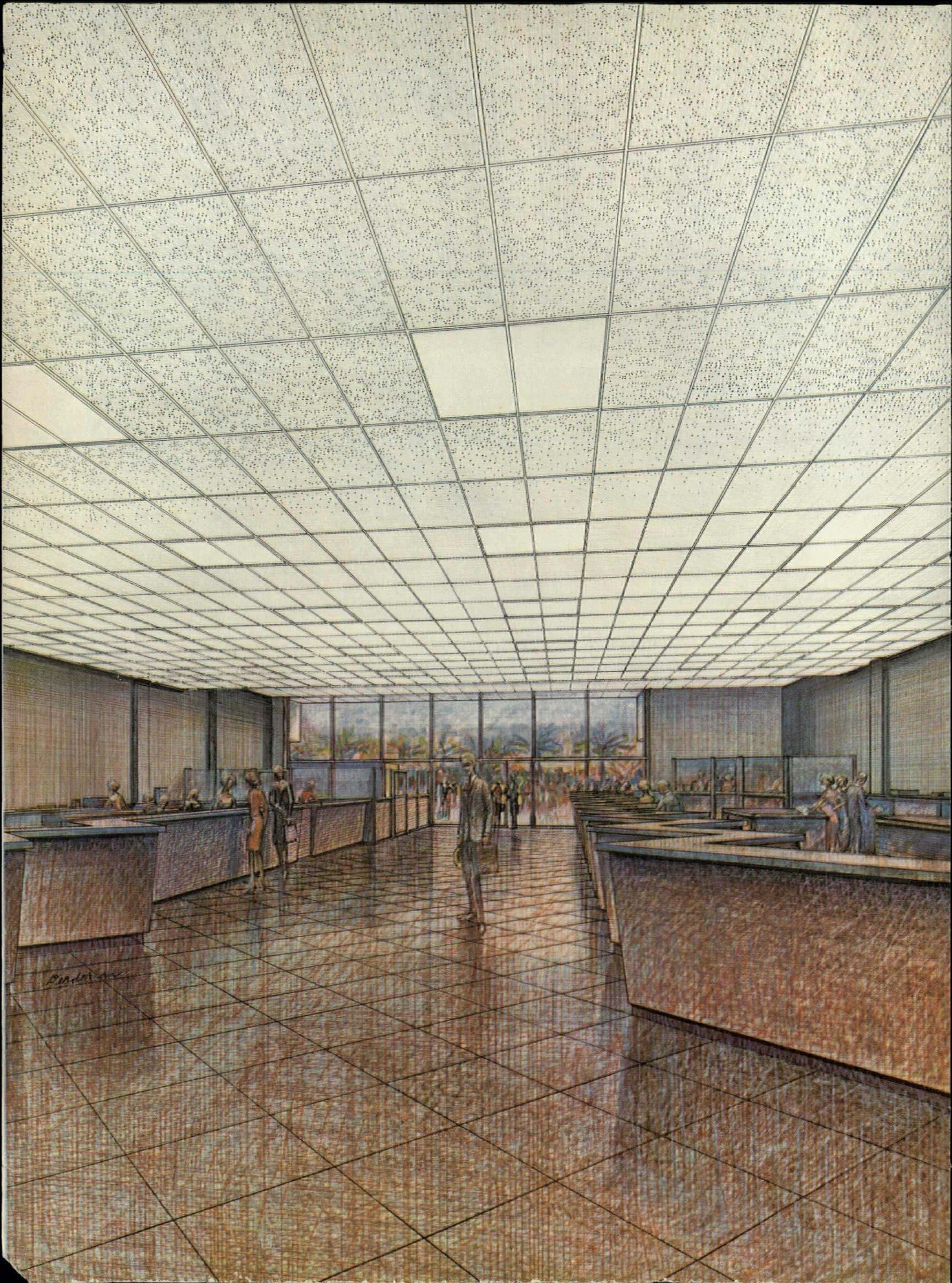
PA-1962-12

**PROGRESSIVE ARCHITECTURE** *December 1962*





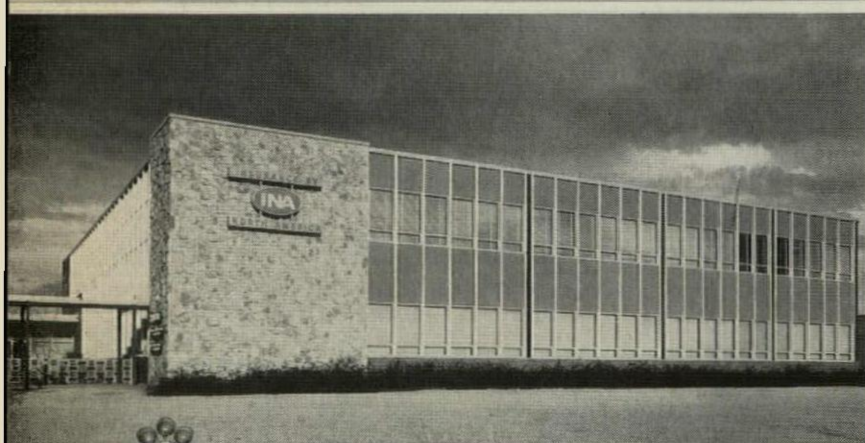
# ROTARY ELEVATORS


Employers Mutuals of Wausau
George L. Dahl, Architects and Engineers

Allstate Insurance Company
George L. Dahl, Architects and Engineers

Insurance Company of North America
Architects: Broad & Nelson

Indiana Lumbermen's Mutual Insurance Company
Harwood K. Smith & Partners, Architects & Engineers




## All these buildings on the Dallas freeways

DOWN in Dallas, where a man can stretch out and buildings can too, Rotary Oildraulic Elevators serve many modern buildings along the magnificent freeways. Shown here are some of the buildings served in the Brook Hollow Industrial Park and Empire Central Office Community.

Esthetic considerations play a large part in the popularity of this modern elevator with Dallas architects: there's no penthouse to inhibit roof-line design; handsome cabs and entrances enhance any interior.

But the real test of elevator acceptance is performance. Here, Rotary gives greatest value because of such features as:

- Power unit designed for elevator service and sized to operate at less than rated capacity under full elevator load. Because the motor and pump are never put under maximum strain, vibration and noise are kept to a minimum.
- Oildraulic Controller, developed by Rotary to control all hydraulic circuits, assures smooth starts and stops and provides easy adjustment of all actions without dismantling. This is not an assembly of commercially

# ROTARY OILDRAULIC® ELEVATORS

*Passenger and Freight*

# PRISMAROUND*

## the fixture that ballast men helped design

Ballasts burn out prematurely in most "wrap-around" luminaires because of overheating. The lamp-heat cannot escape.

Ballast manufacturers didn't like that. THEIR head scratching excited OUR brain waves. That's how PRISMAROUND was born.

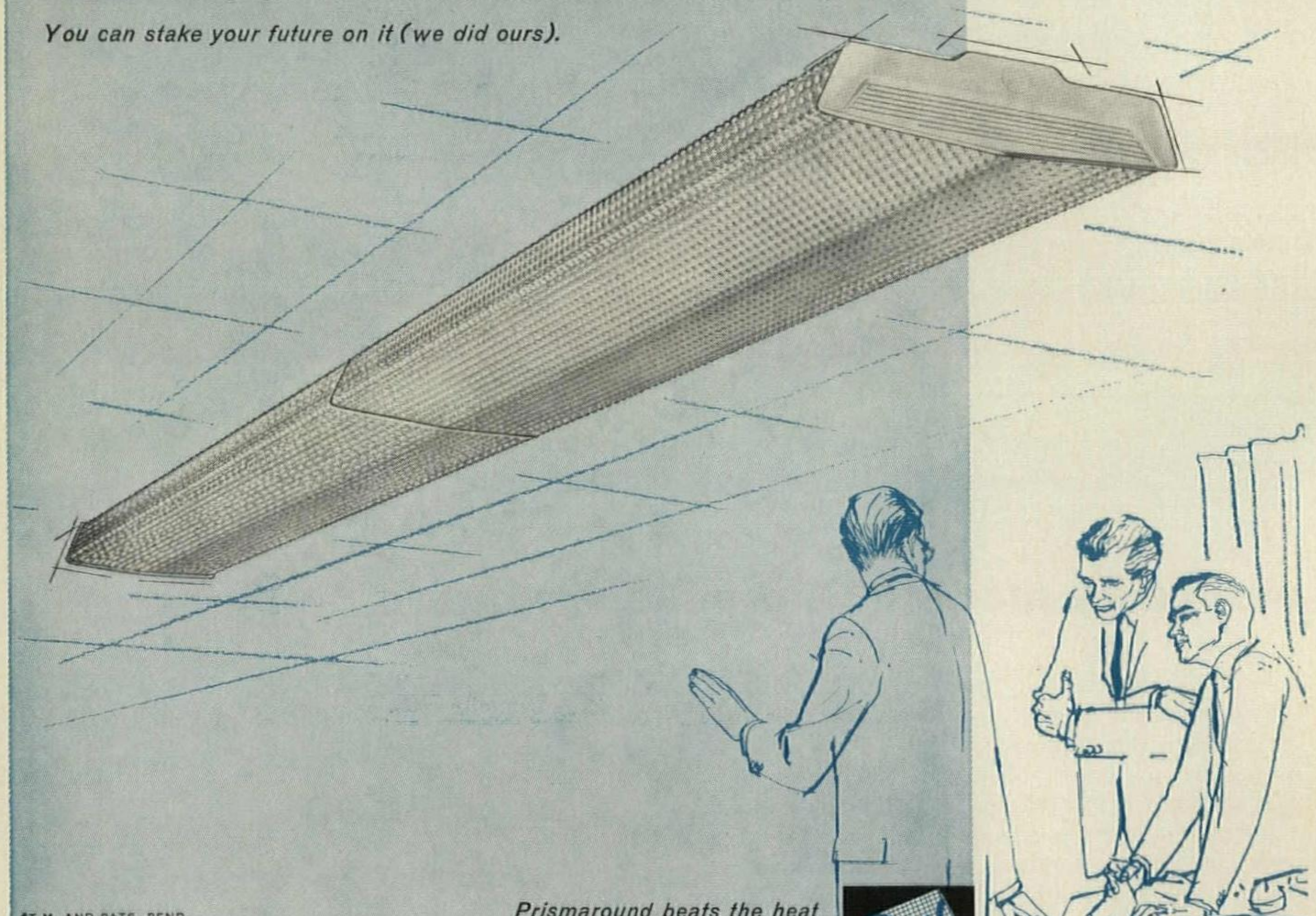
We designed a lens with hundreds of vents through which the heat CAN escape. Result: ballasts operate from 7-25° C. cooler and last until ripe old age. Now ballast manufacturers smile again.

But that's not all. Cooler operation means full wattage to the lamps . . . 10-15% more light for the same money. Also, moving air blows the dust away and keeps fixture and lamps cleaner longer.

Ask your Guth Man to show you a sample. Hold it against the light, and when you see it stream through the many sparkling diamonds, you'll say, "What a beauty!"

Then feel its weight. The plastic lens is a solid ⅜" thick . . . yes, a full three-eighth! Prismarounds (20 gauge steel) are made to last. Satisfaction is built into every unit.

*You can stake your future on it (we did ours).*




*T.M. AND PATS. PEND.

*Prismaround beats the heat*

| Luminaire | a<br>Max. Ballast-Case Temp. | b<br>Max. Capacitor Temp. | c<br>Max. Coil Temp. | d<br>Total Watts to lamps & ballasts |
|---|---|---|---|---|
| 4/40W "PRISMAROUND" | 85°C. | 67°C. | 101°C. | 184.1W |
| 4/40W "Brand-X" | 110°C. | 92.5°C. | 127°C. | 158W |

*Want more data? Send for folder 31*

THE EDWIN F. GUTH CO. • 2615 WASHINGTON BLVD. • BOX 7079 • ST. LOUIS 77, MO.



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# THIS MONTH IN P/A

*The World's Largest Architectural Circulation*




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VOLUME XLIII, No. 12

REINHOLD

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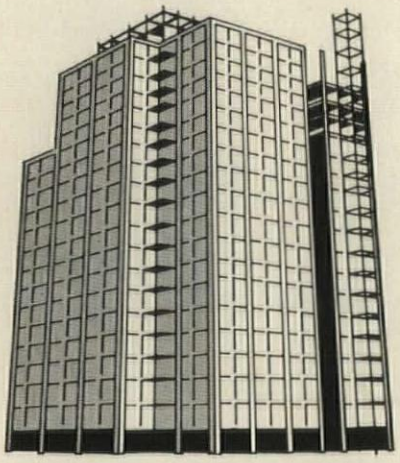

# "Electro-Sheet" protects 1317 family units

In the largest multifamily dwelling ever constructed under one roof in New York City, durable copper in economical form, "Electro-Sheet," was used for the flashing at all windows to prevent water seepage at these critical areas.

Anaconda "Electro-Sheet" Copper is pure, thin copper produced in various thicknesses by electrodeposition. Bonded to high-grade building papers, fabrics or asphaltic compounds, it provides a flexible, lasting, low-cost barrier to moisture and vapor penetration. "Electro-Sheet" Copper-Bonded Products meet government specifications for concealed flashing. The products are available in long, single-length rolls and in widths up to 60".

For more information about "Electro-Sheet" Copper and the list of manufacturers bonding the copper to other materials for concealed flashing applications, write to Anaconda American Brass Company, Ansonia Division, Ansonia, Conn. 62-1095

Installing Anaconda "Electro-Sheet" Copper, bonded to high-grade building paper, for concealed flashing below window sills.

**ANACONDA®**
**AMERICAN BRASS COMPANY**



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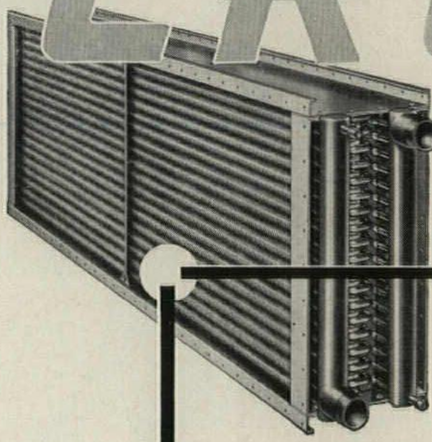
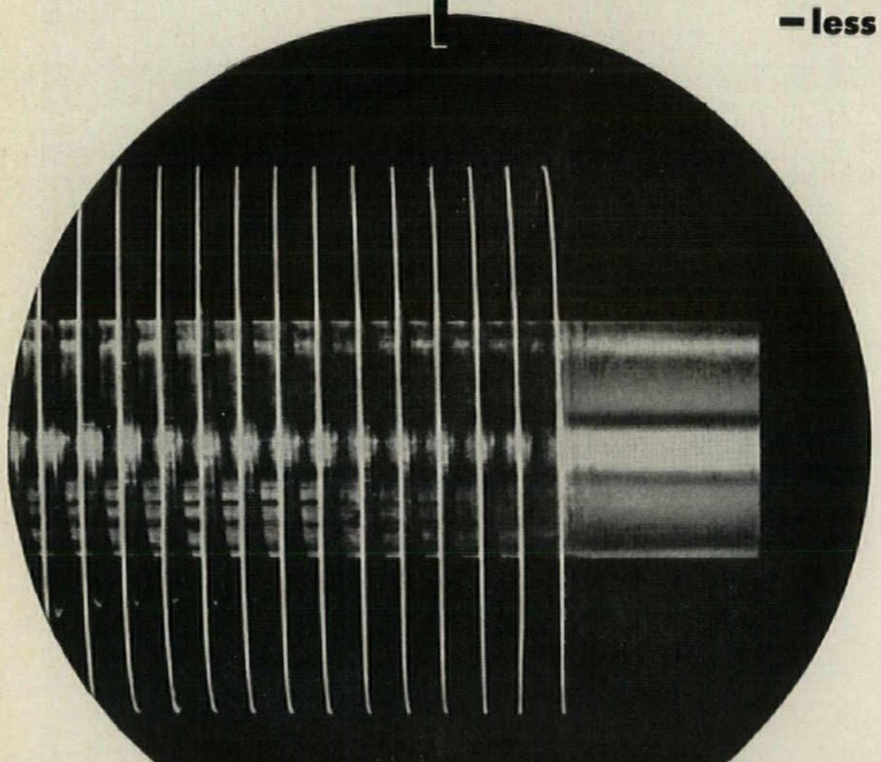
# AEROFIN



## Smooth-Fin Coils offer you:

**Greater Heat Transfer**
**per sq. ft. of face area**

**Lower Airway Resistance**
**—less power per c. f. m.**



Aerofin smooth fins can be spaced as closely as 14 per inch with low air friction. Consequently, the heat-exchange capacity per square foot of face area is extremely high and the use of high air velocities highly practical. Tapered fin construction provides ample tube-contact surface so that the entire fin becomes effective transfer surface. Standardized encased units are arranged for simple, quick, economical installation.

