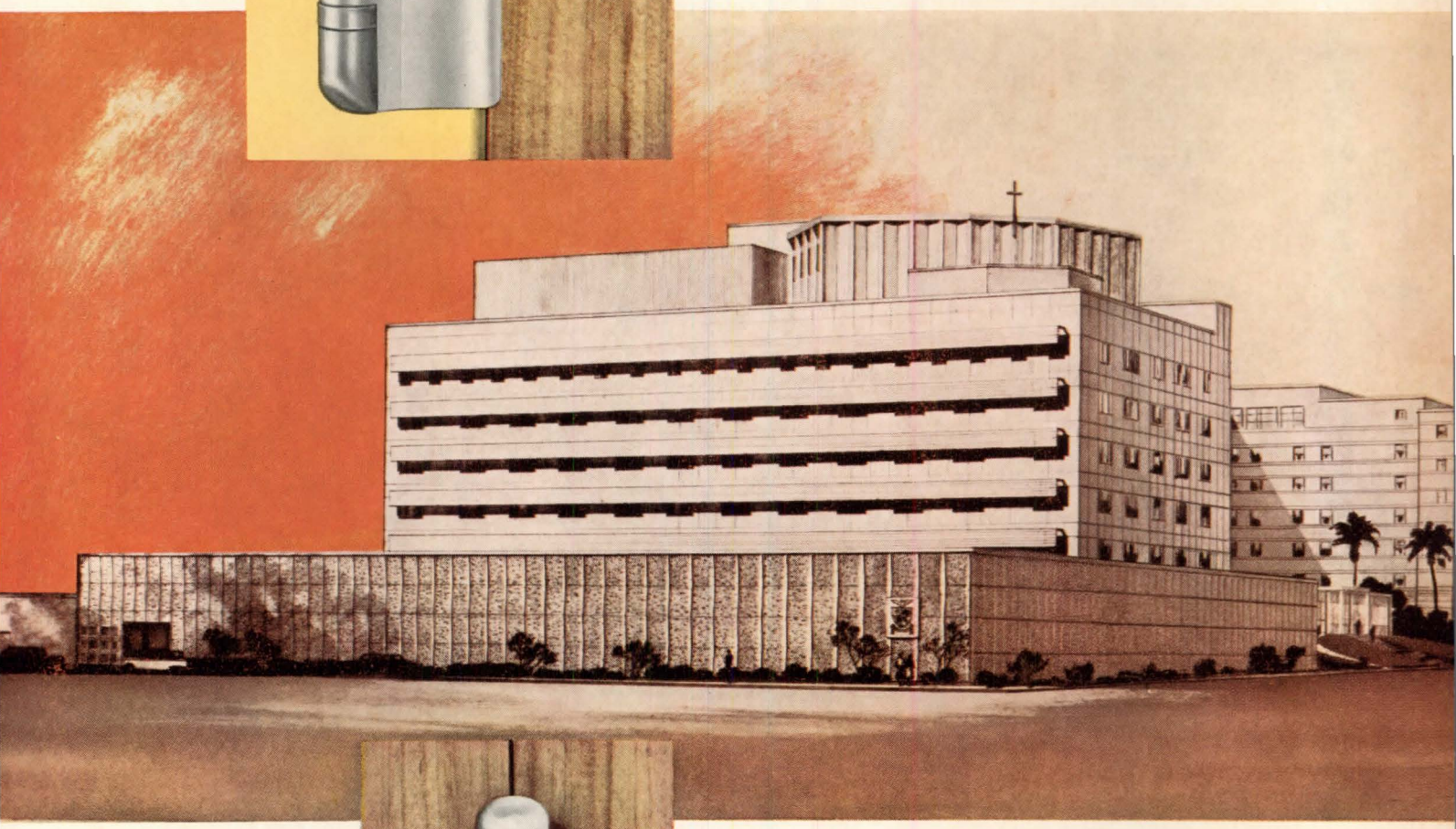
ST. JOHN'S HOSPITAL, SANTA MONICA, CALIFORNIA

ARCHITECT: John W. Maloney, A.I.A.
Seattle, Washington

HARDWARE SPECIFICATIONS: John E. White, A.H.C.
Seattle, Washington

CONTRACTOR: Pozzo Construction Co.
Los Angeles, California

HARDWARE SUPPLIER: Montgomery Hardware
Los Angeles, California



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Original architect:
Frederic P. Wiedersum Associates, Valley Stream, L.I.

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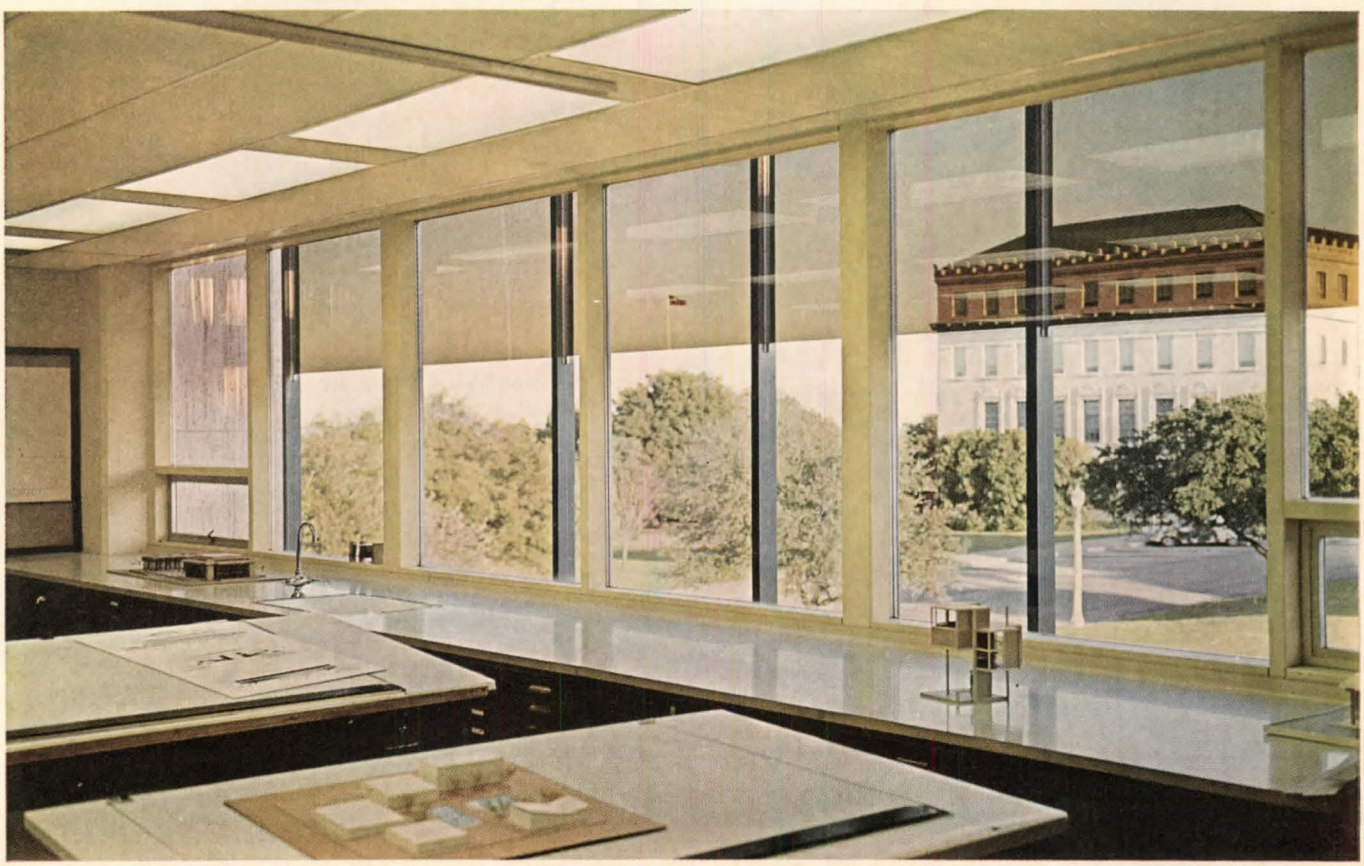

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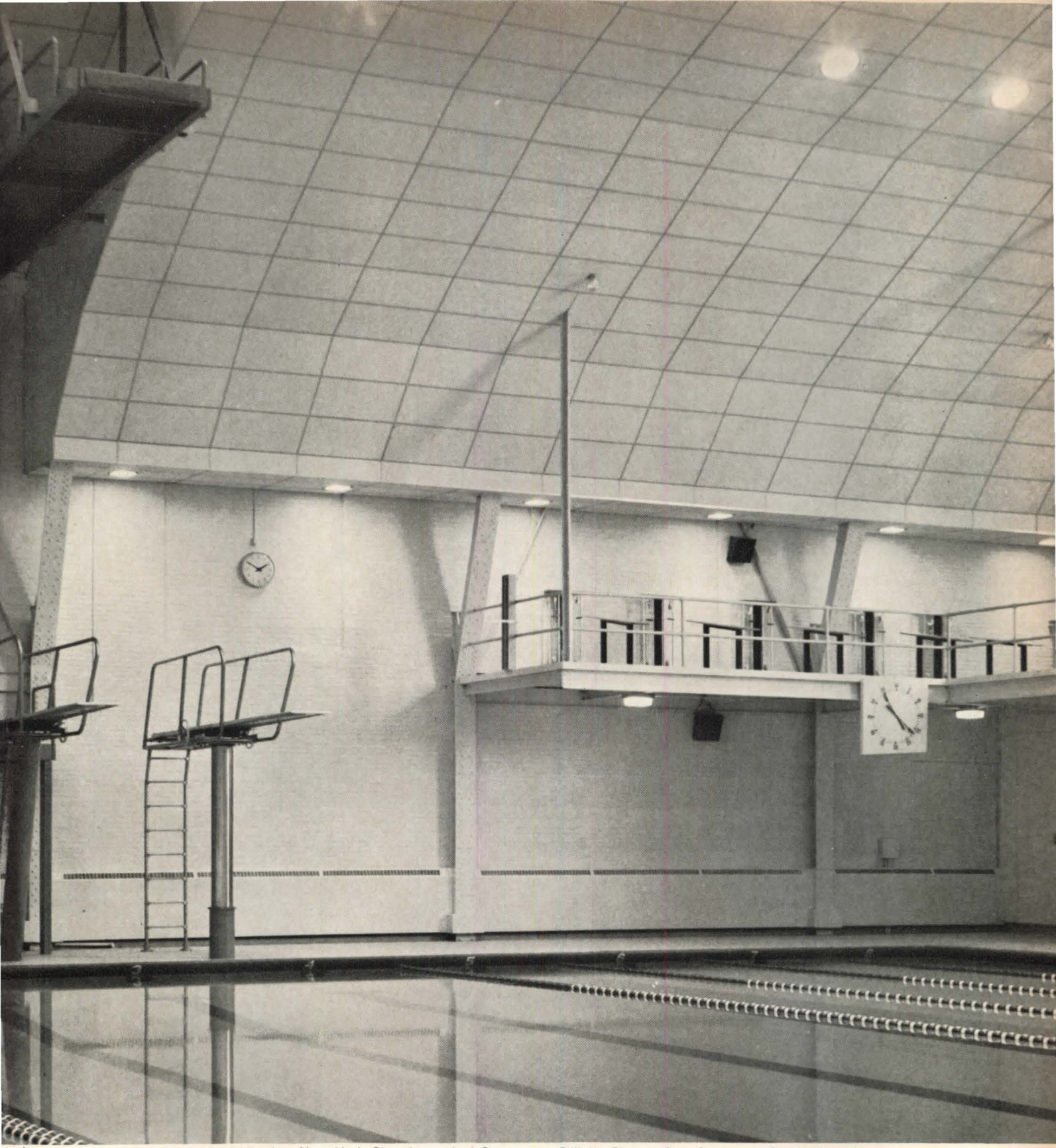

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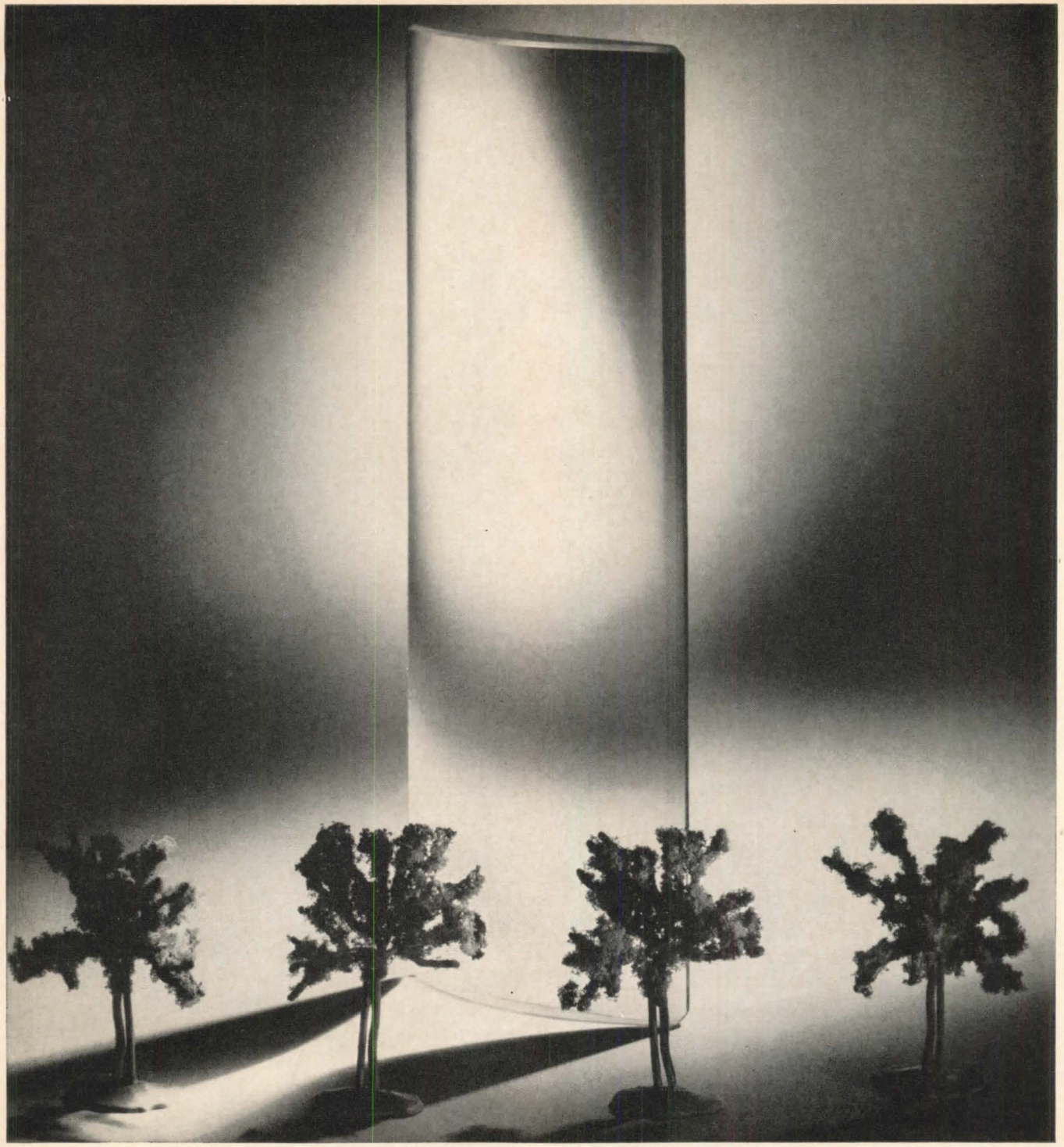

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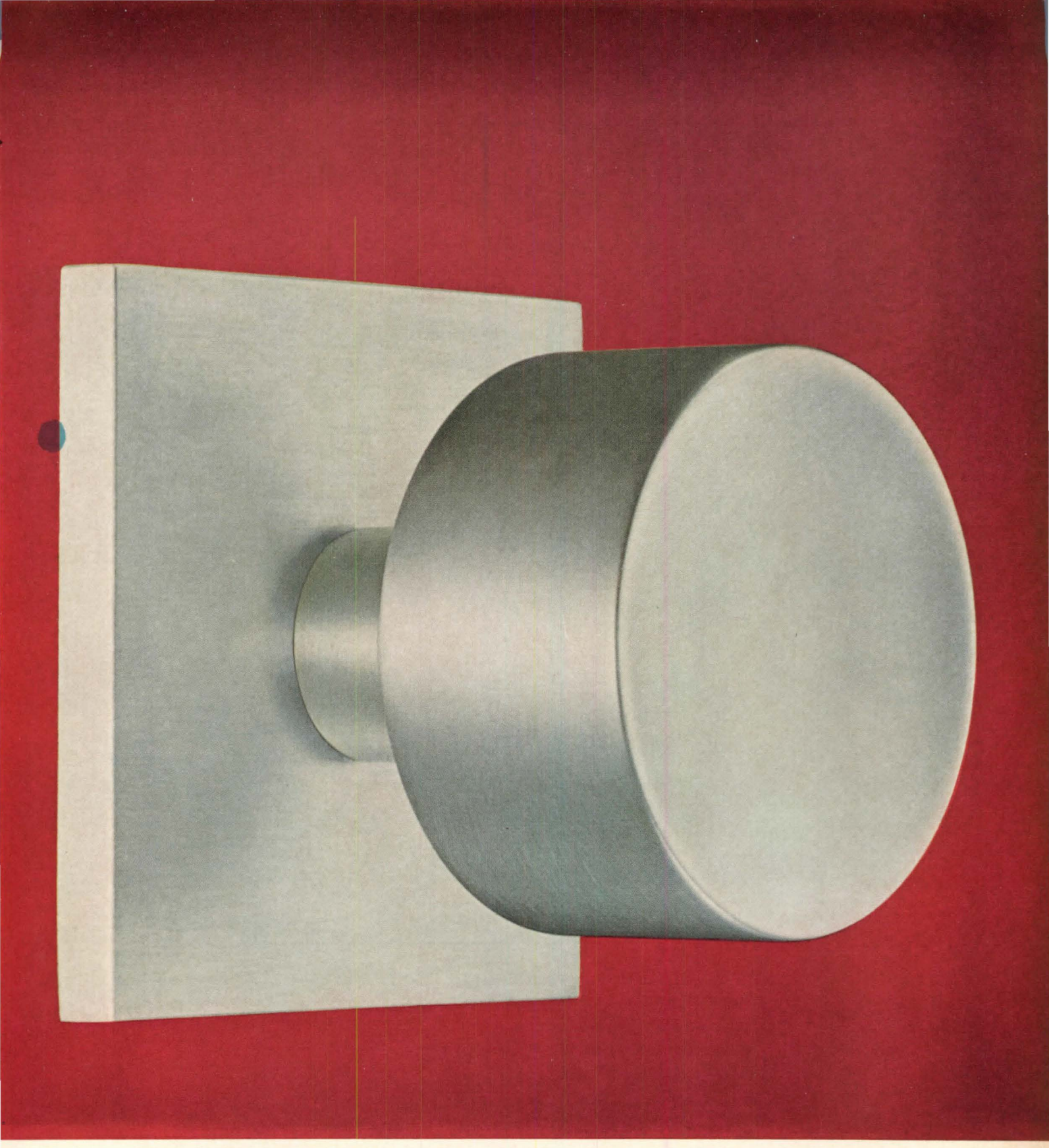

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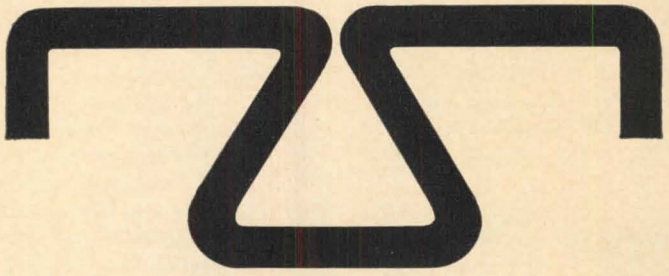

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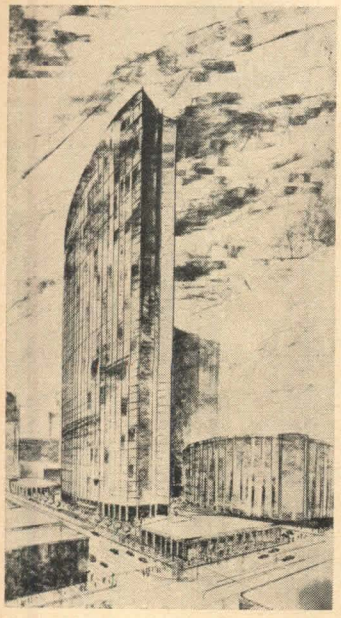


bank in the U.S., and although it will still maintain its headquarters, designed in 1923 by York & Sawyer, on 42nd Street (designated an architectural landmark by the New York Community Trust), the bank will have three banking floors in the new structure.

Kahn & Jacobs' preliminary plans show a thin, glass-walled building, curved like a protective wall around the northeast side of Madison Square Garden. Rising from a raised pedestrian plaza in the middle of the block between 7th and 8th Avenues at 34th Street, the structure will be flanked by fountains and low one-story structures for shops. When completed, the bank/office building will have more than 1.6 million sq ft of office space, more than any other building put up in the last 20 years except for the Pan Am building (2.4 million sq ft) near Grand Central Station and the Chase Manhattan Bank building (1.8 million sq ft) in the downtown financial district. A basement garage will handle 1000 cars. The Bowery and persons in New York realty circles believe the new building will do for the old Penn Station area what the Time-Life Building did for the area west of Rockefeller Center in the early '50s: make way for a rash of "improvement."

Pitkin Avenue High

NEW YORK, N.Y. Junior High No. 292 will be located at Vermont and Wyona Streets between Pitkin and Belmont Avenues in Brooklyn. When completed (sometime in 1966), it will house about 1800 students in two wings: a four-story academic (classroom) complex and a one-story "community" structure, containing the auditorium, gymnasium, and locker rooms. The academic wing will be built around a landscaped inner court, which, the architect hopes, will become a meeting place for students. The community wing will serve both the school and the community, and it will be linked to the classroom building by two glass-enclosed corridors. Rough red brick is planned for the façade of the auditorium wing and the first floor of the classroom building and its stair towers. The academic wing will have a structural steel skeletal

frame with concrete fireproofed spandrels and columns. Architect is Charles Luckman Associates.

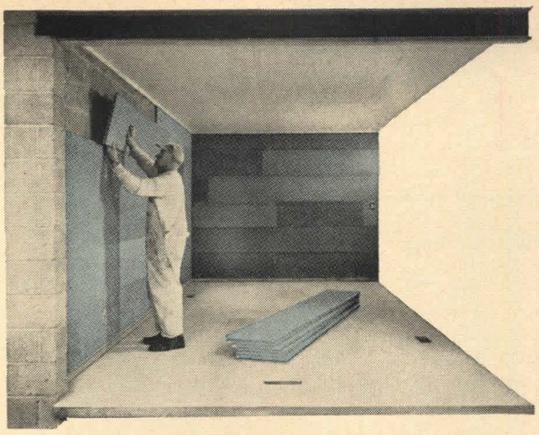
Photo: Fred W. McDarrah

Last of the Big Spaces

NEW YORK, N.Y. Toward the middle of last month, New York architect Herbert Oppenheimer called P/A to report on the latest steps in the devastation of Pennsylvania Station. "The vast interior has been completely gutted," he told us. "Ticket booths, news stands, shops—everything is gone, and the steel framework 9′ off the floor, which will be the new ceiling, is going up." Interested in the old giving way to the new, we sent photographer Fred McDarrah to record the mighty terminal's shuffle to ignominy. He returned with the dramatic photo shown here. Probably seldom before has so much given way to so little.

Personalities

THE HON. ADLAI E. STEVENSON will serve as honorary chairman of the organizing committee for the XI Pan American Congress of Architects to be held in Washington June 14–18. The theme of the meeting will be "Cities of the New World". . . . JAMES FELT, former Chairman of the New York Planning Commission, was elected to the Regional Plan Association Board of Directors in New York. . . . AN NIMMANAHAEMINDA, Acting Dean of Architecture at Silpakorn Fine Arts University and Professor of Architecture at Chulalongkorn University in Bangkok, Thailand, will receive the seventh annual Pan Pacific Architectural Citation of the Hawaii Chapter, AIA. . . . HOWARD S. TURNER will become president of the Turner Construction Company of New York. . . . ARTHUR E. MANN, partner in the Los Angeles firm of Daniel, Mann, Johnson, & Mendenhall, will serve his second four-year term on the State Board of Architectural Examiners. . . . PHILIP JOHNSON has been elected to the council of the National Institute of Arts and Letters. . . . The Museum of Modern Art has recently announced the appointment of WILDER GREEN as Coordinator of the Museum's Program. He is presently the Assistant Director of the Department of Architecture and Design and Coordinator of the Building Program. LUDWIG GLAESER will become the Associate Curator of Architecture at the Museum. . . . Knoll Associates, Inc., of New York have announced the resignation of FLORENCE KNOLL BASSETT as Design Director. DON ALBINSON will become Director of Design Development; MURRAY ROTHENBERG will become vice-president of manufacturing and KURT BURGOLD, vice-president of product engineering. . . . NORMAN ABELSON, news secretary for Senator Thomas McIntyre and 11-year veteran of the AP, has been named Assistant Director of Governmental Affairs for the National Association of Home Builders. . . . National Concrete Masonry Association has installed HOWARD O. WOLTZ, JR., as president. . . . New chairman of the advisory committee for a new division of ACTION, Inc, the Division of Local Development Services, is FERD KRAMER of Chicago. . . . LEE B. KLINE was elected president of the Architecural Guild, a contributing organization to USC School of Architecture and Fine Arts. . . . MARCEL BREUER and NAUM GABO were among the 13 newly elected members to the National Institute of Arts and Letters. The Institute, founded in 1898, was incorporated by an Act of Congress in 1913 for the purpose of furthering literature and the fine arts in the United States. Its membership is limited to 250 American citizens. There are at present 240 members. . . . VINCENT G. KLING, Philadelphia architect and a 1940 graduate of Columbia University's School of Architecture, has been selected to receive the 1965 President's Alumni Award. Another feature of Architectural Alumni Day at the university will be the inauguration of the Talbot Faulkner Hamlin Lectures. VINCENT SCULLY of Yale University will speak on "The Architect and the Historian" in the first lecture of the series. . . . PAUL E. DIXON has been appointed acting architect in the Physical Plant Department of the University of Illinois. He will succeed ERNEST L. STOUFFER. . . . Four executive positions in the American Institute of Architects have been announced. RAYMOND L. GAIO of Washington, D.C., will become Director of State and Chapter Affairs; RICHARD S. STITT of McLean, Va., Director of Information Services; RICHARD R. WHITAKER, JR., of Berkeley, Calif., Director of Educational Programs; and NEIL E. GALLAGHER of Kendall Park, N.J., Assistant Director of Information Services. . . . MARK HAMPTON of Tampa, Fla., appeared in the February issue of Esquire magazine, which cited him as one of the best-dressed Floridians. He was pictured standing on a balcony of his chemistry building at



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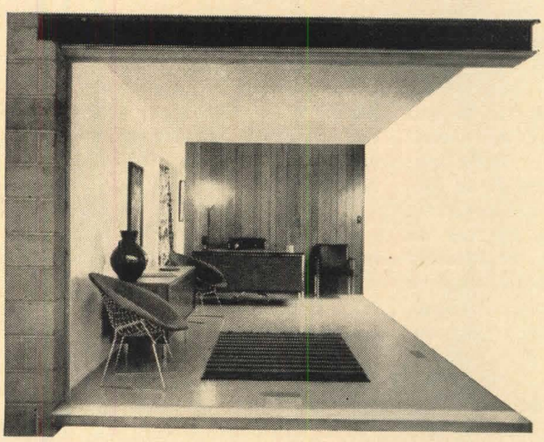

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Calendar

The New York Chapters of ASHRAE and the AIA are jointly sponsoring an all-day seminar on "Schoolhouse Air Conditioning and Ventilating" to be held March 20 at the Brass Rail Restaurant on 40th Street and Park Avenue. Cost for the seminar, including brunch and luncheon, will be $3.50 for Chapter members and $5 for nonmembers. Reservations should be mailed to Bernard Gilmartin, Owen's Corning Fiberglas Corporation, 717 Fifth Ave., New York, N.Y. . . . April 5–7 are the dates for the Southern Pine Association's Golden Anniversary convention, to be held at

held May 17–20 at the New York Coliseum. Information may be obtained from Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N.Y. . . . The Middle Atlantic Hospital Assembly will hold its annual meeting in Atlantic City May 18–20. . . . The American Society of Landscape Architects will hold their 65th annual meeting at the Hotel Statler-Hilton, Hartford, Conn., from June 27–30. Theme of the conference will be "Space for Survival". . . . The Athens Center of Ekistics has organized an annual International Seminar on Ekistics and The Future of Human Settlements to be held in Athens from July 20–24. Seminar will be conducted in English by the faculty of the Graduate School of Ekistics, together with such notables as Buckminster Fuller, S. Giedion, A. J. Toynbee, Barbara Ward,

sor Frederick J. Adams. Further information may be obtained from the Director of the Summer Session, Room E19-356, M.I.T., Cambridge, Mass., 02139.

Competitions

Max Abramovitz, Arthur Odell, Jr., Edward D. Dart, Wallace Chadwick, and Murray A. Wilson will serve on the jury for the 1965 Awards Program of the Prestressed Concrete Institute. June 1 is deadline for submission of entries. Any kind or type of structure using prestressed concrete, and which will be completed by May 31, 1965, may be entered. Copies of the rules booklet may be obtained from the Prestressed Concrete Institute, 205 W. Wacker Dr., Chicago, Ill. . . . A residential lighting

the country. Entry forms and complete details on the program's four regional competitions have been mailed to artists, museums, and art schools throughout the U.S.

Obituaries

JAMES G. WATSON, Architect, died in Greensboro, North Carolina, at the age of 55 on October 2, 1964.

EUGENE R. MARTINI, Landscape Architect and vice-president of the American Society of Landscape Architects, died at the age of 49 on January 22, 1965, at his home in Atlanta, Georgia.

STEPHEN FRANCIS VOORHEES, 86, died in New York City on January 23, 1965. Never trained as an architect (he graduated from Princeton as a civil engineer in 1900), he became a prominent, widely in-

dence that it is in a mood to cut much of the "NOA" asked. If it should start to chop into these requests, however, it would mean lessened business in the future; if it puts the requests through, look for continued heavy spending.

Budget Breakdown

As many commentators have noted in the past few weeks, the whole exercise of budgeting is a very tricky one anyway —whatever may interest you or your business.

In a lump, as noted, it provides for a healthy $7.7 billion for "public works"—including the close to $1 billion for the Army's programs; $3.9 billion for highways; $314 million for the Bureau of Reclamation; $145 million for accelerated public works programs under the Department of Commerce; $675 million for urban renewal; $161 million for urban mass transit work; $303 million for hospital construction; a half-billion or more for educational construction at all levels; $93 million for veterans' hospitals and other facilities; and the like.

But you can also find construction money tucked away into unlikely places: for the State Department (not only for buildings, but for structures like Amistad Dam on the Rio Grande); in the Agriculture Department (for buildings, soil conservation structures, etc.); for the District of Columbia, and elsewhere.

In addition, there are other expenditures not included in the budget at all: those paid for out of trust and revolving funds that range from fishing vessel construction to housing and highways.

Architects will be affected by one aspect of the President's efforts to cut down some expenditures — notably in Washington itself and in construction for the Veterans Administration. (The VA budget request of $93 million for construction is actually up about *$13 million* over last year—but most of this will go to completing work already under way).

In Washington itself, the economy effort has resulted

lion building for the Housing and Home Finance Agency; and an office building for the Labor Department. It may also have some effect on planning already under way on a new headquarters for the FBI. Not affected are programs for a new Air and Space Museum and some other buildings.

Lease-Purchase Out?

Incidentally, there are some rather strong indications that the President may recommend dropping the Post Office Department's lease-purchase program, under which private investors construct the buildings

PO engineers have been conducting an economic study of the system, and are expected to recommend Government construction of its own postal buildings as cheaper in the long run.

(Congress would probably like this idea. Legislators have long argued that in a lease-purchase arrangement construction costs do not show up in the annual figures—only the increasing costs of the leases, which are obligations that Congress must honor. If money for construction had to be appropriated each year, the lawmakers would have better control.)

The New Congress

With the major Presidential messages now delivered, Congress is getting down to its regular business with more than usual rapidity, and hopefully talking about adjournment by midsummer (a goal it hasn't managed to achieve in four years). The major Administration-backed bills have been introduced (among the flood of more than 4000 measures within the first month), and committee hearings are under way.

By early February, nothing had been introduced that would have specific reference to architects, their status or practices.

Of course, much of the general legislation now proposed —the $1.5 billion added aid for education; new urban renewal and transportation

By the same token, matters that will affect construction costs are also in the mill on the Hill (or soon will be): changes in excise taxes to produce more revenues for the Highway Trust Fund; reduction of some other excise taxes; labor legislation aimed at eliminating so-called "right to work" laws; extensions of the minimum-wage laws, and the like.

Bureau Notes

On a nonlegislative level, there were two actions that will also have an effect on construction costs:

The Federal Trade Commission, following up on its announced investigation of ties between cement manufacturers and ready-mix concrete distributors, charged four major companies (including U. S. Steel and Mississippi River Fuels Company) with violations of antitrust laws in acquiring ready-mix companies; ordered another (Lone Star Cement) to divest itself of 25 of its 31 ready-mix plants.

And contractors and labor unions seemed to have patched up differences over the nearly moribund National Joint Board for Settlement of Jurisdictional Disputes. The agreement will keep the 18-year-old Joint Board in action.

High-Rise for D. C.

In Washington, the long-standing dispute over the effect of the city's restrictions on building heights (so that nothing dominates the Capitol dome) kept erupting in different directions.

Many architects have argued that the height restrictions (the 13-story National Press Building is the city's tallest private structure) have produced a flat, monotonous "skyline," and inhibit proper land uses by forcing construction of sprawling structures. A plan submitted to the National Capital Planning Commission (by Architect Chloethiel Smith) would break up the city's low-lying outline by using skyscrapers at selected points.

Among the problems architects have pointed out is that areas surrounding (but outlings soon to be surrounded by a "wall" of higher ones.

Incidentally, the long-debated and generally hailed "Pennsylvania Avenue Plan," got some sharp criticism from one architect, Louis Justement, an elder statesman among Washington architects. The plan—which would make a ceremonial avenue out of Pennsylvania Avenue, and include wrecking the famous old Willard Hotel, the National Press Building and others to make a huge plaza—would be a "death warrant" for the city, said the architect. His point: The large plaza and the blocks of Government and office buildings envisioned in the $500 million proposal would be a flat, dead spot at the very heart of the city every night. What's needed, he said, isn't more buildings and more plazas—but more people and activity.

Financial

In addition to the President's budget, with its assurances of continuing heavy Government construction spending, there was a generally good financial picture for the industry.

Value of new construction put in place during December, for example, was $5.3 billion —just about on target for the month.

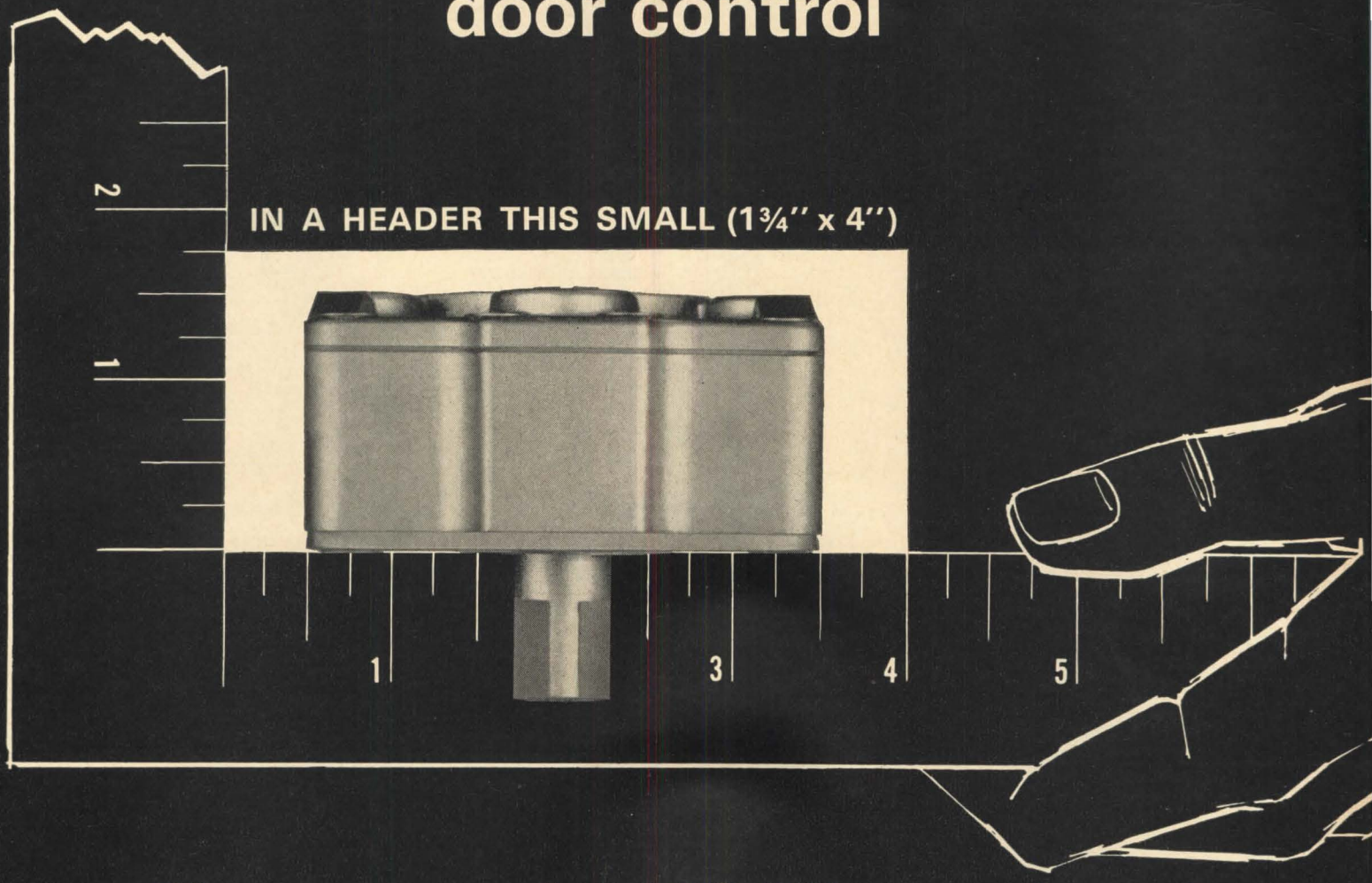
Despite another disappointing showing for housing for the year (a total estimated at 1.543 million new units started for the year, down 4 per cent over 1963) FHA applications were said to have reached an all-time high in 1964, at a total of 1,034,800 units.

Cost indicators seemed to be holding steady.

There was one disturbing note: cost of money, as evidenced by FHA secondary market mortgage prices, seemed to be inching upward very slightly—after registering no change at all for 14 months.

On this, there may be some Congressional help on the way: a bill (S.644) that would enable all private lenders to originate mortgage loans, with assurance that these could always be sold, through establishment of "Mortgage Insur-

Dependable rack-and-pinion door control



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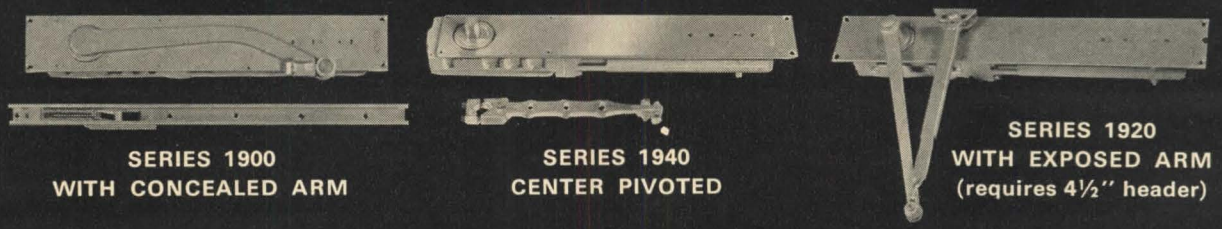

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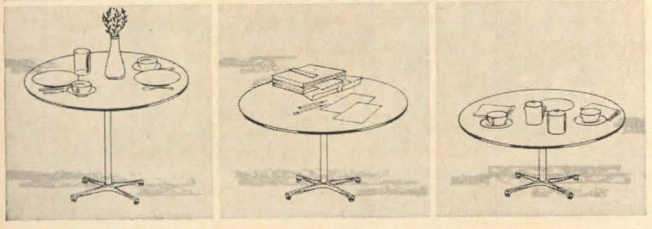

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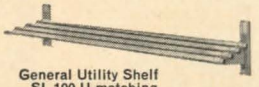

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All-purpose/all-climate insulating window, called "Solarban Twindow," has recently been developed. Coating is applied to the inside surface of standard ¼" clear plate or float glass double-glazed units. Standard double-glazed metal-edge insulating window admitted 170 Btu's of solar energy per hr, per sq ft (on July 21 at 40° North latitude, 94 F outdoors, and 80 F indoors). Solarban Twindow admitted only 65 Btu's of solar energy under the same conditions. U-value for single ¼" glass is 1.1; for standard double-glazed units, 0.6; and for Solarban, 0.35. Window sheathes a building in "automatic sun-glasses" allowing visible light transmission of 20 per cent. Solarban transmits only 11 per cent of ultraviolet light compared with 68 per cent for regular plate glass, 51 per cent for plate glass, double-glazed units, and 27 per cent for units double glazed with "Solargray" heat-absorbing glass.

Coating gives slight tint to glass in warm, light gray tone. Manufacturer states that unit will cut heating and cooling operating costs—by reducing heat flow through window areas—to less than one-third of those normally experienced with single panes of ordinary glass. Units are available in sizes up to 68" x 96" and have a 10-year guarantee. Pittsburgh Plate Glass Co., 632 Fort Duquesne Blvd., Pittsburgh, Pa.

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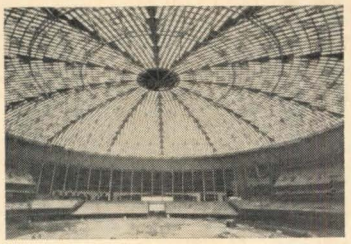
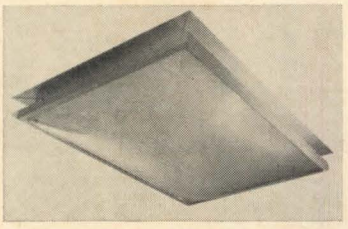
Construction

Plastic Panels For Large-Span Dome

Harris County Domed Stadium in southeast Houston, Texas, has a roof design with a clear span



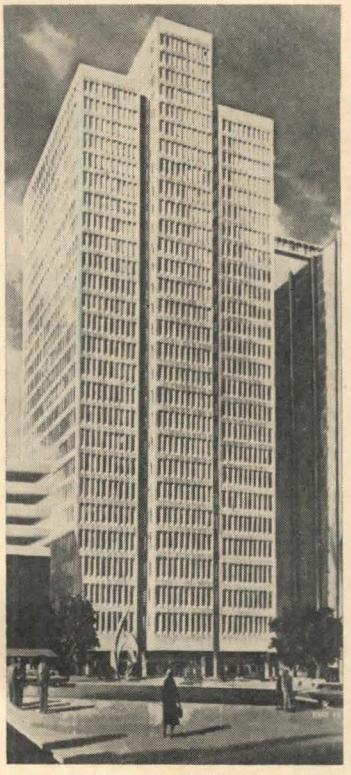


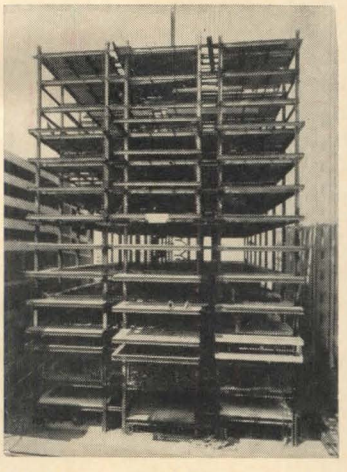
of 642′ and a maximum height of 208′ above the playing field. Roof is a steel lamella frame consisting of trussed beams that arch upward in a diamond pattern to meet at the center of the stadium. Placed within the steel frame are 4596 "Lucite" acrylic resin panel and aluminum frame units measuring 7′-2"x3′-4". Each unit comprises an outer panel of clear acrylic resin cast in sheets 0.25" thick and measuring 41"x88". Inner sheet, 0.187" thick, serves as a prismatic lens that not only reduces visual glare but also diffuses light evenly throughout the stadium. One panel is separated from the other by a maximum of 2½" of air space, which aids in insulating the air-conditioned stadium. Lucite acrylic resin sheets have the high light transmission properties needed to nourish the Tiffway Bermuda grass of the playing field. They are also weather- and shatter-resistant. These panels are placed within the steel framework prior to application of the fluid roof coating composed of neoprene and "Hypalon" synthetic rubbers. Architects: Lloyd & Morgan and Wilson, Morris, Crain & Anderson; Consultants: Praeger, Kavanaugh & Waterbury. E. I. DuPont de Nemours & Co., Wilmington, Del.

On Readers' Service Card, Circle 101

High-Strength Steel

Peachtree Center, 29-story office building in Atlanta, Georgia, is one of the first major structures to employ "Ex-Ten 50" — a columbian-vanadium bearing steel with constant yield point of 50,000 psi. One-third of the building (designed

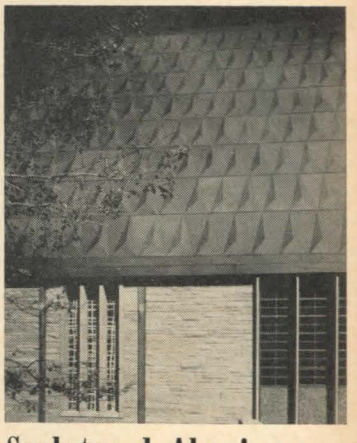




by Edwards and Portman) has frame erected with high-strength bolts so that it can be taken down at the termination of a long term lease shared by two owners, one of whom may wish to use his property for another purpose.

Reduced tonnage for the structure and subsequent lower costs in shipping and fabricating resulted from use of Ex-Ten 50. It also totally eliminated need for column cover plates on most columns. Columns in the three basement levels of the building and the columns supporting lower 19 floors are made from Ex-Ten 50. Other columns beyond the 19th floor are of ASTM A-36 steel. Almost all of the columns in the building are 14" wide-flange column sections. By employing this composite steel construction, transverse wind girders in the welded portion are only 21" wide-flange members. Building has 520,000 sq ft gross, with 440,000 sq ft of rentable space, at a total cost of $8.5 million. This represents an 85 per cent rentable efficiency compared to normal rentable efficiency of 65 to 70 per cent, which applies most frequently to office structures. Use of thinner columns, made possible with Ex-Ten 50, was largely responsible for this increase. United States Steel Corp., 525 William Penn Place, Pittsburgh, Pa.

On Readers' Service Card, Circle 102

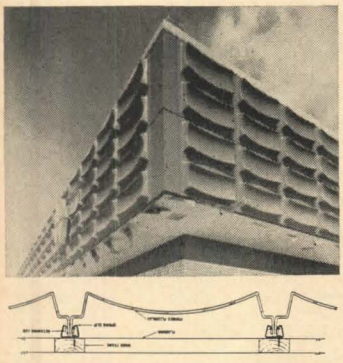


Sculptured Aluminum Roof Design

Presbyterian Theological Seminary chapel in Louisville, Ky., designed by Hartstern, Louis & Henry, features a roof covered with 576 large, sculptured aluminum cast panels. Aluminum panels are sand cast in "Alloy B214" and weigh about 110 lbs each. Each of 552 panels measures 5′-2⅜"x3′-11¾" with typical section thickness of ⅜" and additional 24 end panels about half the width size. Alcoa "Duranodic" finish is applied to all the panels. Wood roof deck on wood arches supports the aluminum castings. Application of the

roof system begins with placing 80 lb roofing felt to wood deck and then attaching cast panels with wood screws. Each casting *is fastened by screws* on one side and at the top. On the other side and at the bottom, each panel overlaps the adjacent panel. Flashing and calking are used for watertightness. Chapel gutters are also faced with matching cast panels as well as 65′ tubular steel bell tower located beside the chapel. Two sets of double wood doors also utilize cast aluminum in the same bronze-colored finish. Michaels Art Bronze Co., Covington, Ky.

On Readers' Service Card, Circle 103



Decorative Fascia

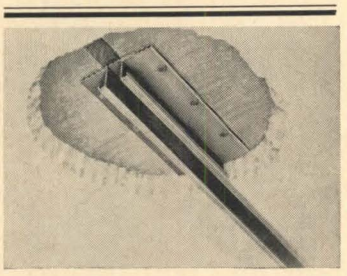
Acrylic plastic facing panels, 4′ x 4′, have been used at Calumet Shopping Center in Munster, Ind. The ⅛″ thick "Plexiglas" acrylic sheet is thermo-formed on plywood dies to specially designed shape. Panels are formed with returns on all four sides. They are installed using fully concealed spring clip mounting. Panels are attached on wood framing erected in front of brick wall by putting up polyethylene flashing, aligning the clips, screwing them to frame, and then snapping panels into place. Two-man crew, with one additional man carrying panels to scaffold, averages five minutes per installed panel. Rohm & Haas Co., Washington Square, Philadelphia, Pa.

On Readers' Service Card, Circle 104

Waterproof Tile Deck

"Travelon Weather Deck System" is an exterior deck surfacing that not only protects the deck itself and the space beneath from the weather, but also provides a durable walking surface. According to manufacturer, tile used as the exterior surface of the system is "the first time that a resilient tile has been successfully formulated for use outdoors." Travelon is a two-part weather deck system composed of a waterproof elastic base sheet that is permanently bonded to the deck itself, and an exterior surface of especially formulated resilient tile that is installed on top of the elastic membrane. Tile is made in 18″ squares, ⅛″ thick, from special blend of weather-resistant polymers and asbestos. Travelon system expands and contracts with the deck surface, thereby eliminating any possibility of water seepage as a result of cracking or joint separation. System is used on exterior-grade plywood and concrete. It may also be installed on asbestos-cement board, metal surfaces, and certain other types of approved decks. Colors include "Spruce Green," "Burnt Olive," "Slate Gray," and "Terra Cotta." Armstrong Cork Co., Lancaster, Pa.

On Readers' Service Card, Circle 105

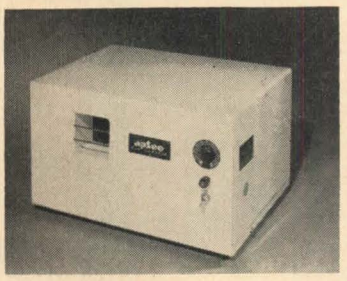


Expansion Joint Eliminates Cracking

Expansion joint has been developed for aid in eliminating unsightly cracking due to structural movement and thermal stresses causing expansion and contraction of plaster and stucco surfaces. Used in areas of climatic extremes, "No. 40" expansion joint has opening which is adjustable from ⅛″ to ⅝″. It incorporates weather- and moisture-resistant shield in joint itself. Plaster base is separated behind the expansion joint so that plaster on each side of separation can move as unit. Tongue-and-groove construction allows movement and still bridges separation. Plaster base can be cement block, brick, gypsum lath, metal lath, etc. No. 40 is made with ½″, ¾″, ⅞″, 1″ or 1¼″ grounds in 26 gage gal. steel or zinc. Zinc joint is used in salt-laden atmospheres where humidity constantly approaches saturation point. Penn Metal Co. Inc., Parkersburg, W. Va.

On Readers' Service Card, Circle 106

Air/Temperature



Purifying Air

Method of purifying air electrostatically has been devised recently. "Apsee" air charger neutralizes static electricity within selected areas up to 1000 sq. ft. Dust, mists, odors, and sprays settle to floor and do not rise again. Air charger can be located near specific equipment, placed in supply or return air ducts, or used as simple 110 AC plug-in portable unit. Apsee Co., 17957 Karen Drive, Encino, Cal.

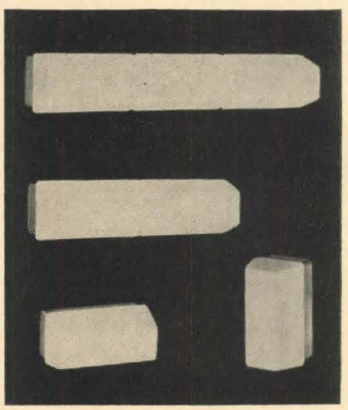
On Readers' Service Card, Circle 107

Smallest Thermostat

According to manufacturer, world's smallset thremostat ("no larger than a cigarette") recently has been designed. It controls pneumatic valves or damper motors and can also be linked to a remote temperature-calibrated pneumatic gage to give continuous temperature indication. A highly sensitive bimetallic element has temperature span from 50 to 100 F. Maximum pressure is 25 psi. One model has perforated cadmium-plated housing and is designed for return-air passages in air/light troffers or return-air grilles. Second model has chrome plated tube for external mounting near horizontal-throw diffusers. Both have plug-in connections for fitting to plastic tubing. Honeywell Inc., 2727 South Fourth Avenue, Minneapolis, Minn.

On Readers' Service Card, Circle 108

Electrical Equipment



Stairway Lighting

Fixtures use geometric modules of illumination in one-, two-, and three-light versions that consist of satin opal glass modules in rectangular, tapered rectangular, and square forms. Fixtures can be applied to flank a mirror above, below or on all four sides. They can also be used on walls and ceilings along stairways, walls, and corridors. Lightolier, 346 Claremont Ave., Jersey City, N.J.

On Readers' Service Card, Circle 109

Finishes/Protectors

High-Speed Laminate

Recently developed system of high-speed lamination bonds vulcanized fiber, called "Forbon," to wood siding. Forbon is specifically used as an overlay for lumber, plywood, particle board, and other substrates used in residentail siding. According to manufacturer, Forbon overlay provides siding that does not require painting for 10-year period. High-speed lamination system developed

This architectural landmark, the M.I.T. Kresge Auditorium, is roofed by a vast concrete shell supported at only three points. As sun and shade subject the structure to temperature differentials, it is quite free to move in response to stresses of contraction and expansion. Soon after construction, observers could actually see a succession of "bubbles" forming in the roof covering as the sun's rays moved progressively across the roof. Under such repeated stresses, the original roof covering soon broke down.

To test a number of promising new roofing systems, trial sections were constructed on portions of the dome. The decisive winner was an age-old roofing material, lead sheet . . . but used in an ingenious new way. Steel studs, driven into the concrete of the dome, support a grid of heavy stainless steel wires, which in turn supports two-foot squares of soft sheet lead locked to the wires and burned (welded) to each other in a continuous sheet with the wire grid restraining expansion to limited areas. Details of the construction are shown on the accompanying drawing.

The entire roof system has now been in place for over a year. Repeated inspections reveal that this new flexible lead roof solves the problem totally. The sheet lead itself should endure for centuries, as it has in other great architectural landmarks . . . cathedrals and monumental buildings through the ages.

Only lead is so flexible in application, so enduring in service, and so beautiful an architectural material. Wherever lasting, maintenance-free roofing is desired, look into lead. This installation illustrates clearly how imaginative engineering, applied to a time tested material like lead, can permit complete freedom in modern design. For full information, write us now: Lead Industries Association, Inc. Dept. N-3, 292 Madison Avenue, New York, New York 10017.

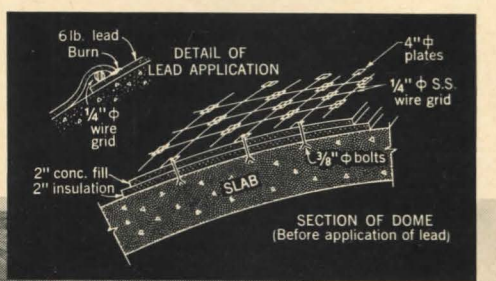
NEW LEAD ROOF SYSTEM

solves a modern architectural problem on Eero Saarinen's M.I.T. Kresge Auditorium

Look Ahead with Lead

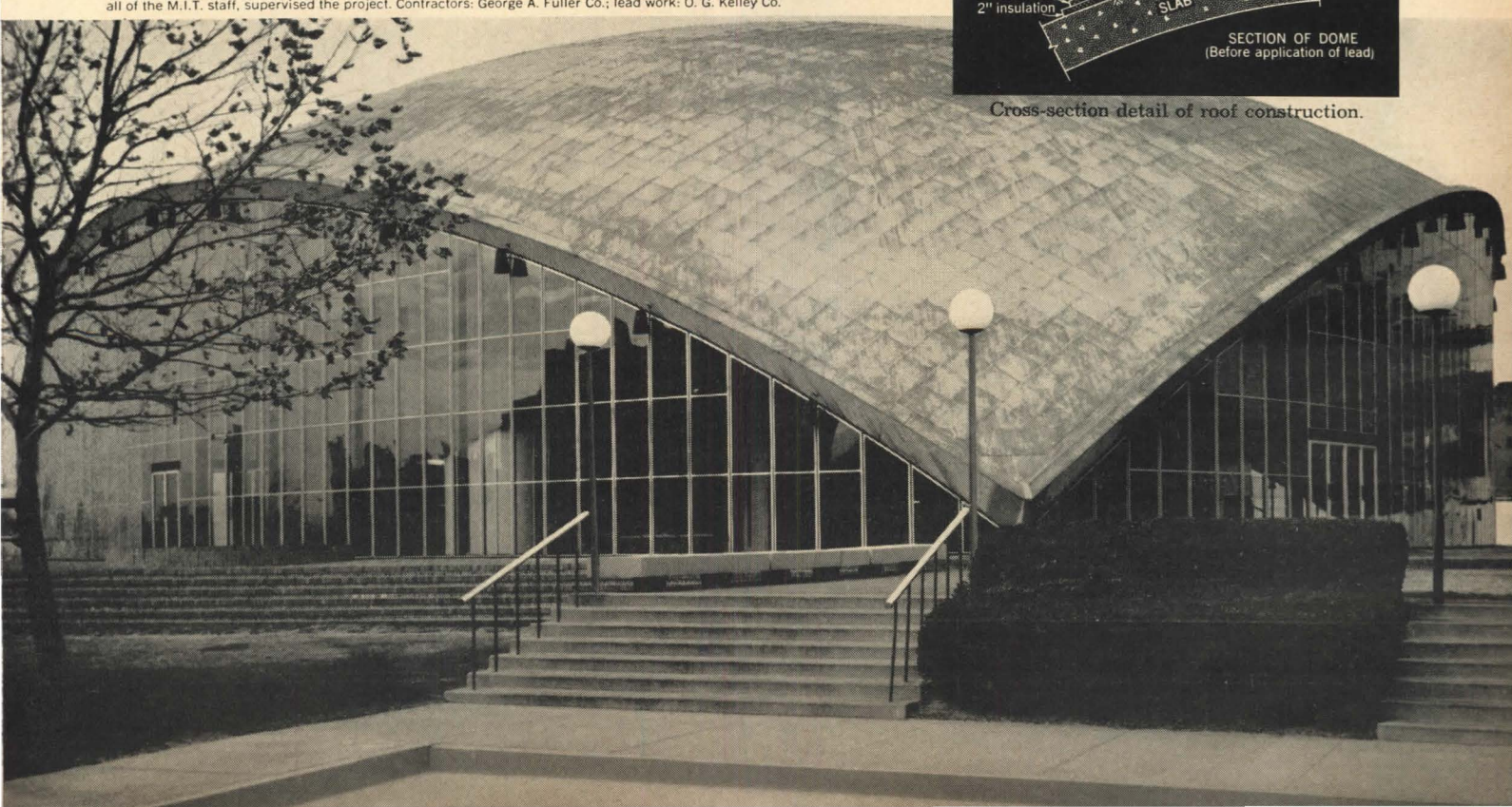
LEAD INDUSTRIES ASSOCIATION, INC.

On Readers' Service Card, circle No. 363



Cross-section detail of roof construction.

Unique new sheet lead roof of M.I.T. Auditorium. Messrs. C. M. F. Peterson, R. E. Collins, and Prof. H. L. Beckwith, all of the M.I.T. staff, supervised the project. Contractors: George A. Fuller Co.; lead work: O. G. Kelley Co.



by National Starch and Chemical Company in association with National Vulcanized Fibre Company can laminate Forbon to wood at rate of 100′ per min. Special thermosetting emulsion adhesive passes rapidly from an emulsion to thermoplastic state in which it becomes tacky enough to bond components. Ability of this emulsion to finalize cure and cross link at room temperature after lamination is what enables laminating process to be fast and continuous. National Vulcanized Fibre Co., 1065 Beech St., Wilmington, Del.

On Readers' Service Card, Circle 110

Fire-Retardant Coating

"Flamort WC" solution is colorless fire-retardant surface impregnation for wood. It protects exterior siding, floor joists, subfloor, interior paneling, acoustical board, insulation board, fiber board, excelsior, etc. It is prepared by dissolving 3 lb Flamort WC per gal of water, and can be applied by spraying on or immersion. Flamort Chemical Co., 746 Natoma St., San Francisco, Cal.

On Readers' Service Card, Circle 111

Foundation Waterproofing

"Asbestoseal," a sheet-applied waterproofing membrane, provides foundation waterproofing in critical areas where excessive moisture and water vapor problems exist. It is composed of two layers of asphalt-saturated and coated, inorganic, and glass-reinforced asbestos felt that have been bonded with heat and pressure to form an impermeable membrane. Water vapor transmission of ⅛″ Asbestoseal is not more than 0.0047 perms. The Philip Carey Mfg. Co., 320 South Wayne Avenue, Cincinnati, Ohio.

On Readers' Service Card, Circle 112

Furnishings

Hexagonal Travertine End Table

Column of matched travertine slabs fitted over wood core has

Reception Room, The Fafnir Bearing Company: Automatic Sliding Entrance by Stanley.

Stanley automatic sliding entrance... a new concept that assures a cordial and impressive reception

Stanley Automatic Sliding Entrances combine the beauty and prestige of modern clean-line appearance with the utility of efficient two-way traffic flow through a single entrance-way. They are an unmistakable sign of design excellence.

Model 1000 — AUTO-SLIDE automatic sliding entrance. Complete with doors that swing open for emergency use. Entrance meets all exit code requirements. Completely safe. Saves space. Write for Folder No. M73.

Model 5000 — SLIMLINE automatic sliding entrance. Lighter, more compact. Especially suitable for small shops and lower traffic applications. Priced within virtually any client's budget. Write for Folder No. M74. And a complete line of famous MAGIC-DOOR® operators (pneumatic, hydraulic, electric), controls and accessories for doors that swing, slide or fold. Write for Folder No. M67-COM, or look us up in Sweet's. STANLEY DOOR OPERATING EQUIPMENT Division of The Stanley Works, New Britain, Connecticut.

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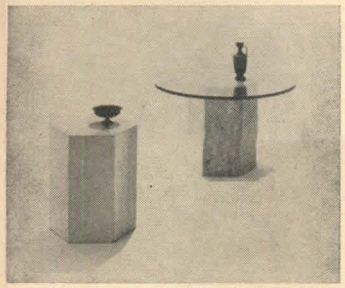
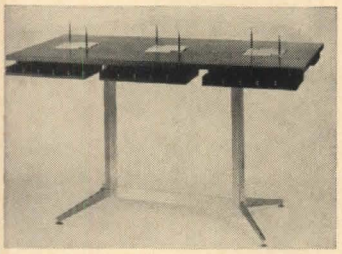
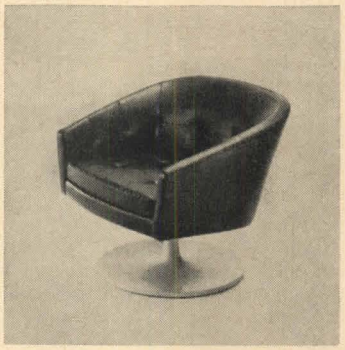


optional plate glass top. Harvey Probber Inc., 155 E. 56 St., New York, N. Y.
On Readers' Service Card, Circle 113



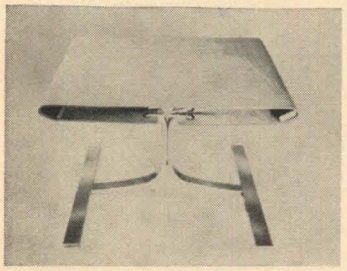
Check Writing Desk

A line of check desks has been introduced with enough design variations to meet most custom specifications. Desk may be installed as a "stand-up," "sit-down," or "wall-mount" model. Tops with from one to six writing stations may be oiled walnut, rosewood, or teak (glass-protected, if required), marble or plastic. Base of vinyl, metal, or above materials, comes in three designs: slab, column "X," and column "Y". Hardware is satin aluminum or bronze. Lehigh Furniture Corp., 16 E. 53 St., New York, N.Y.
On Readers' Service Card, Circle 114



Revolving Shell Chair

Notably comfortable chair, 30″ x 27″ x 27″, has loose seat cushion. Tufting is optional. Revolving pedestal base is cast aluminum coated in beige-colored plastic. Jens Risom Design, Inc., 444 Madison Ave., New York, N. Y.
On Readers' Service Card, Circle 115



Leather Sling Seat

Sole leather sling seat laced to polished stainless-steel base measures 21″ sq x 13″ high. Nicos Zographos Designs, Ltd., 510 Madison Ave., New York, N. Y.
On Readers' Service Card, Circle 116

Saddle Leather Chair

Australian sculptor and designer Clement Meadmore, who now works in New York City, has created a chair in mirror-finish chrome and saddle leather. Heavy leather, in either natural or black, is stitched around frame. Chair measurements: width 28½″, height 29½″, seat depth 26″, and arm height, 19½″. Chair is distributed by Leif Wessmann Associates, Inc., 301 East 64 St., New York, N.Y.
On Readers' Service Card, Circle 117

Portable Drafting

Portable drawing board, called

a specification from Hillyard...

FOR SEALING and FINISHING MASONRY SURFACES

PRODUCT NAME: *HILLYARD SEAL-TITE®*

DESCRIPTION:

A polymer seal-finish for terrazzo, concrete, clay tile, brick, slate and all types of natural stone.

SPECIFICATION AND HOW TO APPLY:

A water emulsion product with an extra high solids content. Apply in a thin film with mop or lambswool applicator. Seal-Tite requires no buffing after application. Its natural high gloss enhances the natural colors in the floor. Excellent for interior or exterior surfaces and is ideal for light colored floors because of its non-yellowing characteristics.

COVERAGE:

1,000 to 1,500 square feet per gallon depending on the porosity of the floor.

TECHNICAL DATA:

N.V.M.: 25.0%—26.0%./Film Properties: Film on black glass—clear./Drying time at 25° C., 50% R.H.—20 min. maximum./Leveling—spreads uniformly./Gloss—high./Water Resistance—no spotting or whitening or film deterioration./Tackiness—none./Odor: non-objectionable at any time.

GUARANTEE:

Controlled uniformity. When floor or surface is properly prepared and when applied according to directions, all claims for the product are guaranteed.

MAINTENANCE:

Clean when necessary with a neutral chemical cleaner (Super Shine-All). Regular treatment with Hillyard Super Hil-Tone dressing for conditioning and dust control. Buffing restores appearance when necessary.

APPROVALS:

Listed by Underwriters Laboratories relating to slip resistance.

REFERENCES:

Product informational literature No. 262-55.

Write, wire or call collect for complete information and specifications on Hillyard SEAL-TITE. You may also want your nearby Hillyard architectural consultant to demonstrate SEAL-TITE in your office or on the job site.

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The Most Widely Recommended and Approved Treatments For Every Surface

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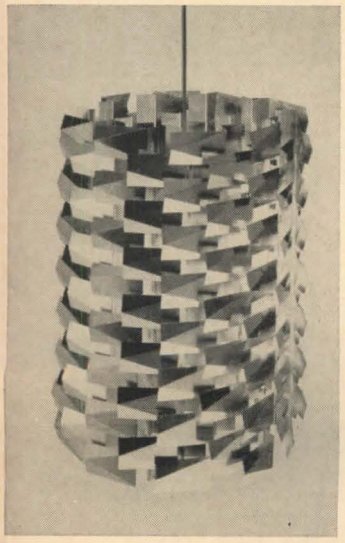
"Porta-Draft," is made of birch and measures 27″ x 20″ x 2¾″. Weighing 15 lbs, it contains a drawer for drafting equipment and T-square. Table tilts to any angle by means of neoprene cleats. Under drawer section, paper can be stored. It is available for $29.95 plus postage. Chutich Wood Products, Inc., 10450 N. Milwaukee Avenue, Des Plaines, Ill.
On Readers' Service Card, Circle 118

Library Carrels

Carrels, designed and built by John E. Sjostrom Co., can be used back to back, side by side, or in tandem. All carrels are supplied with aluminum posts and leveling glides; panels can be of wood with painted interior or of Formica in any standard color. John E. Sjostrom Co., 1717 North 10th St., Philadelphia, Pa.
On Readers' Service Card, Circle 119



Metalites

Extruded polythylene cylinder within arrangement of metal fins diffuses light. Convex or cylindrical in shape; finished in chrome, satin brass or white; 21″ x 27″ or 48″ high. Custom specifications accepted. George Nelson & Co. design for Howard Miller Clock Co., Lighting Div., Zeeland, Mich.
On Readers' Service Card, Circle 120

Rotating/Stacking Record Cabinets

Designer Paul Mayen's versatile cabinet/end table rotates solid walnut surfaces to reveal partitioned opening, which holds 100 records. Neoprene turntable and ball bearings concealed in base allow unit to swivel with only 3″ wall clearance. One, two, or three supplementary units can be stacked and rotated together. Each is 15″ high x 16″ x 13½″. Intrex Inc., 336 Third Ave., New York, N. Y.
On Readers' Service Card, Circle 121

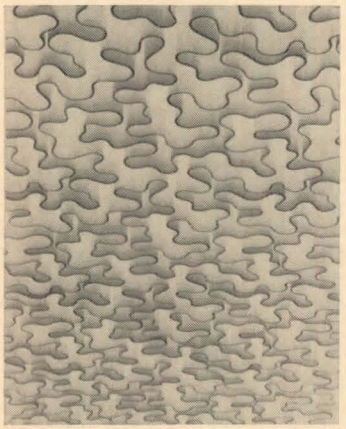
Slim Day-Bed

Design by Dave Parmelee has oak frame with cane panel head and foot. Founders Furniture Inc., Merchandise Mart, Chicago, Ill.
On Readers' Service Card, Circle 122

Special Equipment

Colored Safety Glass

Opaque, translucent, and transparent tortoise shell patterns in a host of colors are laminated between two lights of glass. Safety glass can be made with both laces and original art forms. Maximum sizes are 48″ x 60″, 34″ x 63″, and 26″ x 72″. It can be used as room dividers; shelves; murals; shower doors; and around entrances, exits, escalators, and elevators. Protecto Safety Glass Co., 8206 Cooper Avenue, Glendale, L. I., N. Y.
On Readers' Service Card, Circle 123

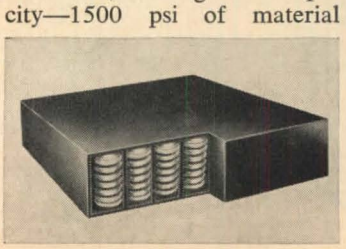


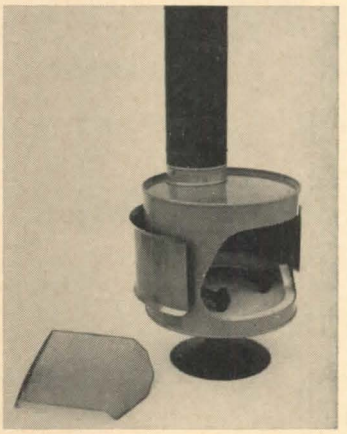
A Mazing Ceiling

"Squiggle," a closed ribbon-like loop of light-stable polystyrene, is used as luminous ceiling. One Squiggle assembly hung in place equals 8″ x 24″ ceiling unit. Assemblies are hung from white enameled steel channels suspended 2′ o.c. in one direction only. Channels are made in 8′ lengths and are notched and indexed for precise positioning and hanging. They are easily removed for cleaning or relamping. Luminous Ceilings Inc., 3701 N. Ravenswood, Chicago, Ill.
On Readers' Service Card, Circle 124

Noise Protection for Building Columns

"Dynelast" is used for protection of building columns, bridges, and elevated highways against shock of thermal expansion. It is constructed of steel springs that are encased within elastomeric block to provide high damping properties. Dynelast offers static deflection greater than 30 per cent of material thickness, controlled resiliency with good damping characteristics in all directions, and high load capacity—1500 psi of material area. Only 1 lb of Dynelast is required per ton of structural loading. It is available in 12″ x 12″ x 2¾″ size. Machinery Mountings Inc., 339 West John St., Hicksville, N.Y.
On Readers' Service Card, Circle 125

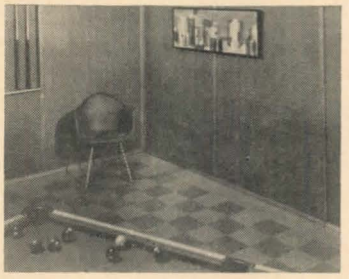




Prefab Fireplace

Recently designed free-standing, prefab fireplace is used with pitched roof, joist or furred ceiling, or side wall. It is produced in two models: fully porcelanized body and baffle unit or a heat-resistant flat black body with a porcelanized baffle. Color combinations can be derived from seven baffle colors and five body colors. Fire Drum Metal Fireplaces, 172 Clara St., San Francisco, Cal.
On Readers' Service Card, Circle 126

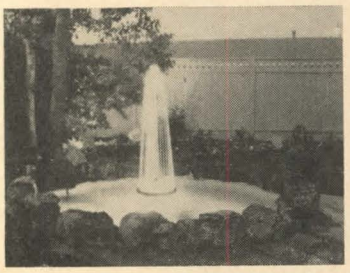
Surfacing



Two Patterned Panel

"Duo-Faced" paneling consists of graded wood chips bonded together with synthetic resins under high pressure and heat. One side is in "Shan-Tong" pattern and the other in "Kascade" pattern. Both sides are hard and mar-resistant. Dimensions are ⅛″ thick, 4′ wide x 8′ long. Colors are natural, but panels may be stained, finished, or painted. Forrest Industries, Inc., P.O. Box 178, Dillard, Ore.
On Readers' Service Card, Circle 127

terials for each cab vary from "Formica" or "Aborite" panels in wood finish to hardwood or vinyl tile flooring. Several types of lighting systems are also used. Turnbull Elevator Ltd., 126 John St., Toronto, Canada.
On Readers' Service Card, Circle 223



Fountain Guide

"Guide To Better Fountain Designs," 118 pages, discusses all phases of construction and selecting water displays. Selection of correct pump as well as helpful hints in caring for fountain in respect to placement and location of various water displays is emphasized. Catalog covers wide selection of self-contained fountains, waterfalls, and water displays. Photos, diagrams of display systems, and sketches of types of spray are given. Roman Jabon Studios, 14847 Bessemer St., Van Nuys, Cal.
On Readers' Service Card, Circle 224

Surfacing

Tile Patterns

Booklet, 16 pages, illustrates various styles of vinyl, cork, and rubber tile. Each style shown includes color patterns and sizes. Other types of tile are vinyl conductive tile for use on floor areas, where static-electricity constitutes a hazard, rubber and vinyl cove bases, and stair treads. Sample book is also available upon request. Robbins Floor Products, Inc., Tuscumbia, Ala.
On Readers' Service Card, Circle 225

PROGRESSIVE ARCHITECTURE
NEWS REPORT
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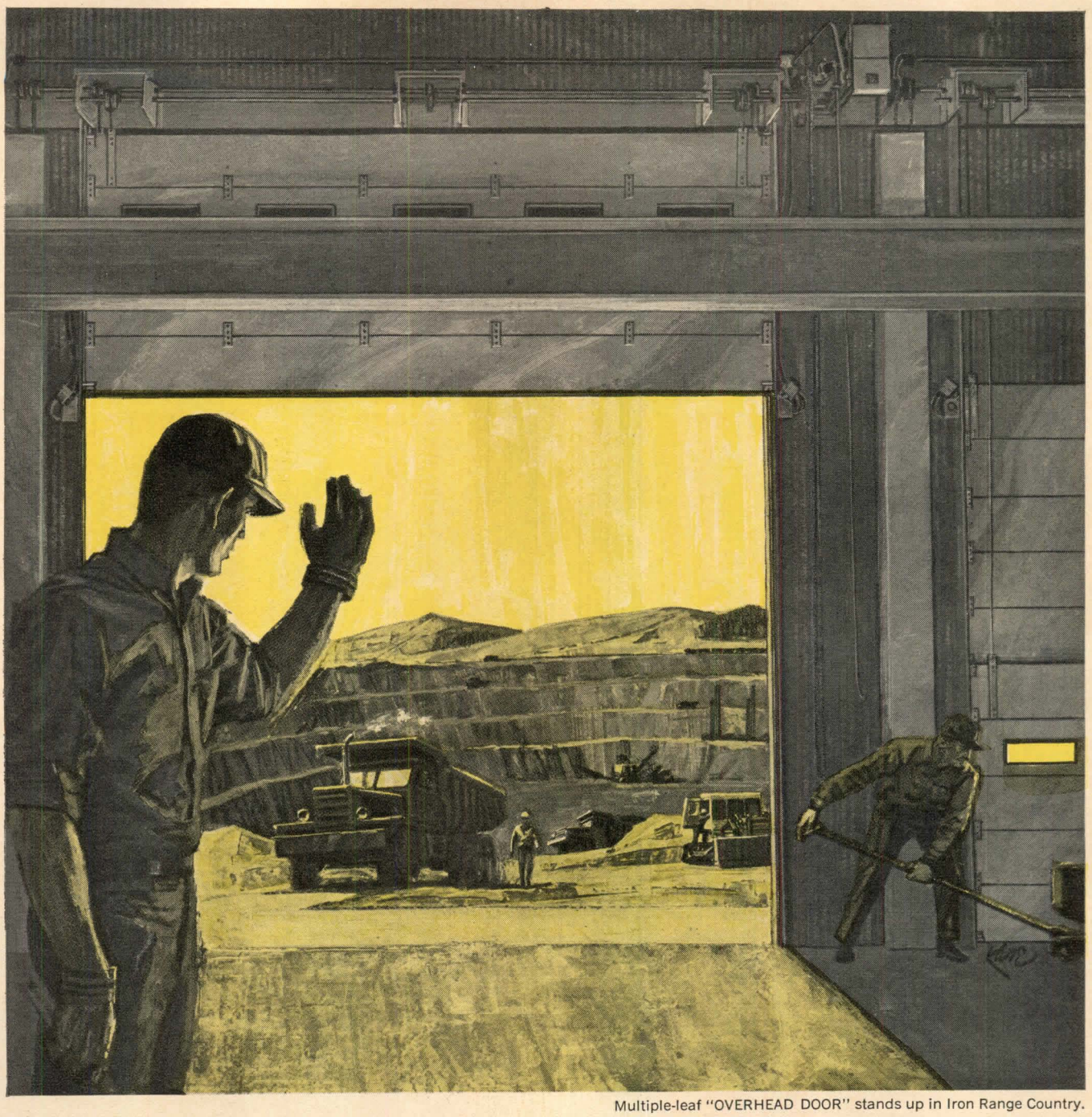
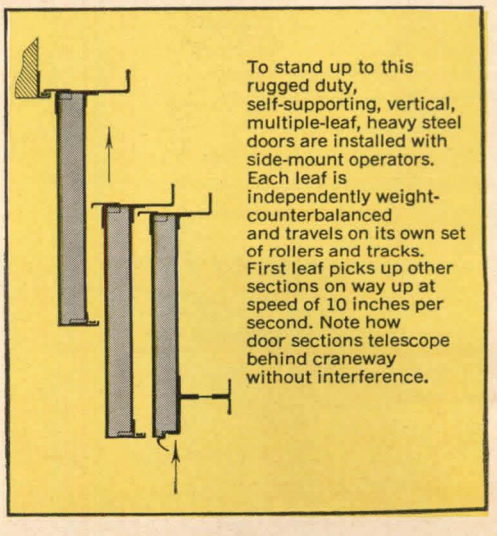


Multiple-leaf "OVERHEAD DOOR" stands up in Iron Range Country.

A rugged problem in dependability solved by new "OVERHEAD DOOR"

You may never have to dig into the rocky problems of such massive doors requiring such unusual dependability. But most architects do run into a stubborn vein of closure problems from time to time. When you do, our Architect Design Service can help you solve them with *skill and imagination*, and The "OVERHEAD DOOR."



To stand up to this rugged duty, self-supporting, vertical, multiple-leaf, heavy steel doors are installed with side-mount operators. Each leaf is independently weight-counterbalanced and travels on its own set of rollers and tracks. First leaf picks up other sections on way up at speed of 10 inches per second. Note how door sections telescope behind craneway without interference.

THE "OVERHEAD DOOR"
TRADE MARK

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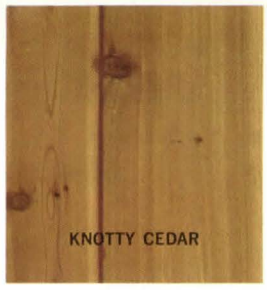

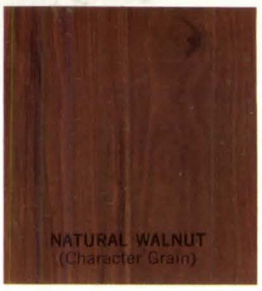

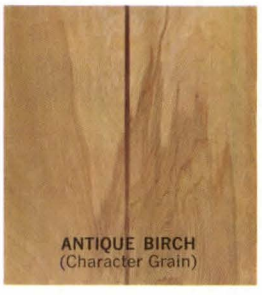

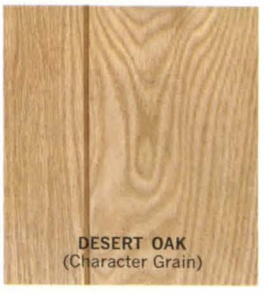

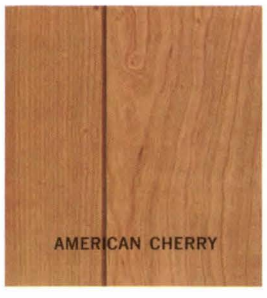

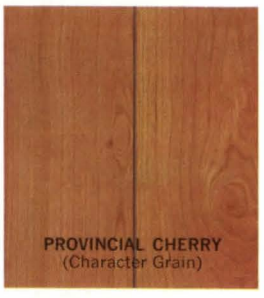

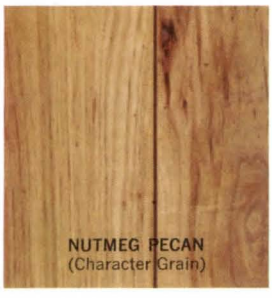

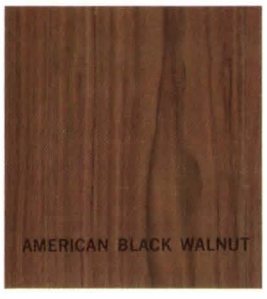

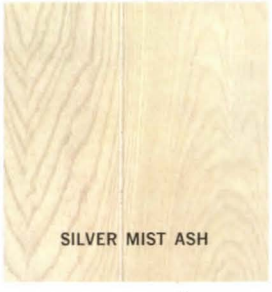

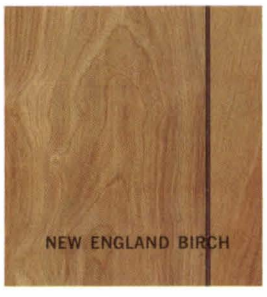

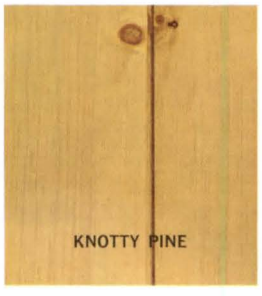

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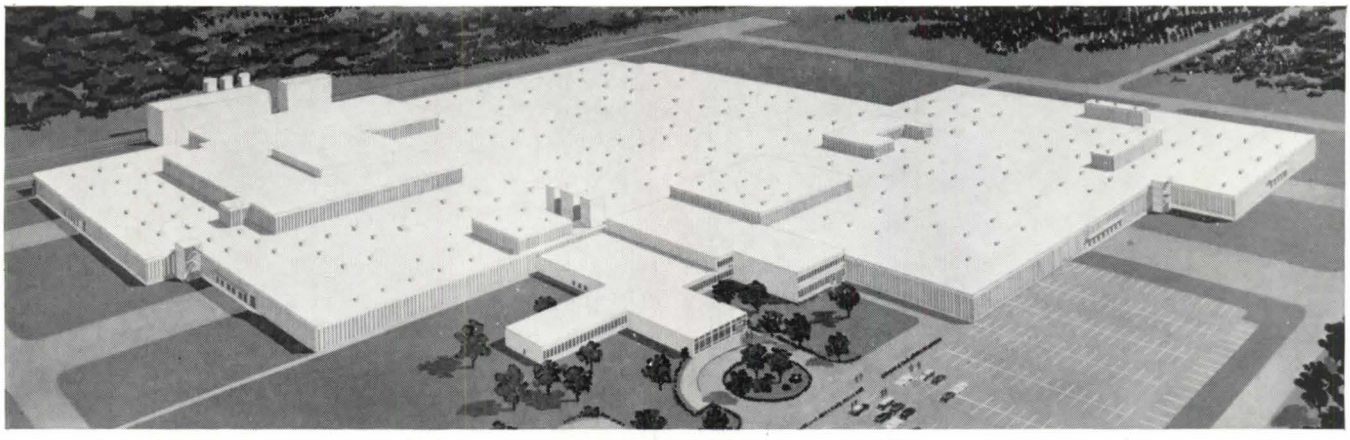


Artist's rendering of The Great Atlantic & Pacific Tea Company's new Ann Page Division plant at Horseheads, N.Y. It has a prestressed concrete roof over approximately 35 acres of prestressed concrete-walled buildings. The structure consists of one-story and two-story buildings (with hanging mezzanine passageways) housing food processing, packaging and warehousing areas. Designed and constructed by: The Rust Engineering Company, Pittsburgh, Pa.; Erector: W. P. Dickerson and Son, Inc., Youngwood, Pa.; Prestressed concrete fabricator: **Dickerson Structural Concrete Corporation, Youngwood, Pa.**

Largest prestressed concrete building in world covers 35 acres

This massive new building, the world's largest of its type, will house the Ann Page Division food processing plant of The Great Atlantic & Pacific Tea Company at Horseheads, N.Y. Covering 1,524,000 square feet under one roof, it stands as a striking example of the efficiency of prestressed concrete. Before prestressed concrete was chosen, extensive studies of a number of possible structural systems were conducted by The Rust Engineering Company, Pittsburgh, Pa.