## AEROFIN CORPORATION

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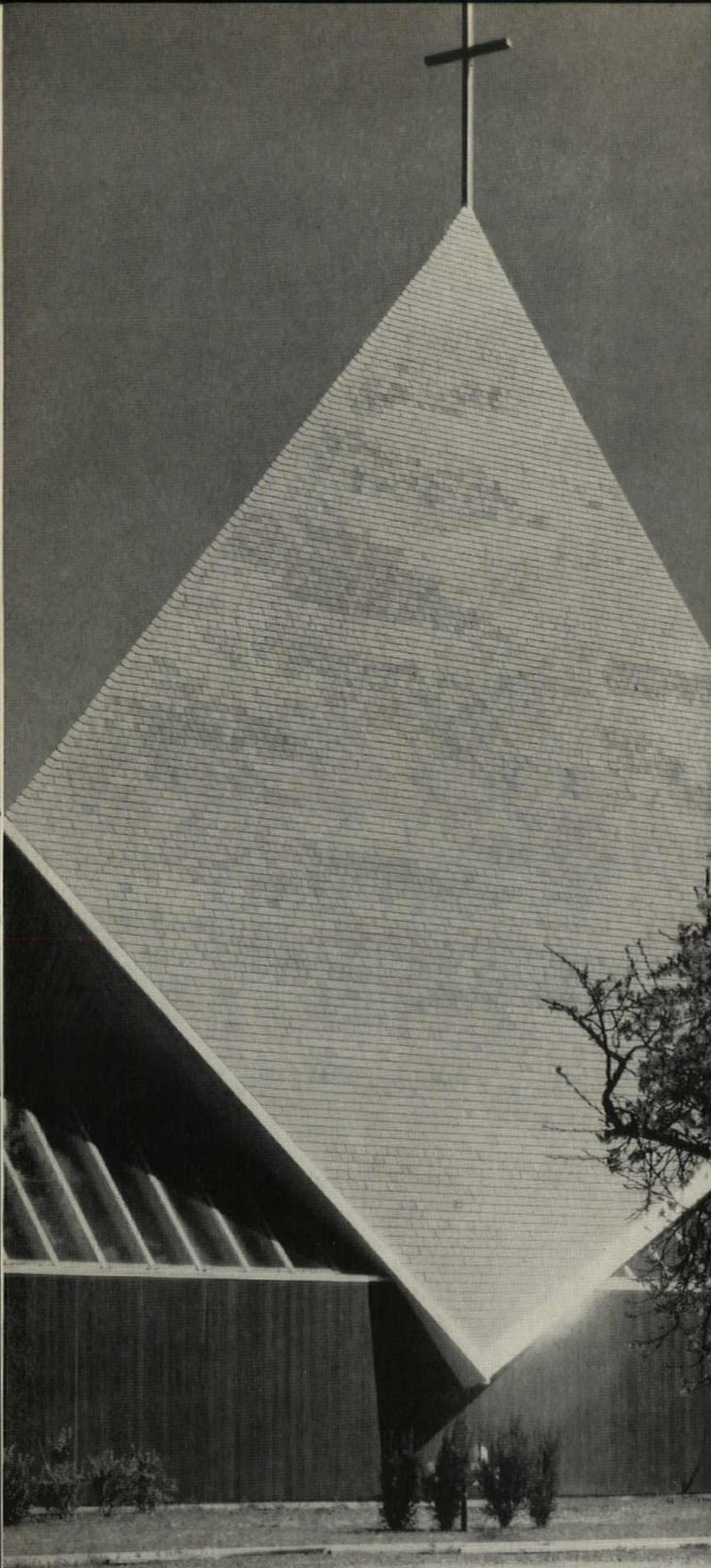

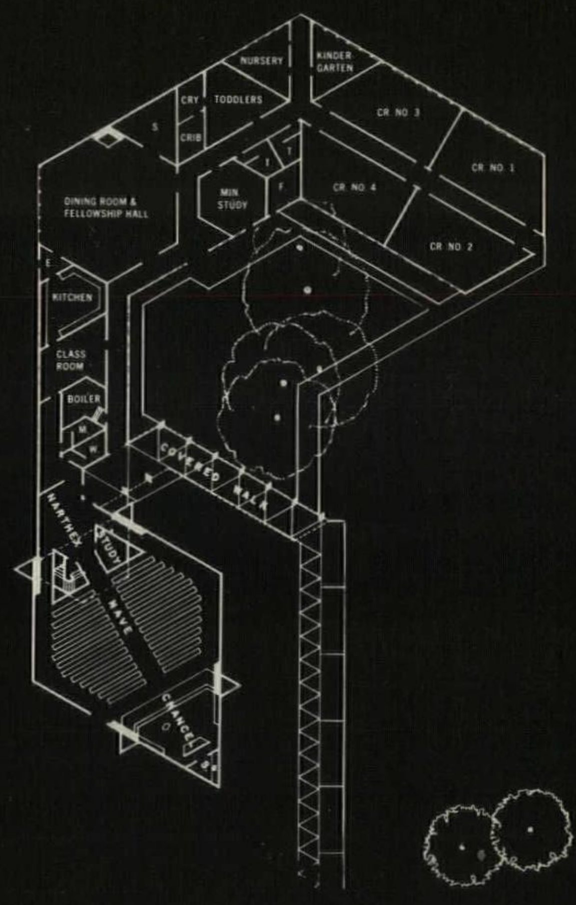


*The First Congregational Church of Milwaukie, Oregon / Architect: Warren Weber, A.I.A.*

## The articulate expression of Red Cedar Shingles

This is an unique material. No imitation roofing matches its natural color, texture and line. Remarkably storm and wind-resistant, it ages gracefully, in fact gains character with the years. If you would like complete information about applications and specifications for this classic material, write: Red Cedar Shingle Bureau, 5510 White Building, Seattle 1, Washington, or 550 Burrard Street, Vancouver 1, B.C.

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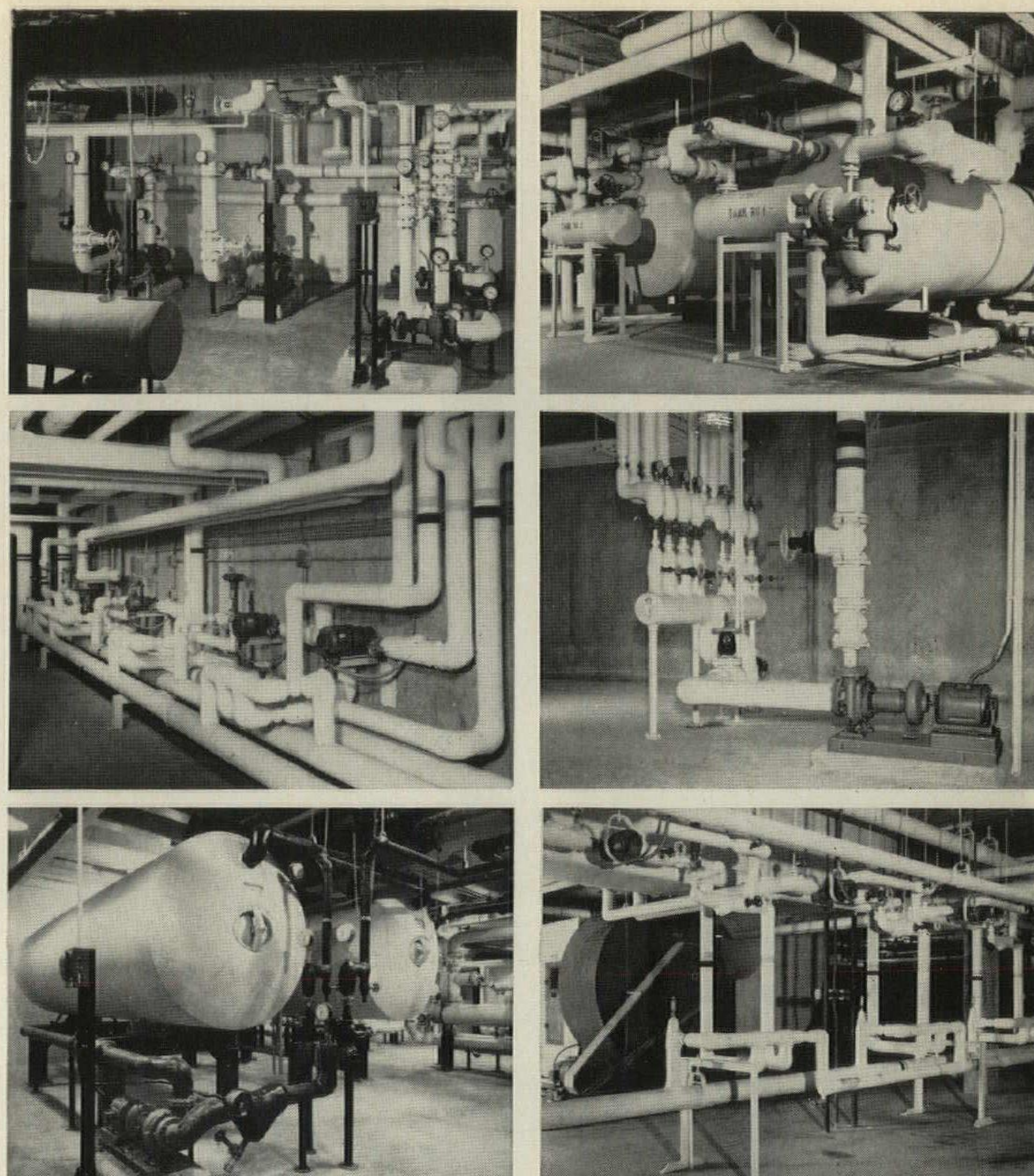
**RED CEDAR SHINGLES**

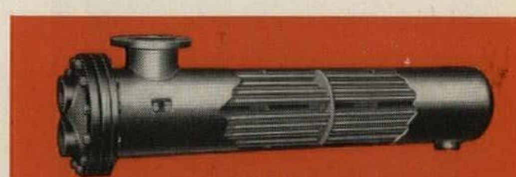


*Typical installations of B&G equipment at O'Hare Field*

# equipment delivers heat to vast building complex

**15**
**B&G INDUSTRIAL PUMPS**

**46**
**B&G HEAT EXCHANGERS**



B&G pumps have the quiet operating characteristics, rugged construction and dependable performance which has won them their place as the world's largest selling heating and cooling system pumps. Their superior qualities have been proved in literally millions of installations.

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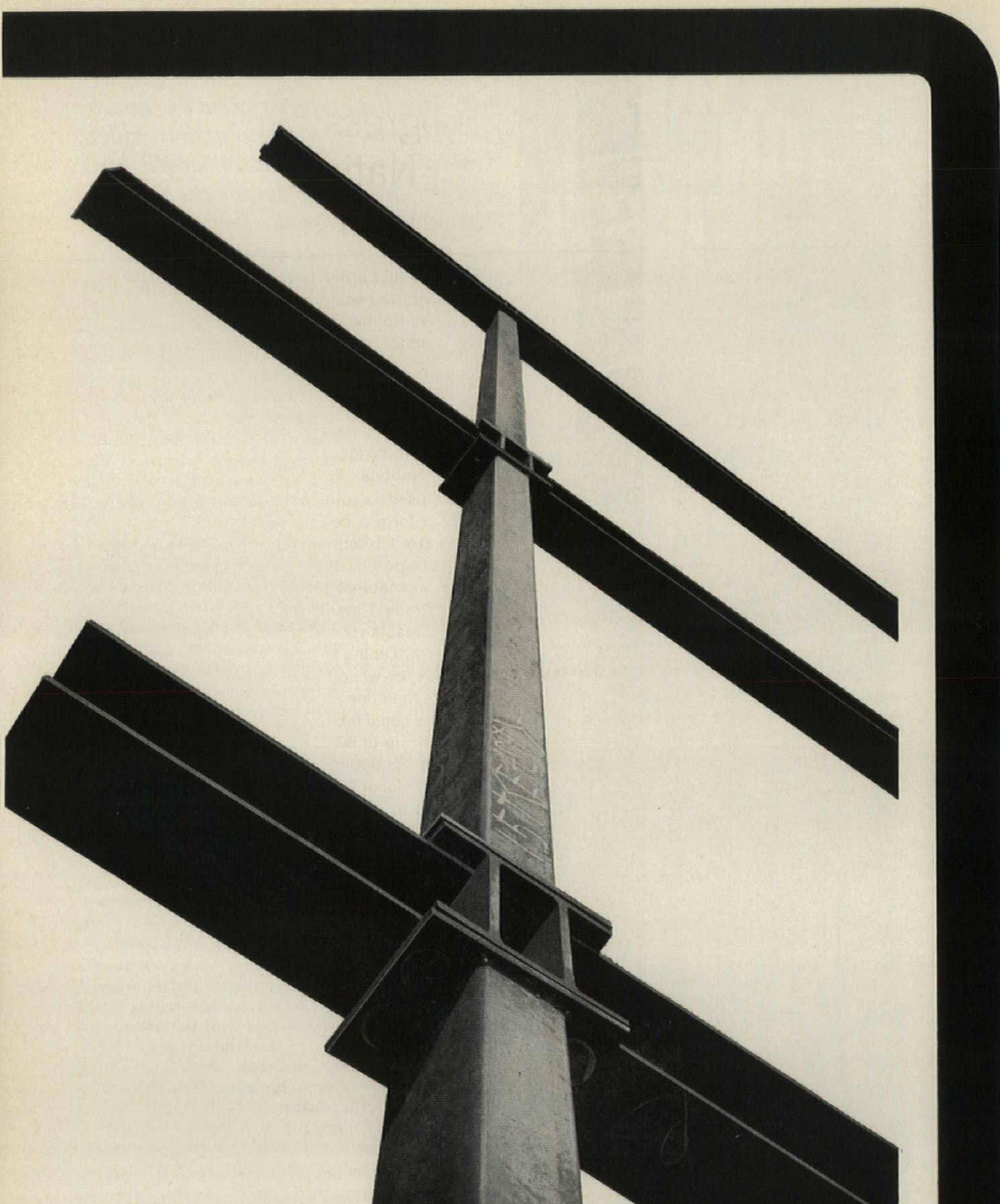


***This is a true story, as can be attested to by fire department records, and by two firemen who were nearly killed. Almost assuredly, many would have died if it had not been for the fire protection. This case history shows you how the fire protection you specify actually does work when a fire breaks out.***

On August 20, a fire broke out on the eighth floor of an unfinished high rise building in a booming port city. (We are omitting the building name and location at the request of interested parties.)

Over 60 firemen raced to the scene. After 42 minutes, and after two men had been overcome by heat and smoke, the fire in a temporary office was under control. Under control because the fire stayed put, burning *only* on the eighth floor!

Inspection the following day revealed a number of curious things. The heat was so intense that "incombustible" tiles stored on the floor and in place on the ceiling were burnt to ashes. Typewriters were melted down into metal lumps. Steel stud partitions were warped beyond salvage. Steel channels for the suspended ceiling were completely collapsed.

Yet on the floor of the ninth floor—inches above this holocaust—the paint on electrical junction boxes wasn't even scorched.

The reason: $\frac{7}{8}''$ of Zonolite spray-on, direct-to-steel Mono-Kote on the deck and $1\frac{1}{8}''$ Zonolite Plaster Aggregate and gypsum on metal lath on the beams.

On the eighth floor, less than 1% of the Mono-Kote had come off. This small loss was caused by warping of steel braces which had been sealed to the deck. As the fire warped the braces out of shape they fell and pulled the Mono-Kote that had covered them away. If the braces had been more securely fastened, every bit of Mono-Kote would have stayed in place.

The key to the successful containment of the fire was this: the fire protection was on the steel, where it is needed. A fire-resistant suspended ceiling would have been no good, because much of the fire was between the suspended ceiling and the real ceiling. Even if the ceiling had been completed—of fire-rated ceiling tile—it still would offer no protection from fire breaking out between the suspended ceiling and the real ceiling, because the metal that suspends the ceiling is vulnerable. (Remember the collapsed steel channels?)

Be sure your fire protection is where it belongs: directly on the steel. It can mean the difference between a contained fire and a deadly inferno.

Our technical bulletin PA-53 gives you detailed information about the spray-on, direct-to-steel fireproofing, Mono-Kote. Write:

**ZONOLITE COMPANY**

135 S. LA SALLE STREET • CHICAGO 3, ILLINOIS



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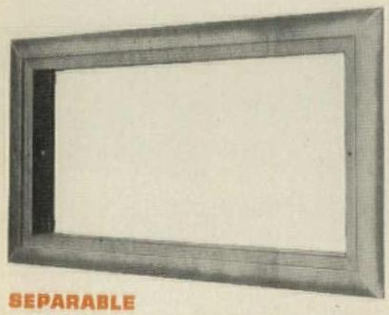
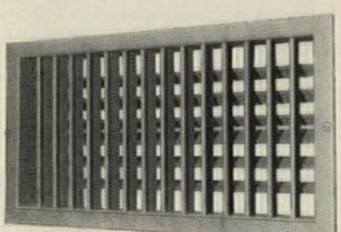
# THE INTEGRAL LOOK
## BY WATERLOO...
# IS

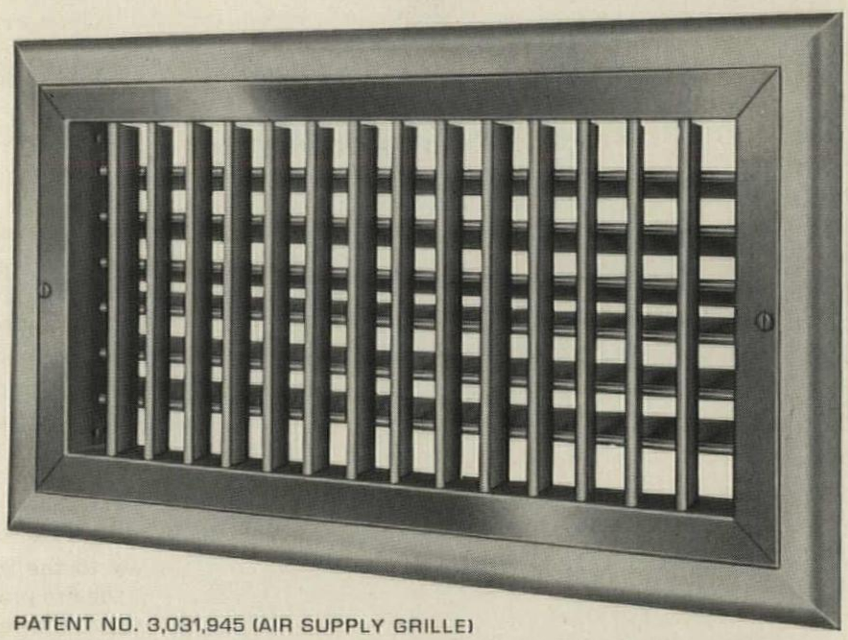


SEPARABLE FRAME

# Integrille™



REMOVABLE CORE



PATENT NO. 3,031,945 (AIR SUPPLY GRILLE)

**INTEGRILLE** is a combination of extruded aluminum Separable Frame and Removable Core.

The frame is easily installed — only the core need be removed for access or redecoration. Eliminates cracks, scratches or marring of plaster or wood paneling. The visible portions of both frames combined represent only a narrow 1⅜" overall width.

And Integrille can be finished in Satalum® — another Waterloo exclusive! Gives a smooth satin-like texture to natural aluminum, further protected by a hard, clear lacquer coating... for lasting beauty.

***This then... is Integrille. This handsome, bevelled frame is worthy of accommodating the finished art of the masters... yet it is designed solely to contain the decorative, functional Integrille core.***

Write for the unique Integrille brochure.
Our representatives will gladly tell you more!

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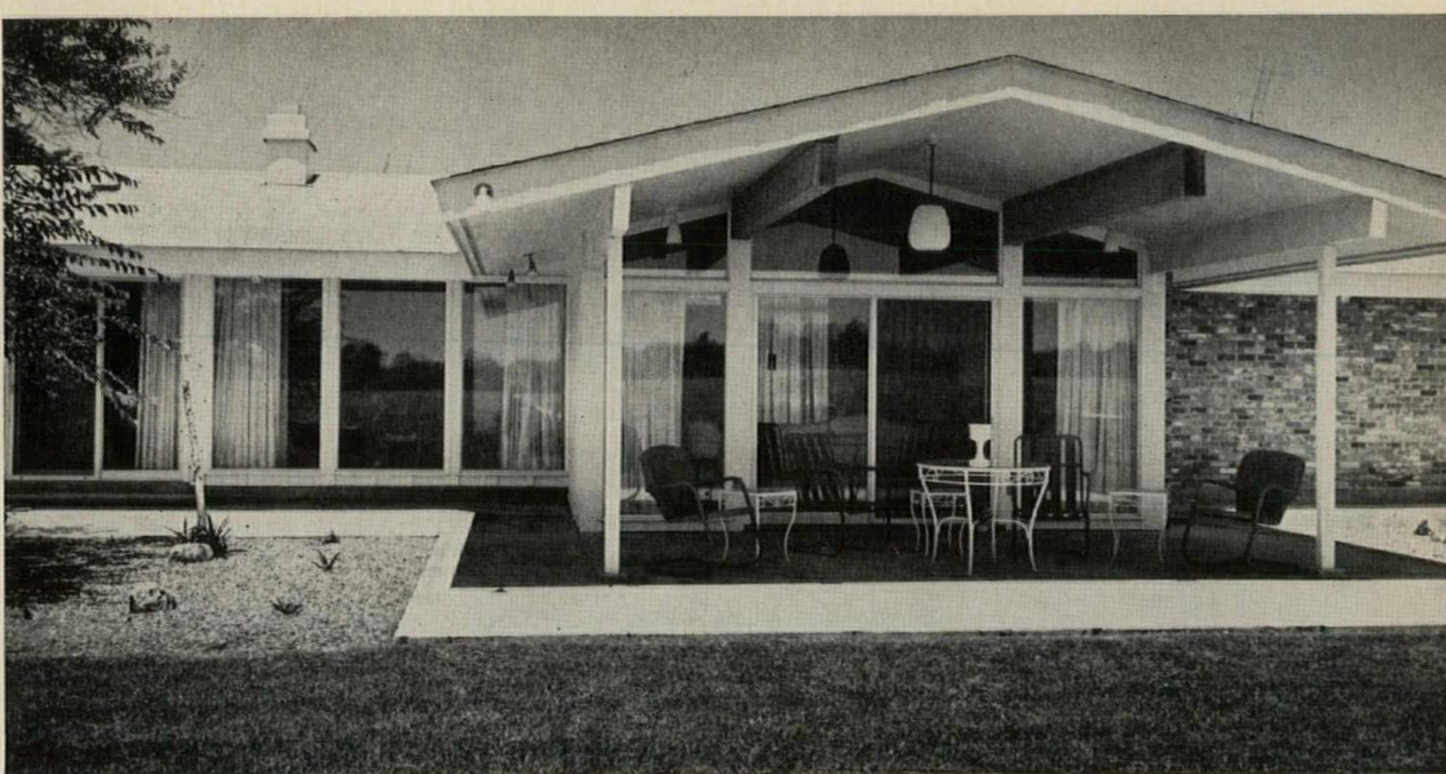


The Jack Voyles residence, Port Arthur, Texas, is of "Open World" design with 900 sq. ft. of glass area and 2400 sq. ft. of floor space.

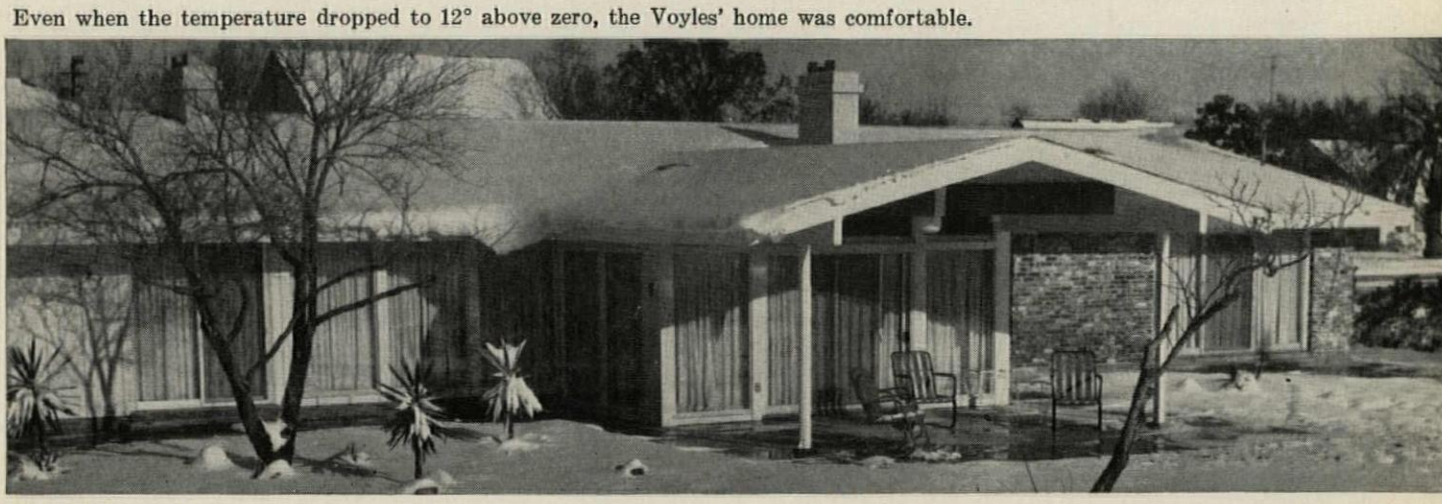
# Practical way to provide along with electric

This house has 2400 square feet of floor area . . . and 900 square feet of windows. It was planned originally for single glazing. But the owners learned that by changing to *Thermopane*® insulating glass, a smaller (and less expensive) 5.8-ton-capacity heat pump could be used. Year-round heating and cooling bills from the utility company have averaged only $19 per month—despite the fact that temperatures in Port Arthur, Texas, vary from an all-time high of 107° to an all-time low of 10.8°.

*Thermopane* insulating glass cuts heat loss through windows in half, as compared with single glazing. Mr. and Mrs. Jack Voyles, owners, also like it for other reasons: "We like the daylight it lets in, the feeling of spaciousness it gives us. We always have a view, no

MADE IN U.S.A. LOF GLASS

Even when the temperature dropped to 12° above zero, the Voyles' home was comfortable.



*Thermopane* insulating glass cuts drafts near windows, provides more comfortable living area.

# big glass areas heating and cooling

matter how cold it gets outside, because *our* windows have never fogged over."

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Send for 16-page technical booklet that includes full data on insulating values.

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INSULATING GLASS

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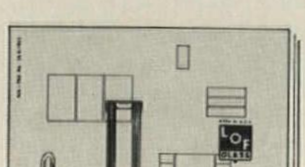


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Please send me free 16-page *Thermopane* Manual.

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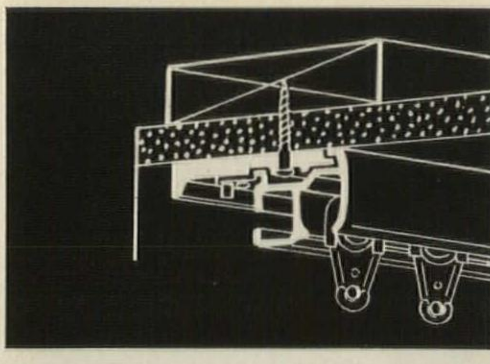

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ANODIZED EXTRUDED ALUMINUM TRAVERSE TRACK AND PARTS

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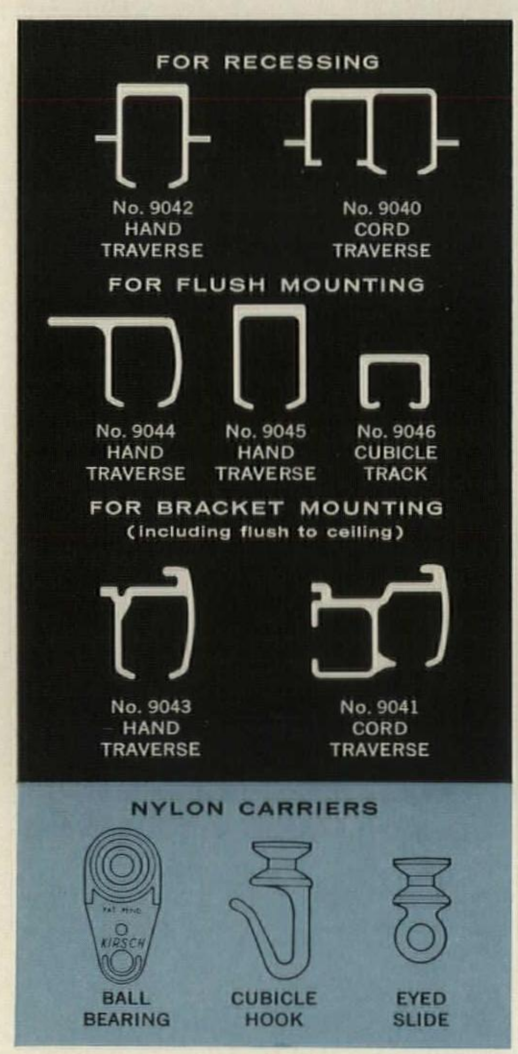


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*for deluxe Commercial and Residential Application*

Designed in collaboration with registered architects, specifically for widespread use in commercial, institutional, and high-grade residential interiors. Clean, simple lines. *Beautiful profile!* Etched-and-anodized extruded aluminum construction, with nylon-encased ball bearing pulleys and carriers.

Now it's easy — and makes sense — to include this professional-grade drapery hardware in planning 'most any structure having windows. Architrac is already installed in scores of prestige apartment houses, office buildings, institutions and fine custom-built homes. (There is no "or equal"!)

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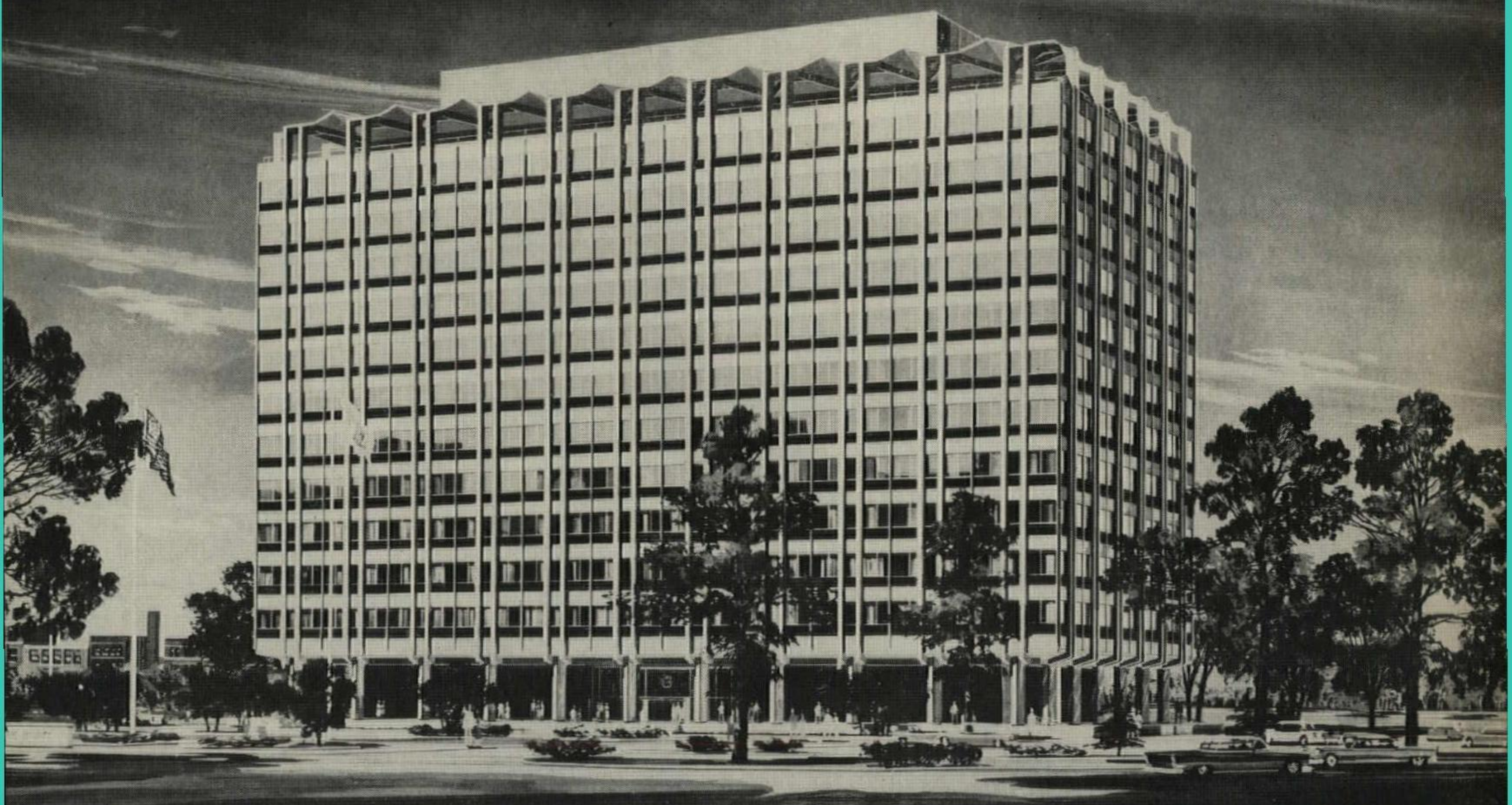
State of New Jersey, Department of Labor and Industry Building, Trenton.