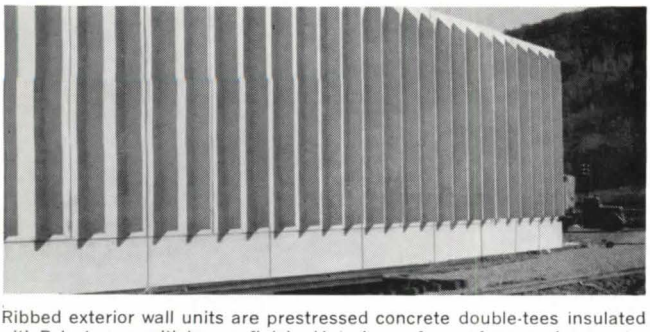
10 Structural Systems Studied

Rated highest for suitability against nine other systems, precast, prestressed double-tees were chosen for the structural roof system. Seven wall systems were subjected to detailed analysis. Precast, prestressed insulated double-tee panels rated the highest and were selected to meet the exacting requirements of the project.

Qualities under comparison included initial cost, permanency and durability, low maintenance cost, fire resistance, suitability for the processes involved, alterability, and other important requirements.

Roof Double-tees 50 Feet Long

The typical roof double-tee is 7.5 feet wide by 50 feet long and is pretensioned with CF&I-Roebling 7/16 in. diameter 7-wire stress relieved 270K high strength strand. Ribs are 18 in. deep, with the top flange 2 in. thick. 30 by 50 foot bays are used throughout.



Ribbed exterior wall units are prestressed concrete double-tees insulated with Polystyrene, with broom-finished interior surfaces of exposed concrete.

Mammoth Task for Dickerson

Dickerson Structural Concrete Corporation, Youngwood, Pa., had the enormous task of producing the prestressed concrete for 35 acres of beams, insulated wall tees, floor and roof double-tees. Dickerson built an 18-acre plant a half-mile away from the construction site, a big factor in pushing the project along in record time.

The Dickerson plant was designed, built and in operation within six weeks of award of contract. Just 26 weeks were required for the production of all precast concrete members. Over 500 different types of members were needed and production reached as high as 250 cubic yards of concrete per day. Building erection and plant production ran simultaneously. The casting system was so efficiently organized that as much as *one acre of building materials in one day* was set.

Prestressed Concrete A Wise Choice

According to the chief prestressed concrete designer, "The high suitability for food processing; the relatively moderate cost; and the excellent load performance characteristics exhibited in the full scale load tests have shown that the choice of precast prestressed concrete for The Great Atlantic and Pacific Tea Company's food processing and packaging plant was a wise one."

Get the Details from CF&I-Roebling

CF&I-Roebling, pioneer in the development of prestressing wire and strand, has a wealth of technical material available. Just tell us what type of structure you are considering; we will be glad to supply up-to-the-minute data and the names of the prestressed fabricators in your area. The Colorado Fuel and Iron Corporation, Denver, Colorado; Trenton, New Jersey. Sales offices in principal cities. 9751

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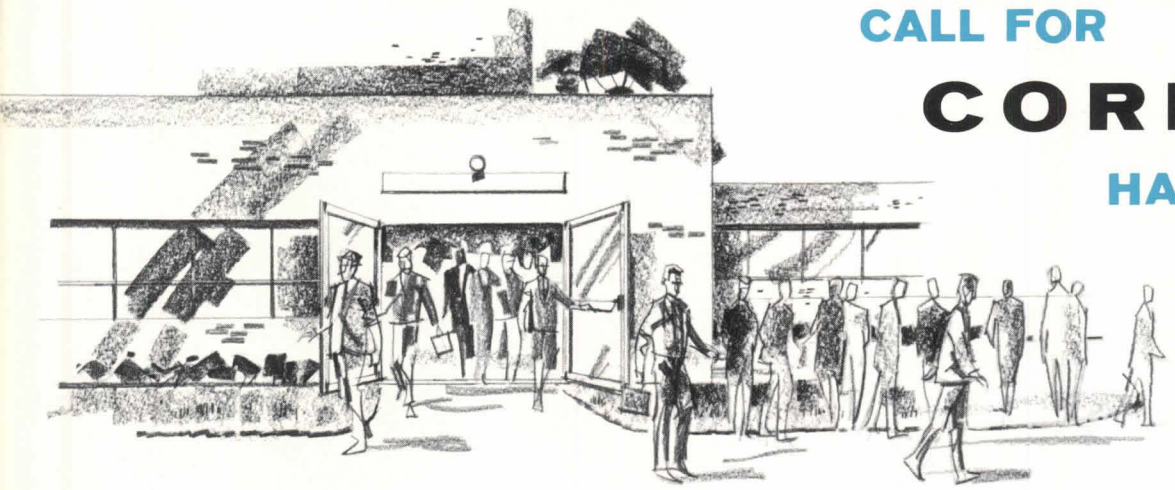

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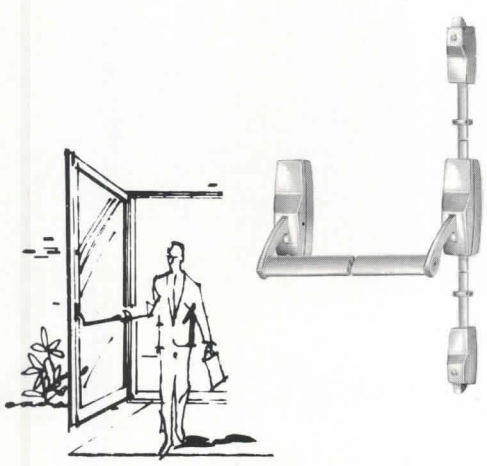

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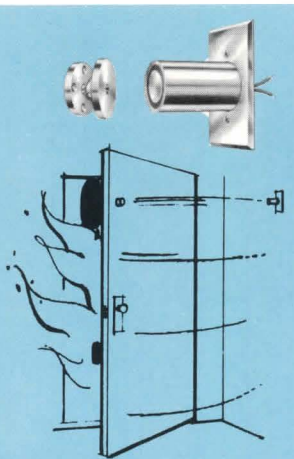

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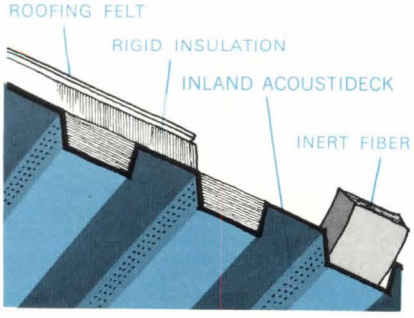
It's Inland Acoustideck®



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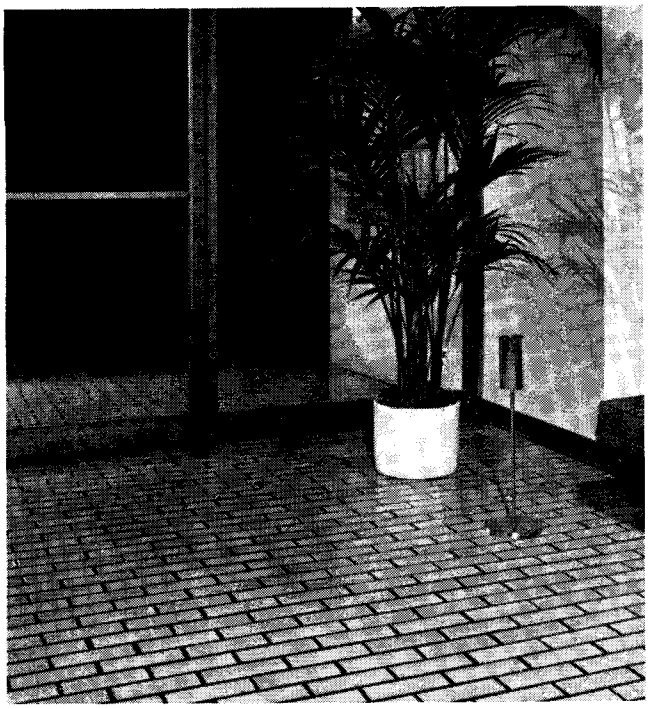

Apartment house, San Francisco, Harold Major, Architect

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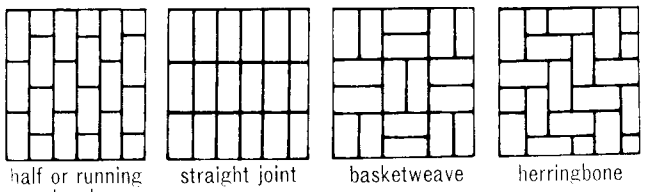

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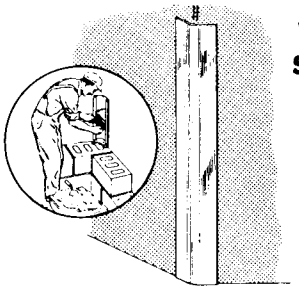

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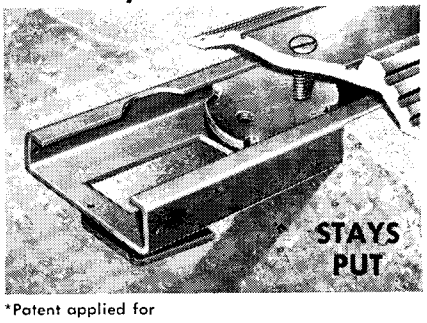

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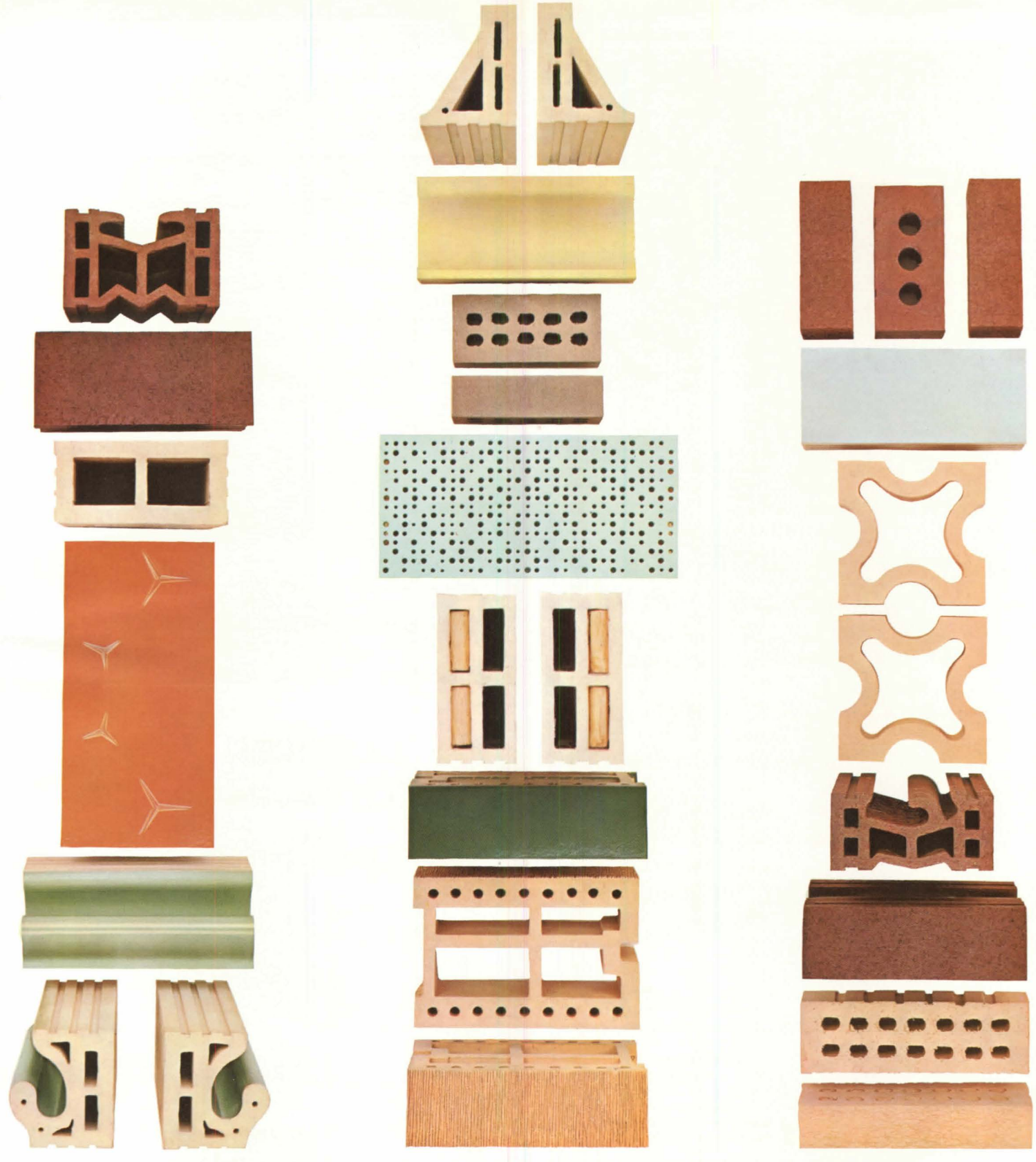

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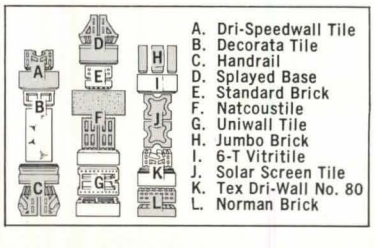

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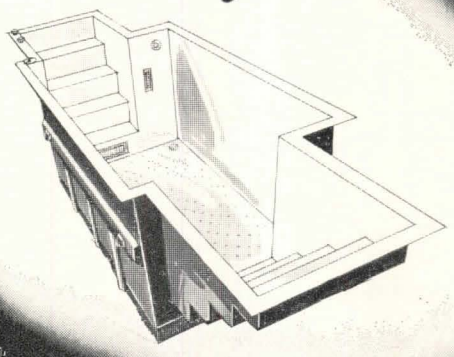

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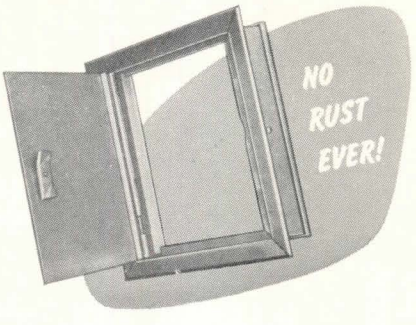

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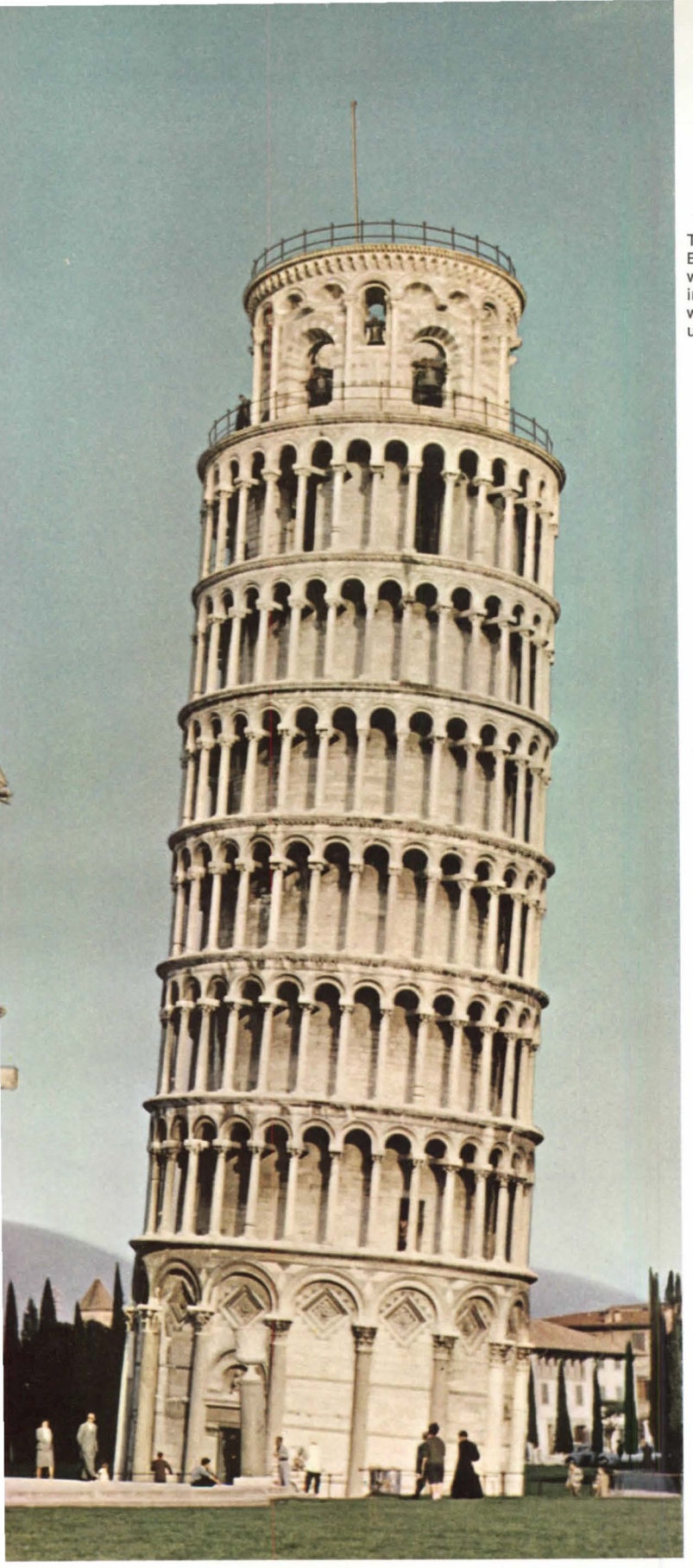

The Leaning Tower of Pisa is a round marble bell tower designed by Bonanno Pisano in 1174 and completed in 1350. It is 179 ft. high with walls that are 13 ft. thick at the base. It was 15½ ft. out of perpendicular in 1829, 16½ ft. in 1910. The tilt rate was 1/25th of an inch in 1962, and when it started tipping twice as fast, the Italian Public Works Ministry undertook corrective measures.

Would designing with "slide rule" Castell have prevented this 17′ 9.779″ tilt?

Faulty engineering—not designing—was responsible for the oblique position of the Leaning Tower of Pisa. Despite the crude drawing tools available to Architect Bonanno Pisano in 1174, this graceful structure remains one of Italy's most splendid monuments. Trouble developed when the wet, porous sub-soil gave way when the tower was only 35 feet off the ground.

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10 CASTELL 9201 POLYCHROMOS Crayon Pencils offer a complete range of 72 pigment colors—bright, beautiful and light-proof—for sketching, drawing, rendering and map making. Widely used by artists, architects, designers, draftsmen, and engineers for any coloring required.

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A.W. FABER-CASTELL Pencil Company, Inc., 41 Dickerson Street, Newark 3, N. J.

Please send me a sample each of the following for testing purposes.

CASTELL #9000 Drawing Pencil____ ____ ____ ____ degrees. CASTELL #9030 Refill Drawing Leads ____ ____ ____ degrees. POLYCHROMOS #9201 Crayon Pencil ☐ Red or ☐ Blue or ☐ Black

MY NAME IS_____ TITLE_____ COMPANY_____

STREET_____ CITY_____ ZIP_____ STATE_____

specify MAHOGANY... *if he's big enough for this chair!*

When you want the subtlety of success, design his office with the finest wood in the world. You'll build good taste and good sense around him and he'll have it easier with both customers and board members. You'll have a friend and client forever—thanks to Genuine Mahogany.

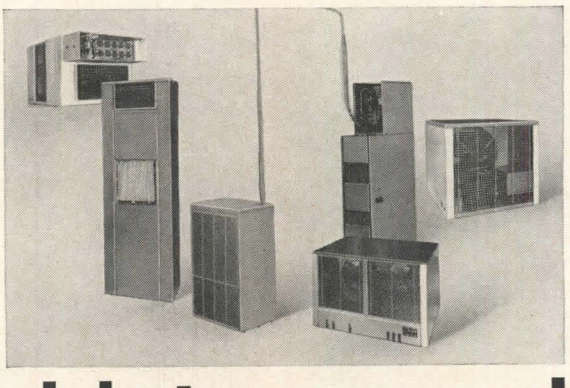
As the world's largest importer and manufacturer of Genuine Mahogany, Weis-Fricker produces only *Swietenia Macrophylla* from Central and South America. It's yours quickly in any quantity at prices that will please you, and at lengths up to 20 feet, widths to 24 inches, and thicknesses to 4 inches!

From Weis-Fricker you'll get the same magnificent material that tests by the U. S. Forest Products Laboratory and Cornell University show superior over all other popular hardwoods in nearly all properties for mortising, boring, planing, warping, shrinking, shaping and turning. You'll have the same wonderful wood that remains unchanged, uncracked, unwarped in the Cathedral of Ciudad Trujillo after 450 years of tropical climate with hurricanes, earthquakes, and insects. And you'll join America's top architects who chose Genuine Mahogany recently for the interior of the luxurious Hotel Sheraton in San Juan, the Professional Golf Association's (PGA) clubhouse in Palm Beach, and the Library at the University of Chicago. In fact, watch for *House Beautiful's* 1965 Pace Setter Home. It's full of Genuine Mahogany from Weis-Fricker!

For the name of your nearest dealer, write today. Free mahogany kit on request. Contains samples with finishes in red, yellow, green, blue, brown, and violet, plus mahogany fact book with mechanical stresses and other information. Circle number 350 on the readers service card or write Weis-Fricker Mahogany Company, P. O. Box 391, Pensacola, Florida.

PHOTOGRAPH BY EZRA STOLLER ASSOCIATES

By squeezing or stretching, you can force-fit the average air conditioning system into a great many applications.



But wouldn't you rather pick the right type for your job from the tremendous variety of application-engineered systems we offer?

Ever notice when you're installing a so-called flexible air conditioning system how often it turns out that "flexibility" comes out of *your* hide?

You use up valuable time in the planning stage; then there's the time-consuming cut-and-fit installation; then still more time used up in service call-backs before the system works right.

That kind of flexibility costs you money ...and it costs you customer goodwill, too.

We've put the flexibility back where it belongs by developing a complete line of application-engineered systems.

Adding central air conditioning to the present heating system in an *old* or *existing* residence? We have the perfect system.

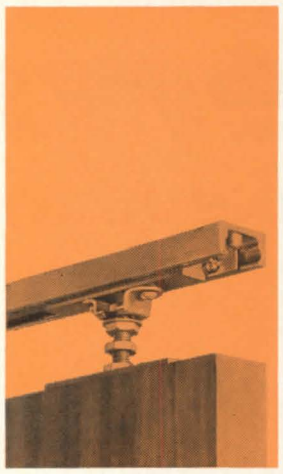
Want one system to provide both electric heat and central air conditioning? Take a careful look at our CLIMA-PUMP.

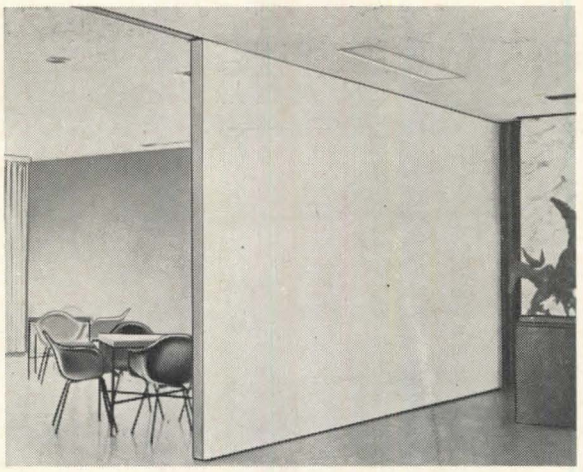
Or a similar unitized system for zoned spot cooling in light commercial installations? Our completely new CLIMA-AIRE is outstanding.

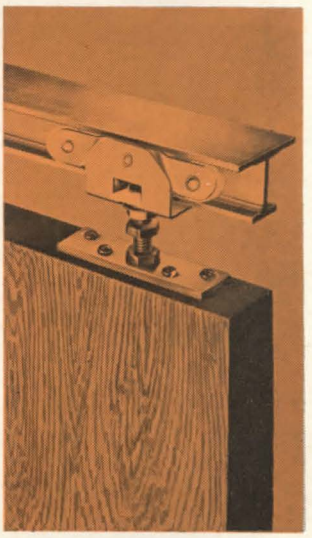
Need a self-contained air conditioning system for attic or crawl space applications? We have it.

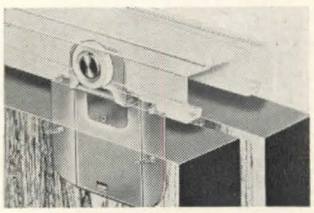
We're just giving you a hint of what SPACE CONDITIONING SYSTEMS has to offer. *The ad is too small to cover our* complete line of application-engineered units. Write for complete brochures now and let *us* be the flexible ones this season.

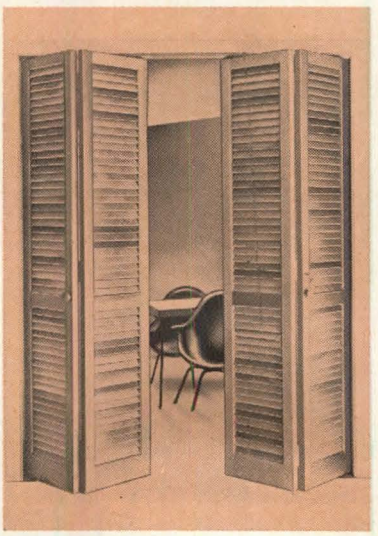
SPACE CONDITIONING, INC.
Formerly Iron Fireman-Webster, Inc.
Harrisonburg, Virginia 22801
A Subsidiary of Electronic Specialty Co.

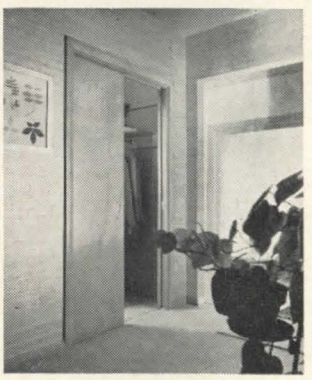












For tall, short, skinny,
fat, solid, hollow,
heavy, light, wide
and narrow doors

(or what have you)

In closets, walls, cabinets, dividers, storage areas, between rooms, store fixtures, wardrobes

(or where have you)

Grant Sliding Hardware

Write for complete information.

GRANT PULLEY & HARDWARE CORPORATION ■ EASTERN DIVISION / 49 High Street, West Nyack, N.Y. ■ WESTERN DIVISION/944 Long Beach Ave., Los Angeles 21, Calif.

Celo-therm

TRADE MARK

NONCOMBUSTIBLE ROOF INSULATION

"Superior affinity for asphalt" say the Research men who developed this new top-surface coating. In plain talk, it grabs asphalt like glue. Sticks and stays stuck. For good. When the felts go down, you've got a permanent "one-piece" roof that defies wind and other weather hazards.

And that's only one of the many advantages you get with Celo-therm noncombustible Roof Insulation from Celotex:

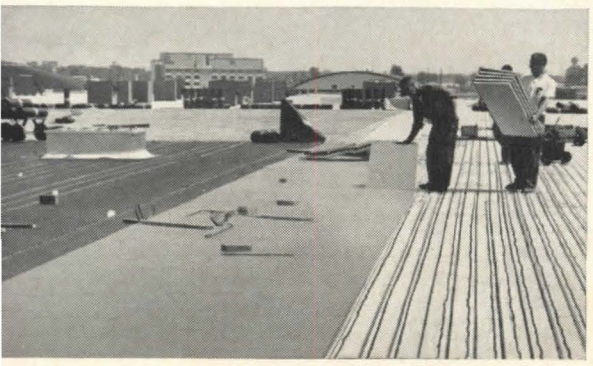
It's made from Perlite ore. It's highly moisture resistant. Has excellent insulating value and is dimensionally stable. Roofing crews like its light weight, and the way it takes deck traffic and wheeling loads without denting or fracturing.

Truly a premium product—but costs no more than ordinary roof insulation. Send coupon today for samples and application specifications.

Distributed East of Rocky Mountains.

now better than ever!

coating for strongest bond



THE CELOTEX CORPORATION
120 S. La Salle Street • Chicago 3, Illinois
Subsidiaries: The South Coast Corporation...Crawford Door Company... Big Horn Gypsum Company ...California Celotex, Inc....Vestal Manufacturing Company... Cweco Industries Limited (Canada)... Celotex Limited (England). Affiliate: South Shore Oil and Development Company.

CELOTEX
REG U.S. PAT OFF.
BUILDING PRODUCTS

THE CELOTEX CORPORATION, DEPT. PA-35
120 S. LA SALLE STREET, CHICAGO 3, ILLINOIS

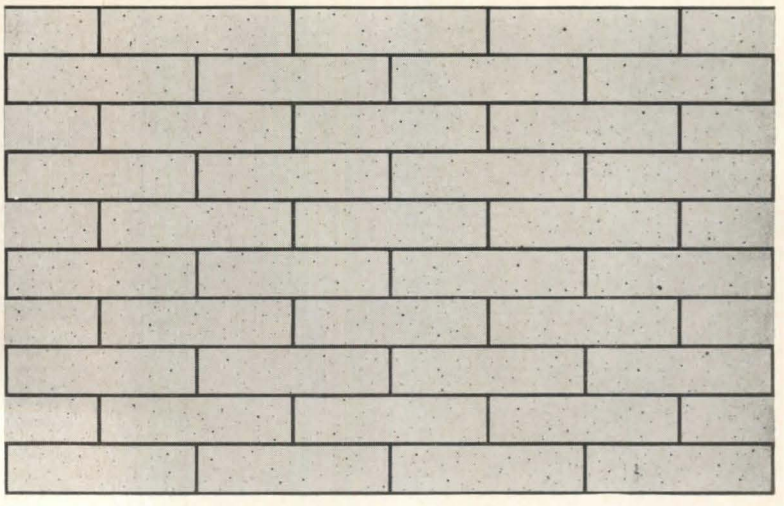
☐ Please send me application specifications for Celo-therm noncombustible roof insulation.
☐ Show me samples.

My Name_____
Firm Name_____
Address_____
City_____ Zone_____ State_____

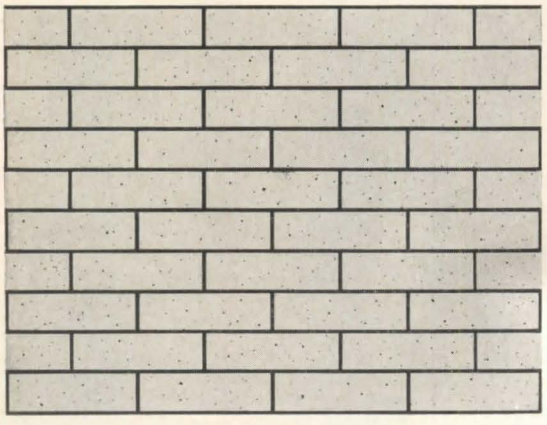
On Readers' Service Card, circle No. 450

When you specify Hanley Jumbo Norman Brick you get 75% more surface area

40 HANLEY JUMBO NORMAN BRICK
(Jumbo Norman 11⅝" x 2¾" x 3⅝")



40 STANDARD BRICK
(Standard size 8" x 2¼" x 3¾")



The Hanley Jumbo Norman Unit means substantial savings in both labor and material costs—75% more surface area than standard size brick—one-third less vertical joints—one-sixth less horizontal joints. Proportional to standard brick, Hanley Jumbo Norman is available in 30 Duramic* glazed brick shades and 12 Summerville face brick shades. Specify Hanley and save.

HANLEY COMPANY
Summerville, Pennsylvania
District Sales Offices:
New York • Buffalo • Pittsburgh

The sands of time flow slowly for the sealants in Lever House

After 10 years of exposure on the job, polysulfide-base sealants retain vitality and leak-proof serviceability.

Most structural sealant claims to long service life are based on evidence secured in the laboratory. The polysulfides on the other hand are supported by the testimony of history.

In scores of early curtain wall buildings, such as the pace-setting Lever House sealed a decade ago . . . sealants based on Thiokol's LP® polysulfide polymer have delivered completely satisfactory weatherproofing. They still are delivering—retaining inherent adhesive strength, flexibility and resistance to age.

Why specify sealants on the basis of laboratory evidence alone when you can level your judgment on the strength of actual performance? Rely on time-proven polysulfide base sealants. After all, history has a way of repeating itself. Write for case history and structural sealing booklets.

Service-proved in structural JOINTS

Thiokol

CHEMICAL CORPORATION

780 N. Clinton Ave., Trenton, N. J. 08607

In Canada: Naugatuck Chemical Division, Dominion Rubber Co., Elmira, Ontario

Why?

This sign, found on swing doors that flank revolving doors, is a practical attempt to eliminate drafts. As long as people use the International *Controlled Air Entrance** Revolving Doors, there will be no drafts. At least two wings always touch the enclosure, ceiling and floor so drafts can't get in. But every time people use the swing doors, drafts sweep into the building. About 50% of all revolving doors in use today replaced swing doors. Why not *design* draft-free and avoid trouble later?

*Trademark

NEW CONCEALED SPEED CONTROL
Nothing to get in the way of your straight-line design. Speed control is hidden within revolving door ceiling.

75 YEARS

International originated revolving doors over 75 years ago. Experience says, "They must be the best!"

CONTROLLED AIR ENTRANCE
ALWAYS OPEN ALWAYS CLOSED

Write for free 54-page book, *The Controlled Air Entrance**

INTERNATIONAL STEEL COMPANY

1627 Edgar Street Evansville, Indiana 47707

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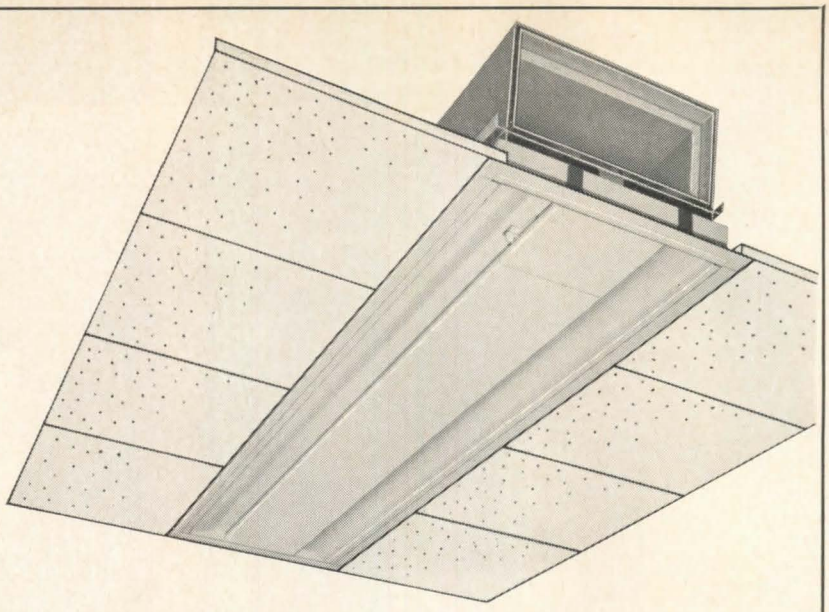

Take a closer look at a new look in central air conditioning!

It's our new Carrier Moduline Weathermaster® unit.

With clean, functional lines, it almost disappears into any type of hung ceiling—acoustical tile, exposed T-bar, concealed Z-bar or lath-and-plaster.

And integrates with lights in dozens of different ways.

But pleasing as it is to look at, there's a lot more to this new all-air ceiling terminal than meets the eye.

Moduline® has all the advantages of variable volume air distribution, with none of its disadvantages. None? None!

To be explicit: It provides automatic room-by-room temperature control with a low-cost, space-saving single duct system.

The air pattern in each room is always right—no drafts, no stratification, no waterfall at any volume, from low to maximum.

It's quiet, too, and fully self-balancing. Each terminal compensates constantly for duct pressure changes.

Adjustable factory-installed controls are powered by the supply air. No external wiring or pneumatic connections. Just dial the required supply air volume—the unit does the rest.

There are other advantages—too many to mention here.

You'll find the complete story, with technical details, in the Carrier Moduline Weathermaster Unit brochure. Ask your Carrier representative for a copy. Or write us at Syracuse 1, N. Y. In Canada: Carrier Air Conditioning (Canada) Ltd., Bramalea, Ontario.

Carrier Air Conditioning Company

More people put their confidence in Carrier air conditioning than in any other make

IMPROVED!

EXIT

miller PATHFINDER

THE ORIGINAL LONG-LIFE EXIT SIGN

IMPROVED TO GIVE YOU . . . .

- Longer Lamp Life—approximately 20% longer
- Greater Brightness and Uniformity of Illumination
- Unsurpassed Visibility

Along with these improvements, you continue to get the same quality construction and appearance features: *all die-cast aluminum housing and door frames; brushed satin finish; hinged door; compactness; complete line.* And, there's no increase in price.

Write Dept. 365 for complete catalog information.

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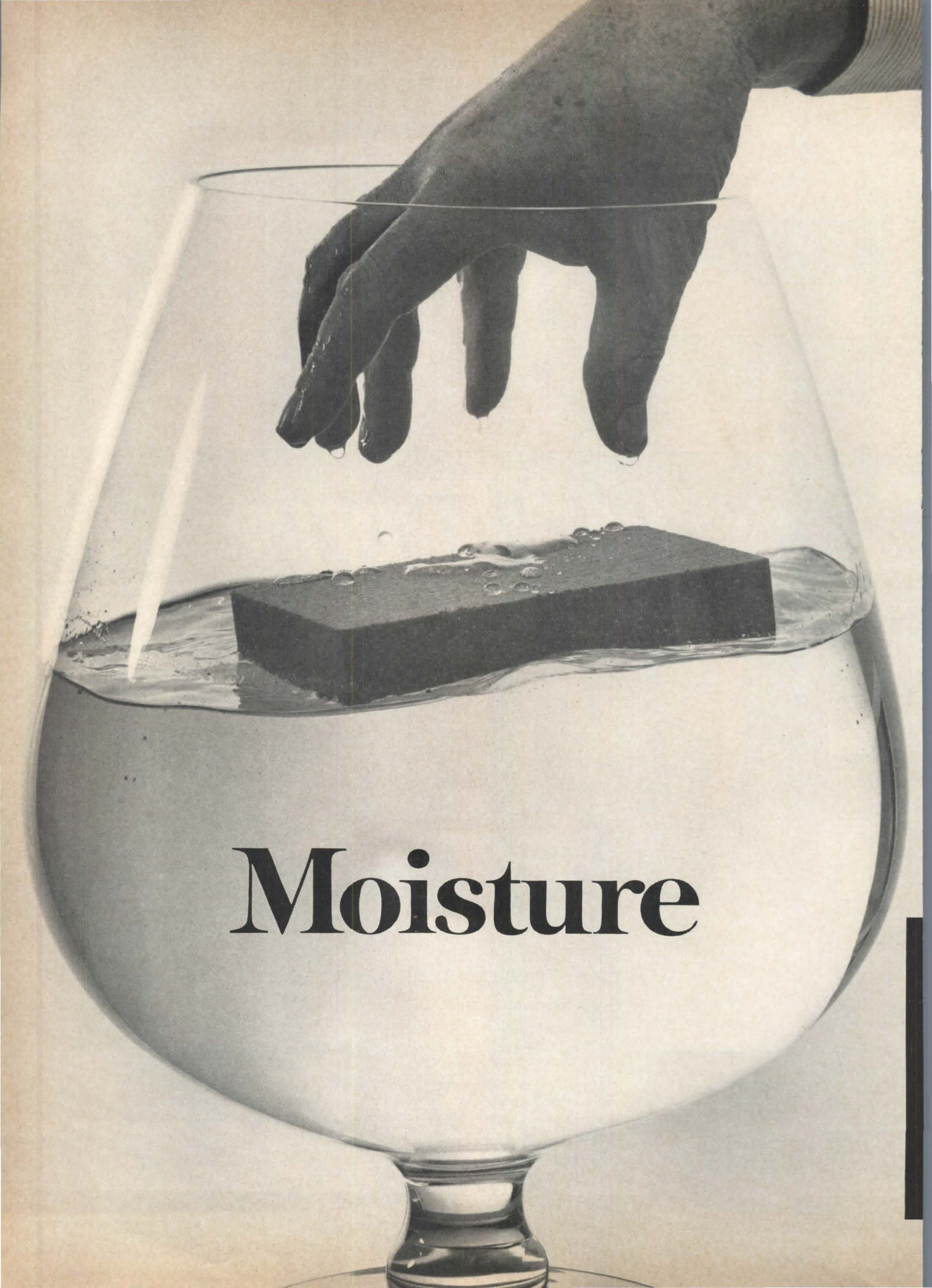
miller LIGHTING
SINCE 1844

THE miller COMPANY • MERIDEN, CONNECTICUT • UTICA, OHIO


Moisture

The restless, probing fingers of moisture find no entry in Permalite. The permanently dry, hermetically sealed, perlite cells were produced by the explosion of entrained moisture, driven out by heat. The intricate honeycomb pattern, blown in volcanic glass, provides a combination of thermal efficiency, moisture-resistance, strength, non-combustibility, lightness and permanence found only in one rigid roof insulation:

RIGID
Permalite®
ROOF INSULATION GLC

Listed, labeled and approved by Underwriters' Laboratories for Constructions 1 & 2; and approved by Factory Mutual for Class 1 Metal Deck Construction.

PHYSICAL DATA: Permalite Rigid Insulation Board

C (Conductance Value) 1″ Nominal Thickness	0.36
Water Absorption (% by Volume)	1.5 @ 2 Hrs. Total Immersion (No Capillarity)
Vapor Permeability	15 Perms @ 73° F. and 51% Relative Humidity
Concentration Load Indentation	1/16″ @ 77 lbs.
Compression Resistance	185 PSI (50% Consolidation)
Fungus Resistance	Complete
Flame Spread	25 (Non-combustible)
Smoke Developed	0–5
Wt./Sq. Ft./1″ Thick	0.8 lbs. Approx.

FM

Building Products Department, Great Lakes Carbon Corporation
333 North Michigan Avenue, Chicago, Illinois

On Readers' Service Card, circle No. 348

when Hetron®-based panels let in the light

Gently filtering a flood of daylight, these plastic panels let you light up big areas without glare.

They won't support combustion because they're made of self-extinguishing Hetron polyester resin reinforced with glass fibers. Like all Hetron-based panels, they qualify to carry the Factory Mutual seal of approval and the U/L label.

Neither vandals, hail nor high winds can shatter them—another important safety and economy benefit.

They are also lightweight and easy to install.

You can specify Hetron-based panels as translucent or opaque, corrugated or flat, for exterior or interior use, in any of more than 20 different colors, for high, medium or low light transmission.

They are also available integrally bonded to "Tedlar"* PVF film for maximum resistance to weather.

For more information on the properties of fire-retardant Hetron and a list of fabricators who can supply the panels, please write us. Durez® Plastics Division, Hooker Chemical Corporation, 7703 Walck Road, North Tonawanda, N. Y. 14121.

*Du Pont registered trademark

HOOKER CHEMICALS ® PLASTICS

DUREZ PLASTICS DIVISION

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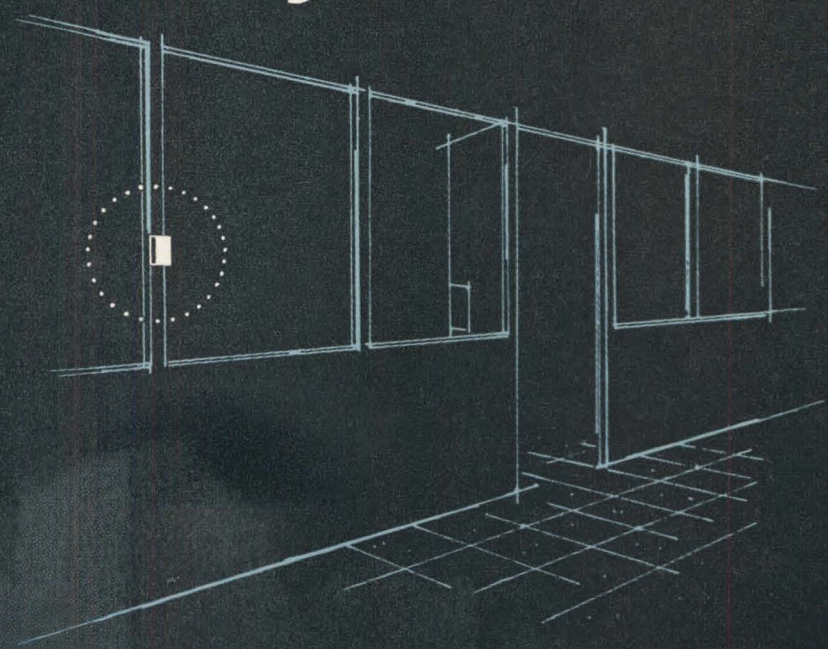
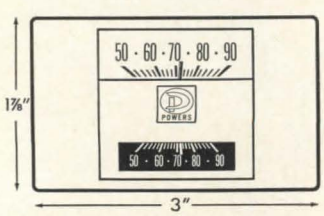
Announcing....

POWERSTAR

by POWERS

ACTUAL SIZE





CONCEALED ADJUSTMENT
EXPOSED SET POINT
EXPOSED THERMOMETER

Powerstars have a faster response than any other pneumatic thermostat on the market.

'Decorator styled', they can be installed horizontally or mounted vertically on narrow mullions.

Cover styles available
- Plain cover
- With or without thermometer
- Exposed or concealed adjustment
- Exposed or concealed set point

Models available
- Direct or Reverse Acting
- Day/Nite
- Heating/Cooling
- "In Wall" Aspirating

65-124-1

Please furnish complete data on Powers' New POWERSTAR Line

Name _____

Title _____

Firm _____

Address _____

City _____ *State* _____ *Zip* _____

THE POWERS REGULATOR COMPANY

Dept. 365 Skokie 28 Illinois

Offices in Principal Cities in U.S.A. and Canada

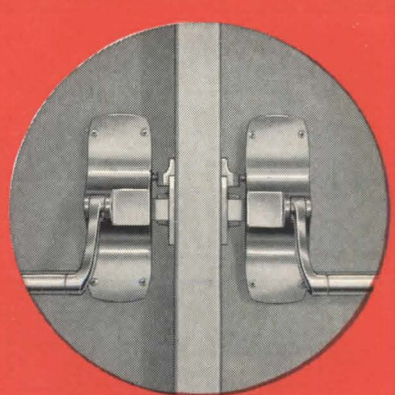
CONTROL SYSTEMS SINCE 1891

On Readers' Service Card, circle No. 444

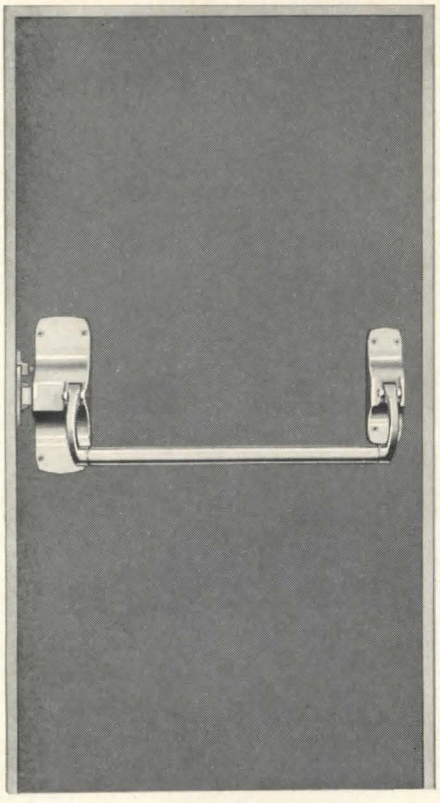
New...from Von Duprin!

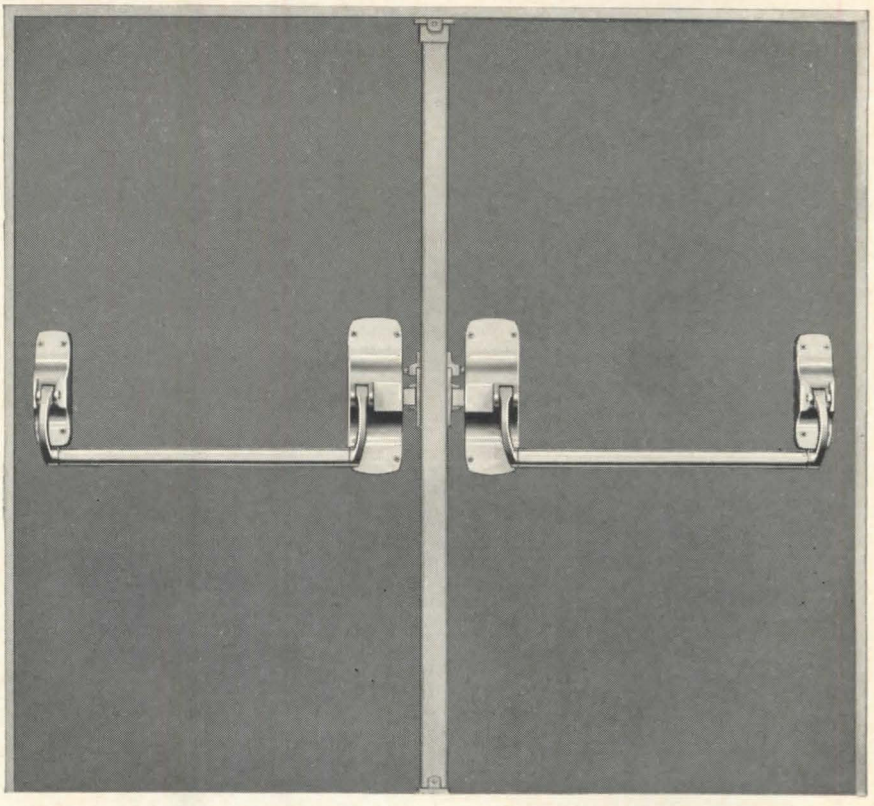
Rim-type Fire Exit Hardware!

FOR A,B,C,D,E LABELED DOORS



For Single Doors . . . Or Double Doors With Removable Mullion





Removable mullion eliminates need for overlapping astragal and coordinator!

Here's another major engineering breakthrough by Von Duprin! We call it our 88 Rim Fire Exit Hardware. You'll call it a boon to building . . . because now, for the first time, you can recommend double-door Fire Exit Hardware with a removable mullion that eliminates the overlapping astragal and the coordinator.

Four types of operation are available: thumb-piece, knob, exit only, and nightlatch.

Available in stainless steel, bronze or aluminum. All lock stile cases are stainless steel, plated or finished to match crossbar and hinge stile case in bronze or aluminum.

Von Duprin 88 Rim Fire Exit Hardware also incorporates other outstanding features, such as a pick-proof auxiliary dead-locking latch bolt.

For complete details on the new Von Duprin 88 Rim Fire Exit Hardware, write today for your copy of catalog Bulletin 652, or contact your Von Duprin representative.

Von Duprin®

Underwriters' Laboratories, Inc.®
INSPECTED
FIRE EXIT HARDWARE
NO. [ ]
VON DUPRIN INDPLS, IND.

For Openings Up To	RATINGS				
	"A"	"B"	"C"	"D"	"E"
DBL. 7' wide x 7'2" high (HM)	3 hr.	1½ hr.	¾ hr.	1½ hr.	¾ hr.
SGL. 3'6" wide x 7'2" high (HM)	3 hr.	1½ hr.	¾ hr.	1½ hr.	¾ hr.

VON DUPRIN DIVISION • VONNEGUT HARDWARE CO., INC. • 402 WEST MARYLAND STREET • INDIANAPOLIS, INDIANA 46225
IN CANADA: VON DUPRIN LTD. • 903 SIMARD STREET • CHAMBLY, QUEBEC

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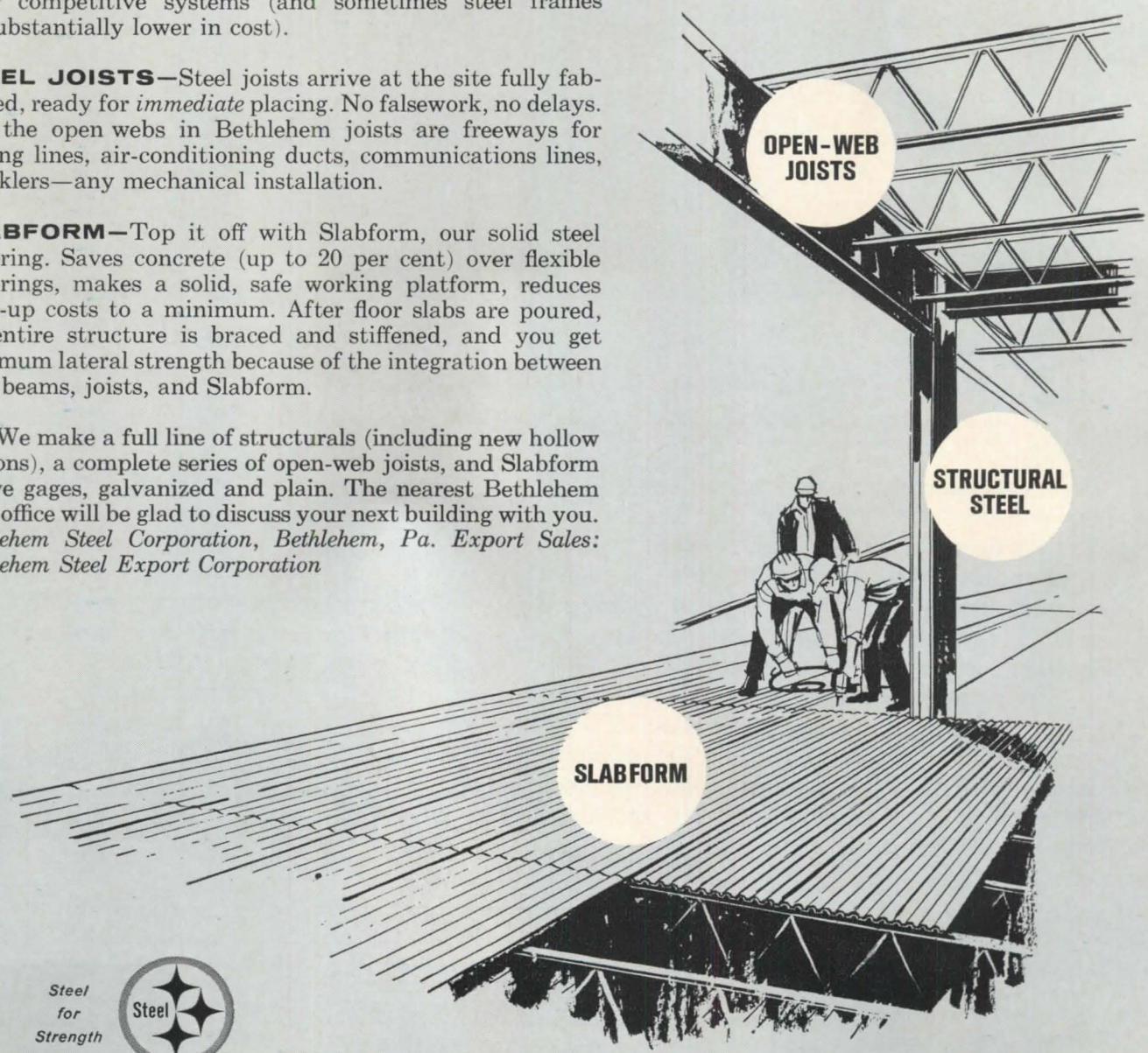
THIS STEEL CONSTRUCTION "PACKAGE" SIMPLIFIES DESIGN AND SAVES YOUR CLIENT MONEY

STRUCTURAL STEEL—Shop-fabricated structurals go up fast in any weather. No falsework required. No construction schedule delays. Solid framework holds future maintenance costs down. Simplifies future expansion, too. Erected costs for steel frames are fully competitive with concrete or other competitive systems (and sometimes steel frames are substantially lower in cost).

STEEL JOISTS—Steel joists arrive at the site fully fabricated, ready for *immediate* placing. No falsework, no delays. And the open webs in Bethlehem joists are freeways for heating lines, air-conditioning ducts, communications lines, sprinklers—any mechanical installation.

SLABFORM—Top it off with Slabform, our solid steel centering. Saves concrete (up to 20 per cent) over flexible centerings, makes a solid, safe working platform, reduces clean-up costs to a minimum. After floor slabs are poured, the entire structure is braced and stiffened, and you get maximum lateral strength because of the integration between steel beams, joists, and Slabform.

We make a full line of structurals (including new hollow sections), a complete series of open-web joists, and Slabform in five gages, galvanized and plain. The nearest Bethlehem sales office will be glad to discuss your next building with you. *Bethlehem Steel Corporation, Bethlehem, Pa. Export Sales: Bethlehem Steel Export Corporation*



Steel for Strength

Steel

BETHLEHEM STEEL

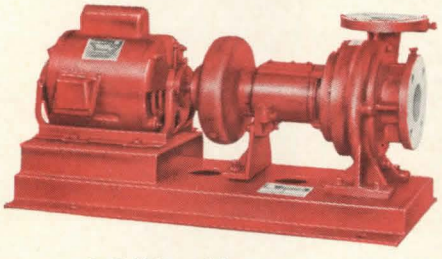
BETHLEHEM STEEL

The building:
1500 Chicago Avenue
Evanston, Illinois

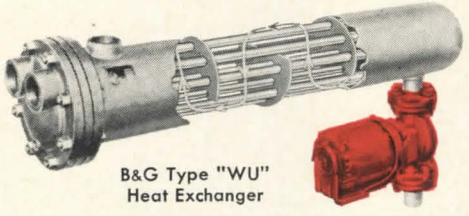
Architects:
Hirschfeld, Pawlan & Reinheimer
Chicago

Engineers:
Nachman, Vragel & Associates
Chicago

Mechanical Contractor:
Advance Heating & Air Conditioning
Corporation, Chicago



B&G Universal Pump



B&G Type "WU"
Heat Exchanger

B&G
Booster
Pump

B&G
Flo-Control
Valve

B&G EQUIPMENT, OF COURSE, FOR HEATING AND DOMESTIC WATER SYSTEMS

The heating system in this apartment house reflects the architect's concern with tenant comfort as well as the aesthetics of design. The building has a forced hot water system furnishing radiant heat by means of copper tubing buried in the ceiling plaster. *All circulating pumps and exchangers for heating water are B&G!*

Tenant comfort is not merely a matter of furnishing sufficient heat... absence of mechanical noises within the building is also extremely important. That's why the quiet, vibrationless operation of B&G Universal and Booster Pumps has made them the unchallenged favorites. Nearly 5,000,000 of these specially designed pumps for heating and cooling systems have been installed in every type and size of building.

The B&G type "WU" Heat Exchangers used in this building meet the requirements of the ASME Code. They are particularly notable because boiler water is pumped through the shell by a B&G Booster, permitting an amazingly small unit to deliver a large volume of hot water.

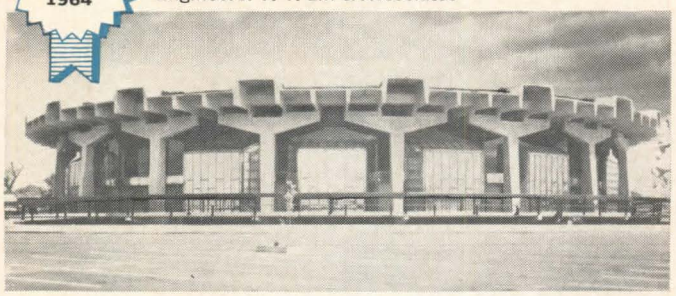
For information on the complete line of B&G *Hydro-Flo* heating products, write to ITT Bell & Gossett Hydronics, *division of International Telephone and Telegraph Corporation*, Morton Grove, Ill., Dept. IK-37.

BELL & GOSSETT ITT

A MEMBER OF THE HEATING AND AIR CONDITIONING GROUP

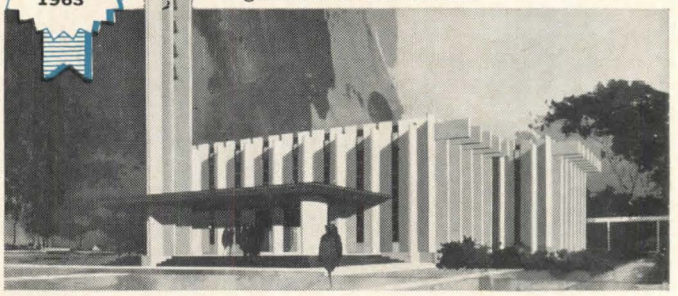
FIRST AWARD WINNER 1964

PHOENIX CONVENTION CENTER
Architect: Perry Neuschatz
Engineers: T. Y. Lin & Associates



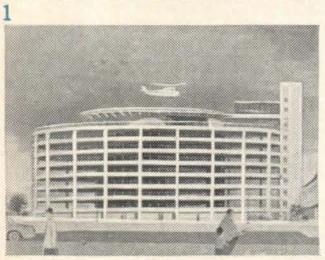
FIRST AWARD WINNER 1963

ST. RICHARD CHURCH, CANADA
Architect: Maurice Robillard
Engineer: Jean Duchesneau



PAST PRESTRESSED CONCRETE INSTITUTE AWARDS PROGRAM WINNERS

1



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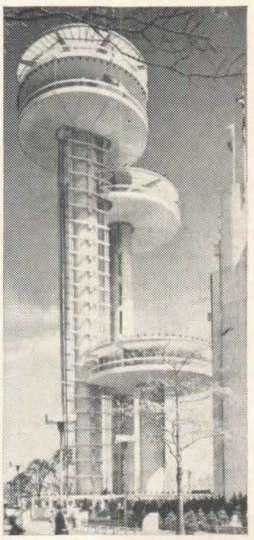

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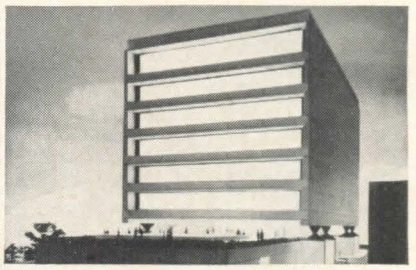
Examples of Past **AWARD OF MERIT** Winners

1. Fire Station. Arch: Durham, Anderson and Freed. Eng: John H. Stevenson.
2. Parking Garage-Heliport. Arch: Van Bourg/Nakamura. Assoc. Arch: Ratcliff & Ratcliff. Structural Consultant: H. J. Brunnier.
3. Observation Towers, New York World's Fair. Arch: Philip Johnson. Eng: Lev Zetlin and Associates.
4. Church. Arch: Kirk, Wallace, McKinley and Associates. Eng: Worthington, Skilling, Helle & Jackson.
5. Swimming Pool. Arch: G. R. Beatson & Associates. Eng: Haddin, Davis & Brown Co.
6. Winner of Special Bridge Award. Consulting Eng: Howard, Needles, Tammen & Bergendoff.
7. American Republic Insurance Company. Arch: Skidmore, Owings & Merrill. Eng: Paul Weidlinger.
8. United States Science Pavilion. Arch: Minoru Yamasaki & Associates. Eng: Naramore, Bain, Brady & Johanson.
9. University Classroom. Arch: Gardner A. Daily and Associates. Eng: T. Y. Lin and Associates.
10. Carrying beams over channel. State Highway Engineer of California: J. C. Womack.
11. Japanese Canadian Cultural Center. Arch: Raymond Moriyama. Eng: G. Dowdell and Associates.



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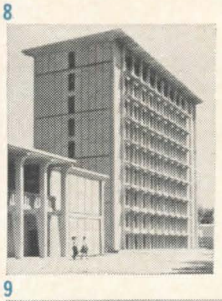

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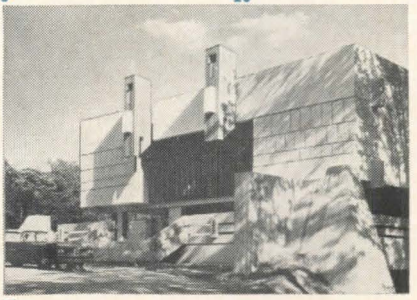

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These PCI Active Members will be glad to give you complete details on the PCI Annual Awards Program:

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ARIZONA Arizona Sand & Rock Co., Prestress Division, Phoenix • United Materials, Inc., Phoenix

CALIFORNIA Basalt Rock Co., Napa • Ben C. Gerwick, Inc., Los Angeles, San Francisco • Delta Prestressed Concrete, Inc., Sacramento • Rockwin Prestressed Concrete, Los Angeles • San Diego Prestressed Concrete, San Diego • Wailes Precast Concrete Corp., Sun Valley

COLORADO Prestressed Concrete of Colorado, Denver • Rocky Mountain Prestress, Denver • Hydro Conduit Corp., Denver

CONNECTICUT C. W. Blakeslee & Sons, New Haven

FLORIDA Capitol Prestress Co., Jacksonville • Concrete Structures, Inc., North Miami • Dura-Stress, Inc., Leesburg, Holly Hill • Finfrock Industries, Inc., Orlando • Juno Prestressors, Inc., West Palm Beach • Meekins-Bamman Precast Corp., Hallandale • Prestressed Concrete, Inc., Lakeland • Southern Prestressed Concrete, Pensacola • Stresscon International, Miami

GEORGIA Augusta Concrete Products Co., Inc., Augusta • Macon Prestressed Concrete Co., Macon

HAWAII Concrete Engineering, Honolulu

IDAHO Ready-to-Pour Concrete Co., Idaho Falls

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MASSACHUSETTS New England Concrete Pipe Corp., Boston • San-Vel Concrete Corp., Boston

MICHIGAN American Prestressed Concrete Inc., Centerline • Precast/Schokbeton, Inc., Kalamazoo • Price Brothers Co., Livonia • Superior Products Co., Detroit

MINNESOTA Cretex Companies, Elk River • Lysne Construction, Inc., Austin • Prestressed Concrete Inc., St. Paul • Wells Concrete Products Co., Wells

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You are invited to enter the

PRESTRESSED CONCRETE INSTITUTE AWARDS PROGRAM

PURPOSE of the PCI Annual Awards program is to recognize creative design using prestressed concrete.

ANY KIND OR TYPE OF STRUCTURE using prestressed concrete which was completed within the last three years, or substantially completed by May 31, 1965, within the United States, its possessions or Canada may be entered. Judgment will be based on:

Design judged most worthy as a contribution to the advancement of prestressed concrete. Originality of architectural and/or engineering design involving applications of prestressed concrete, techniques of assembly, arrangement or use. Effective employment of the properties of prestressed concrete. Aesthetic appearance where applicable. The nature of each project submitted will influence the weight given to each of these considerations.

FIRST AWARD winner will be presented with a plaque testifying to the value of his contribution. An expense paid trip for two to the PCI Annual Convention in Miami Beach, Florida, December 5 to 10, 1965, including a weekend Caribbean cruise will be provided so the winner may be recognized at Award ceremonies.

AWARD OF MERIT PLAQUES will be given other distinguished entries.

SPECIAL BRIDGE AWARD. A special award will be given for the bridge demonstrating the best application of prestressed concrete.

ELIGIBILITY. The Awards program is open to all registered architects and engineers practicing professionally in the United States, its possessions and Canada, except Directors of PCI and all Active Members and their employees.

SUBMISSION OF ENTRIES. Entries must be made by the designer of record. An entry consists of one copy of the following material pertaining to the design of the structure and shall consist of the following:

1. Proper name of entry, type of structure and location (State or Province) owners name, and the date of completion. Anonymity of entries will be preserved throughout the judging. An envelope identifying the entrant and containing appropriate additional credits will be affixed to inside back cover of the entry.
2. Concise discussion outlining all of the advantages which the contestant considers noteworthy, typed on 8½" x 11" sheets.
3. A minimum of two 8" x 10" photographs and one 35mm color slide of the completed prestressed concrete portions of the structure. Detailed photographs, perspective drawings, or large scale details if considered significant by the entrant.
4. Design computations and specifications if they show to a greater extent the design aspects of the entry.

All the above to be bound in ring or other type binder approximately 10" x 12". Entries to be received not later than June 1, 1965, at the Prestressed Concrete Institute, 205 West Wacker Drive, Chicago, Illinois 60606.

JURY OF AWARDS. Entries will be judged by the Jury of Awards composed of Max Abramovitz, FAIA, Chairman; Arthur G. Odell, President of the American Institute of Architects; Edward D. Dart, AIA, architect practicing in Chicago; Murray A. Wilson, past President of the National Society of Professional Engineers; and Wallace L. Chadwick, President of the American Society of Civil Engineers.

NOTIFICATION OF AWARD. Notification of Awards to entrants will be made as soon as practicable after judging is completed.

OWNERSHIP AND PUBLICATION OF ENTRIES. All entries and all material submitted with entries shall become the sole property of PCI.

Since one of the purposes of the PCI Awards program is to encourage new and advanced architectural and engineering approaches in the use of prestressed concrete, the Prestressed Concrete Institute shall have the right to make all entries and all material submitted with entries available through publication and dissemination editorially, or in advertisements in its own or other publications. This shall include the right to publish photographs and names of any and all award recipients without compensation.

The decision of the Jury of Awards shall be binding on all persons.

By taking part in the program, the contestant agrees that he or she shall have no claim against the Jury of Awards or any member thereof, or the Prestressed Concrete Institute or its individual members.

NOTIFY PCI of your intention to enter by mailing the coupon below. You'll receive helpful information on past winners and a free 12-month subscription to PCItems magazine.

PRESTRESSED CONCRETE INSTITUTE
205 West Wacker Drive • Chicago, Illinois 60606

Gentlemen: I plan to enter the 1965 PCI Awards Program. Please send descriptions of past winning structures and put my name on your list to receive the next 12 issues of PCItems.

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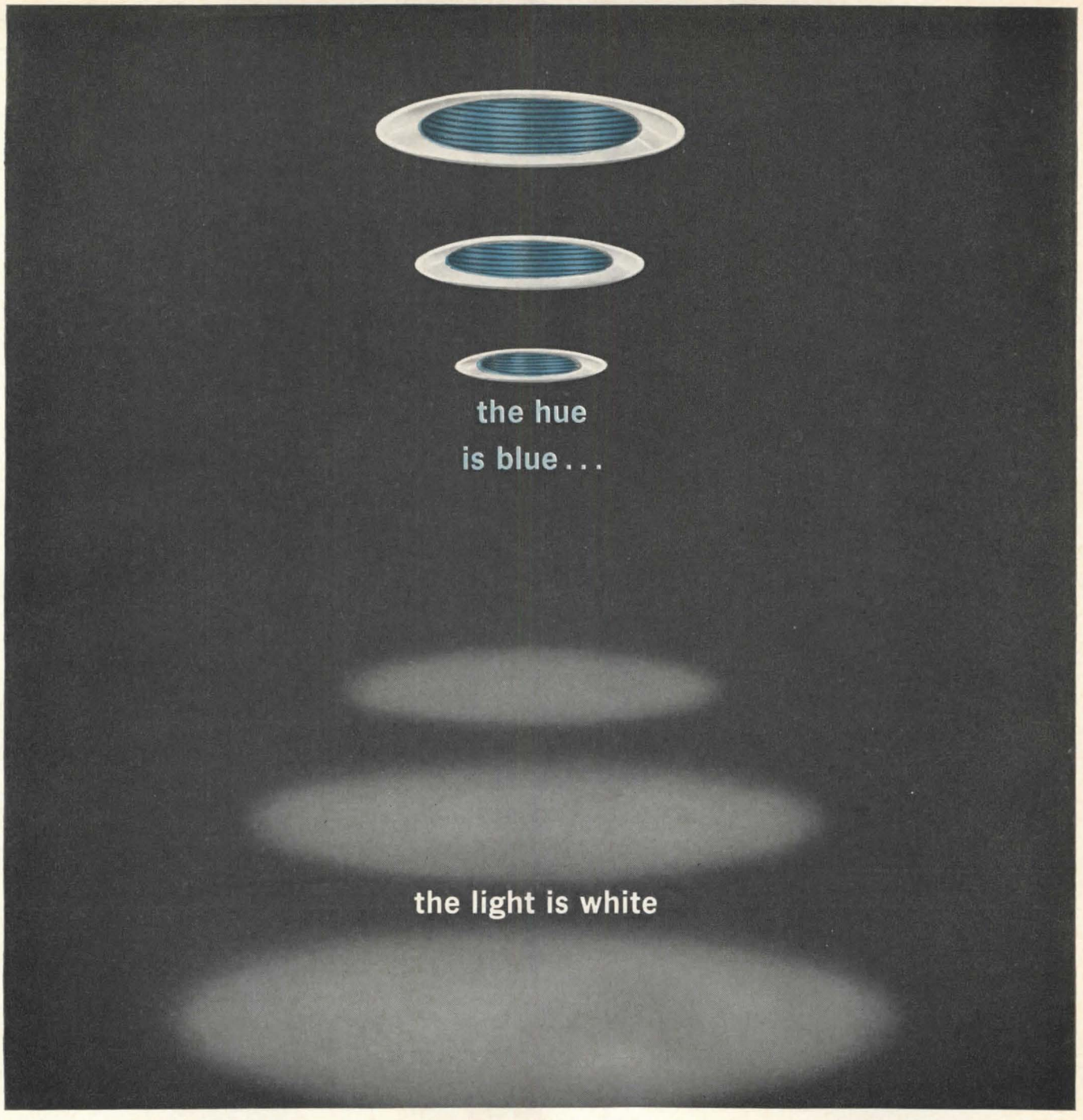
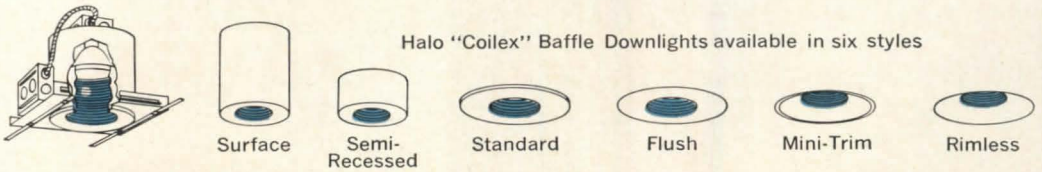


Halo "Coilex" Baffle Downlights team brightness control with apparent colored hues to produce unusual lighting effects. The "Coilex" phenolic baffle gives the illusion of producing "colored" light, because the light, hitting its coiled surface, creates a soft pastel "glow" on the baffle. The light actually emitted is white, high intensity downlight. "Coilex" baffles are available in blue, pink, gold or black. "Coilex" is but one of many Halo architectural lighting ideas that combines the use of color with optical performance. See them all. Send for full color catalog today.



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Behind this *32-page manual from the Steel Joist Institute is more than 30 years of research, testing, design, application and standardization of open web steel joists.

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Steel joists are better and more versatile than ever, thanks to the standardization leadership of the Steel Joist Institute. This handy reference manual shows you how to use these versatile structural members to best advantage.

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**Load and Spacing Tables may also be obtained by writing to the Institute.*

†Adapted by SJI February 10, 1965.

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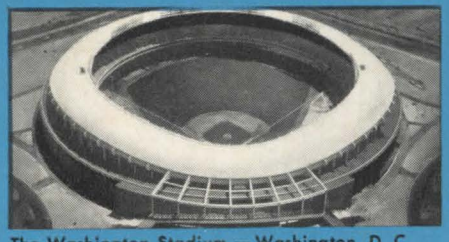
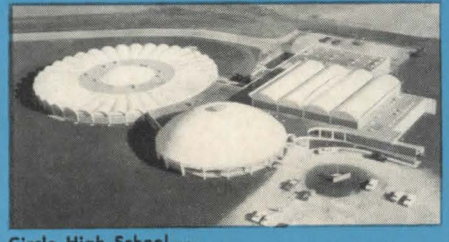
Eden Theater — Chicago, Ill.



The Washington Stadium — Washington, D. C.



Circle High School —
Butler & Sedgwick Counties, Kan.

. . . and *you* never had it so good!

. . . and you never had such a free roofing hand before. The Flintkote MONOFORM® System, applying special MONOFORM compound and chopped glass fibers simultaneously, sprays quickly over any shape or contour to form a tough, weather resistant, monolithic film — an excellent base for decorative and reflective coatings.

The wonderful shapes your roofs are taking, good thing you can count on the versatility of the Flintkote MONOFORM System!

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Remember the MONOFORM "9 Points to Better Roofing": 1. Less total membrane weight factor — 2. Decorative and reflective surfaces — 3. Lasting protection and minimum future maintenance — 4. Only one material for roofing and waterproofing — 5. Non-contaminating materials — 6. Fire possibility reduced — 7. Higher in-place value — 8. Resists bad weather the world over — 9. Flashing problems reduced.

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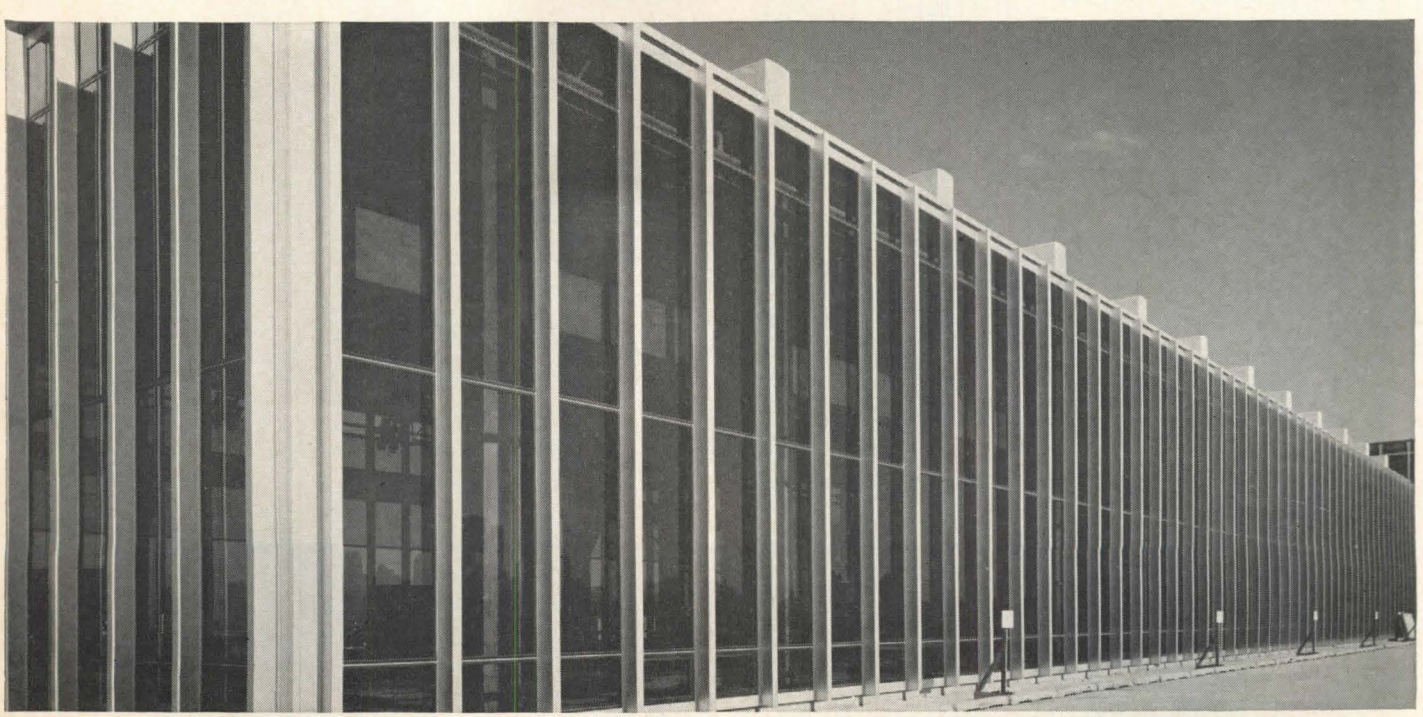
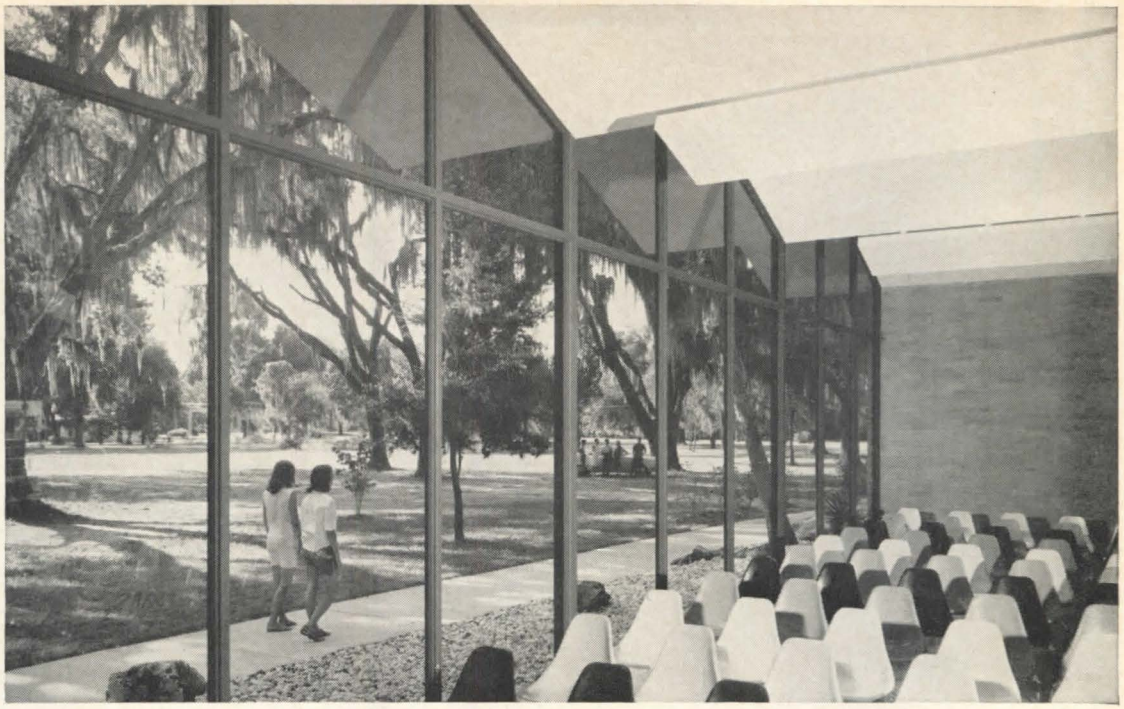
Parallel-O-Bronze is the plate glass used in this vast showroom of the Lou Bachrodt Chevrolet Shopping Center, Rockford, Ill. Designed by Cherry & Fraboni, Inc., of Beloit, Wisc. Glazed by Cadillac Glass Co., Rockford.

More ways to control the sun

A different sun-control glass was used in each of the four buildings shown here. L·O·F offers a range of tints and thicknesses for varying degrees of glare reduction and solar-heat exclusion. There are *Parallel-O-Grey*® and *Parallel-O-Bronze*® Plate Glass in 13/64″, 1/4″, 3/8″ and 1/2″ thicknesses. Each thickness provides slightly different depth of tint. And there's blue-green Heat Absorbing Plate in 1/4″ and 3/8″. All in regular or heat-tempered glass. Polished or rough plate. And as the outer pane in



Heavy-Duty Parallel-O-Grey (3/8″ thick) was used in the largest lights of these vertical sections. Others are 1/4″. This is the pump house for Chicago's central district filtration plant. Architects: Naess & Murphy, Chicago. Glazing Contractor: Hamilton Glass Co., Chicago.



Parallel-O-Grey plate glass was used in the Orange Park (Fla.) Civic Center for sun control. Architect: Allen D. Frye. Glazing Contractor: Florida Glass & Mirror of Jacksonville, Inc.

Thermopane® insulating glass units. You get design freedom with a right glass for every need.

So design freely, but within glass limitations. For example: avoid heat traps that can cause thermal breakage. Drapes and venetian blinds should be hung at least 6″ from the glass with space at top and bottom to permit air movement. For additional information, see Sweet's Architectural File 26A, or call your L·O·F distributor or dealer listed under "Glass" in the Yellow Pages.