Architects : Frank Grad & Sons, Newark, New Jersey ■ Gen'l Contractor: Belli Construction Co., Trenton, New Jersey

Theodore J. Kauffeld, M.E., P.E., Consulting Engineer



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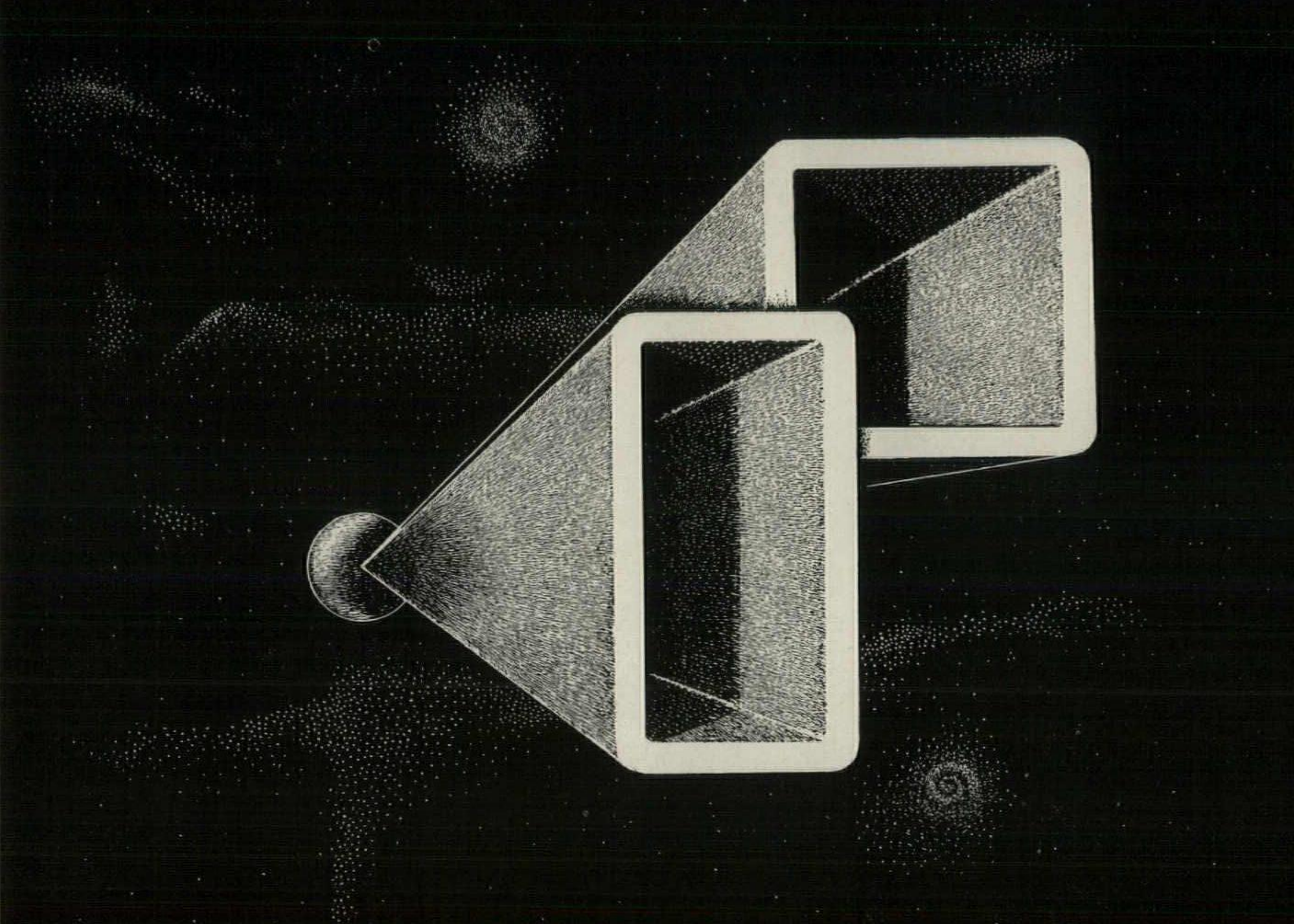
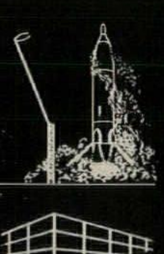


## MONOWELD...*Another Big Idea From Van Huffel...*



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**for membrane waterproofing and concealed flashing**
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**RUBBER & PLASTICS COMPOUND CO., Inc.**

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# To accent your creative design...

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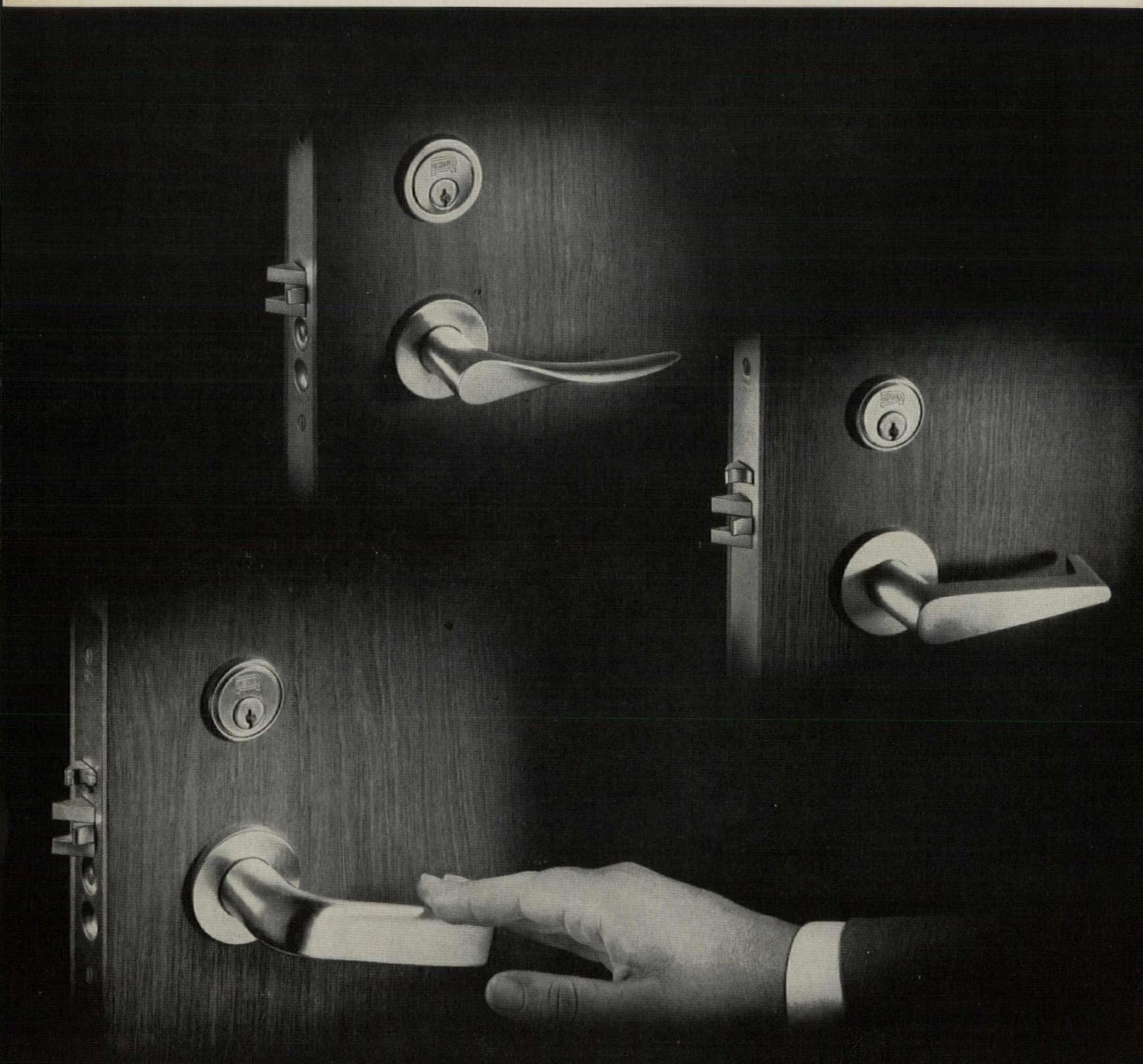
*...the doorware that lives up to your reputation*



**New designs in doorware!** Three striking new lever handles bring Continental flair to Russwin Ten-Strike Mortise Locks. From left: Citation, Royale, Tornay. Unique sag-proof construction. See your Russwin distributor.

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# NO YELLOWING PROBLEM

When you specify acrylic shields made from LUCITE* acrylic monomer for the lighting fixtures in your building, you can expect service life three to five times greater than that of non-acrylic plastic materials. You virtually eliminate the problem of "yellowing". And maintenance costs are reduced to a minimum. In short, shields made from LUCITE make possible the most efficient—and attractive—lighting you can buy.

Fluorescent lighting fixture by The Frink Corporation, Brooklyn, New York, has lighting shield formed by Dura Plastics of New York, Westport, Connecticut, from cast acrylic sheet made by **The Polycast Corporation,** Stamford, Connecticut.

*DU PONT TRADEMARK

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**PLASTICS DEPARTMENT**

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

# LUCITE*

For more information, turn to Reader Service card, circle No. 329

*SEND FOR MORE INFORMATION*

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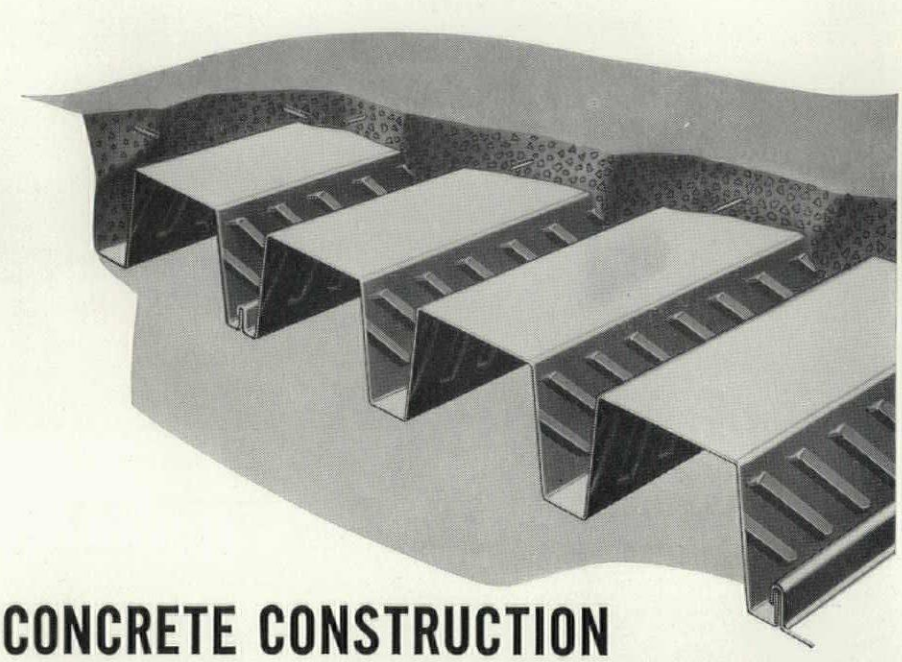
☐ Please send your lighting booklet.
☐ Please ask an acrylic-sheet manufacturer to contact me.

Name............................................................
Position............................................................
Company............................................................
Address............................................................
City............................................State..................



# NOW: REINFORCED CONCRETE CONSTRUCTION WITHOUT REBARS, TEMPORARY FORMS, OR SHORING

## *Inland Hi-Bond Floor Deck cuts slab cost 10%-20%*

Today, a new system has eclipsed the low cost of traditional reinforcing materials and methods for concrete floor slabs. On a recent typical job, a complete Inland Hi-Bond Floor, including deck and poured slab, cost $90.00 per square; a comparable traditional concrete slab would have cost $101.00.

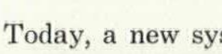
Here's how you save, using Hi-Bond deck: You don't need steel reinforcing bars (except temperature mesh). You don't need temporary forms or shoring; Hi-Bond deck is a permanent form for wet concrete.

Raised lugs in the webs of Hi-Bond panels provide a positive lateral and vertical mechanical bond between steel and concrete, causing them to act as a composite unit.

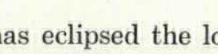
Hi-Bond floor deck is available in a number of profiles. Where electrification is desirable, Hi-Bond can be furnished as a cellular floor.

For further information on Hi-Bond — or other Inland floor systems — ask an Inland sales engineer. Write for catalog 270, or see Sweet's, section 2j/In.

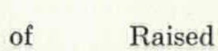
*There's an Inland floor system to meet every span requirement economically.*



**Type B Hi-Bond Floor Deck**
24" wide, 1½" deep.



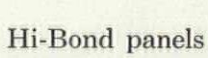
**Type BR Hi-Bond Floor Deck**
24" wide, 1½" deep.



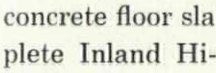
**Type BF Celluflor**
24" wide, 1½" deep.



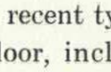
**Type BB Celluflor®**
24" wide, 3" deep.



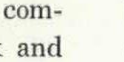
**Type N Hi-Bond Floor Deck**
24" wide, 3" deep.



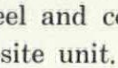
**Type NF Celluflor**
24" wide, 3" deep.



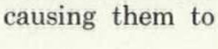
**Type 3HF Celluflor**
12" wide, 4½" deep.



**Type 4.5H Floor Deck**
12" wide, 4½" deep.



**Type 4.5H Celluflor**
12" wide, 4½" deep.



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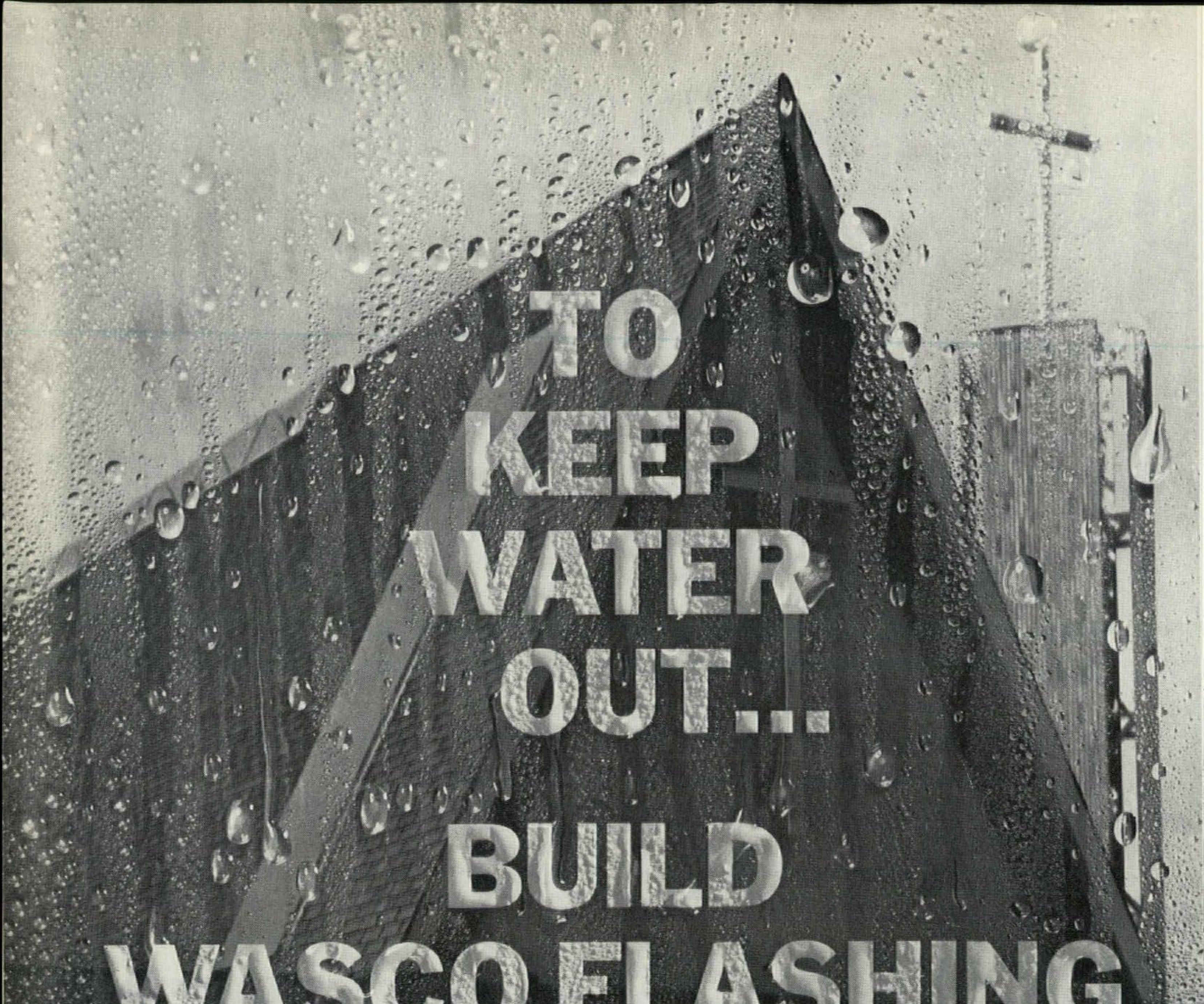
**Hi-bond floor deck is available in Canada through Rosco Metal Products Limited, Toronto 4, Ontario**

EP-18

For more information, turn to Reader Service card, circle No. 340

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Yet the cost of this complete WASCO protection is generally less than 1/20 of 1% of total construction investment. ■ Only Cyanamid offers every kind of thru-wall and spandrel flashing you need to keep water out — from parapet to foundation. You can specify 14 types of flashings including copper-fabric, copper-asphalt, copper-lead, fabric, plastic and aluminum. For exceptional flashing problems, you are invited to consult the Cyanamid Engineering staff. For full details, see Sweet's Architectural File 8g/Wa.

WASCO® FLASHING

For more information, circle No. 322

AMERICAN CYANAMID COMPANY, BUILDING PRODUCTS DIVISION, 5 BAY STATE ROAD, CAMBRIDGE 38, MASS. CYANAMID

PROGRESSIVE ARCHITECTURE DECEMBER 1962

# NEWS REPORT

*Architecture's Monthly News Digest of Buildings and Projects, Personalities, New Products*

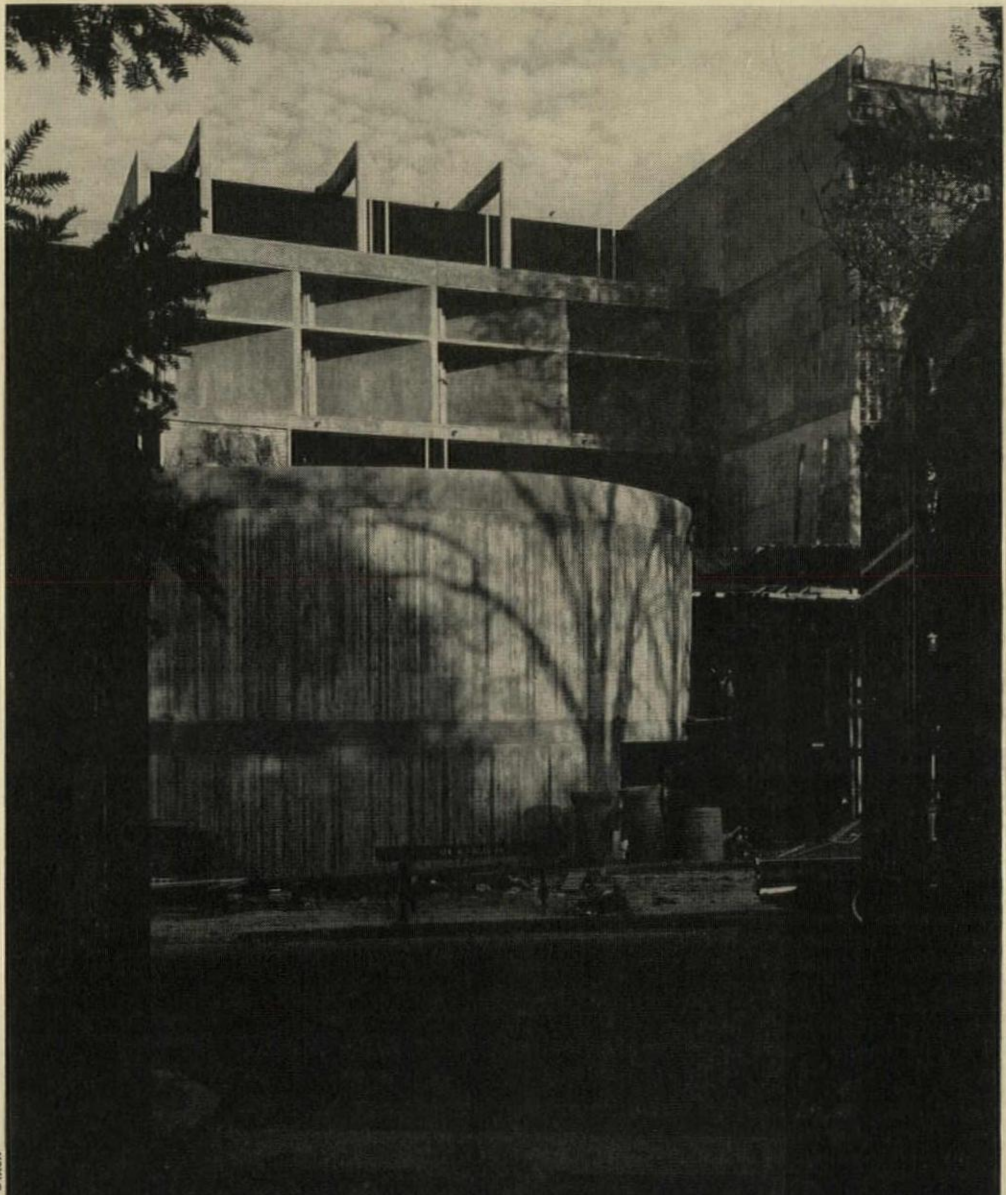


Photo: John M. Dixon

*Corbu's Visual Arts Center framed by entry gates to house of Harvard's president.*

For more information, turn to Reader Service card, circle No. 376

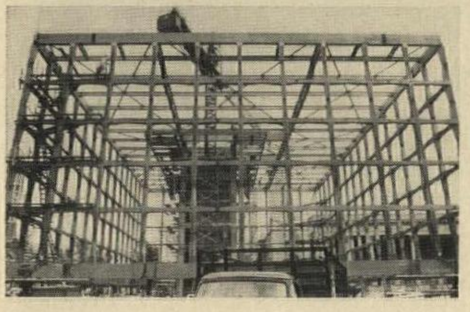
# *TWO TOPPING OUTS*

Two buildings that have achieved considerable interest in project stage for their unique structures have recently been topped out: Curtis & Davis's IBM Building in Pittsburgh [pp. 162-167, SEPTEMBER 1962 P/A] and the Beinecke Rare Book and Manuscript Library at Yale University by Skidmore, Owings & Merrill [pp. 152-159, DECEMBER 1961 P/A].

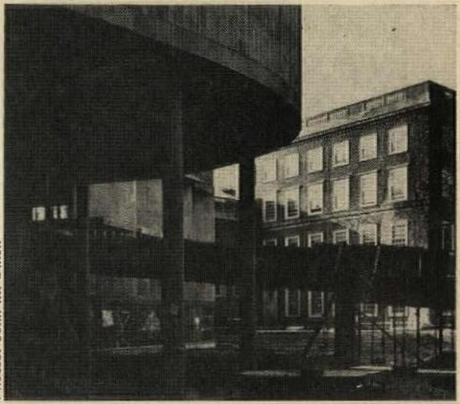
IBM's multilozenged façade already gives a good idea of what the final building will look like. During erection, a system of color-coding was used for each type of steel making up the load-bearing exterior walls, for the convenience of both construction crews and sidewalk supers.

The Yale structure was still an unenclosed frame when photographed, so the immense, all-welded Vierendeel trusses which create each façade are visible in their unadorned state.

Yale Photos: Ilse M. Reese



# Corbu's Center Rises at Harvard



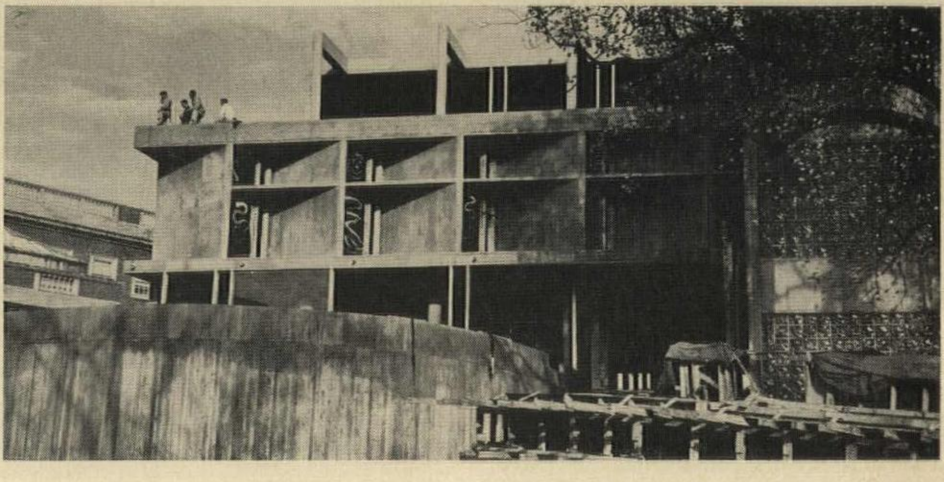
Photos: John M. Dixon

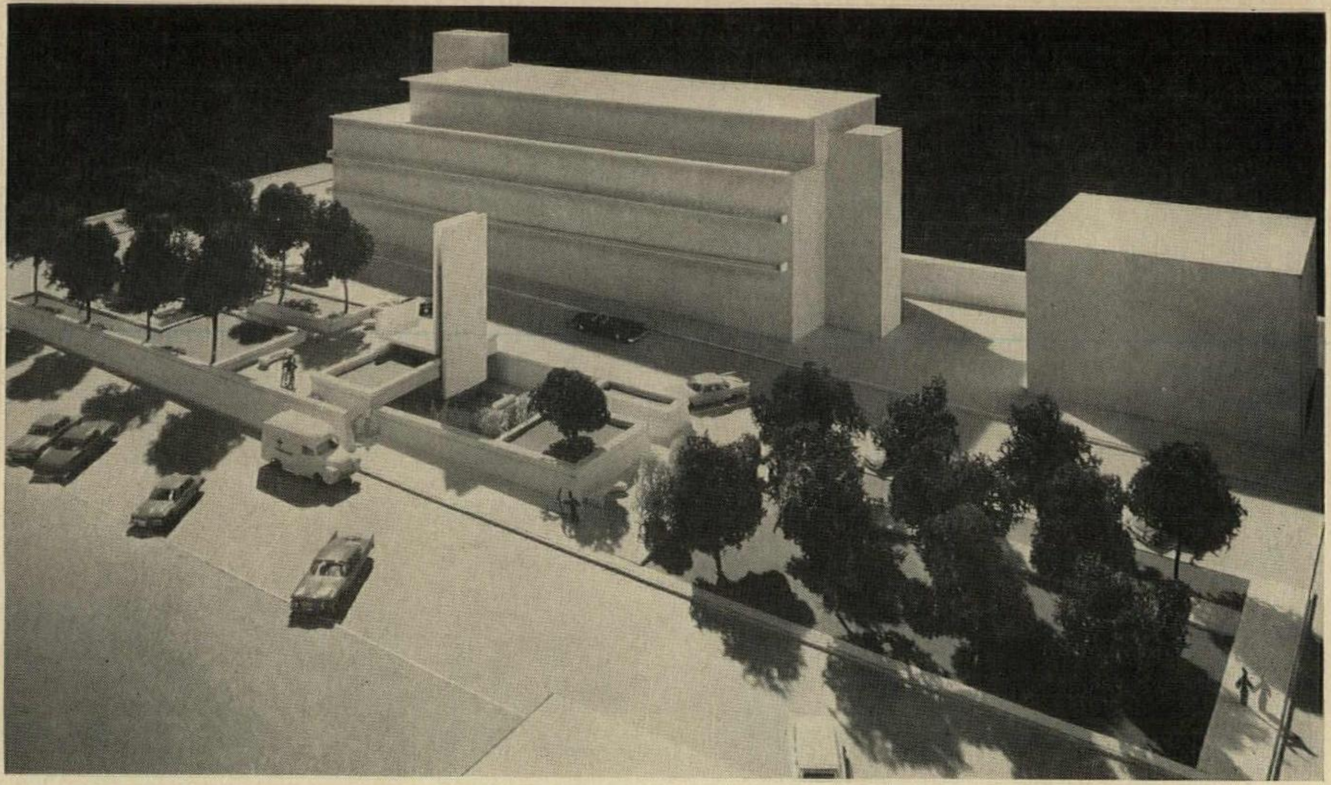
CAMBRIDGE, MASS. On a recent trip to this area, P/A's John Dixon explored and photographed Le Corbusier's Visual Fine Arts Center, now under construction at Harvard. Some of his impressions are recorded here.

*Relation to other buildings:* "The building is totally unrelated to the vocabulary of forms and details of surrounding buildings, yet the relationship of forms and newly created spaces between them is peculiarly satisfying. Because the building is of a light, neutral color, with many penetrations, it seems to complement the surrounding red brick masses, rather than competing with them for the limited space. The organization of the plan on a diagonal grid relates it (according to Corbu) to open spaces of the campus, with their diagonal walks."

*Materials:* "The concrete is not very white, not really slick, not particularly *brut*—just concrete. There is also clear glass, much of it set far back within concrete grids, but some in random width vertical strips on the surface, like some of the walls at La Tourette. The most surprising material is the good old glass block that suddenly appeared in large areas."

*As an entity:* "It is a surprise, unsettling but amusing, to find the two street façades similar in composition—not mirror images, but with elements of the composition appearing on the *same* hand. Another notable experiment in diagonal, or crossword puzzle, symmetry."





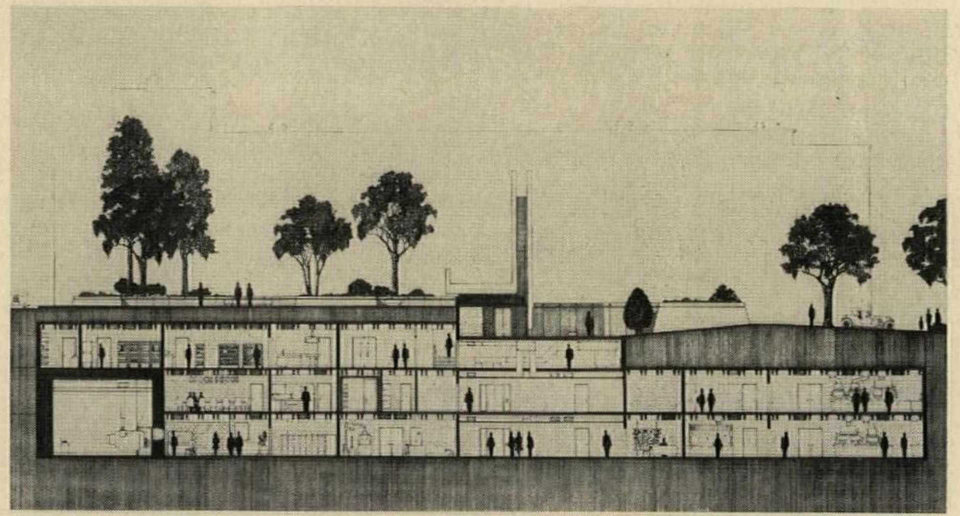
# Radiation Research Goes Underground In Boston

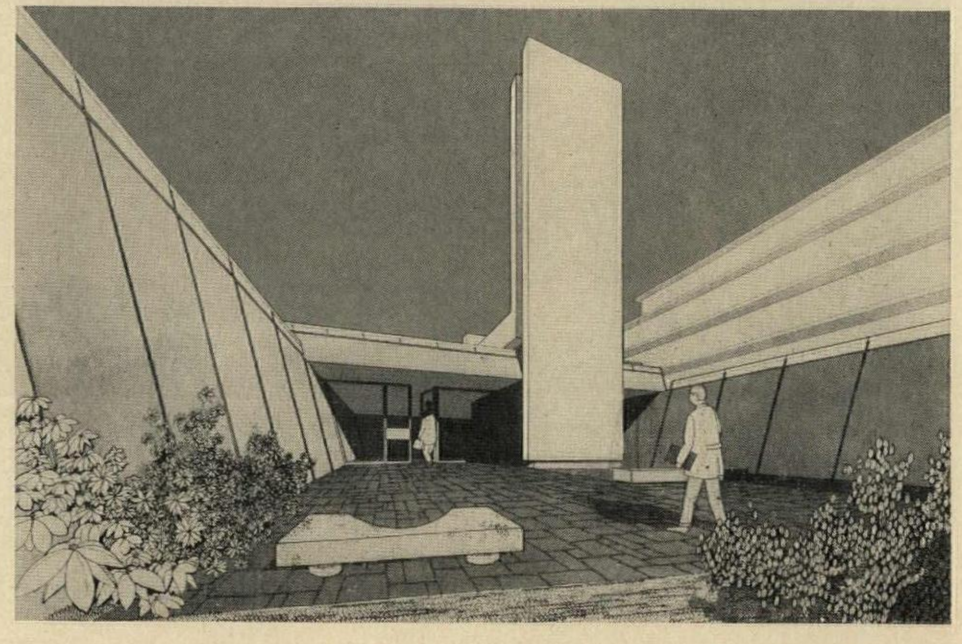
BOSTON, MASS. A project that is at the same time a health research center and a unique problem in the design of urban space is the proposed radiation research building for New England Deaconess Hospital and Harvard Medical School here, by Peirce & Peirce.