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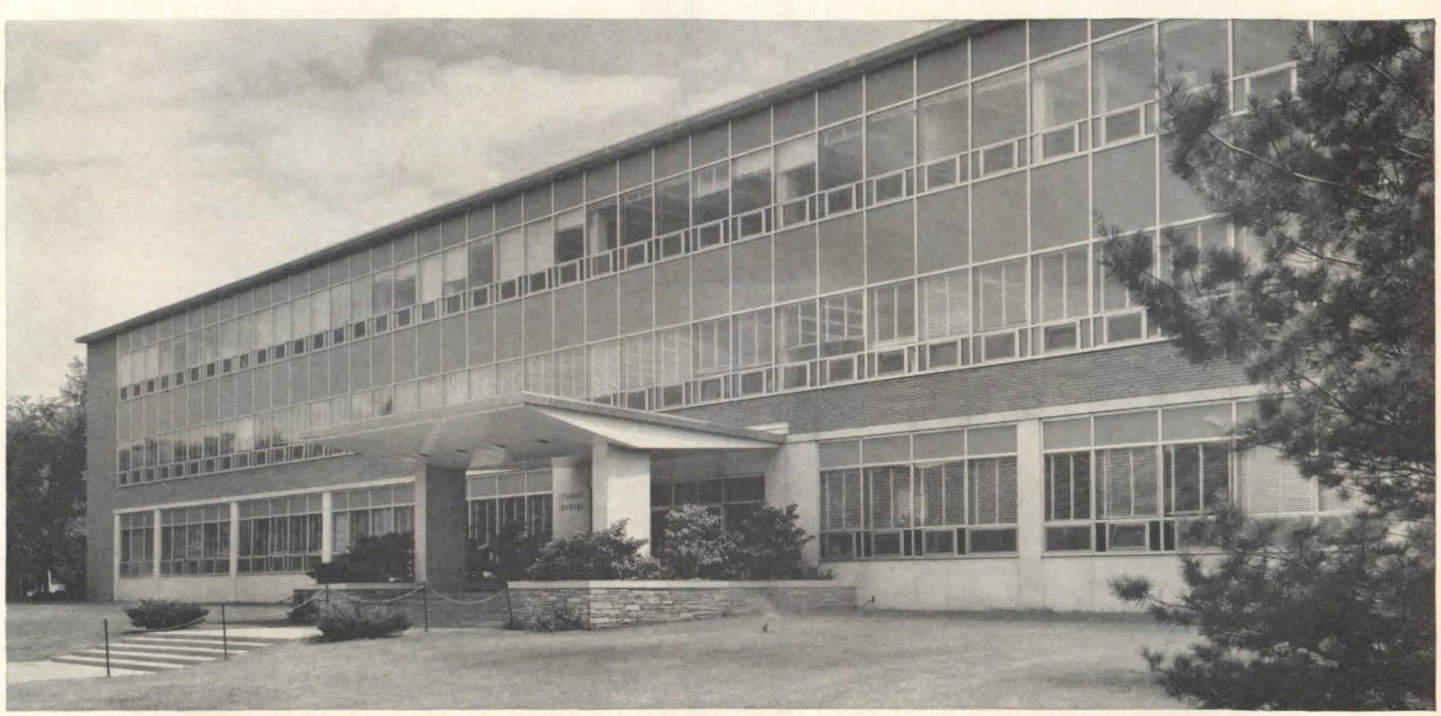
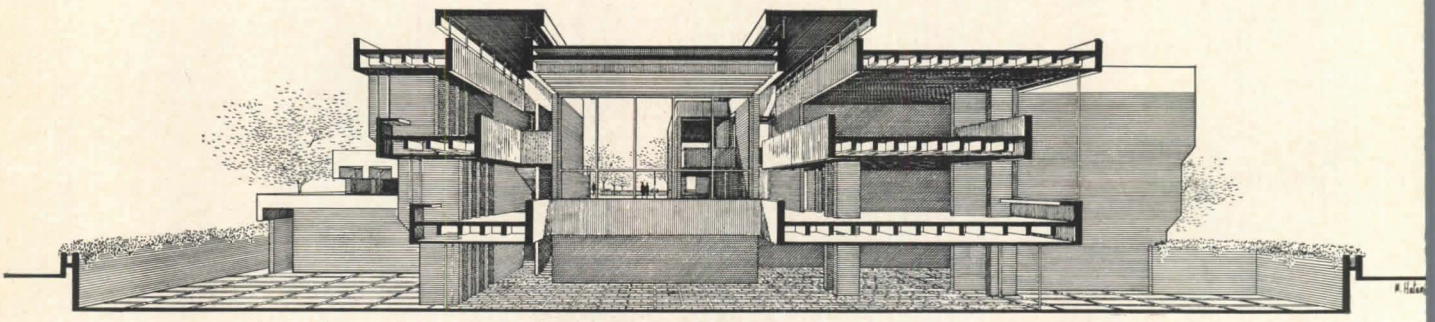


Heat Absorbing Plate is the outer pane in *Thermopane* insulating glass units in the Student Services Building at Michigan State University, East Lansing. Architects: Ralph R. Calder & Associates, Detroit, Mich.



Marvin Hatami designs a college library.

Utilizing Zonolite® Masonry Fill Insulation in walls reduces initial equipment costs, saves $700 per year on fuel, substantially raises indoor wall surface temperature.

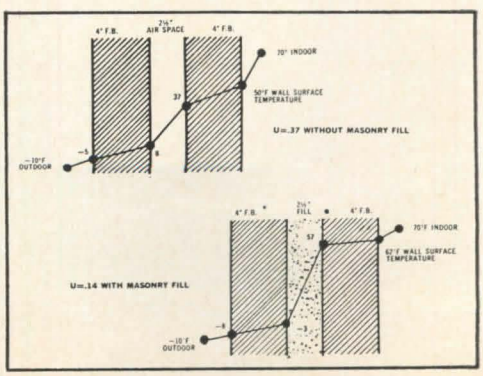
What would seem to be an added cost for insulation, in reality, is a highly profitable investment for your clients.

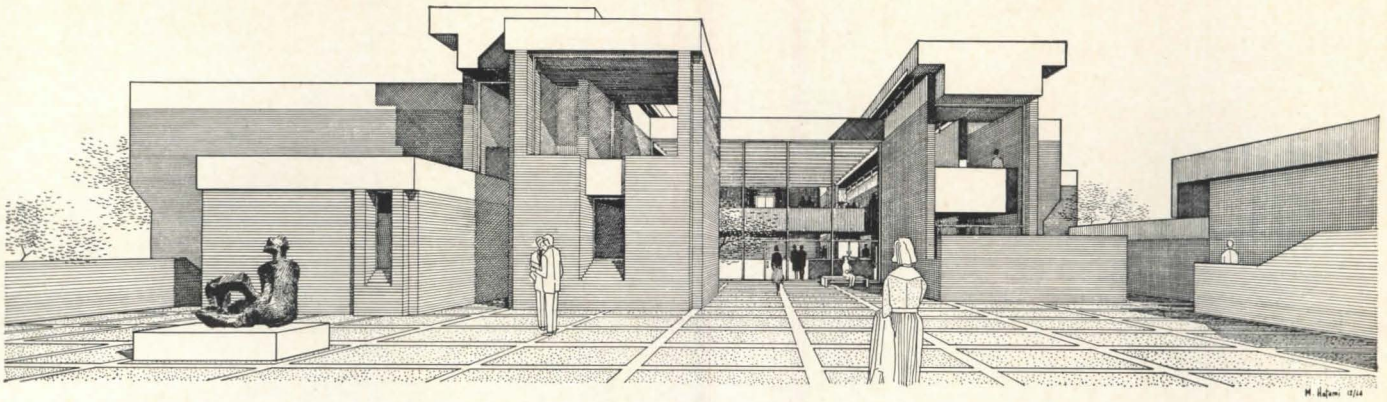
Consider this library designed by Marvin Hatami and engineered by Cator Ruma of Denver, Colorado.

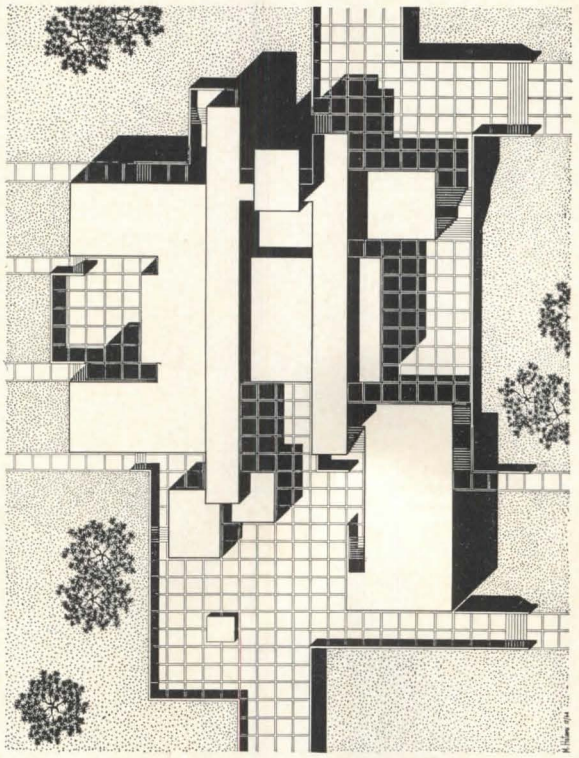
Its reinforced brick cavity walls feature Zonolite Masonry Fill Insulation. Installed cost? 10¢ per sq. ft. or $3245 total. As part of a 20-yr., 6% mortgage, it figures out to $279 annually.

For this investment, the client saves $700 per year on fuel. That's a direct 250% return on his yearly investment in Zonolite Masonry Fill Insulation.

There are indirect savings, too. (1) Smaller, less costly heating equipment can be used. (2) Indoor wall surface temperatures are raised from 50° to 62° F. This reduces body radiant heat exchange, minimizes wall surface downdrafts. (3) The interior surfaces of the walls can remain unfinished. And (4) the building is quieter because of Zonolite Masonry Fill Insulation's excellent sound absorption characteristics.







DESIGN CONDITIONS			Winter Heat Loss in BTU/Hr. Assuming 70°F Indoors —10°F Outdoors		Summer Heat Gain in BTU/Hr. Assuming 95°F, DB 64°F, WB Outdoors 78°F, DB 65°F, WB Indoors	
	Without Masonry Fill	**With Masonry Fill**	Without Masonry Fill	**With Masonry Fill**	Without Masonry Fill	**With Masonry Fill**
Walls	4″ Face Brick 2½″ Air Space 4″ Face Brick	4″ Face Brick 2½″ Zonolite Fill 4″ Face Brick	962,000	**364,000**	201,000	**76,000**
Roof	Roofing, 3½″ Concrete		225,000	**225,000**	107,000	**107,000**
Floor	4″ Concrete on Grade		56,000	**56,000**	—	—
Glass: Solar & Transmission	¼″ Heat Absorbing Plate		730,000	**730,000**	443,000	**443,000**
Ventilation	15,000 DFM		1,080,000	**1,080,000**	229,000	**229,000**
Lights	175 Kilowatt		—	—	596,000	**596,000**
People	500		—	—	200,000	**200,000**
Totals			3,053,000	**2,455,000**	1,776,000	**1,651,000**
% Savings with Masonry Fill			$\frac{3,053,000-2,455,000}{3,053,000} \times 100 = \mathbf{19.6\%}$		$\frac{1,776,000-1,651,000}{1,776,000} \times 100 = \mathbf{7\%}$	

Additional facts of significant interest are available in our Bulletin MF-113. For your copy, please write Dept. A, Zonolite, 135 South LaSalle Street, Chicago, Illinois 60603

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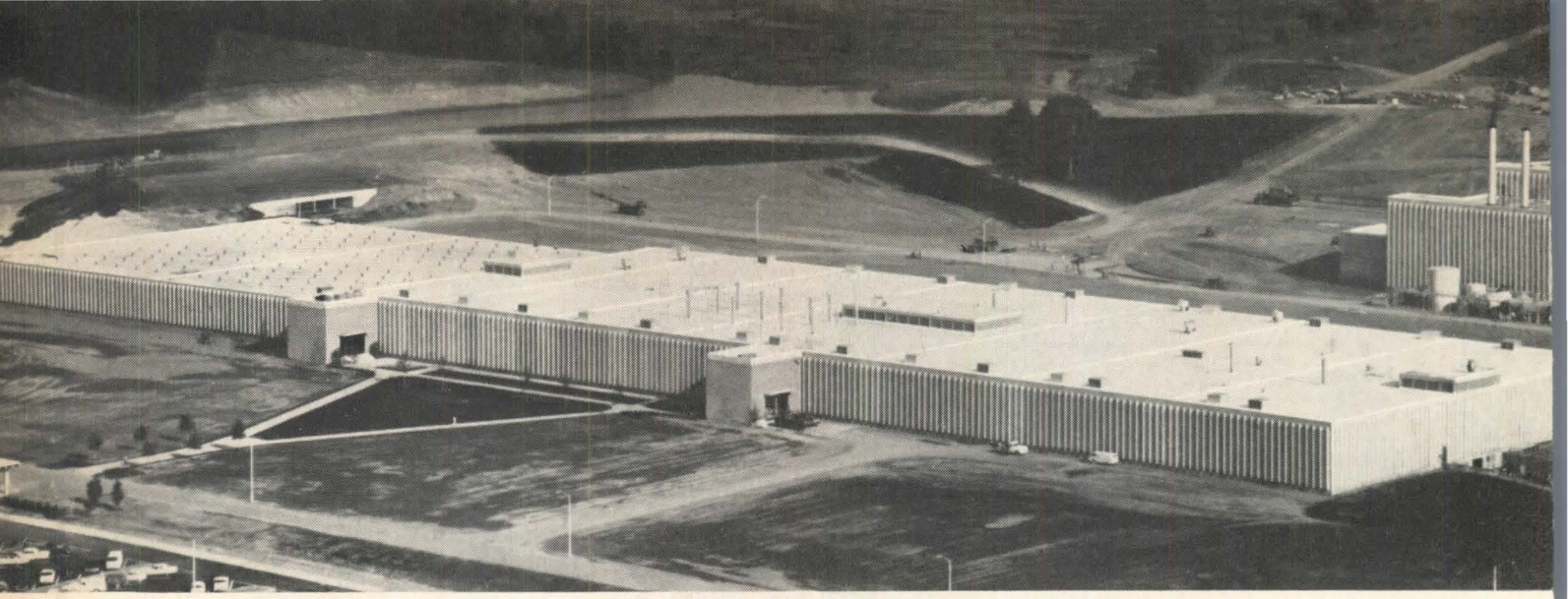


Here's how Deering-Milliken solved a roofing problem with RUBEROID T/NA 200® (made with Du Pont TEDLAR*)

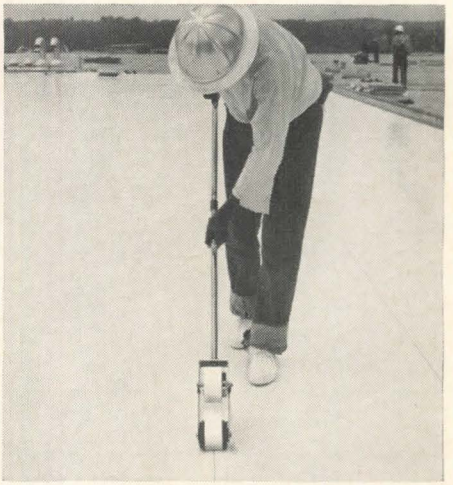
PROBLEM: Deering-Milliken's new textile finishing plant at Blacksburgh, S. C. needed a 200,000 sq. ft. flat roof with these properties: high reflectivity, chemical resistance, a smooth surface, superior strength, flexibility, and long, trouble-free life. This was the problem facing Daniel Construction Co., the general contractor, and J. Roy Martin Roofing Co., the roofing contractor.

SOLUTION: Ruberoid T/NA 200 roofing, combining Du Pont TEDLAR with Ruberoid Asbestos Felt, was used because it met *all* these requirements. The new roof has gleaming whiteness, resistance to chemical fumes and weathering, and will give long, trouble-free protection. And all this in a single roofing material!

Labor costs were low because of ease of application:

Installation of T/NA 200 is begun by imbedding the membrane in roofing asphalt. For this job, Ruberoid custom-cut rolls to 37" wide x 221 feet long.

Workers use soft bristle brushes to smooth the membrane. Conventional built-up roofing methods are used throughout, so no special equipment is required.



To mask the laps, and as a final seal, a pressure-sensitive tape, made of the same tough TEDLAR is used. The roof is completed!

For complete facts on Ruberoid T/NA 200 roofing for industrial, commercial, and institutional designs, write to this address:

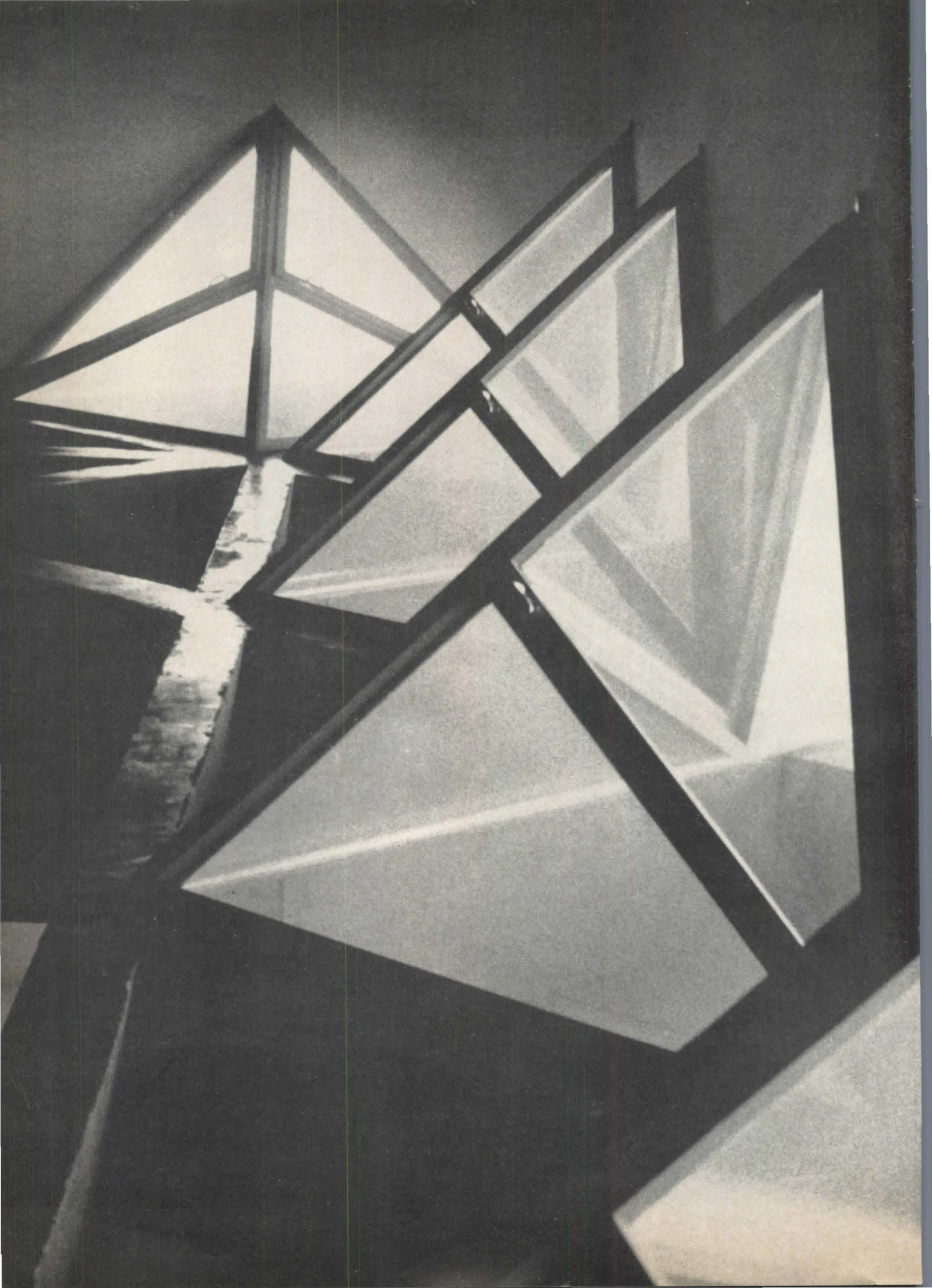
RUBEROID®

733 Third Avenue, New York, N.Y. 10017

*Du Pont's registered trademark

"I have often toyed with the idea of what it would be like to take the Lever House, which is diagonally across the street from the Seagram Building, and raise it up bodily and set it down on Seagram's Plaza and put the Seagram Building over where the Lever House is. I wonder if anybody would notice."

ARTHUR DREXLER



Building products manufacturers are not different from other manufacturers. They are happy when sales curves are up and unhappy when they are down. That the volume of sales is not necessarily a sure indicator of how well a product is really doing can be illustrated by the predicament of the porcelain enamel industry.

The bright and glassy curtain-wall, that trademark of architectural modernism of the 50's, has been on the wane for some years now. In October of 1960, in an issue devoted to concrete technology, we predicted a strong shift away from the flat and reflective curtain walls to a much more muted and plastic design expression. This prediction proved to be correct.

A few weeks ago, nearly five years after it was apparent to us on P/A which way the design wind was blowing, the Porcelain Enamel Institute announced a new promotional program. Basically, the Institute now stresses the availability of porcelain enamels in a wide range of recently developed mat, muted colors that are quite handsome and a far cry from the glossy, garish examples used in promotional literature so far. The Institute also points out that porcelain enamel panels need not be necessarily traditional flat plates held by mullions, but can be easily made into three-dimensional shapes of considerable depth variation. In other words, somewhat similar results can be achieved with stamped sheet metal as with cast or precast concrete.

Whether the present preoccupation with concrete is the result of a love for the material itself or for its plastic possibilities is of course open to debate. Judging from history, however, it would seem that designers tend to shape materials to suit their current design idiosyncrasies. In spite of all the organic theories about the nature of materials, marble can be used in its rough form as well as in a highly polished one; and so can concrete. Reinforced concrete can be brutally massive or thinly delicate; wood can be used as a composition of rigidly straight lines or of sensuous curves. Even glass can be transparently nonexistent or bulkily obtrusive. Materials—all materials—can have many meanings when used in different ways.

The mistake that the porcelain enamel industry made was not to point out the design potential of their product at a time when a change in design approach was quite evident. There is a time lag between the preliminary drawings and the bidding stage, and even a greater lag between the first buildings of the design leaders and the subsequent volume of similar construction. A manufacturer who is blinded by a current sales curve may not know that he has already lost a market.

It is only after the sales stopped rising and eventually started to fall off that the porcelain enamel people decided to do the obvious—to find out what it is that the profession is doing today. Guided by an advisory committee of architects, they finally fell into line with present-day design trends. Better late than never, the saying goes, but it would have been still better to have pioneered new paths instead of merely catching up with fast-moving developments.

The moral of the story is, I think, that those who are in the business of producing something should rely more on people who understand intimately both the product and the market. Too often a sales-trained, sales-oriented, sales-preoccupied management loses track of what it is that they are selling. This is unfortunately often true not only in the area of building products but also in many other fields of endeavor. ■

RELIGIOUS BUILDINGS: The Essentials of Worship

Some would say that architecture is irrelevant to the religious experience. There have been recent reports of the "astonishing effect" of students celebrating the Eucharist in lecture rooms, of prisoners of war rediscovering the meaning of the Eucharistic fellowship far removed from anything resembling the usual church building. Throughout the ages, a mere building has never been the *sine qua non* of religious experience. (From a different point of view, buildings may be similarly irrelevant—awareness of the glory of nature, the humanity of man, can be a complete and sufficient religious experience in itself.)

For those, however, who are practicing members of a religious denomination, who gather from time to time in a particular place, the architecture is not unimportant. But what is the importance attached to it by the congregation, the clergy, and the architect? The architecture for worship is most often viewed from a personal perspective, the experience of worship considered as a subjective and emotional response to those elements of light, space, and symbol deemed necessary for putting the individual into a "religious" frame of mind. But is this the totality of the worship experience? Even if it were possible to find the symbols and forms that will have an emotional impact on everyone, is this enough? Or is the purpose of corporate worship different from that of private worship? Is the meaning of the assembled group and its activities different from, and greater than, the sum of the individual participants?

In a very provocative book by James F. White, *Protestant Worship and Church Architecture* (Oxford University Press, 1964), this subject is extensively examined. To White, an ordained minister who teaches at Southern Methodist University, many recent contemporary churches are "monuments of confusion" and a denial of the real meaning of liturgical architecture. Personal devotions are only a part of Christian worship, he writes. He defines worship as work done in God's service—the acts performed are more important than the effects received. The word *liturgy*, in fact, which is derived from the Greek, means a fulfilling of public obligations (demanded only of the true Athenian, not of foreigners or slaves). The chief purpose of liturgical architecture, then, is to provide "the architectural setting of common worship," and to this end there must be a clarification of basic theological questions or the congregation "can hardly expect an adequate building no matter how competent the architect." Unfortunately, though, appearance is often the primary concern of those creating a new church, he observes, and this necessarily results in an architecture that subverts the real purpose of the church building. He makes an eloquent plea for contemporary architecture, but he brings architects to task for neglecting the basic dictum that "form follows function." Contemporary and functional are far from synonymous these days, he chides.

This approach is quite different from what White describes as the legacy of revivalist days in 19th-Century Protestant America, when the primary aim was the conversion and salvation of the individual, and the means were anything that would work—and emotionality worked. But to put primary emphasis on feelings, he says, is idolatrous; it conceives of worship as a "service of self" and an egocentric satisfying of our own emotions. (Concentration on essentials, however, "has often resulted in buildings of amazing emotive power.") It is worth mentioning that White's book is replete with plan-diagrams of churches —simple outlines with the letters "A" for altar, "P" for pulpit, etc. There are no photographs, or even drawings, of buildings real or imaginary.

In returning to essentials—"this is a time for purification, not elaboration in worship"—White analyzes the Protestant wor-

ship service and relates various aspects of it to what he calls liturgical *spaces* and liturgical *centers*. He traces the development of plan types, keying them to the original intent of the Protestant reformers of the 16th Century, and to the evolution of Protestant theology since the Reformation. The emphasis is on bringing participants into a closer and more meaningful contact with the essentials of the worship service, making them active participants rather than passive spectators.

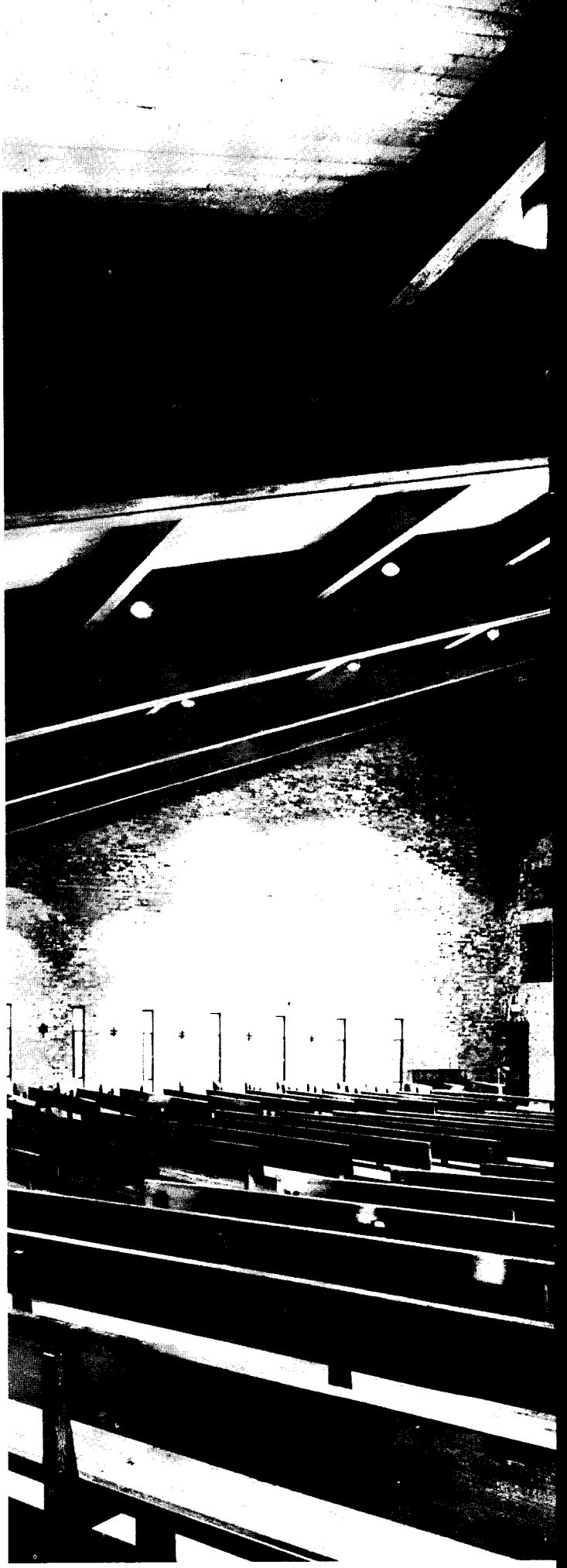
White's concern, of course, is with the Protestant denominations. But the major reforms in liturgical matters recently have been undertaken by the Roman Catholic Church. Revolutionary changes in the liturgy were promulgated early in 1964 by Pope Paul VI, as part of the Second Vatican Council. These changes (the priest facing the parishioners, the celebrants engaged in singing and responsive reading, and the Mass conducted in the language of the people) are already affecting the worship of Roman Catholics the world over, and will strongly affect the new architecture for the reformed liturgy.

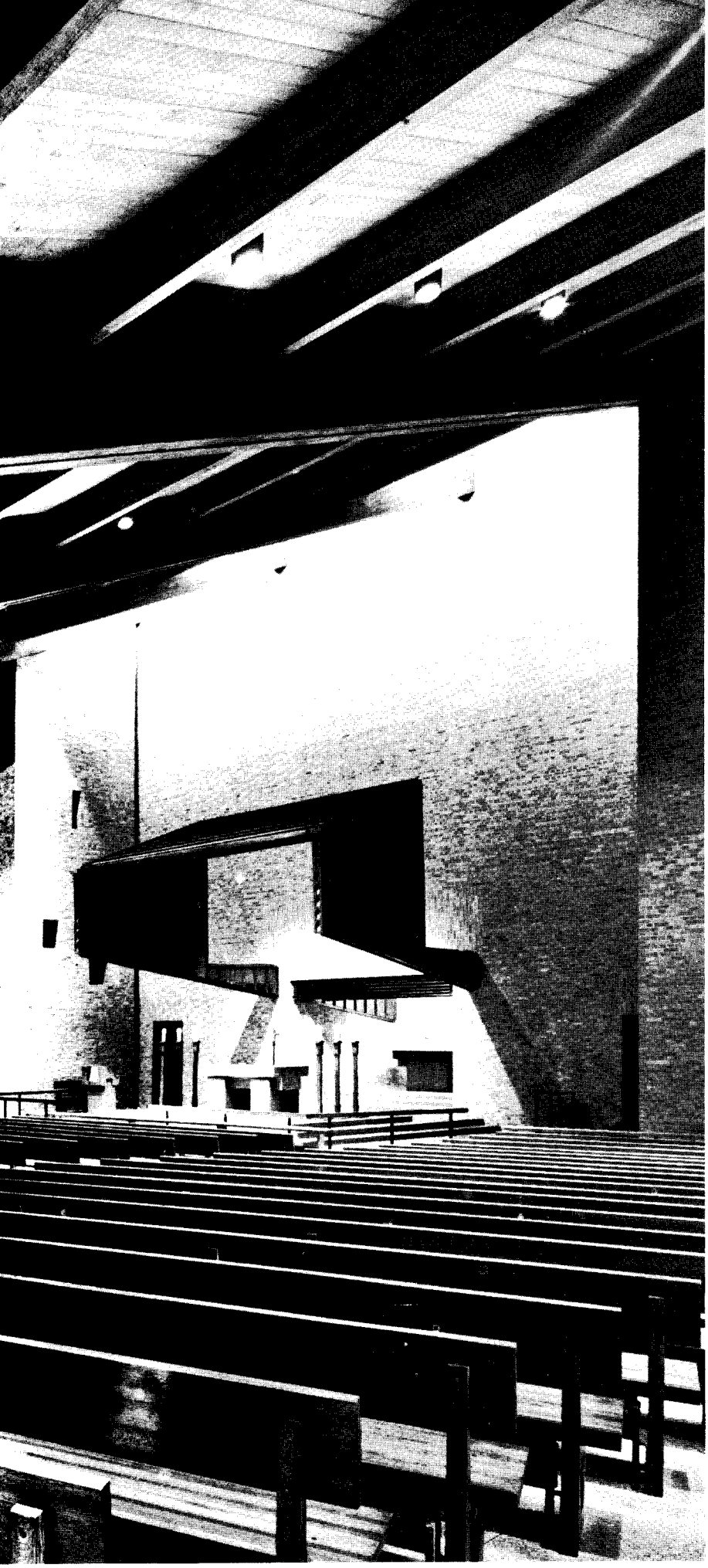
Major rethinking of church design has been going on in England, too, with significant explorations by the New Churches Research Group, founded in 1957. Peter Hammond, one of the leaders of this group, is editor of a book entitled *Towards a Church Architecture* (Architectural Press, 1962), a series of essays about the significance of the liturgical movement and its effect on architecture. In his own essay, "A Radical Approach to Church Architecture," Hammond asks that the same attention to "the underlying social realities" that marks the best of modern secular architecture be applied to religious buildings too. He deplores the fact that a church commission is often regarded by the designer as "an architectural holiday: an opportunity to escape from the restraints of normal design procedure into the less exacting world of fantasy and individual expression." In his earlier book, *Liturgy and Architecture* (Columbia University Press, 1961), Hammond writes: "The cardinal principle of church planning is that architecture should be shaped by worship—*not* worship by architecture."

The planning of a synagogue must also involve an investigation of basic principles of worship. The problem of "whether the synagogue should be primarily a house of worship or a house of study, or whether study and worship are synonymous" is a theological problem that also becomes an architectural one, as Richard Meier pointed out in the exhibition of "Recent American Synagogue Architecture" he organized in 1963 for the Jewish Museum in New York.

The AIA, too, recognizes the need for new thinking on religious architecture, noting that most of the work done today is approached "without any common basic understanding of religion and its relation to architecture." In March 1964, the Octagon was host to a seminar (sponsored by the AIA and the major national religious associations) under the title of "An Interdisciplinary and Interfaith Exploration Toward Research on Religious Buildings." Their thesis was that before meaningful religious architecture can occur, there must be a many-sided evaluation of the meaning of religion in our society.

We suggest looking at the religious buildings on the next few pages with these ideas in mind. What are the important parts of the worship service for which special space or special furnishings had to be provided? What is the symbolic meaning of these acts of worship? In what ways was it important to express new or evolving practices of worship, a liturgical reformation, a return to basic early principles, etc. How has the architect expressed the purposes of the house of worship in a way that reinforces what the congregation and clergy will consider truly meaningful.—EP





The New Liturgy

Architects: *Progressive Design Associates; George E. Rafferty, Partner-in-Charge. Van Allsburg & Koprowski, Field Supervision.* ***Consultants:*** *Meisch & Stevens, Structural Engineers; Gausman & Moore, Electrical and Mechanical Engineers; Frank Kacmarcik, Liturgical Art and Architectural Consultant. Two major sculptures by Gerald Bonnette.* ***Site:*** *Grand Rapids, Mich. Some 20 acres of rolling woodland on the outskirts of the city. "The site is perhaps as beautiful as an architect could hope for, within the bounds of city environment. The approaches to the church take one from the city traffic to the calmness that nature provides, as a perfect 'atrium.'" Already on the site are an elementary school, rectory, and convent. The size of the church, plus the pattern of traffic, located the church further from the school and convent than is normal. "In the future, there could be a tunnel connection to the school and convent."* ***Program:*** *A church, seating 850, for the Roman Catholic parishioners of St. Jude Parish. Attached, an enclosed area for the Shrine of St. Jude. Architectural spaces and elements to develop with special consideration for the changes in liturgy being anticipated with the Second Vatican Council.* ***Structural System:*** *Reinforced-concrete walls; laminated wood beams and purlins, pan and joist system for floor and roof of sacristy.* ***Mechanical System:*** *Hot-water heating. No air conditioning at present.* ***Major Materials:*** *Reinforced concrete; facing brick for walls; terrazzo for floor; copper for roof of nave.* ***Photographer:*** *Balthazar.*

When the new changes in the Roman Catholic liturgy went into effect in November 1964, reports of the most active acceptance of the new ways came from the Midwest. Although this parish church in Michigan was designed before Vatican Council II convened in October 1962 (ground for the church was broken in August 1962), the form of the new church was clearly in anticipation of the changes in worship that were expected.

The architects state that the controversial form of the church "grew not for the sake of being 'different,' but from the strength of the liturgy." They suggest that the Pastor, Rt. Rev. Msgr. Charles D. Brophy, "should be singled out above all the others for being a real leader in promoting a new image of the Church, one fully cognizant of the revised liturgy of the Roman Catholic Church."

Msgr. Brophy explains the new St. Jude Church in these words: "The historical

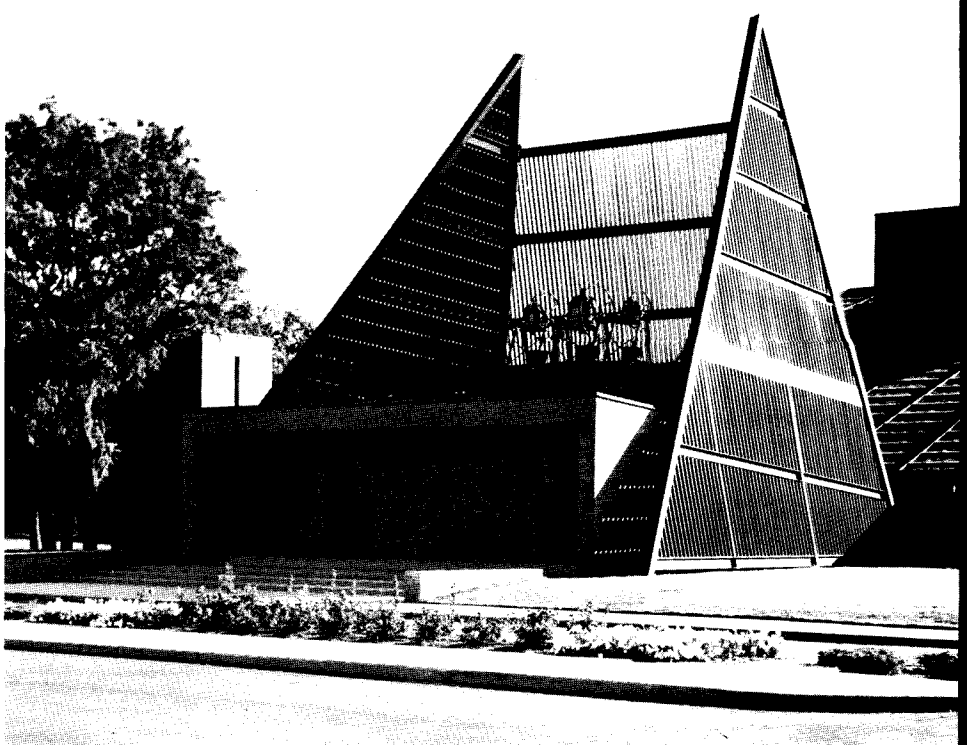
origin of the Christian church is the supper-room at Jerusalem. There the Lord Himself celebrated, as the origin and *pattern* for all time, the Eucharist, which is the center and heart of the Church's worship. The heart of the church is the altar, which represents Christ. The altar has this symbolism even without the presence of the Holy Eucharist upon it. The altar, therefore, dominates the interior of the church. . . . The design of the altar brings out both the New and Old Testament ideas of an altar. The upper part represents the table of the Last Supper. Since primitive Old Testament altars were made of heaped-up stones, the altar table rests upon two large granite blocks. The altar is free-standing so that Mass may be offered facing the people, which is an ancient and traditional way of celebrating Mass." (Placing the altar along a wall only began with the formation of the various religious orders, the development of the monasteries, and the multiplication of altars in one religious house. Many of the great churches of Europe have free-standing altars—among them, St. Peter's in Rome.)

Emphasis in the new liturgy is on bringing the people as close to the essentials of their worship as possible. In plan, then, the church is almost as wide as it is long, putting most congregants in close contact with the altar. All attention is focused on the altar—the floor slopes down to it, the ceiling rises up from it. There are many such aspects of the design, where the disposition of spaces or the treatment of focal points reinforces the meaning of the worship. The baptismal font, for instance, is in the center of the vestibule: "Our incorporation into the Mystical Body of Christ comes through Baptism. Only with Baptism are we members of the Church." (This and the following quotes are from a brochure published for the dedication of the church.) Since baptism, further, gives one the duty and privilege of worshipping God, the baptismal font is in line with the main altar, and is of the same granite. Above the altar is a canopy, its "crown-like appearance declaring to us that Christ is our King." Above the canopy is the unadorned main wall of the church—"impressive in its emptiness, it is a true expression of the worshipping community's humility before the invisible and inexpressible *tremendum mysterium* who is God the Father." The pulpit, to the left of the altar, is also of the same granite as the altar, "to show the close relationship between the Word of God in Sacred Scriptures and the Word Incarnate on the altar."

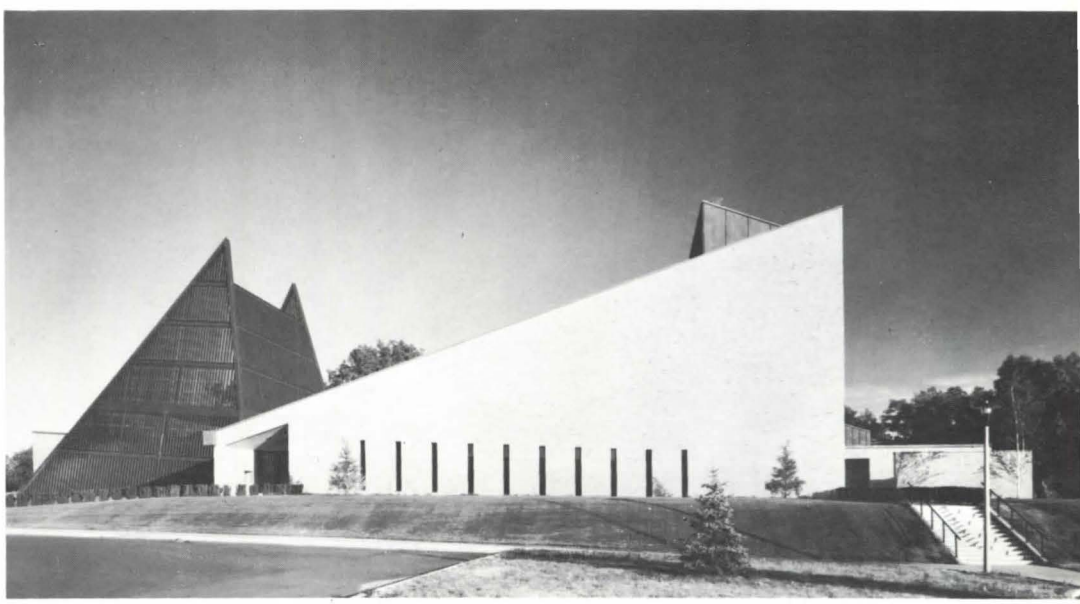
Directly behind the altar is the Blessed Sacrament chapel. Here, on another altar of granite, is the Eucharistic tabernacle. When the church was designed, church rubrical law demanded that the tabernacle be on the altar, a problem that was solved by creating another altar. According to Msgr. Brophy, "Suggestions along this line had been made before St. Jude's, but not it seems in a *parish* church of this magnitude, nor in the Midwest." Now, with the permissive rulings of the Ecumenical Council, the tabernacle no longer has to be on the main altar.

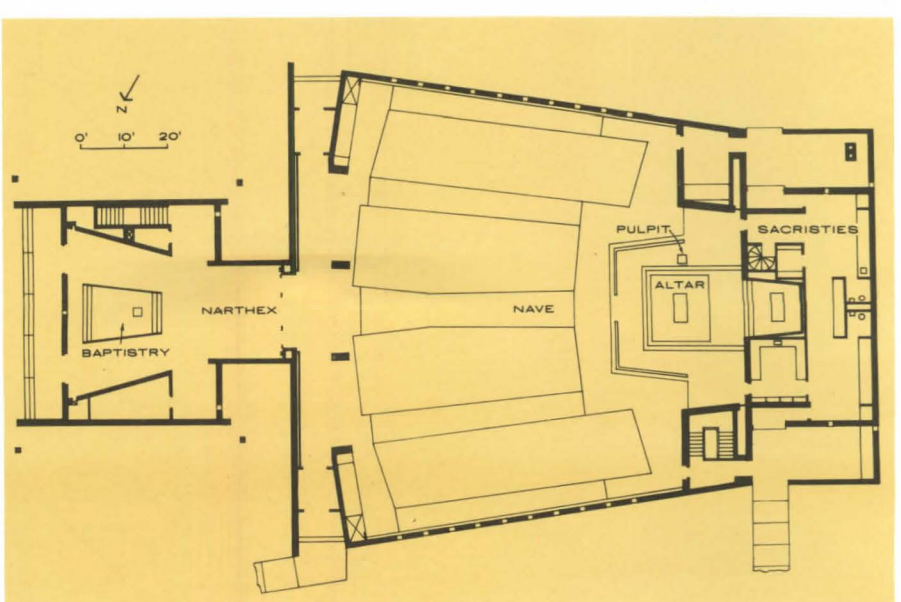
The exterior of the church also underscores the spiritual message. "Rising majestically to a height of 70 ft, the roof of the church dramatically illustrates the ascent of man to God; the massive skylight cutting through the crown of the roof demonstrates that this ascent has cosmic implications." Similarly, with the unusual bell tower: "The tower or steeple of any church is first a banner, announcing to all who come near that they are approaching the enclosed sacred space of the House of the Living God. But it is also an integral part of God's house, and rises out of it up into the free air and takes possession of all wide space in God's name."

As one of the earliest of the new Roman Catholic churches, this church owes its architectural excellence to the way in which, together, the architects and church people approached the problem. As expressed by Msgr. Brophy, "The role of architecture in the liturgy is not to nurture sentimental nostalgia for monuments of the past . . . [but is] the continuing problem of creative thinking to build the House of the Living God as a fresh expression of the Incarnation extending itself alive to the men of our time."



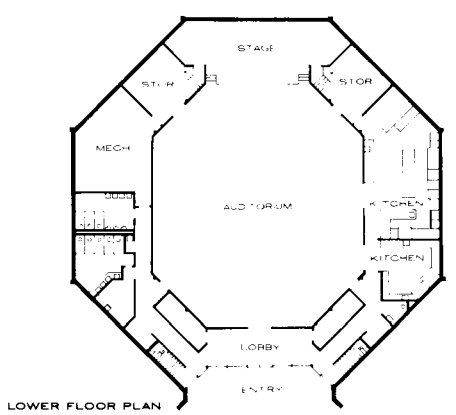
The new Roman Catholic liturgy authorized by the Vatican's Ecumenical Council can be expected to have far-reaching effects on church architecture. This parish church in Michigan, although designed before the reforms were promulgated, clearly anticipated the changes in worship that were expected. In particular, people are brought as close to the essentials of their worship as possible—the church is almost as wide as it is long, and all attention is focussed on the altar. Mass is offered facing the congregation (above), an ancient tradition that is now being universally revived. The baptismal font (above right) is of the same granite as the altar, to indicate the connection between the sacraments; and the baptistry is in a direct line with the altar, to signify the meaning of baptism as entry into the Church. Throughout, a simplicity of form and plainness of materials underscore the emphasis on essentials. The bell tower is a strong expression of this new emphasis.



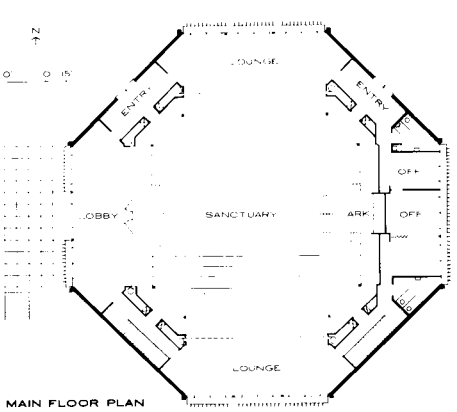


An Old Tradition

Architects: *Davis, Brody & Wisniewski.* ***Consultants:*** *Wiesenfeld & Leon, Structural Engineers; Wald & Zigas, Mechanical Engineers; Lewis S. Goodfriend & Associates, Acoustical Consultant; stained glass by Samuel G. Wiener, Jr.; ark doors, eternal light, screen, and menorah by Ludwig Wolpert.* ***Site:*** *Lakewood, New Jersey. A small site with an existing sprawl of parochial school buildings. Since the orientation of the ark had to be east, both the position of the synagogue and its dimensions were practically preset.* ***Program:*** *An orthodox synagogue for Congregation Sons of Israel, to be used by the resident population, and by visitors to the many resort hotels along this main street. A sanctuary to seat 350 people (men and women separate), expandable to accommodate 700 for holidays and special occasions; a social hall, with stage, to seat 300 for dining; separate kitchens for meat and dairy food preparation; lounges and meeting rooms; offices.* ***Structural system:*** *Lower level is steel and concrete, made fireproof; upper level is steel and wood. Dome is of light steel T-sections, with wood members bolted to the webs, and an in-filling of wood framing covered inside and out with plywood skin. The eight steel columns of this light rigid "hat" are continuous through to the lower level.* ***Mechanical System:*** *Heating and air-conditioning by an oil-fired air system. Air can be switched from upper level to lower level, depending on need.* ***Major Materials:*** *Concrete block, stuccoed on exterior, for walls; grooved plywood panels for ceilings of sanctuary and lounges, painted for light reflectance; copper, with batten seams, for roof; wood panelling for ark wall.* ***Photographer:*** *Louis Reens.*



LOWER FLOOR PLAN



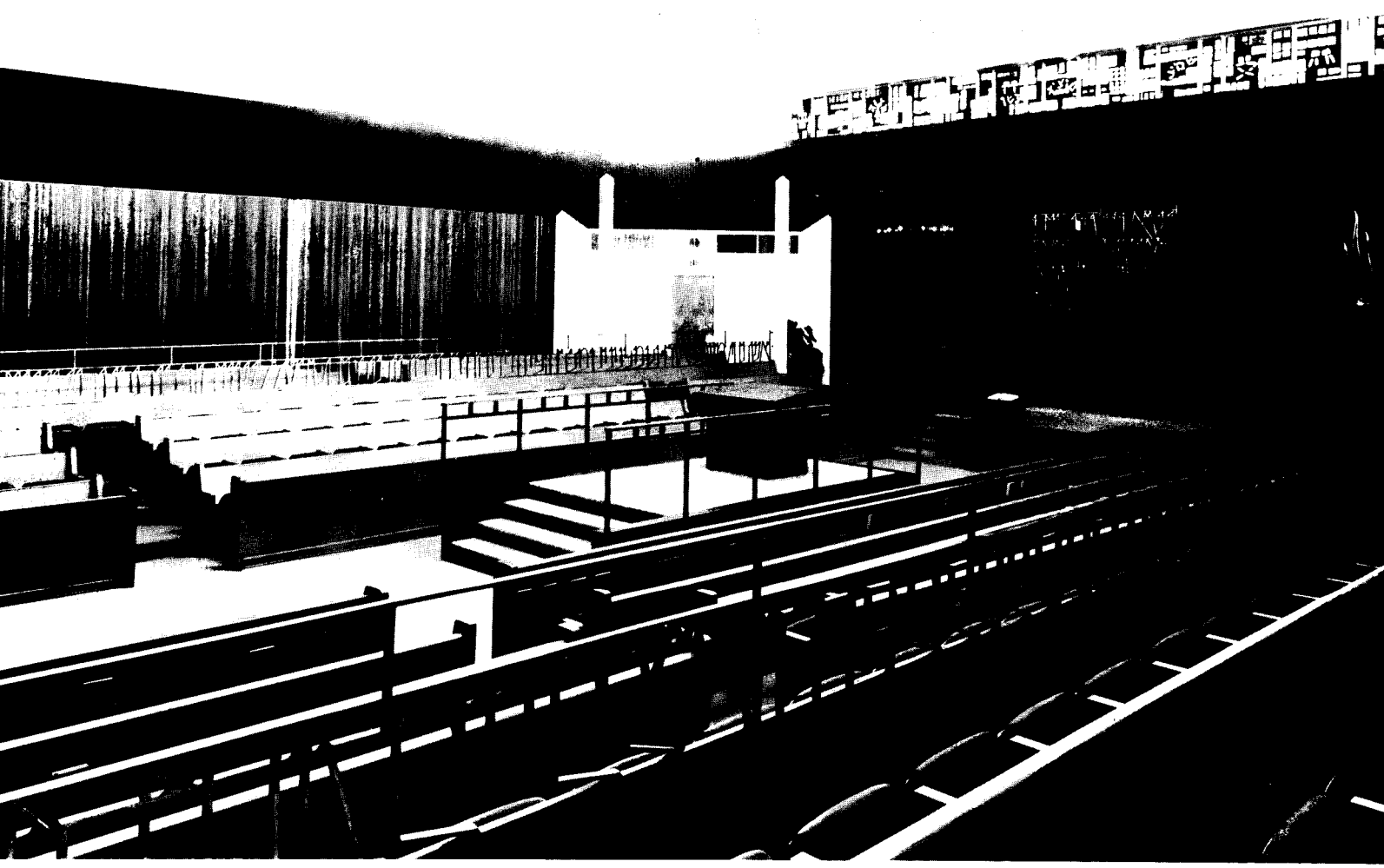
MAIN FLOOR PLAN

There is no single tradition of synagogue architecture, because wherever Jews have lived, in their 2500 years of dispersion throughout the world, they have tended to build in the manner of the people around them.

The first synagogues, it is thought, came into existence with the beginning of this dispersion, after the Jews were conquered by the Babylonians in 586 B.C. The Temple in Jerusalem was in ruins, and the captive Jews were exiled to Babylonia. In the hope of maintaining the continuity of their heritage, the Jews gathered to study and pray. Lacking a mediating priesthood, and without animal sacrifice, they considered it possible to establish a direct communion with God. The great Temple of Solomon had been a house of God, a place where the Deity dwelled, but the synagogues were different: they were gathering places for the people (the Greek word, *synagoge*, means assembly). The synagogue was, in a sense, "portable"—it could exist wherever 10 men convened, and the destruction of any single synagogue would not threaten the life of the entire faith. The synagogue's sanctity derived from the existence of a community of faithful believers, not from the actual or exclusive presence of the Deity. In the evolution of religious thought, God was now conceived of as dwelling everywhere and nowhere.

For this synagogue in New Jersey, the architects, Davis, Brody & Wisniewski, began with traditional considerations. "Although there is no specific historical tradition of synagogue design, there are strong traditions of worship and ritual. The most important aspect of the service, especially in the orthodox congregation, is the reading and studying of the Law or Torah." With this in mind, they have brought back a traditional plan—the congregants are seated on both sides of the central bimah where reading takes place. Besides symbolically enhancing the ritual, this gives the sense of "intimate congregational participation"—the opposite of an audience-to-stage relationship. The spatial design further emphasizes the "gathering together of the congregation under one roof."

The rabbi, Pesach Z. Levovitz, also speaks of the transformation of a "passive audience *into an active* congregation." The synagogue service, he says, "is conducted by and for the congregation. While the rabbi and cantor officiate, the service is sanctified by the congregation's participation. . . . Regardless of his location, every worshipper experiences a sense of closeness to the bimah, which is the spiritual hub of the sanctuary." For the



rabbi, the shape of the plan has another meaning: "The circular character of the sanctuary is symbolic of the eternity of our faith and the never-ending truths of Judaism. In the Jewish mystic tradition, the circle is a sign of infinity and eternity; for just as the circle has no beginning and end, so it is with God and our Torah."

The rabbi mentions other symbolism. "The sunken sanctuary reflects the words of the Psalmist, 'Out of the depths have I called unto Thee Oh Lord.'" And the exterior of the synagogue "towers high into the sky, giving the appearance, at a distance, of two hands clasped in eternal supplication." He suggests that the form of the synagogue is "a translation of the lines of the 16th-Century Eastern European synagogue into contemporary architecture."

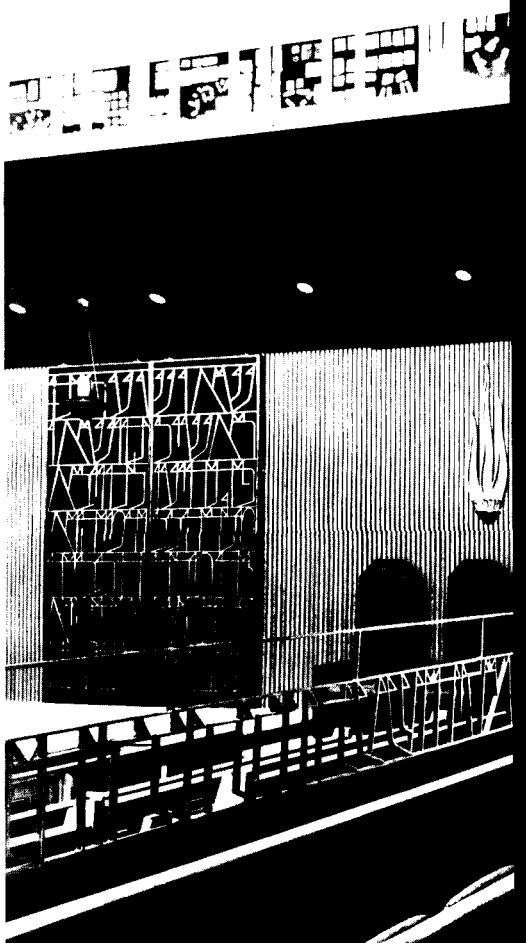
A major problem in the design of a synagogue today is providing worship space for the large attendance on High Holy Days. The normal sanctuary must be complete in itself, yet must also function well as an expanded space. Quite frequently, the sanctuary is enlarged by merging it with the social hall, which is spatially—and in its mood and details—quite different from the major worship space. In this synagogue, the three areas adjacent to the sanctuary are small meeting rooms and a lobby. The circular plan, which can be difficult to expand, opens easily into these three areas. The north and south extensions add seating for women, the west for men. (The sexes are kept separate, as they were in the ancient Temple in Jerusalem. The separating screen of Hebrew calligraphy has verses from "A Woman of Valor," the last chapter of Proverbs.) Calligraphy is the work of Ludwig Wolpert.

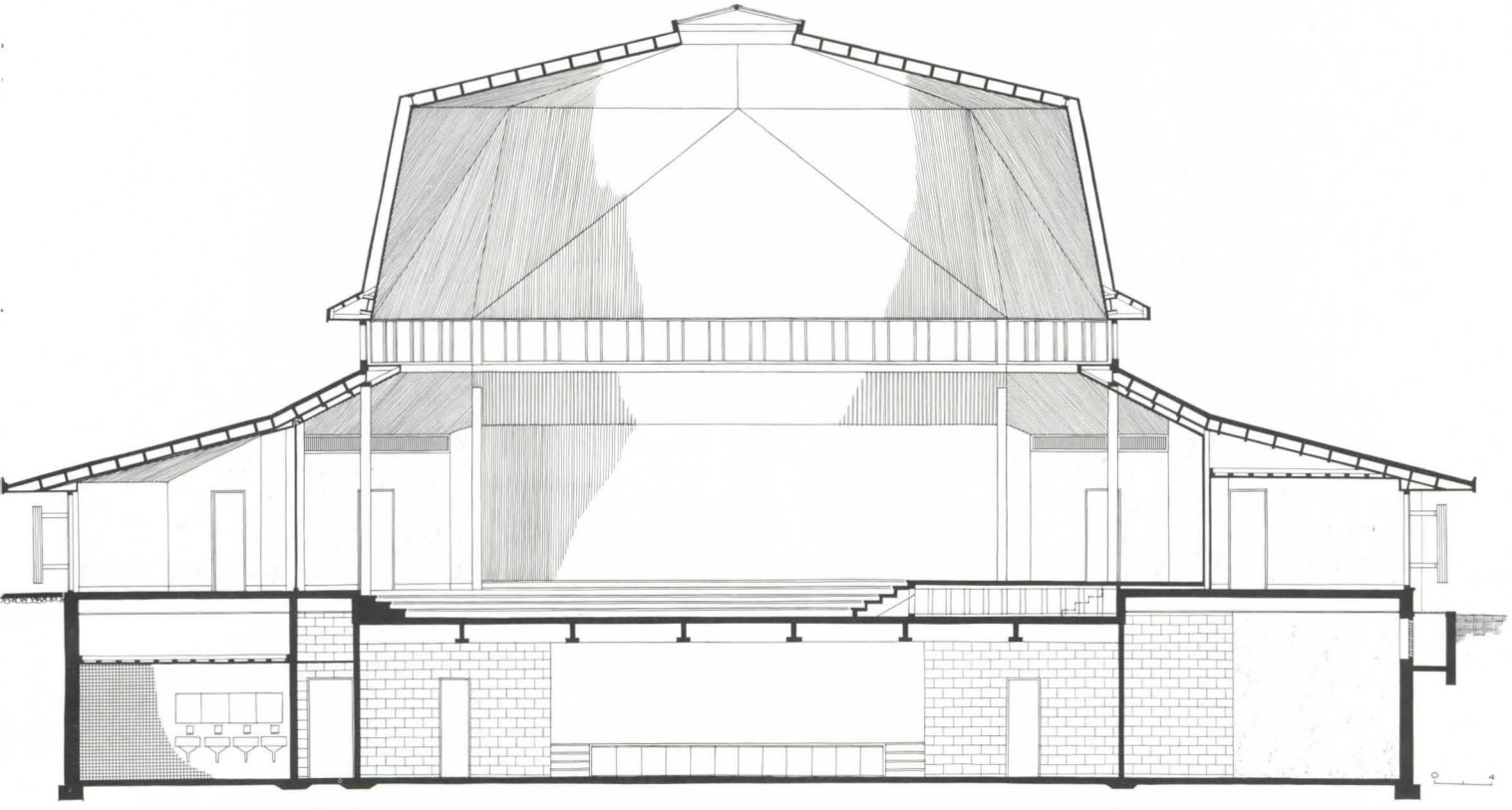
Artwork throughout the synagogue is particularly elegant. The proscription against graven images, from the Ten Commandments, has often resulted in abstract designs of high merit, as is the case here. Calligraphy appears again on the ark door. Clerestory windows filled with colored glass panels represent daily, weekly, and yearly rituals.

Lighting for the sanctuary is indirect—high-powered quartz lamps are aimed upward from the projecting cove under the clerestory. Elsewhere, in lounges and lobbies, recessed downlights emphasize the contrasting scale of subsidiary spaces.

Social facilities are on the lower level, utilizing the slope of the land. "We felt this was desirable," explain the architects, "in that the dominant expression of the structure is that of a synagogue, rather than a community center, and more in keeping with the orthodox conception."

In this orthodox synagogue in New Jersey, the exterior is reminiscent of the traditional synagogue of 16th-Century Eastern Europe, but the plan is from a still older tradition—the gathering together of Jews who were removed from the ruined Temple in Jerusalem but who continued to meet for reading and studying of their Torah. The centrality of the plan here puts greatest emphasis on this ritual, gives a sense of intimate participation in it. All secondary facilities in this synagogue are placed on the lower floor, which was made possible by the slope of the land (above). To enlarge the sanctuary for the increased attendance on High Holy Days, vertical wood-slat doors are rolled open on three sides of the sanctuary, adding three ancillary spaces to the major space (right and far right).





Experimentation in Ritual

Architects: *Davis, Brody & Wisniewski; Raymond J. Wisniewski, Supervising Architect.* ***Consultants:*** *Atlas & Rosenberg, Structural Engineers; Wald & Zigas, Mechanical Engineers.* ***Site:*** *West Hartford, Conn. Six acres of sloping, country land, the high ground visible from a half mile in three directions. A chapel for the United Church of Christ (Congregational) to seat 225; a parlor that is both narthex and congregating area after service; a multiuse area that will ultimately become administrative space. This is the first stage of a projected master plan that will include a building for education and a wing for social functions.* ***Structural System:*** *Laminated beams and laminated cluster columns. A tension ring at the perimeter of the high roof counteracts thrust. Stressed-skin plywood panels provide for lateral stability; heavy wood T & G decking further braces the structure.* ***Mechanical System:*** *Forced warm-air heating, with provision for future air conditioning.* ***Major Materials:*** *Laminated wood, for beams and cluster columns; brick, for cavity walls; hexagonal brick for floor of sanctuary; clapboard for exterior of plywood panels; wood or slate shingles, on 1½ in. rigid insulation and 2½ in. wood deck, for roof. Economic considerations led to discipline in the choice of materials, and to the use of local brick and fairly simple wood details.* ***Photographer:*** *Louis Reens.*

This centrally-planned church in Connecticut, by the same architects who designed the synagogue in New Jersey (*preceding pages*), derives its form from some of the same considerations. Necessarily, however, some of the symbols and purposes are different.

Davis, Brody & Wisniewski write: "The circle or near circle is a form that geometrically expresses unity; in this case, the unity of the worshippers and the minister. This symbolic form enunciates one of the essences of "Congregationalism"—the complete breaking down of the barriers between clergy and laity. The circle symbolically intensifies the ritual of communion, and the concentric seating around a central table gives a great sense of intimate congregational participation."

The pastor, Loring Sabin Ensign, further describes the meaning of the building. "The primary elements in our worship are the celebration of the Eucharist or the Lord's Supper, the proclamation of the Word, baptism, and the work of the people (liturgy) or congregational participation. Thinking of ourselves as a people of God gathered around the table of our Lord, to be fed by His varied grace, to render thanksgiving, praise, and gifts, we had to have a unicameral sanctuary of a round nature in which the altar-table could be the central symbol at the Eucharistic celebration." (He mentions that there is "no particular reason or symbolism served in the building's twelve-sidedness. That is simply the choice of the architect.")

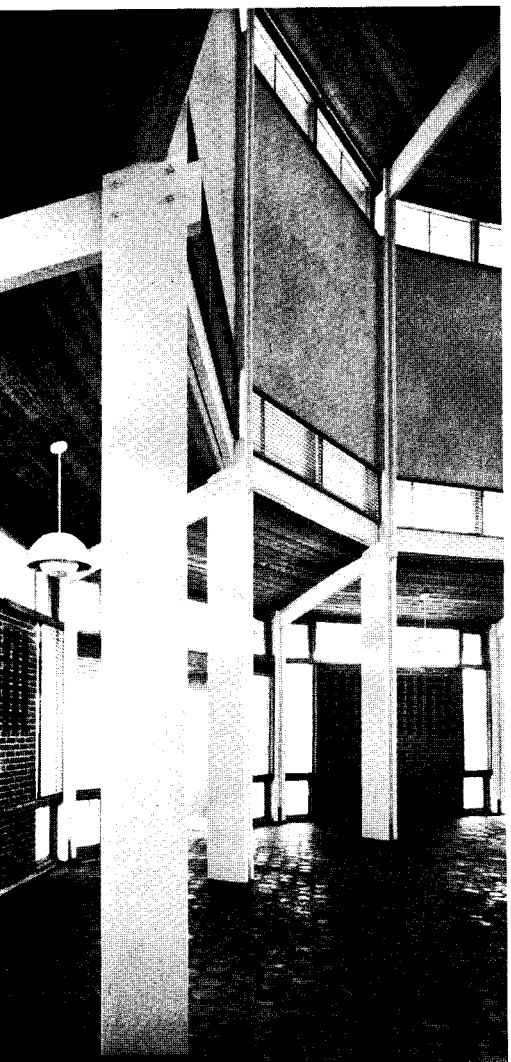
Also, he continues, we wanted " 'holy space,' as it has been called so aptly, in which there is an apparent tension between God transcendent or beyond and God immanent. This called for a vertical dimension of considerable height, vaulted and quite perpendicular (it is 40 ft to the interior apex), and a horizontal dimension commensurate with the human scale (it is 60 ft in diameter). The space is awesome, therefore, without being simply large or *overwhelming*; and it is intimate without being sentimental or chummy."

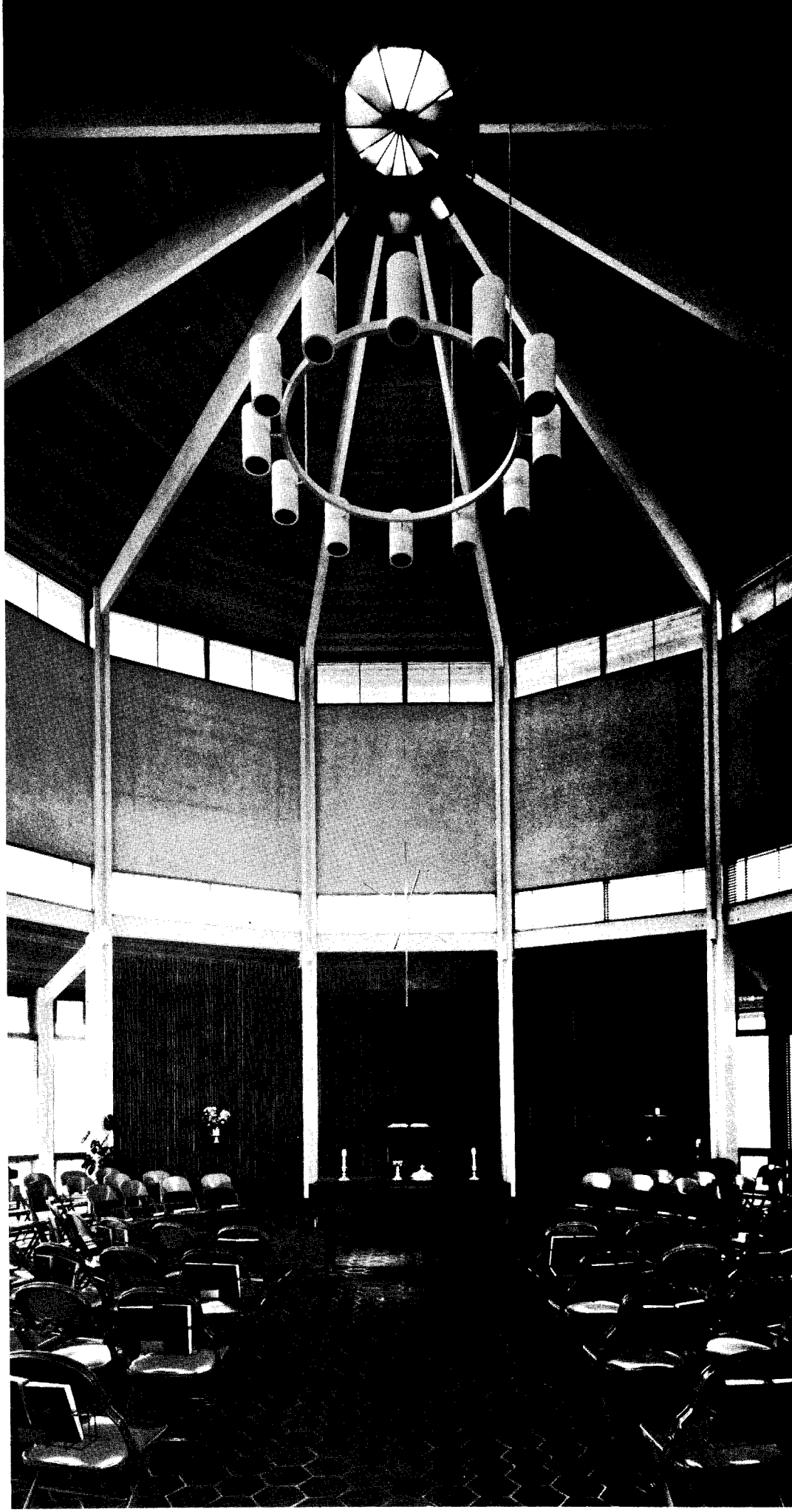
"Everyone gathered is a participant; no one can be a mere spectator. Pastor, choir, and any other liturgists are all part of the gathered congregation, with no one set apart in some 'holy' space. . . . Everyone is equal at the foot of the cross." There is thus no chancel, no nave.

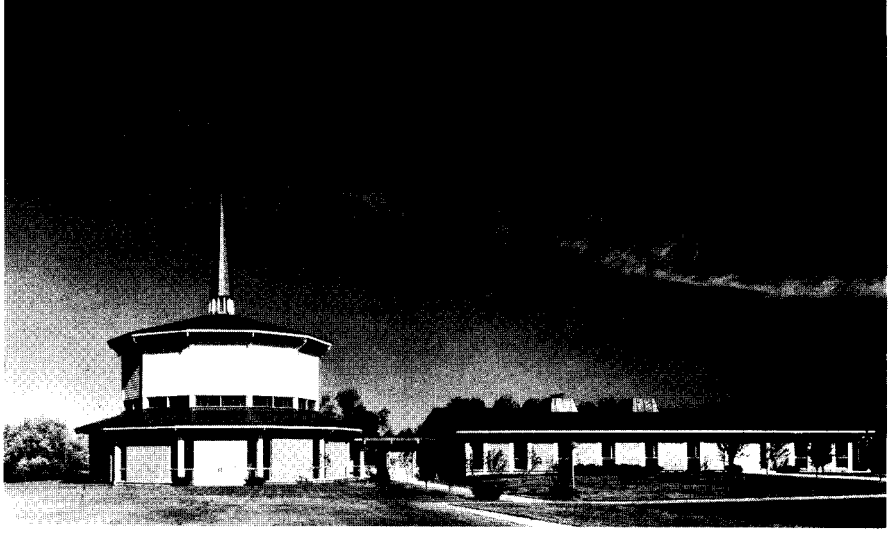
"To give visual imagery to God's presence we conceived a somewhat stylized cross composed of the Greek letters Iota and Chi, standing for Jesus the Christ, an ancient monogram of the early church, and hung it in the center of the room. It very forcefully says that God is at the center of our worship, wherever His people are gathered, and at the very center of life."

Basic to the Congregational denomination is the autonomy of local units free to develop their own methods of worship. The pastor mentions that they wanted this church to permit "continued experimentation. We do not now have all the answers, nor do we assume we ever will." This meant flexible seating, and movable symbols (altar-table, pulpit, and font), "so that every liturgical need can be served." The baptismal font, for instance, symbolizing the entry of a person into the community of faith, will be placed at the entrance to the sanctuary; but it can be moved to the very center, "when we wish to give it that sort of prominence."

Most forward-looking is the Rev. Ensign's belief that the sanctuary "could lend itself to such things as religious drama and other usages which now surpass our conceptualization. This is why we insisted on a flat floor, chairs rather than pews (permanent chairs, probably wooden, will one day be purchased), and symbols of

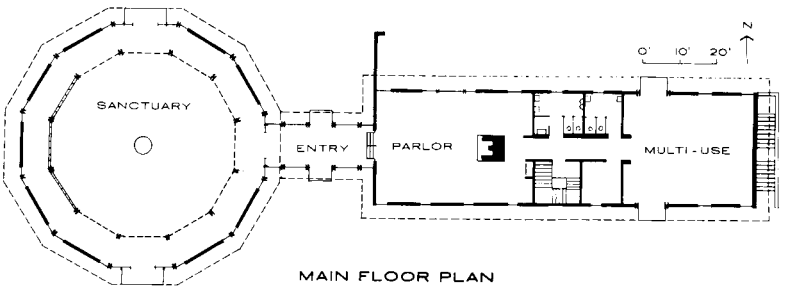




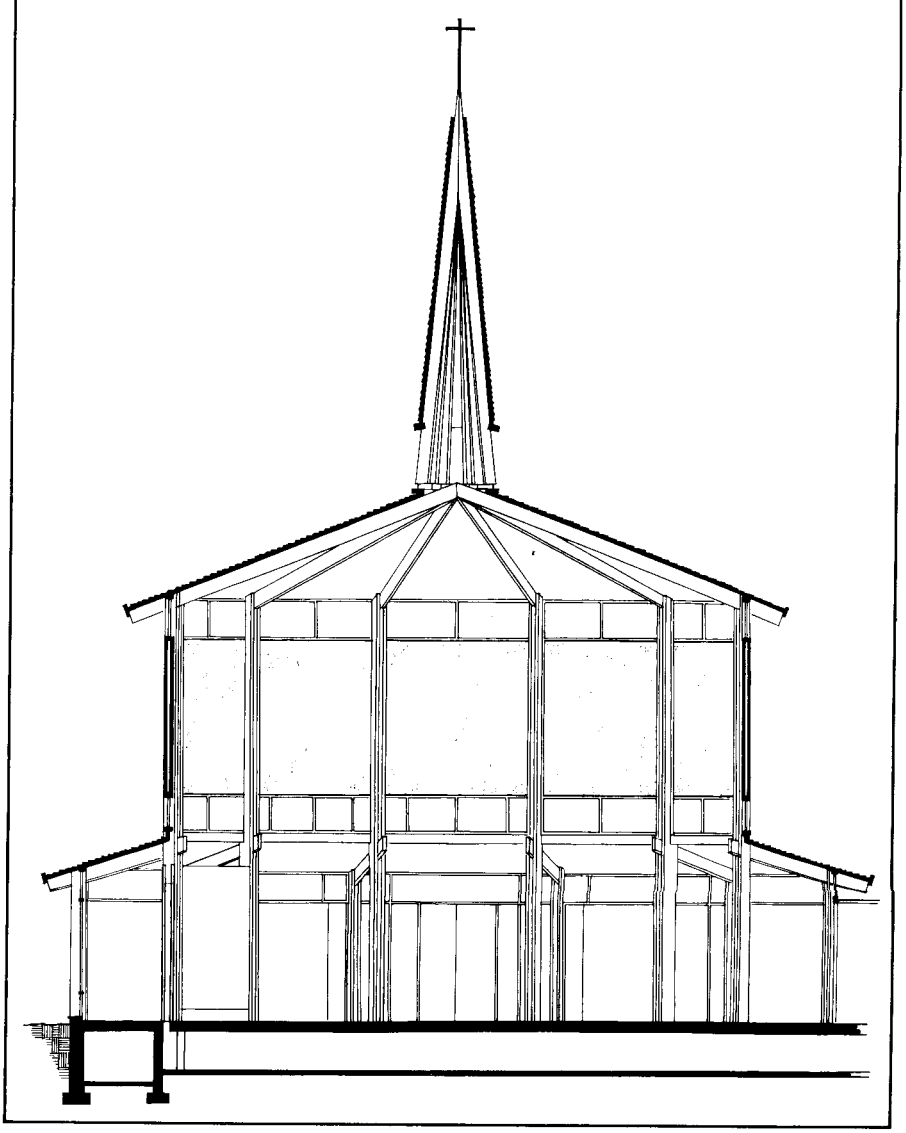


worship that could be moved according to need. As far as I know, this experiment is a radical departure, virtually unique in church circles today."

Thus, these two religious buildings by Davis, Brody & Wisniewski, although superficially similar, are based on quite different needs and purposes. They each recall a different "style," of course—the synagogue, that of medieval Eastern Europe, and the church, that of "the strong traditions of simple and modest New England meetinghouses." But the most significant difference is the synagogue's reflection of the wish to preserve intact a centuries-old tradition of worship; and the church's move into uncharted territory of religious observance. The architects have given expression to what is most meaningful to each congregation.



MAIN FLOOR PLAN



Designed by the same architects as the synagogue on pp. 138-141, this church in Connecticut is also based on a central plan. In this case, however, the circle is symbolic of the complete breaking down of barriers between clergy and laity. The details and construction of the church recall "the strong traditions of simple and modest New England meeting houses," say the architects; but the pastor notes that in various respects the church is a "radical departure" from customary thinking.

A Simple Service

Architects: *Earl P. Carlin, Architect; Peter Millard, Design Associate; Paul E. Pozzi, Associate.* ***Consultants:*** *Henry A. Pfisterer, Structural Engineer; Jerome F. Mueller, Mechanical Engineer.* ***Site:*** *Hamden, Conn. A corner suburban lot of moderate size in a neighborhood made up of small wood-frame houses. Since future parking for approximately 25 cars will be provided on the undeveloped lot to the east, the main entrance doors are located at the south, allowing entry either from parking lot or from main street.* ***Program:*** *A low-budget church for the Mount Zion Seventh-Day Adventist congregation. A sanctuary to seat 350 people; with a chancel to contain speaker's rostrum, choir of 30, and a large baptistry, which is an important liturgical element for this denomination. Also, a large general-purpose room with provision for future kitchen; two small classrooms; a pastor's office.* ***Structural System:*** *Concrete-block bearing walls, with precast-concrete floor and roof.* ***Mechanical System:*** *Gas-fired air system, utilizing the precast-plank floor for supply and return ducts.* ***Major Materials:*** *Concrete block for exterior walls, 12 in. thick, exposed; precast-concrete planks for upper-level floor system; 2 in. concrete topping for finished floor; wide-span precast double-T beams, for roof system.* ***Photographer:*** *David Hirsch.*

The simplicity of this building matches the simplicity of worship in the Seventh-Day Adventist Church.

The beliefs of this faith center around Christ's return, the example of Christ in guiding one through life, and God's love. The religion stresses the feeling of "all as one before Christ." The pastor is thus on equal footing with the congregation—laymen, usually three in number, sit with the pastor and conduct the worship service with him. This equality is even more strikingly seen in the Ordinance of Humility when members of the congregation wash each others' feet, following the example of Christ. In general, however, the service form and many of the particulars of church life are left to the individual churches, which maintain a high degree of autonomy. Prayers at the service are often spoken "from the heart," not read from a written text. The cross is not always

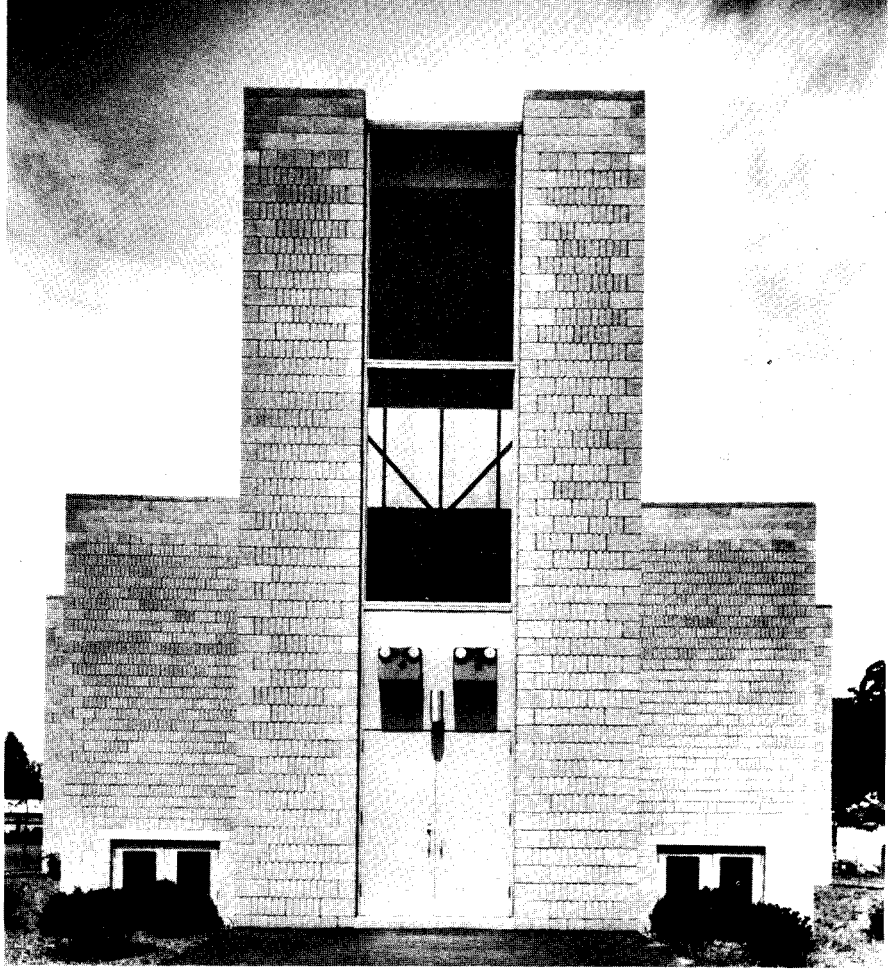
a necessary symbol in the worship.

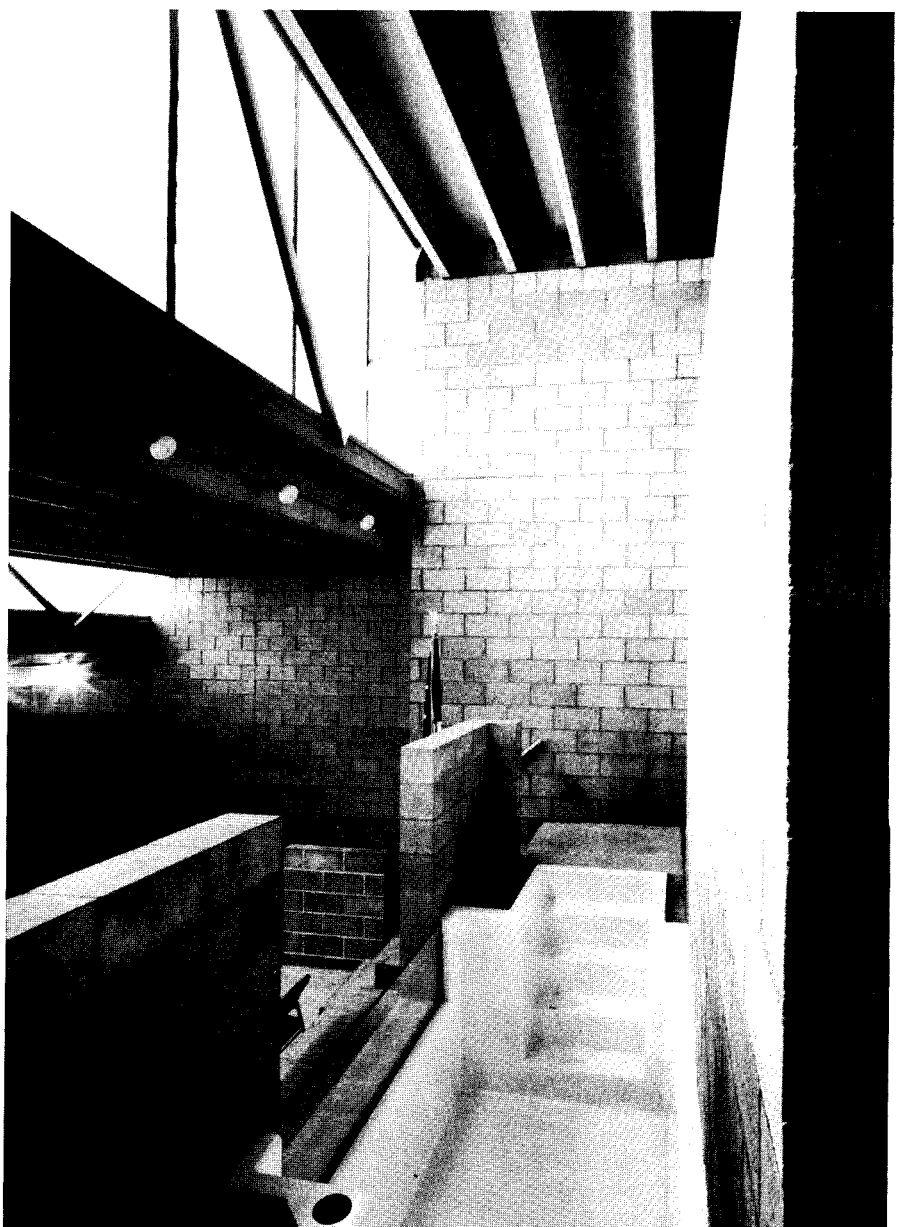
George W. Timpson, pastor of the new *Mount Zion* Seventh-Day Adventist church, explains: "Although contemporary in structure, the church was especially designed to be conventional in our basic worship. . . . Ours is a simple worship service. Our worship is the general congregational type of assembly. The Baptistry is the only special piece of 'ordinance' furnishings other than the Communion Table."

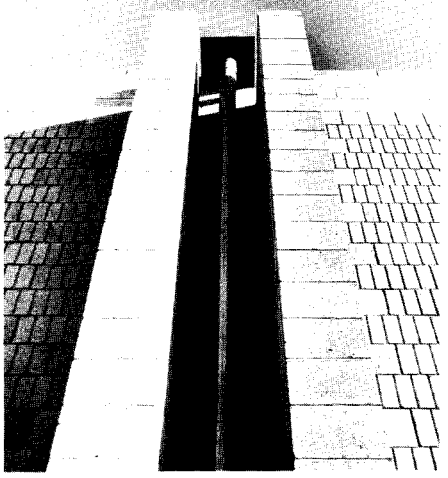
The important baptismal service is held as part of the regular Sabbath service (Saturday morning or afternoon). One is eligible for baptism when of an age to make up his own mind. It is considered a communal experience; those not actively participating are "witnesses." The baptismal area is best placed within full view of the congregation, yet somewhat out of the way. Baptism is by complete submersion. In this building, the central forward position of the baptistry, together with its approach by two carpeted flights of stairs, and its dramatic back-lighting by clerestory, mark this area and its activity as basic to the entire worship service.