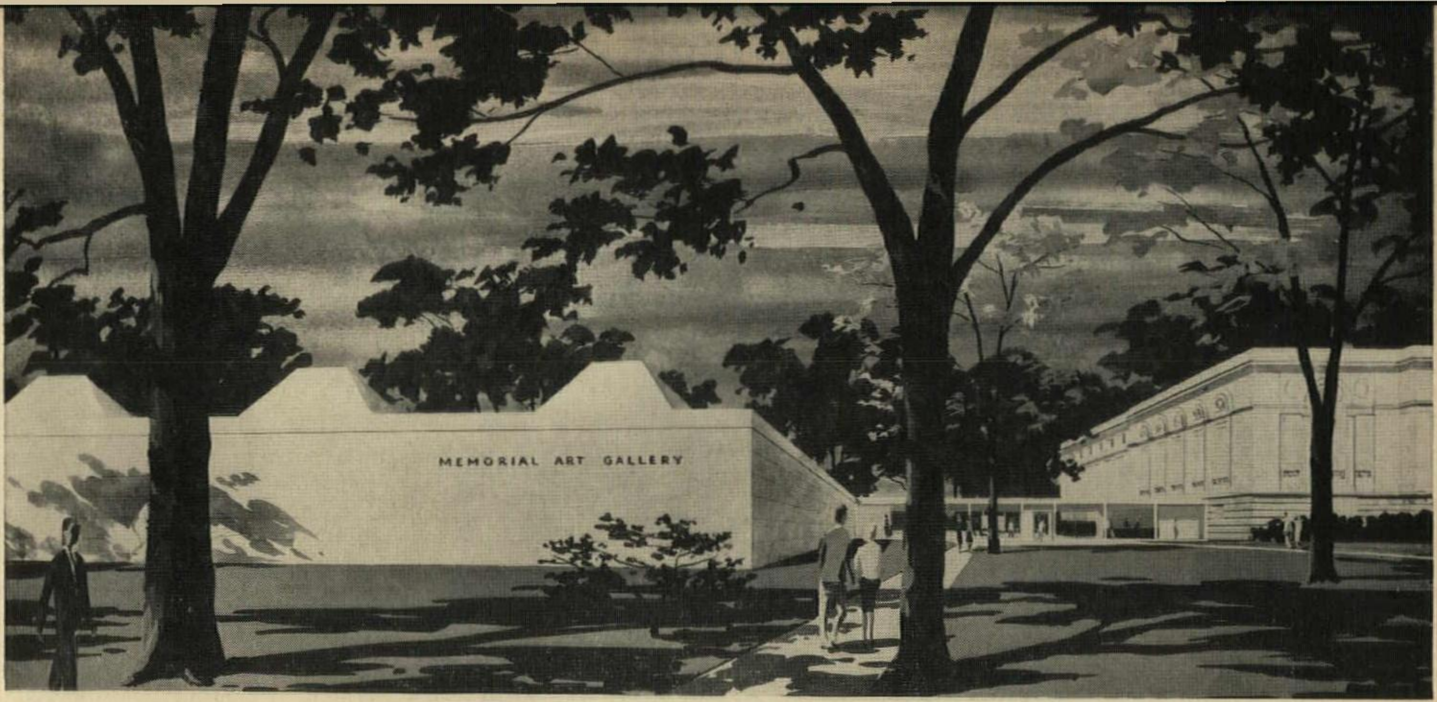
The site is a small park across from the hospital, which was willed to the city to be a perpetually open space. In order to provide a badly needed center for cancer research, and at the same time preserve the park-like amenities of the site, the hospital was permitted by the state to purchase "earth rights" below the park to within 12" of the surface and with reasonable access. Since no building was allowed to appear above the surface, the entrance to the center, the fresh-air ventilation ducts, and the emergency exit are all located in a sunken court above the center of the building. A sculptural pylon for use as a memorial rises above the park and contains high-velocity exhausts.

Within the center, three levels contain chemical and radioisotope laboratories, a 6,000,000-v lineal accelerator, outpatient treatment areas, office and conference rooms, and a complete "farm" for experimental animals. Early detection, structural containment, and automatic door closers perform as fire and hazard protection.

Structure will be reinforced concrete underground, with glazed masonry interior partitions. Above ground, garden walls will be bush-hammered concrete; the pylon will be ribbed and bush-hammered concrete.





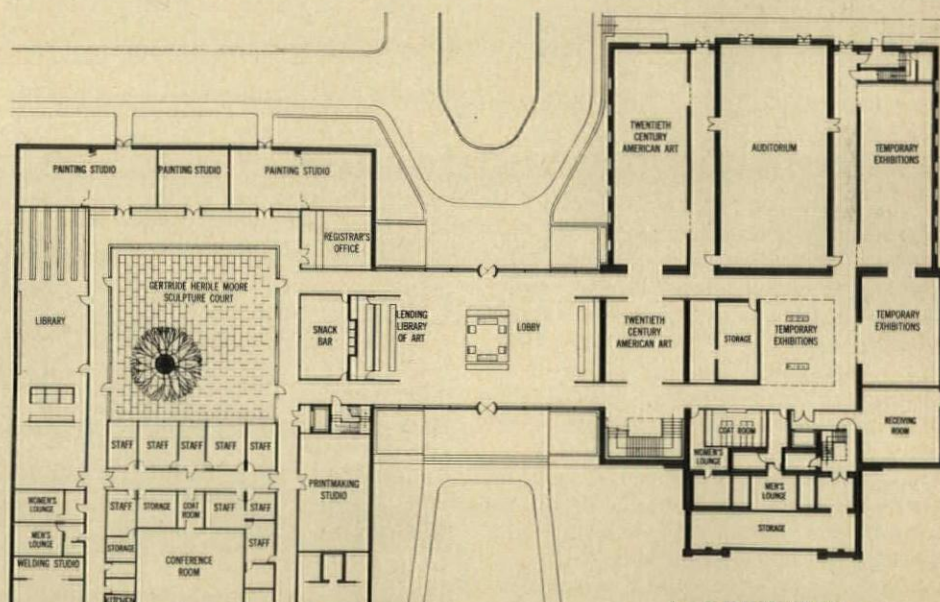



# N. Y. SOM USES LIMESTONE, NOT GLASS

ROCHESTER, N.Y. The only significant glass expanses in the addition to the Memorial Art Gallery here by Skidmore, Owings & Merrill (New York) will be on the inside, sculpture court. The exterior will be all limestone to match the existing, neo-classical building. (There *will*, however, be a glass-walled connection: the unit between the two buildings containing the lobby and the lending library of art.)

Since its inception 50 years ago, the gallery has been the center of Rochester's art life. In the past few years, educational and administrative functions have taken up more and more of its precious display space. The new addition will relieve the gallery areas of that burden, and SOM has redesigned the present gallery space so it can be used to best advantage for both permanent and temporary exhibitions. The ground floor of the old building will now have two halls for its permanent collection of 20th-Century art and three for temporary exhibits. On the second floor will be ten galleries for permanent collections ranging from primitive through 20th-Century art works.

The new, one-story wing will include painting studios at the rear, library and snack bar at both sides of the sculpture court, and staff room, conference rooms, and workshop studios for printmaking, jewelry, weaving, enameling, sculpture, and pottery and ceramics at the front of the building. Evenly spaced skylights over the studios will enliven the silhouette of the building. The new 3600-sq-ft sculpture court will be dedicated to Gertrude Herdle Moore, director of Rochester Memorial Art Gallery from 1922 to 1962, who retired recently.




ROCHESTER MEMORIAL ART GALLERY
GROUND LEVEL

# Square Peg in Round Hole for Toronto Airport

Photos: Panda

TORONTO, CANADA The design by John B. Parkin Associates for the new Toronto International Airport, now under construction, offers a unique concept of terminal planning.

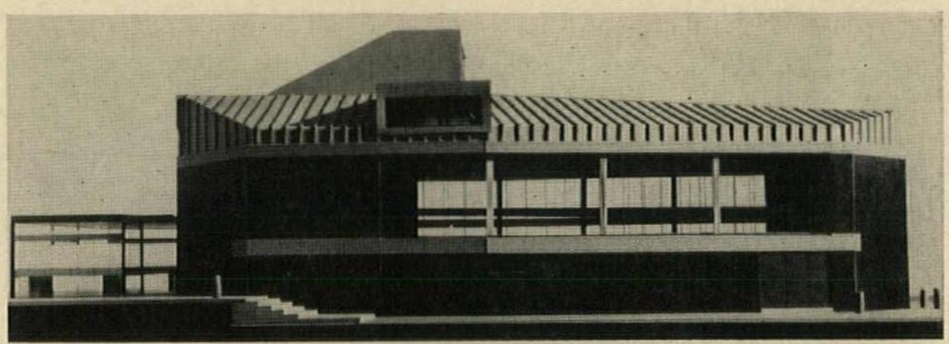
The terminals, or "aeroquays," as Parkin calls them, are circular buildings surrounding square towers largely given over to garage space. Two of these units will provide a total of 34 plane loading bays; two more aeroquays are planned for the future. The traveller drives his car into the airport on a below-grade road to the entrance to the parking garage, which goes beneath the apron of his particular aeroquay. Leaving his car to be parked, he checks in and can either go directly to the waiting area for his flight in the circular concourse, or enjoy bar and restaurant facilities in the building. The central area of the base building contains such general provisions as ticket counters, lobby, entrance and exit ramps to the garage, and customs, luggage, and deplaning facilities.

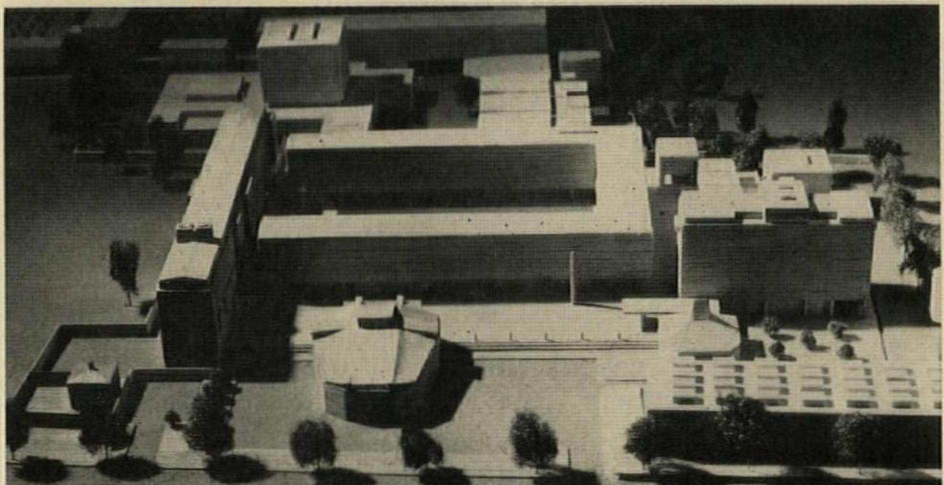
Other buildings are administration building, power plant, and freestanding control tower.

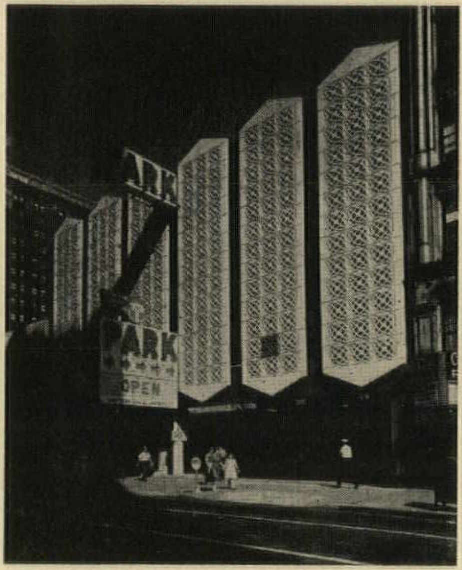
# Cambridge Auditorium To Have Sculptural Shape

CAMBRIDGE, ENGLAND Lady Mitchell Hall is the latest unit in a development plan devised for the University of Cambridge by Sir Hugh Casson, Neville Conder & Partners in 1952. To stand in the landscaped forecourt leading to other, more rectangular buildings (*see site photograph*), the hall has been designed with a more "sculptural" form. It is to be used primarily for lectures, but will also be suitable for chamber music, films, and small dramatic productions.

Lower level of the building will contain cloakrooms, actors' rooms, and space for mechanical equipment. The main level will have the entrance foyer, auditorium, and stage. The foyer will be a glass and steel structure treated separately from the rest of the building. Main structure will have a reinforced concrete basement and brick load-bearing outer walls. An aluminum roof will cover precast concrete T-units spanning between an external ring beam and two central beams. The central beams span lengthways between in situ concrete fins; they are of precast, poststressed tubular sections that also act as ventilation ducts. Construction started last September.

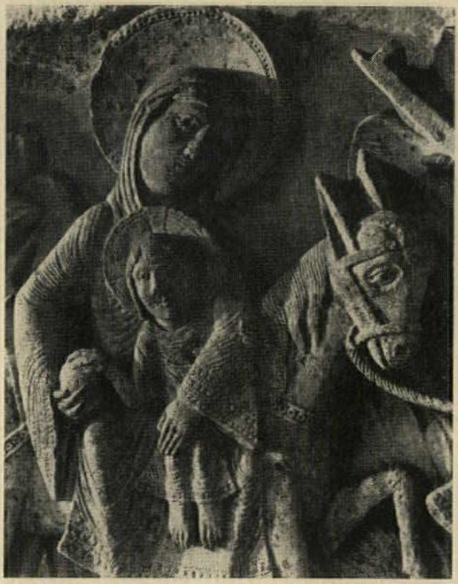






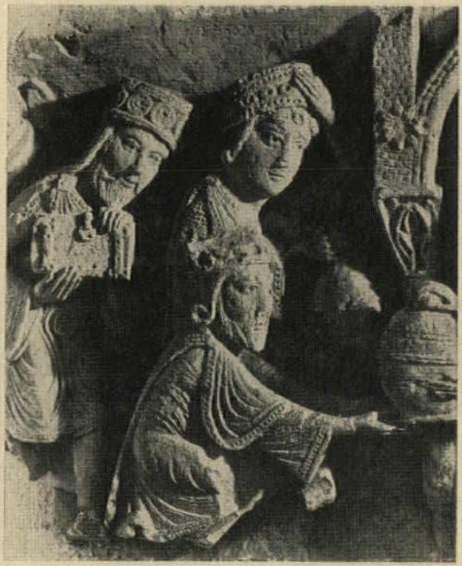

## Sullivan Redivivus (It Says Here)

Where stood Louis Sullivan's Garrick (*née* Schiller) Theater in Chicago now stands the Civic Center Parking Garage. The theater, you remember, was the subject of a heated controversy involving Le Corbusier, Mayor Richard Daley, and the Chicago Heritage Committee for the defense. Despite considerable public sentiment for saving the building, "economic" interests prevailed, and destruction took place. Evidently someone's conscience is acting up, for the garage was designed by Rosen & Horowitz with a concrete grille reminiscent of Sullivan's terra cotta traceries in the old theater. Not quite the same thing, boys.