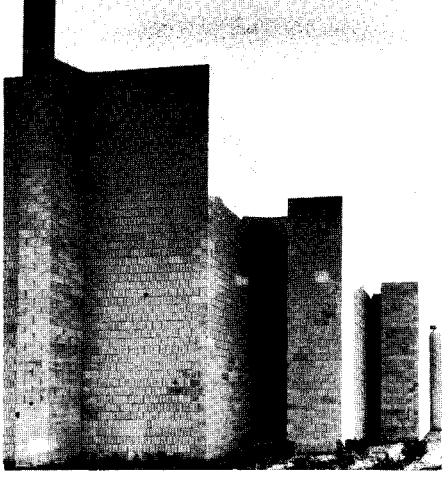
In the general organization of spaces, the more secular and utilitarian functions of social hall and classrooms are subordinated to the lower level. The architects explain that they have deliberately broken up the total exterior form into smaller masses, to fit the church into its neighborhood of small-scaled residential buildings. The church has a Romanesque masonry solidity; in another sense it has the strong, spare, functional look of the controversial "foreground" fire station done by the Carlin office several years ago (see JANUARY 1961, JULY 1961, and SEPTEMBER 1962 P/A). The architects describe their design of this church as an attempt "to arrive at symbolic sculptural elements by emphasizing some of the utilitarian elements, such as chimney stacks, clerestory windows, entrance tower, etc." Two major verticals, therefore, owe their existence to a 16″ x 16″ terra-cotta flue, at the rear, and to a 3 in. metal rain leader along one side.

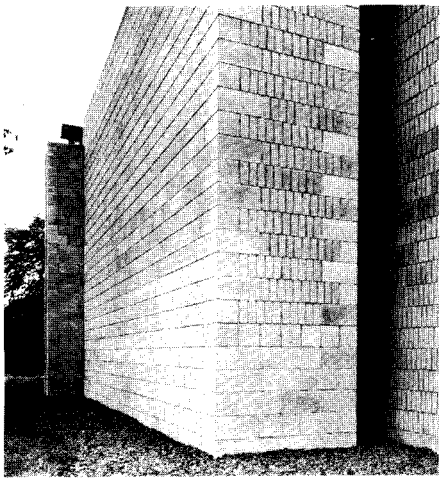
Simplicity of design was partly imposed, too, by a low budget. "Materials and construction methods were employed primarily for economic reasons," Carlin says; "all of the basic materials are of local manufacture." The concrete block was specially embossed, he explains, "to refine the building's scale." Final cost of the church (including site work, but excluding furnishings) was $11.80 per square foot, reports the architect, or 35½¢ per cubic foot.

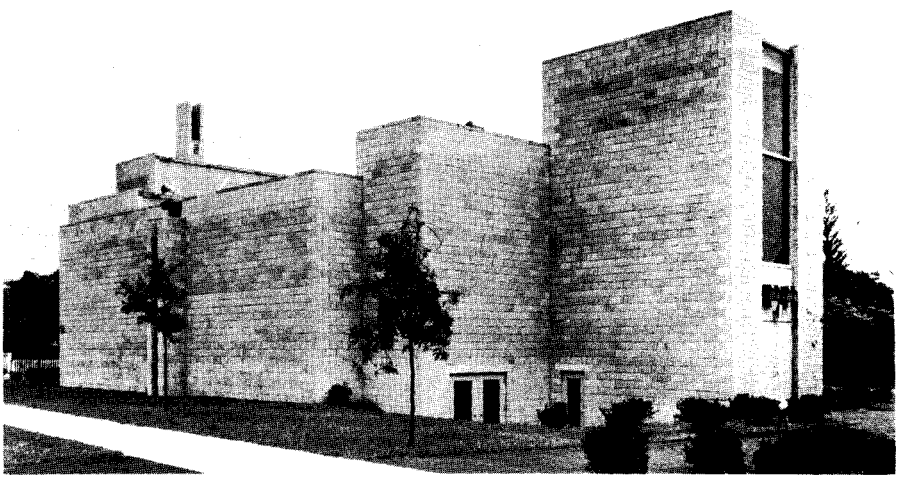




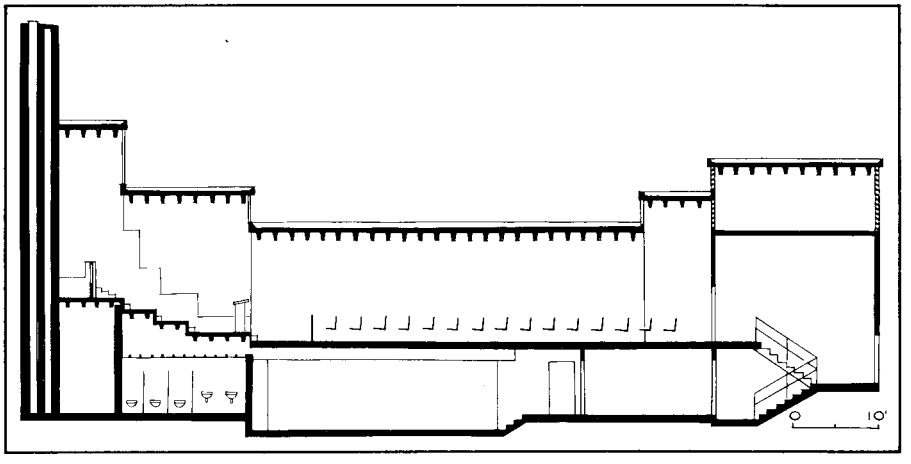


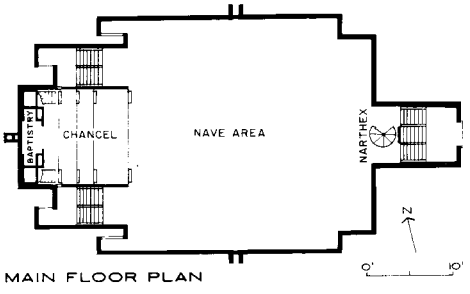




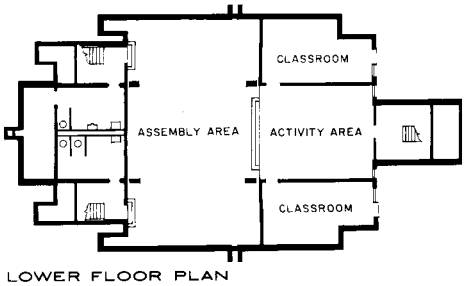


The simplicity of worship in the Seventh-Day Adventist Church is reflected in the simple forms and simple materials of this church outside New Haven, Connecticut. Baptism is a major part of the regular worship service, and the baptismal area (facing page, bottom) is thus a prominent part of the interior—the baptismal area is located dramatically at the front of the nave, always in view, and is approached by two parallel flights of stairs (below, right). But simplicity of design was imposed, in addition, by the exceedingly low budget. The pressures of costs have led to some interesting low-cost details—a change of scale has been achieved by embossing the concrete block (above).

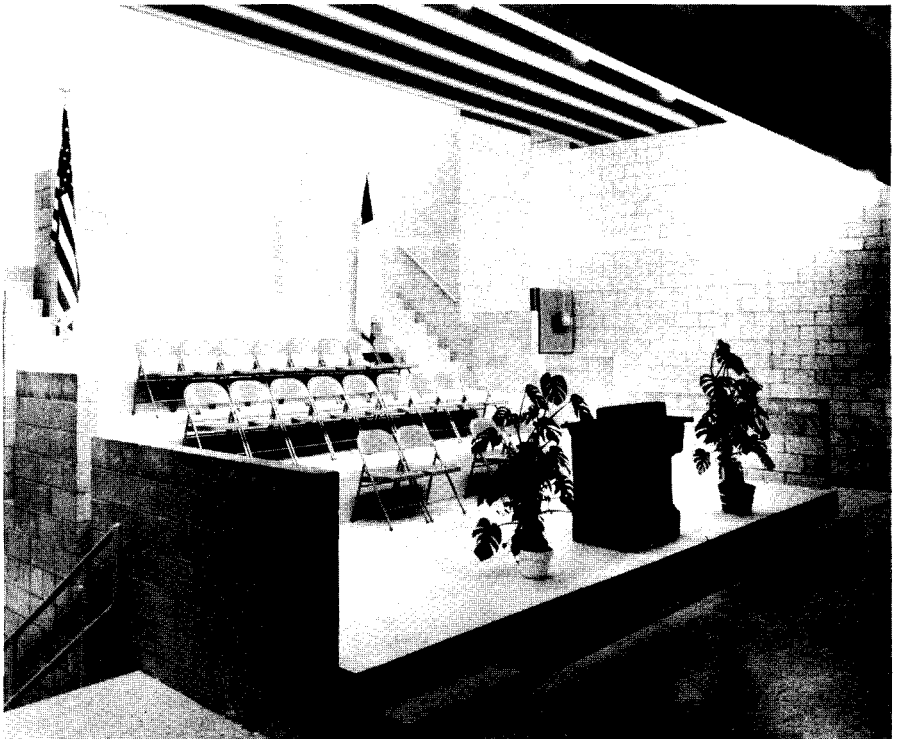




MAIN FLOOR PLAN



LOWER FLOOR PLAN



LITURGICAL ART: The Fourth "R"

BY R. H. MUTRUX

An iconoclastic view of the status of liturgical art is wittily set forth by an architectural gadfly, who is an Associate of Fletcher-Thompson Inc., Architects-Engineers.

We have just interviewed our hundredth representative of a liturgical art firm. We have viewed an impressive, if somewhat shopworn, portfolio of designs and photographs, acknowledged a guarantee of full cooperation, flawless workmanship, on-time delivery, and a promise to stay within the budget, and have graciously accepted the souvenir ballpoint pen. We promised to consider his firm for future work, asked him to keep in touch with us, then consigned him to a file bursting with the brochures of his colleagues. The real chance of ever resurrecting him, however, is remote, at best. In addition to the fact that the supply of works of religious art far exceeds the demand, liturgical art is a field of creativity that has only an illusory present, and, in my opinion, no logical, theological, or aesthetic future.

The glorious past of religious art is unquestioned, and its development in the last decade has, indeed, been nothing short of phenomenal. The rebirth of religious architecture, which enriches city and countryside, has been accompanied by a corresponding resurgence of enthusiasm and talent in the area of objects and effects related to the church's function. This long list of individually-designed items begins with the lowly door-pull, includes every fixed and movable element of the interior from the floor pattern to the most obscure light fixture, and ends with the spire and the symbol that crowns it. All these have been jumbled together into a convenient grab-bag labelled "liturgical" and their design euphemistically dignified with the seal of "art." Yet individually and collectively they represent a field that, regardless of its debatable aesthetic value, is commercially limited and spiritually irrelevant. And since church decoration and furnishings are the normal concomitant of ecclesiastical architecture, it is time that they be given serious reappraisal.

A few basic definitions may be useful at this point. Liturgical art, as a generic term, resembles the Holy Roman Empire, which, according to an old saw, was neither Holy, nor Roman, nor an Empire. The word "liturgical" is highly misleading, particularly in light of the current reanalysis of church liturgy in the dogmatic sense. Coupled with "art," it does not limit itself to those elements such as the chalice, the crucifix, or the altar, which are required by the liturgy. Nor does it exclude numerous elements such as the stained-glass window, the carved reredos, the pew, or the poor-box, which have no liturgical significance whatsoever. Furthermore, the term "art" in this connection does not in any sense imply the freedom of expression with which creation is endowed in the world of the theater or the art gallery. In fact, the very ambiguity of terminology has opened the doors of the church so wide that, under the cloak of ecclesiastical imprimatur, a forest of apocryphal elements has invaded the house of prayer and transformed it into a museum. Worst of all, both museum and church have lost in the process. The end result not only impedes and detracts from the church's intrinsic function; the effectiveness of the separate works of art themselves is, at best, wasted in an embarrassment of riches.

The end, if predictable, is certainly nowhere in sight. The atmosphere surrounding the furnishing and decoration of the new local church is dominated by a generous but hopelessly romantic enthusiasm for the colors, forms, sounds, and smells of a millennium of historic prototypes. The arched ceiling, the shafts of multicolored lights that emanate from mysterious recesses and concentrate theatrically on the richly vested altar, the carved lectern, the railings, and the candlesticks all bear silent testimony to the crafts dedicated to the service of worship. Interestingly enough, this approach is not circumscribed by denominational limitations. Catholic, Lutheran, Episcopalian, Presbyterian alike, all of whom survived a period during the Depression when no churches were built, seem engaged in friendly competition to produce the superlative church and to omit nothing that could possibly go into it.

The explanation for this persistent anachronism may lie in a misinterpretation of the message of history. Forty years ago, relatively few people had the opportunity to see the Sistine Chapel and the Sainte Chapelle. Today, with dubious thanks to World War II and its lingering aftermath, hardly a family exists that has not been represented abroad and exposed, at least vicariously, to a good measure of art and archeology. The result has been an unconscious desire to possess what they have seen and admired by recreating it. The building of the communal shrine in terms of its European antecedent is probably not far removed, psychologically, from the trend prevalent a generation ago, when wealthy individuals transported English country manor houses, stone by marked stone and beam by beam, and rebuilt them on estates on the Hudson. Unfortunately, for every G.I. who has seen Marot's jewel in wood at Fontaine-les-Grès and Corbusier's monument in concrete at Ronchamp, a thousand have seen St. Paul's, St. Peter's, and St. Mark's with all their period trappings. They have been overwhelmed by the four-starred tourist attraction and have lost sight of the center of worship. This attitude was perfectly characterized by a young Catholic priest, recently ordained, who pointed to a 40-year-old New England replica of an English Gothic parish church, and, ignoring its Methodist dedication, unabashedly declared, "That's the kind of church I want!" This presages little for the future of art.

However, there is a possible answer in a modest proposal based on a relocation of emphasis. Though this suggestion may not immediately revolutionize the interior of today's church, it may lead to a re-evaluation of art in relation to religion. It may also open the way to a relatively unexplored field of decoration and applied design. And it is certain to broaden the horizon for the artist and his untiring agent.

It is simply this: Take the "art" out of the church proper, and place it in the schools. This will immediately place "art," with its myriad definitions, *its message, its ability* to entertain, to instruct, to inspire, in immediate contact with children, who are its most receptive and perceptive audience. In this way, its total effect will most readily and universally be recognized, without in the least denying its impact on the generation of adults who produce it. Is there a single school whose lobby, library, all-purpose room, or courtyard would not be immeasurably enhanced by the skillful introduction of a piece of sculpture, a fresco, or a mosaic? On the other hand, what church would suffer by the elimination of some of its furnish-

ings rather than by their multiplication? How many of our village greens are framed, on the one side, by a red-brick-and concrete "budget" school wading in a sea of asphalt, without one shred of free expression to illustrate its dreams and beliefs, while the nearest approach to color, form, and imagination is confined to the local church, which is open only on Sunday?

Consider this suggestion from the viewpoint of the artist. In the church his work stands alone, enthroned in emptiness, except for those fleeting periods on Sunday when his audience is preoccupied with the service itself, if not the Sunday dinner and the inevitable golf game. In the school, the same work by the same artist is surrounded by the teen-age art class, and seen in passing by every teacher, parent, and friend of the community for five days and possibly as many evenings a week. Consider, furthermore, the breadth of subject matter, no longer limited to the procession of devout figures with folded hands, which are available en masse from innumerable catalogs, but an infinity of educational, athletic, even military subjects in the full scale of *mens sana in corpore sano.*

It is interesting to note that religious art in historical perspective followed closely the pattern outlined in my proposal. The church, after it emerged from the catacombs, was a simple, chaste shelter. Almost immediately, however, iconography was born, perhaps when the first worshiper drew the picture of a fish to symbolize the Ichthys acrostic. And, in quick succession, the frescoes, mosaics, then the carving of stone and wood, (coincident with the indiscriminate cannibalizing of pagan temples), all designed to lead and instruct the faithful in the story and the ritual of Christianity. It culminated in the magnificent storybooks in glass and in stone which still line the walls and façades of the great cathedrals.

For several centuries, the church was the sole center of mass instruction—the school; the propagation of the faith was symbiotic with the propagation of free thought and discussion. The cathedral and all that accompanied its inspiration ultimately gave birth to the city, the university, the theater, and the hospital; art soon burst out and blossomed in secular life.

Yet religion did not, as far as we can ascertain, suffer from this progression. Christian faith existed in the beginning, independent of all tangible, visible expression, through centuries of oppression. And faith grew to great heights in succeeding centuries, as much in spite of its artistic extensions as because of them. In fact, St. Bernard de Clairvaux, among others, fought valiantly against the use of decorations in the churches he built. It is well known that many great churches were admittedly the symbols of individual vanity and self-aggrandizement rather than the direct products of pure religious zeal. And it is undeniable that the light that art and architecture shed on a hitherto dark world brought forth the freedom of thought and research that culminated in the Renaissance and the Reformation. (The collapse of the proud arches at Beauvais signaled the imminent fragmentation of the Christian Church in an obvious structural and sociological parallel to the débacle at Bab-El in the Old Testament.) But faith—pure faith—continued at its own rate long after the much heralded gothic style, symbol of the misnamed "Age of Faith," was abandoned in the 15th Century as barbaric—hence the name.

Yet today, despite our claim to an objective view of the past and a supposedly contemporaneous approach in all fields, we feel impelled to introduce all the foreign attributes of religion into the modern church without realizing that this atavistic view can never achieve anything but an art derivative, retrospective, and meaningless except as a romantic illusion.

The development of this proposal should go hand-in-hand with current revisions of the liturgy and the architectural introspection they will undoubtedly inspire. The window that the late Pope John opened to let a little light into the church may also let out many of the accumulated habits of centuries, and the result cannot help but be salutary.

Like Martin Luther King, "I have a dream."

I can see the new church, "a place of silence, of prayer, of spiritual joy," (the quotation is not from the gospels, but from Le Corbusier), uncluttered by outward effects, free for worship and meditation alone, a pure shell in which to enjoy one's own private visions.

I can see the schools, broadened by new sculptural dimensions, brightened by new colors and textures, bursting with an endless stream of visitors.

I can see the harassed mothers leaving their station-wagons to enjoy the new bas-reliefs or some experiment in calligraphy, and a group of fathers who came to retrieve the Little Leaguers and remained to discuss an abstraction.

I can see the artist, freed from the graven images of the past, devoting his time, energy, imagination, and genius to an eager audience of all school ages.

I can see the teachers, too, with The Three "R's" amplified by an additional one for art, leading their classes to new horizons of sensation, creation, and expression. This, incidentally, may serve to balance the overpowering diet of TV and comics with a cultural influence. It may even serve to introduce a new world of devotion. A noted rabbi (teacher) recently blended two great spheres of education in gentle and unconscious defiance of a recent Federal decision, in a single phrase: "Study is a form of prayer." Would the courts object, I wonder, if a student lit a votive candle before the figure of Socrates or Lincoln, simply because it was beautifully executed?

I can see the children, with the light from the windows of Chartres falling on their passing T-shirts, wearing away the bronze toes of great teachers, or scholars, yes, and even great athletes with their caresses. And I can see these same children, brought up in an atmosphere of taste and culture like the children of the Medici, the Pitti, the Pazzi, and La Scala families, and matured to become the democratic patrons of a great world of free expression.

I must confess, in all honesty, that my vision of the pastor and the priest in terms of this fanciful prospect is not equally clear, and I have no doubt that their view of my proposal is, reciprocally, quite dim. This hiatus in communication will certainly not hasten the project.

But this is not the main reason that Martin Luther King may realize his dream long before mine is fulfilled. The stark fact remains that this cause, if it merits that name, will be difficult and slow to implement. It is not the well-intentioned school board, nor the dedicated teacher, nor the wealthy donor, nor the inspired artist who can set it into motion. The first and foremost responsibility lies with the architect. First, there must be a period of private soul-searching, followed by the difficult indoctrination of his dual client, the school board and the church committee. Then the inevitable tussle with the ugly-headed monster, the factor of cost. This paradox persists in the nation which is not only admittedly the richest in the world, but the one in which freedom of thought and expression are the watchword. We accept without question the astronomical financial burden required to place a man on the moon, in full awareness that we may not be the first to arrive and with no guarantee that he will ever get there. Yet we balk at the relatively insignificant cost of launching this and all future generations into a new spiritual universe. This particular facet of modern education is one of the most challenging aspects of modern architecture. Will we be the ones to get there first?

CHURCH FURNISHINGS: Continuity of Design

Of all the types of specialized furniture available from manufacturer's catalogue designs, seating for religious buildings appears most in need of attention. Numerous inappropriate chairs and countless Georgian, Victorian gothik, and nondescript pews are offered in the catalogues, but few, if any, modern designs that seem to be especially suitable for churches and temples. As a result of selecting unsympathetic furniture, the consistency of many an otherwise well-designed religious interior has been destroyed.

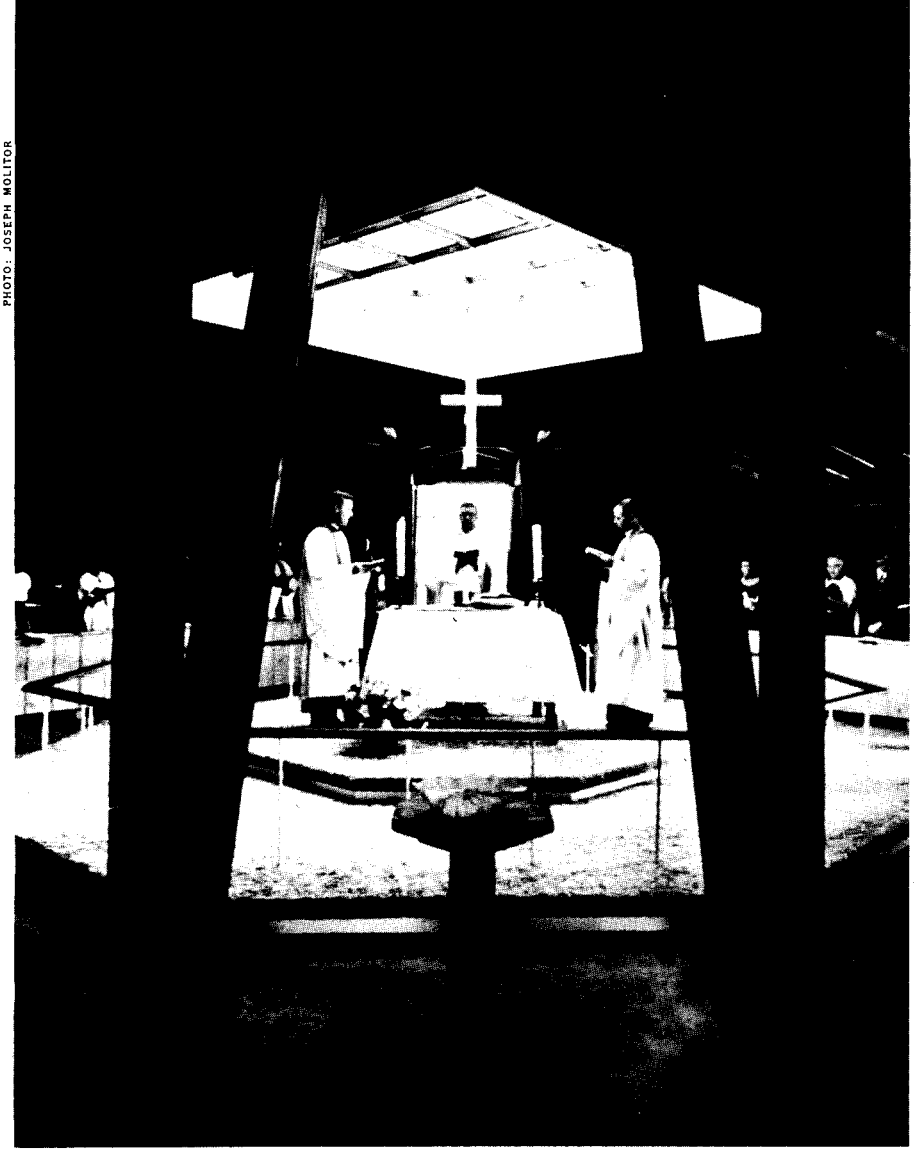
Architects who care—and that would seem to be the determining factor, since cost can usually be taken up in the quantity order — must design their own seating for these buildings. Perhaps this is as it should be. And perhaps manufacturers are not at fault. Those individual elements such as the pulpit, font, and altar, or the ark and menorah are almost always designed by the architect for each project, or by a commissioned sculptor.

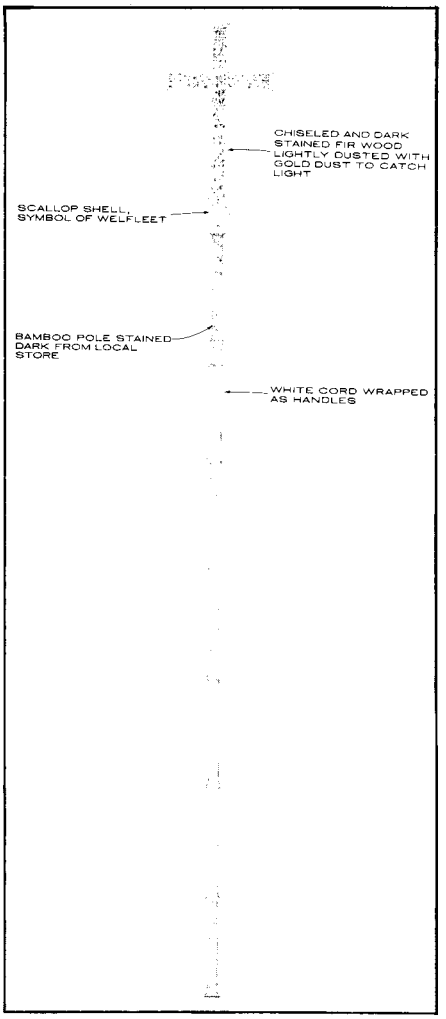
Often, the prominence of these custom-designed elements is expected to convey an effect of over-all design integration; yet they are insufficient to bear this design burden when the larger-scale element of seating has not been integrated into the design.

In the consistent religious building, the design of the seating is a major element of the aesthetic. For seating units are used in such quantity in these interiors that they become, through repetition, a single, large-scale architectural element, virtually an adjunct of the floor treatment. It should therefore perhaps be more generally recognized that custom-designed seating or significant adaptation of catalogue designs is essential if a custom-designed religious building is to be given complete continuity of its aesthetic.

A few examples of such microcosms within the macrocosms of these buildings are shown on the following pages.

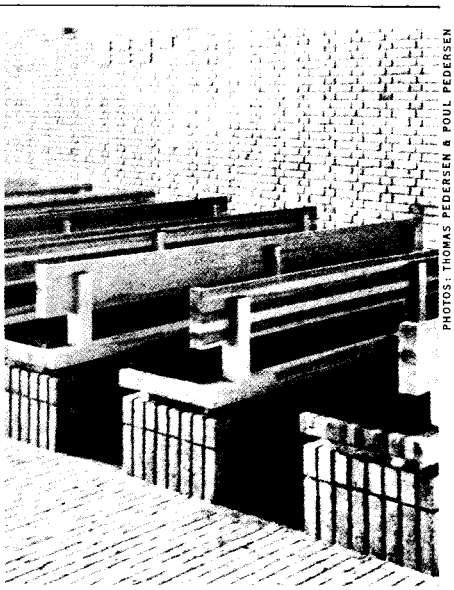
PHOTO: JOSEPH MOLITOR





A rare degree of consistency in both architecture and symbolism is to be found in Olav Hammarstrom's Episcopal Church of St. James the Fisherman in Welfleet, Massachusetts. There is virtually an interpenetration of the physical and spiritual aspects: The rustic character of the structure gives to the centrally placed altar a sense of the manger at Bethlehem, while a tablecloth drapery on the same altar table produces a realistic setting for the symbolic sacrifice of The Last Supper. Simple wood pews are in keeping with the exposed wood structure; together with the base of the font, the suspended altar cross, and the processional cross—all of which are of carved and chiseled firwood highlighted with gold dust—they conjure up the image of a carpenter's work. A shell, the symbol both of St. James and the town of Welfleet, is used as the font itself.

St. Clemens' Church in Randers, Denmark, by architects Inger Exner, Johannes Exner, and Knud Erik Larsen, is constructed of brick with a wood roof. Using the same materials, the pews have brick bases with seats and backs of laminated pine. This treatment of pew bases might become an exemplary guideline toward achieving design integration.



PHOTOS: THOMAS PEDERSEN & POUL PEDERSEN

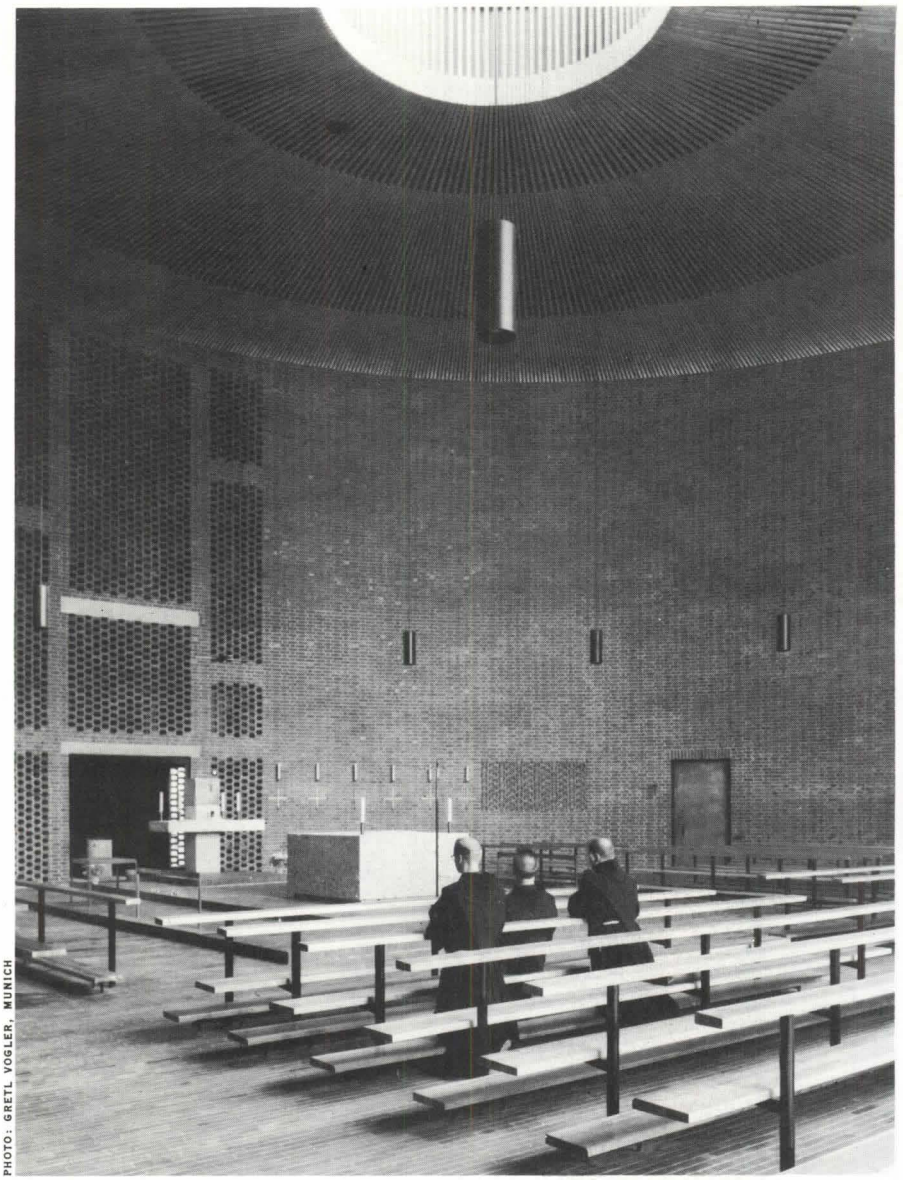
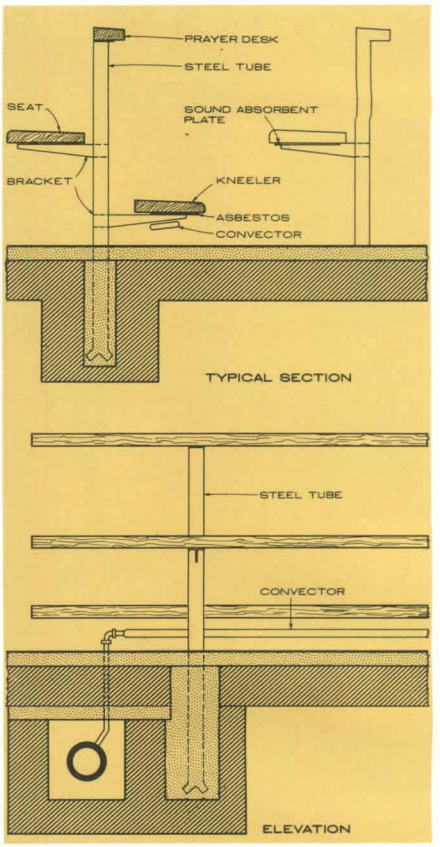
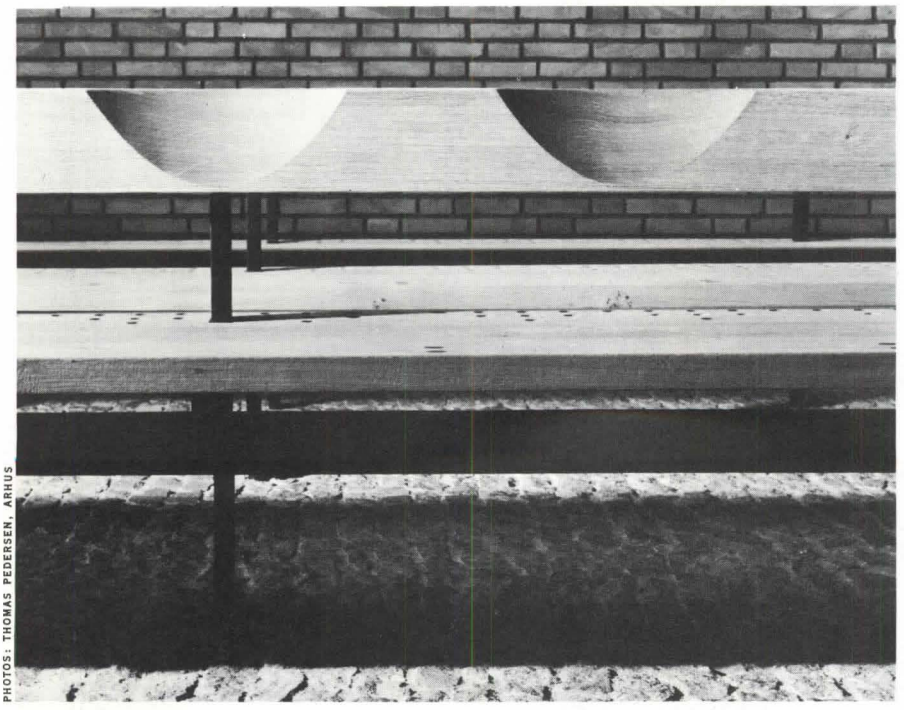


PHOTO: GRETL VOGLER, MUNICH

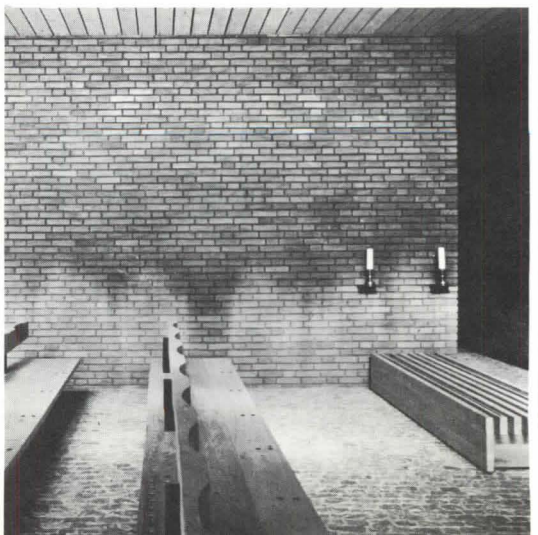


In the monastic severity of architect Sep Ruf's Roman Catholic Church of St. John Capistran in Munich, the pews themselves make a strong statement about the Franciscan order founded by the patron saint. A single steel tube is used as the upright to support both the pinewood seat and back of the pew, as well as the kneeler. This economical design is probably the purest expression of such furniture to date. Heating is incorporated in the form of a convector running underneath the kneeler.



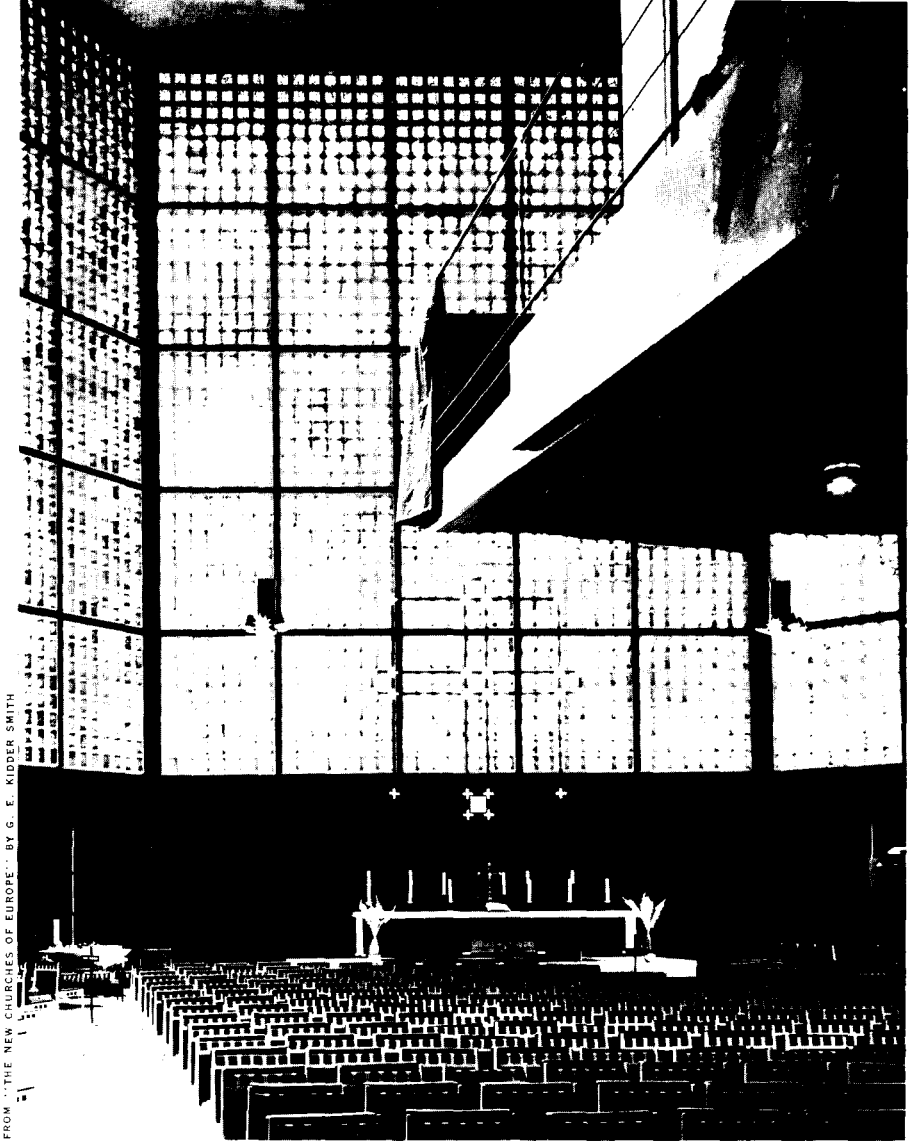
PHOTOS: THOMAS PEDERSEN, ARHUS

The Mortuary Chapel of the Bogense Hospital in Bogense, Denmark, by architect Salling-Mortensen, is constructed of red brick walls, granite block floor, and a ceiling of unpainted boards. The distinctive benches, which, like the bier, are of light oak, provide the major decorative element of the interior. Individual places are defined by segments carved out of the backs of the benches and by a pattern of incised circles in the bench seat.



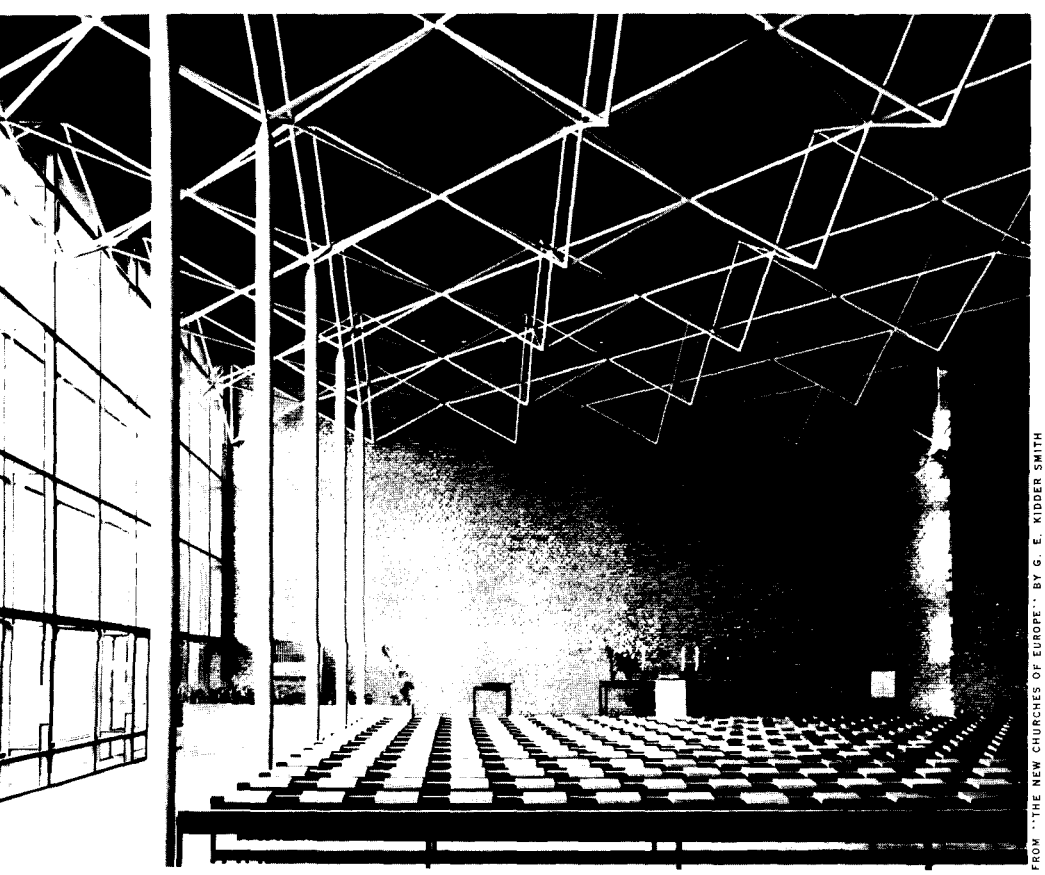
PHOTOS: MAX HELLSTERN, REGENSBERG

Swiss architect Julius Dahinden's Roman Catholic Church of St. Paul, in Dielsdorf, Switzerland, is constructed of reinforced concrete, exposed on the exterior and on the interior, with larch wood used as the ceiling surface. The pews and kneelers are constructed of concrete vertical supports and larch horizontals. This seating design is "an integrated part of the architectural totality," the architect says, and clearly has visual weight appropriate to the brutal, cubistic design of the building. The pulpit, altar, and font are similarly of rough-formed concrete. In the main, "all decoration was eliminated in accordance with the Early Christian liturgy."



FROM "THE NEW CHURCHES OF EUROPE" BY G. E. KIDDER SMITH

Architect Egon Eiermann's Kaiser Wilhelm Memorial Church in West Berlin, a rebuilt version of the old, bomb-ruined Protestant church, is completely surrounded by walls of stained glass in precast panels, which are set within black steel framing. The tense insistence of the pattern is further reinforced on the interior by black leather strapping on the wood chairs. This combination of similar patterns makes a powerful statement.



FROM "THE NEW CHURCHES OF EUROPE" BY G. E. KIDDER SMITH

The Protestant Paul Gerhardt Church in Mannheim, Germany, has wood and steel pews arranged in the "continental seating" plan—that is, continuous and without aisles. The prayer desks on the pews, however, are not a single continuous board, but are individual desks marking single seats. The skipping pattern created by this design is strongly decorative and has an obvious affinity with the vaulting tracery of the delicate space frame that supports the roof. Gerhard Schlegel and Reinhold Kargel were the architects.

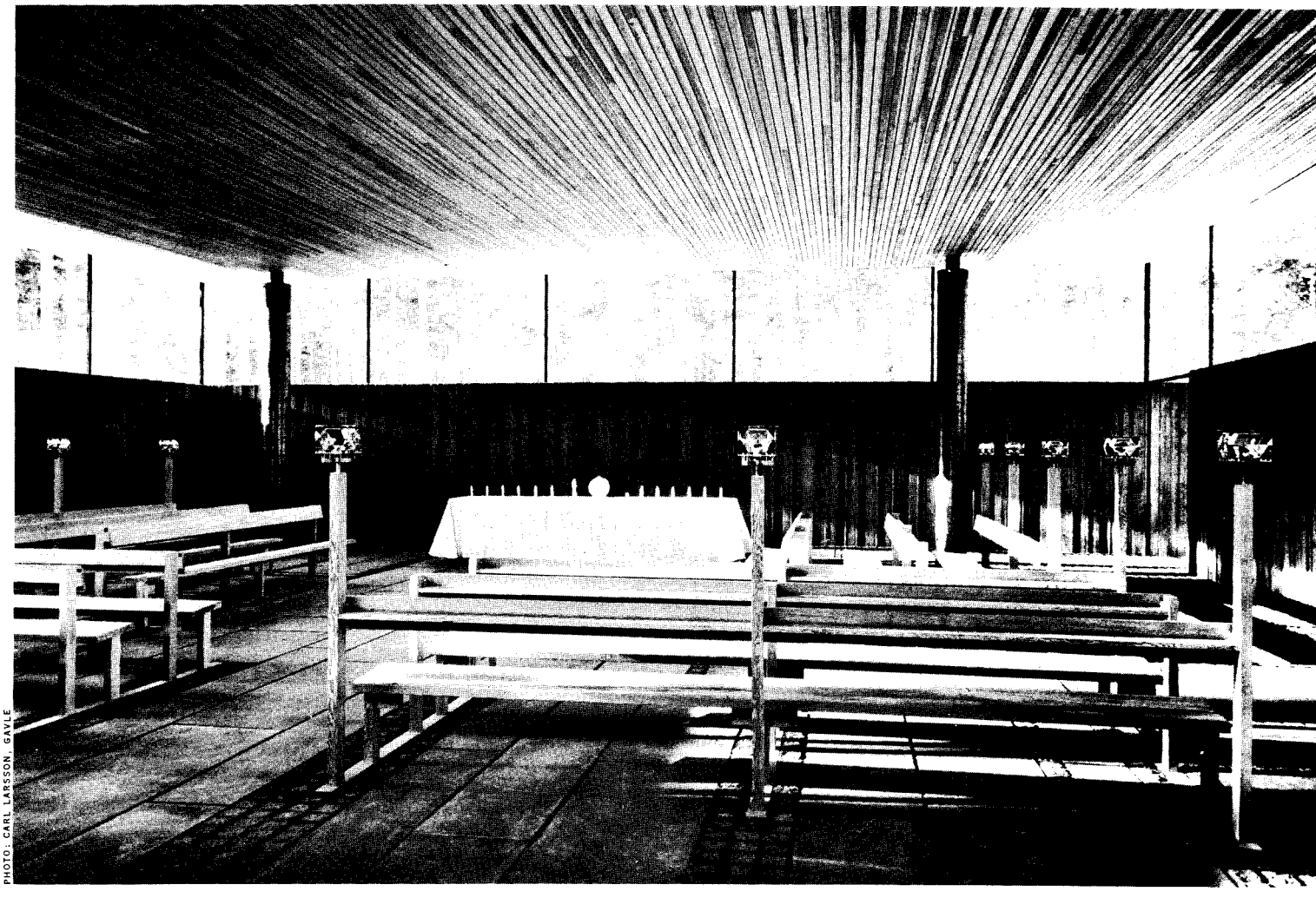


PHOTO: CARL LARSSON, GAVLE

The Crematorium of the Swedish town of Gävle is justly celebrated as a poetic setting of refinement and repose appropriate to the funeral ceremony. In each of the two chapels, a continuous clerestory above the concrete walls has the effect of a frieze incorporating the natural tranquility of the pine wood site as part of the interior. The altars and plain, sparse furniture, which are of untreated pine like the ceiling, have been grouped to surround the bier and create a simple but direct focus. Cubes of prismatic crystal glass brilliantly light the space from posts that are extended uprights of the pews. The architects are Alf Engstrom, Gunnar Landberg, Bengt Larsson, and Alvar Törneman.

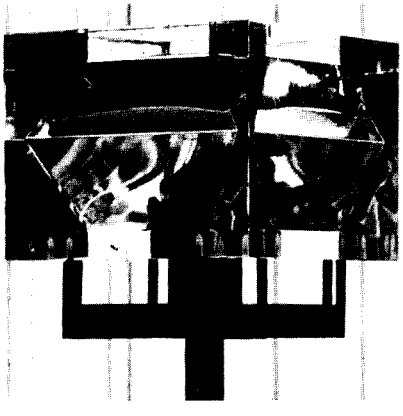
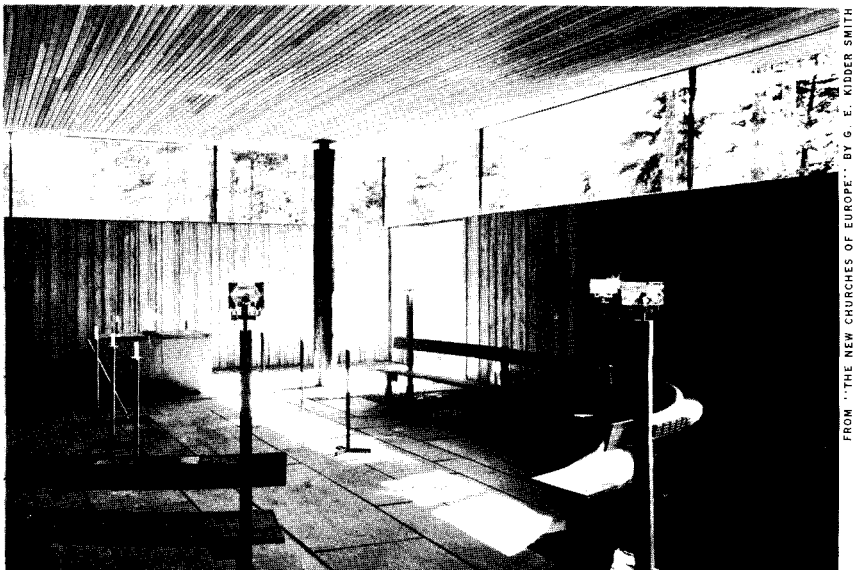
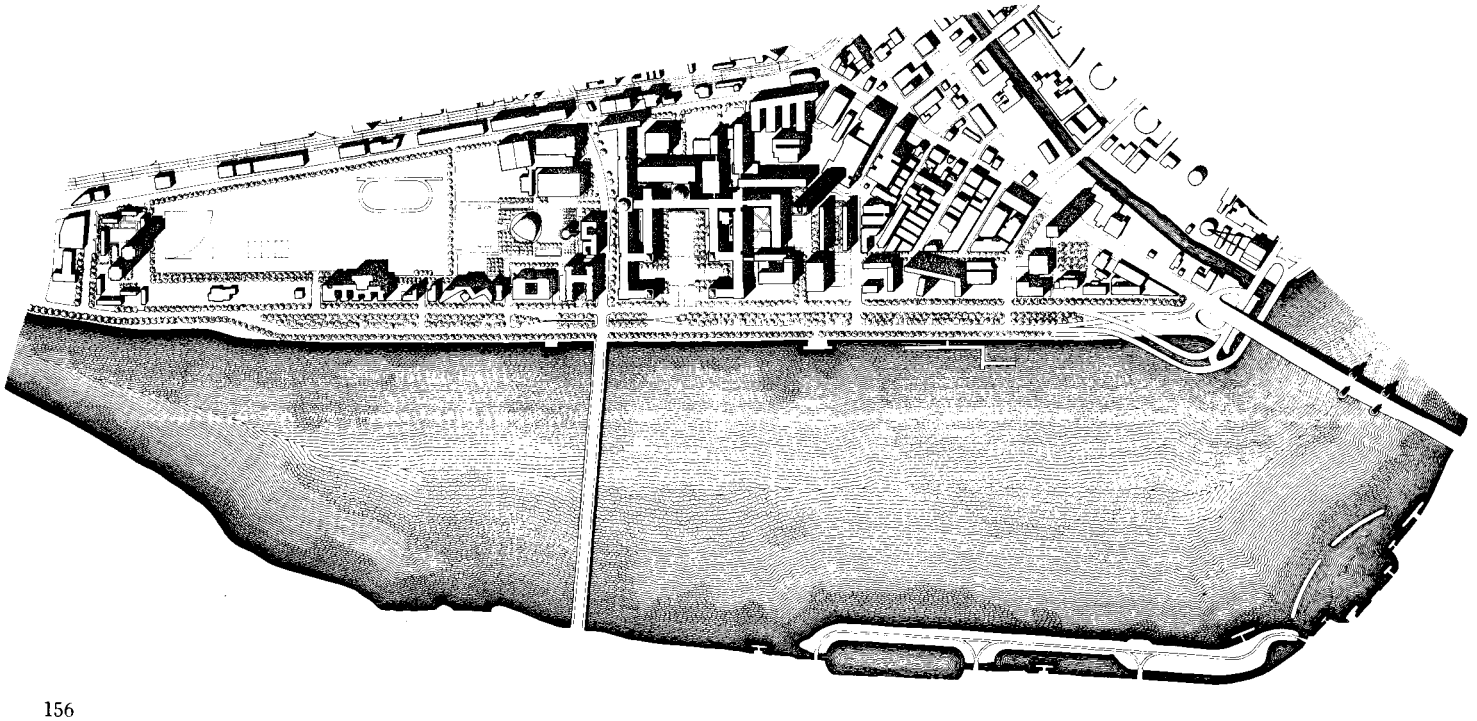


PHOTO: ATELJE SUNDAHL

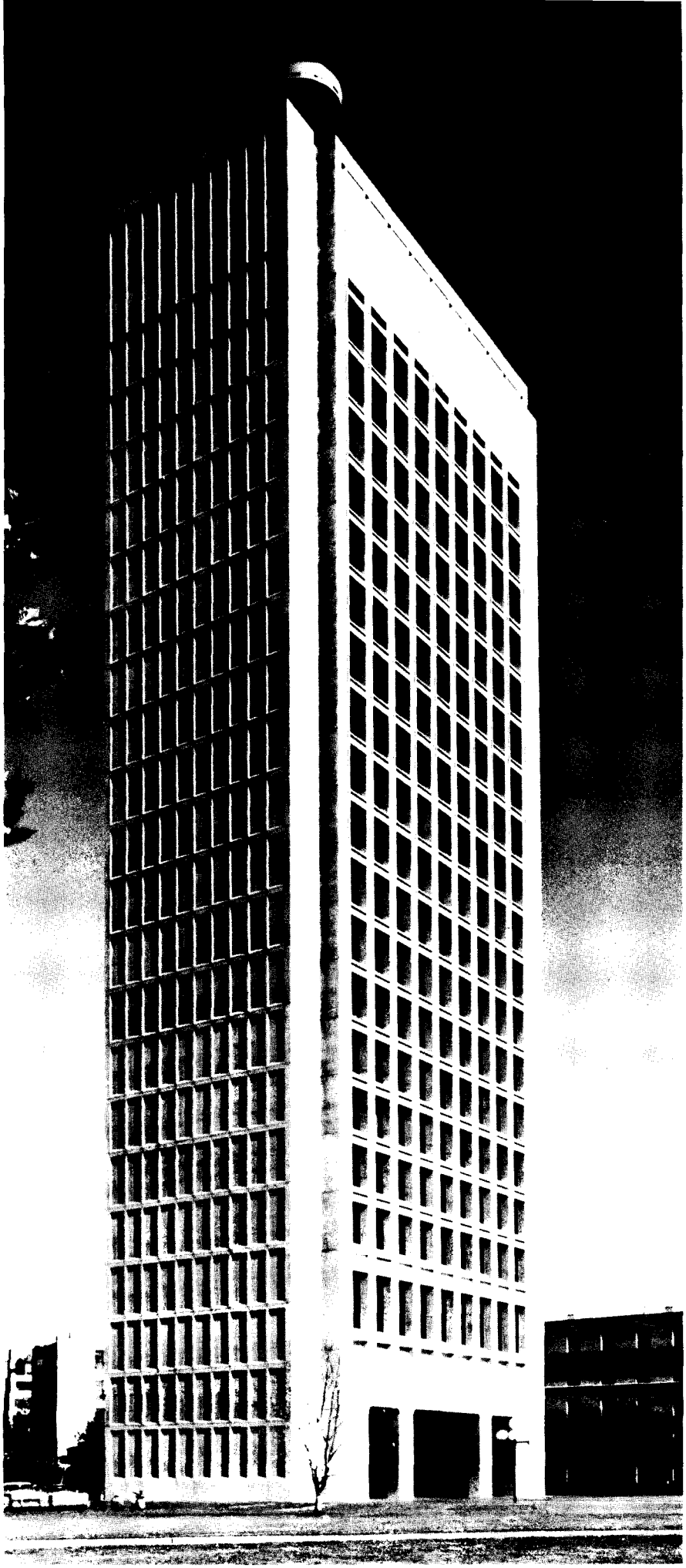


FROM "THE NEW CHURCHES OF EUROPE" BY G. E. KIDDER SMITH



NEW LANDMARK FOR M.I.T.

The 21-story Center for Earth Sciences by I.M. Pei & Associates joins with new towers on nearby campuses in reshaping the Charles River skyline. The next several pages are devoted to a discussion of this new tower in relation to the form of the M.I.T. campus, following which the building itself is examined.



THE SETTING: COMMUNITY AND CAMPUS

Nowhere is the changing scale of American education more strikingly evident than along the Charles River, the placid stream that separates Cambridge from Boston. High-rise buildings completed within the past year at all three major institutions along the river have reshaped a skyline that was once dominated by domes, turrets, and cupolas. (See "Harvard's New Married Student Housing," pp. 122–133, DECEMBER 1964 P/A.)

MIT's first high-rise academic building is merely the most visible part of an extensive physical expansion program, but is of special significance as a sharp break from a distinctive and long-established pattern of campus development. This pattern was established by Welles Bosworth, who designed a new campus for the Institute when it moved to Cambridge in 1916. The most conspicuous characteristic of Bosworth's buildings was the elegance of their Classical style. His Great Court—with its rows of cool Ionic columns leading up to a low central dome, its elms and rhododendrons, and its framed view of the Charles—has served as an image of MIT for generations of students. But behind this classical serenity, Bosworth concealed a planning concept that was revolutionary for its time. He established a system of four-story buildings continuously linked together at all levels and free of interior bearing walls, within which academic space could be assigned freely.

Bosworth envisaged this continuous academic structure spreading to several times its initial size—a concept that was realized in part through actually expanding the building several times, up to the time of World War II. Faced with the need for rapid physical expansion after the war, MIT gave up Bosworth's limestone and Ionic details and turned to yellow brick; ceiling heights were lower in the new buildings and some of them had as many as six or eight stories, but the concept of linked buildings was generally maintained.

Bosworth's system has been a great asset to MIT. Much of the flexible academic space has been divided and redivided several times over the years, allowing whole departments to swell and shrink or refill the gaps left when an activity has moved to newly constructed wings.

The interior weatherproof circulation system is welcome in the bitterly windy Cambridge winters, and the Great Court offers appealing shortcuts in fair weather. Central corridors, some of which run almost 1000 ft in a beeline, seem interminable, but are no longer in fact than most campus walks; moreover, they make

it unnecessary to return to ground level in going from one area to another.

Late in the 1950's, when a campus Master Plan was drawn up by the Institute Planning Officer in collaboration with Sasaki, Walker & Associates, it was decided that MIT's future needs for academic space could best be met by introducing high-rise towers among its sprawling low-rise buildings. It was on the basis of that plan that the Earth Sciences tower was designed. Since the other project towers have not been carried over to subsequent Master Plans prepared by the MIT Planning Office, this tower may remain the only one in the central, academic area of the campus.

Pei's commission was not limited to this single building, but included the entire quadrangle in which it stands. This area, at the east side of the original academic complex, lies directly on the main axis of expansion for academic facilities as MIT spreads into an area of light industry to the east. It has been said that this new tower marks the eventual academic center of gravity of MIT as the Bosworth dome marked its original center of gravity.

The placement and form of this tower were determined in relation to other buildings proposed for this quadrangle, the preliminary layouts for which have already been approved. Alternatives to a tower were considered, but the architects felt that a strong building form was required to give this pivotal area of the campus a focus. The existing buildings surrounding the quadrangle—of disparate forms and functions and loosely arranged —needed the "leadership" of a tower. Moreover, if all the academic space programed for the quadrangle had been housed in low-rise structures, it would have been impossible to develop a major open space.

In the design of the tower, Pei and Cossutta were consciously respectful of the architectural tradition established by Bosworth. Like some of the architects commissioned to develop other areas of the campus (Walter Netsch of SOM—the north academic area; Harry Weese—the graduate living center on the West Campus), Pei is an MIT alumnus. Pei contends that the buildings designed for MIT by Aalto and Saarinen could have been built anywhere; they bear no particular relationship to this campus. His building—the tallest on campus and visible from miles away—would inevitably become a new symbol of MIT. He was determined that it should restate the classical theme of the original campus buildings, but in new materials and at a larger scale, befitting a campus that now stretches more than a mile along the river. The situation did not call for an assertive "prima donna" form, he felt, but one as serene as the existing dome.

In reiterating the established campus architectural theme, the architects have recalled Bosworth's 9-ft module, his rigorous symmetry, and his theme of dark, recessed glass areas between columns; they have also closely duplicated—in concrete—the texture and color of the original limestone. It is perhaps only a coincidence that the resulting building is as consistent with the recent works of I. M. Pei & Associates as it is with the MIT campus.

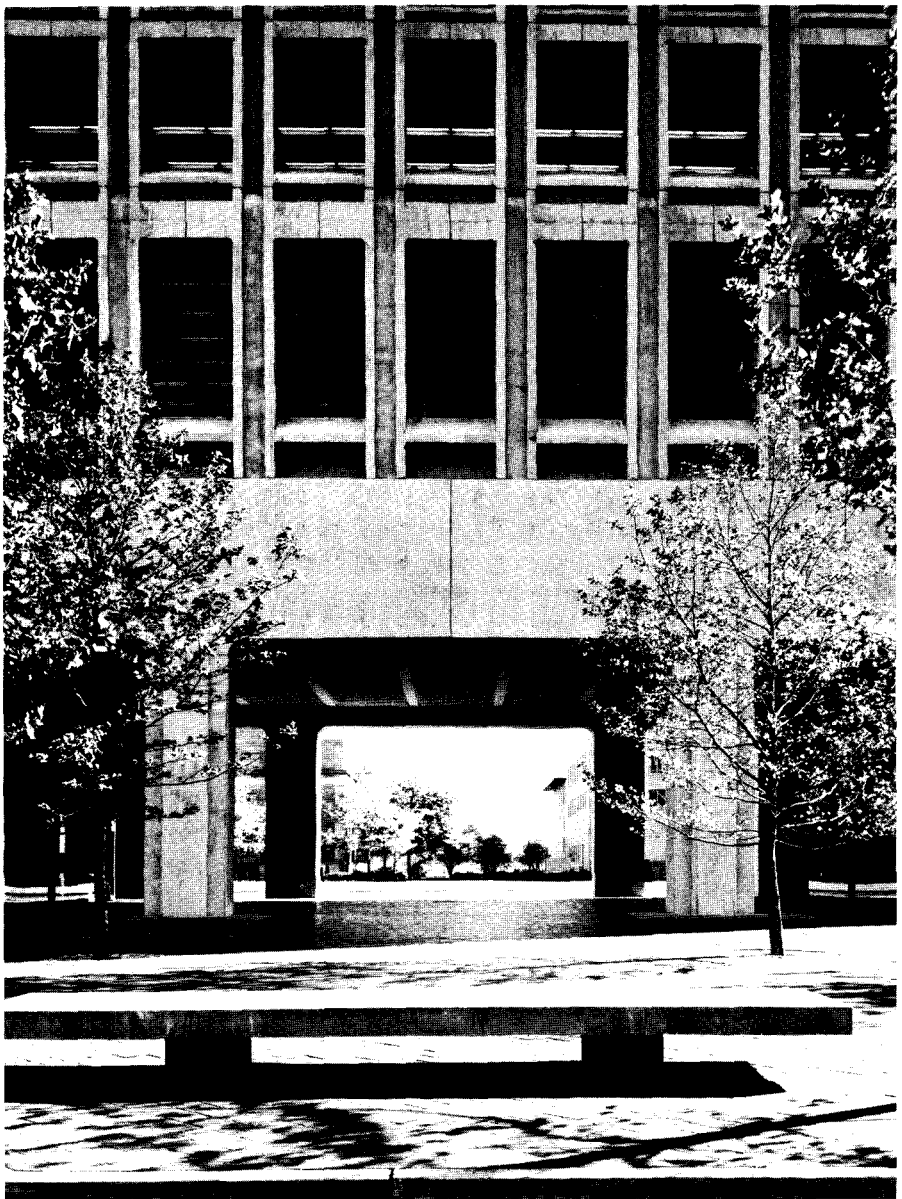
However sensitively it conforms to the architectural spirit of the older academic buildings, the building departs completely from the prevailing pattern of planning. It is not only higher than all previous buildings, but it is free-standing and fixed in volume. As if to emphasize the break with the existing indoor circulation system, the ground floor has been left largely open, maintaining the unity of the space in which the building stands.

The problem of accommodating student traffic in elevators has been solved by placing the lecture hall and the few conventional classrooms in the building on the lower floors, where they are accessible by stairs. The remaining 16 floors are devoted entirely to offices, laboratories, seminar rooms, and other facilities that generate light, unscheduled circulation.

Problems have developed, however, because MIT students refuse to follow prescribed routes. They wisely choose to reach the lecture hall at the wrong end by way of the elevators, shunning the 40-ft climb by stairs. When the elevators are fixed to by-pass the lecture hall stop, they merely ride to the next floor and walk down; the result is unforseen congestion at times when classes change.

Completion of the nearby Life Sciences Building, to which this building is linked by an underground passage, will give the tower two badly needed features: an indoor link to the main academic buildings, and a means for receiving freight and disposing of trash. A truck dock would have been incompatible with the design of this building and the site development, however convenient it might have been for the functions within.

Reactions to this precedent-breaking



building among MIT staff and officials reflect the many-sided questions it raises. Many Institute officials feel that the continuous corridors of the older campus buildings have value beyond that of sheltered communication between parts of the complex—that they encourage social encounters and foster interdepartmental relations. Any alumnus who recalls passing through the H_2S of the Chemistry Department to get to English class, or any researcher subjected to hourly bedlam just outside his door can testify, however, that the established system has very real drawbacks.

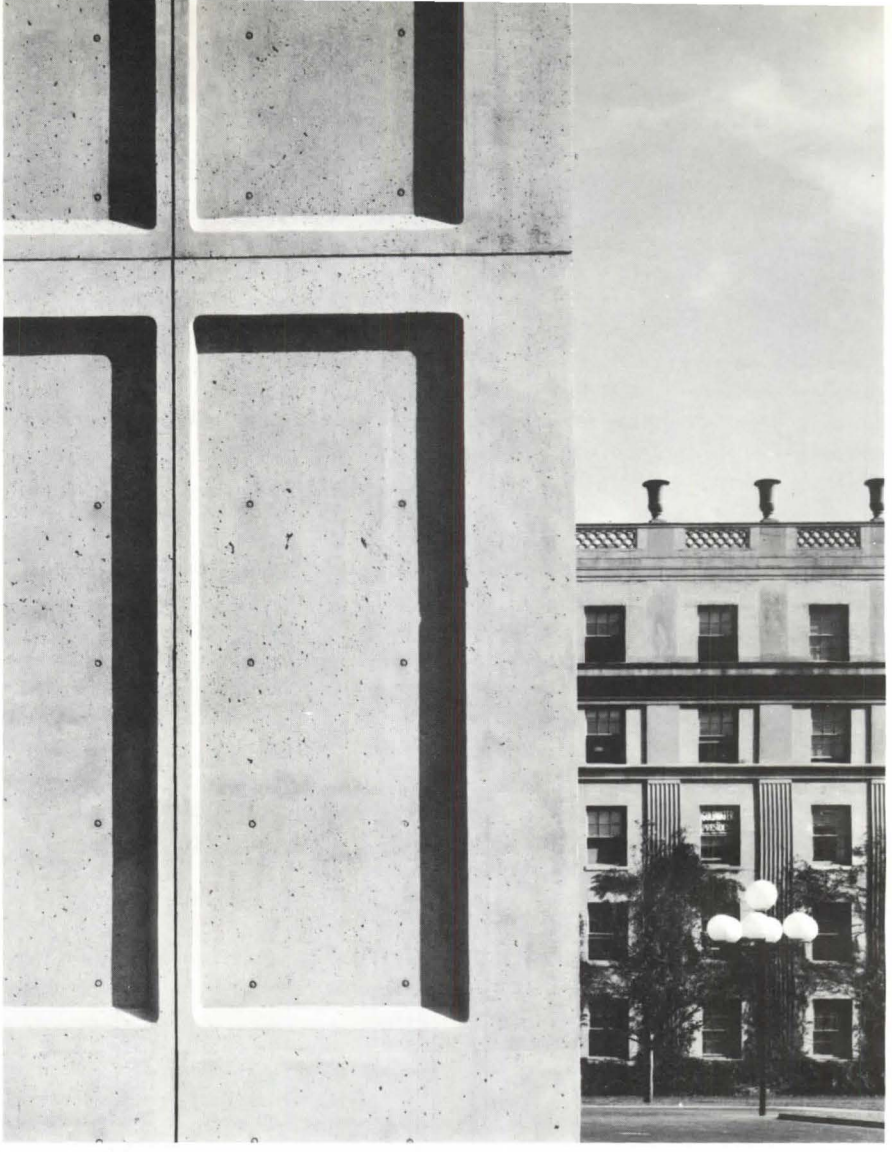
In this new building, interdepartmental contact among the faculty has to be artifically nurtured by daily afternoon tea, but researchers report greatly increased output after their first term in air-conditioned quarters with corridors free of student traffic.

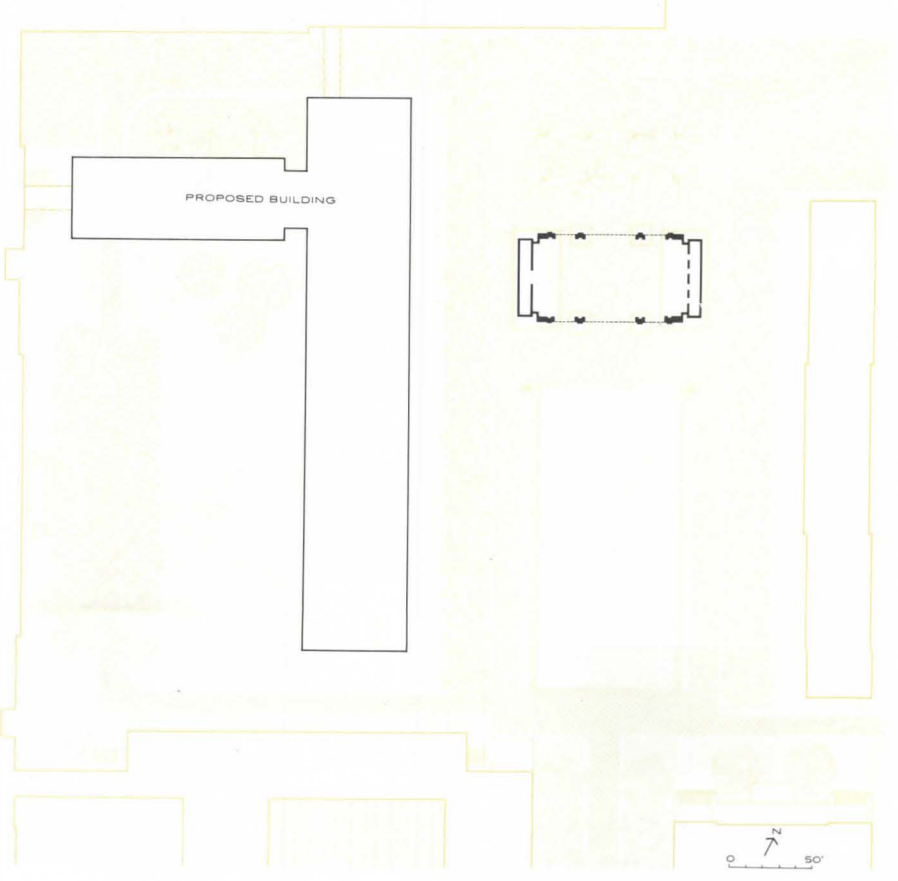
While the pattern of circulation in the new building may have some advantages, the lack of flexibility is a definite disadvantage. Expansion of the departments in the building beyond its initial capacity will result in major relocations or separation of related facilities. The flexibility and efficiency of assigning space are limited both by the 9-ft module for partitions (roughly twice today's average) and by the division of the total area among 20 relatively small floors.

MIT Planning Officer Robert Simha is among those who favor the existing, continuous-corridor system of campus development. He explains that current plans for development of the central campus call for a floor area ratio of about 2.0 (as compared with 1.3 in the original Institute buildings), and contends that this ratio can be provided within a general height limitation of five stories, "broken wherever appropriate by higher buildings." "For the present," he explains, " 'appropriate' means 'residential.' "

Pietro Belluschi, who has closely guided construction of new buildings on the MIT campus during his 14 years as Dean of Architecture, finds that the positive values of the new building outweigh any functional shortcomings. While the planning office is quite properly concerned with circulation and flexibility, Belluschi speaks of the importance of form as a symbol of a university's concern for values. As for the design of the building, he is pleased. "It is handsome and serene, has good scale, and—most important—it looks like MIT."

In a cityscape bristling with the varied towers of other institutions, this immediate identification of the building with MIT is an outstanding virtue.





THE BUILDING: CONCEPT AND DETAILS

The Earth Sciences Building exemplifies the design approach of Pei's office in the integration of its structural and architectural concepts and in the meticulousness of its detail. In this case, the need to minimize weight because of very poor subsurface conditions resulted in "spare," complex profiles for beams, columns, and panels that might otherwise have been considered uneconomical.

Modeling of the concrete surfaces has been designed so that the form of the building will be accentuated as surfaces become soiled. Patterns of window walls and paneled end walls will be intensified by soiling, and plain surfaces at the corners and above the loggia will remain relatively clean. Uniform air-intake scoops at penthouse level on both sides of the building will result in consistent soiling patterns; all exhaust air passes through wells in the penthouse.

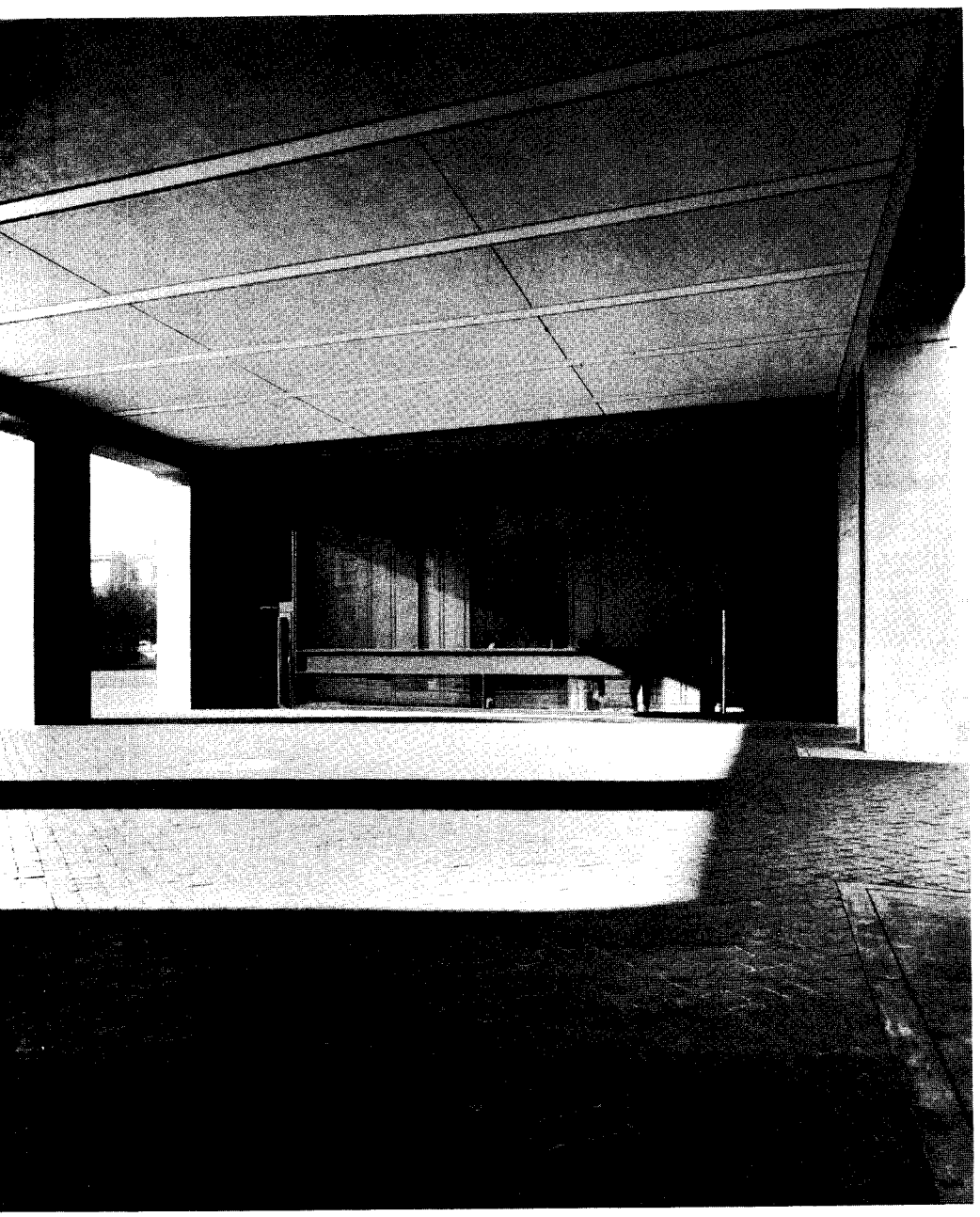
Precise control of the various exposed concrete surfaces required application of almost all forming techniques in general use. Glass-fiber reinforced plastic forms were used for most exposed exterior surfaces and plastic-coated plywood for exposed interior surfaces. Sheet metal forms were used for the concave recesses in the window wall at lecture hall, library, and penthouse levels. Window sills were precast off the site, using a precisely matched mix. Although the original plan was to sand-blast all exterior surfaces, it was later decided that leaving the sills smooth would produce a pleasing variation. The windows were set directly into grooves cast in the concrete, using no metal except for a strip at the sill.

Interior details are uniform and uncomplicated. Unshielded fluorescent troffers run between the flanges of the floor beams at 4'-6" intervals throughout the building; in the lecture hall, steeper angles of view made it necessary to shield the fixtures with grilles. The lighting system effectively blots out the view of ducts and piping, which run along the underside of the floor slab, passing through octagonal openings cast in the floor beams.

The use of the rooftop for meteorological equipment was part of the program for the building, and the supporting platforms were designed by the architects. Strong reactions to its appearance developed, however, even before the building was completed. Aesthetic objections came from MIT staff and alumni—groups generally assumed to be more scientifically oriented—as they came to recognize the building's symbolic role. As a result, the MIT administration rejected a proposal by the meteorologists to erect a 35-ft-

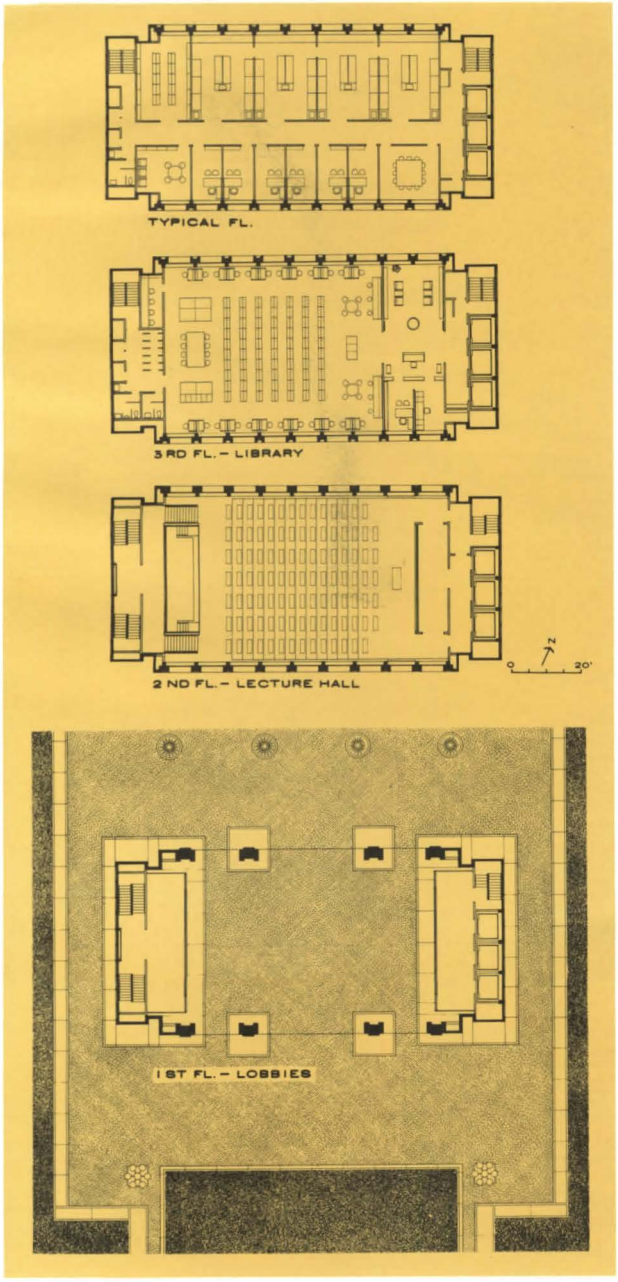
diameter radar dome, and it is now considering elimination of some elements already there and the lowering of others.

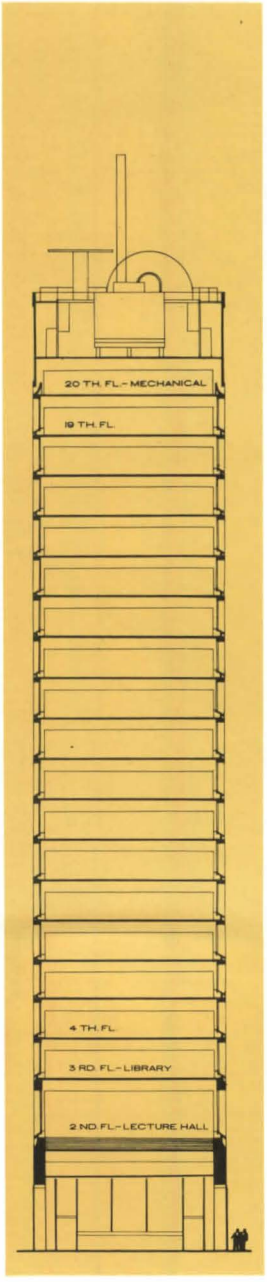
Pei dismisses any suggestion that the building might have been designed to be more compatible with the platforms and equipment. The relation of the building to the campus, he feels, ruled out any irregularity of massing. He considers the location of the equipment on the rooftop to be merely temporary. Operating such equipment in the smog of Cambridge—even 250 ft above ground—is far from ideal scientifically; it belongs, he feels, on the hills outside of the Boston area, where MIT's more sensitive meteorological equipment is already located. "After all," says Pei, "the oceanographers go to Woods Hole for their studies; they don't dig in the bottom of the Charles."