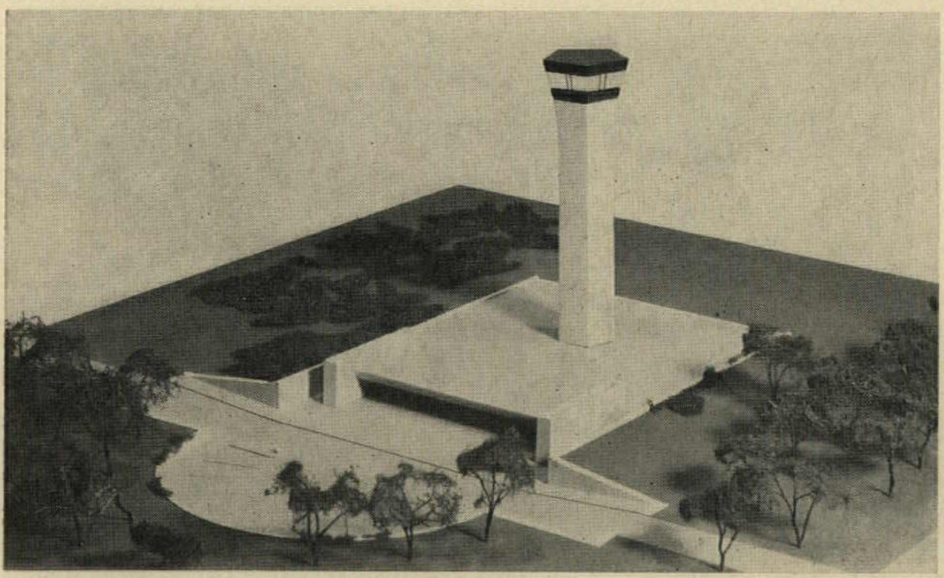


## "Gislebertus Hoc Fecit"

Such is the inscription on the Last Judgment scene on the typanum of



the Cathedral of St. Lazarus in Autun, France. Beginning December 12, the first major show of Gislebertus's great medieval sculptures goes on view (in original pieces and life-size photographs) at the M. H. de Young Memorial Museum in San Francisco. Although it had been known that the sculptor was responsible for the Last Judgment scene, it was not until 1949 that scholars began to attribute other works in the cathedral to him. With the recent publication of *Gislebertus, Sculptor of Autun* (Trianon Press and Orion Press), his full achievement can be measured as one of the world's sublime accomplishments in the blending of art and architecture.



## Pei Designs Prototype Air Control Tower

A pentagon-shaped structure that will be the model for all future Federal Aviation Agency air control towers has been designed by I.M. Pei & Associates. The Pei concept provides a free-standing tower to be separate from the terminal building or any other airport buildings. The base structure of the tower can be expanded laterally as air traffic grows, without disturbing the building's main function. Height of the tower will be from 50′ to 150′, depending on the requirements of individual airports; it will rise from a parking area depressed 4½′ from grade. To insure standardization throughout the country, tower cabs will be prefabricated.

## European Study Tour For Architects

Alitalia Airlines announces a unique 12-day study tour of Europe, designed especially for U.S. and Canadian architects, with visits to England, France, and Italy.

In each country the architects will inspect not only historical landmarks, but also many examples of European contemporary work. Included in the tour will be: Roehampton Estates and Bethnal Green low-cost housing developments; luxury housing near Green Park, Royal Festival Hall; new town of Harlow; UNESCO building; new city of Marly-Les-Grandes Terres; several buildings by Nervi (Palazzo delle Esposizioni, Italia '61 Pavilion, Palazzo delle Sport, etc.); the Olivetti complex; the Pirelli skyscraper; the Torre Velasca; Termini Station; Fiumicino airport; and many others.

In each city, Alitalia has arranged for famous local architects and archi-

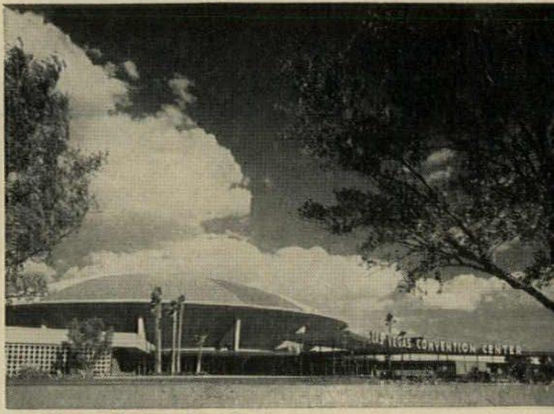
*(Continued on page 52)*

# Only Onan has solved

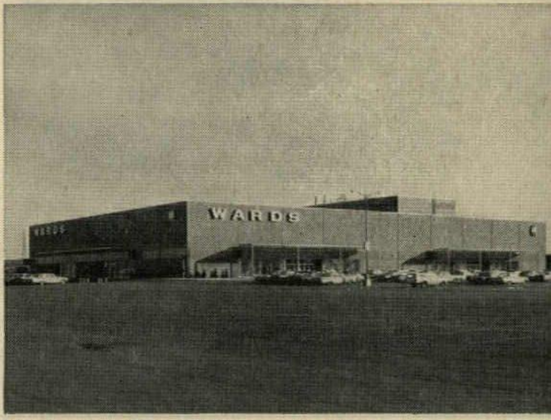
## HERE ARE A FEW OF THOUSANDS OF BUILDINGS THAT HAVE INSTALLED ONAN STANDBY POWER

Halle Bros. Department Stores
Middleburgh Heights, Ohio
Rothrock Bldg. • Erie, Pa.
Forbes & Wallace Dept. Store
Springfield, Mass.
Newspaper—La Presse
Montreal, Canada
Parking Ramp—Pigeon Hole Parking
Montreal, Canada
Phillip's Supermarket • Auburn, Mass.
Loveman's Dept. Store
Birmingham, Ala.
Hudson's Bay Company
Winnipeg, Canada
Newfoundland Radio Station VOCM
Newfoundland
Radio Station CJAD • Montreal, Canada
Tediskis Supermarket
Plymouth, Mass.
Chellels Supermarket
Barrington, R.I.
Howard Johnson Restaurant
Portsmouth, N.H.
Radio Station WEEL • Medford, Mass.
Birch Street Garage • Cranston, R.I.
Hugo Hillstrom Hatchery
Cokato, Minn.
Ford Motor Co.—Twin Cities
Assembly Plant • St. Paul, Minn.
University of Minnesota
Minneapolis, Minn.
Jesuitez Fathers Church
St. Jerome, Quebec
Pako Co. • Golden Valley, Minn.
Vanderbilt Univ. • Nashville, Tenn.
Sunbeam Farm Greenhouse
Westlake, Ohio
Lines Orchids, Inc.
Signal Mountain, Tenn.
Rhode Island Milk Assn. Bldg.
Warwich, R.I.
Beauchamp Dairies • Winter Haven, Fla.
Rider College • Lawrence, N.J.
Central Service Station • Editson, N.Y.
Gulf Power Co. • Fort Walton, Fla.
Bessemer Electric Service
Bessemer, Ala.
City of Nashville • Nashville, Tenn.
Water Resources Board (State of New Hampshire) • Manchester, N.H.
R E A (Clay Union Electric Corp.)
Vermillion, S. Dak.
Michigan Bell • Detroit, Mich.
Wisconsin Southern Gas Co., Inc.
Lake Geneva, Wisc.
California Interstate
Carson City, Nevada
Toll Road Service Area—Near Ohio Line,
Ohio Turnpike • Lorain, Ohio
KVOO-TV • Tulsa, Oklahoma
Troy Elementary School • Troy, Pa.
Chambersburg High School
Chambersburg, Pa.
Sioux Falls School (Axtell Park Jr. H.S.)
Sioux Falls, S. Dak.
St. Lukes Elementary School • Erie, Pa.
Pure Oil Station • Cable, Minn.
Wold Chamberlain Field
Minneapolis, Minn.
Police Bldg. • Lexington, Mass.
Barrington Town Hall • Barrington, R.I.
Radio Station WGL • Ft. Wayne, Indiana
Southeast Colorado Power Assn.
La Junta, Colo.
Radio Station WPBC
Minneapolis, Minn.
Radio Station WBRY • Waterbury, Conn.
Radio Station KSTL • St. Louis, Mo.
Fire Station • Minneapolis, Minn.
Sewage Disposal
Columbia Heights, Minn.

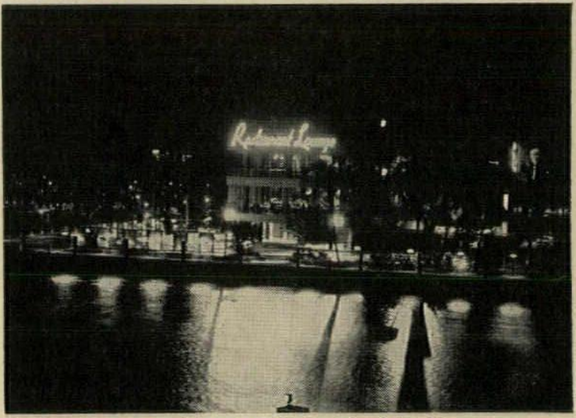
First Federal Savings & Loan, La Crosse, Wisc.


Las Vegas Convention Center

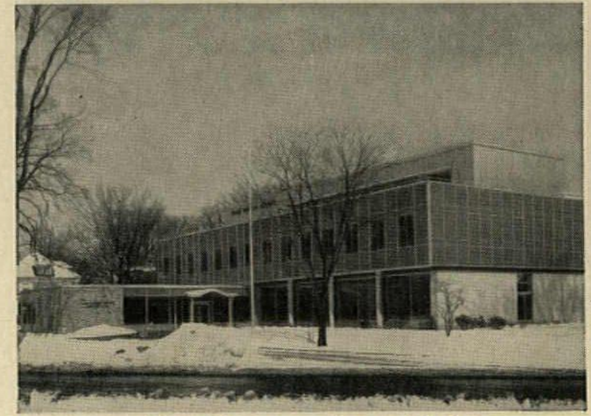

Central & Southern Florida Flood Control District



Montgomery Ward, Minneapolis, Minn.


Phillips Restaurant Lounge, Ft. Lauderdale, Fla.

Amityville Theatre, Amityville, L.I., N.Y.


Farm Bureau Mutual Insurance, Concord, N.H.


Shadowbrook Jesuit Noviate, Lenox, Mass.

# so many standby power problems

## *Call in your Onan representative for suggestions on type of fuel, cooling system and other options*

Yours is the essential judgement in determining the practicality of standby electric power in buildings you plan or modernize. When, in your judgement, standby is a consideration, we hope you'll call in your local Onan man early in your planning. Fulltime specialists in this field, you'll find their experience helpful in deciding how much critical power insurance is needed. Often, you'll be surprised *how little* emergency power they'll recommend.

An Onan specialist will work closely with you, without obligation, to determine *where* in the building a standby plant should be located, the most efficient cooling system, the most inexpensive fuel system, and all other options.

They'll help select—and supply—all necessary accessories including line transfer control and fuel lines and tanks. *Only Onan offers this complete one source responsibility.*

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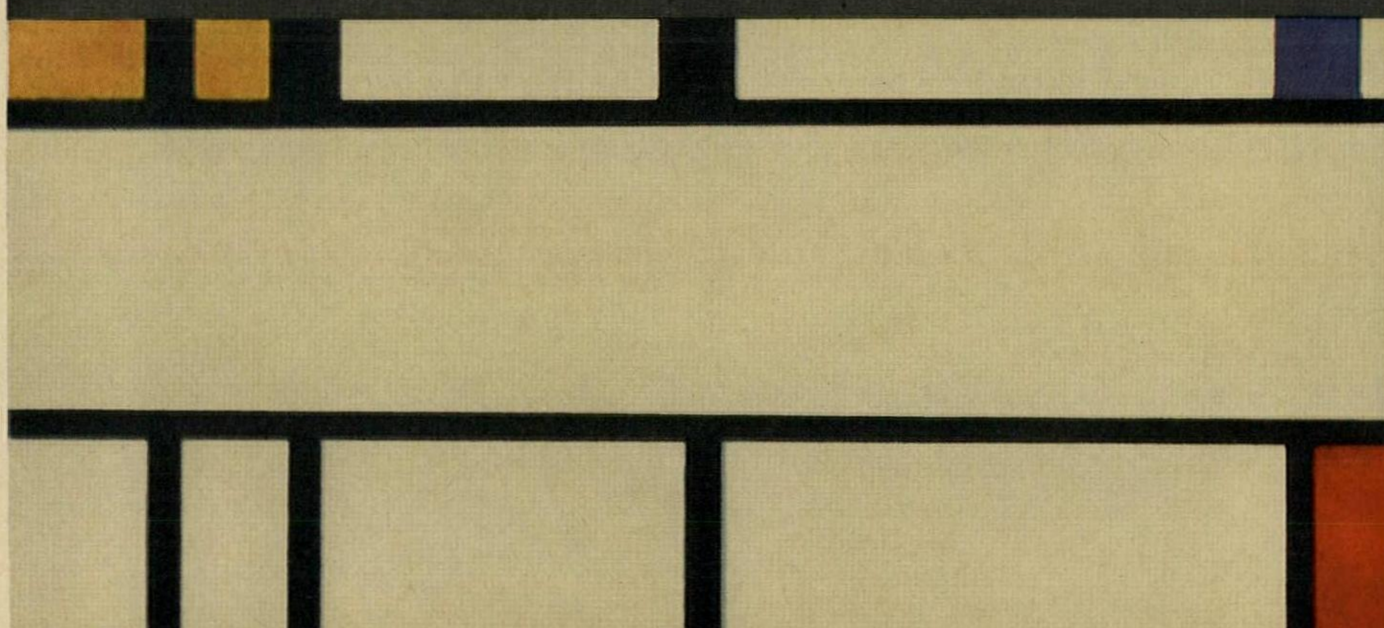
# Now...for enduring beauty in acoustical



ENDURING BEAUTY BY MONDRIAN. The painting above, by the famed Dutch artist (1872-1944), is titled "Composition in Red, Yellow And Blue." Some admirers of Mondrian have called him one of the fathers of modern architecture, since his juxtaposed space divisions and unique sense of asymmetry have greatly inspired modern architects. (Reproduction by arrangement with Sidney Janis Gallery, New York City.)

*(Continued from page 47)*
tectural editors to be guests of the group at lunches or dinners and to accompany the group during visits to the sites. There will also be an opportunity to tour the architects' offices. Among those who will meet with the group are: Gio Ponti, Bruno Zevi, Ernesto Rogers, Pier Luigi Nervi, architects of the London County Council, editors of the *Architectural Review, L'Architecture d'Aujourd'hui,* and *L'Architettura,* and several senior members of the Royal Institute of British Architects, the Conseil Superieur de l'Ordre des Architects, and the Ordine degli Architetti.

The tour, limited to 40 persons, will depart on March 9 from New York's Idlewild International Airport. The price of $698 includes DC-8 jet flight both ways, first-class hotel accommodations and meals, all the tours, local transportation, etc. The participants will have an option of returning with the group on March 21 or remaining in Europe on their own for an additional four-day period. Jan C. Rowan, AIA, managing editor of PROGRESSIVE ARCHITECTURE, will accompany the group throughout the trip. For further information contact Mr. James Branciforti, Alitalia Airlines, 666 Fifth Avenue, New York, N.Y., or any local Alitalia Airlines office.

## Snibbe Bids 42nd Street Return to Glory

Since before World War II, Manhattan's 42nd Street between Broadway and Eighth Avenue, formerly the heart of the legitimate theater district, has been a scrofulous stretch of run-down, second-run movie houses, dubious hotels, flea circuses, and cheap bars and eateries. The Broadway Association, the theater district's equivalent of the elegant Fifth Avenue Association to the east, has long been concerned about this cancer in its midst, and has finally had Architect Richard W. Snibbe come up with a redevelopment proposal.

Snibbe's plan calls for the rededication of the street as the center of the legitimate theater, and the restoring of its 10 auditoriums as platforms for the live drama. The stench, noise, and neon of present-day 42nd Street would be replaced by arcades through which theatergoers and shoppers could stroll, two second-story pedestrian overpasses, and a green center island in the street. Douglas Leigh, president of the association, stated that his organization would even support the erection of a monument to the owners of the theaters who co-operate with the plan.

## Multi-Domed Roof Designed for Field House

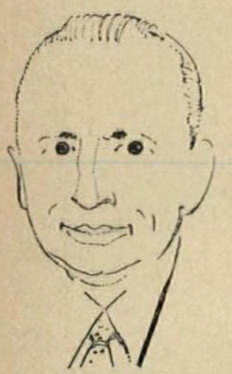
A roof of prestressed, thin-shell, liftslab, lightweight concrete will cover a school field house in Munster, Indiana. Designed by Architect Bachman & Betram, Hammond, Indiana, and Structural Engineer Kolbjorn, Saether & Associates, Chicago, the roof will be formed on a shaped hill of gravel covered with "Styrofoam" boards. Prestressing will be by means of 17 post-tensioned strands, each developing a force of 800,000 lb. Edges of the 360′ × 210′ roof will be scalloped and free of supporting beams. Span will be 60′ from column to column. Beneath the large dome will be the track and ball playing area; smaller domes will cover pool and dressing rooms.