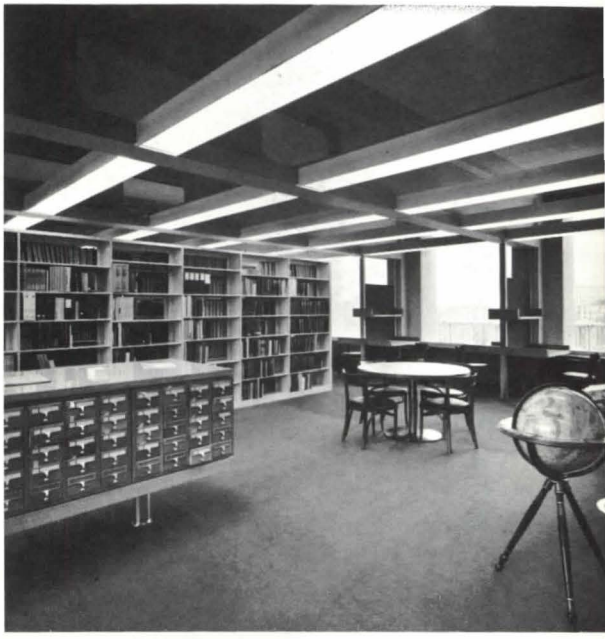
GREEN BUILDING, CENTER FOR EARTH SCIENCES, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Massachusetts. ***Architects:*** *I. M. Pei & Associates; Collaborating Partners: I. M. Pei & Aldo Cossutta.* ***Program:*** *73,500 net sq ft for teaching and research facilities in the fields of geology, geophysics, geochemistry, oceanography, and meteorology; included are a 294-seat lecture hall, a 20,000-volume library, and provisions for rooftop meteorological equipment.* ***Design Solution:*** *20 floors of uniform area above an open entrance loggia; each floor has column-free space approximately 48' x 93' between an elevator tower at one end and a stair tower at the other; extra-high story just above loggia devoted entirely to lecture hall; floor above that occupied by library.* ***Structural System:*** *Cast-in-place concrete; 42-in.-deep, I-shaped floor beams spanning 48 ft are supported by bearing mullions at 9-ft intervals; loads from the mullions picked up by 10-ft-deep post-tensioned girder at first-floor level; foundation consists of 392 concrete-filled 12-in. piles, average depth of 120 ft.* ***Major Materials:*** *exposed concrete painted on interior, sand-blasted on exterior; solar-bronze plate glass windows fitted directly into concrete frame, with precast concrete sills; metal stud and plaster interior partitions; acoustical tile ceiling directly on concrete slab; linoleum and asphalt tile floors; asphalt block site paving.* ***Mechanical System:*** *peripheral induction air-conditioning system with 100 per cent fresh air supply; fume hoods in geochemistry labs, with constant exhaust and untreated outside make-up air supplied directly at hood.* ***Project Manager:*** *Werner Wandelmaier.* ***Supervising Architect:*** *James Morris.* ***Interiors:*** *Suzanne Sekey.* ***Architectural Consultant:*** *O'Neill Ford.* ***Landscaping Consultants:*** *Sasaki, Walker & Associates.* ***Acoustical Consultants:*** *Bolt, Beranek & Newman.* ***Structural Engineers:*** *Severud, Elstad, Krueger Associates.* ***Mechanical Engineers:*** *Syska & Hennessy.* ***Photography:*** *George Cserna.*

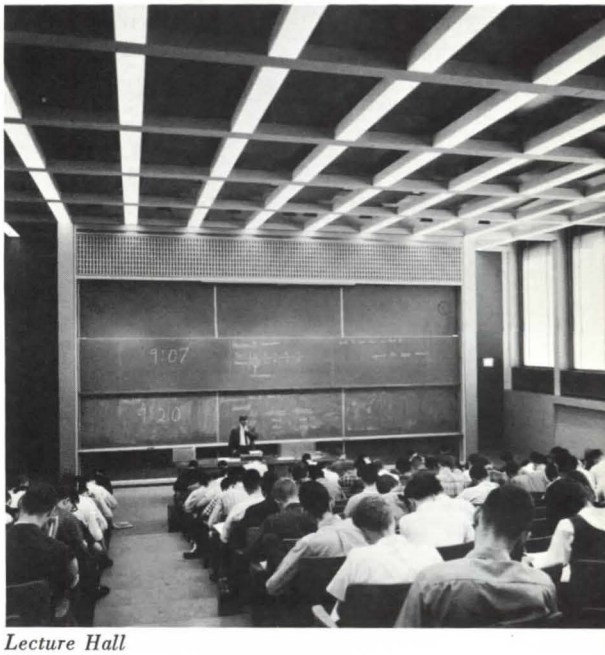
Faculty Lounge



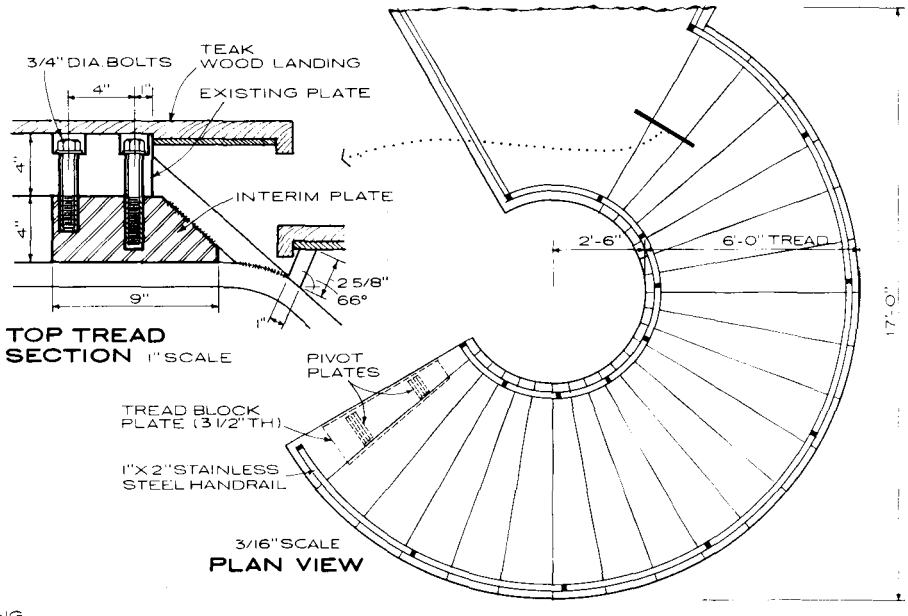


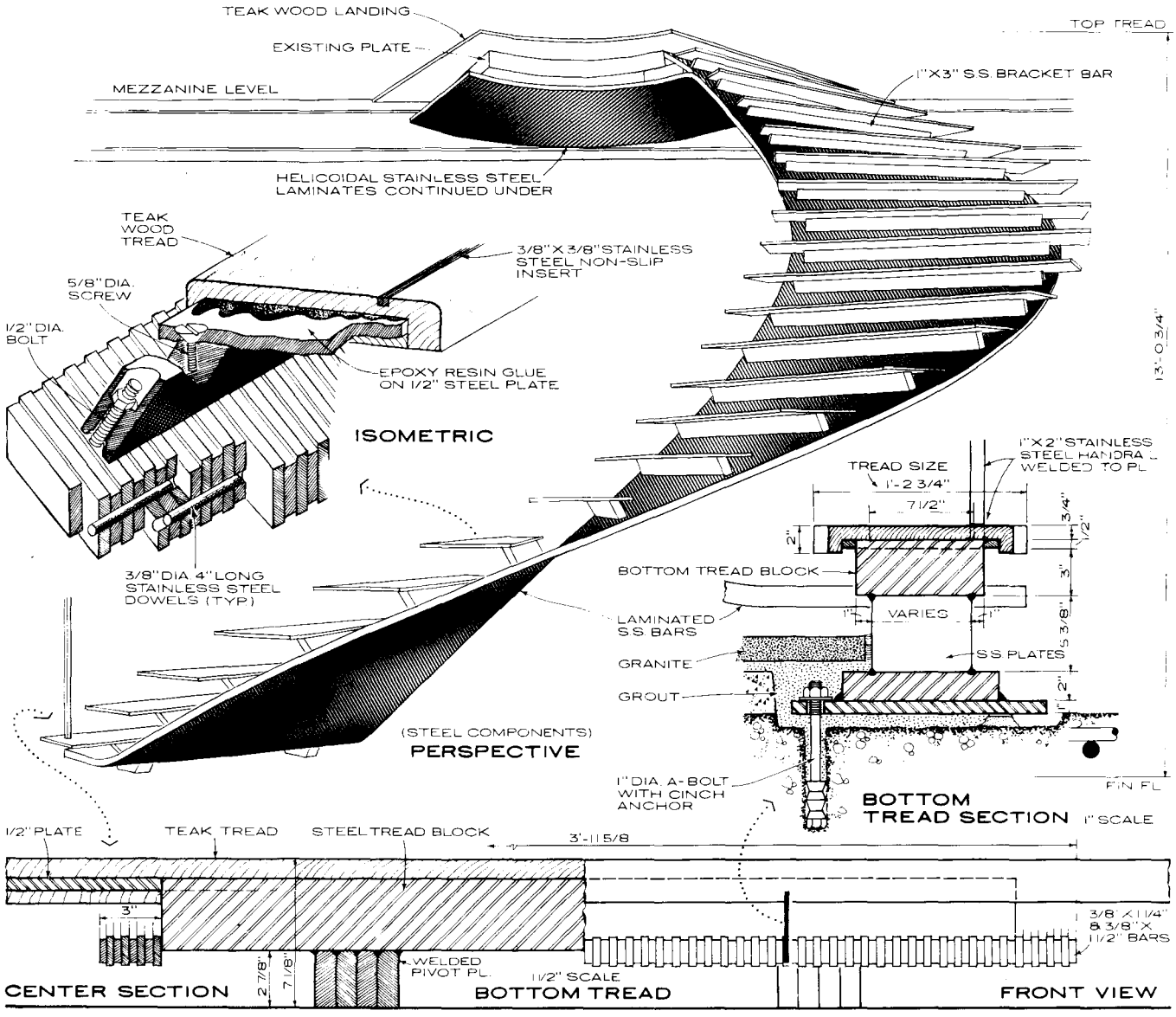
Library





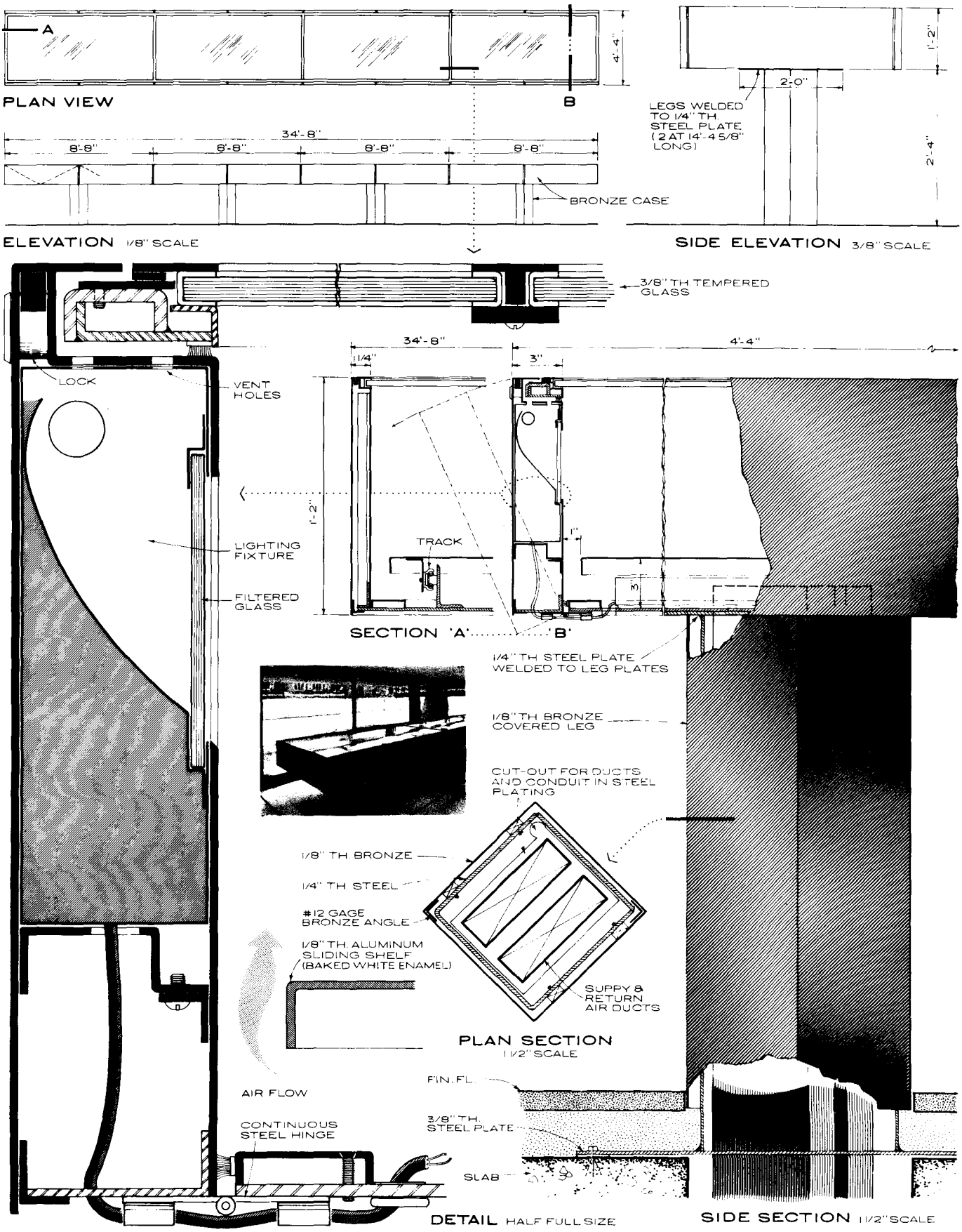
Lecture Hall





CANADIAN IMPERIAL BANK OF COMMERCE: Montreal, Canada* CLIFFORD & LAWRIE, Architects	SELECTED DETAIL HELICOIDAL STAIRS

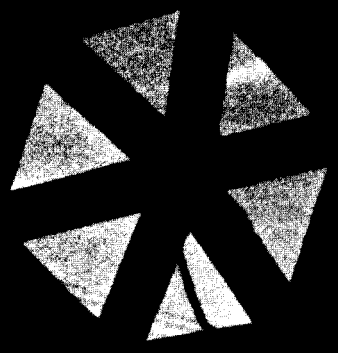
* See SEPTEMBER 1963 P/A



YALE RARE BOOK AND MANUSCRIPT LIBRARY: New Haven, Conn.** SKIDMORE, OWINGS & MERRILL, Architects	SELECTED DETAIL SHOWCASE

**See FEBRUARY 1964 P/A

THE ARCHITECTURE OF ISRAEL



BY ELLEN PERRY

Observations on a recent trip through Israel, made by an Associate Editor of P/A.

The architecture of Israel can only be understood against the background of its geography, its people, its history, and its special economic and social and technical facts of life. This is a truism, no doubt, and should apply to the evaluation of all architecture. But it is particularly essential to the discussion of an architecture arising from unfamiliar conditions.

This is difficult. Critical reflexes are conditioned by one's own standards and expectations. And in Israel, one simply does not find the sophistication of form, or the multiplicity of means, for instance, that are found in the United States. To compare the Israeli product with the product of another society—and to use as criteria factors that were unimportant to the original problem, or unattainable within it—is to make a serious mistake. Another difficulty for the visitor is that one cannot hope to understand the special conditions of Israel from a visit of less than a month. However, despite the drawbacks of built-in bias and nonexpert status, the report of a traveler has a certain interest and value. Here, then, is one traveler's view of the architectural situation in Israel, with such background information as will help to put the architecture into its context.

Geography and Climate

There are four distinct climates: the coastal plain, which supports the growth of orange trees and urban areas; inland, the Hills of Judea and the almost tropical Jordan Valley; to the north, Galilee, with fertile soil and rolling hills; and to the south, the desert, which extends from the Beersheba area to Eilat. Rainfall in the Negev, decreasing steadily from north to south, is less than an inch a year in Eilat.

From north to south, the country measures about 270 miles, half of it desert. Ben-Gurion, who has twice retired to the Negev, has said: "If the State doesn't put an end to the desert, the desert is likely to put an end to the State."

The People

The total population, which is derived from more than 70 countries, is 2,500,000. When Independence was declared in 1948, the population was about 700,000; by 1951, it had doubled. Immigration waned since those early years, averaging about 33,000 a year until 1960, but has now increased again. At any rate, the Law of Return enacted by the new state means that the country is open to any Jew who chooses to live there. (Of the people now in Israel, 38 per cent were born there.) There are, of course, other citizens of Israel—250,000 Arabs (four-fifth Moslem, one-fifth Christian), and 5000 who are neither Arabs nor Jews.

Everything built or planned in Israel must be seen against the background of the tremendous population increase.

The whole cultural-social climate must also be viewed against this growth. The present balance between those of Afro-Asian origin and those of European and other "Western" origin is 40:60. Afro-Asian immigration has been higher than that of the Europeans until very recently, and their birth rate continues to be higher also. There are many frictions between groups, and it is not simply a difference between the intellectual/business communities of Europe and the agricultural/artisan groups of less-developed areas. (Jews from Persia could claim to be the most authentic and aristocratic Jews of the world, with the foundations of Jewish law in Babylonian writings; Jews from isolated Yemen, whose practice of religion equates study with worship, are in the oldest and purist tradition of the early scholars.) It is a complicated conflict between people of different outlook and experience—and often of different color.

The disorientation that accompanies settlement in a new land, and the hostility that flares up between groups, suggests the turbulence of America's great waves of immigration. As in America, there is hope that the many languages and nationalities in Israel today will shape themselves into a nation of Israelis tomorrow. Also as in America, language will be a powerful force in effecting this fusion; one Hebrew writer says that the creation of modern Hebrew is "an even greater miracle" than the creation of the State.

Unity by Design

Certainly, too, architecture is making one nation out of a loosely related conglomeration of people. Much of the housing put up by the government, until a few recent exceptions, has been repetitive throughout the country, regardless of climate or terrain. Whatever judgment is made about this (and sensitive Israelis are making one), and whatever factors are responsible for it, the uniformity results in an undeniable national identity.

Architecture unifies in another way. Different family types, it is recognized, need different housing types. As seen in Beersheba, therefore, small units for older European immigrants are in taller blocks;

larger units, for the larger families of the north African immigrants, are in lower buildings. The policy is to build high next to low within a very small locale, hoping that the children will bring families together. Beersheba already has one of the highest rates (15 per cent) of "mixed marriages"—in Israel, a marriage between Jews of different ethnic background.

In another case, proximity for different groups has not been forced. The unique Lachish Regional Development has groups of small villages, each of homogeneous cultural background; the residents are often from the same village in Morocco, Iran, etc. At the center of a group is shopping, school, cinema. There will be the inevitable assimilation here, as in the rest of Israel, but it will be less abrupt and shattering.

As the nation develops, one might expect a specific Israeli architecture to emerge. Opinions vary: "No, it'll all be International." . . . "Perhaps yes, but it will take another generation at least." . . . "The Israelis are ruining Israel; only the old is authentic and we've turned our backs on it completely."

Style—whether invented or imported—seems to have been largely irrelevant thus far. The immediate problems of shelter have been paramount to—and even exclusive of—any deeper problems of architecture. In fact, the demand for new buildings was so great in the first hectic years that some say there was no time to think once, much less twice.

Cities, New Towns, Suburbs

Yet one thought, developed early, has been steadfastly upheld: the creation of new towns, instead of adding heavily to existing cities. In 1948, half the population lived in the three major cities of Tel Aviv, Haifa, and Jerusalem; today, only one-third lives there. These cities have each grown substantially, to be sure, but in relation to the country as a whole their growth has been deliberately checked by various policies—particularly the construction of new housing elsewhere. The number of new place-names rose from 400-odd to more than 900 in the years between 1948 and 1960.

Within the past decade, suburbs have appeared and are burgeoning. But even with the growth of suburbs, those who live in the three major urban areas and their environs represent only 50 per cent of the total population today, as compared to 70 per cent in 1948.

While the idea of suburbia, and the desire for it, seems to be catching on fast in some circles, others regard it as "bourgeois" and a far cry from the self-

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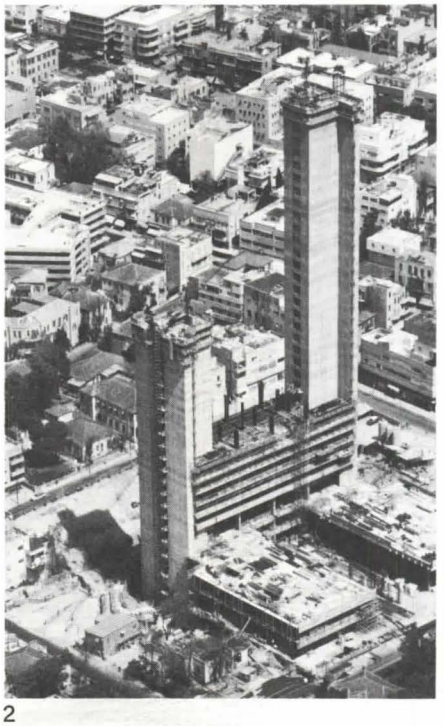

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Previous page: The old and the new in Israel. Club Mediterrané, a vacation village near the ancient ruins at Ahziv, north of Haifa. This imaginative exercise in geometry is by Heker, Neumann & Sharon, Architects. The system is an exceedingly economic one, and the shelters can be easily demounted for out-of-season storage. Tel Aviv ***(1)*** *is Israel's largest city, and although it is on the great crashing Mediterranean, there is little visible or audible reminder of the sea only a few blocks inland. This air view is southward, towards the Manshieh redevelopment area and beyond to the Jaffa promontory. Mayer Tower* ***(2)*** *in Tel Aviv will be the tallest building in the Middle East. Construction began with completion of its twin elevator shafts. The El Al building in Tel Aviv* ***(3)*** *is a curved slab of offices, with shops and parking below. The architects, Karmi & Associates, call it a "finite building, fitting into an existing urban pattern." Three service elements are emphasized vertically—main stairs, elevators and toilets, escape stairs.*

sacrificing pioneers who first settled the land and are still moving into difficult conditions in the undeveloped areas. Some of those in the development areas, however, are unhappy to be far from any "city," and a recent official suggestion urges that the population of new towns be brought quickly to a minimum of 10,000, so as to attract and hold those with initiative and education who might otherwise gravitate to the major cities.

In fact, there is a growing debate in official circles as to the whole future of the "development towns." Of the 23 special new towns established since Statehood, only one (Beersheba) has attained the 50,000 population deemed necessary for real viability. Only one other (Ashdod, location of the new port) is expected to join this rank by 1970. A number of the towns in the northwestern Negev are not expected to reach even 10,000 by then, despite various incentives and policies aimed at population dispersal. It is reported that although sites have been selected for seven more new towns, these may be delayed until 1980 or even later.

Tel Aviv—Jaffa

The first city, in terms of size, is Tel Aviv. In the first decade of the century, Tel Aviv had a population of 400; today, it has 400,000. Land prices in the area are growing accordingly, some 200 per cent in the past two years, in the city that was originally to be only an outlying district of Jaffa. In 1925, when Sir Patrick Geddes envisioned the future of Tel Aviv, his plan called for its being a garden-city suburb of Jaffa. Today, a master plan is being prepared under the direction of A. Hashimshoni, an architect on the faculty of Technion.

Tel Aviv is a difficult city to become oriented to, despite the fact that it is on the great, crashing Mediterranean **(1)**. A few blocks inland, there is no visible or audible reminder. Few major avenues look toward the sea or take advantage of this special (and only major) natural feature.

Inland, blocks have a sameness that reinforces the lack of a sense of place. But many of the blocks are pleasant: streets seem especially wide because they are tree-lined, and because gardens often extend well into the houses, under overhanging upper stories.

The architecture of Tel Aviv is monochromatic, as it is throughout Israel. But within the bounds of quiet restraint, there is variety; buildings in the heart of the city do not have the monotony of some of the newer developments outside the city. Variety does not enter into major elements of size or form or materials; it enters into the details by which the history and character of the buildings are read—their fenestration, balconies, gates.

Tel Aviv has a many-sided personality. Arthur Koestler has called it "a frantic, touching, maddening city which gripped the traveler by the buttonhole." Others respond to its outdoor cafés, reminiscent of Paris, or to its fashion and entertainment and commerce, reminiscent of New York, or to the jumble of squat white buildings, which recall Los Angeles—"a willful baby Los Angeles" with slums at the center and with suburbs in a mad spiral outward.

But the center of the city is changing rapidly and radically. Mayer Tower, a 32-story office building now under construction, will be the tallest building in the Middle East **(2)**. Its elevator shafts were built first, slip-formed, before the floors were constructed; the towers were designed to take all lateral loads and to reduce the number of other vertical supports. These twin shafts are at either end of what is unfortunately a banal slab on a banal pedestal. The building is "Pan-Amming" it with a vengeance, including its placement at the head of one of Tel Aviv's major business streets (six lanes of traffic will go under the tower). The architect is Y. Perlstein, who has probably the largest architectural office in Israel; he is also a planner who studied with Sir Patrick Abercrombie. In Perlstein's view, the Mayer Tower is only one of a kind, not even the first, and is part of the changing character of the city, inevitable and good. The city's first skyscraper is only five years old, an eight-story apartment block designed by Nahum Zolotov for a food chain; a separate low block is for the retail store, and its roof-garden makes a plaza for the tower behind it **(1, *center foreground*)**.

A major part of the city will change with the eventual execution of the Manshieh project. This area, along the waterfront between Tel Aviv and Jaffa, is to be redeveloped with a civic and cultural center, commercial facilities, and housing. Among the judges for the recent competition were Sir William Holford, Lou Kahn, and Bruno Zevi. Whether the winning designs were considered unbuildable, or whether the competition was to be only "an idea competition" from the first, is not clear. However, when the winning team turned out to be two young architects from Germany, there was outspoken public reaction, one citizen pointing out what he saw as a swastika form on the plan. At any rate, the municipality is studying the whole problem anew, hoping to combine the best of the ideas proposed. The result, says one bystander (an architect), is that they will come up with "half a tower, half an island, half a lagoon. It can't possibly be scrambled this way. And by the time there's a master plan for Tel Aviv, this area will already be established. All wrong. It was even wrong to pick this area in the first place. Just because it's empty doesn't mean that it is the place for a civic center." The jury report gave an excellent series of basic conditions under consideration, among them "the sight and sound and consciousness of the sea are vital to the city" and "the new center should have a sense of location strong enough to act as a real focus for a large town, even if not the only one."

Among the newer buildings in the center of Tel Aviv is the dramatic El Al tower by Karmi & Associates (the late Dov Karmi was a leading Israeli architect; his son Ram studied at the Architectural Association in London). The building is primarily in the rational-functional idiom, but is punctuated vertically by three expressive service elements that wind up the exterior of the building. One critic remarked that the architect had taken liberties with the program to create a monument to his own name **(3)**.

With such criticism in the air, it is no surprise that one of the most controversial buildings is the new municipal complex for Bat Yam, an industrial town outside of Tel Aviv. This group of buildings, only the first of which is completed, is being widely acclaimed as one of Israel's most significant achievements. Several elements of the city hall are indeed interesting: the sculptural forms on the roof, over openings for natural light and ventilation, and the sculptural form of the entire building, an inverted ziggurat that gives shade to each lower story. But in its shower-room materials, its overinsistence on the diagonal grid that is repeated in plan and elevation, and its overrationalized geometry that makes for some thoroughly irrational working spaces, the building is profoundly disturbing **(4)**. Architects were Z. Heker, A. Neumann, and E. Sharon, who are making a number of explorations into the integration of form and structure. Neumann, born in Vienna in 1900, studied under Behrens, Perret, and Loos.

Elsewhere around Tel Aviv, while not as extreme as the Bat Yam competition winner, are various interesting buildings **(5, 6)**.

Haifa

With a population of 200,000, Haifa is Israel's second city, although it is the

primary city industrially, as well as the primary port (until the further development of facilities at Eilat and Ashdod). It is also the first city for most immigrants: it was Haifa that witnessed the drama of illegal immigration boats during and after World War II, and Haifa that continues to see the poignant drama of newcomers kneeling to kiss the earth of the Land of Israel.

Theodor Herzl, the Viennese journalist and playwright who founded political Zionism with a pamphlet in 1896 (after having covered the Dreyfus case), visited Palestine only once, and briefly, in 1898. But his utopian novel, *Old-New Land*, which looked ahead from 1902 to a Jewish State as it might be in 1923, is remarkable for its prescience. About Haifa, he wrote:

"At its northern end, the gray fortress walls, heavy cupolas, and slender minarets of Acco were outlined in their beautiful ancient Oriental architecture against the morning skies. Nothing had changed much in that skyline. To the south, however, below the ancient, much-tried city of Haifa on the curve of the shore, splendid things had grown up. Thousands of white villas gleamed out of the luxuriant green gardens. All the way from Acco to Mount Carmel stretched what seemed to be one great park. The mountain itself, also, was crowned with beautiful structures. . . . A magnificent city had been built beside the sapphire-blue Mediterranean."

Herzl's description was an accurate prophecy in many ways. Acco (or Acre) remains today almost exactly what it was at the turn of the century, but where it was once the port, it now serves only for local fishing. The port facilities of Haifa were built by the British, during the 30's, and the city was planned by Sir Patrick Abercrombie, who came out to the Middle East to live for a year. His plan called for long green fingers stretching outward from the center, and his careful study of prevailing winds located all industry to the north of the city.

From the water's edge to the top of Mount Carmel is indeed a new city—perhaps not as "magnificent" as Herzl had envisioned it, but certainly vital and varied (7). Haifa is a city where social position is in almost exact correspondence to one's location on the mountain. There are three distinct strata. At the bottom is the port, with the huge grain silo that is symbol of the area and landmark of the city. Also at this level, back from the commercial and governmental buildings, are the older parts of town—a genuine Mediterranean architecture, buildings of hand-cut stone, in severely dilapidated condition and awaiting renewal. Midway up the mountain is a residential and shopping area of European flavor, with many bookshops and a rich café life. There are specialized cafés for artists, actors, stamp collectors, even for the building trades. Criss-crossing these busy streets, going up and down the hill, is the recurring "street of steps." These pedestrian ways may be broad or narrow, open thoroughfares or tight alleys. There is a visual richness here, and a vitality, that come from more than the ascending or descending elevation; this is one of the few places in Israel where a newer building does not look out of place among the old, where past and present are together part of a *place*.

At the top of the mountain, above the 4- and 6-unit cooperatives that are a common form of new housing, are single-family homes. Until as recently as two or three years ago, these areas were totally undeveloped. The new houses, for the most part, have a plainness very different from the gaudiness of an American development. An extra-legal device operating in Israel is partly responsible—the disapproval of "snobbishness," which is any noticeable display of wealth.

The Technion

High on Mount Carmel is the Technion, the Israel Institute of Technology that has been called "the MIT of the Middle East." When Chaim Weizmann, the Zionist leader who became Israel's first president, was asked how the tiny country could hope to absorb thousands of new people, his reply was a single word—science. Weizmann himself was a noted scientist, a chemist. He was also a man of great diplomatic skill; largely through his efforts the famous Balfour Declaration came into being (it was actually a letter, written in 1917 by Foreign Secretary Balfour to Lord Rothschild, with the phrase, "His Majesty's Government view with favour the establishment in Palestine of a national home for the Jewish people . . .").

The Technion came into existence long before the "national home." Classes opened in 1924, for 35 students of civil, mechanical, and electrical engineering. Today, there are 3500 students on a full-time basis, plus some 6000 "external" students on a part-time basis or in extension studies. The new 300-acre campus has facilities (or sites earmarked) for microbiology, hydraulic engineering, nuclear physics, aerodynamics, electronics, etc. (8). Each of these studies is challenged to devise ways of expressing modern scientific and technological concepts in the language of the Bible.

If the Technion is a source of pride to Israelis, it is also a rallying point for Jews of the Diaspora. The American Technion Society is one group that has worked to aid the Technion; its current president is the New York architect B. Sumner Gruzen, of Kelly & Gruzen.

The Technion has Israel's only school of architecture, and has produced over 500 graduates in the past four decades—or 90 per cent of the architects at work in Israel today. Last year, the school had about 300 students, one-third of them women, in a course that was recently extended from four to five years. Planning is an option of the fifth year, so that all planners are architecturally trained.

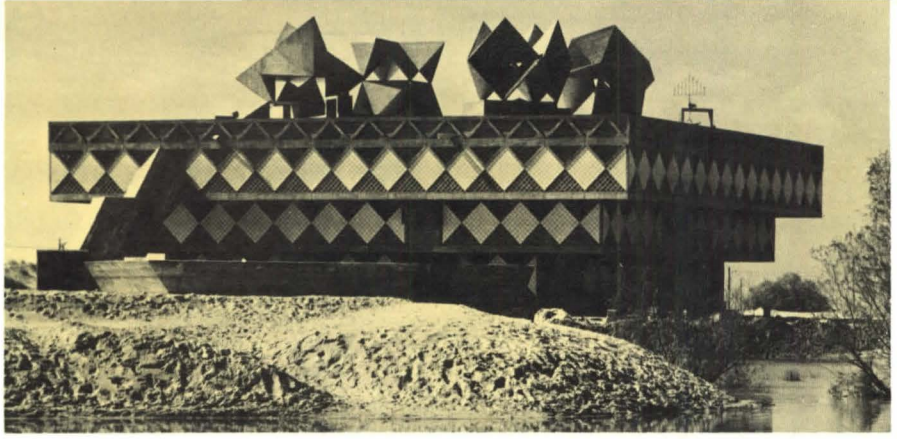
A Building Research Station was established at the Technion in 1953. It has several functions: as an educational laboratory where students can learn about materials; as a commercial laboratory where important buildings are tested first in scale models; as a branch of the government bureau of standards; and as a research laboratory for the variety of projects sponsored by government and industry. Head of all research at the Technion is Vice-President Rahel Shalon, a woman whose special field is concrete, the major building material of Israel.

The architecture library at the Technion contains more than 140 subscribed-to periodicals. When I visited, unannounced, the librarian showed me a stack of recent *P/A*'s on a table, and he spoke about the P/A Design Award Citation that had been won by David Reznik, a Jerusalem architect, for the Israel pavilion at the New York World's Fair (unfortunately, not built to this design).

There is one architectural journal in Israel, the official magazine of the AAAI—Association of Engineers and Architects of Israel—a group with about 600 architectural members out of a total of 3500. Another magazine covers the arts and interior design. One architect mentioned that his dream is to start an independent journal; another, to start a new Bauhaus in Israel.

In the meantime, the Technion grows. The original campus plan had cul-de-sac streets leading off from a wooded ring road. But with the extensive recent development the plan has become more flexible, in some ways perhaps neglected. During the next four years, it is expected that 16 new structures will go up on the campus.

In addition to the changing character of the Technion, as it expands, there will be other changes in Haifa. New "luxury" housing will overlook the bay; new housing will replace some of the deteriorated middle sections; and a new shore development is being planned. One of the most exciting new projects is the Oscar Niemeyer proposal, just approved by the



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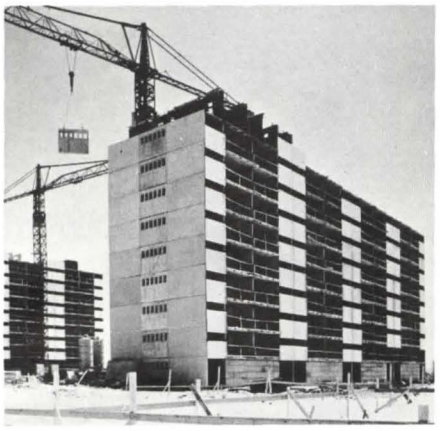

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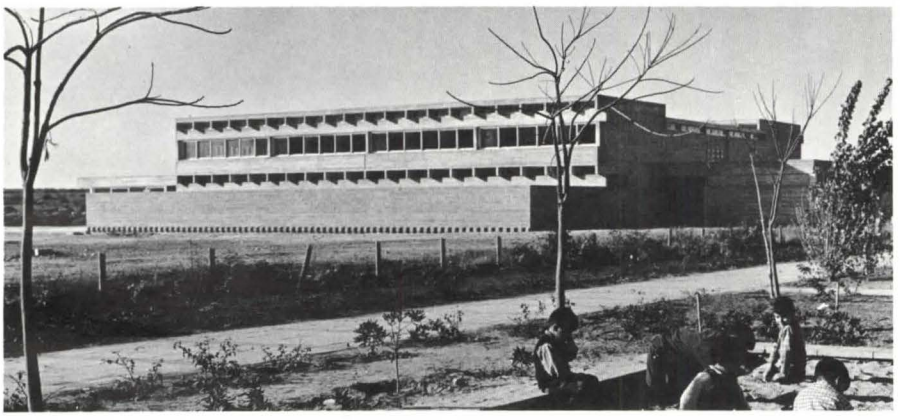
Bat Yam city hall ***(4)*** *is alternately considered the most beautiful building in Israel and the most shocking. Government-sponsored apartments at Bat Yam* ***(5)****, by Y. Perlstein, have eight units and four communication cores per floor. School in Tel Aviv* ***(6)*** *is by Rechter-Zarhy. Lower grades are on ground floor, each classroom opening onto its own courtyard; upper-floor classrooms partly cover these courtyards. View of Haifa and Mount Carmel* ***(7)*** *shows new medical center by Rechter-Zarhy. Churchill Auditorium* ***(8)****, one of the finest Technion buildings, is by Sharon & Idelson. Arieh Sharon was born in Israel, went to the Bauhaus in the 1920's, was director of planning in the first cabinet.*



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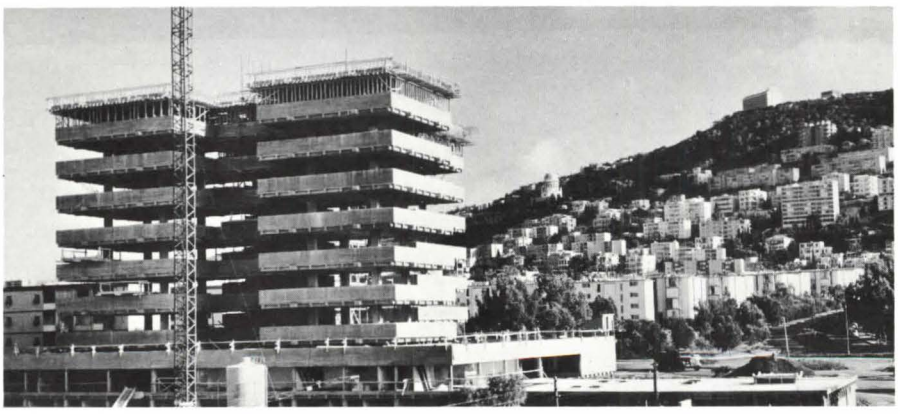

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Haifa City Council, for a single large structure on Mount Carmel for the city university. The first stage of construction calls for a prefabricated concrete skeleton —1000 feet long and 230 feet wide—which will be filled out gradually as the university grows. After some controversy, the city council approved an initial outlay of $3,000,000 for the structure.

Jerusalem

Jerusalem, too, is growing, although it remains a rather staid small town. It has a slow-moving air to it, reflecting the deliberations of government and the quieter pursuits of university life that are the main focus of the capital.

Jerusalem is a city holy to three faiths. The associations with Christianity and Judaism are well known, and it is from Jerusalem that Muhammed is believed to have risen to Heaven. But some of the most sacred religious sites are in the Old City, which is now within the boundaries of Jordan. Gethsemane and the Church of the Holy Sepulcher, sacred to Christendom, are in Jordan, where is also the Wailing Wall of Solomon's Temple.

It is ironic that the name of this divided city, Jerusalem, means City of Peace. A narrow strip of no-man's-land divides it, separating Israel and Jordan. But hostility is one more fact of life in Jerusalem today, just as it has been throughout the history of this city. The list of conquerors that followed David's conquest of the ancient Jebusites includes Egyptians, Assyrians, Babylonians, Persians, Ptolemies, Seleucids, Romans, Byzantines, Islamic Caliphs, Crusaders, Saracens, Mongols, Mamelukes, Ottoman Turks. The most recent siege of Jerusalem followed the end of the British Mandate in 1948, when the city withstood the armies of six Arab states who declared war on Israel immediately after Independence was announced.

But throughout the centuries, too, there has been a mystical link between the dispersed Jew and the Jerusalem he would probably never see. The Ark of every synagogue (containing the sacred scrolls of the Torah) is oriented toward Jerusalem. Perhaps the oldest religious festival in continuous celebration (the Passover Seder, celebrating freedom from Egyptian slavery) includes the words, "Next year in Jerusalem." But if Jerusalem has a special meaning in the mind and heart, it is a meaning that does not reach the eye from the artifacts of the modern city. Much of the building in Jerusalem dates from recent times. It was about Jerusalem that Arthur Koestler was talking when he commented on "the vulgarity of modern

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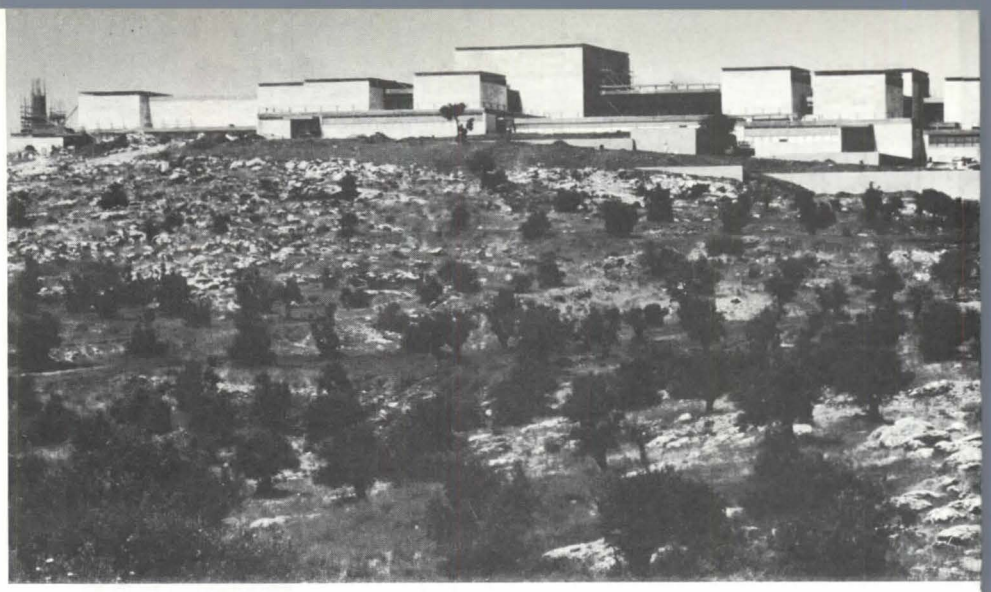

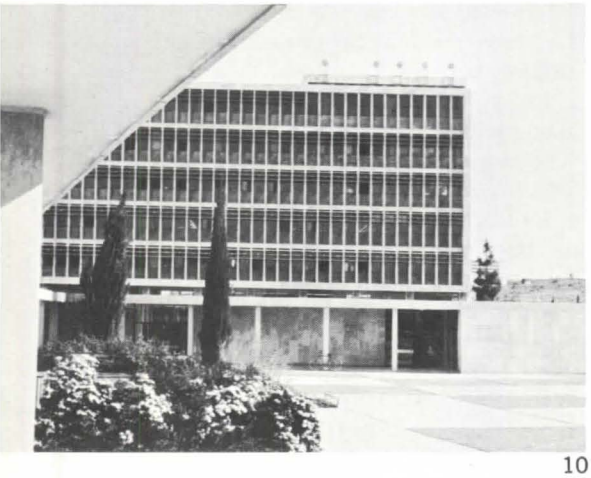

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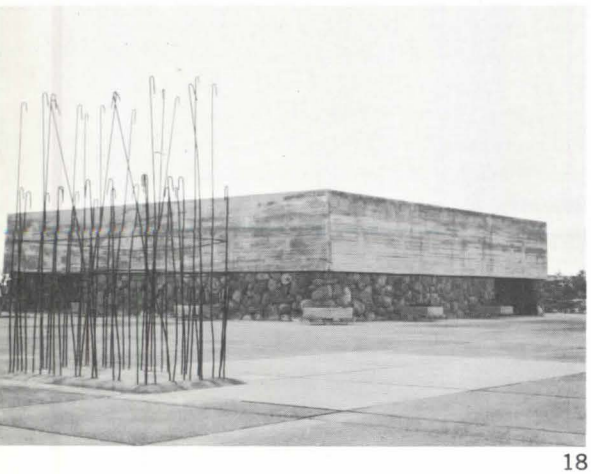
Hadassah-Hebrew University hospital ***(9)****. The architect, Joseph Neufeld, calls these Judean hills "architecture in themselves." The Chagall windows that were shown in New York's Museum of Modern Art have now been installed in the small synagogue here. At the Hebrew University, in Jerusalem, the administration building by Karmi & Associates* ***(10)*** *received the first of two Israel prizes given thus far in architecture. View across the campus* ***(11)*** *shows classroom buildings on right, library at rear. The university synagogue* ***(12, 13)*** *by Rau and Reznik is one of the few exercises in free form to be seen in Israel. The midfloor is independent of the curved form; light enters the worship space from a strip at the perimeter.*



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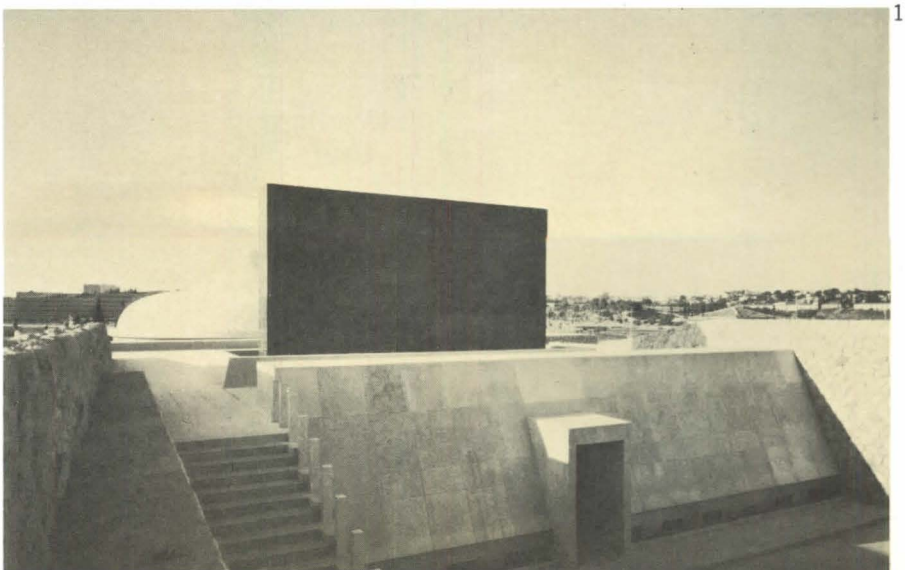

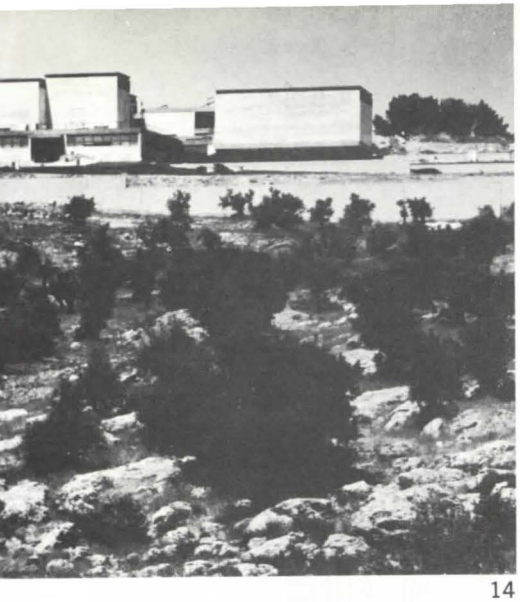

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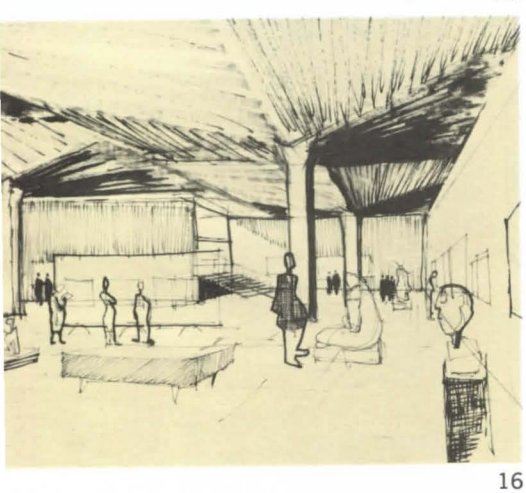

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Under construction, the National Museum of Fine Arts and Biblical Archeology ***(14, 15, 16)****. For organic growth, and for flexible use, this design makes a progression of spaces—small and large, high and low, open and enclosed — from the repeated hyperbolic-paraboloid. The prestressed hollow column of each h-p contains all services. Mansfeld was born in Russia, came to Palestine in 1935. He had studied earlier at the Technische Hochschule in Berlin and with Perret in Paris. Shrine of the Book* ***(17)*** *has a roof shaped like the jars in which the Dead Sea Scrolls were found. Memorial for Six Million* ***(18)*** *overlooks the hills of Jerusalem. Steel rods in the foreground make a haunting sculpture but are only reinforcing for a later commemorative work.*

Hebrew architecture."

It is the landscape, instead, that strongly evokes the past. The American architect Joseph Neufeld, whose Hadassah-Hebrew University Medical Center stands on one of these magnificent and strange hills, has said that the Judean hills are "architecture in themselves, ancient and perfect." Robert Payne, in his book *The Splendor of Israel*, has speculated that "there is probably no architecture which possesses sufficient strength to crown the massive weight of one of those bare Judean mountains; even the crenelated fortress walls of old Jerusalem are scarcely adequate." To Payne, the only building with power equal to its setting is this Hadassah Hospital **(9)**.

In Jerusalem proper, there is an architectural uniformity that is rarely found in modern cities. By an ordinance established under the British, all buildings must be built or faced with the local sandstone, a material that is golden-hued in a range from pink to tan. If the material offers few possibilities for plastic form, it nevertheless gives the city a sense of unity and a continuity between past and present. There are few buildings at variance with the ruling. But in any case, buildings are mostly masonry (concrete) throughout Israel; steel and wood are imported only at considerable expense, and their use in architecture is limited—steel to reinforcing; and wood to framing of windows and doors.

Notable Buildings

Jerusalem's architecture is most notable for its institutional buildings. Perhaps best known of the recent ones is the sizeable group at the Hebrew University, the work of many of the leading architects in the country **(10, 11, 12, 13)**.

A new and interesting complex near the University includes the National Museum, by A. Mansfeld and Mrs. D. Gad, which is a series of strong h-p shells, each springing from a central column, the group massed along the hill in the manner of an Arab village **(14, 15, 16)**. The architects describe their competition winner as a building that attempts to create unity in diversity, integrity with the landscape during all stages of development, and "a true monumentality without resorting to formality or pompousness." Nearby are the Billy Rose art garden, by Isamu Noguchi, which has a range of earthworks of strong and primary appeal; and the Shrine of the Book, by Frederick Kiesler and Armand Bartos **(17)**. This small, crypt-like museum for the Dead Sea Scrolls is a sophisticated design that has aroused some controversy; one criticism condemns the building for its "foreign" form and "pretentious" formality. It has an underground passageway that leads past display cases, appropriate enough for scrolls that were found in a cave; but there are trickling fountains to be seen and heard, inappropriate for parchment that was only preserved because it was kept dry for almost 2000 years. The water, however, is symbolic of "the continuity of life—coming from the earth and returning to it," says Bartos. Cascading over the dome, the water also cools the building.

Adjoining this site is the new building for the Knesset (parliament), a strong masonry unit sitting uneasily on a glass lower portion; there are many good spaces in the interior, major spaces as well as street-like corridors.

Elsewhere throughout Jerusalem are many new cultural and institutional buildings, all designed with a restraint that makes for either a strong sense of dignity **(18)** or, in lesser hands, a dreary pomposity. Among the better buildings is the Israel Institute for Arts and Sciences, a research center similar to Princeton's Institute for Advanced Study. The building by Reznik & Powsner has the closed stone forms, interior courtyards, and low scale characteristic of Jerusalem architecture. Another notable building is the Hebrew Union College archeological school, by Rau, one of the most carefully detailed structures in Jerusalem. To other architects here (Rau himself has since left, for a professorship in England), this one building is cited as proof that with stubbornness from the architect and a sizeable budget from the client, quality building is possible.

As for housing and its accessory facilities in Jerusalem, there is a considerable amount of new work. Unfortunately, much of it does not go "leaping along the valleys like a vine" as Payne says; it lacks the organic quality of natural growth. In Jerusalem, as in other places in Israel with a strong landscape, one often winces at the sight of a landscape violated by the new architecture. Israeli critics are aware of the situation; they deplore the fact that there is little retention of the flavor of the old Arab village in the new housing estates. One of the richest word pictures of the old Arab village was written by Koestler, in *Thieves in the Night:*

"Its houses were the colour of the hill, built from the clay and stone of the hill; they hugged the slope out of which they were carved and into which they seemed to dissolve by natural mimicry. Their walls were blind with only the smallest square window-hole or no windows at all. The terraces below the village were protected by loose stone walls,

demolished in parts by last year's rain. Some of the houses carried spherical domes of baked clay; others had flat mud roofs with grass and weeds growing out of them. The whole of the village looked like an ancient ruin spread over the slope and gently crumbling away into the dust out of which it had arisen in some timeless past."

For architects today, it is a matter of density and massing more than detail; and, obviously, the aim is not to build an ancient ruin. The problem is one of creating an authentic architecture, true to the landscape and the climate of this place, while it is true to human needs.

The Negev

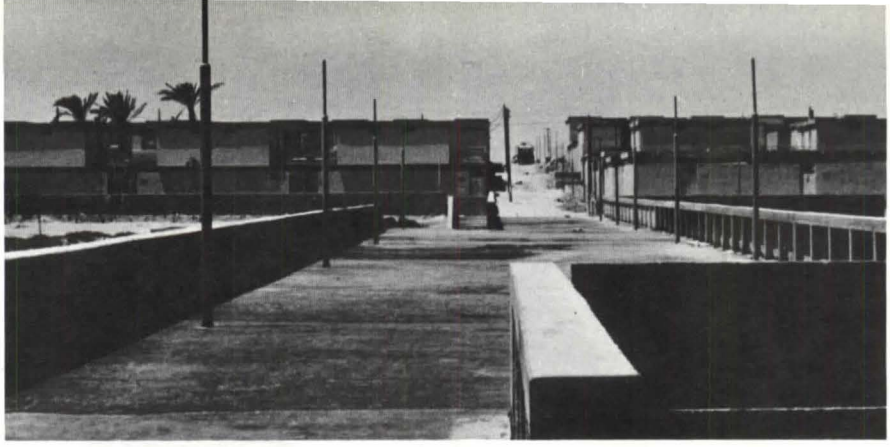
In modern Israel, it is said, one must believe in miracles to be a realist. Perhaps the biggest miracle in Israel's recent development has occurred in the Negev, where the desolation of the desert has been turned into areas of productive settlement. Less than 1 per cent of the population was sprinkled across the Negev in 1948; now it is a substantial 10 per cent, an actual increase of 30 times what it was at the end of the British mandate.

The desert in this part of the world has long been a place of miraculous happenings, scene of some of man's earliest awareness of his God and his humanity. But the Negev has not always been a wasteland. It is now assumed that the patriarch Abraham could only make his wanderings through this area, as told in Genesis, because of a string of settlements secure against the climate and against attack.

And even earlier, 5000 years ago, there were settled here the highly civilized people whose cave-like houses have been found near Beersheba. They were an agricultural people, surprisingly, and excavations also show an advanced copper industry in the area. Their underground homes were groups of egg-shaped rooms connected by tunnels, the line usually entered by a vertical shaft at one end. It is believed that these people burrowed not for security but for protection against the heat and cold and wind of the desert. Similar underground housing is still used by some Bedouins of the Negev.

But the most remarkably adept at desert life were the Nabateans, who came out of the Arabian desert in the Second Century B.C. to live as an agricultural people in the Negev. They were engineers of consummate ingenuity, devising a complex system for gathering and storing every precious drop of rainwater. Their cisterns, dug into rock and plastered for watertightness, are used today.

A major figure in the modern history of the Negev is an American rabbi and



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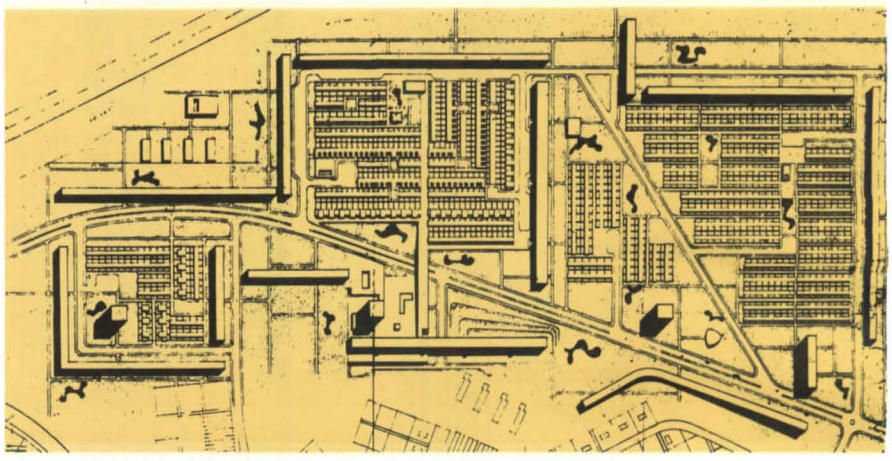

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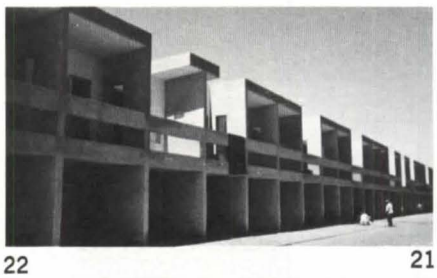

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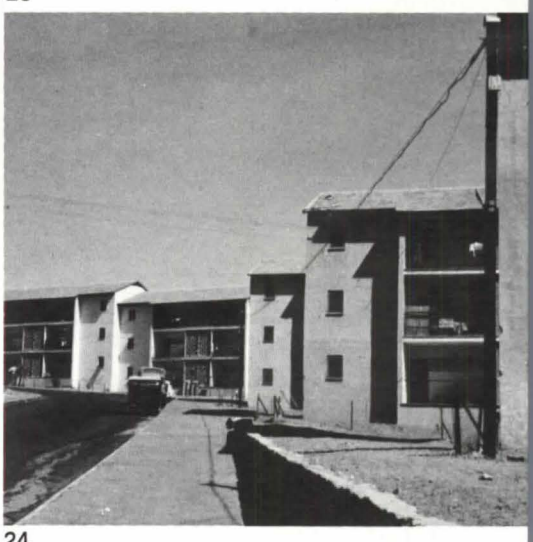

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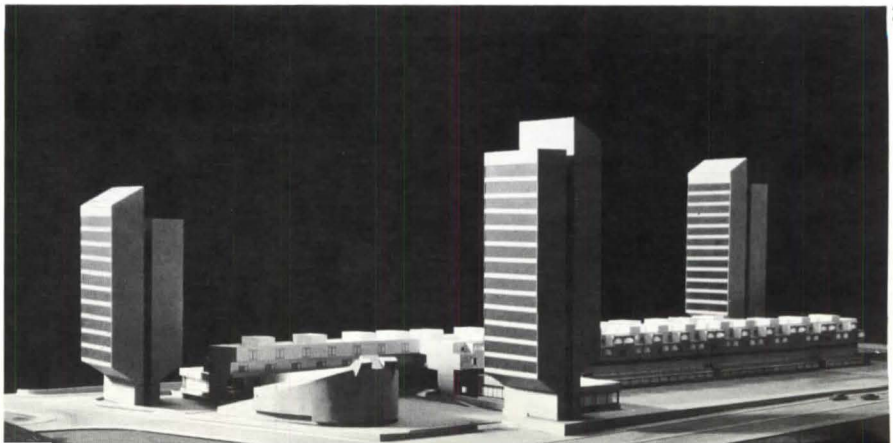
"Casbah" of patio housing by Nahum Zolotov in the experimental neighborhood of Beersheba ***(19)****. Plan of this newest neighborhood* ***(20)*** *shows one- and two-story casbahs surrounded by long lines of row houses* ***(21)*** *and apartments* ***(22)****. Elsewhere in Beersheba is the "Lean-To" project, now going up* ***(23)****. In Eilat, recent apartments* ***(24)*** *and an interesting new compound of patio houses* ***(25)*** *step up the gradual slope.*



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archeologist, Nelson Glueck. Using his Bible as a divining rod, much as Schliemann used his Homer to find Troy, Glueck has discovered hundreds of ancient settlements in the past 30 years. His most famous discoveries have probably been King Solomon's Mines, near the Dead Sea, and Solomon's copper smelter near Eilat. But it is the quantity of sites unearthed, more than any one site in particular, that opens the possibility of extensive resettlement of the desert in the future.

Capital of the Negev

Beersheba, today, is the major city of the Negev, with some 60,000 people. Until 1948, it was a small town with less than 2000 inhabitants, little different from the administrative and trading center that was built by the Turks at the turn of the century. Since 1948, Beersheba's development is a veritable casebook of the planning practices in Israel since Independence.

Early neighborhoods, for instance, built in the early 1950's, were on the British pattern, with the low densities then favored for garden cities. An English garden, however, will grow in Israel only with painstaking effort and plentiful water, if then, and neither of these is lavished on private gardens. By now, the earliest bungalows and apartment buildings have been softened by a few trees and shrubs, but typical housing of recent years still looks unfinished. The dust, literally, has not settled; many sites still look under construction.

But the newest neighborhood shows major departures. Densities are higher; housing design is interesting and more varied; and the special conditions of desert climate are beginning to be considered.

Individually, this housing has definite aesthetic interest. But the neighborhood as a whole lacks strong aesthetic unity. It seems to be a laboratory of different parallel experiments into the nature of various dwelling types, rather than an integrated total experiment into the nature of the larger environment. The taller buildings are not tall enough, and the buildings in general are not close enough, to make a cohesive neighborhood. The flat desert landscape has inspired a flat, spread-out neighborhood **(19, 20, 21, 22)**.

A master plan to establish the future development of Beersheba is in progress, and a city of 250,000 is spoken of as one possibility. But it takes more than sheer numbers to change a town into a city. One housing official says about Beersheba, "We want to have some tall buildings here, but we're not sure how or where." A large project now under construction, however, is very promising **(23)**. It creates a shaded environment like the traditional bazaar; it includes a cinema and supermarkets among the offices and housing. The architects, Karmi & Associates, explain that the functional elements are used "to generate an urban context of their own." Ram Karmi is only one of a growing group of Israeli architests who recognize the "great need for architects to take more responsibility for the implications of their work on the total environment."

Eilat on the Red Sea

The town of Eilat, on the Red Sea route to Asia and Africa, is in some ways the most interesting of the Negev. Its setting is undoubtedly the most spectacular, and its remote location gives it an added uniqueness.

As with almost any place in Israel, one moves forward into history. In ancient times, Eilat was a main road-junction and seaport; many of these routes are revived today. And the new copper works, north of Eilat, revives an industry that dates from the 10th Century B.C.

Eilat, today, is a frontier town in every sense of the word. It is within a few miles of the borders of Egypt, Jordan, and Saudi Arabia, yet is cut off from them. Communications between Eilat and the rest of Israel are thin—the trip from Beersheba by bus or car is four hours; from Tel Aviv by small plane it is one hour (there is no rail connection yet). The town is dusty, rough, hard-working, self-sufficient, rather like a pioneer town in the early days of the American West.

Eilat is a boom-town that has grown from less than 500 people to more than 10,000 in the past 15 years; and a population of 50,000 is likely within another 10 years. There are valid reasons for the natural growth of a community in this isolated place. Foremost is the location of Eilat at the head of one branch of the Red Sea. In fact, the Sinai campaign in 1956 is justified by Israel partly because of the need to break Egypt's blockade of the port of Eilat. (Between 1948 and 1956, only four ships were able to enter the port.) The Gulf of Aqaba has another meaning for Eilat—tourism. While port facilities are being built along one part of the waterfront, a series of new hotels is going up along another. And thirdly, the Eilat area is unusual in having the raw materials to support primary industrial activity. (Israel has few natural resources that demand the location of towns at specific places; copper around Eilat, chemicals throughout the Dead Sea area and the Negev, and oil recently discovered in various spots near the coast, are exceptions.)

The town is set amid some of the most awesome natural beauty in the world—raw rocky mountains on either side—yet the town itself is not stirring or beautiful. It is a sprawling encampment. One Israeli architect has written that the new Israeli towns are "at best a Wild-West stage set, at worst something out of Kafka." Perhaps he had Eilat in mind, although any number of places would fit the description. People in Eilat know that their town is not beautiful, and some feel doubly deprived because life here is already harder and rougher than elsewhere. But they live here by choice—if they did not want to, they would not. There is a real commitment here to the building of a new community. It is unfortunate that this concept is not translated into an architecture to match the inspiration and the effort.

What, then, are the planners and architects doing with this spectacular site and its special needs? There are bold plans for 2000 new hotel rooms, to be built along a labyrinthine series of lagoons and canals that will vastly increase the effective waterfrontage. The airport will be relocated from the center of town to a location some few miles north of the town, and the development and "renewal" of other low-density areas will eventually give a different character to "downtown" Eilat. A promising new building, midway up the low slope, is the municipal office tower. There is a new jail ("it isn't a *city*, without crime," said one resident). There is only one synagogue—enough in Jerusalem, it is joked.

Residential quarters of Eilat are laid out with all major roads leading down to the sea along the gradual 6 per cent slope. Most housing repeats the types seen frequently in Israel—the early bungalows and row houses, the more recent three- and four-story blocks **(24)**. But there are various experiments with different design and higher density in apartment blocks and row housing **(25)**.

New attempts at prefabrication are continually being made, although the industry is not highly developed in Israel. The less expensive conventional methods are usually preferred. In Eilat, however, one sees a small number of building components repeated in different housing types **(26)**; some of the newer units are whitewashed —and highlighted in strong green or blue —to give added variety **(27)**. A key problem in the desert, acute in Eilat, is the transportation of materials; as much as possible, materials and assemblies are of local manufacture.

Other towns in the Negev, begun more

recently than Eilat, show a growing concern with the over-all environment. In Dimona, a new town near the Dead Sea, the sequence of spaces between housing was an important consideration in the design. In Arad, another new town near Beersheba, there are further explorations of urban space: four- and five-story apartments are grouped closely together along narrow streets in an attempt to fit desert conditions and create shade and windbreaks through the disposition of buildings.

Oscar Niemeyer has just completed a series of proposals for Israel, among them a residential area in Eilat and a town for 40,000 in the Negev. He suggests 30- and 50-story buildings, spaced closely together—blending the building structure of the 20th Century with the town structure of earlier times.

The quantity of housing built by the government continues to be large. In the year 1962–63, for instance, there were 23,600 units built by public agencies, 13,500 built privately. Public-housing design is under the control of the Ministry of Housing (design is by their own architects or by private architects); as much as possible, construction is by private companies **(28)**.

Miscellany

There are a number of other points of architectural interest:

1. The nuclear reactor, at Rehovot, which won an AIA Honor Award for Philip Johnson. Lev Zetlin was the engineer.

2. Ashdod, the new port on the Mediterranean, which will eventually be a city of 350,000. Among those judging the architectural competition for its civic center are Georges Candilis and José Luis Sert.

3. Caesarea, further up the coast, is developing into a major vacation area—with a luxury hotel designed by Candilis; the only golf course in Israel; cluster groups of private homes on the water; camping villages—all against a background of the remains of Herod's ancient harbor-capital. An annual festival of music is held at Caesarea's magnificent Roman theater, now restored.

4. Galilee, where Jesus lived and taught. The hills are rich with the flowers that were inspiration for many of the parables. In modern Nazareth, one of the best of Israel's recent buildings, a rest home by Rechter-Zarhy, looks out onto these gentle hills **(29)**.

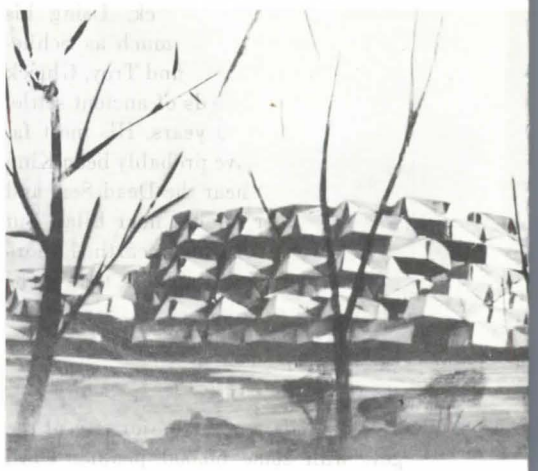
Throughout Galilee, a familiar landscape feature is the line of eucalyptus trees, unique in their ability to absorb moisture from the soil. Much of this area of Palestine was malarial swamp until pioneers of the 1880's and early 1900's (mostly from Eastern Europe, mostly without farming experience of any kind) began to settle the land.

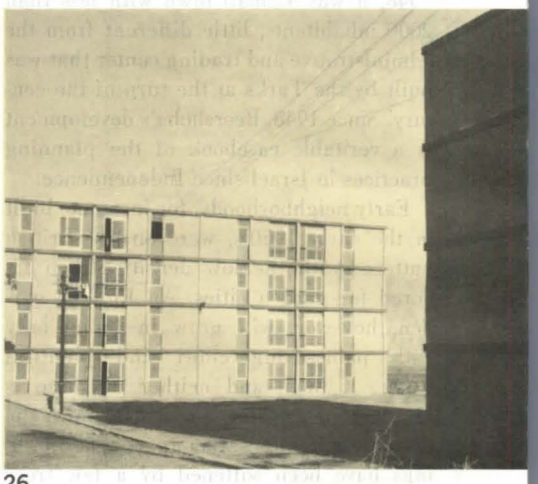
5. The kibbutz, the first of which was founded by 12 settlers in 1909 on the shores of the Sea of Galilee. The evolution of this type of settlement is interesting for many reasons. During the past 10 years, for instance, the early asceticism has softened; also, the desire for privacy has become recognized as a legitimate one. Housing has thus become more "luxurious"—with kitchenettes, toilets, and showers now included in apartments; these changes have involved both financial and ideological factors.

Typically, the kibbutz has a multipurpose dining hall at the center, with an array of agricultural buildings in one direction and housing in another. Plans for one new kibbutz, however, now on the drawing boards, show a tightly knit group of buildings—linked partly for security (the settlement is directly on the border), and partly for the heightened sense of place that comes with a higher density.

Only some 4 per cent of the population lives on a kibbutz—less than one-fourth of the agricultural labor force. The moshav form of cooperative settlement is more prominent (124,000 members, compared to 80,000; in a moshav, the land is individually held, and private profit is permitted) **(30)**.

6. Archeology, the national pastime on an amateur level, and a serious study on the professional level. The government (owning more than 90 per cent of the country's land) has just begun a 10-year archeological survey, with an eye to preserving historical sites and guiding future building operations. Since the first systematic historical survey of Palestine, made 85 years ago by British archeologists, there have been many finds. But one of the most exciting excavations is currently in progress at Massada, the remote hilltop overlooking the desolate landscape of the Dead Sea **(31)**. In this spectacular place, site of an early Hasmonean fortress and a later palace by Herod, 960 Jews held out against the combined forces of 6000 Roman troops and their 9000 slaves. Jerusalem had fallen to Rome in 70 A.D., but it was not until three years later that Massada, the last stronghold, fell. When defeat was imminent, these men, women, and children died by their own hand, rather than be taken captive. It is an awesome event in Jewish history, and almost every schoolchild in Israel has made the pilgrimage up Massada rock. The present dig will not be concluded until





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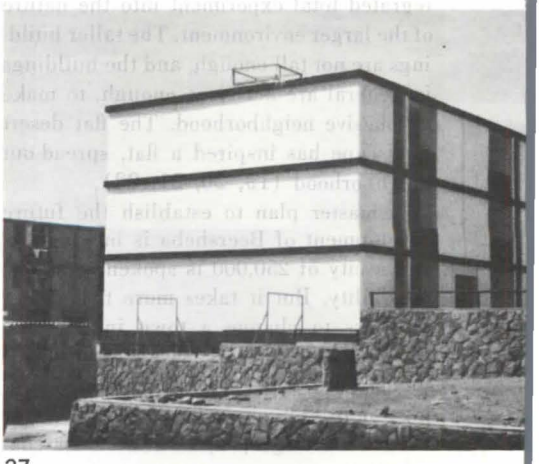
In Eilat, prefabricated housing ***(26, 27)****. A housing proposal* ***(28)****, of which the Ministry of Housing has ordered the experimental production of 10 units. The architect, L. Gerstel, says that his aim is to dissolve the structure into the landscape. Each dwelling-unit cell is capable of continuous multiplication; some sides of the cell are vertical, and other sides are inclined to obtain a continuous flow of form. In Nazareth* ***(29)****, first award for the Labor Union Insurance Institute's convalescent home. The local fieldstone is a predominant material. In a kibbutz near Jerusalem* ***(30)****, a memorial room by David Reznik, a Brazilian who worked with Niemeyer early in his career and came to Israel soon after Independence. Air view of Massada* ***(31)****.*



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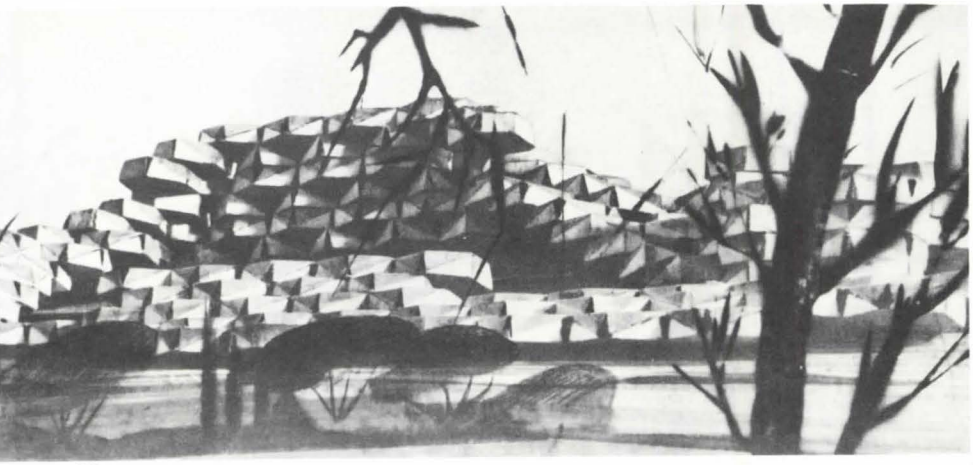

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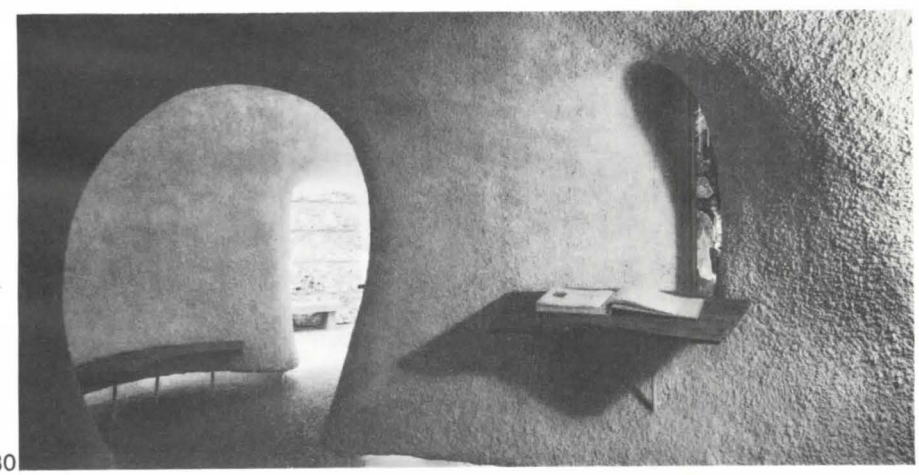

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next year, but already the finds are impressive: a three-tiered palace so constructed as to put two levels in almost constant shade; the earliest synagogue ever found; bright frescoes and mosaics; scrolls similar to the Dead Sea Scrolls.

Conclusion

Many Jews came to Israel because they wanted to live as Jews, but ironically, only about one-fifth of the Israelis are practicing Orthodox Jews. Since Statehood, many came in order to take their place in the modern history of an ancient people, in more of a secular identification than a spiritual one. Many came simply in order to live "normal" lives, in a society that would not single them out for special derogation and deprivation. Their reasons were a basic few, but they brought with them the traditions of many lands to add to the indigenous one. Despite the fact that Israel is a "modern" nation, a sense of tradition is very much present.

Among the people of Israel, there are some to whom tradition is a total way of life—the extremely orthodox communities, for instance, who live in Jerusalem in a ghetto of their own making. They want only to continue their life of secluded piety. To them, the state is a heresy, and the every-day use of Hebrew a profanity. They are a small minority. But among the others—Zionists, pioneers, émigrés, refugees—there are many for whom the old cultural and religious traditions still have much of their meaning. (To the young, of course, this is less so.)

In terms of contemporary architecture, a strong sense of tradition can prevent a full development of expression and a full receptivity to new ideas. But tradition can also be a means of rooting the present in a solid past, preserving a special identity and adapting it to new times. In Israel, it remains to be seen what forms the new architecture will take, as attempts are made to make it more fully responsive to the needs of these people and more appropriate to the special conditions of this place. It remains to be seen what part tradition will play—and which traditions will dominate, which disappear, as a new tradition evolves.

Ultimately, however, much of the future of Israeli architecture depends on the economic and psychological conditions that will permit attention to more than the basic shelter for survival. To a person or people whose life has been threatened, only life itself is important at first. There are signs in Israel today that those responsible for its cities and buildings believe life to be only worth living when it is lived well.

(For photo credits, see page 262)

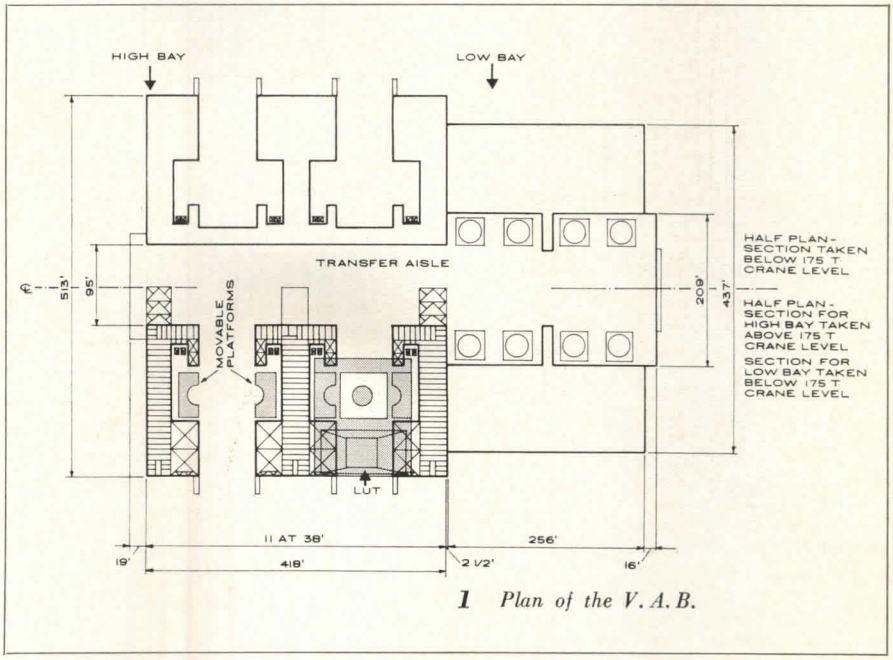
VAB TWO ENGINEERING ANALYSES

1. Framing Design

Two significant engineering aspects of the Assembly and Launch Facilities for the Apollo Program at the Kennedy Space Center, Merritt Island, Florida, are reported in the following articles.

BY ANTON TEDESKO

In this first discussion, a structural design analysis of the world's largest structure is presented. Its author is Partner in Charge of Structures, URSAM, a joint venture of four firms: The office of Max O. Urbahn (architectural planning, specifications), Roberts & Schaefer Company (structural engineering), Seelye, Stevenson, Value & Knecht (mechanical-electrical-civil), and Moran, Proctor, Mueser & Rutledge (foundations). The report was first presented at the American Society of Civil Engineers' Structural Engineering Conference and Annual Meeting in October 1964.



1 *Plan of the V. A. B.*

Among the countless questions that arose as URSAM began the design of the Vertical Assembly Building were: What are the best and most economical ways of handling vehicle components? Can we afford the best ways? What equipment is needed to put the stages together? What movable parts of the building should hug the vehicle during assembly?

The space vehicle is erected on its launch platform in vertical or firing position. How much flexibility, how much side-sway should be permitted in the complex industrial building, so that the vehicle will not be damaged during periods of high winds, bearing in mind that it is less costly to restrict the movements of the building than to provide mechanical systems for the vehicle to *live* with side-motions.

What structural systems should be considered for the assembly building and for the doors? What materials? Concrete, steel, or aluminum? Should shells or folded plates be used, or space truss systems, or some other design concept?

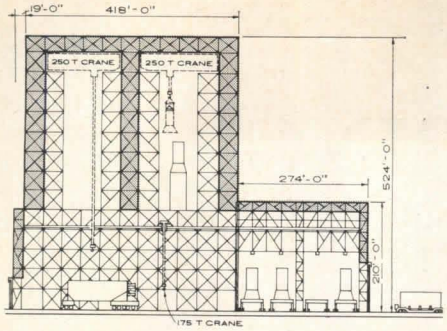
Basic Decisions

General Eisenhower once said, in discussing the invasion of Europe, that it is difficult or next to impossible to recreate the climate in which certain vital decisions were made. The same applies to many vital decisions made in the Apollo project. The climate was created by: the huge size of the project, the vast scale of components, the size of loads; the tight time frame—less than a year to design the structure; the concept of concurrency with its frequent changes of criteria; the many people involved in the job; and the pressure to keep the work on schedule in spite of changes.

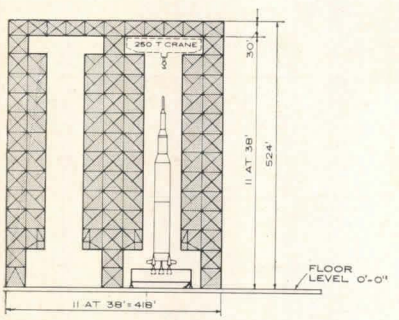
A model of the VAB is shown (*see photo, overpage*). The shape of the building was developed at the same time as the handling of the rocket components was being planned. An early, so-called "in-line" layout placed the assembly and checkout bays in a single row and resulted in a narrow slab-like skyscraper. A ring-type layout was considered next. URSAM recommended and NASA adopted the "back-to-back arrangement" with a transfer aisle between rows of checkout bays (**1**). The result was a stiff, box-like structure of smaller wind movements and increased economy; the need for a separate crane for each bay was eliminated. Certain operations, such as the movement of components of the vehicle from the transfer aisle to the assembly bays, were necessarily inhibited by the stiffness requirements of the north-south framing along the transfer aisle. This framing provides clearances from the 190 ft level to the roof for the passage of the cranes with their loads.

The VAB is a giant piece of machinery. The transfer aisle (**1**) extends along the north-south axis from the Low Bay through the High Bay. The assembly and checkout bays admit the Launcher Umbilical Tower (LUT) platforms on which the space vehicles are assembled. Four checkout bays are provided now; two additional bays are contemplated for a future extension to the north. The building is equipped with shops, laboratories,

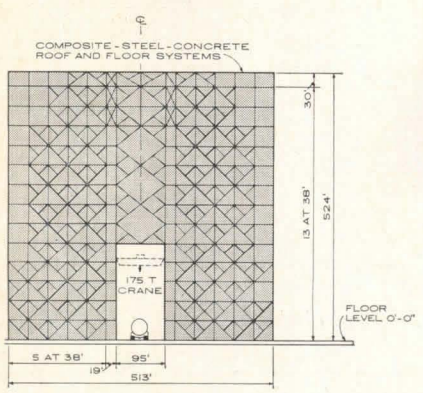
Photo: Courtesy, E. I. DuPont de Nemours & Co.



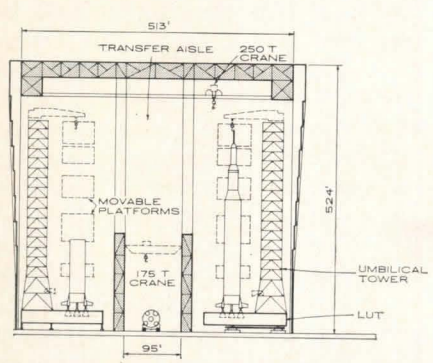
2 Section at transfer aisle looking east.



3 Section at assembly bay looking east.

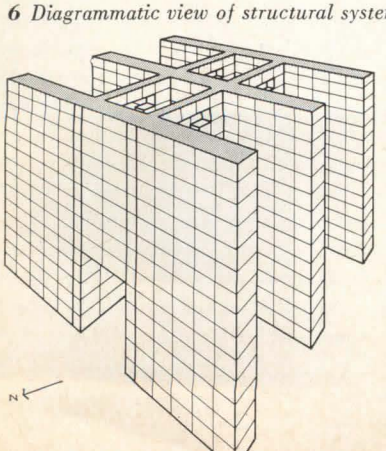


4 Section looking north showing steel framing.



5 Section at assembly bay looking north.

6 Diagrammatic view of structural systems.



offices, storage space and support areas for the various vehicle contractors and for NASA. The design provides for substantial increases in the developed floor areas in the future whenever needed.

Design Approach

The short time permitted for concept development, design, and construction ruled out solutions for the main structure, as well as for the doors, which are not absolutely foolproof. The lack of time focused the designer's choice on variations and combinations of conventional structural concepts and materials. Radical new approaches did not appear suitable for a rush project where criteria changes might render useless any solution not adaptable to drastic redirections of stress flow. The structural concepts investigated included folded plates, shells, and a silo-type concrete structure; the latter appeared not able to take design changes.

Construction of the lowest portions of the structure in reinforced concrete seemed to provide advantages from the standpoint of stiffness and restraint against wind loads. A steel frame structure was studied, in which giant through-bracing, of conventional steel or of prestressed cables, took the place of individual bracing for each panel. Such a system, with super-bracing, proved economical and simple to analyze but insufficiently adaptable to criteria changes; the reduction in indeterminacy and thereby of the built-in-safety reserve was considered unfavorable when compared with a system braced at each panel. The framing with super-bracing also increased the difficulties in connection with future extensions of the structure. The designers investigated the use of various stiffening devices for the reduction of wind deflections at the door openings and at openings in truss bents along the transfer aisle. Bracing, objectionable during normal operations, was considered for temporary installation prior to a hurricane, but the idea was discarded as not sufficiently reliable considering the limited period of a hurricane alert.

Alternate assembly bay door concepts considered included immense self-contained doors, towers of various space-truss and shell configurations overhead-type doors of multiple shells of aluminum or plastic, horizontal swing doors and counter-balanced bascule-type doors. Door leaves of shell-type lost some of their advantages when subjected to reversal of wind pressure, took too much space, carried the loads too well, thereby leading to an undesirable concentration of reactions which, to distribute, would have required systems of extra beams, guides and rollers.

The chosen shape for the VAB is not the most advantageous from the standpoint of shedding wind, but it is economical and good from the standpoint of minimum sidesway. The structure, as finally adopted, is stiff for wind, but stresses due to volume changes are not too large. The VAB is a three-dimensional system of steel trusses and horizontal diaphragms of steel and lightweight reinforced concrete. The multiple braced steel towers provide great flexibility of layout for a building that may have to be extended or altered in the future. The adopted doors consist of simple, standard components. The lowest part for each opening is equipped with horizontally sliding, hangar-type door leaves on tracks. Above are seven flat, vertical-lift, sliding leaves, individually powered and counter-weighted, which stack in a pocket above the door opening. Facing of building and doors is V-beam aluminum siding.

URSAM was permitted to decide whether to follow or to disregard codes intended to cover only the usual types of problems. The designs led to creative decisions and new techniques, for example, in the fields of stress and wind analysis, welding, acoustics, new uses of

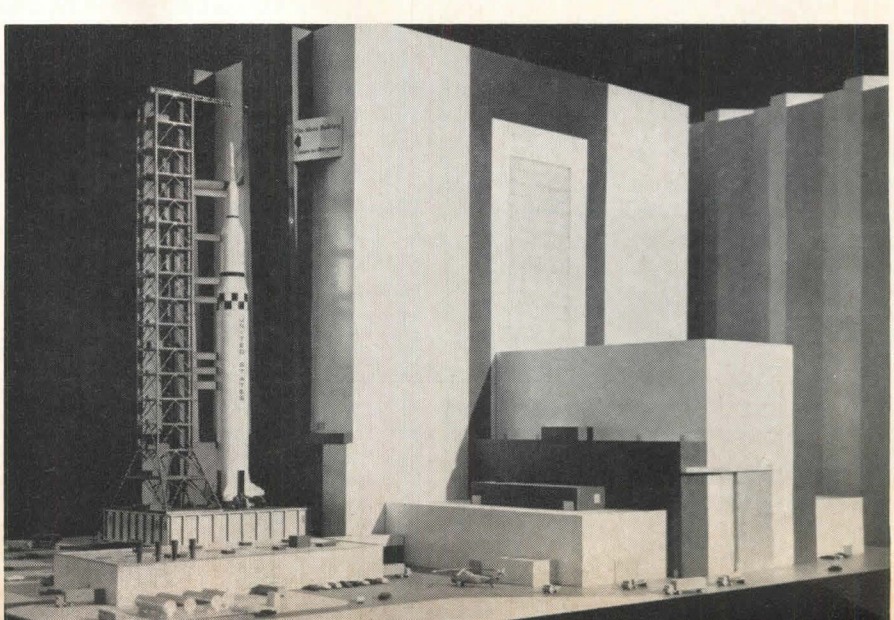
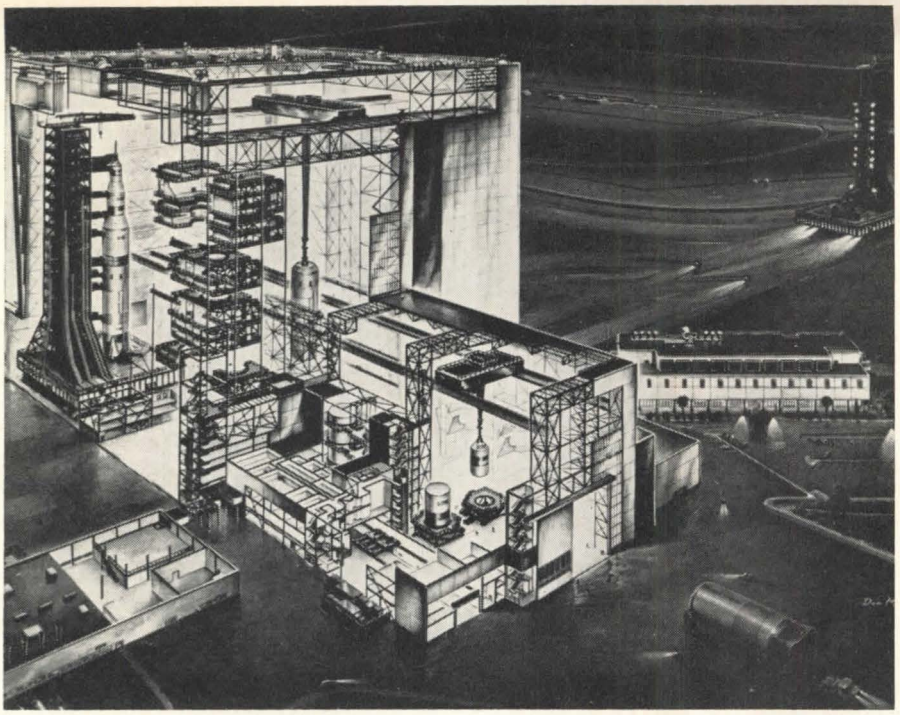


Photo: Courtesy, Aluminum Company of America



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materials, and new research and tests.

The designers excluded solutions that had not proved themselves in practice for construction under overtime conditions by nonspecialist contractors. They decided on a structure (**2,3,4,5**) with 38-ft column spacing and a space-truss system in multiples of 38 ft, in which structural parts do not materially interfere with operations and the handling of vehicle components—a structure composed of relatively small members as dictated by space limitations, in which no single member is so vital that it cannot be omitted for a price, if later found necessary by changing criteria. The goal was to produce the most flexible assembly plant and with operations in the building functioning at lowest cost.

Space Truss System

The space truss system of the VAB combines optimum stiffness with flexibility of layout, steel, and concrete working together. A structural designer would have preferred a simpler system, easier to design and with a more clear-cut flow of stresses. However, simpler systems would have frozen operational requirements and could not have taken the design changes that later became necessary, sometimes requiring accessibility where the structural engineer had provided an important member. The High Bay of the VAB is highly statically indeterminate (2840 times) and therefor has many ways to carry the loads. Reserve strength, due to high redundancy, seemed important for a structure which, due to operational requirements, might not be loaded as originally intended. The space-truss system of the High Bay has a horizontal diaphragm at roof level and wherever floors are required. The basic system has 2440 joints and 12,400 members. The framing is of A-36 structural steel, the horizontal diaphragms are slabs of structural semi-lightweight reinforced concrete in composite action with rolled structural sections.

The structure has trusses parallel to three mutually perpendicular planes. It derives the major part of its stiffness from the roof slab and truss diaphragm below roof level, from exterior truss diaphragms along north and south walls, the truss bents along the transfer aisle (north-south direction) and the east-west bents between assembly bays. A diagrammatic view of these main truss systems is illustrated (**6**). (The roof diaphragm and all secondary trusses have been removed for clarity.)

Variety of Framing Systems

Vertical sections through the High Bay indicate a variety of truss framing systems. North-south truss configuration at the door frames, because of door loads, clearance, and operating requirements, is different from that shown (**3**) some distance from the door, where crane clearance requirements control the dimensions. The most flexible north-south bents are opposite the vehicle where the vehicle platform and the movable parts of the structure prevent more extensive framing. The stiffest north-south bents (**2**) are along the transfer aisle, where operational requirements necessitated slotting only at upper levels for passage of 250-ton cranes. The truss frames of the n-s direction are connected with e-w direction trusses for combined space action; they are all trusses or portal frames of varying characteristics and behavior. As the loads from a north-south wind enter the structure through its north wall and are distributed by the truss diaphragm of the roof, it becomes apparent that the truss bents paralleling the transfer aisle (**6**), being the stiffest north-south bents, must resist the major part of the n-s wind, the other n-s truss bents contributing only as much as their greater horizontal wind deflections will permit them to take.

Wind-load Distribution

North-south wind is distributed according to the stiffness of the n-s bents. Compatibility of deflections determines that the bents along the transfer aisle take 32 per cent each or 64 per cent of the load, the frames in the planes of the doors 11 per cent, and the bents next to the doors 10 per cent. The remaining bents carry only from 1 per cent to 10 per cent of the entire n-s wind, or a total of 15 per cent.

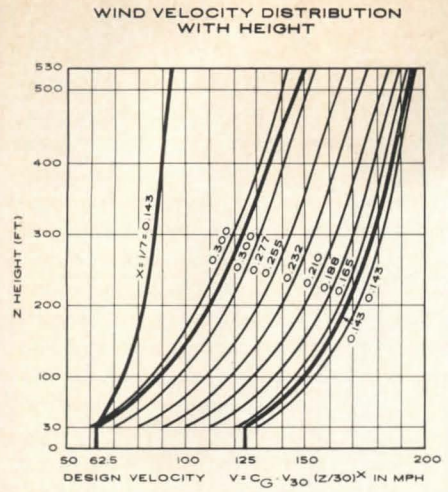
In a similar way, it can be shown that the loads of an east-west wind on the doors are primarily carried by the trussed east-west bent of the type shown (**4**), used for the wall separating the checkout bays and for the north and the south wall. An east-west section through the center of one of the bays (**5**) indicates that here only the roof trusses contribute to east-west load transfer.

Wind in any other direction was resolved in its north-south and east-west components.

The above is a simplified explanation of the load-carrying action; the truss diaphragms along the transfer aisle may be considered not only enormous webs but part of a gigantic box section (shaded area **6**), in which they represent the webs and in which the north wall and the south wall may be considered the flanges of the section. In other words, not only the diaphragms in n-s direction take the n-s wind, but the diaphragms in the other direction contribute to the n-s carrying action as well.

Retractable Shops

An idea of the operational problems and the loads on the VAB structure is indicated (**7**). View shows the extensible



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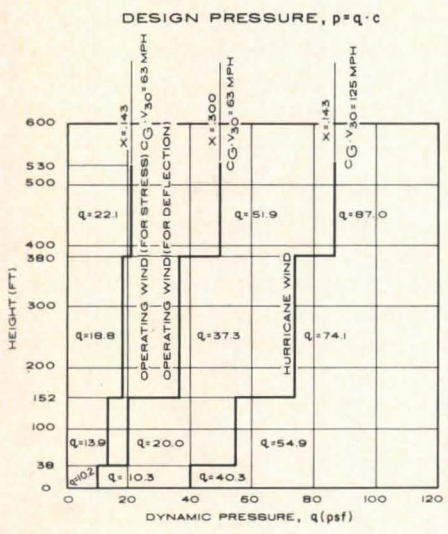

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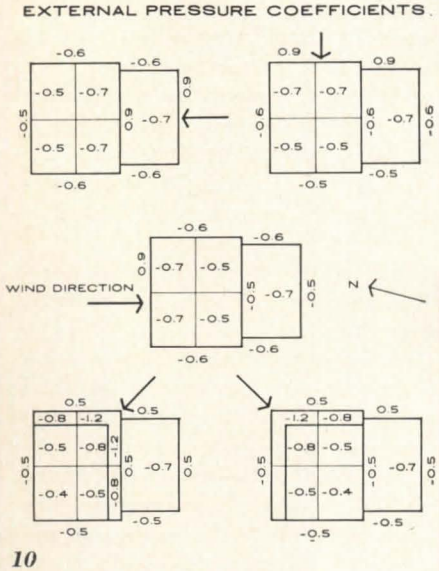

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11 Smoke tunnel test.

working platforms, five in each bay, actually one-, two-, and three-story retractable shops that move on cantilever supports to envelop the vehicle at any desired level. The largest platform half weighs 180 tons. The building is equipped with two 250-ton, one 175-ton, and two 15-ton bridge cranes, eight 2-ton jib cranes, and eight 5-ton monorails. The 250-ton crane has a bridge span of 150 ft and a dead load of 500 tons.

Towers and framing were designed for floor loads at many levels. The design provides for floors at the third points of the 38-ft modules. Thus, there is a possibility of as many as 33 floors in the VAB. But if floor loads were to occur simultaneously at all possible levels, columns and foundations would be overloaded. NASA decided that at most 27 floors will be installed now on any one tower but not more than 21 of these will have full live load.

At several stages of the design, changing requirements added more finished floor area, with consequent increases in vertical loads. These increases radically changed the ratio of gravity load to lateral load. As time passed, and uplift forces decreased, the designers found it less and less difficult to meet wind-deflection requirements.

Wind forces had a governing influence. In order to continue with operational functions under wind forces up to a so-called operational wind, the structure was checked and the door mechanisms designed for a maximum wind velocity of 63 mph including gusts, measured at 30 ft above ground level. Above this velocity, the launch-ready space vehicle will be returned to the sheltering VAB.

Wind Tests

To determine the actual forces due to wind on the structure, URSAM initiated a program that at first involved research into available literature of tests, codes, meteorological data, design experience and measurements on high structures. The second part of the program involved wind-tunnel tests of a scale model of the VAB. Pressure coefficients from the test became available to the designers when the analysis was already completed; therefore, it was reasonable to expect some discrepancies between values obtained by the model test and those assumed in the design. Nevertheless, the order of magnitude of the differences and their influence on the size of the structural members in the actual building was rather small. Design assumptions and test results were considered in satisfactory agreement.

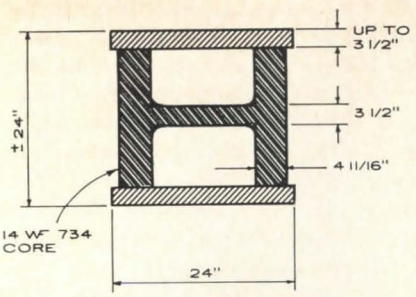
Wind velocity and pressure curves developed for various winds with respect to various heights of the structure are charted **(8,9)**. External pressure coefficients used for the design of the structure under winds of different directions are also shown **(10)**. The coefficients of internal pressure also ranged between positive and negative values. The gust factor c_G, x (exponent, defining variation with height z), and v_{30} (basic wind speed at a height of 30 ft above the ground) **(8)** are influenced by the type of storm, the terrain in the wind path, and the geometry of the building. The VAB will require gusts of 10 or more seconds to envelop the structure and the choice of a gust factor of 1.1, independent of the height z, was considered conservative. A storm arriving at Cape Kennedy from the sea has a steep velocity profile, compatible with pressure gradient, curvature of the wind path, roughness of water surface, and other factors affecting air movements. A storm arriving after some inland travel will have its wind profile modified by the increased turbulence. The exponent $x = 1/7$ was chosen for the profiles of maximum design velocity. A much more severe law ($x = 0.300$) of "wind velocity as function of height" was used for the determination of deflections due to maximum operating wind than for the determination of stresses due to the same basic wind.

Horizontal sidesway under wind gust at the highest movable platform was not to exceed 6 in. during assembly operations. When hurricane winds are predicted, the movable platforms are withdrawn from the vehicle, assembly work stops, the doors are closed, and the structure is prepared to take hurricane winds (including gusts) of 125 mph at the 30 ft level and of 195 mph at roof level, while sidesway at top platforms is allowed to be 12 in.

A wind model was made. The testing program considered the influence of beveling of the sharp edges of the roof, of the large doors partially opened and closed, as well as the influence of the configuration of the Low Bay on the pressures of the High Bay structure. Wind was considered in orientations at 22½° intervals. A model test in a smoke tunnel gives an idea of the wind flow around the VAB **(11)**.

On windy days, only one High Bay door of the VAB can be opened at one time. Movable platforms were designed for dynamic pressures of 7½ psf, a value measured inside the largest U.S. Navy dirigible hangars.

Maximum positive wind pressure at



12 Built-up column section.

the roof level becomes 90 psf, suction 105 psf for the 100-year hurricane; but even higher pressures can be tolerated before any members or connections will reach the plastic range when redistribution of stresses will permit the highly statically indeterminate system to carry its load in a different fashion. The VAB can go through the heaviest known hurricane without major damage.

The space truss system interconnected with composite slabs at modular levels carries the loads three-dimensionally, but for ease in handling, the analysis was reduced to sets of one-plane problems satisfying geometrical compatibility conditions (compatibility of deformations) among them. After these were achieved, the results for those members common to more than one system were combined. Even so, the determination of forces required the solution of sets of equations with 350 redundants.

Structural Design Calculations

Earlier experiences of the Joint Venturers with highly complex structural systems, where strict time schedules had to be met, indicated that it was wise to rely on manual methods for the basic designs, except for possible computer help in solving equations. A step-by-step solution was used to obtain the redundant forces by the energy method. The results of preliminary designs were used for member sizing prior to making the more sophisticated designs. Subsequently, as confidence increased in the adequacy of assumptions and results, URSAM progressively increased its reliance on and use of electronic computations: for the solution of forces in truss bents by an iteration method; for the solution of a flexibility matrix to obtain forces in planar trusses; for a space frame check of calculations of forces and deflections using the STAIR program, an independent computer check with Simpson, Gumpertz & Heger as consultants. The structure was calculated for five loading conditions. Good correlation of results increased URSAM's confidence in deflection values previously obtained by combining deflection analyses in the north-south and east-west planes. The input of the space frame check consisted of joints, loading and member areas. The rigidity of concrete slabs was simulated by steel bracing. The results were obtained in terms of deflected coordinates and member forces. For URSAM's final electronic calculations, use was made of the U.S.-Navy-owned GISMO System and of an IBM 7090 computer. The maximum member forces were printed for 88 loading combinations based on 49 basic loading conditions.

Throughout its calculations, URSAM used several avenues of approach with independent checks, never completely relying on one single approach. In case of computer trouble and unrealistic answers, URSAM was prepared to have a fairly correct answer in reserve so as not to be caught in weeks of delay in case of computer errors and the requirement of an extensive search for "bugs." As it turned out, only a few weeks were required for de-bugging, for search and corrections of discrepancies.

Loading

The basic loading conditions for the VAB take full advantage of symmetry, including dead load, live load, future live load, wind, extensible platform loads and crane loads in various positions.

The elastic deformation of the piles was considered in the design of the foundations. The influence of foundation deformations on the VAB structure was evaluated. Temperature stresses for the VAB were separately analyzed, and these secondary influences were added to the maximum stresses from other loading conditions.

A problem arose because of unequal loading of adjacent bents of the VAB. While columns may eventually carry the same load, one column may now carry only 7 floors, while adjacent ones may support 22. The difference in loading may cause differences in column lengths of 1 in. due to dead load, and 2 in. due to dead plus live loads. This increased the difficulties of providing satisfactory operation of the extensible platforms, which have to work to close tolerances. The problem was solved by locating the connections for the platforms after the structure will have attained its full dead load distortions, and by providing internal means of adjustment in the platform leveling mechanism.

Floor loads added during the design stage made it less difficult to meet sidesway requirements. The stiffness of certain framing could then be decreased; single bracing could be substituted for cross-bracing, in many instances reducing the redundancy of the system and saving cost and erection time for steel connections. On the other hand, operational requirements for clearance, passages, elevator access, etc., called for the omission of bracing for entire bents, which resulted in loss of effective load transfer, greater deformations and costs.

Types of Structural Members

The designers made maximum use of rolled structural sections. Some of the column sections are heavier than any ever rolled before, 14 in. wide flange, 734 lb and 513 lb per ft. The structure has columns forming a box-section, about 2′ x 2′ square, consisting of heavy wide flange sections and welded plates, the heaviest of which, built up to 1305 lb per ft, is shown (**12**). Structural members were shop-welded and field connected with high-strength bolts. The columns and tower units for the VAB are braced in three planes by diagonal members of structural steel, except that 1,200,000 sq ft of 4 in. lightweight reinforced concrete slabs of the High Bay, in lieu of steel bracing, serve to transfer shear and carry the floor loading in composite action with steel beams whose top flanges are equipped with welded stud connectors. Welded studs for the connection of concrete slabs are of ½ in. diameter and ¾ in. diameter The concrete has a dry weight of 115 lb per cu ft, with a strength of 3500 psi, containing a water-reducing retarder and an air-entraining agent. A tensile splitting strength of 330 psi was required to assure reliability in transferring shear forces. The welded studs were designed to take 85 per cent of the shear force normally allowed for stone concrete.

The ground-floor slab is 12 in. in the High Bay and Transfer Aisle, 10 in. in other areas. Type II cement was used for this concrete because of lower heat of hydration.

The Low Bay structure consists mainly of a series of braced east-west frames tied together by north-south vertical trusses and at floor and roof levels by concrete diaphragms. The design of the frames was expedited by electronic computers. Shop and office portions of the Low Bay are conventional beam girder frames.

Fabrication

Foundation work and fabrication of structural steel preceded other work. American Bridge Division of the U.S. Steel Corporation obtained the steel ad-

vance procurement contract on the basis of their low bid seven months after start of design, six months before the general contract award. In view of the tight time schedule, the steel was fabricated in eight different shops. Some 45,000 steel members were required for the entire VAB. The heaviest column sections were rolled by Bethlehem Steel Corporation, which also furnished the piling. The contractor had the option of using all welded column sections but preferred to use the heavy rolled sections. These heavy rolled sections cannot be worked as extensively in the mill as smaller sections; this makes the occurrence of laminations more likely. The heavy partial penetration welds also increase the need for careful inspection, including magnetic particle and radiographic examination. The rejection rate due to laminations in the rolled sections or in the heavy plates inspected by ultrasonic testing methods was significantly low.

Typical girders of the VAB are 30 in. and 33 in. WF sections, floor beams are 18 in., diagonals are 14 in. WF members. Diagonal wind bracing subject to substantial temperature forces is end-connected by means of high-strength bolts in slotted holes that are tightened when the structure is at a median temperature.

Stresses and strains were kept low; this was the main reason for not having high-strength steel. Also, compression members (diagonals and columns) were necessarily quite long and had high slenderness ratios. In view of this, it would not have been possible to take full economic advantage of high-strength steels.

Corrosion Protection

Due to corrosive atmosphere and the inaccessibility of most of the structural members after erection, a protective coating was chosen that will guarantee freedom from corrosion throughout the life of the building.All exposed steel surfaces are sandblasted and coated with a special zinc-rich paint prior to erection. Faying surfaces and surfaces to receive welded studs are masked prior to painting to retain rust-free, clean contact surfaces.

During a hurricane, differential east-west movements at the joint between *High* Bay and Low Bay could amount to 9 in. at the 165 ft level, where the crane rail linkage provides for crane travel from High Bay to Low Bay. The possibility of the High Bay and Low Bay oscillating at different frequencies may result in opposing and additive movements at the joint. The movement is 2½ in. under operating conditions and provisions are made for the crane to travel across the joint by means of a linkage that moves on low-friction bearing plates.

During the early design phase, the Launch Control Center (LCC) was located at ground level in the west part of the Low Bay area of the VAB. Later, it was considered incorporating it near the roof level of the High Bay. Finally, it became a 375′ x 182′, four-story monolithic reinforced concrete building that makes extensive use of precast and prestressed elements. It has a concrete mat foundation. The glass front of its north wall is equipped with adjustable sun visors of aluminum **(13)**. Windows of the LCC are tinted, 24′ x 80′; louvers, 5½′ x 28′, work in pairs. Each of the four firing control bays 80′ x 120′ of the LCC with computers, TV screens, visitors' gallery, etc., corresponds to one of the assembly and checkout bays in the VAB as well as to one of the launch pads. Advanced electronic transmission techniques permit each vehicle, throughout assembly, checkout, and up to its launch, to be controlled from the same bank of instruments and computers, although a master control room permits switching to another firing bay in an emergency.

The following facts may be of some interest: Door leaves weigh between 32 and 73 tons. Maximum door deflection is 6 in. Doors open in less than one hour. Side sliding doors move first. Lowest lift door provides the top guide for the side sliding doors; it therefore starts moving when guidance for them is not required anymore, about 10 minutes later. Other lift doors follow quickly, with each leaf having a few seconds headstart over the leaf just above. The cost of doors and equipment for one door opening is $1,000,000.

The VAB is equipped with 21 high-speed, fully automatic elevators. These can stop at any level at which extensible platforms may be located in the future.

The total of steel under the steel advance procurement contract is 60,000 tons. The weight of piles is 21,500 tons; the weight of reinforcing steel is 2090 tons. The general construction contract includes 15,000 tons of steel. The total amount of steel used in the VAB, therefore, is about 100,000 tons. This compares with 60,000 tons of steel used for the Empire State Building.

The steel connections in the field will take 1,000,000 high-strength bolts.

The total length of piles for the VAB foundations is 128 miles.

Some 30,000 cu yds of concrete are used in the foundations and the ground floor; 15,000 cu yds are in the structure.

The highest point of the VAB, the roof of Elevator No. 17, is 3½ ft short of the height of the Washington monument, which is 555 ft high.

The VAB sets a record for volume enclosed in a single building—125 million cu ft (178 million cu ft with future extensions planned).

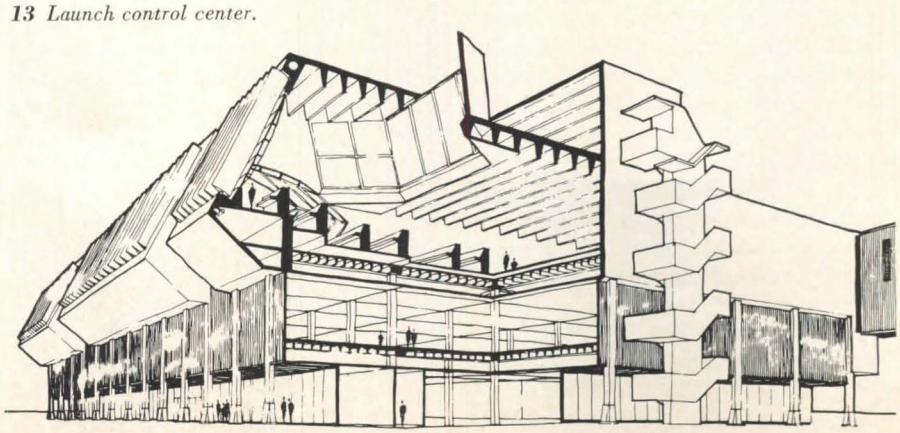
The designers produced 2700 drawings in less than a year. Some 6000 shop detail drawings were required for the structural steel. The total estimated number of shop detail drawings is 18,000.

Credits

The project was executed under the supervision of Col. G. A. Finley and later Col. W. L. Starnes, District Engineers of the Canaveral District of the Corps of Engineers, and J. L. Harvey, Chief of the Engineering Division; John P. Coony is Chief of Design and W. J. Lenzewski Project Manager at the District; Col. J. A. Bacci is Resident Engineer.

NASA principals involved in the project are Dr. Kurt H. Debus, Director of the Kennedy Space Center; Col. A. H. Bagnulo, Director of Facilities Engineering; and R. P. Dodd, Chief of the Facilities Engineering Branch.

***13** Launch control center.*



2. Cathodic Pile Protection

BY W. T. BRYAN

Cathodic protection of the steel piling of NASA's Vertical Assembly Building is discussed by the Chief Corrosion Engineer, The Duriron Company, Inc., Dayton, Ohio.

A major technical problem that had to be evaluated was whether corrosion would occur on the tremendous amounts of buried steel piling supporting the major foundations and the miles of metal utilities. The science of corrosion analysis and control is now well established, but knowledge of the need for it and what it can accomplish is just beginning to be widely understood. The engineers on the Apollo Project were alert to this, and the Corps of Engineers made a soil resistivity survey at the site early in the summer of 1963, before construction was begun. This survey showed alarmingly low soil resistivities, as well as variable resistivities in critical areas, especially at the site for the VAB.

Electrical resistivity of a soil is a measurement of the ease with which corrosion currents may be expected to flow, and since all corrosion is due to electric current flow, low resistivities indicate a high potential for corrosion. In general, soils of less than 10,000 ohm-cm resistivity are considered corrosive, and those below 1000 ohm-cm highly corrosive. At the VAB Area, resistivities were recorded below 1000 ohm-cm. In addition, the variable resistivities noted tend to create the natural potential differences

Anodes were readily installed between the 16-in.-dia. piling that they were designed to protect from corrosion. A water-jet nozzle fluidizes the sand and the 5-ft-long anode sinks to full depth. When installed, only lead wire remains in view, to be carried out below the foundation and spliced to a collector cable leading to the rectifier.

All cable connections must be moisture-proof. Special splice kits were used to provide adequate insulation at each of the more than 2200 splices.

that cause corrosion currents to flow.

Corrosion was considered to be a very serious potential threat to the Apollo Project because of the tremendous amounts of buried metals it could affect. There are a total of 4225 steel piles in the VAB foundation. These piles are 16 in. in diameter and would stretch for 130 miles if laid end to end. They go down over 150 ft to bedrock and aggregate 2,800,000 sq ft of steel. Inasmuch as they support massive reinforced-concrete foundations, often as much as 12-ft thick, serious corrosion in these piles could ruin the $100,000,000 building. In addition, corrosion could cause havoc in the many miles of communications cable, water piping, electric lines, and other buried utilities.

Corrosion Analyses

It was at this point that an interesting drama arose. On the one hand, there were many factors here to indicate an extremely corrosive environment. Modern techniques could completely protect all buried metal on the Apollo Project against corrosion, and the amount this would cost would total only a fraction of 1 per cent of the cost of the structures themselves. Yet if corrosion were allowed to occur, it could result in the loss of tens of millions of dollars and would create havoc with the space effort.

On the other hand, other experience, unearthed by a long and thorough study by the National Bureau of Standards, had led to the conclusion that piling will not corrode appreciably when driven deep into undisturbed soil. Thus, there was a strong stand to do nothing about corrosion. Yet a decision on whether to protect had to made immediately because piling was being driven by late July and concrete would soon be poured into massive foundations that could never thereafter be protected against effects of corrosion.

Key personnel at the Canaveral District Engineer's office and at URSAM had had experience with corrosion protection before and they knew that in this field it was not necessary to theorize. A trained corrosion engineer can make field tests on existing structures—piles had by then been driven at the LUT Assembly Areas—and determine whether the electric currents that cause corrosion are flowing on and off the structure. Tests will yield a quantitative as well as qualitative measure of the amount of corrosion that is taking place below ground level.

The Hinchman Company, a consulting engineering firm specializing in corrosion, whose headquarters are in Detroit, was called in to immediately survey the LUT and VAB Areas. They had analyzed and designed corrosion control systems for monumental structures before, including the Panama Canal, and had worked with one of the URSAM team, Moran, Proctor, Mueser & Rutledge, to design such protection for the Air Force's Texas Towers.

Corrosion engineers flew to Florida in the early part of August, where they faced a great challenge. Here was by far the largest and most important structure for which corrosion protection had ever been considered. Not only did they have to have an answer in less than a week, to permit possible installation, but the answer had to be buttressed with solid facts. Fortunately, a quick and practical series of tests provided the answer.

The problem was to find out whether a corrosion current could flow between steel pile surfaces driven deep into undisturbed soil. A corrosion cell such as this operates on low voltages in the millivolt range. Therefore, a contractor's welding generator was connected to two sets of driven piles, approximately 200-ft apart, and Hinchman engineers impressed a current through the ground from one pile group to the other, similar to the way natural corrosion cells operate.

In all their experience, Hinchman engineers had never seen such easy transference of current from one buried structure to another at such a distance. Potential, current, and polarization measurements all indicated that a corrosion current would flow readily in this soil for the full depth of the piles and would continue to flow indefinitely.

It only remained to be established that sufficient potential difference would be expected to exist in the completed structures to cause corrosion currents to flow. As it developed, this entire project, through an inadvertent combination of nature and man's design, was one huge and efficient corrosion cell. Fortunately, it was also true that protection was easy to apply.

An immediate conference evaluated this corrosion survey data, and it was decided to go ahead with corrosion protection. The Hinchman Company was selected to design a complete protection system for the project, which was to be built around the same type of cathodic protection that keeps transcontinental pipelines and many other structures from corroding. They were to act for the Corps of Engineers and NASA, and through URSAM, on a crash program to design the cathodic protection system, and secure the manufacture and installation of all components ahead of the rapidly advancing construction.

What Causes Corrosion?

It is instructive to examine here the factors in this project that would cause so much corrosion. They are typical of those encoutered on most projects, small or large, that have foundations, utilities, or piles. The difference at Merritt Island is that all factors are present—and on a monumental scale.

A major corrosion factor was the moist, humid marine environment at the surface with greatly varying soil layers below. All soil was basically sandy, but the variance in chemical composition and in resistivity would cause the potential differences that make for corrosion. The top of the piles would be in an aerated hydraulic fill and also capped with a huge mass of concrete, while the lower areas were bare steel in unaerated soil. This combination would be expected to cause substantial corrosion of the lower pile areas. There was an additional factor in that the dewatering process used during construction greatly aerated the upper layers of soil, adding to the corrosion environment.

There were several other corrosion factors, all of which could be expected to work together to insure rapid corrosion. All of the metal in the area—piles, reinforcing steel, utilities, structural steel—

had to be thoroughly bonded together for operational reasons; but, in a corrosion sense, this insured that one huge cell would be operating. There were huge masses of bare copper systems to be bonded into all of this, a gigantic galvanic corrosion cell between copper and steel. And, perhaps most corrosive of all but indeterminate until the complex was in full operation, was the expected presence of large amounts of stray currents from the numerous and large DC motors, all well grounded, being built into the LUT and VAB systems.

The process by which corrosion occurs is a simple one, at least in its basic concept. It is the same process that occurs in an automobile or flashlight battery, only there the process is controlled to produce a useful electric current. All corrosion is caused by the flow of an electric current from a metal surface into a surrounding moisture environment. This moisture environment is known as an electrolyte because it will conduct an electric current flow. The whole process is known as electrolysis. The corrosion occurs at the point where the current leaves the metal. Here, atoms of the metal (they are electrically charged atoms known as ions) migrate into the electrolyte and so conduct the current. The current must leave the electrolyte at another area on the metal surface and return through the metal path to complete the circuit. This other area is the protected or noncorroding pole of the corrosion cell and is known as the cathode. The area where corrosion is occurring is known as the anode.

No corrosion can occur if a current is made to flow *on* to the structure at all parts of its surface—that is, if the entire surface of the metal to be protected is made the cathode. This is exactly what is done in cathodic protection. Specially developed cast iron anodes are placed in the ground near the structure to be protected and a direct current is impressed through them into the soil and onto the structure. The anodes corrode slowly in the process of protecting, but when properly designed they can be made to last for a great many years, and can be replaced if accessible.

A great many other factors affect corrosion and enter into protection against it. These include coatings, electrical insulation of structures from each other, elimination of differential metal couples, and elimination of concrete-coated and bare metal areas contiguous to each other. Proper consideration of all these aspects in the design stage will tend to assure corrosion-free and economical structures.

Cathodic Protection

The cathodic protection system chosen to protect the enormous amount of steel piling under the VAB and LUT foundations was the impressed current type, using rectifiers as the source of direct current and high silicon cast iron anodes to feed the current into the ground and onto the piles. The attached relationship and details of these components is shown (**1**).

Of vital importance in this protection system was the selection of anodes. It was necessary to locate these between the piles being protected in order that current distribution would be achieved over the full area of each pile, without one pile shielding another from the protective current. This required that the anodes be installed before concrete was poured for the foundations; and that they have a long and assured life, for they would not be accessible for repair or replacement.

Although these anodes were located in the ground, essentially they were operating in a sea water environment, due to the salt saturation near the surface in this area. This required special anode material that would operate in the chlorine gas environment that is generated when sea water undergoes electrolysis.

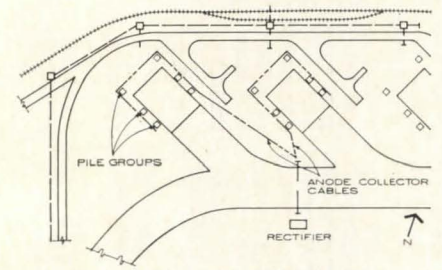
Details of the anode selected are illustrated (**2**). They are long, thin rods that distribute current equally from all areas. A special epoxy resin cap has been developed to seal the lead wire connection at the top, and keep this vulnerable area from corroding prematurely. The cap and the high density polyethylene lead wire insulation are completely resistant to the chlorine that would be generated.

The special alloy content of the anodes assures a low and uniform corrosion rate of the anode of less than 1 lb to metal per amp discharged per yr. This compares with approximately 20 lb per amp-yr lost from conventional cast iron and structural steel when they corrode. An accurate life prediction can be achieved and a minimum 50-yr life is expected with the large anodes used at Merritt Island.

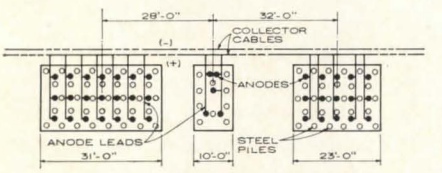
Actual current output per anode can be varied greatly with the system selected, and this will be monitored regularly to assure that proper protection is always being achieved. Current requirement tests made by Hinchman Company engineers established an initial requirement of one amp to protect 2½ pilings. One anode is used to supply this requirement, and this 115 lb anode will theoretically last for over 150 yrs at this current output (115 lb x 1 amp x 1 yr = ¾ lb per amp-yr). Therefore, there is a factor of safety of three over the 50-yr desired life. This leaves a substantial reserve of anode material for future contingencies, such as increased current requirements to protect against stray current corrosion, or to make up for damage to one or more of the anodes or cables.

The soil in which the anodes are embedded averages approximately 1000 ohm=cm in resistivity. No specially prepared backfill was required around these anodes, since they make an excellent low-resistance path into the soil electrolyte by themselves. Therefore, they could be installed by simply jetting into place in the sand.

1

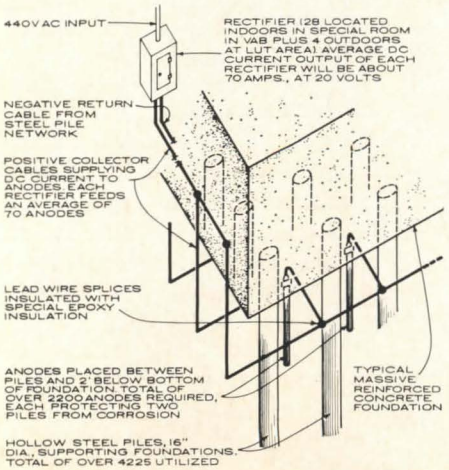


PLAN VIEW OF LUT ERECTION AREA
SHOWING ARRANGEMENT OF RECTIFIER & COLLECTOR CABLES



PLAN OF PILE GROUPS
(SHOWING PILINGS, ANODES, ANODE LEADS & COLLECTOR CABLES

2



NEW DIRECTION + PATIENCE + FORTITUDE = Rejuvenated Architecture for Washington, D.C.

The Rayburn—or New House—Office Building in Washington, called the most expensive building ever built, has given Federal architecture a black eye from which it will not soon recover. The monolithic pile built for itself by the House of Representatives is (we hope) the final yawp of monumental, eclectic pretentiousness that has for so long blighted Governmental architecture. Now, under guidelines set down by the Kennedy and Johnson Administrations, the ancient "Federalese" is being discarded in favor of design that reflects the spirit of the second half of the 20th-Century.

One agency in which this new approach is particularly evident is General Services Administration, coordinator of most Governmental nonmilitary construction in the United States. Under the watchful eye of Karel Yasko, Assistant Commissioner for Design and Construction of GSA, a number of projects have taken shape bearing out the determination of those in charge to have Federal buildings on these shores become Government exhibits as distinguished as the notable series of embassies and consulates built abroad by the State Department's Foreign Building Office.

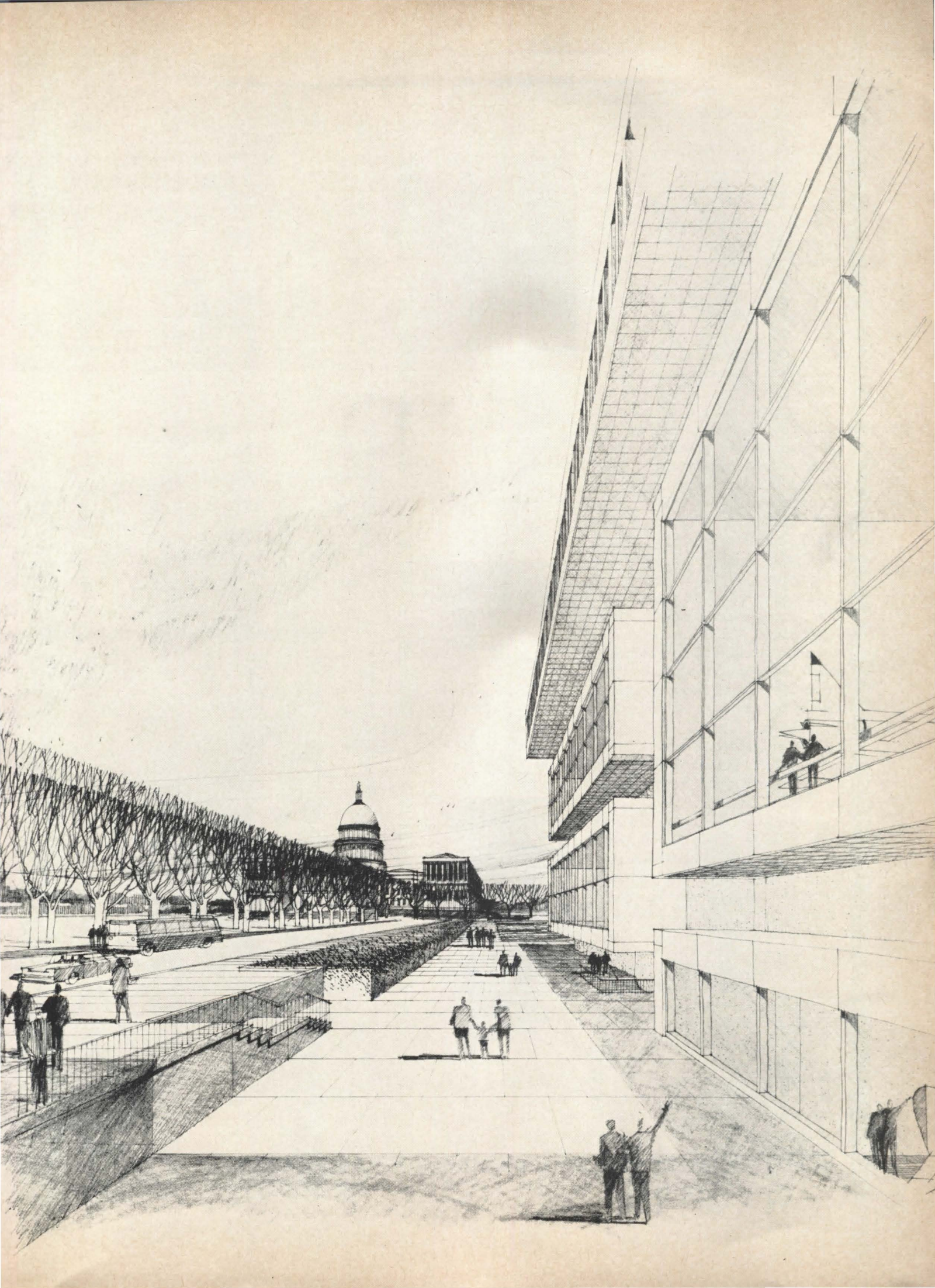
Yasko has told P/A that one basic ingredient necessary for his job is patience. "Sometimes, you have to send it back and send it back again until it's right," he said. The endless conferences, staff meetings, and talks with the "client"—which is likely to be another Government agency and which, on its end, wishes to please or placate the communities where the buildings will be located—make for a wearying job, but one that is eventually rewarded by seeing an Air and Space Museum or HHFA Building come through. Given a particular Federal project, architects naturally wish to do an outstanding job. Yasko feels that an important part of his contribution is to see that they do just that, and not flag or turn in a design that is right in total concept but needs more thinking in details. "I've been working with these people for months on how to turn that corner," he said, pointing to one of the most important jobs in GSA right now. "They haven't gotten it yet, but we'll keep plugging, and they will."

Yasko is impatient of "fancy" rendering and presentation techniques submitted by some architects to GSA. He is an advocate of thinking with a pencil, and would prefer dozens of sketch plans and drawings to all the slick professional renderings to be had (these are for showing the "client" and the public). A lot of GSA work is done using inexpensive models and detail mock-ups.

For work outside the capital, GSA's policy is to contract with architects in the locality of a project. He says this procedure has worked well and has even turned up talent he did not know existed in some out-of-the-way places. Keeping local authorities and private citizens satisfied with the planning and design of Federal buildings in their communities is a continuing chore. In three major cities, for example, Federal buildings are under critical scrutiny for different reasons: New York (siting); St. Louis (destruction of a fine old Post Office); and Philadelphia (relation to Independence Mall).

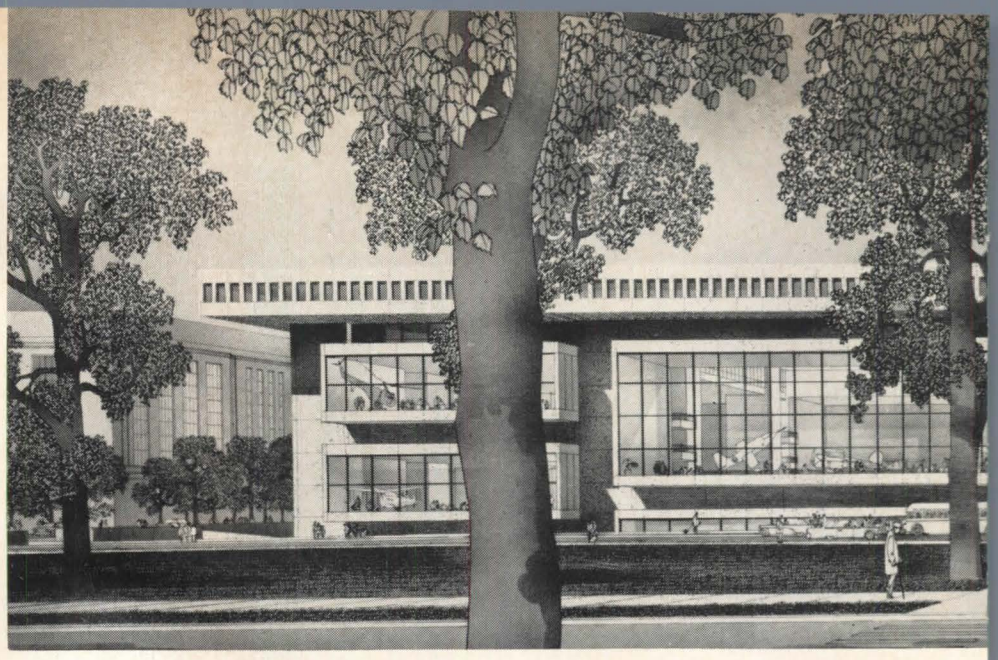
In Washington, Yasko can draw on talent from all over the U.S. and so is currently working with Hellmuth, Obata & Kassabaum, Marcel Breuer, Curtis & Davis, and C. F. Murphy Associates on four major projects for the capital.

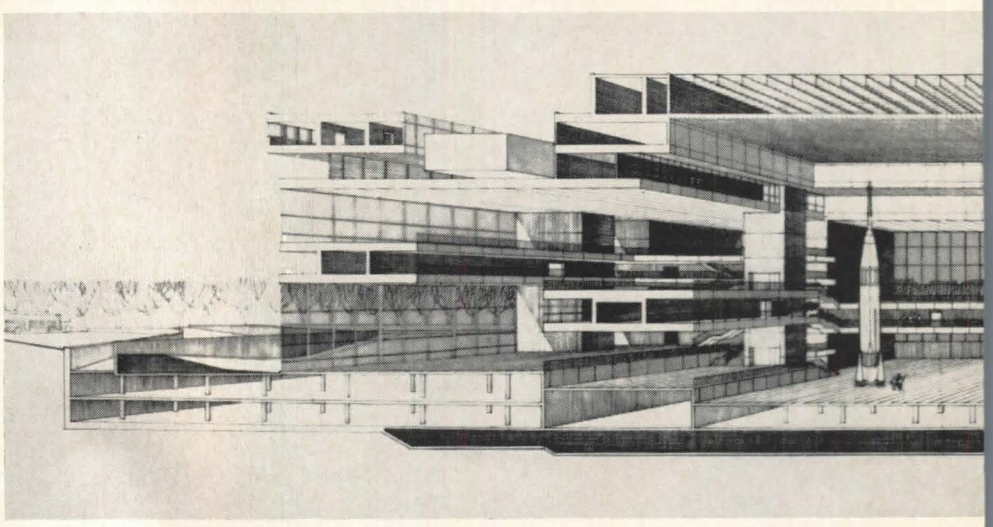
While most GSA projects require months and months of conferences and "salesmanship," one recent proposal that enjoyed almost immediate success was Obata's design for the National Air and Space Museum (*facing page*). As the latest in the series of museums and galleries along the Mall between the Capitol and the Washington Monument, the Air and Space Museum will have an

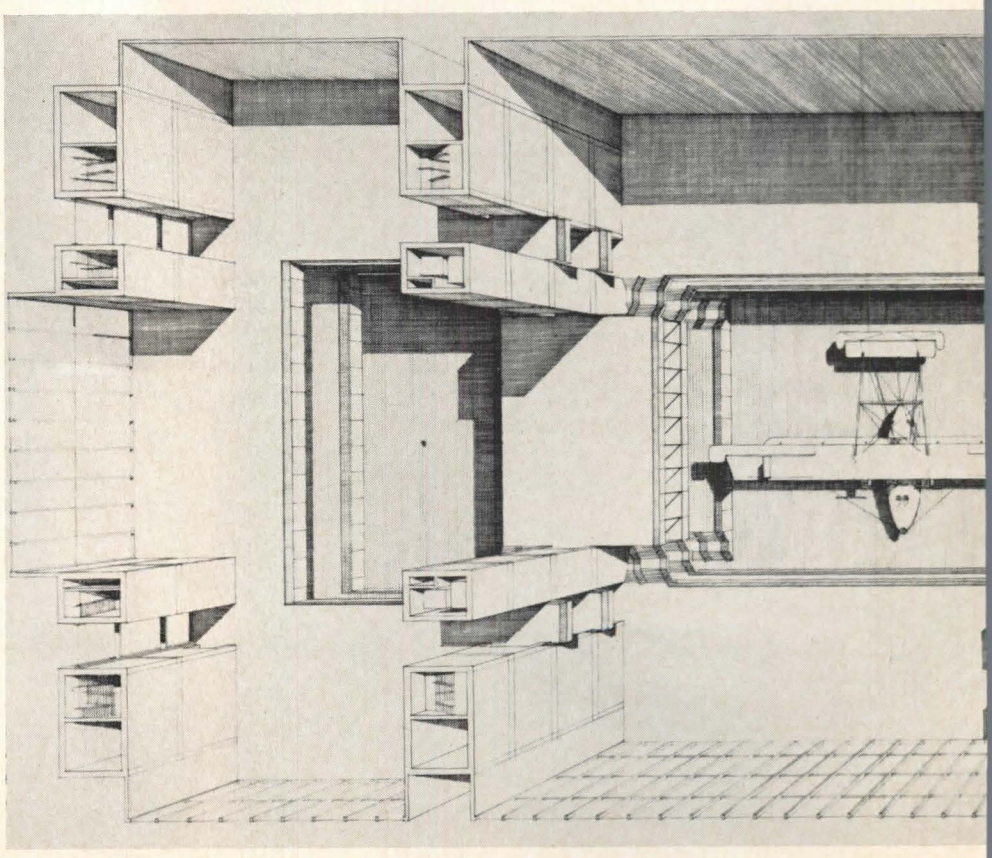


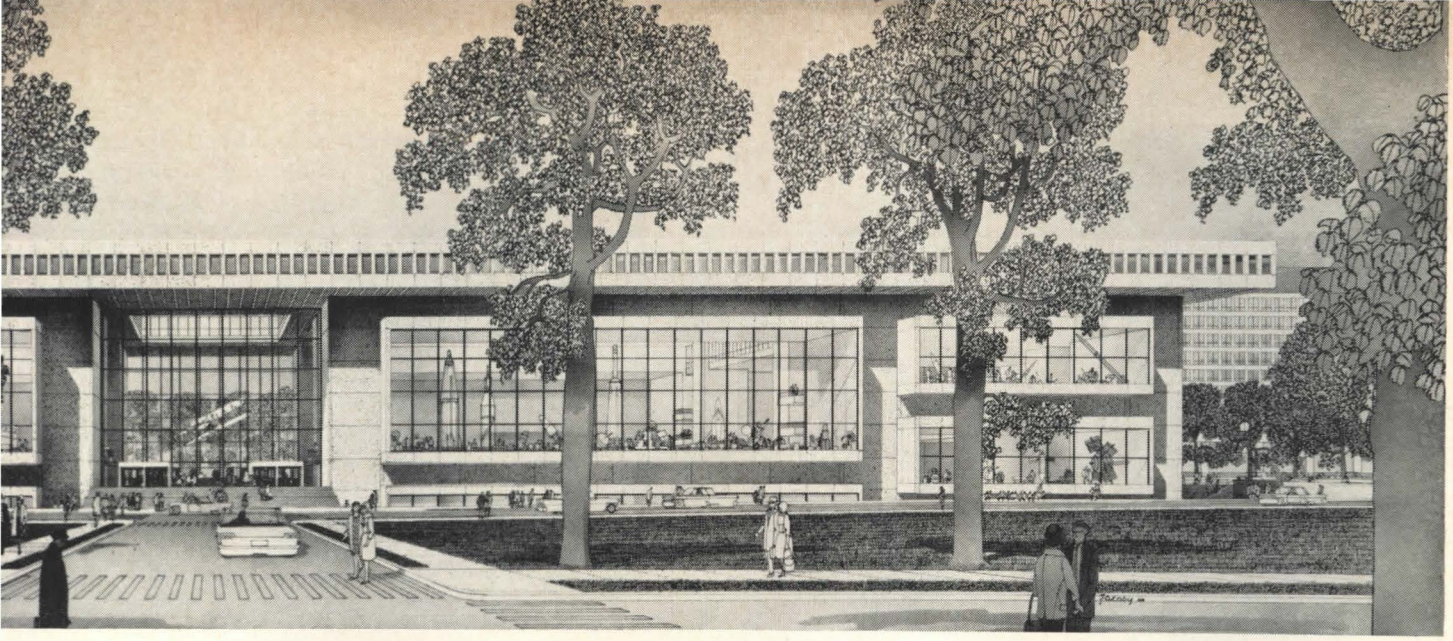
imposing dignity that is completely of its own time while also respecting its eclectic neighbors. Most of the excitement of this building will come from the multilevel interior spaces. In dealing with exhibits ranging from subminiaturized components to full-scale airplanes and space vehicles, Obata has designed areas varying from ones for intimate viewing of small artifacts up to the panorama of the huge halls displaying the aircraft (*right: center and bottom*). Ingeniously worked into this solution are a 700-person capacity cafeteria, a 350-seat auditorium, and underground parking for 1200 cars. A particularly good grace note is the use of the top floor of offices and research spaces as a "cornice" (*top*) to continue the classic feel of the Capitol and National Art Gallery nearby. Aggregate concrete and dark anodized aluminum infilled with tinted glass will also recall the masonry and marble of other buildings. As noted, this project was "off the ground," in a design sense, within 12 months of its award to Hellmuth, Obata & Kassabaum and Mills, Petticord & Mills as Associate Architects, a remarkable tribute in view of the seemingly interminable delays and reviews that accompany most public projects in Washington.

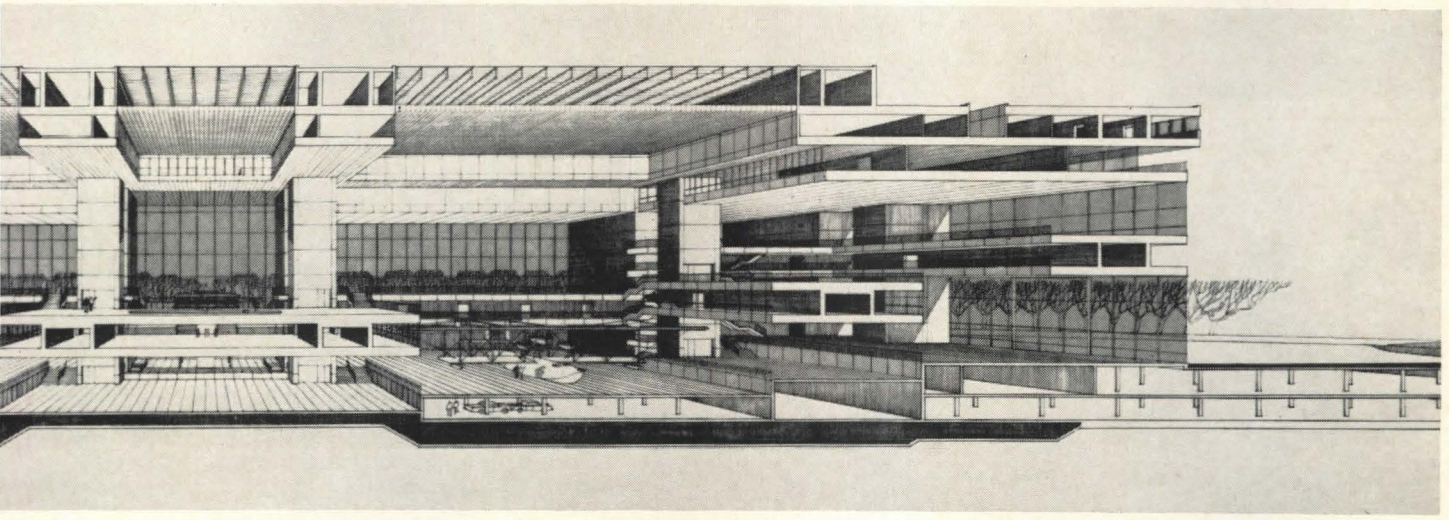
Another important project in the capital city is the new headquarters for the Housing and Home Finance Agency by Marcel Breuer & Associates, with Nolen & Swinburne associated (p. 192). The proposal, redolent of UNESCO, the IBM Research Building at La Gaude, France, has a double-Y plan for maximum peripheral space in ratio to agency office space. The building will have small windows, deeply recessed, and solid concrete end walls adorned with extended stairwells. Offices for commissioners and administrators of HHFA's multitudinous agencies will probably be the one located atop the other at the south end of the structure. HHFA's extensive printing operation will be located in the basement and data processing will occupy the fourth floor. Ground floor will contain entry and employees' cafeteria and service facilities; executive dining room will

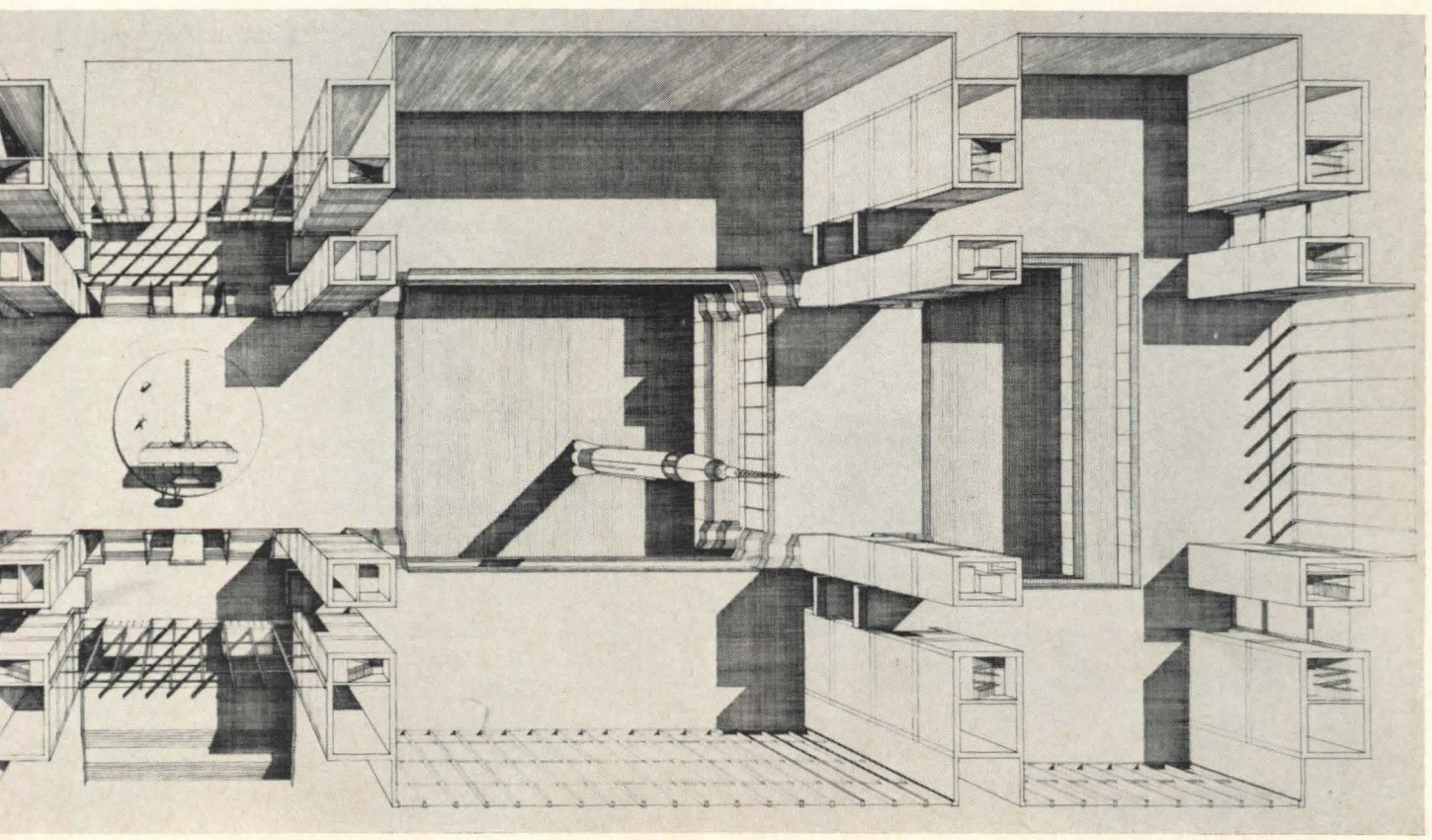


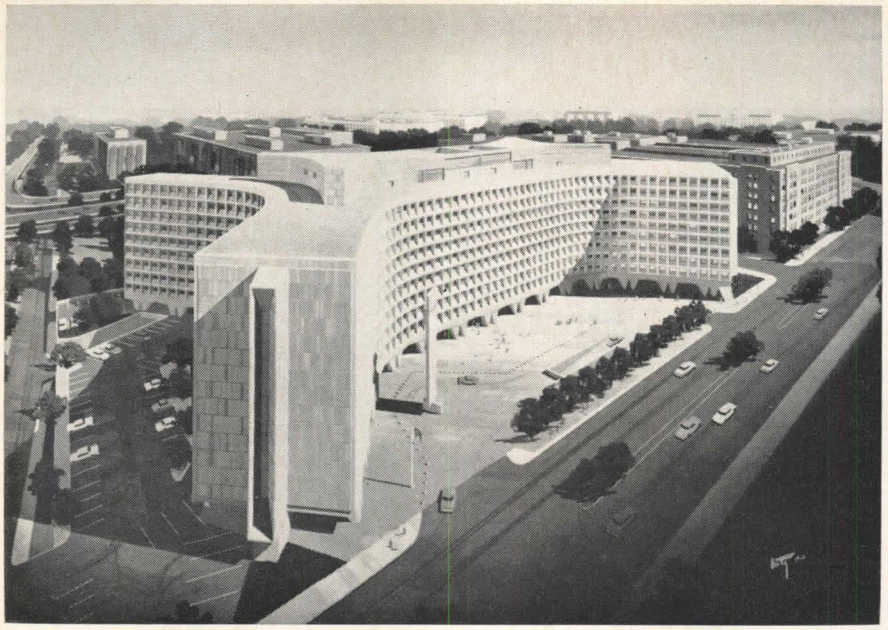


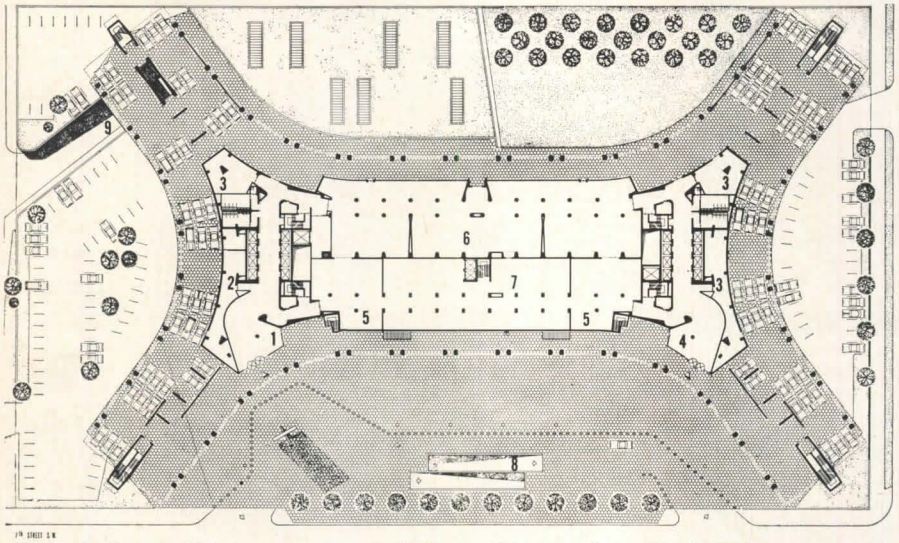




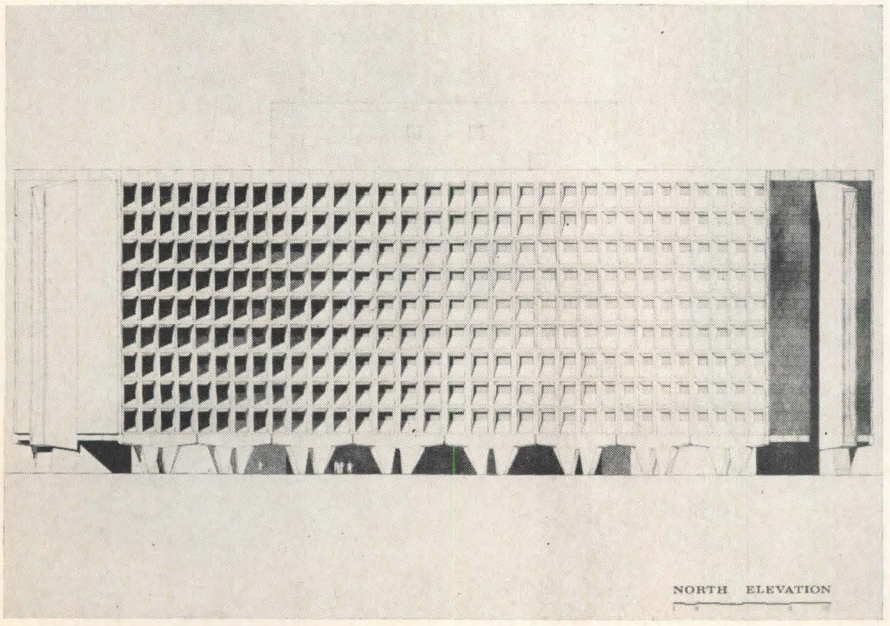








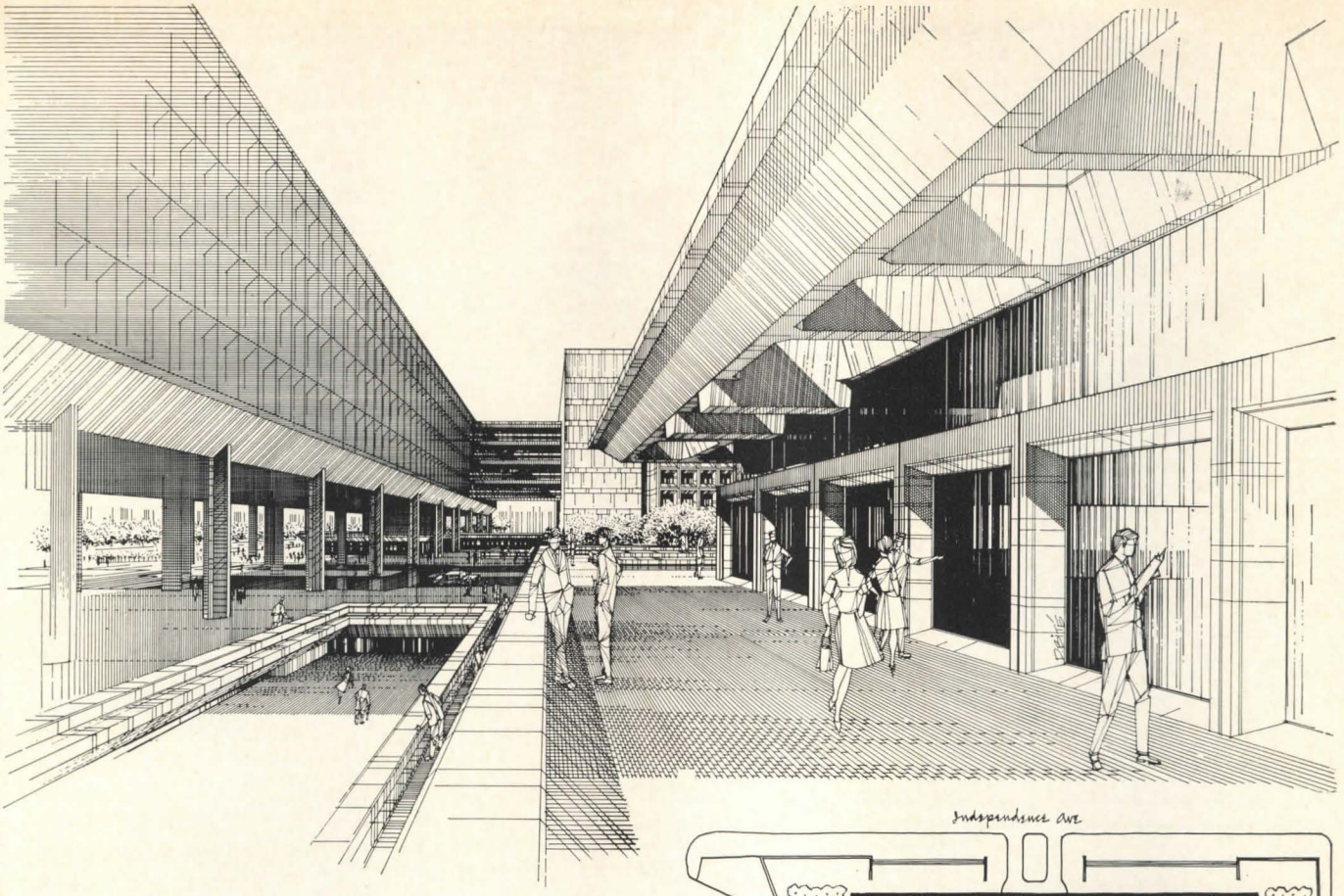
Ground floor: (1) entrance and lobby; (2) guards; (3) building management; (4) north entrance; (5) cafeteria service; (6) cafeteria; (7) kitchen; (8) ramps to underground parking; (9) ramp to service area below.

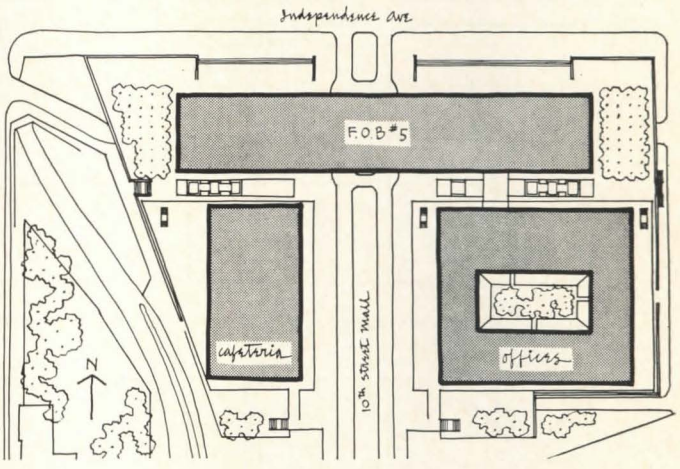


be on the second floor. The two long sides of the building will have an entrance court at the front, with ingress and egress ramps to underground parking; at the rear will be terraces overlooking I. M. Pei's L'Enfant Plaza development, a private project. Exteriors above the La Gaude-like ground floor pilotis will be precast concrete; interior concrete will be bush-hammered where exposed.

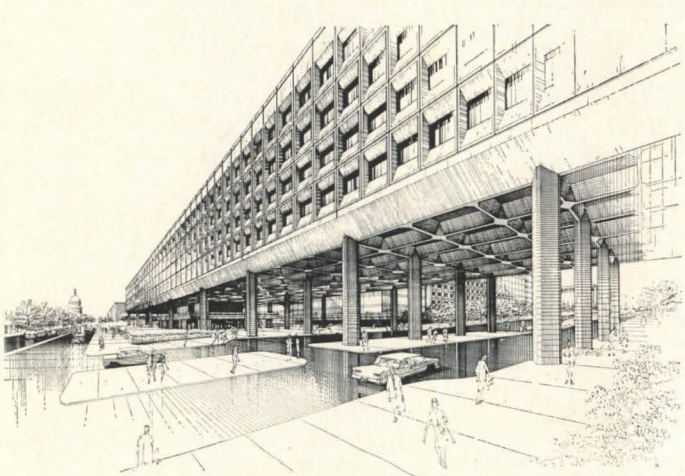
A project that has had a bit of heavy weather with the National Capital Planning Commission and two Fine Arts Commissions is Federal Office Building #5 (*facing page*), to be occupied by Defense Department workers. Main reason for the delay is that FOB #5 will lead into the proposed 10th Street Mall (by Wright, Andrade & Amenta), which will go past L'Enfant Plaza to an overlook terrace above the to-be-redeveloped riverfront below, and at the same time act as a sort of "entrance"' to Washington's Southwest redevelopment area. The latest, and now finally approved (by the Fine Arts Commission) design by Nathaniel C. Curtis, Jr., of Curtis & Davis (Associated Architects: Fordyce & Hamby and Frank Grad & Sons; Landscape Architects, Robert Zion and Harold Breen) features a low building of warm-colored aggregate concrete bridging 10th Street across from the Graustarkian old Smithsonian, backed by a taller annex and a separate cafeteria. Starting with a larger, faceted, glass box bridging the street, the architects patiently redesigned and redesigned and GSA patiently resubmitted and resubmitted until a satisfactory proposal was found. To insure a certain continuity in this area, the architects of FOB #5, L'Enfant Plaza, and the 10th Street Mall have agreed on coordinated paving materials for all projects: Hastings block, paving brick, and granite accents. Washington architectural critic Wolf Von Eckhardt called it "a design that promises to work—practically and aesthetically."

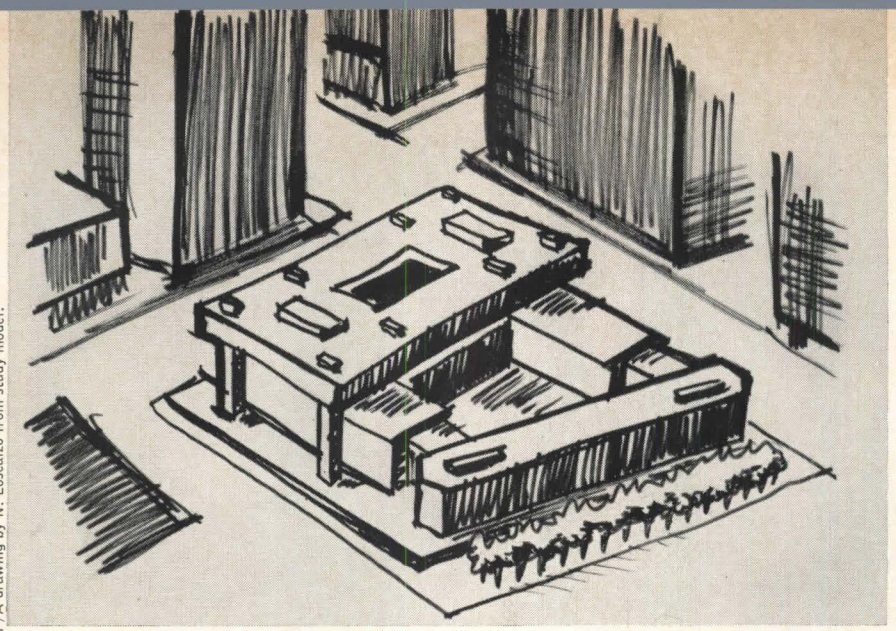
A siting problem of another nature faces C. F. Murphy Associates with the project for the headquarters of the Federal Bureau of Investiga-





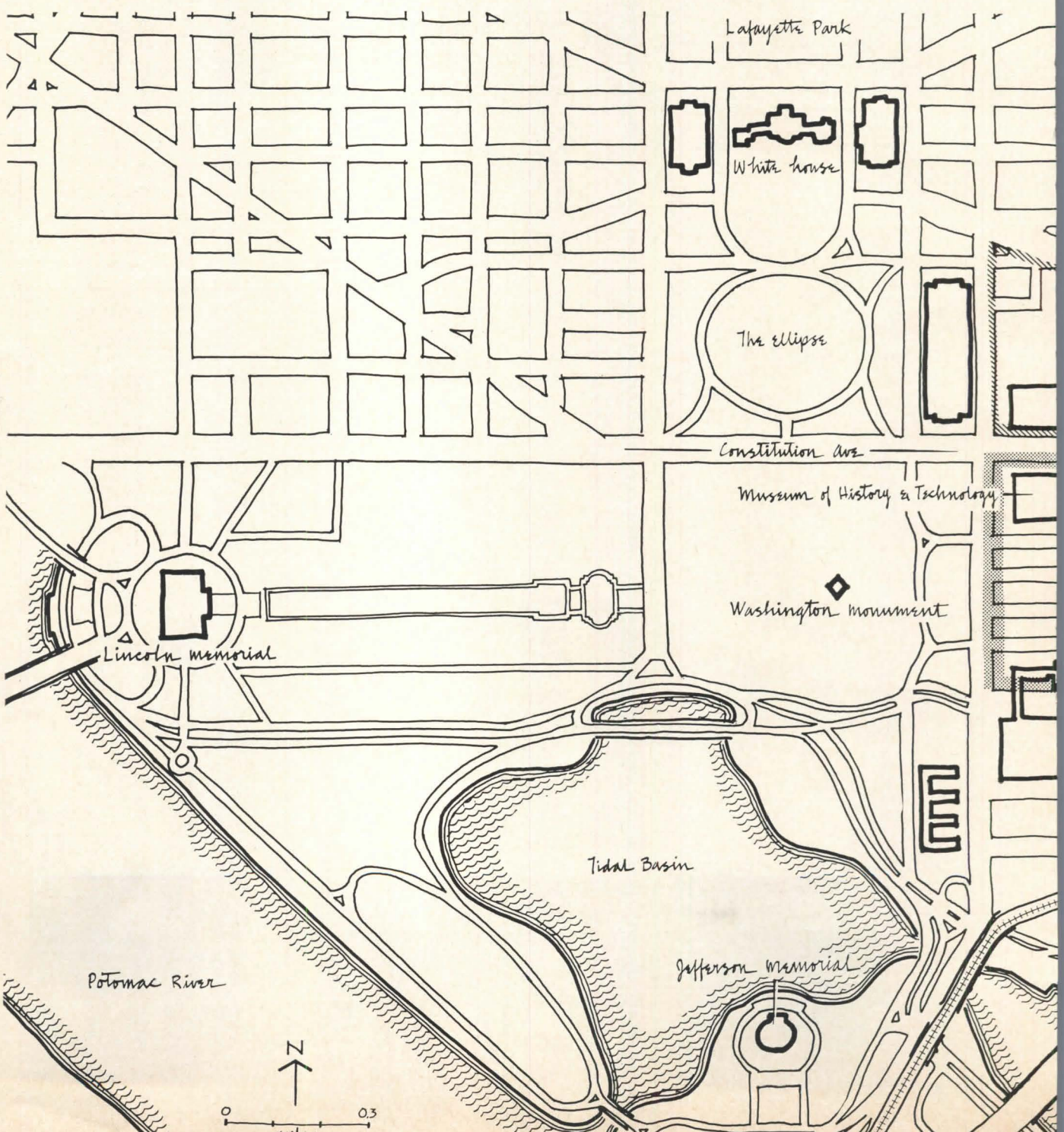
FOB #5 drawings by Davis Bité show area between cafeteria and main element, above; Independence Avenue façade, below; and the main structure from the terrace of the office wing, bottom.





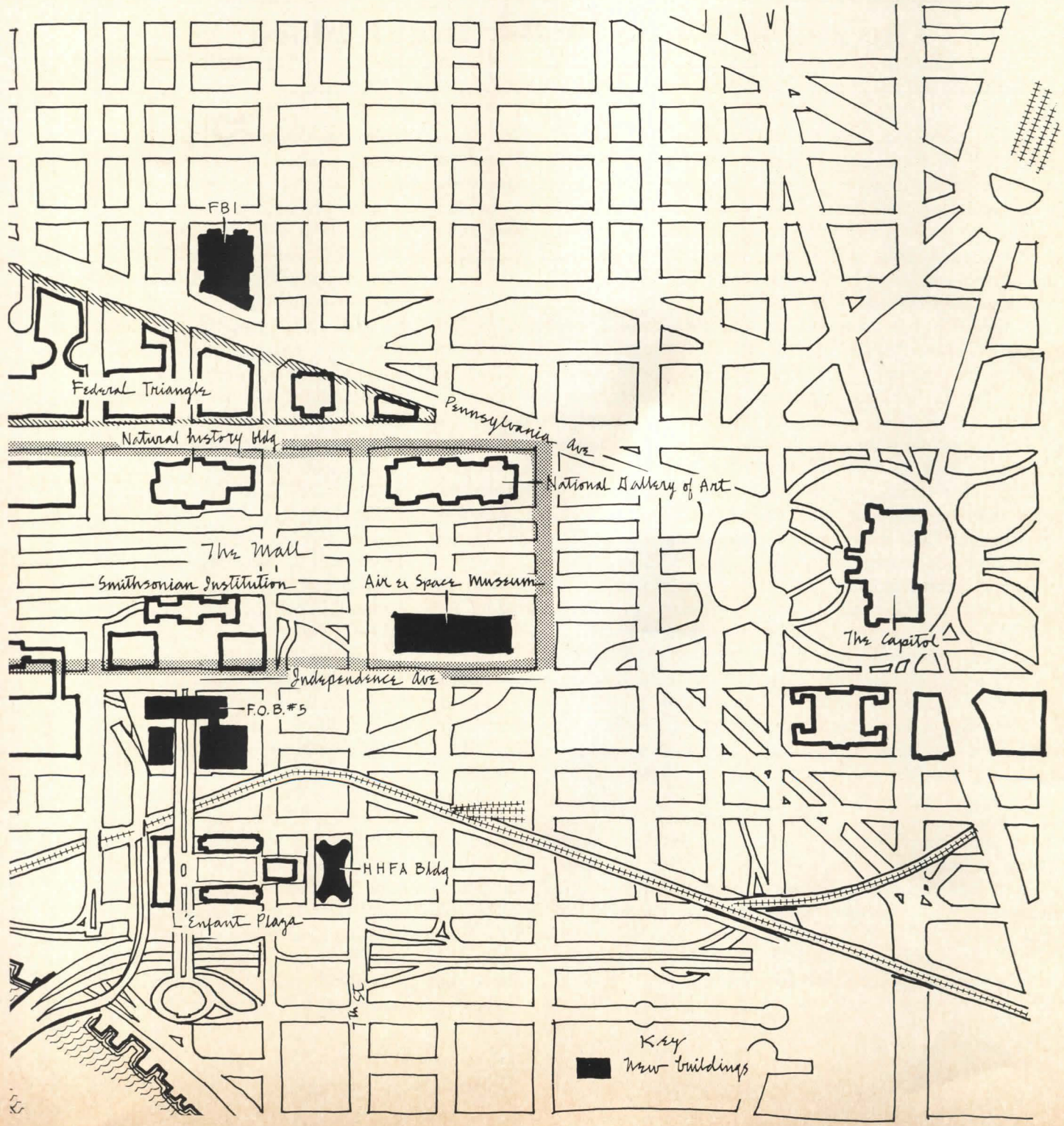
P/A drawing by N. Loscalzo from study model.

tion across from "Federal Triangle" on Pennsylvania Avenue (*left*). This problem is to produce a building that will satisfy the FBI's needs and at the same time make a contribution to the new upgrading program for Pennsylvania Avenue. Actually, even though the FBI design is not yet final, it may have accomplished the latter goal; a private builder planning a project next to the FBI site scrapped some rather unimaginative plans and asked Washington architect Chloethiel W. Smith to take over and produce a better design after seeing study de-



signs for the FBI building. J. Edgar Hoover's new bailiwick will be set back about 80 ft from the avenue, extending from 9th to 10th Streets and providing approximately 2,200,000 sq ft of floor area. The Murphy office has worked with interlocking rectangular forms to produce a basic design that has power but does not overpower. A two-story colonnade on the avenue side will furnish a view of a major courtyard. Major material here, once again, will be concrete to relate to the Government buildings across the way. The architect feels that "the emphasis upon volume rather than surface creates a building powerful in its own right." Studies of the design continue, but there is no doubt that this will be one of Washington's important new buildings.

The significance of these four projects for official architecture in Washington and the rest of the United States is patent. Three of them—Air and Space Museum, the "Little Pentagon," and the HHFA Building—will (with private buildings and the creation of the 10th Street Mall) create an entirely new neighborhood where the Smithsonian held sole sway for so long. The other—the FBI Building—will, when the final design is set, make the Government's own first contribution to the master plan for redeveloping its glory road, Pennsylvania Avenue. (John C. Warnecke's project for Lafayette Square and its surroundings is another example of advanced design concepts at high Governmental levels.) Perhaps some of this architecture is not as forceful as it could be, given another locale, but remembering the sorry mess of just a few years (even months?) ago, GSA can be lauded for making some important first advances. —JTB, JR.



JOHNSON'S INTERIOR DETAILS:

The Right Thing in the Right Place

On the first of this month, Philip Johnson received the Elsie de Wolfe Award, presented annually as the highest honor of the New York Chapter of the American Institute of Interior Designers. Named in honor of the most prominent New York decorator of the first quarter of this century, the Award is presented for distinguished contribution in the field of interior design.

Among the 10 previous winners are decorators William Pahlmann and T. H. Robsjohn-Gibbings; furniture and interior designer Edward Wormley; color stylist and weaver Dorothy Liebes; museum director James Rorimer; art critic and historian Aline B. Saarinen; and architect Edward Durrell Stone.

Johnson's award cites his "unprecedented contribution to the life, look, and enjoyment of New York City as exemplified by the New York State Theater at Lincoln Center, the New York State Pavilion at the World's Fair, the Seagram Building, Asia House, and the gardens and new additions to the Museum of Modern Art."

This recognition of Johnson's contributions to interior design points up the fact that his interiors are carried to a degree of refinement and a perfection of detail that are rare in interior design work and especially in interiors by architects in this country.

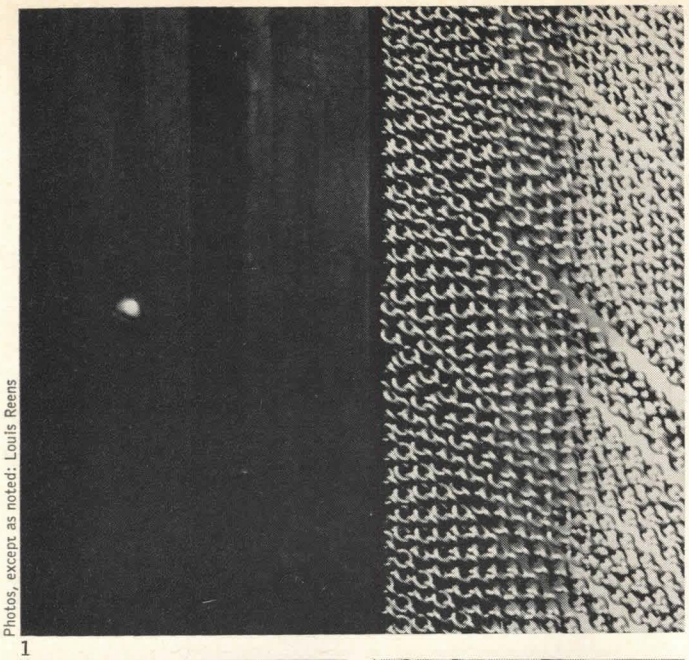
In fact, two rooms Philip Johnson has created—the Promenade of the State Theater and the Bar of the Four Seasons restaurant—are unquestionably among the most handsome and stately rooms created in our era.

Architects have been heard to say that they could do as well with similar budgets, but high budgets do not account for consistency of detail from exterior column to interior ashtray, nor for nearly infallible taste in furnishings selection. Thus the AID has been perceptive in recognizing an aspect of Philip Johnson's work that is frequently regarded as an ancillary activity to the creation of his buildings.

Some of the contributions to the vocabulary of interior design and furnishings made by Johnson are: the innovational use in the Four Seasons of metal link chain as a modern version of the "Austrian" shirred shade (1, 3), here, the constant rippling motion of the chains created by air movement from air conditioning gives a sensuous effect that has been described as inducing dizziness or, more often, as intoxicating and scintillating. Another monumental drapery, which is also an uncommon use of common material, is the gold anodized ball-link chain in the State Theater (4); there, the chain is hung in straight, single strands from a bronze batten having a serpentine pattern of connections so that the over-all window covering hangs in "folds" (5).

In the Sheldon Art Gallery, Johnson provided a functional rationale for a trick that decorators and carpet promoters have tried unsuccessfully for years—using carpeting on the walls (8); here, the carpet not only acts to deaden sound, but also provides a self-sealing surface that will not show nail holes caused by frequent rearrangement of pictures. Another pioneering design was the use of metal mesh for the walls of elevator cabs, first in the Seagram Building (2) and then (running the mesh in the other direction) in the elevators of the State Theater. Johnson also designed a significant modern lamp in collaboration with Richard Kelly (6), who later used a similar reflector principle in the Brutal Glitter lamps at the State Theater. In the latter, four sources behind the faceted plastic cover are hidden by mirrored surfaces and reflect off the faceted reflector backing (7).

Some of Johnson's other furniture designs include the variations made for the Four Seasons of Saarinen's pedestal furniture: cocktail tables have black bases with spun brass tops (3); ash urns with black bases (9) have aluminum bowls filled with black sand, (not caviar, as has been invidiously suggested); legless banquettes rest on convector (3).



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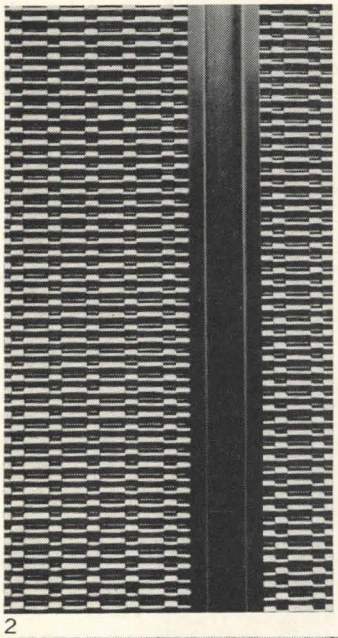
Photos, except as noted: Louis Reens



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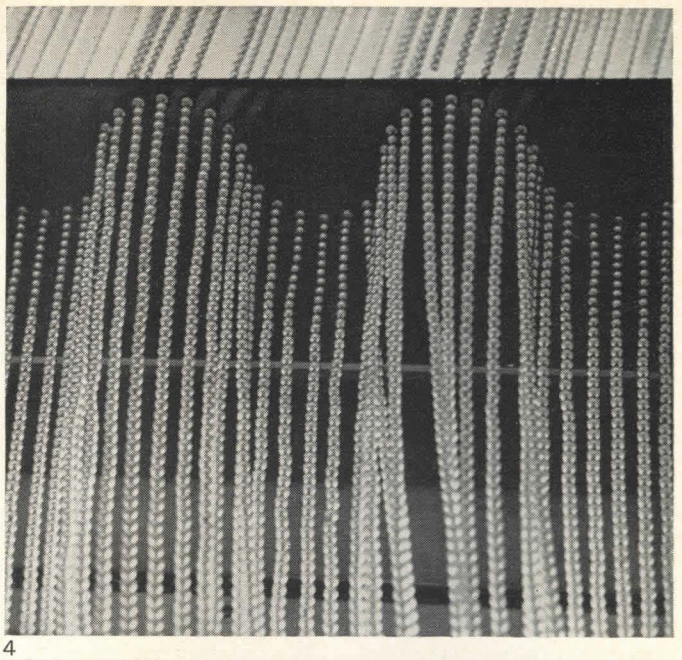

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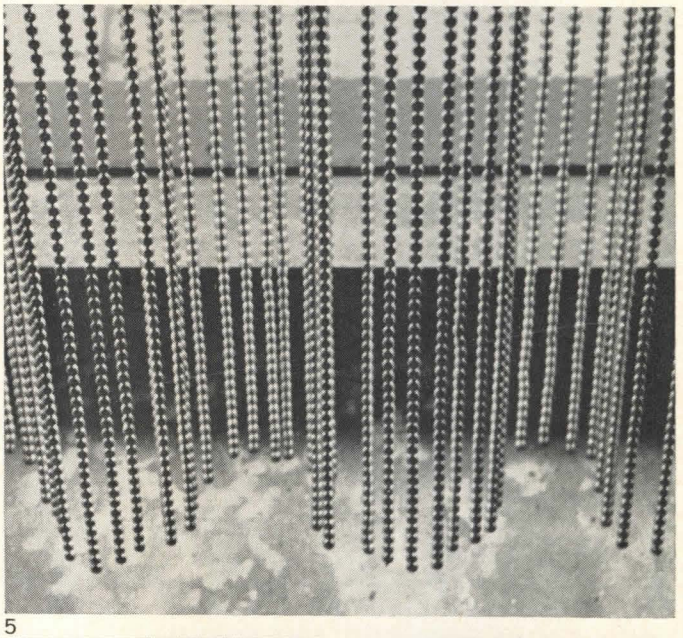

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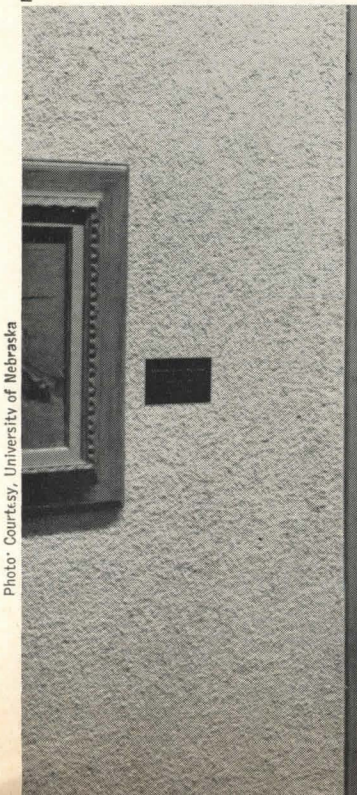

Photo: Courtesy, University of Nebraska

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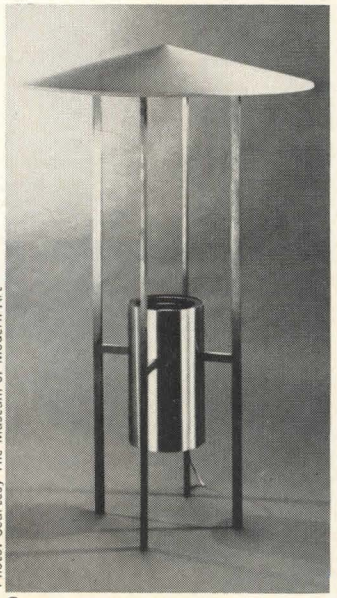

Photo: Courtesy The Museum of Modern Art

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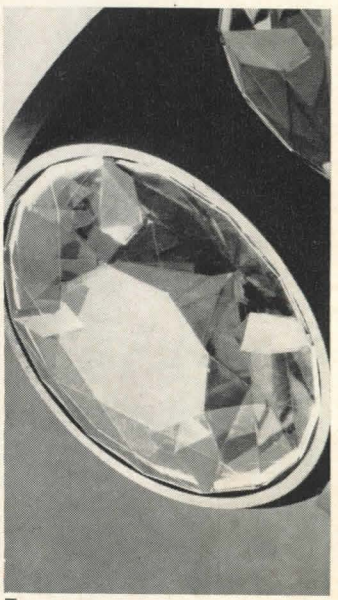

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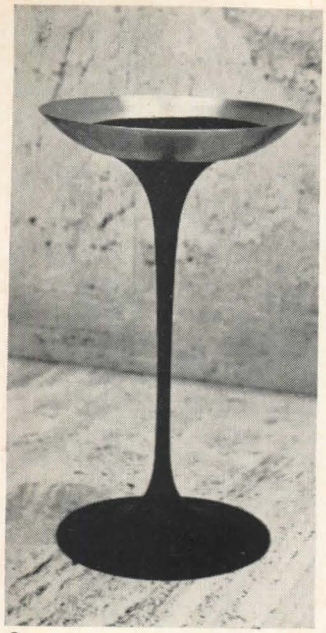
Photo: Forrest Wilson



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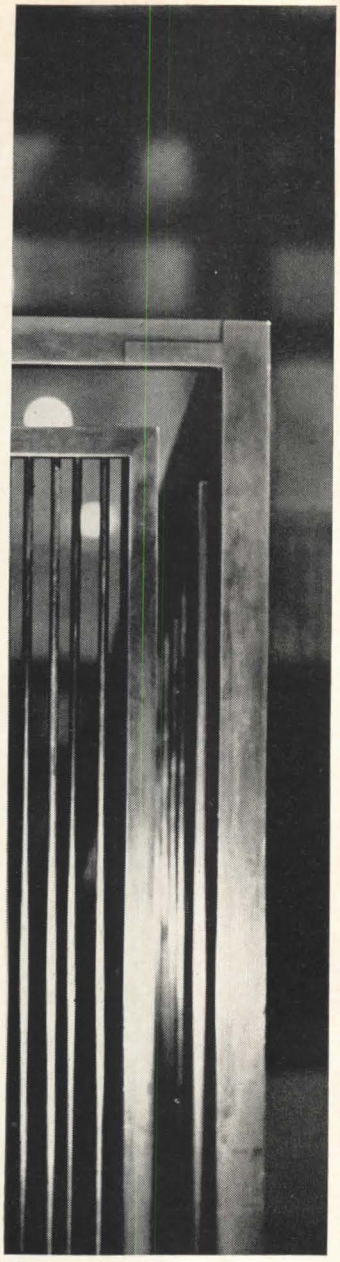

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Photo: Ezra Stoller Associates

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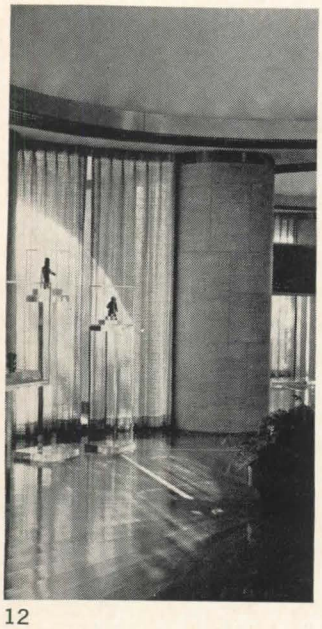

Photo: Bernardo Rostad

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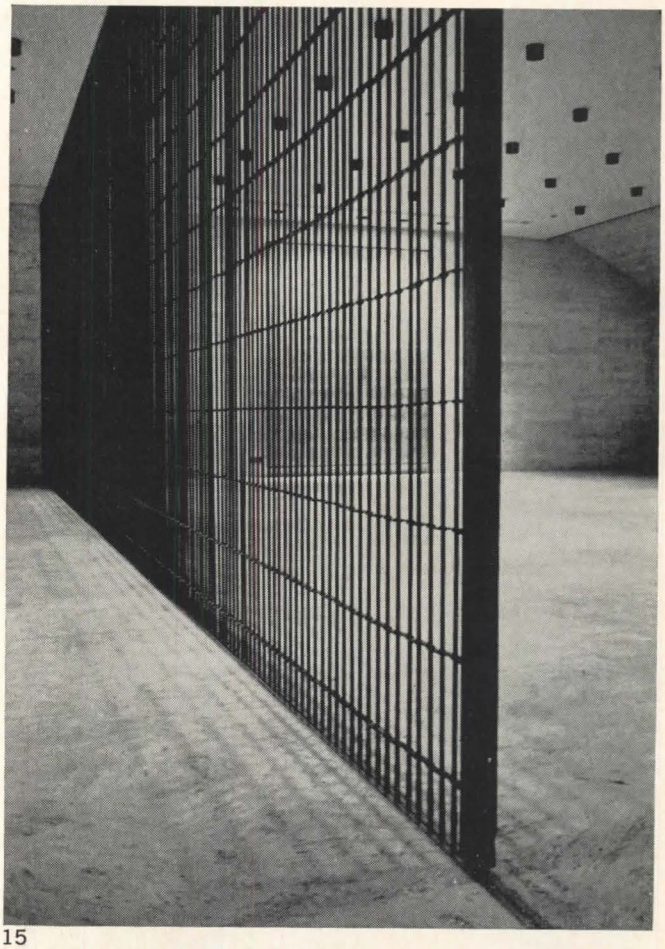

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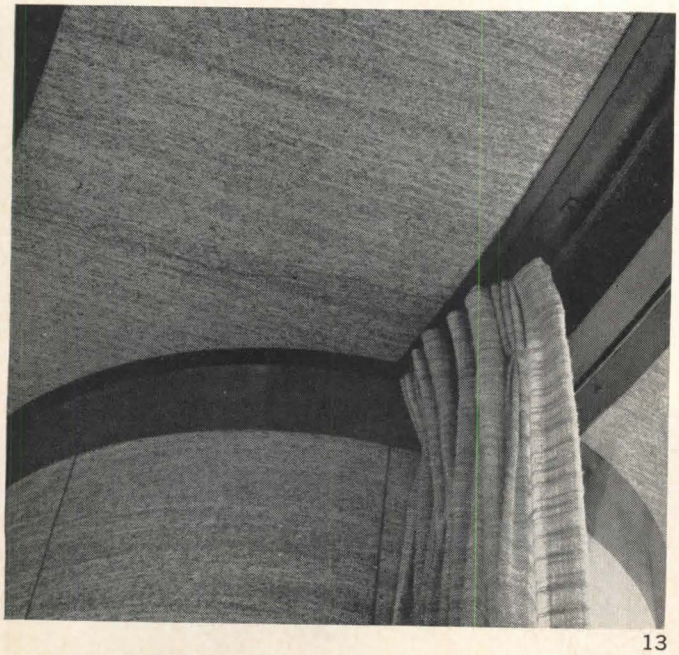

Photo: Bernardo Rostad

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Photo: Ezra Stoller Associates

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Photo: Martha Swope

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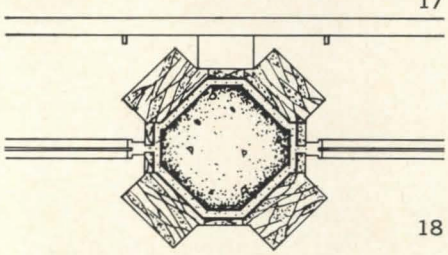

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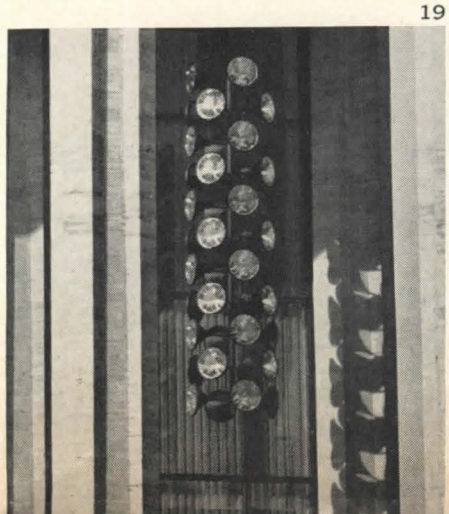


Photo: Forrest Wilson

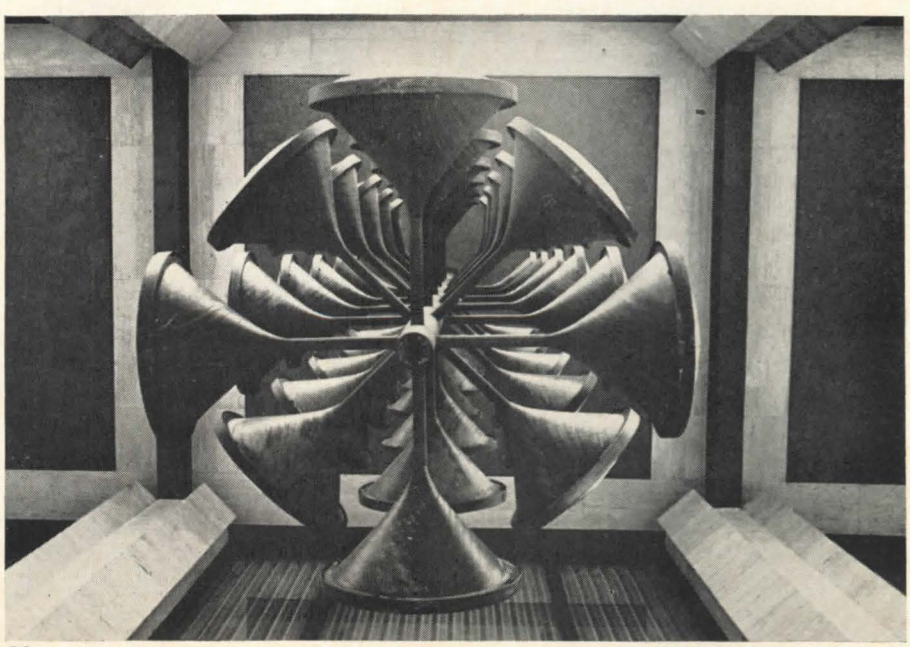
Also in the Four Seasons, the bronze balustrade panel gives an optical effect of movement as one passes it (10). A similar panel is used in the Munson-Williams-Proctor Institute (11). This kind of neat incorporation of functional elements into the interior scheme is also exemplified in the bronze drapery track that is treated as an architectural element in the new wing for the Dumbarton Oaks museum (12, 13), and in the invisibly pivoted windows in the same building.

Similarly, the new wing to the Museum of Modern Art shows a careful camouflaging of slim diffusers against the black-painted curtain wall (14). A recessed channel in front of the vents is for a vertical blind track, and an aluminum strip serves as a furniture and waxer stop as well as a carpet stop on other floors.

Johnson's continuing investigation of metal screening has produced two elegant-looking security grilles, one at the book store of the Museum of Modern Art, the other at the State Theater (15).

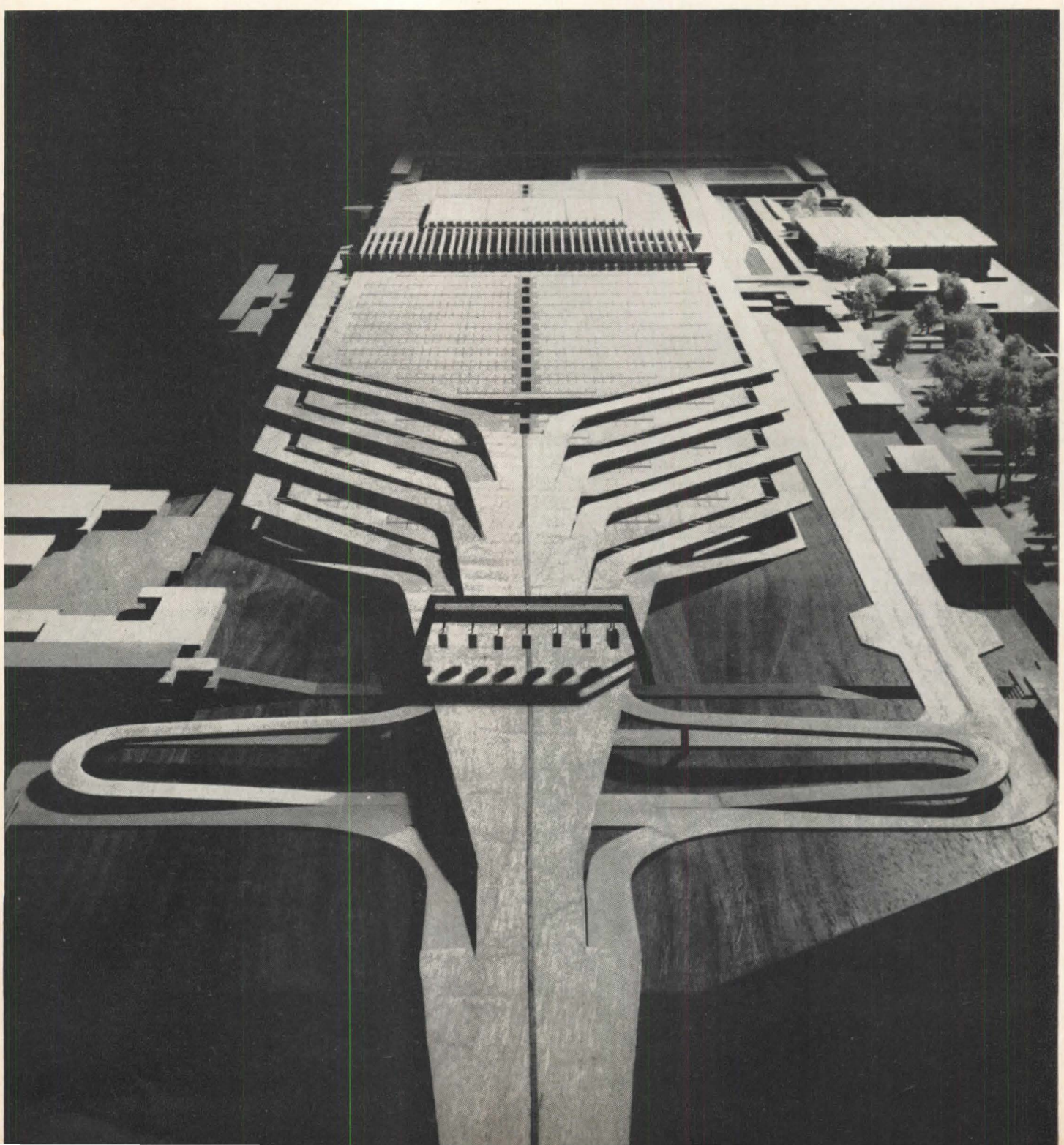
The kind of consistency that Johnson achieves is probably best exemplified in the controversial State Theater. There the plan of the column (18), the plan of the hanging light fixtures (20), on the exterior (looking like inverted "sparkler" fireworks 19), and the fabric pattern of the stage curtain (17), all bear a similar motif. Also, in the same building, the cross-hatching of the metal leafing on the balcony fronts is reiterated in the metal mesh balustrade panels, the similar proscenium arch decoration, and perhaps not coincidentally, on the backs of the distended Nadelman statues (16).

Edgar Kaufmann, Jr., writing in this magazine three years ago (p. 143, OCTOBER 1962 P/A), made an oblique comparison between Elsie de Wolfe and Philip Johnson, perhaps not without premonition. He wrote: "As the 19th Century drew to a close, in America, as throughout the Western world, there arose a desire for 'light, air and comfort' to quote Elsie de Wolfe, then the most elegant New York decorator. Besides her stated ideals, Elsie de Wolfe also stood for good taste, with the accent on the 'good.' Taste had been all too plentiful in the preceding decades; now what was wanted was restraint, nuance, the calculated little accent. . . . The good manners of it all was rather precious by present-day standards; the suavest effects of a Philip Johnson would look positively brutal by comparison." However, with an eye on the modern idiom, Elsie de Wolfe would doubtlessly give her High-Spirited concurrence to the selection of this meticulous architect to receive the award bearing her name.—CRS



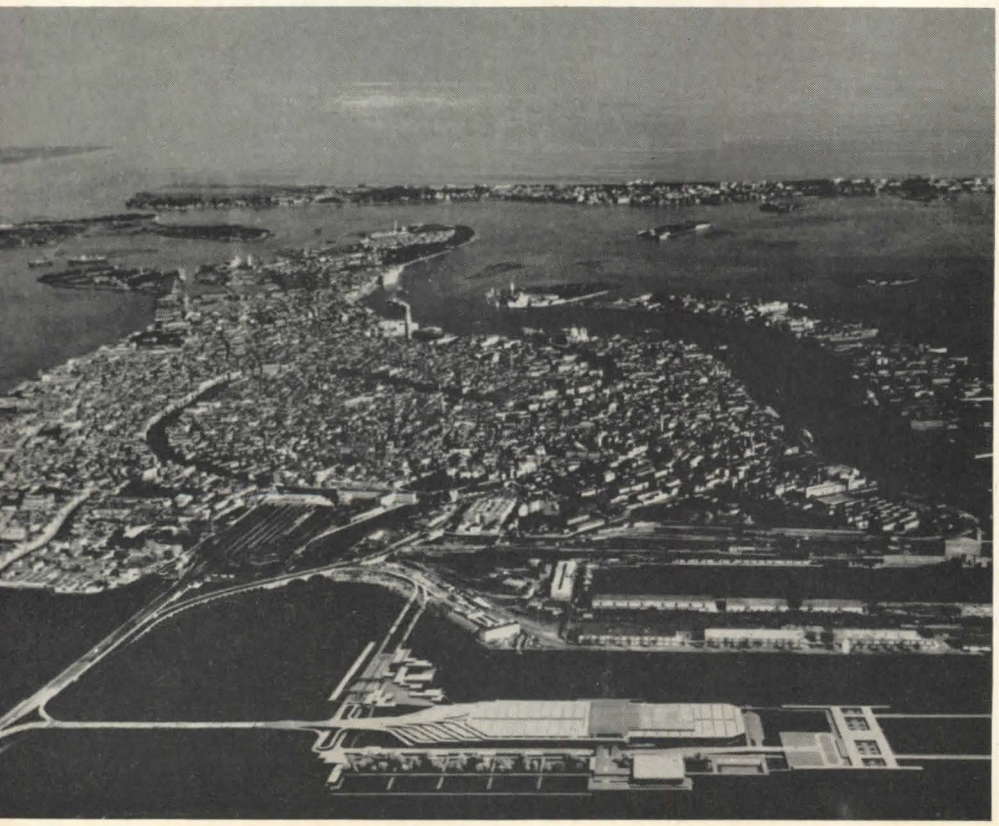
20

VENETIAN
TRANSPORTATION ISLAND



Bernard De Voto once wrote, "New England is a finished place. Its destiny is that of Florence or Venice, not Milan, while the American empire careens onward toward its unpredicted end."[1] When this was written 32 years ago, it probably appeared to be unassailably true. In recent years, of course, New England has decided not to be a finished place at all, but to become the site of activity by some of our most advanced and talented architects and planners.

Similarly now, Venice, which still sits "in state, throned on her hundred isles,"[2] has found it necessary to accommodate the on-rushing transportation technology of the 20th Century by providing a land and water terminal on Tronchetto Island, a 49-acre body of made land at the end of the causeway connecting Venice with the mainland. For the design of this major structure, the Municipality of Venice conducted an international competition, a first prize *ex aequo* of which was won by architect Manfredi G. Nicoletti of Rome, with Riccardo Morandi as consultant structural engineer and John Peverley as architect-assistant.



Nicoletti has planned his proposal for Tronchetto Island in five elements:

(1) The parking terminal, to service the automobiles and buses of Venice's ever-growing tourist traffic (air passengers must also approach by motor over the causeway);

(2) The port facilities, providing dockage for six oceangoing vessels;

(3) The local goods dock, for distribution of goods and staples into the city via water;

(4) Federal center, to include activities concerned with port traffic and tourism, such as customs, customs police, associated administrative offices, and storage areas;

(5) "Flexible structures," namely provision for "still nondefined activities" that would make Tronchetto a year-round economic feasibility to compensate for the seasonal nature of the tourist trade (perhaps including a public hall or sports palace, pedestrian mall lined with restaurants and shops), and a public marina.

Nicoletti says that he considers the design significant for two main reasons: because of the compact nature of the plan, the island becomes a single building subdivided into different uses; and because the parking terminal itself is seen as a new "visual symbol of traffic architecture," in that the causeway does not simply feed into the building, but "becomes itself a building which is planned like a street with platforms for parking, loading and unloading areas for passengers and luggage, service stations, etc. This building is a logical and visual end of the traffic artery: a real Terminal," according to the architect.

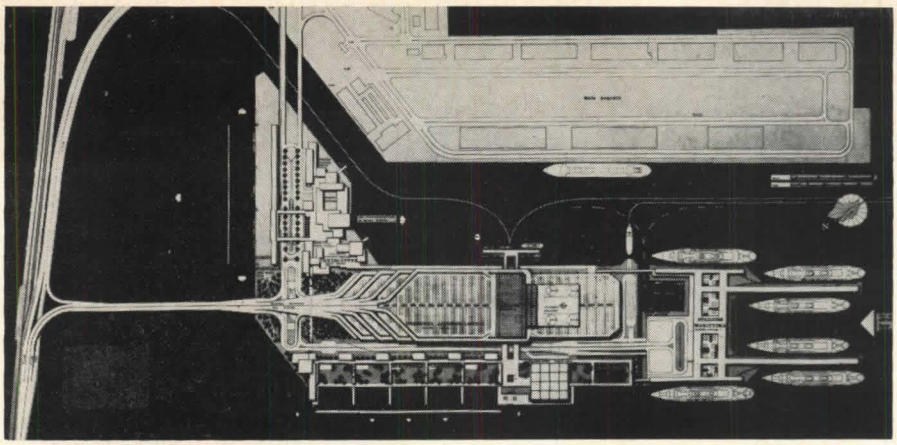
The core of the terminal is a system of concourses or *gallerias* for pedestrians, offering information desks, tourist agencies, change offices, bars and restaurants. This area is the point of changeover from bus or private car to motorboats and water taxis to Venice and the Lido, as well as possible helicopter connections.

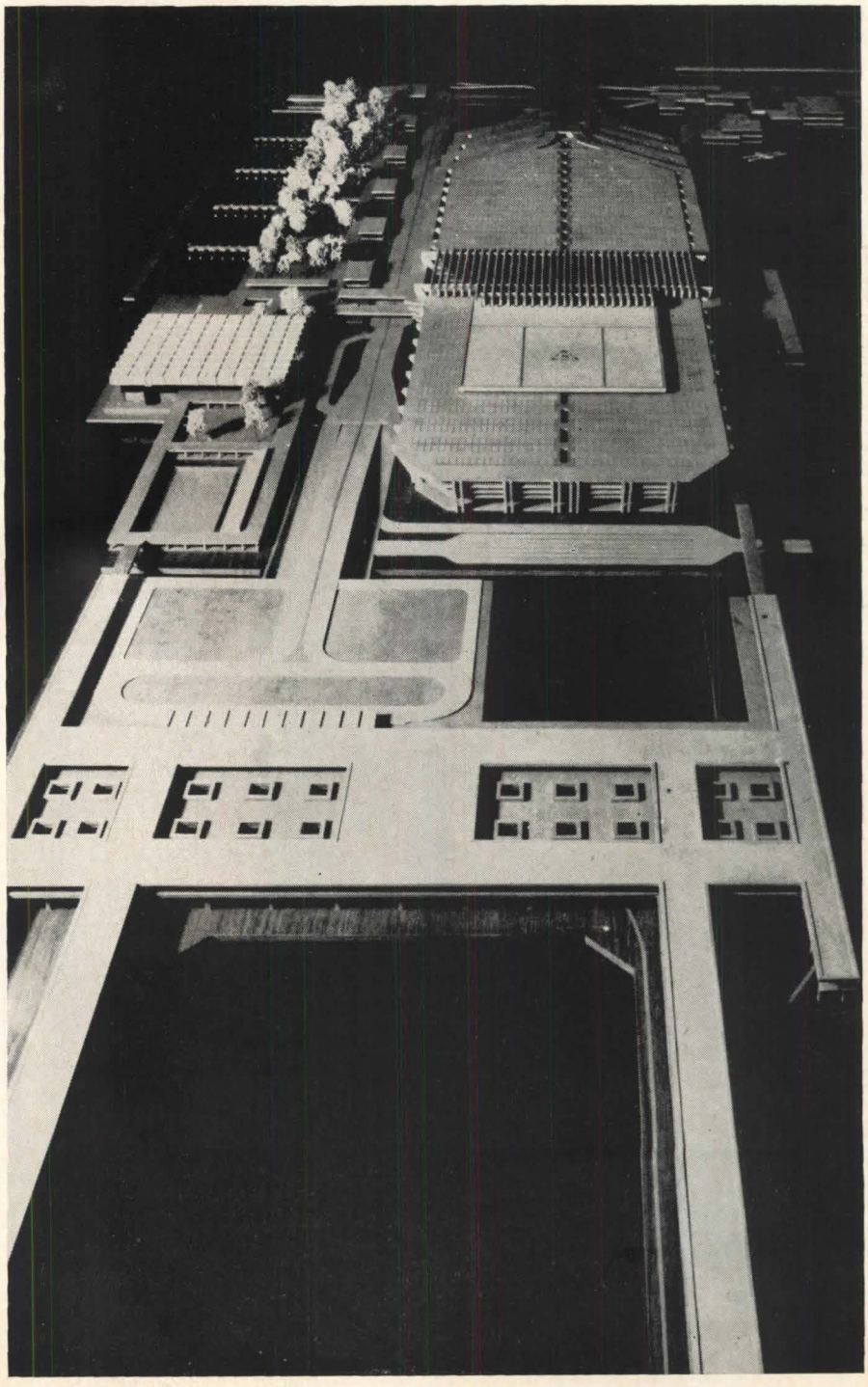
Circulation is as follows: the passenger enters past a toll station, is directed to his parking place, approaches it on the outside ramp (depositing his baggage at an unloading platform on the way), parks, takes elevator or escalator to the ground floor of the concourse, then takes a water taxi or *vaporetto* into town. The circulation is all cyclical and one-way in-and-out to avoid any mix-ups. Capacity of the terminal is to be 6500 cars (in four layers spreadeagling out from the entry) and 500 buses (on the ground floor).

The structure of prefabricated, prestressed concrete, according to engineer Morandi, will consist of a 16 x 16 meter modular system of columns supported on a cast-in-place pedestal concrete pile foundation and connected to a grid of continuous concrete beams. Floors will be waffle-type, two-way post-tensioned slabs measuring 50 cm. in thickness. The entrance and exit ramps at the periphery of each floor will be cantilevered continuations of the horizontal grid system.

Jury report on this winner stated: "The jury appreciates the technical qualities and the functionalism of this project, especially where it is concerned with the organization of communication and the adaptation of the program to the terrain and to the site. Nevertheless, it offers a certain disproportion between varying elements and an exaggerated filling of the ground."

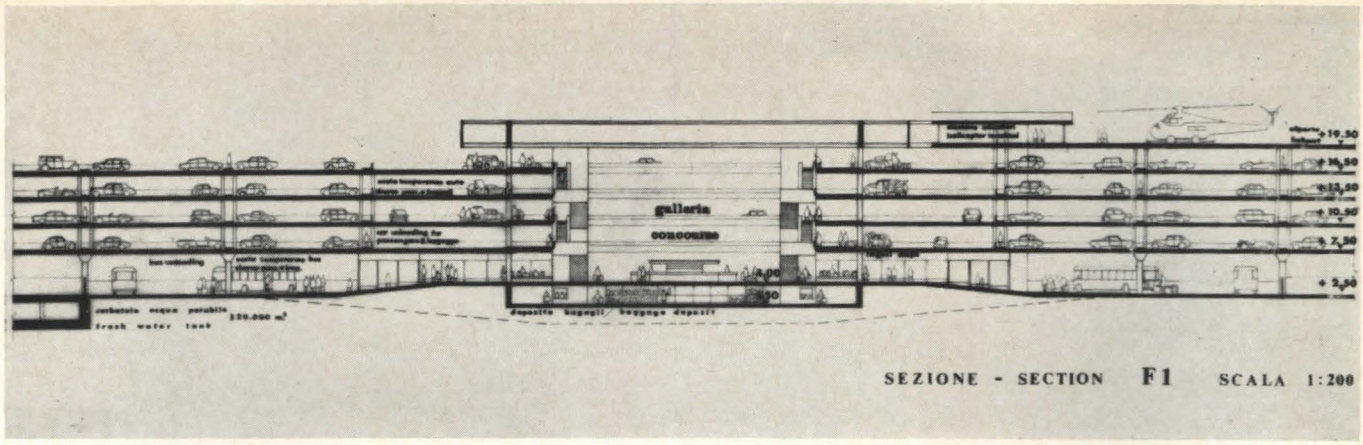
Nicoletti writes that the scheme will probably be adopted by Venice, but he cannot foresee what modifications will be required. As a needed facility that appears not to obtrude upon, but rather to serve discreetly, a formidably "inviolate" city (not even Frank Lloyd Wright could enter here!), Nicoletti's solution appears to us a notable plan. Of the other 2,800,000 lire "first prize" winners, one was from Poland, one from Florence, one from Yugoslavia, and one from Venice.—JTB, JR.





[1]De Voto, Bernard, "New England: There She Stands," *Harpers Magazine*, March 1932.

[2]Byron, *Childe Harold's Pilgrimage*, Canto IV, Stanza I.



SEZIONE - SECTION **F1** SCALA 1:200

District Heating/Cooling

BY WILLIAM J. McGUINNESS

Advantages of utilizing a central utility plant system for heating and cooling in urban and suburban planning are discussed by a practicing mechanical engineer.

Scheme of supplying customers (building owners) with chilled water, hot water, or steam from a central utility plant is beginning to emerge as a new pattern in urban and suburban planning. The third utility-owned/operated plant and distribution network of this type in the United States was formally opened at Nassau Bay near Houston, Texas, in December 1964 (*for description of first installation see* M. E. CRITIQUE, OCTOBER 1962 P/A). Experience in this kind of operation is broader than indicated, if one considers similar but specialized installations that deliver heating and cooling to college campuses and airports. The movement is growing rapidly.

The Nassau Bay district plant is owned and operated by Thermal Systems, Inc., a subsidiary of Houston Natural Gas Corporation. In its location adjacent to the NASA Manned Spacecraft Center, the Nassau Bay community derives much of its patronage from the personnel of that venture.

The central plant, now equipped and delivering one-third of its ultimate capacity, is architecturally attractive, well-planned for current and future operation, and relatively simple in concept. The major elements that produce the high-temperature water and chilled water for underground distribution comprise gas-fired, high-temperature steam boilers, water chillers powered by steam-driven turbine compressors, a two-cell cooling tower, steam-to-water heat exchangers, and the essential pumps.

The boilers, which produce superheated steam at 600 F and 230 psig, operate as the prime power source for both hot and chilled water. The convertors deliver water at 300 F and the chillers send water out at 40 F. Thus, natural gas and its thermal product, steam, are used throughout the year. The steam energizes the high-temperature water at the convertors and initiates the cooling cycle by powering the five-stage steam-driven centrifugal compressors.

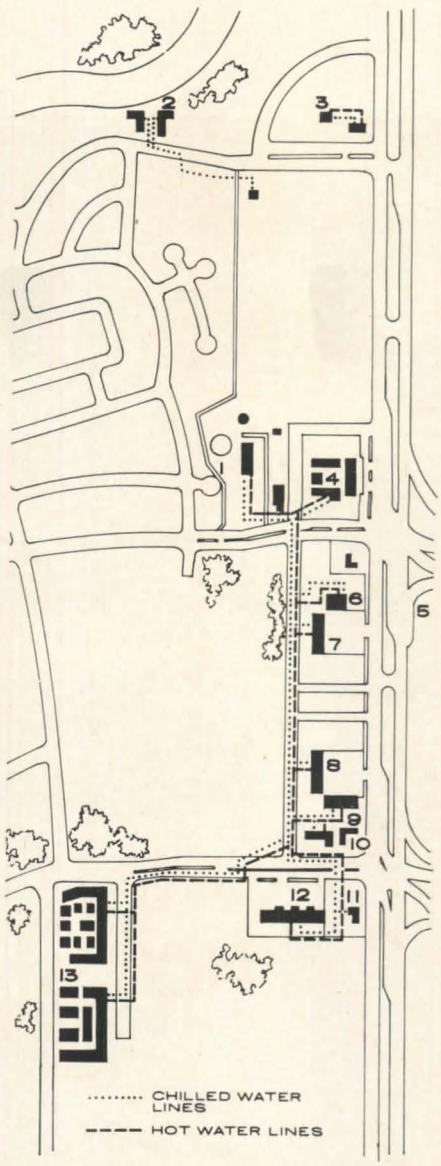
When the plant capacity expands to 6000 tons of cooling from its present 2100 tons, there will be four boilers instead of two, chilling centers will increase from two to six, as will the cooling tower cells.

The distribution system (*illustrated*) presently totals 3 miles of underground piping and will expand in the future to 12 miles. There are four pipes, two for the supply and return of chilled water, varying from 4 in. to 14 in. in diameter, and two for the supply and return of hot water. The latter measure up to 8 in. Insulation is foamed glass and there are sand beds below and above the piping.

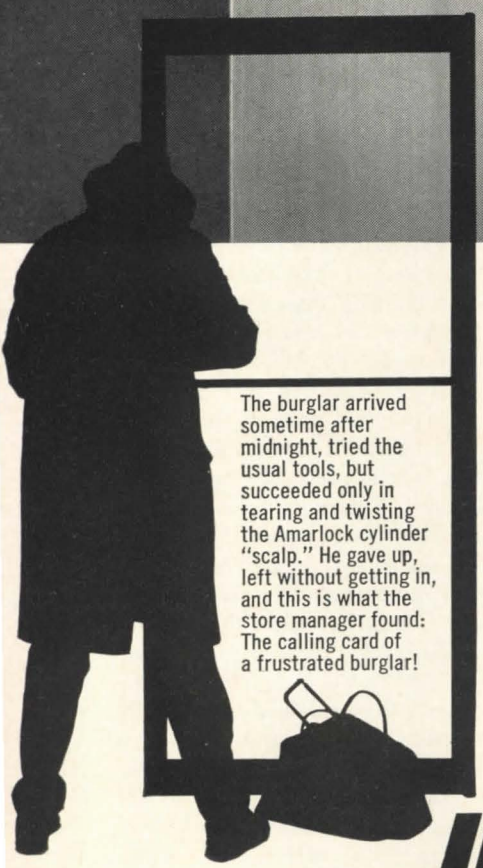
At the various offices, shops, motels, apartments, and other buildings, the only capital investment is in heat exchangers, coils, blowers, and ductwork. Eliminated are boilers, chiller, cooling towers, and much piping.

Benefits accrue to both the utility and its customers. The Houston Natural Gas Corporation increases the use of its product and balances its seasonal demand. Integrating the needs of customers establishes a peak demand that is *not* the sum of its parts. A theater will use maximum cooling at a different time than a supermarket. The result is a diversity factor that reduces the size of the plant serving this shifting occupancy. The consumer, of course, saves a large part of his capital investment in building equipment. Comparative financial studies issued by Thermal Systems, Inc., indicate an anuual saving to the consumer for heating/cooling service of between 10 and 30 per cent. The budget cost of the service to the owner is about 20 or 30 cents per sq ft of floor area.

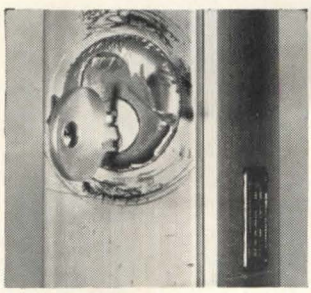
Architects for the project were Welton Becket & Associates; Mechanical Engineers were Bovay Engineers, Inc., of Houston. Cooling equipment is by Carrier Air Conditioning Company. Ultimate cost of the system will be $2,000,000.



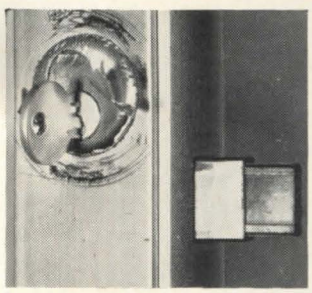
1. *Nassau Bay Thermal Systems Plant*
2. *Town Houses*
3. *Savings & Loan*
4. *Hotel*
5. *NASA Manned Spacecraft Center*
6. *Office Building*
7. *Office Building*
8. *Office Building*
9. *Office Building*
10. *Service Center*
11. *Bank*
12. *Professional Building*
13. *Apartment Complex*



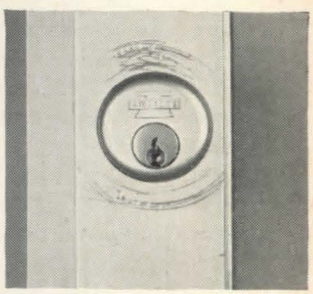
The burglar arrived sometime after midnight, tried the usual tools, but succeeded only in tearing and twisting the Amarlock cylinder "scalp." He gave up, left without getting in, and this is what the store manager found: The calling card of a frustrated burglar!



After break-in attempt, lock still worked like new, opened for business as usual.



Amarlock long-throw bolt shows deeper penetration length. Chrome-plated steel sleeve is armored reinforcement.



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Subgrade Waterproofing—Part I

BY HAROLD J. ROSEN

Prerequisite information to writing proper specifications for subgrade waterproofing is the subject of a two-part report based upon a paper delivered at last fall's BRI conference in Washington, D.C. Contributing Editor Rosen has recently been named Chief Specifications Writer of Skidmore, Owings & Merrill, New York.

Certain elements are essential in the preparation of good specifications for subgrade waterproofing: comprehensive knowledge of the various types of waterproofing systems; assessment of the conditions at the site; and type of construction involved.

Elements that aid in the enforcement of the specifications during the construction period and that should be incorporated in the specifications include: prequalification of waterproofing subcontractors; provision for inspection of surfaces prior to waterproofing; control over the approval of materials; specifications for dewatering the site to permit application in dry excavations.

Specifications writing techniques also play an important role in the development of sound, enforceable specifications. These involve: organization of material into an orderly, logical sequence; use of specification language that is clear, concise, and unambiguous; the types of specifications used: proprietary, descriptive, performance, and reference.

To begin with the ingredients of a good specification: Knowledge of the various types of waterproofing systems and materials is necessary in order to evaluate their attributes and deficiencies. This permits the architect, engineer, or specifier to make the proper selection for a given installation.

Waterproofing systems of subgrade structures can generally be classified under the following headings: membrane waterproofing; hydrolithic waterproofing; integral waterproofing.

Under the heading of *membrane waterproofing*, there are the old, familiar bituminous types utilizing tar or asphalt bitumens with rag, asbestos, and wood fiber felts, or with cotton and glass fabrics. The more recent membrane waterproofing systems utilize butyl rubber sheets and polyvinyl chloride sheets installed with adhesives and cements.

As far as the bitumens are concerned, suppliers of tar and asphalt make identical claims of excellence for their products. The general concensus, however, is that coal tar pitch is more stable in the presence of water than asphalt. The felts or fabrics used with bituminous membrane systems should be resistant to bacterial action from the soil, and also resistant to rupture at corners and other points of stress. The number of plies to be used with respect to the hydrostatic head of water is based on the following table:

Head of Water In Feet	*No. of Plies*	*Pitch Moppings*
1–10	3	4
11–25	4	5
26–50	5	6
51–100	6	7

To the best of my knowledge, this criterion was originated in Europe and brought over to this country. According to the best information available, it has never been subjected to tests to verify it.

The new butyl and vinyl chloride sheet materials have been in use for about 15 years, and, according to their manufacturers, are resistant to soil bacteria and soil chemicals.

The second category of waterproofing systems is the *hydrolithic coating*. Hydrolithic coatings consist of portland cement mortars with additives of either metalic iron or proprietary integral waterproofing admixtures. They are usually applied to the inside face of below grade walls and slabs to a total thickness of approximately 1 in.

The final category is the *integral waterproofing* system. This consists of the introduction into concrete of liquid, paste, or powder admixture—generally of a proprietary nature—for walls or slabs below grade in order to render the concrete impermeable.

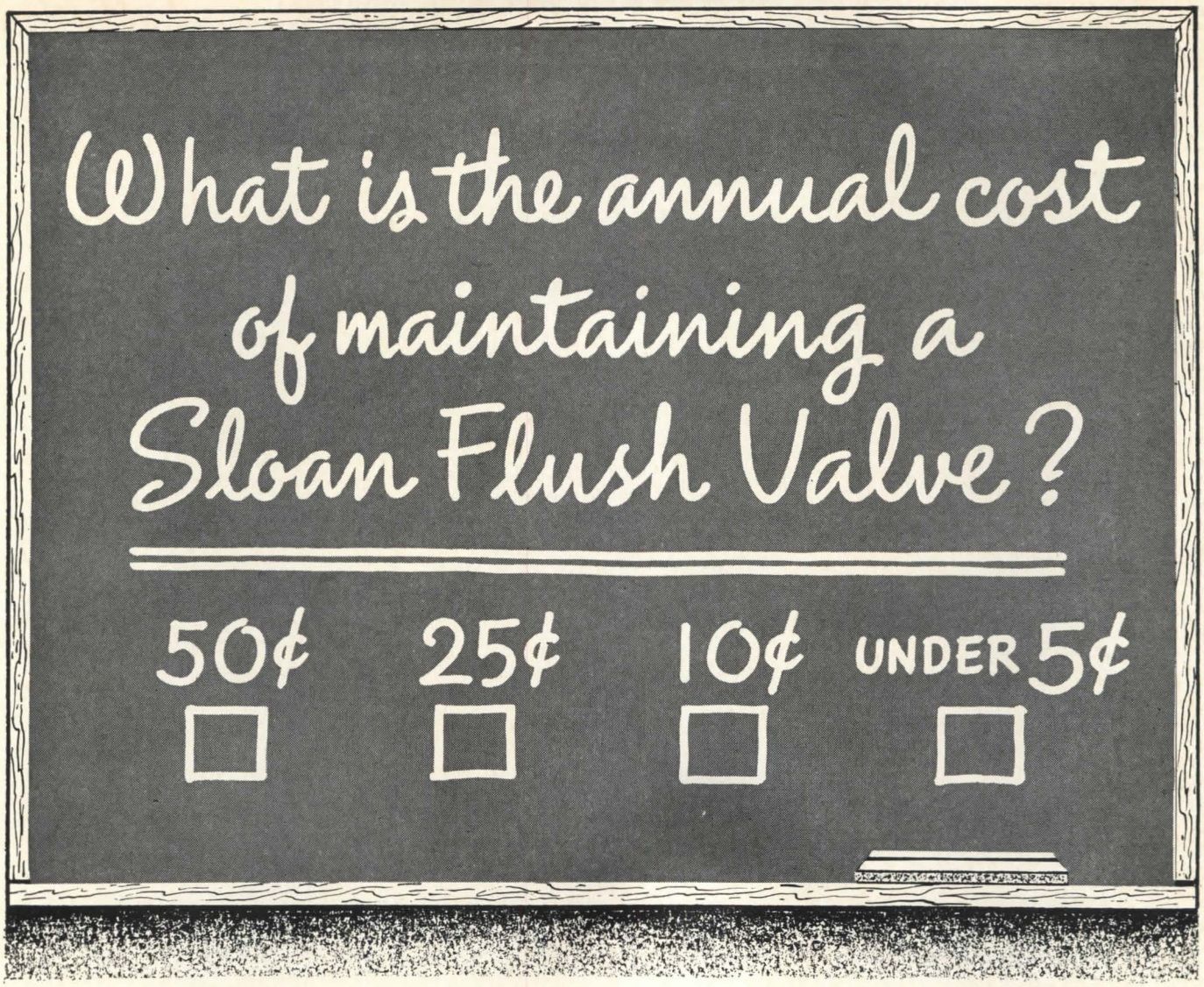
The next step in the writing of the specifications would be to analyze the boring data, the proposed design of the walls and slabs, and the local topography to determine the extent and depth of water to be encountered. These factors help influence the type of waterproofing system to be selected. The siting of a building may prevent access for application of exterior types of waterproofing if the building lies between existing structures or if rock excavation is required that would add to the cost of additional excavation.

A good specification does not necessarily insure good results unless the provisions of the specifications are adhered to and enforced during the construction phase. To insure good results, the specifications should restrict the list of waterproofing subcontractors to prequalified bidders. This system of prequalification is just as valid as prescribing the materials to be used. Specifying the approval of materials by the architect precludes the use of inferior or unsatisfactory substitutes.

Inspection of the surfaces to be waterproofed is of vital importance. Surfaces should be dry, clean, and free of projections. The need for dry excavations is imperative; therefore, the specifications must provide for the use of pumps, well points, or other dewatering methods.

The most effective method for testing whether the waterproofing has been properly installed is to shut down pumps and well points and ascertain immediately whether leaks develop and whether remedial work is necessary.

Each of the various waterproofing systems requires close supervision and inspection; however, it does not follow that inspection by the architect should relieve the contractor of responsibility for providing a waterproof installation.



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Architecture and the Law in Canada: Part 1

BY BERNARD TOMSON AND NORMAN COPLAN

In the first of two articles, P/A's legal team discusses various legal aspects of architectural practice in Canada.

It is always a rewarding experience to discuss with an architect from another country the various aspects of the environment in which he practices. It affords a valuable insight into his particular social and cultural milieu—one that would be difficult to obtain as quickly in any other way. The reason for this is obvious: The architect must intimately understand the community in which he practices if he is to express in concrete form the social dynamics that shape it. Without such understanding, how can the architect design structures that will suit the community's habits of living, of work, of play?

It was therefore enlightening for Bernard Tomson, co-author of this column, to meet and spend time with architects —and in one case an attorney who represents a number of architects—who practice in the Canadian Provinces of Quebec, New Brunswick, Prince Edward's Island, and Nova Scotia.*

Several statistics serve to indicate the scope and the growth of architectural practice in Canada. In the first seven months of 1964, for example, Canadian construction contracts totaled $2,587,497,000 (an increase of 26 per cent over 1963). This is extraordinary for a country whose total population is less than 20,000,000. The population figures of the Provinces are significant. The Province of Quebec, which is large and prosperous, contains the largest city in Canada, Montreal (with a population in the metropolitan area of approximately 1,621,000), and the city of Quebec (with a metropolitan population of 310,000). The Province of Quebec itself has a population of approximately 5,300,000. In comparison, the Province of New Brunswick has 600,000, Nova Scotia 470,000, but the latter contains the important city of Halifax with about 165,000. Prince Edward's Island, an area of approximately 1,000,000 acres, has a population of about 110,000.

The legal aspects of the practice of architecture in these Provinces fits almost perfectly into the pattern of practice in the States. There is a similarity —almost an identity—of problems regarding the licensing statutes, the problems involving practice by engineers, by package dealers, the problems of enforcement, and so on *ad infinitum*. The problems of the architect in the large city appear to be the problems of the architect in a large city in the United States; similarly, the problems of the architect in the small town are not too unlike the problems of his U.S. counterpart. There is a feeling, however, that the status of the architect in general is something above that of the architect in in the United States, in the sense that there is somewhat better understanding, on the part of those with whom the architect deals, of his function and his social importance.

Of particular interest is the Civil Code of the Province of Quebec, which makes the architect and the contractor jointly and severally responsible for defects in the work for a period of five years.

Articles 1688 and 1689 of the Code provide as follows:

"Art. 1688 C.C. If a building perish in whole or in part within five years, from a defect in construction, or even from the unfavourable nature of the ground, the architect superintending the work, and the builder are jointly and severally liable for the loss.

"Art. 1689 C.C. If, in the case stated in the preceding article, the architect does not superintend the work, he is liable for the loss only which is occasioned by defect or error in the plan furnished by him."

The statutory provisions above-quoted provide a rule which many think harsh, in that either the architect or the contractor may be held liable for defects regardless of fault. Thus, improper workmanship or defective materials furnished by the contractor becomes the joint responsibility of the architect, and defective design becomes the joint responsibility of the contractor. This rule differs from that of the common law of the Canadian-English Provinces and apparently from that of the Code Napoleon. The statutory rule of Quebec, however, appears to be an express enunciation of the common law rule of that Province.

The underlying premise of the Quebec rule that the owner and the public can only be protected in the construction of a project by the joint liability of architect and contractor, regardless of fault, has been subject to criticism. (For example, see the book, *The Joint and Several Responsibility of Architects, Engineers, and Builders*, by Walter S. Johnson, Q.C., 1955.) Certain decisions of the Quebec courts seem to be indirect attempts at modifying the harshness of the rule. The statute itself has required interpretation by the courts in such respects as what constitutes a "building," the meaning of the term "perish" contained in the law, and the application of the statute to those others than architects, such as engineers.

In next month's column, we will continue this discussion of the special liability of the Quebec architect as contrasted to the rule of liability for U.S. architects.

* For the insights obtained from these meetings we are indebted to Austin Johnson, Q.C., of the firm of Byers, McDougall, Casgrain & Stewart, a barrister who practices in Montreal; to Andrzej Madeyski, a Montreal architect; to Gerald J. Gaudet, a New Brunswick architect with the firm of Leblanc, Gaudet, Roy & Sumers; and to G. Keith Pickard, a Prince Edward's Island architect. Mr. D. Dimakapoulos of the firm of Affleck, Desbaratus, Diamakopoulos, Lebensold & Sise was kind enough to arrange the meeting with Mr. Johnson.

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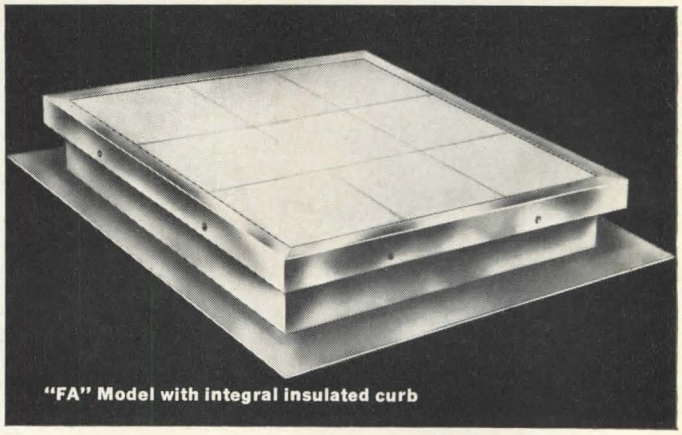

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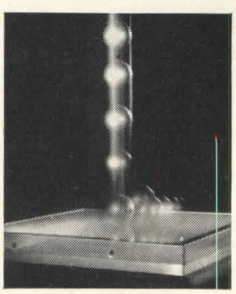

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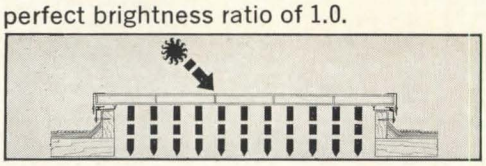

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The Planning Process in Minute Detail

By PHILIP H. HISS

CAMPUS PLANNING *by Richard P. Dober. Published by Reinhold Publishing Corp., 430 Park Ave., New York 22, N.Y. (1964, 314pp., illus. $25). The reviewer has visited and studied educational institutions throughout the country and has had unusual experience as chairman of the school board of Sarasota County, Florida, and Chairman of the Board of Trustees of New College. He is presently completing a book on the environment for education to be published soon.*

Early in his comprehensive and important book, *Campus Planning*, Richard Dober quotes Alfred North Whitehead's inspired definition: "The task of the University is the creation of the future." But he soon makes it clear that most institutions of higher learning in the United States have not been very prescient—educationally, architecturally, or otherwise.

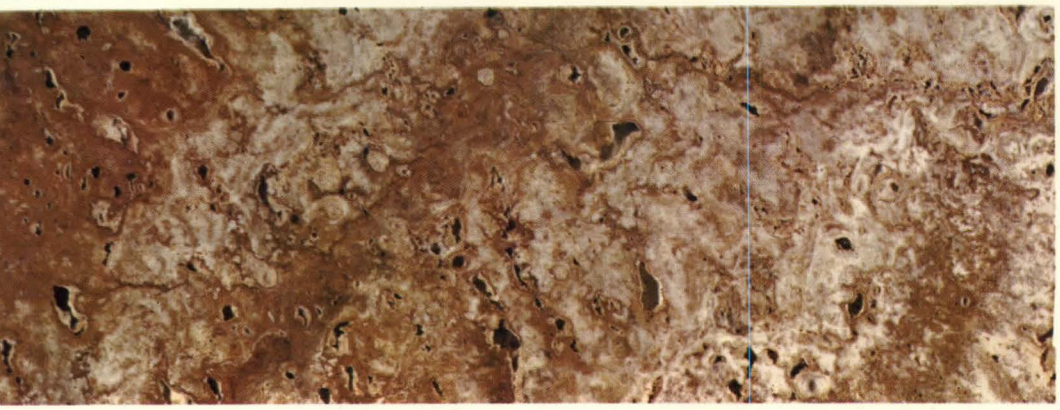
As Dober points out: "The institution of higher learning is remarkable for pursuing an intricate program with little agreement about fundamental purposes." Since "Planning is the response of design to program, and program is response to design," it is not surprising to discover that there may be "ten times as many bad buildings as good."

Lack of planning, the preponderance of poor architecture, and the absence of amenity on many older campuses are attributed to "poverty, a lack of an architectural tradition, an uncertainty as to educational purposes." He concludes: "The emulation of the English models was at best a token obeisance to an educational symbol." Early colleges and universities in this country were small, often comprising no more than one or two buildings, and consequently did not require planning in the sense that it is now known: architectural style was almost always derivative.

Today, poverty is more often that of the imagination or of the spirit. In the most affluent society the world has ever known, if institutions of learning are poor, it is because we value other things more than education. The problem of money scarcely exists on many campuses except in the sense that they have so much they can afford to buy themselves out of problems rather than solve them.

California and New York—our two largest states—are pouring billions into new universities and colleges and other billions into additions and renovations to existing institutions. Many of our leading private colleges and universities have recently completed fund-raising campaigns of astronomical proportions. And many people would be surprised to discover the amount of Federal money that is invested in both public and private education. Today, many more institutions are in a position to invest in the services of the most talented planners, designers, consultants, and engineers than are actually doing so.

Continued on page 218



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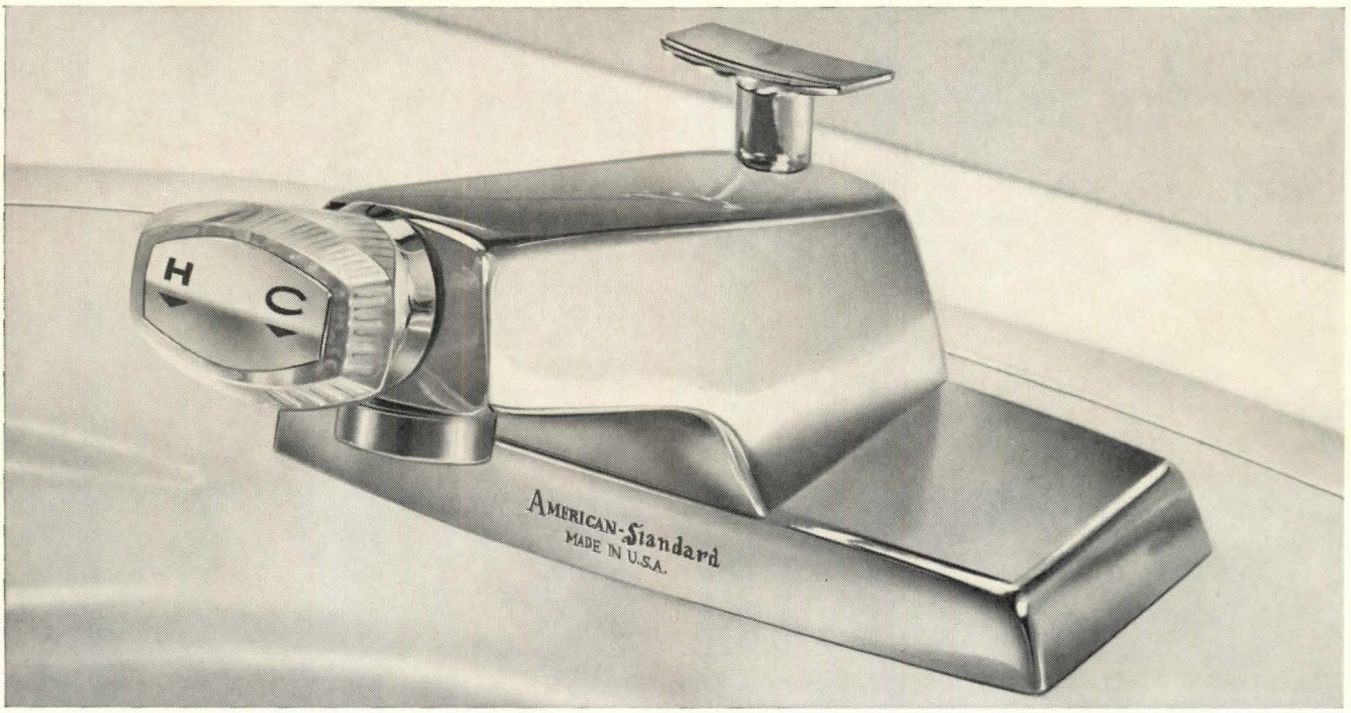

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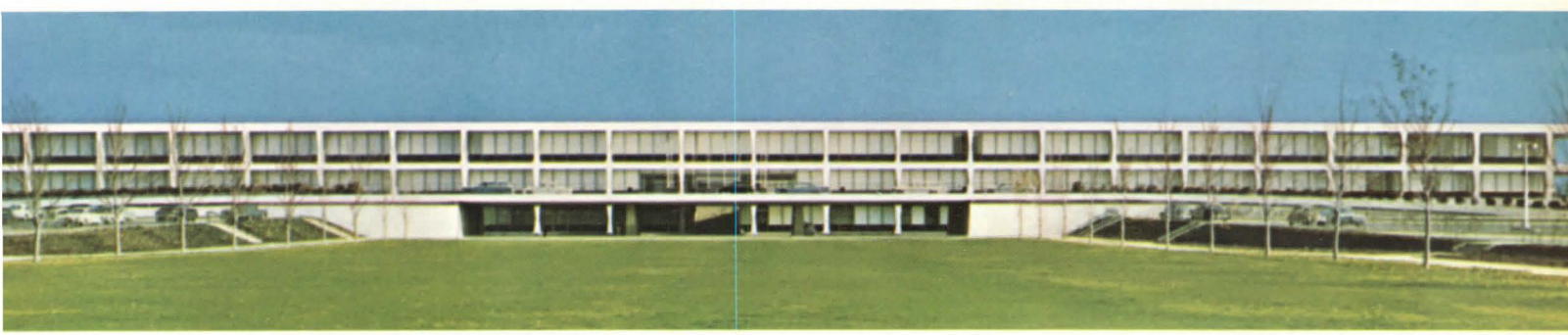

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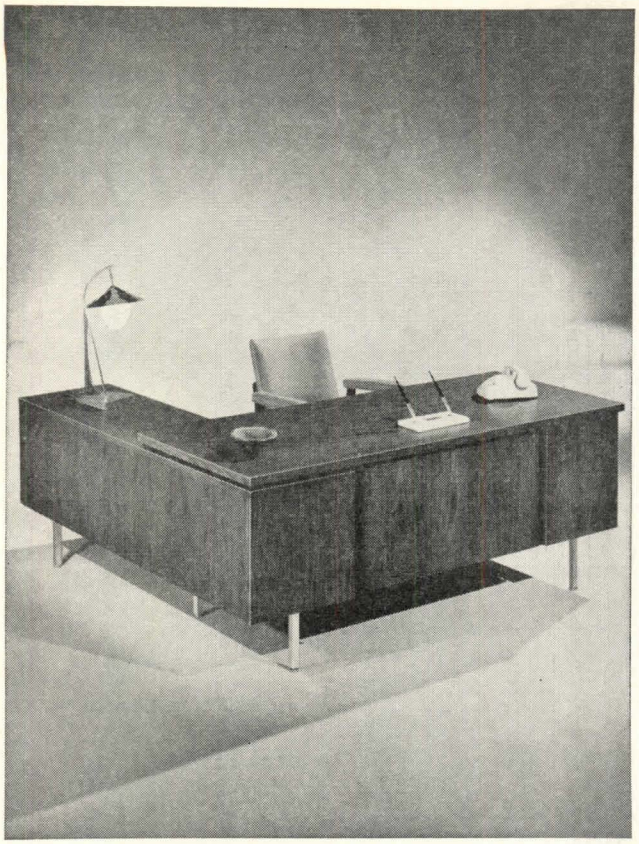

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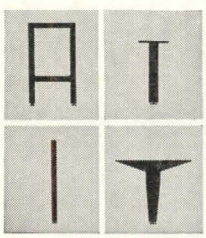

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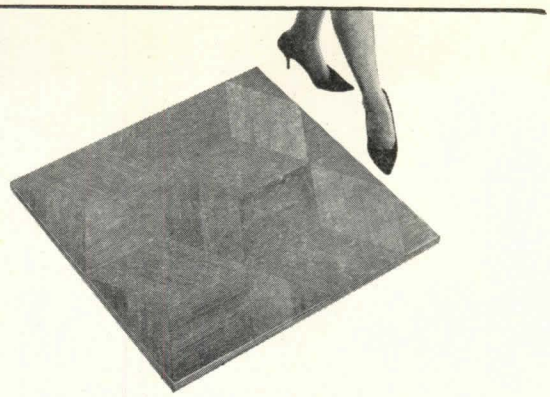

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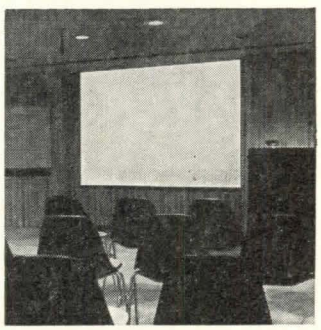

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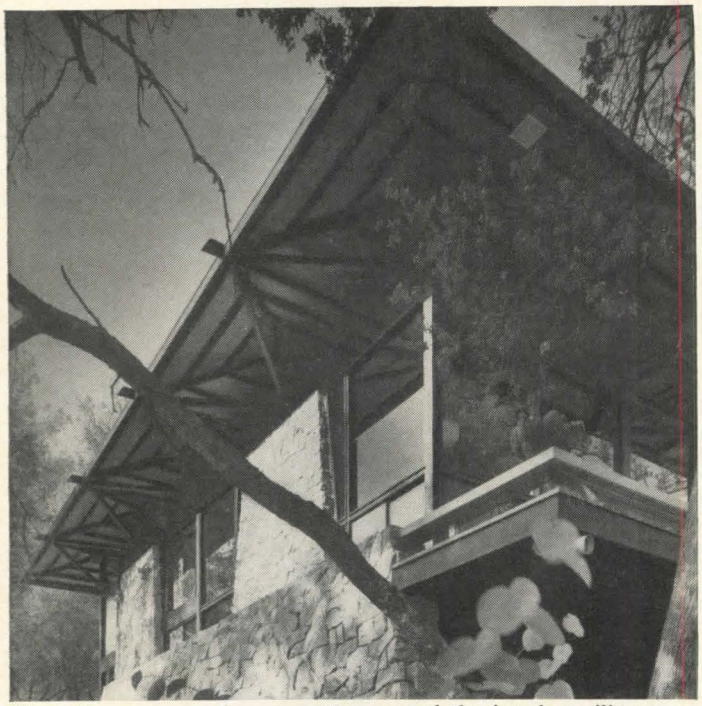

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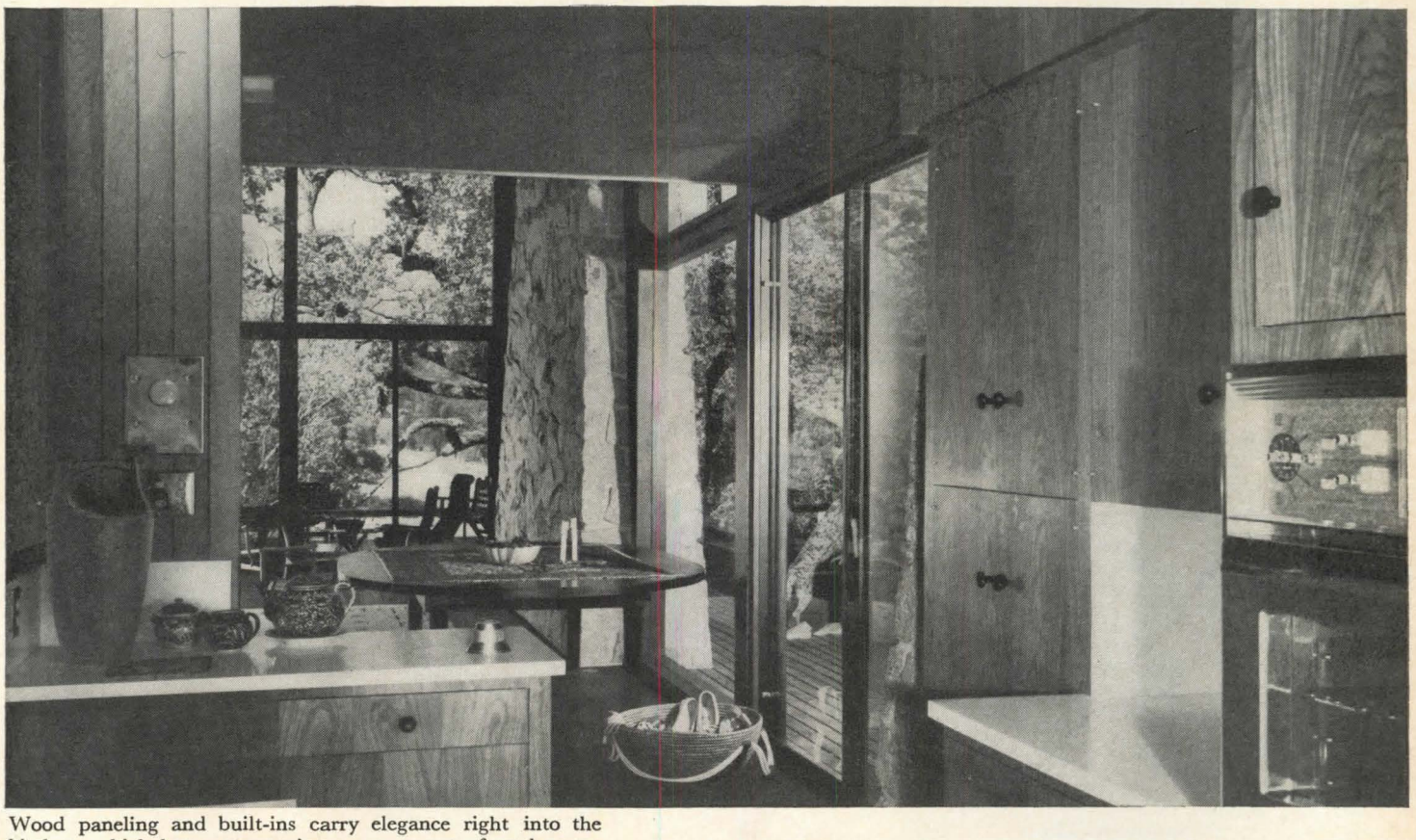

Wood paneling and built-ins carry elegance right into the kitchen, which has a step-saving arrangement of work space and an easy accessibility to the wood-and-window dining area.

Continued from page 218

prediction?

There are, of course, other reasons for poor planning and design: One, a "Parkinson's law for campus design: a donor's taste, when coincidental with that of an ambitious college president or board member, can make faster strides in imposing the latest fashion or fad than any aesthetic revolution." (Dober did not have Yale in mind! And it reasonably can be argued that the wave of brilliant individualism which recently has swept the campus may suggest the diverse paths to truth—an important lesson to students in an age when we seek the comfort of certainty.)

Another telling point: "The frequency with which academic folk by committee appointments are made into architects because they got a Nobel prize in chemistry, or into a certified accountant because they discovered a new anti-coagulant for blood is astonishing. The only thing more astonishing is the number of times these academic folk accept such jobs, posing as experts." (Not at all; this is in the American tradition of the omnicompetent, if not the omnipotent, man!)

Those of us with short memories may be surprised to read that, as recently as 1941, *Architectural Record*, in its fiftieth anniversary issues of January and February, cited Silliman College at Yale as the single example of distinguished university or college housing—"in the Colonial idiom, carrying on a still rigorous tradition." "*Rigor* something" is the appropriate retort. Six years before the atom was split beneath the Gothic grandstands of the University of Chicago, a critic wrote: "The choice of either style (Gothic or Georgian) is characteristic of the conservative nature of our institutions and is indicative of America's coming of age sufficiently to remember the past." "The task of the University" (to recall Whitehead's definition) "is the creation of the future." Indeed!

Homogeneity or heterogeneity of architectural style is a question that continues to plague most campuses. Heterogeneity must always win in the end (though there is no need to enforce it from the beginning). The early buildings of Oxford and Cambridge *cannot* be duplicated today without revealing the essential falsity of such a step. Freya Stark is quoted to support such a conclusion: "No living organism can be copied; for a civilization is not made by mere acts but by traditions and impulses left behind them. These alone can be handed on, to be assimiliated, nurtured and reborn in a new shape, alive and in different hands. Unless such a process takes place, the mere imitation is dead."

There can be both respect for the past and progress toward the future! "Harvard Yard comes readily to mind as an area in which heterogeneity has been overcome to achieve a singular unity." This has been brought about because each building is a first-class example of its period; there has been respect for scale, massing, fenestration, and doorway treatment; certain materials have been used throughout; there has been respect shown for neighboring structures and spaces; and landscaping has completed and unified all.

The subject matter of *Campus Planning* is so intricate it is difficult to handle in a way that will inspire the reader, but Dober succeeds very well in conveying the knowledge so necessary to an intelligent approach to planning. It is a truism to state that a reader profits from a book in proportion to what he is able to bring to it in understanding and experience; it is a measure of this book's worth that it can be read with profit on several different levels of comprehension.

Examples, literary and graphic, inevitably seem arbitrary to everyone but the author, and, as Dober himself notes, it is unfortunate that some of the more exciting recent campus commissions, in California and New York State particularly, were not far enough advanced at the time of publication to be included. But one wonders why Le Corbusier is represented only by a detail from the chapel at Ronchamp and not by his only building in the United States, the Carpenter Center for the Visual Arts at Harvard—or does Dober fear this might constitute an endorsement of a building which in some areas is referred to as the "Corbooboo" or "Sert-ified Corbu"? And where are the Mies buildings of IIT and the Frank Lloyd Wright campus of Florida Southern at Lakeland?

The book on the whole is well printed and easy to read; the illustrations, though not photographic masterpieces, do make their points; and plans can be read by those with less than 20/20 vision. The index is reasonably inclusive and useful, but I would have preferred that the footnotes had appeared where the dictionary says they belong—at the foot of the page—rather than at the end of each chapter.

Although only Richard P. Dober's name appears on the title page, the dust

Continued on page 228

Schokbeton's ability to produce precast concrete architectural components incorporating sophistication of design with functional purpose is graphically illustrated on the New Arts Building, McGill University, Montreal, Canada. This isometric drawing shows the excellent detailing of the Schokbeton double window unit which provides the theme of this handsome building.

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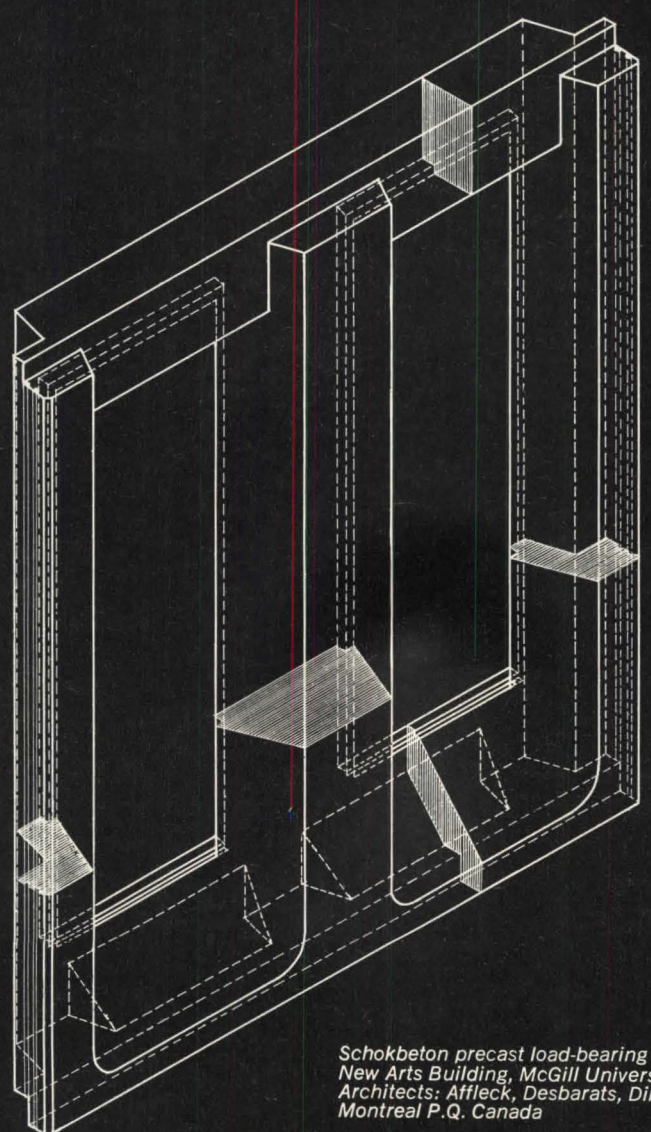

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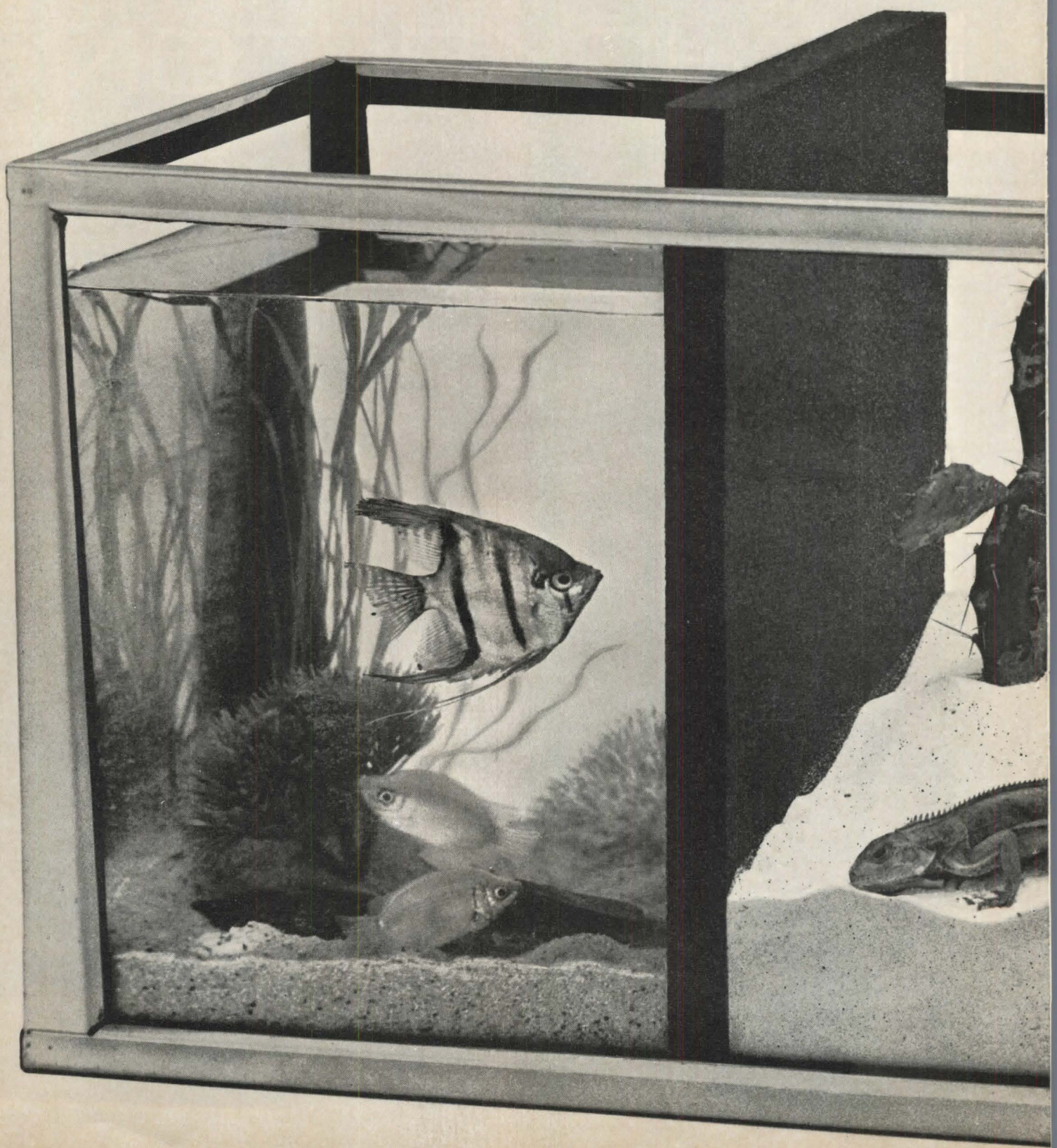

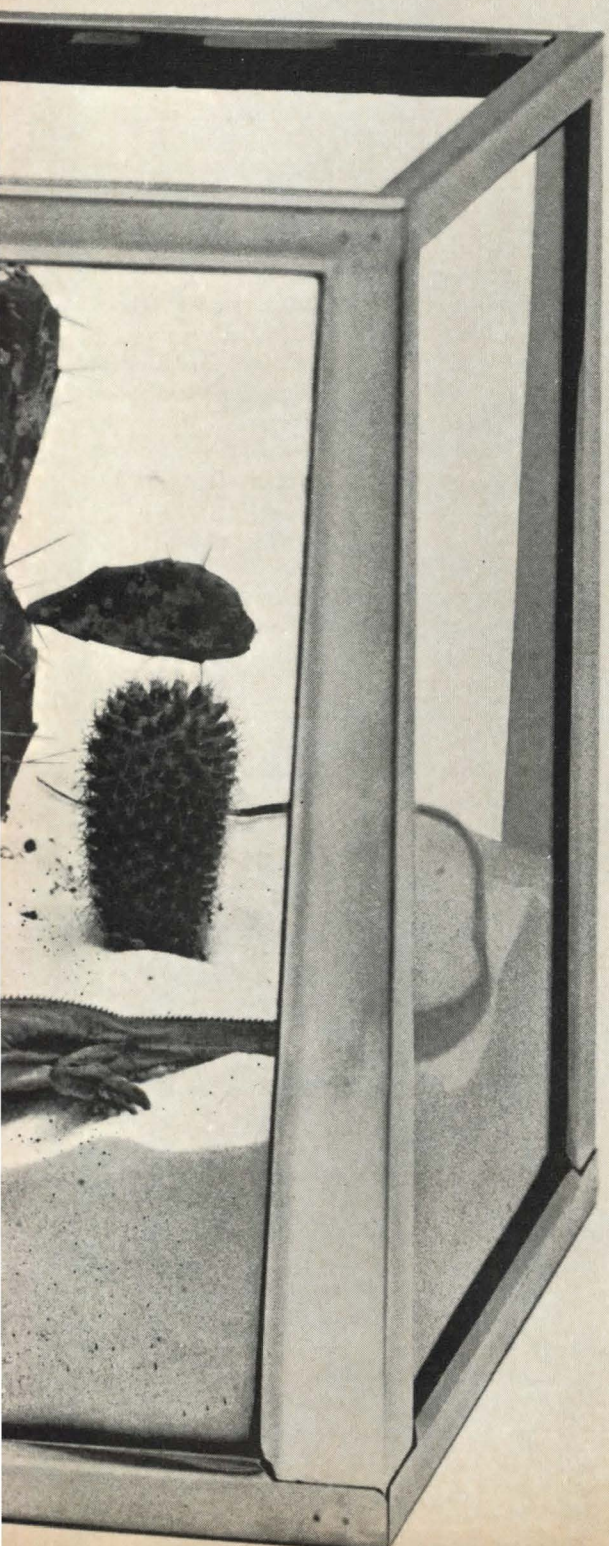

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Continued from page 224

jacket credits three others with having helped in the preparation of the book: Hideo Sasaki (of Sasaki, Dawson, DeMay Associates, Inc.), who is Chairman of the Department of Landscape at Harvard; Malcolm R. Rivkin, former Planning Officer for MIT; and James Doi, Director of Institutional Research at the University of Colorado. Mr. Dober himself has served as consultant on planning and design to MIT, Harvard, Drake, and Goucher, and has prepared master plans for the universities of Rhode Island, Colorado, and others.

This book should be immensely valuable to planners, architects, educators, administrators, and—if they can be persuaded to read it—college trustees and all the others entrusted with making decisions vitally affecting our environment.

Computer Planning for Hospitals

By ISADORE and ZACHARY ROSENFIELD

PLANNING FOR HOSPITALS: A SYSTEMS APPROACH USING COMPUTER-AIDED TECHNIQUES. *James J. Souder, Welden E. Clark, Jerome I. Elkind, Madison B. Brown. American Hospital Association, 840 N. Lake Shore Dr., Chicago, Ill. (1964. 167 pp. $7.50). Reviewers are architects and hospital consultants in New York City.*

Some years back, Congress began to appropriate millions annually for hospital research. One of the earliest appropriations was a sizable sum awarded to Research Project W-59, also referred to as "Collaborative Research in Hospital Planning." The award was a joint one to the AIA and the American Hospital Association. The subject of this collaborative research, and the researcher, were not specified at that time; the researcher finally selected was architect James J. Souder. The "first purpose of study [of the acute general hospital] was to gain an understanding of the organization, and of the organizational relationship, within this kind of hospital." The second was to "permit the inclusion in the architect's armamentarium of the tools of systems analysis, or operations research."

Two decisions were made as a basis for the study: (1) two hospitals, physically far apart, were to be selected for study; and (2) computer-aided techniques were to be employed in dealing with the gathered information. One of the hospitals chosen for study was an eastern Massachusetts institution of 250

Continued on page 234

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The Meadows—Owner: Washington Trotting Association, Inc. Architects: Thayer-Menges & Associates, New Castle, Pa. Fabricated and erected by American Bridge Division of U. S. Steel.

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Continued from page 228

beds, with six floors and a basement: we shall call it hospital E. This hospital is typical of many, perhaps the majority, of our hospitals that grow like Topsy; they are generally planned on one "principle"—stacking vertically until that is exhausted, then spreading laterally. The other hospital, completed in 1959, is on the West Coast. At the time of study, it had 188 beds in a stack of three equal nursing-unit floors standing horizontally contiguous to a two-story "pancake" of services; ancillary services at basement level, and diagnostic-therapeutic on the first floor. The principle in this hospital, hospital W, was to locate as many patient beds horizontally contiguous to the diagnostic-therapeutic services as possible and to obtain as much horizontal contiguity as possible between the diagnostic-therapeutic departments.

The researchers assumed that the distance between the subject hospitals, rather than the nature of their respective plans, would reveal significant differences. As it turned out, some differences discerned were peculiar to the plans, but no differences were discerned peculiar to geographic location. The study does not attempt to pass judgment on the two hospitals, yet the difference of being planned according to principles or "just happening" would seem vitally pertinent to their operation. It is also important to note that among many significant differences, hospital W had a pneumatic-tube system and dumb-waiters (intensively utilized), whereas hospital E had one dumb-waiter (seldom used) and no pneumatic-tube system. And, of course, the departments of E were disposed opportunistically, rather than in accord with principles of relationship.

To study interdepartmental relations, the researchers decided to measure and evaluate the "commerce" flowing between departments—telephone calls, reports or small articles delivered by tubes, items sent by dumb-waiter, with or without aid of elevators, trips on foot, etc. Before feeding the findings to the computer, each piece of information was variously coded and classified in a spectrum of values and considerations, with respect to time consumed in the transaction, distance covered, and the relative costliness of the trip in terms of the range of pay of the individual making the trip. It is regrettable that the time spent collecting data was extremely short—only a few weeks—which allowed only several days for the observation of separate departments. The authors appreciate this weakness, but they were

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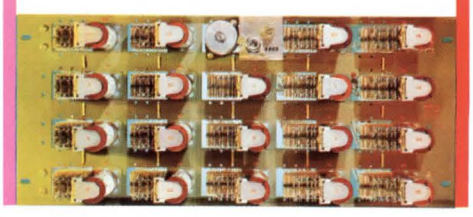

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more interested in developing a "methodology" than in developing a meaningful body of data.

The methodology consisted of feeding the gathered data into a computer and then putting questions (within the competence of the data in the computer), to which it would reply in the shape of figures, tables, or graphs. All of this is highly technical and requires that the reader learn a practically new language. Extremely simplified one-line schematic hospital plans, at a scale suitable to the size of the oscilloscope attached to the computer, could be fed into the "memory" of the computer, and by asking the computer questions in the language which the computer understands, one could obtain, via the oscilloscope, figures and graphs showing what the "commerce" between the departments would be in a proposed plan. If, in terms of the commerce, a scheme did not seem satisfactory, other plans or variations of the same plan could be fed into the computer indefinitely and comparisons of commerce could be made.

The principal question here is whether "commerce," as defined by the study, is an adequate yardstick for determining what the relationships between departments are or should be, so that hospital plans could be shaped accordingly. The study appears to assume that a patient needs services and that, regardless of the plan and communication equipment in the subject hospitals, these services will be performed. What remains to be done then is to find the most favorable plan configuration for the most efficient performance of the requisite services. In this assumption we do not concur; in hospitals generally, the services that the patient needs are occasionally—even frequently—not performed. The machine would therefore teach us how to plan average hospitals, and this is precisely what now plagues hospital planning.

This "commerce" methodology is superficial and does not come to grips with the more significant and meaningful considerations that should help us plan a hospital. It deals with what is and tries to tidy it up a bit. That is not hospital planning. The proposed methodology offers us a crutch whereas we need to learn how to walk like men.

For the present, the machine can deal only with the most simplified linear expressions of schematic plans. However, in actual practice a scheme stands or falls depending on how it works out in the "development" stage. For instance, the machine can tell us that a nurses'

Continued on page 242

CONTEMPORARY ROOF DESIGN...

Stars Glass

St. Sebastian's Catholic Church, North Hills, Pittsburgh, photographed for Aluminum Company of America by Leonard Schugar.

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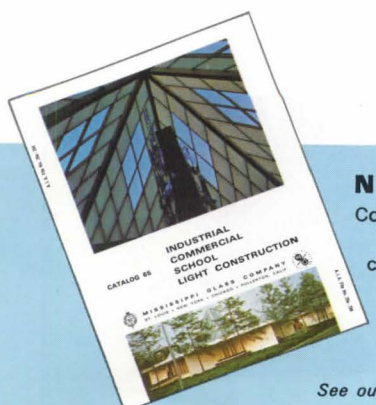

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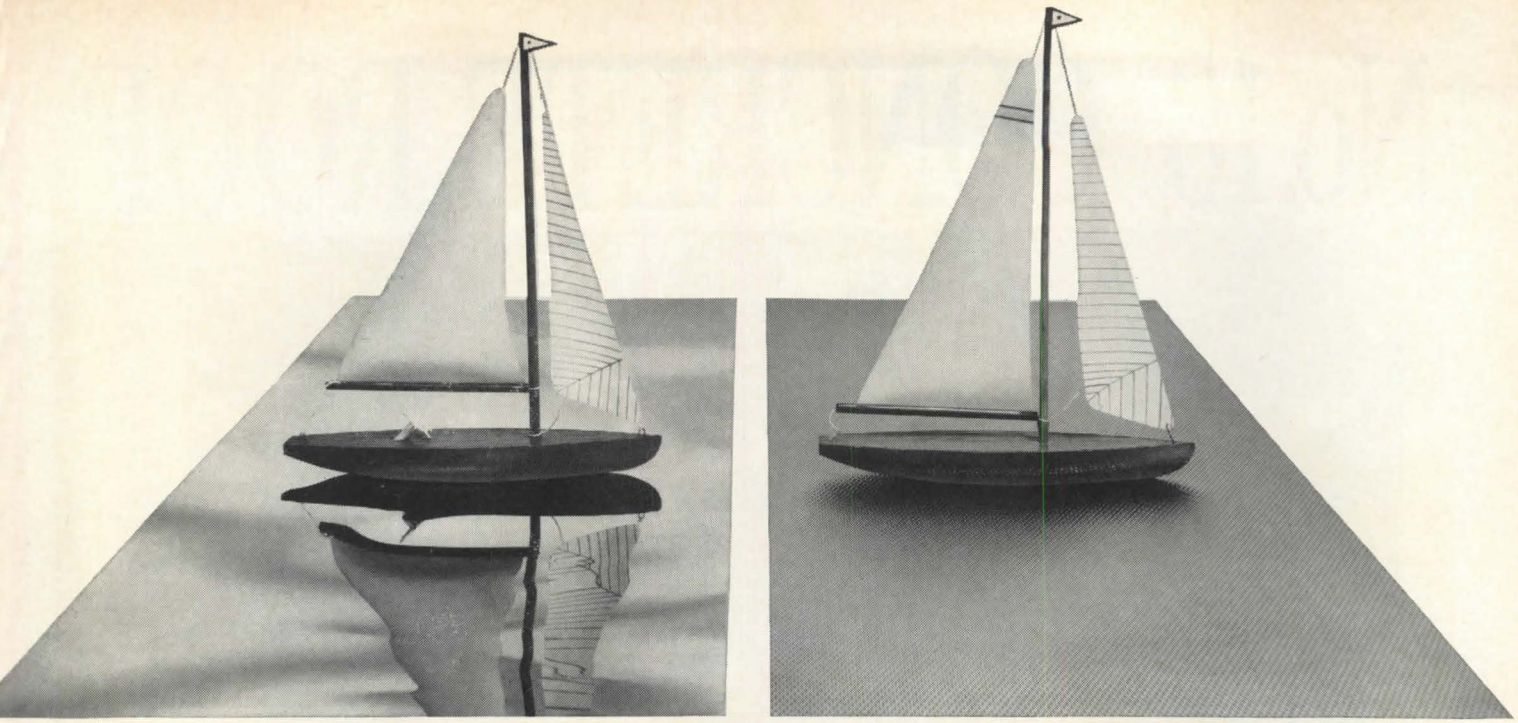

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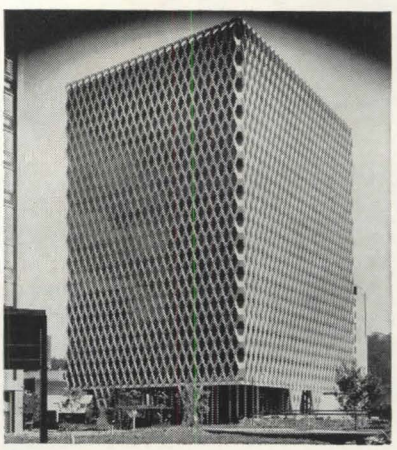

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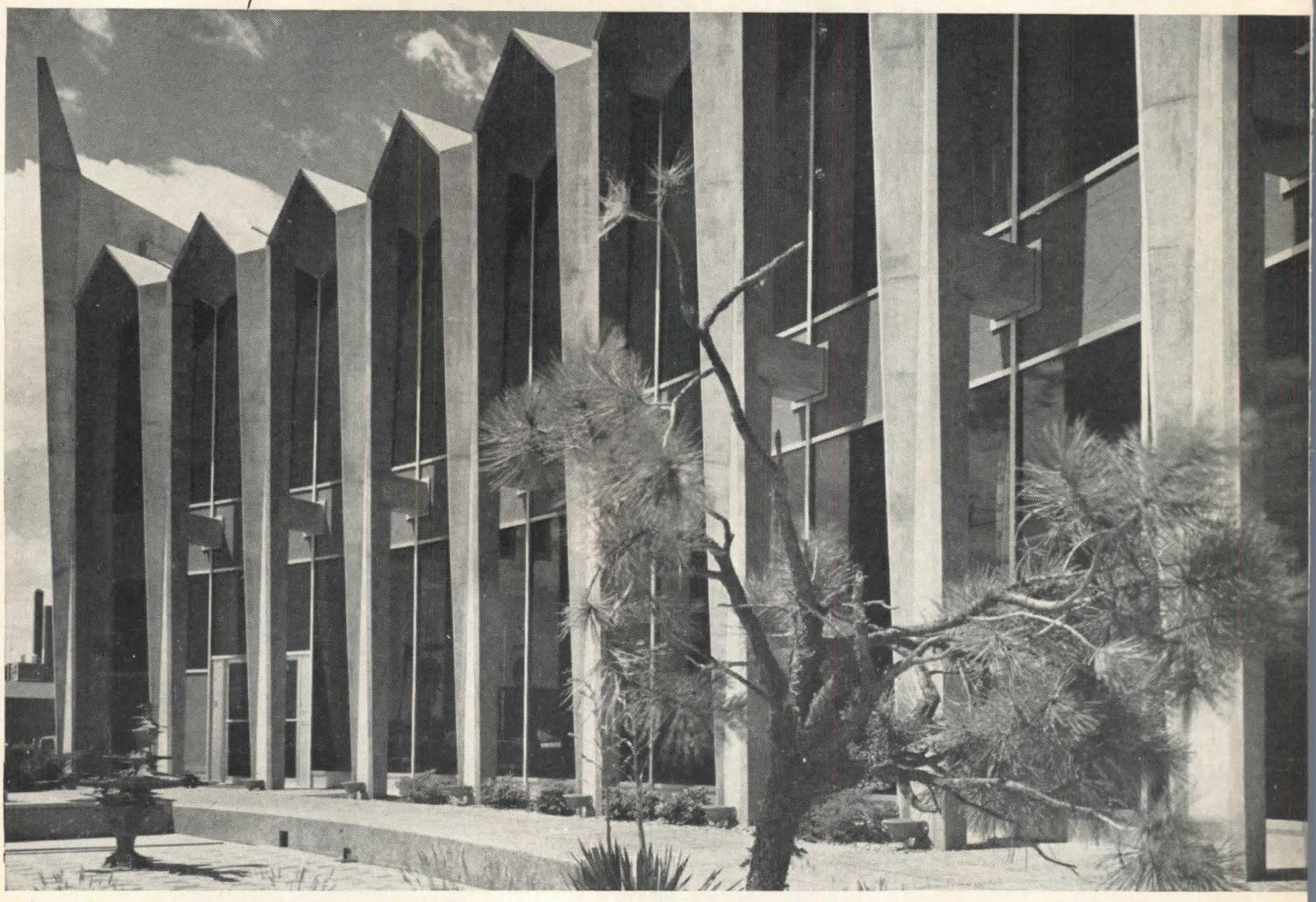
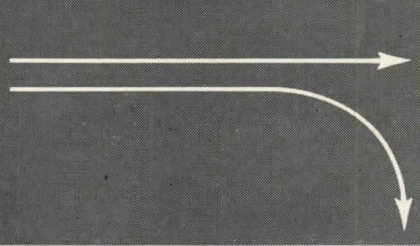
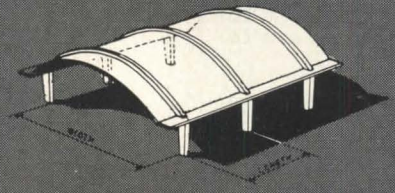
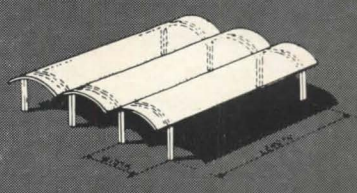
No. 16 / CONCRETE ROOF









Type of Roof	Short Barrel Shell	Long Barrel Shell
*Typical Bay Dimensions**		
Width	100 to 250	30 to 60
Length	30 to 50	80 to 150
Main Features	Usually cast-in-place but can be pre-cast.	Barrel shell roofs are capable of providing large areas free of interior columns.

SYSTEMS

Clip for a.i.a. file 4-a

Prepared as an industry service by Portland Cement Association

In evaluating structural costs, the roof system is a basic factor, and its square-foot price is quite often the most meaningful cost guide available to a prospective owner.

In most cases, concrete roof systems are in the $1.00 to $3.00 per square foot range. Construction costs, of course, are not uniform throughout the nation and are dependent upon variables such as spans, loads, bay sizes, and manufacturing requirements. Local builders can provide accurate estimates geared to local labor costs and other considerations.

Since the roof system is such a basic factor in most industrial or one-story building construction, the selection of roof type and the spacing of its supports are especially important. The roof and its column spacing must be designed to meet specific occupancy requirements. These include the arrangement of machinery, processing ductwork, accessory equipment and production layouts. Concrete roof systems can be efficiently and economically designed to meet all industrial and commercial needs. The chart below compares some common concrete roof systems.

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The light, spacious look of concrete roof systems is accentuated here by the repetitive forms of these folded plates. Capitol Federal Savings & Loan Assoc., Denver, Colo. Architect: Bank Building and Equipment Corporation of America, St. Louis, Mo.

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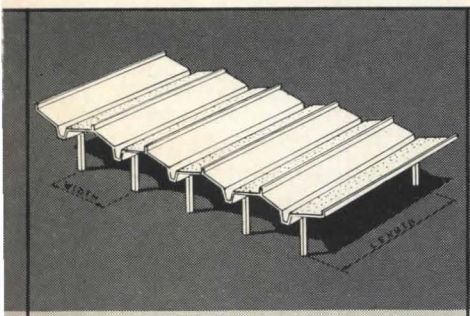
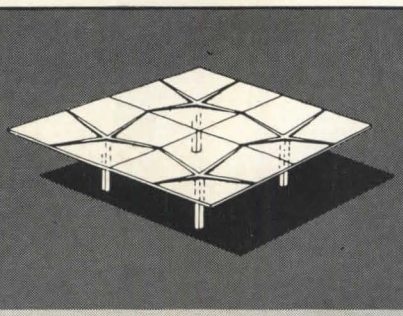
An organization to improve and extend the uses of concrete, made possible by the financial support of most competing cement manufacturers in the United States and Canada.



Folded Plate

15 to 30
50 to 150

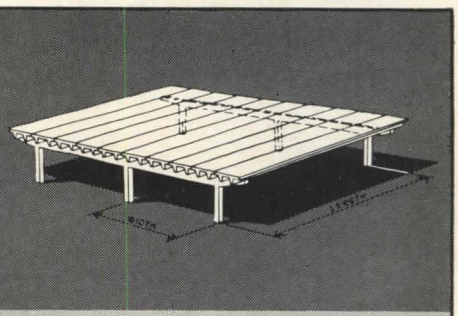
Versatile designs can accommodate a wide variety of span and processing requirements.



Hyperbolic Paraboloid

20 to 100
20 to 100

Adaptable and very economical.



Prestressed

25 to 50
30 to 100

Structural members provide long, clear spans with esthetically pleasing shallow depths.

**Representative dimensions only. Specific column spacing and spans may vary for individual designs. Dimensions given in feet.*

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Continued from page 236

station if placed as shown on a given simplified version of a schematic plan would produce unfavorable "commerce," and so the architect would try another location, hoping this time the machine would be kind. All the architect has to do is to work for the machine. He may later find out that what the machine favors does not work in practice and that much of the rest of the plan has to be turned about. This "methodolgy" implies an endless process of trial and error. The planner is not the planner—he is the machine's draftsman.

The machine can tell us quantitative answers. In planning, on the other hand, we need the ability to think, to find new insights into the vital problem of how, through physical planning, we can help to make sick people well and how we can develop principles for such planning. The authors of this book admit that much more experimentation is needed and we agree with them.

Controversial Viewpoints

BY ROBERT B. RILEY

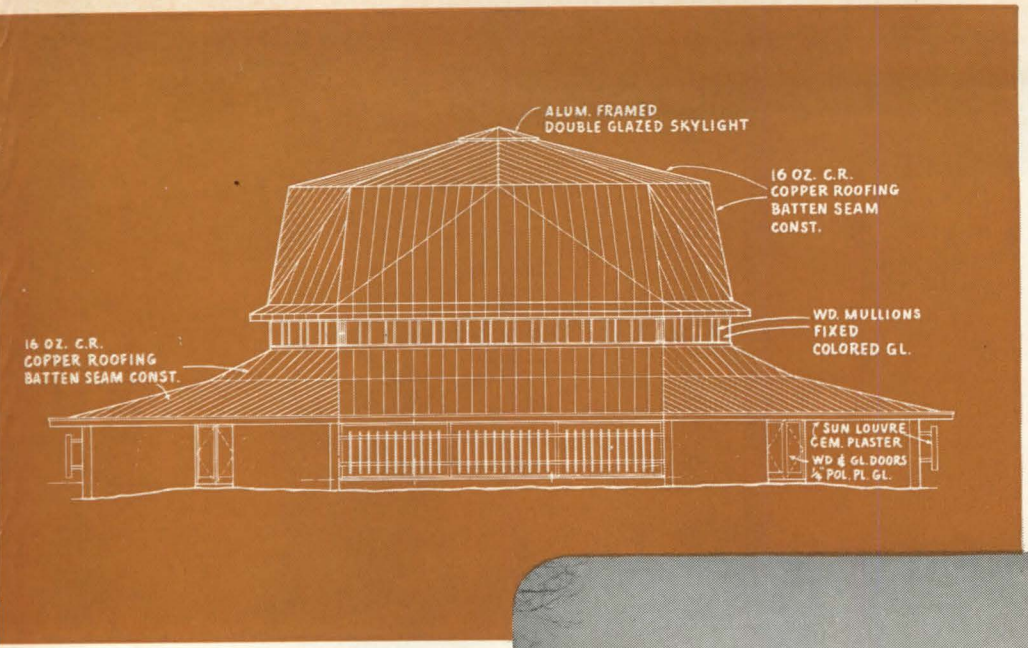
WORLD ARCHITECTURE TODAY. *John Donat, Editor. A Studio Book. Published by the Viking Press, 625 Madison Ave., New York, N.Y. (1964 255 pp., illus., $15). Reviewer is an architect who has his own practice in Albuquerque, New Mexico.*

Architectural philosophy has often surged far ahead of building practice, but today the gap is of frightening size. This book attempts to narrow that gap by presenting "really good building in a way that will appeal as much to the awakening interest of the layman as to the specialist." Now this desire to speak simultaneously to both layman and specialist is common enough in architectural books. It is, alas, a difficult job to bring off, a job requiring a lucid prose style and an exceptional breadth of personality. This is a rare combination, found in Steen Rasmussen and John Summerson, but too few others.

Today, architectural thought is rich, complex, and diverse. A layman's book on such a topic demands certain simple things: careful organization, lack of jargon, good prose, and a unity that stems from meticulous writing—not loose editing or anthologizing. Mr. Donat's effort lacks all these qualities, and will probably bewilder rather than help the non-architect. The book is a collection of plans, photographs, personal credos and critical commentary, collected by teams of editors in 24 countries. The treatment is erratic and confusing. Some editors attempt to summarize all important national trends, others consider only the work of a single firm or individual. Much of the writing is vague and obscure and for the layman this is the book's worst fault. It is full of those familiar references to biological growth and the space-time continuum—principles which (as Peter Collins has noted) are usually misapplied by architects. This kind of thing is bad enough in a professional journal. In a book for the public, it is inexcusable. The layman eager to understand contemporary architectural thought does not need doses of such philosophical gobbledygook. He would better have a series of small, inexpensive, well-written books, specialized volumes that take up where Rasmussen's *Experiencing Architecture* left off.

But if the book will bewilder a layman, it should excite any architect. It is not a coffee-table book and not just another picture survey of recent work. It is a collection of controversial personal viewpoints on architecture. It is often irritating, never dull. Many of the build-

Continued on page 246



SYNAGOGUE OF THE CONGREGATION SONS OF ISRAEL, Lakewood, New Jersey. Note the imaginative use of battens to accentuate the numerous changes of roof planes of this novel octagon-on-octagon roof design. Batten seam dome and roof were constructed of 9 tons of Revere 16 oz. cold rolled copper by J. N. BEARMORE & COMPANY, INC., Sheet Metal Contractor, Asbury Park, New Jersey. Installation was made as recommended in Revere's "Copper and Common Sense." General Contractor: BRITTON CONSTRUCTION CO., Asbury Park, New Jersey. Revere Distributor: FABLE & COMPANY, INC., Philadelphia, Pa.

octagonal synagogue wears lasting

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Synagogue of The Congregation Sons of Israel, Lakewood, New Jersey, designed by DAVIS, BRODY & ASSOCIATES AND C. J. WISNIEWSKI, Architects, New York

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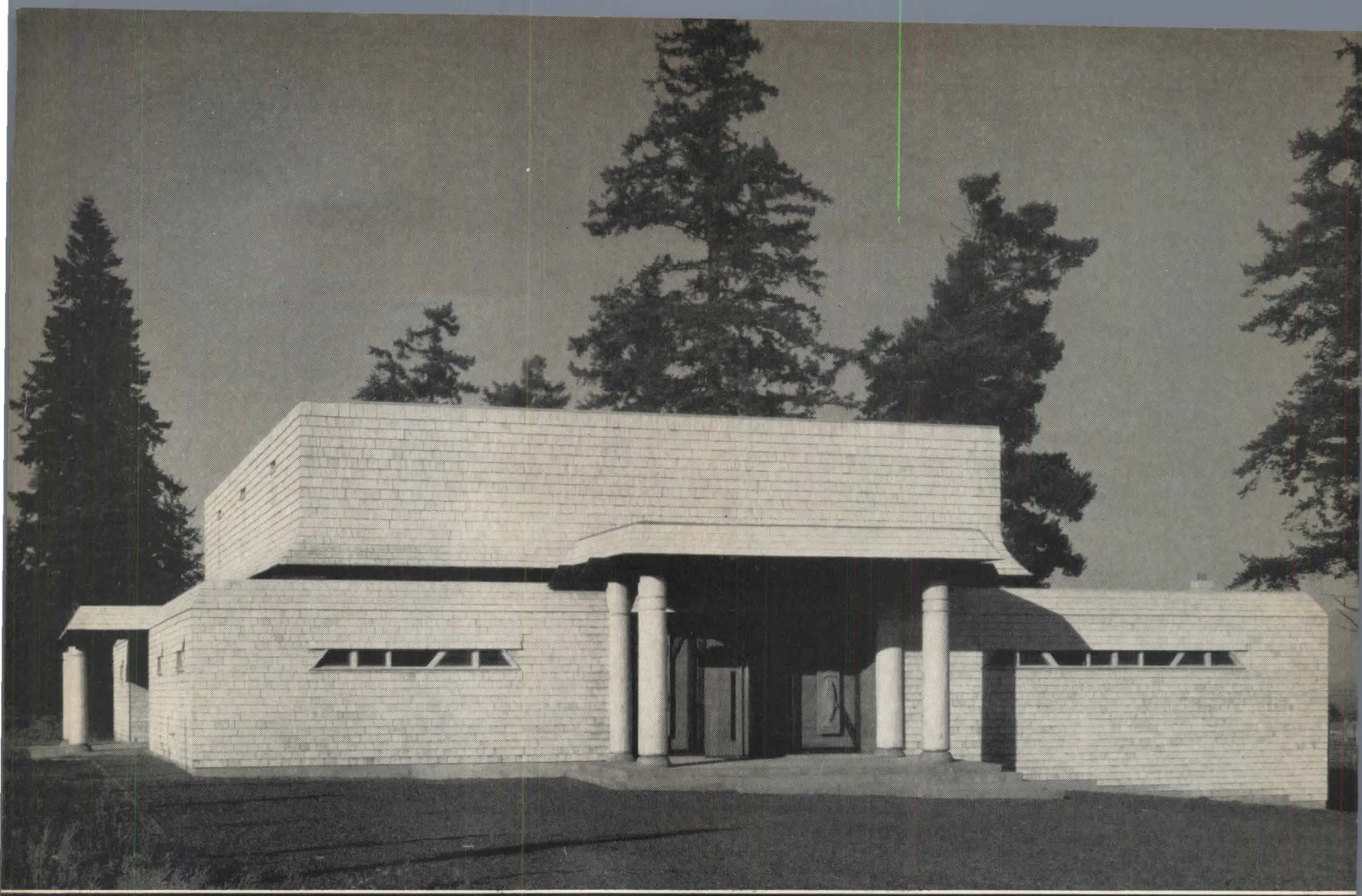

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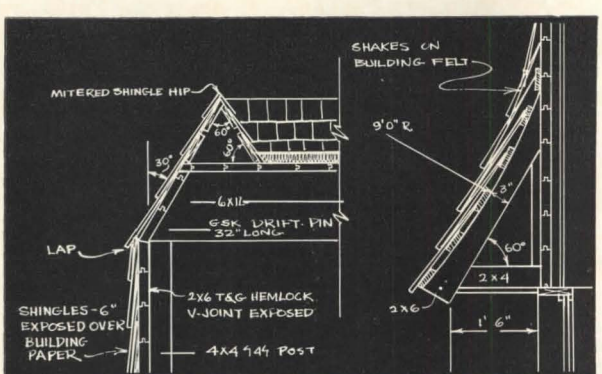
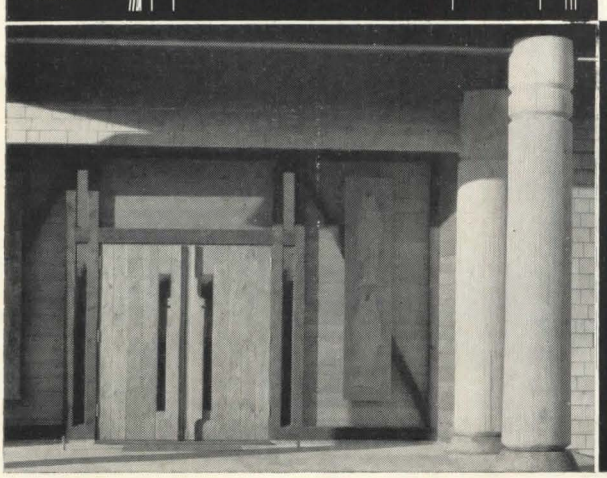
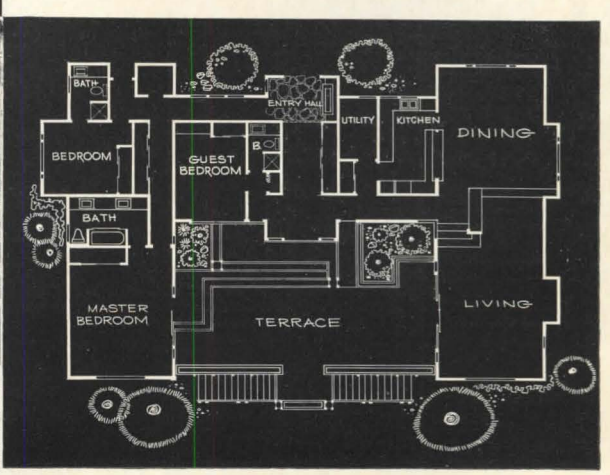


Architect Henry Klein specified Certi-Split 24" x ½"- to - ¾" handsplit-resawn shakes with 9" exposure for the upper sidewalls, and Certigrade No. 1 shingles, 16" long with 6" weather exposure below. The central tribal meeting room can be used as a basketball court, while border rooms contain kitchen, locker and Indian artifact display facilities.



The vacation house at Lake Tahoe, designed by architect James D. Morton, is roofed with Certigrade No. 1 shingles, 16" long, with a 4¾" weather exposure.



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Continued from page 242

ings shown are unfamiliar and all of them are good, really good. Even the murkiest of the writing often does have value for the architect who can cut his way through the double talk. For me, the highlights of the book were the modest and draftsmanlike work of three Portuguese architects, the troubled and deeply involved feeling of the Israeli section, and the powerful structures of the Swiss Atelier 5. This Swiss section also follows a highly critical commentary with a rebuttal by the architects, an excellent framework for deeper understanding of architectural work. Each reader will have his favorites, but I think individual honors must go to Amancio d'Alpoim Guedes of Mozambique who presents his own work, two rather cubist buildings of awesome vitality.

For a professional reader, the drawbacks of the book are the inclusion of too many buildings, too superficially treated, and that familiar high-flown philosophical mumbo-jumbo architects use. As always, their buildings are far better than their writings.

I suspect that in their hearts most of the contributors are more interested in reaching their fellow architects than in communicating with the public. Perhaps in future volumes (this is to be the first of a series), Mr. Donat will cater to this desire and give us a more detailed treatment of fewer architects, along with criticism and response. If he does, the series should fill a unique and valuable role in contemporary design.

Models for Structural Analysis

BY WILLIAM ZUK

STRUCTURES, MODELS, AND ARCHITECTS *by David P. Billington, Jack B. Janney, and Robert Mark. Princeton University Report. (1963, 59 pp., illus.). Available to anyone in the education field, free of charge, by writing to School of Architecture, Princeton University, Princeton N.J.*

STRUCTURAL MODELS FOR ARCHITECTURAL AND ENGINEERING EDUCATION *by Peter J. Pahl, Keto Soosaar and Robert J. Hansen. MIT Research Report R64-03. (1964, 269 pp., illus. $3). Available by writing to Robert Hansen, Professor of Civil Engineering, MIT, Cambridge 39, Mass. Reviewer is Professor of Civil Engineering at the University of Virginia. He has contributed various articles, from time to time, to the* MATERIALS AND METHODS *section of P/A; his discussion, entitled "Simple Models for Structural Analysis," appeared in the* MARCH 1962 P/A.

There can be no denying that model analysis as a design tool in the field of building structures is a sadly neglected orphan in America. While other countries and other disciplines freely make use of the many unique features of model studies, members of the building profession here still tend to look askance at its use. They say models involve extra trouble and expense, and that models make them look incompetent if they admit not being able to analyze a structure mathematically. Rather than investigate the way a special structure truly behaves, they often resort to conservative assumptions and gross overdesign. Admittedly, the press of immediate economic factors often forces their hands to this course; but long-range economic benefits and long-range progress are thereby inhibited.

So it is with hope that I welcome such publications as *Structures, Models, and Architects* and *Structural Models for Architectural and Engineering Education.*

Continued on page 250

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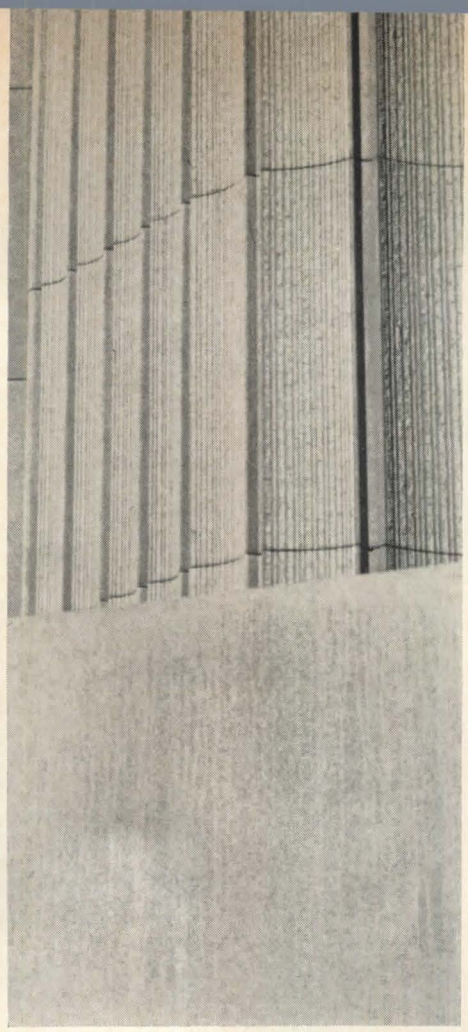
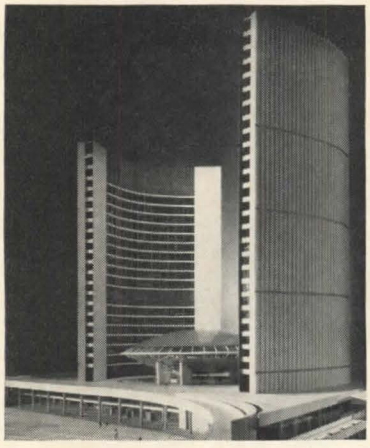


Viljo Revell—John B. Parkin Associates achieved warmth and character by contrasting panels of **acid-etched concrete** with other precast panels accented with strips of inset marble, and smooth-form finishes in Toronto City Hall. Architects and Engineers: Viljo Revell, John B. Parkin Associates. General Contractor: Anglin-Norcross Ontario Limited. POZZOLITH Ready-Mix Concrete Suppliers: Dual Mixed Concrete and Materials Limited and Canada Building Materials.

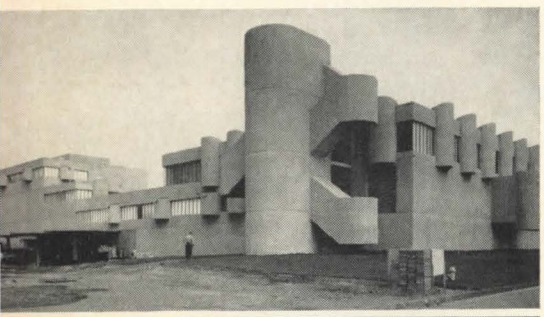


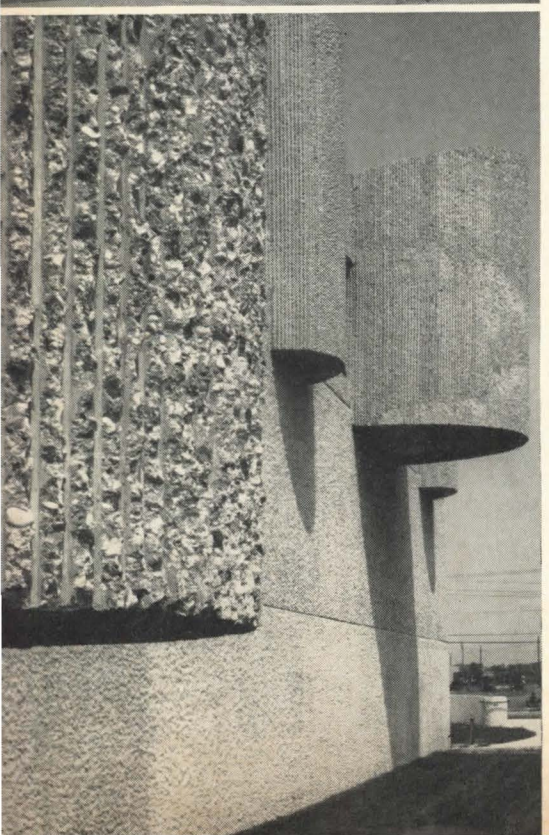
The most expressive concrete is made with Pozzolith

Marcel Breuer placed classic church architecture in modern dress with rough **formboard textures** in St. John's Abbey. Designer: Marcel Breuer. Project Architect: Hamilton Smith. Structural Engineers: Weisenfeld, Hayward and Leon. Structural Consultant on Theory: Pier Luigi Nervi. Coordinators for Owners: Traynor and Hermanson, Architects. Contractor: McGough Construction Co. POZZOLITH Ready-Mixed Concrete: St. Cloud Ready-Mix Concrete Co.

Minoru Yamasaki surrounded Seattle's Pacific Science Center complex with a wall of colorful precast, **exposed aggregate** panels. Architects: Minoru Yamasaki & Associates and Naramore, Bain, Brady and Johanson. Engineers: Worthington, Skilling, Helle and Jackson. Contractor: Purvis Construction Company. Precast and Prestressed POZZOLITH Concrete Components: Associated Sand and Gravel Company, Inc.

Paul Rudolph expressed the fortress-like appearance of Endo Laboratories with a striated, **bush-hammered finish.** Architect: Paul Rudolph. Engineer: Henry Pfisterer. General Contractor: Walter Kidde Constructors, Inc. Concrete Contractor: Central Cement Finishing Co., Inc. POZZOLITH Ready-Mixed Concrete: Colonial Sand & Stone Co., Inc.





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Continued from page 246

The first, from Princeton University, is a readable and well-illustrated introduction to the subject, based on a seminar given there. (It should be mentioned that Jack Janney, one of the co-authors, is one of the few engineers in this country not affiliated with a university whose practice it is to conduct precise model studies for clients in the building profession.)

The second publication, from MIT, is a much more detailed and documented presentation of the subject. As a study of this volume will attest, model studies for accurate analysis are not simple slapdash affairs, for models beget their own host of problems. Problems of material, model manufacture, loading, instrumentation, and experimental error all call for special study, far removed from the problems of the original prototype structure. Thus it would be quite foolish to say that models are in all cases the ideal technique, despite their apparent directness. Nor should this volume scare away one and all. The authors cite three categories of model studies: one for demonstration of behavior, one for quantitative design studies, and one for precise research work. The architect should have no fear of the first, since it is both direct and simple, yet at the same time capable of yielding valuable information on relative behavior and basic strengths. With some training, he may also cope with the second category. He can leave the third category to engineers.

Acquaintance with quantitative model analysis should begin in architectural and engineering schools, and it was for this reason that the National Science Foundation supported the research for this MIT report. Makeshift, nonquantitative models of paper and balsa-wood can no longer answer the needs of contemporary education. New materials and new configurations demand new answers and new optimums, at a level of sophistication consistent with contemporary technology.

Intelligence and Discrimination

BY C. RAY SMITH

VICTORIAN COMFORT, A Social History of Design from 1830–1900 *by John Gloag. Published by the Macmillan Company, 60 Fifth Ave., New York 11, N.Y. (1961, 252 pp., illus. $10). Reviewer is an Associate Editor of P/A.*

The Victorian Age has been so ungenerously mistreated as the producer of hideous overstuffed lumps with dusty excrescences that we have, until very recently, largely neglected to observe that the people of that age were also people of intelligence and discrimination. In times of crusades, we tend to wipe away an entire age and not merely those products of the age that we disapprove of. That is how we have treated the Victorians. Yet they were aware of many delicate nuances of city planning and of country living that our own age has only gradually rediscovered. (Or is it that our own age is following the same pattern?)

It will be startling to many, for instance, to read in Gloag's erudite and sprightly history that in the 1860's, when a bridge was proposed across London's Fleet Street that would—and did—obstruct the view up Ludgate Hill to St. Paul's Cathedral, the Victorians lodged great protests against despoiling a city vista. It will also be surprising to many to read that the abolition of England's window tax in 1851 had the general influence of introducing larger windows with fewer panes; this will be especially disturbing to those who cannot resist "restoring" six-over-six windows to Vic-

Continued on page 254

expose

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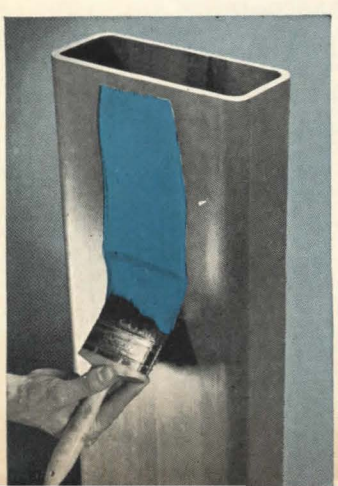

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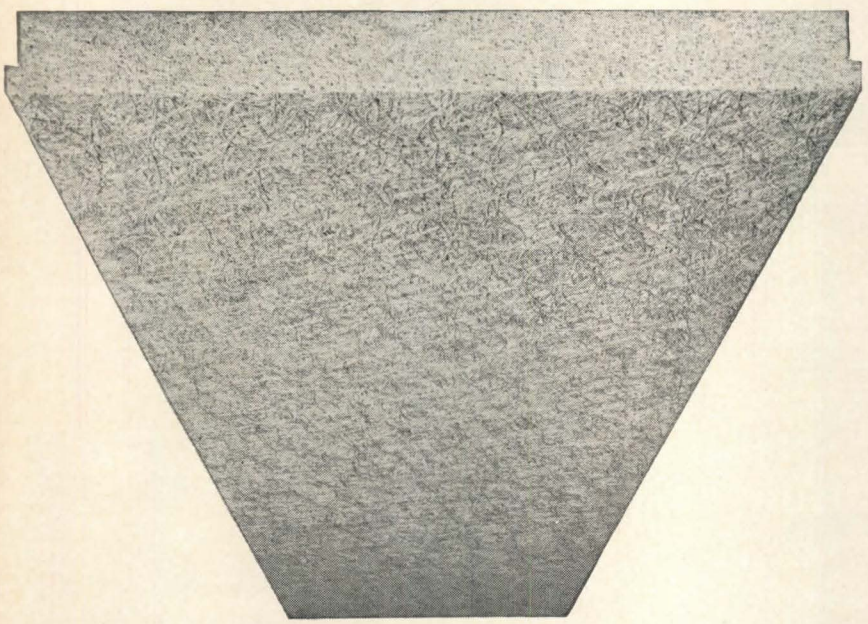
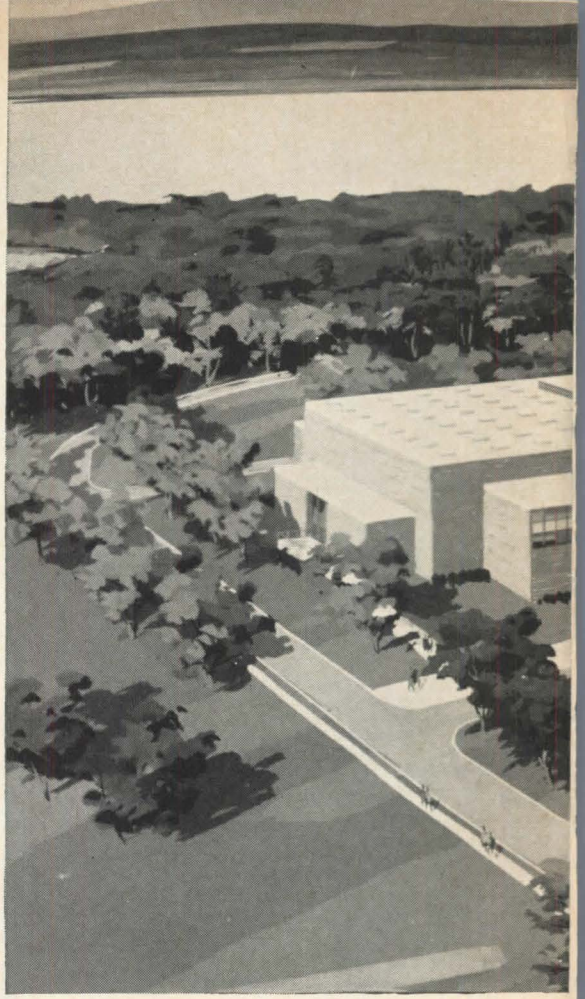
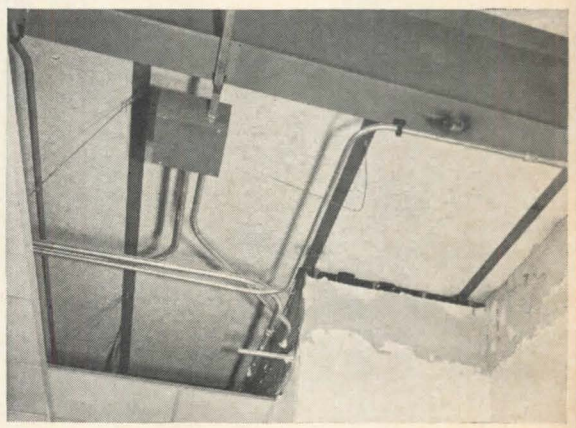


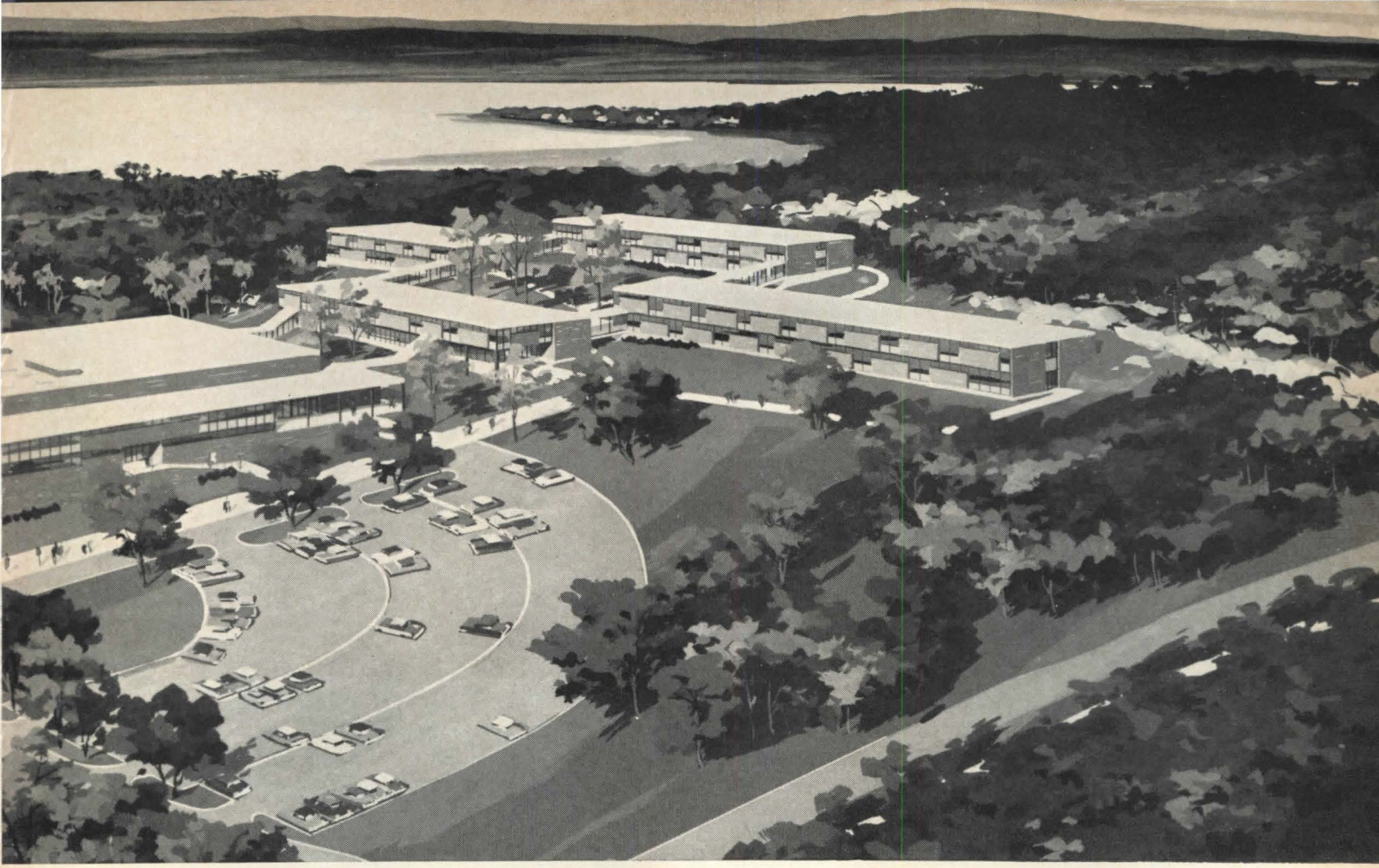




Bulb tee subpurlins support the lightweight Tectum roof deck, cut cost of structural steel.

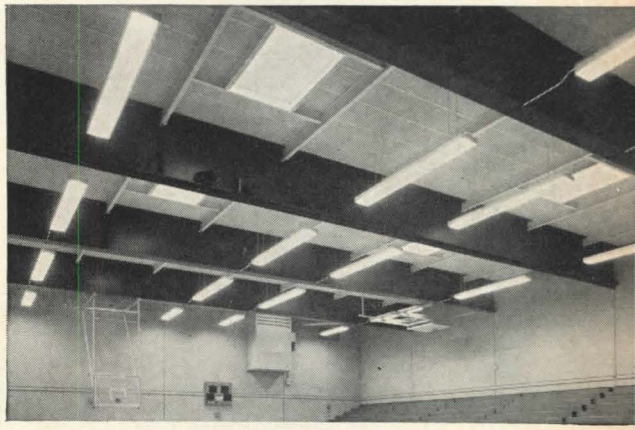
Tectum insulates, saves structural steel, quiets noise

in U.S.'s biggest electrically heated school. Burlington High School, Burlington, Vermont, cost less than $15.30 per sq. ft. Its 3"-thick Gold Bond Tectum roof deck in 10'x 2'8" tiles have an insulation value of U-.15. Only 1½" of insulation was needed between the deck and the built-up roof to



Burlington High School is a 216,000 sq. ft., five-building complex. Architect & Engineer: Freeman-French-Freeman. General Contractor: McNamara Vermont, Inc., both of Burlington, Vt.

Tectum eliminated need for additional acoustical treatment in most classroom areas. Drop ceilings were needed only in corridors and on lower floors under concrete slab.



Each of four-classroom buildings required one day to lay 10,000 sq. ft. of Tectum roof deck.

insulate for electrical heating against even Vermont winters. Noise-reduction coefficient up to .90. So lightweight, yet so strong, that only minimum structural steel was needed. 60,000 sq. ft. of Tectum tile were laid for the four-story administration building in *4* days! Thinking new about getting better schools for less money? Think new with Gold Bond. Call your Gold Bond® Tectum representative, or write to National Gypsum Company, Dept. PA-35, Buffalo, New York 14225.

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Continued from page 250

torian town houses.

Such sensibilities are related by Gloag to the Victorians' love of comfort. "For the Victorians loved comfort without shame," he writes. "In time, the love of comfort debilitated the critical faculties, and this status persisted, with minor exceptions until the end of the century," the author feels. The book "attempts to illustrate some aspects of social history," but it does so "through the design and character of many things that ministered to the comfort, physical and moral, of the Victorians."

Separate chapters present the comforts of travel on the road and the railway, comforts of clothing, objects, and amusement. The lushness of illustrations—from *Punch*, manufacturers' catalogues, and contemporaneous publications—will make the book fascinating to architects and designers who can permit themselves to rediscover the refinements of past ages.

Practical Problems

BY JEFFREY ELLIS ARONIN

ARCHITECTURAL SUPERVISION OF MODERN BUILDINGS *by Martin D. Dubin. Published by Reinhold Publishing Corporation, 430 Park Ave., New York 22, N.Y. (1963, 304 pp. $10). Reviewer is in architectural practice in New York City.*

Buildings are becoming increasingly complex, and whether or not a design is successful depends to large degree on the quality of supervision rendered by the architect. This book is "must" reading, despite the fact that the title suggests emphasis on the organizational aspects, which, in fact, constitute only one-seventh of the book's page total. Most of the book is devoted to "what-to-look-for" in supervising different trades.

The introduction—"The Project Representative's Ten Commandments"—could well hang on the walls of the architect's office:

1. Face all construction problems immediately and solve them with all parties concerned as soon as possible.
2. At all times protect the project.
3. Protect the position of the architect.
4. Deal fairly with the contractor.
5. Avoid verbal changes.
6. Document the construction period with a full portfolio of records and correspondence.
7. Establish the fact that the contractor can proceed from his decision.
8. Keep the owner current regarding the schedule.
9. Know the project better than anyone else.
10. Handle all payments in a business-like fashion.

Too much cannot be written on these matters, even though they are so obvious.

The book is definitely a field man's book, with little analysis of Owner-Contractor contracts, possibly the province of the head office. An explanation of the pertinent provisions of the Owner-Contractor Agreement and of the General Conditions of the Contract would have been in order. Also, discussion of such things as penalty clauses, Certificates for Payment, checking of accounts, verification of quantities delivered to the site, recording time, and typical job-inspection reports would have been pertinent.

But had they been included, perhaps the author would not have found space for the excellent discussions on labor-management relations, safety programs, project spirit, analysis of lump-sum versus cost-plus contracts, organization of

Continued on page 256

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Application Details on Opposite Page

Continued from page 254

field office, construction schedules, and the varied responsibilities of the owner, contractor, architect. All these, as well as the excellent chapters on how to check each trade, are informative and interesting and should be read.

OTHER BOOKS TO BE NOTED

Architecture without Architects. Bernard Rudofsky. The Museum of Modern Art, 11 W. 53 St., New York 19, N.Y., 1964. Distributed by Doubleday & Co., Inc., Garden City, N. Y. 128 pp., illus. $6.95 (hardcover); $3.95 (paperbound)

The integrity of indigenous architecture—underground villages in China, African cliff dwellings, cemeteries, caves, etc.—is dramatized in more than 150 impressive black-and-white photographs, representing 60 countries. Mr. Rudofsky's seven-page introduction explains that "the philosophy and know-how of anonymous builders presents the largest untapped source of architectural inspiration for industrial man. The wisdom to be derived goes beyond economic and aesthetic considerations." Book includes most of the text and photographs from the controversial exhibit which appeared at the Museum November '64–February '65. (See pp. 45–47 and EDITORIAL DECEMBER *1964 P/A.) Material is perhaps more comprehensible in book form than as an exhibit.*

Financing Lower-Middle Income Housing, Demonstration Project Pa. D-3. Bureau of Economic and Business Research, Temple University. Bureau of Community Development, Department of Commerce, Commonwealth of Pennsylvania, 1964. 107 pp., illus. no charge. (paperback)

Problem: to make housing available to lower-income families. Approach: the use of electronic data-processing equipment in surveying housing desires and financial capabilities of selected segments of the population in three Pennsylvania cities. Results emphasize the effects of possible change in credit terms on demands in each city. This report was made possible through a Demonstration Grant administered by the Urban Renewal Administration, Housing and Home Finance Agency.

The First and Chief Grounds of Architecture. Published by John Shute, Painter and Architect, and printed by Thomas Marshe, 1563. Facsimile reprint by The Gregg Press, Ltd., 37 Catherine Place, London S.W. 1, England, 1964. 50 pp., illus. $7.50

A kind of manual—in Old English—describing the five-column orders. Of interest as an amusing historical curiosity.

Problems in Planning Library Facilities. Ed. by William A. Katz and Roderick G. Swartz. American Library Association, Chicago, Ill., 1964. 208 pp., illus. $4.25 (paperbound)

Proceedings of the Library Buildings Institute Conference in Chicago, July, 1963. College and University, public, school, hospital and institutional libraries are treated separately. Emphasis is on the building team and its development of the building program.

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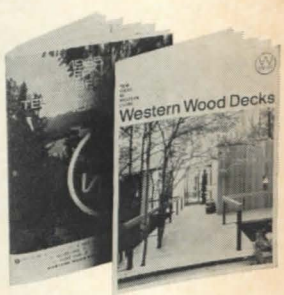

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Continued from page 30

auspices of the J. M. Kaplan Fund.

On February 4, 1964, this committee warned Mayor Wagner that the ABC plan was "doomed to failure" unless its scope was broadened and greater consideration given to the following five points: (1) traffic; (2) coordination of city, state, and Federal structures; (3) adjoining (Title I and) private areas; (4) integration of expansion possibilities; (5) impact of imminent drastic changes in neighboring areas, i.e., The World Trade Center. None of these conditions has yet been fulfilled.

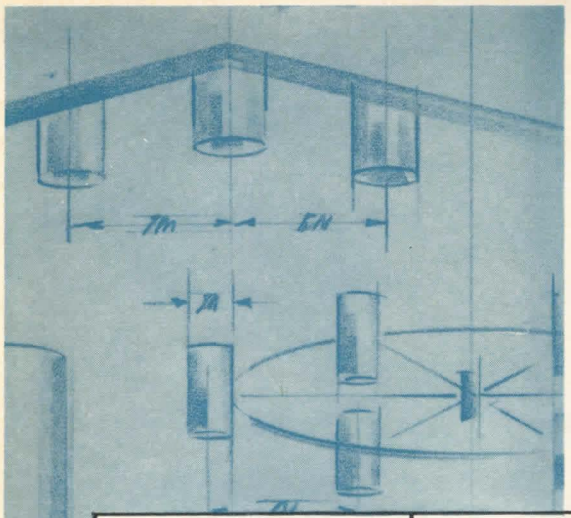
In its second statement (May 28), following a preview on April 18 of revisions to the ABC plan by the new architects, Stone-Eggers & Higgins, the committee specifically condemned the basic concept and central feature of their plan—the proposal to utilize an office building skyscraper as the "imposing marker and central symbol of New York's governmental center." The 52-story tower "intrudes into and dominates the main space," they said; instead, the central area should be developed as "a well-defined public space, one of great quality and distinctive character." They further emphasized that "all buildings . . . should be so placed as to enclose, mark, and render attractive the main central space . . . It is the space and not the building that should become the core and symbol of the Civic Center."

In any case, the very integrity of the "tower in the park" concept hinges on the destruction of the adjacent Hall of Records. Since it is highly improbable that venerable monument will ever be demolished, the "tower"—if built—will remain a misfit.

Although the committee flatly condemned the basic concept of the "tower in the park," your article conveys the impression that "the revised approach to Brooklyn Bridge . . . [is the] last barrier to the acceptance of the total plan." Actually, we do not yet have even the semblance of a "total plan." The present plan includes only a tower and a mall within the area bounded by Duane Street and the back of City Hall.

Meanwhile, as a matter of public record, preliminary plans were filed to go ahead with the $78,787,000 tower, while 10 unintegrated city projects (to cost a total of $218,568,000) are slated for the immediate Civic Center area in the 1965-66 Capital Budget. In other words, piecemeal planning prevails.

Consequently, after five years, five



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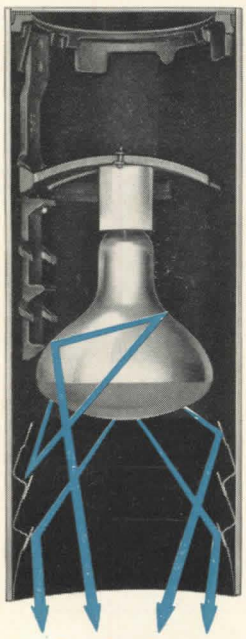

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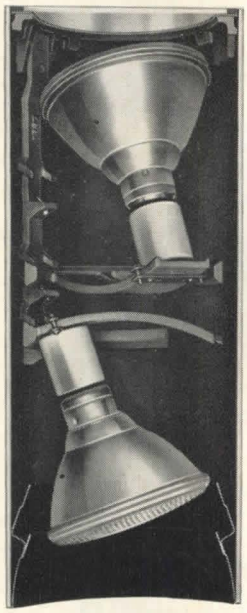

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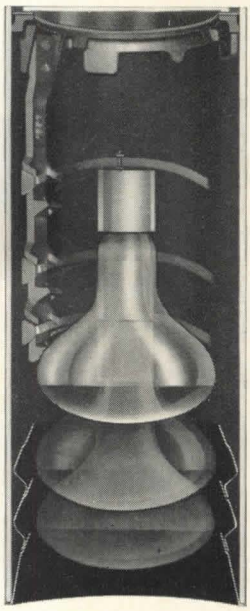

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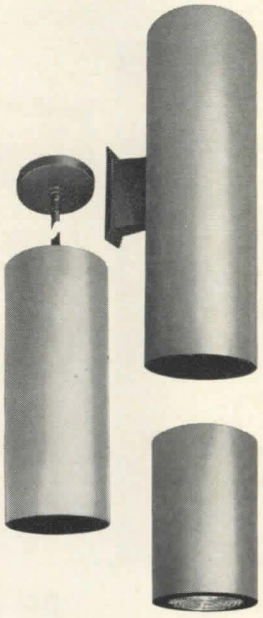

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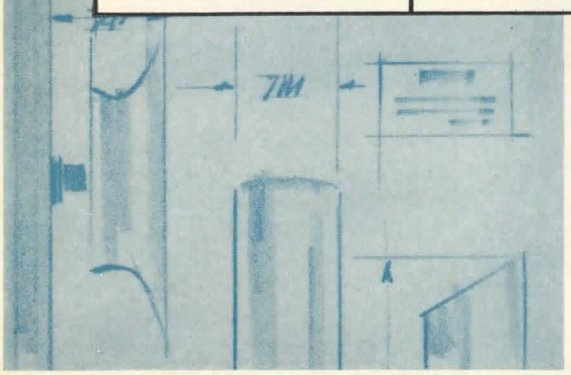

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architectural firms, and at least $600,000 in "studies" for a Civic Center, the idea, only now, is ripe for its molding into greatness, or being left—by default—to its present piecemeal course.

NATHAN R. GINSBURG
Chairman, Civic Center Committee of
The Architects Council of N.Y.C.
New York, N.Y.

Dear Editor: Your Civic Center take-out is excellent. You have succeeded in bringing some order and continuity to this long tale of travail.

Congratulations on a fine piece of work.

FRANCIS BRENNAN
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BROWN & POMERANTZ, Consulting Engineers, 666 Third Ave., New York, N.Y.

MALSIN-REIMAN ARCHITECTS, 347 Madison Ave., New York, N.Y.

MARCHESANI & COHEN, Architects, 236 Westward Dr., Miami Springs, Fla.

NOONAN ENGINEERING CORP., 111 E. Market St., York, Pa.

JOSEPH OSHER ASSOC., Consulting Engineers, 828 High Ridge Rd., Stamford, Conn.

STEPHENS, WALSH, EMMONS & SHANKS, Engineers-Architects, Suite 114, Bldg. Arts Bldg., 5045 N. 12 St., Phoenix, Ariz.

New Firms

RICHARD O. ABBOTT, Architect, Bradford Bldg., Town Square, Plymouth, Mass.

CALCAGNI & FRAZIER, Architects, Stowe and Burlington, Vt.

INMAN H. LEFF, Architect, 1776 Massachusetts Ave., Lexington, Mass.

MORRIS HALL & PETER NORRIS, Architects, 3 Rhodes Ctr. N., Atlanta, Ga.

OSBORNE INDUSTRIES, INC., Manufacturer of Nuclear Shielding Materials, Calif.

PAPACHRISTOU & HAVEKOST, Architects and Planners, Tower Suite #2, Continental Oil Bldg., 1755 Glenarm, Denver, Colo.

SPIGEL, ZINKEL & HERMAN, Architects, 200 Kresge Bldg., Norfolk, Va.

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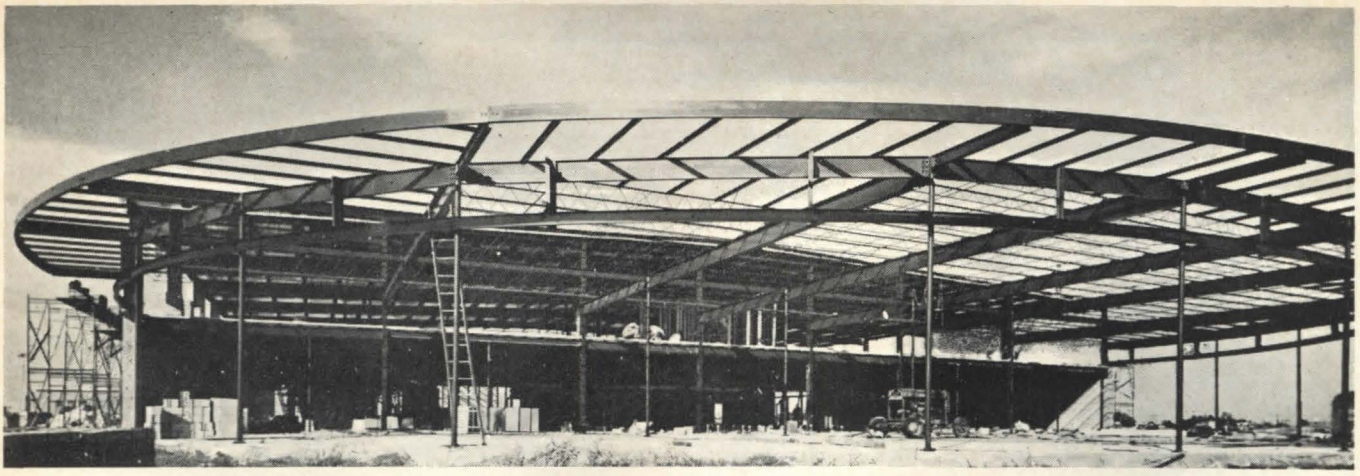

Designer and Contractor: Shannon Boatman, Investment Builder, Houston, Texas.

This unusual semi-circular auto agency was designed with Sheffield High Strength (H-Series) Steel Joists for the roof. Each joist was supplied in a specified length, simplifying erection.

High Strength Sheffield Steel Joists used in unique semi-circular auto showroom

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New Partners, Associates

FAULKNER, KINGSBURY & STENHOUSE, Architects, Washington, D.C., have admitted JAMES PHILIP MARSHALL and ALBERTA FULLER WEST as associates.

MARCELLUS WRIGHT & PARTNERS, Architects, Richmond, Va., has become a six-man partnership with the addition of FREDERIC H. COX, RICHARD N. ANDERSON, STEVENS M. JONES, WILLIAM W. MOSELEY, and DONALD L. STRANGE-BOSTON.

FRANK E. MCCLURE & DAVID L. MESSINGER, Structural Engineers, Oakland, Calif., have named ARTHUR W. ANDERSON, JR., an associate.

MCCOY & BLAIR, Architects, White Plains, N.Y., have made DAVID WHYTE BUSING an associate.

RICHARDS, BAUER & MOORHEAD, Architects-Engineers, Toledo, Ohio, have named CHARLES H. STARKE III an associate.

Elections, Appointments

BOVAY ENGINEERS, INC., Houston, Tex., have admitted William A. Penfield to the staff as a senior electrical engineer.

A. EPSTEIN & SONS, INC., Architects-Engineers, Chicago, Ill., have appointed WAYNE C. BRYAN and LESTER H. SEILER project engineers.

GEORGE M. EWING CO., Architects-Engineers, Philadelphia, Pa., have named WILLIAM M. BOYLAN director of planning and development.

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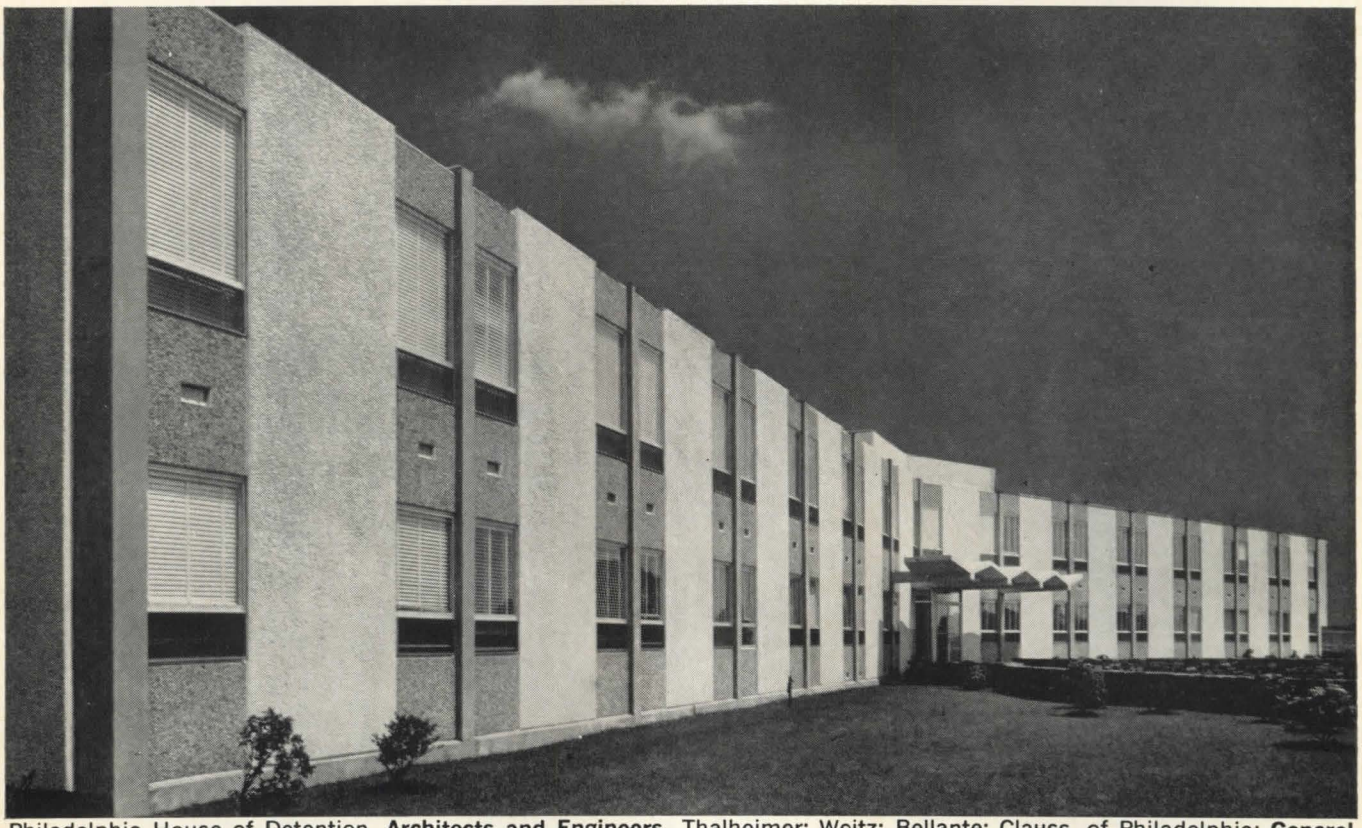
PRECAST WHITE CONCRETE CURTAIN WALLS CARRY THEIR OWN INSULATION



Philadelphia House of Detention. **Architects and Engineers,** Thalheimer: Weitz: Bellante: Clauss, of Philadelphia; **General Contractor,** John McShain, Inc., of Philadelphia; **Precast Concrete Panels,** Indiana Limestone Company, Inc., of Bedford, Ind.

One of the economies of precast concrete curtain-wall construction is that you can specify panels with insulating material already in place. Made with ATLAS WHITE portland cement, the panels enclosing this building are insulated with fiber glass, using the "sandwich" method of casting. Attachment to the building frame is by means of inserts and clip angles cast in the panels at top, center and bottom. There are no metal conductors extending through the wall to increase transmission of heat or cold. To give a textured interest to the gleaming white panels, some have an exposed aggregate finish. Others a simple "broom" finish. For more information about insulated panels, see your local precast concrete manufacturer. Or write Universal Atlas Cement Division, United States Steel, 100 Park Avenue, New York 10017.

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P/A JOBS AND MEN

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Continued on page 266

P/A JOBS AND MEN

Continued from page 264

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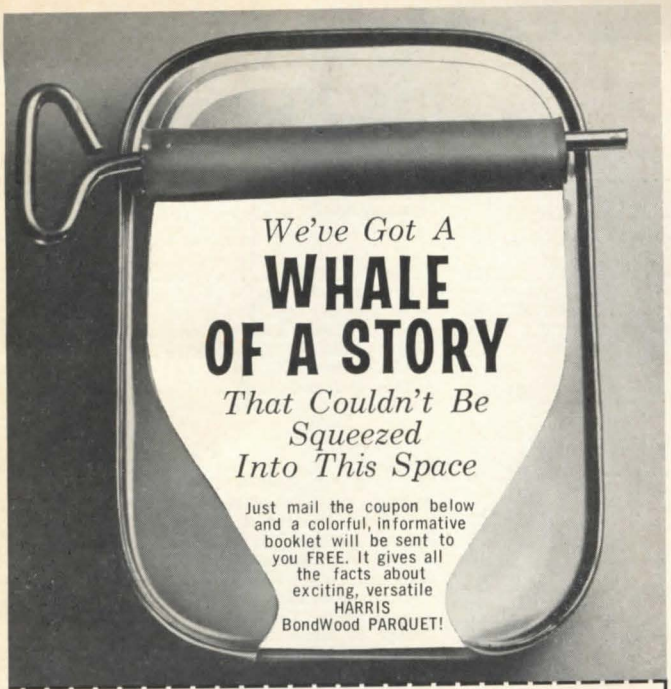

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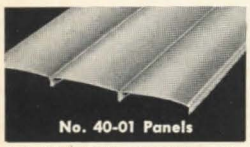

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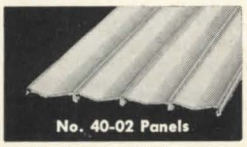

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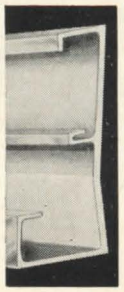

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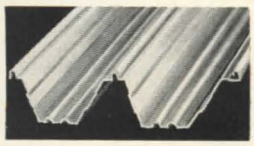

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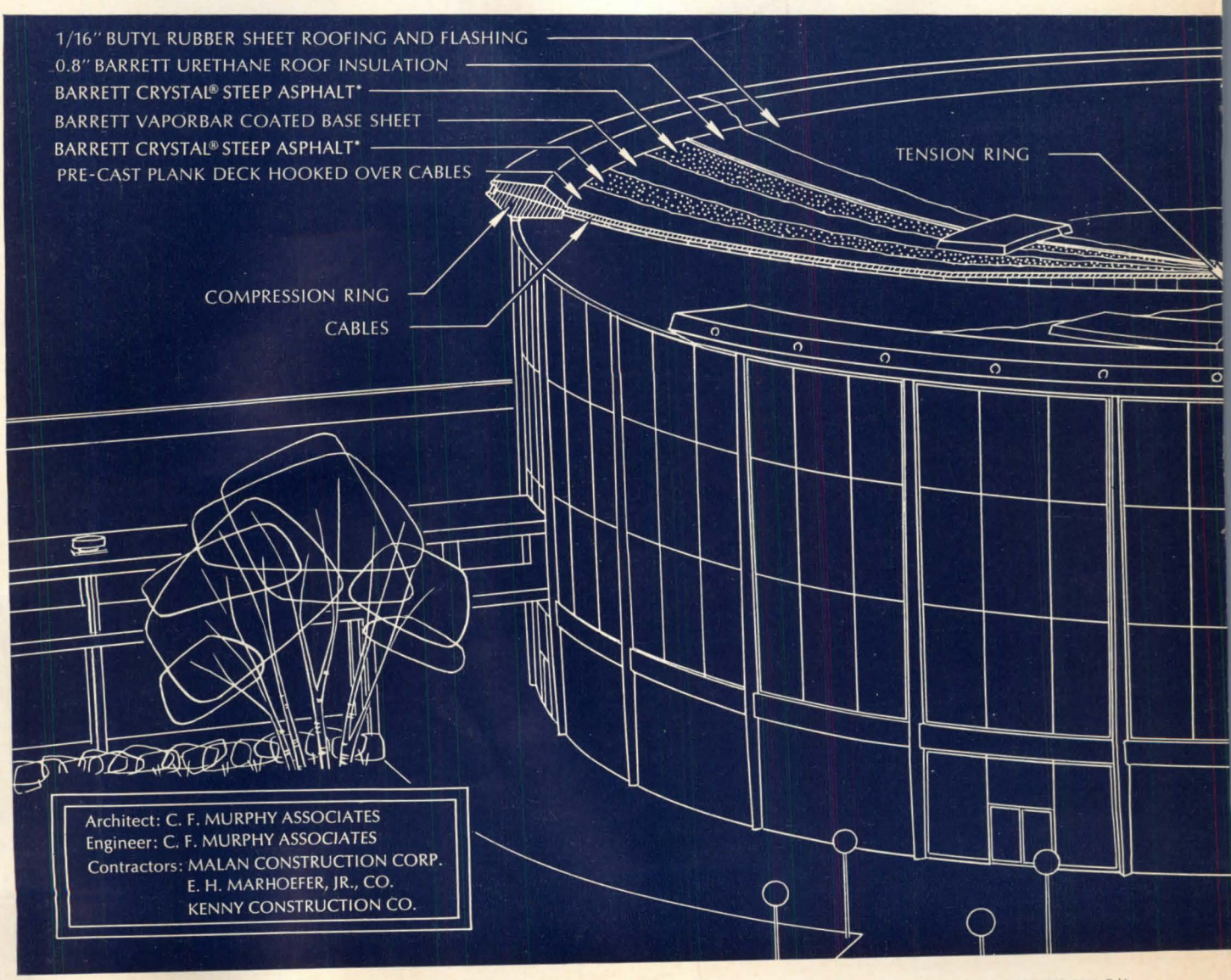

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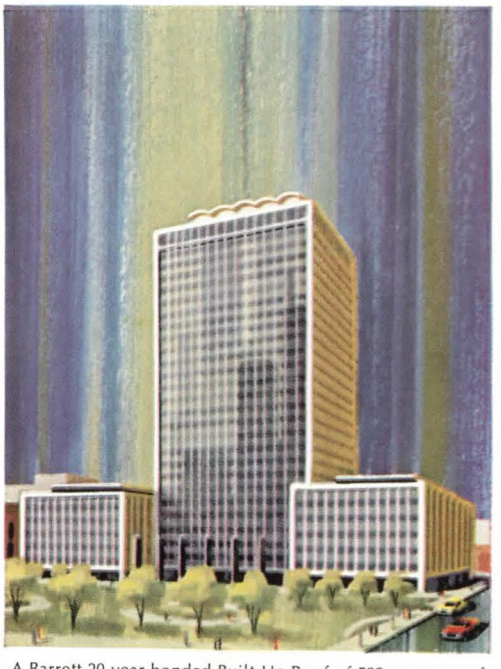

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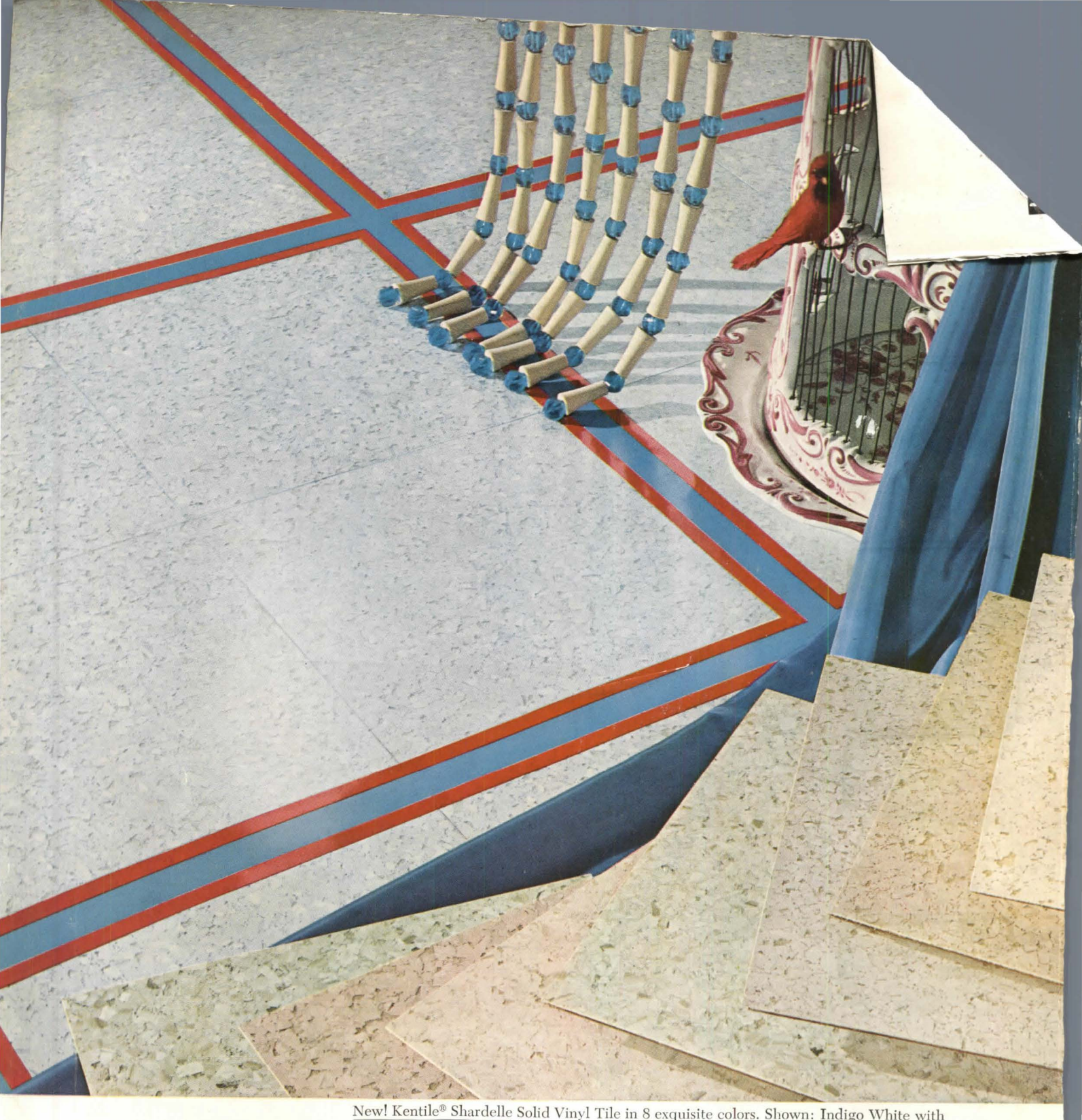

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