## Johnson's Fair Pavilion; U.S. Design Set

Elements of the New York State pavilion for the World's Fair, designed by Philip Johnson Associates, will be a circular theater, three observation towers, and a "Tent of Tomorrow" containing the "County Fair of the Future." The "tent" will be a 350′ x 250′ ellipse ringed by 16 100′-tall conrete piers supporting a suspension roof of multicolored plastic. Towers will be 60′, 150′, and 200′ high, the two lowest having restaurants atop them, and the highest having an open observation platform. The project will make generous use of contemporary murals and sculpture.

In other New York World's Fair news, it was announced in Washington that the Department of Commerce, the General Services Administration, and the U.S. Commission to the Fair have agreed on one of Charles Luckman Associates' designs for the Federal pavilion. The selected design is of a simple, rectangular structure, open for a court in the center, and raised on columns. Use of related art and landscape architecture will be integral to the design, according to word from Luckman's office. Renderings and model photographs re expected to be released soon.

# AIA Chided on Transit Report



*By E. E. Halmos, Jr.*

The growing, nationwide debate over highways vs. rail rapid transit as a solution for urban traffic problems has earned architects a stern tongue-lashing.

The rebuke was delivered by Brig. Gen. Frederick J. Clarke, engineer-commissioner for the District of Columbia, and the object of his ire was a report on a forthcoming report by AIA's National Capital Committee. The report, according to Clarke and local newspaper accounts, will strongly favor rail transit over highways.

As a matter of fact, the report had not been completed as of early November, and its support of rail transit, according to AIA sources, is expected to be much milder than newspaper accounts had it: more in the nature of a warning that highways can tear apart the fabric of a city if not properly controlled and planned.

Said Clarke: "I am concerned that . . . the American Institute of Architects . . . will publish in January a 96-page document opposing highways and supporting mass transportation, and that further they will initiate a lobbying group to push the mass transportation solution.

"I do feel that groups such as [AIA] could render a much more constructive public service by using their many talents to advise and consult on the ways by which highways may be skillfully threaded into the fabric of the nation's capital."

The transit-highway debate has been focused in Washington on planned construction of numerous freeways and other highway facilities and their effect on the monumental character of the city. But it has been widespread enough throughout the nation to frighten highway advocates into considering a nationwide campaign to support their views.

Fuel was immediately added to the debate when a Presidential advisory committee in Washington came out with a report advocating bus lanes on freeways, rather than rail lines; and on almost the same day, the National Capital Transportation Agency brought out a report calling for an elaborate rail system.

## Mall, Memorial in Abeyance

Among the Washington projects that fell by the wayside as Congress finally got out of town in mid-October was the proposal to make Pennsylvania Avenue a "grand concourse" to link the Capitol and the White House.

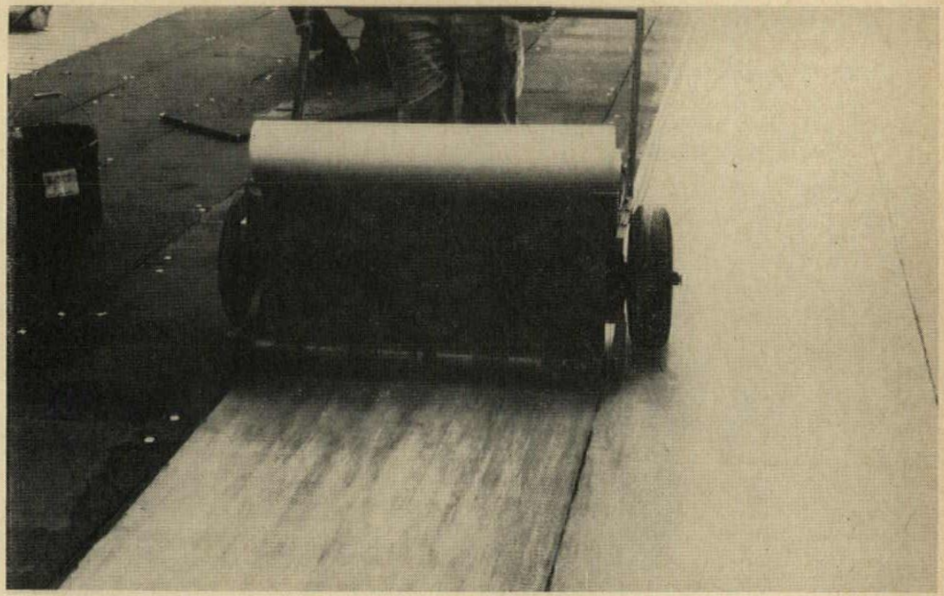
(Another proposal that went under was the controversial Franklin D. Roosevelt Memorial. Congress directed the Memorial Commission to take another look at plans—then forgot to appropriate enough money.)

Idea was to replace the present rag-tag assortment of restaurants, stores, warehouses, and the like that lines much of the avenue with a series of new Government buildings.

A fund of $110,000 had been requested to finance initial planning. But Congress never got around to finishing consideration of the idea.



For more information, turn to Reader Service card, circle No. 383



Johns-Manville has developed a single-specification, one-ply roofing that is highly adaptable, elastic, durable, lightweight, and easily applied with cold adhesives. The prefabricated roofing is virtually invulnerable to application errors and is easy to maintain. It is suitable for almost any type of service, any surface, any slope, any climate. Principal membrane of the "Last-O-Roof" system is an elastic and highly durable weathering face of plastic bonded to an asbestos support. This is called Last-O-Bestos. For flashings, another membrane is used—Last-O-Flash—in which a woven glass scrim is substituted for the asbestos support. For special fittings, an unsupported film is available. Adhesives are supplied in three grades —to be poured, brushed, or troweled. Johns-Manville, 22 E. 40 St., New York 16, N. Y.

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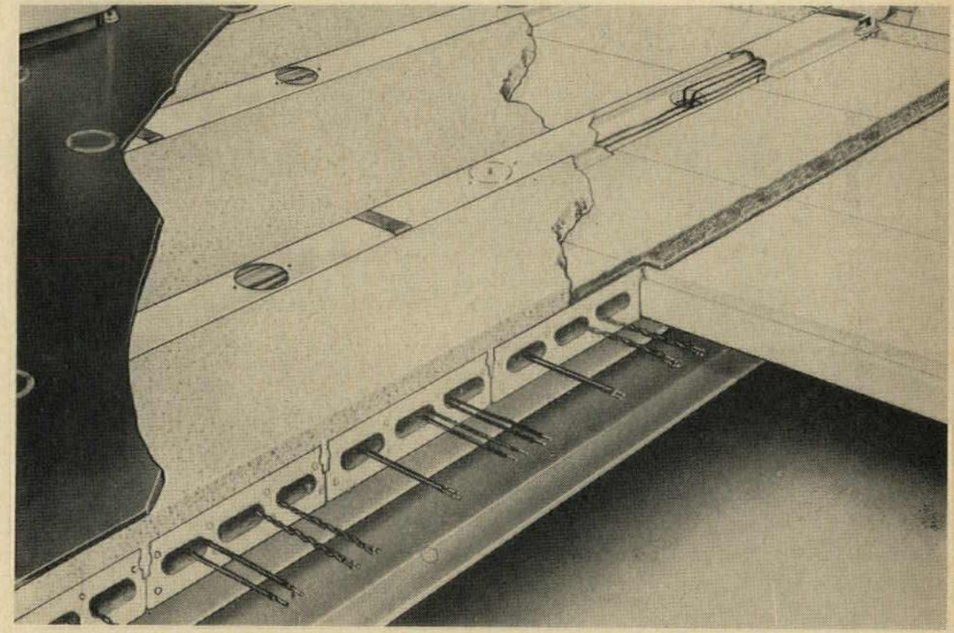
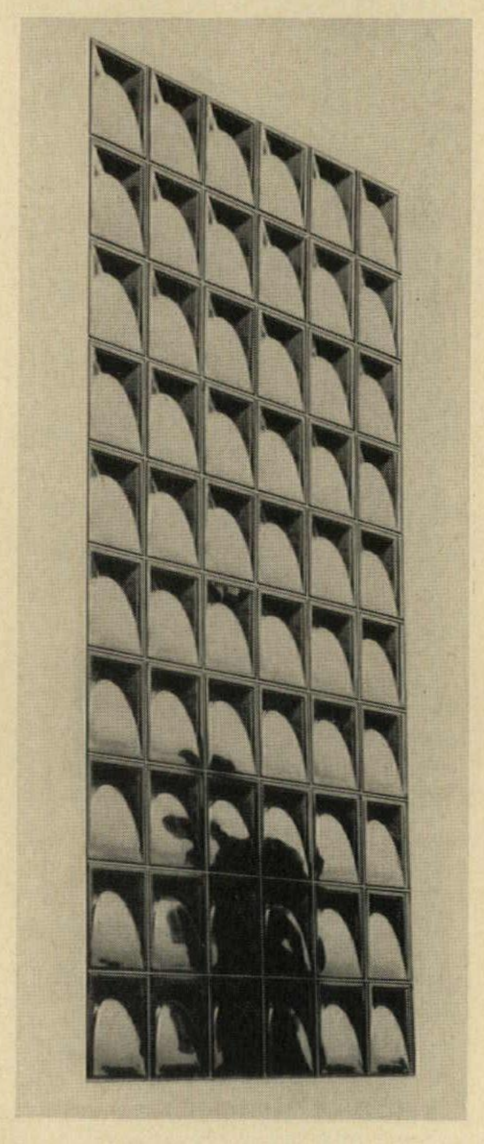


A new type of Flexicore slab is now available, produced in lengths up to 24' and designed for multiple-span use where it will have intermediate beam support. (Other Flexicore units are designed for long, clear spans.) Staggering of the end joints and welding the slabs to supporting beams creates continuity across the beams and contributes an over-all stiffness to the structure. The thinness of the slabs cuts wall height, and the hollow cells reduce dead weight. The Flexicore Co., 1932 E. Monument Ave., Dayton 1, Ohio.

*On Free Data Card, Circle* **101**



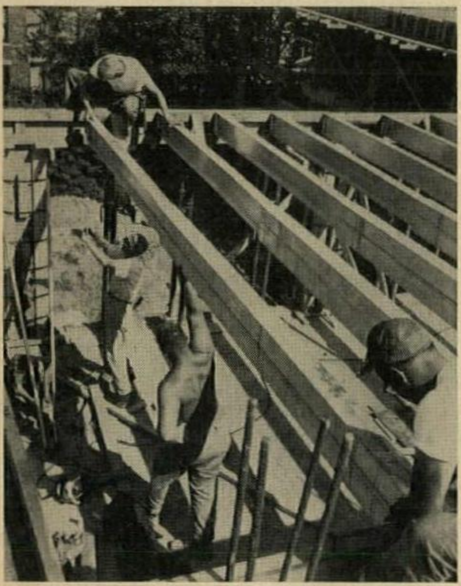
A new pattern and a new size have been added to the expanding O-I line. The new pattern, called "Crescent," has a sloping concave shape on the face of the block, and is the first in a series of "Contour" shapes to be introduced. The new size, 12" x 6", is the first new size in glass block to be marketed in recent years. It can be used with either 8" or 12" blocks, suggest the manufacturers, for interesting horizontal and vertical patterns. The new products are available in "Royal Gray" as well as "Shade Green" and white; prismatic construction provides for light transmission but eliminates all vision and curtails the need for shading devices. Kimble Glass Co., Subsidiary of Owens-Illinois, Ohio Bank Building, Toledo 1, Ohio.

*On Free Data Card, Circle* **102**

## Aluminum Sheet Finished with Tedlar

Reynolds has announced availability of aluminum sheet finished with DuPont's new "Tedlar" film, and thus becomes the first primary aluminum produced to offer coil and cut-to-length sheet prefinished with the tough plastic film. Tedlar is not a liquid coating but a finished film in itself, to be laminated to the material in question during the manufacturing process [see p. 87, SEPTEMBER 1962 P/A]. According to tests by DuPont, the film has proved to be chemically inert, inherently weatherable, readily formed, and extremely long-lasting. It is available in several colors; the prefinished aluminum sheet is available in a variety of alloys, lengths, and gages. Reynolds Metals Co., 19 E. 47 St., New York 17, N. Y.

*On Free Data Card, Circle* **103**



## Aluminum Shoring Beam Saves up to 40%

Aluminum's light weight-to-strength ratio is providing contractors up to 40% savings on framing all types of concrete slabs, through use of a new adjustable shoring beam. Material costs are lowered, and the time for handling, erecting, and stripping is reduced drastically. Called "Alcoa *Hico Beam" (produced by Alcoa and marketed by Hico), it is currently being used on a number of projects throughout the country. The device consists of an I-beam telescoped inside a box section. It is easily adjusted to fit the required span. Three different sizes are available, to bridge spans from 6′ to 17′. Hico Corp. of America, 30 Rockefeller Plaza, New York 20, N. Y.

*On Free Data Card, Circle* **104**

## New Plastic–Phenoxy

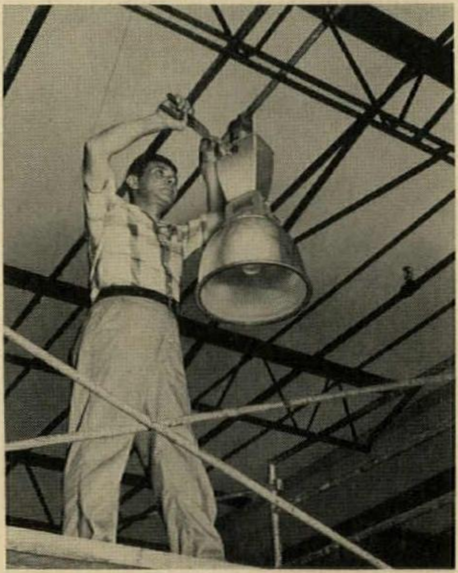
A new plastic called "Bakelite phenoxy" has been developed by Union Carbide. Although phenoxy is classified as a thermoplastic, it presents some properties of the thermosets, as well as some not previously known in either type. (Thermoplastics soften upon heating, become solid upon cooling; while thermosets cannot be resoftened by heating. Polyethylene and polystyrene are examples of thermoplastics; phenolics and epoxies are thermosets.) The new material is expected to have considerable impact in many industries and to open up entirely new fabrication techniques. As an adhesive, phenoxy forms such a strong bond that it can adhere wood or steel parts together for structural applications. Other forms of phenoxy can be used as tough protective coatings; some can be molded into rigid shapes and others extruded into strong sheets and contours. Union Carbide Plastics Co., Div. of Union Carbide Corp., 270 Park Ave., New York 17, N. Y.

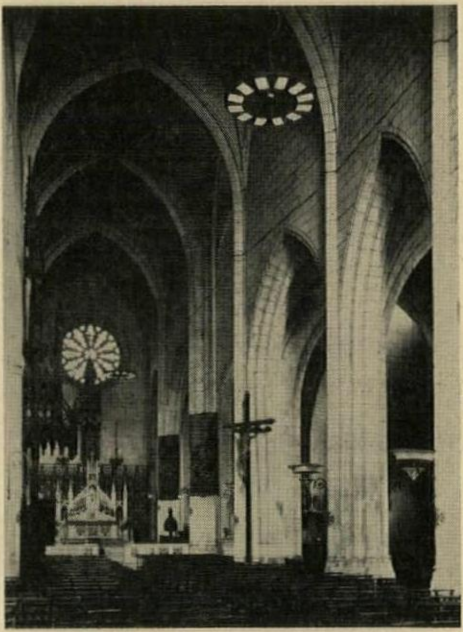
*On Free Data Card, Circle* **105**

## Mercury Fixture with Built-in Ballast

Holophane's new "Prismpack" is the latest in a series of improvements that makes mercury an efficient and economical way to light industrial spaces. Prismpack combines a mercury lighting fixture and ballast into one unit; formerly, ballast and fixture had to be installed separately and wired together in the field. Other factors which contribute to the expanding use of mercury lighting are: (1) improved color, now very close to that of natural daylight; (2) brightness control at low mounting heights, with a deep-cupped prismatic reflector that shields the lamp from direct view; (3) long lamp life of 20,000 hours, compared to 12,000 for fluorescent; (4) lowest first cost and operating cost. The Prismpack has a choice of two reflectors, for widespread distribution or narrower downlight. There is also a choice of models for several mounting and connecting methods. Holophane Co., Inc., 1120 Avenue of the Americas, New York 36, N. Y.

*On Free Data Card, Circle* **106**





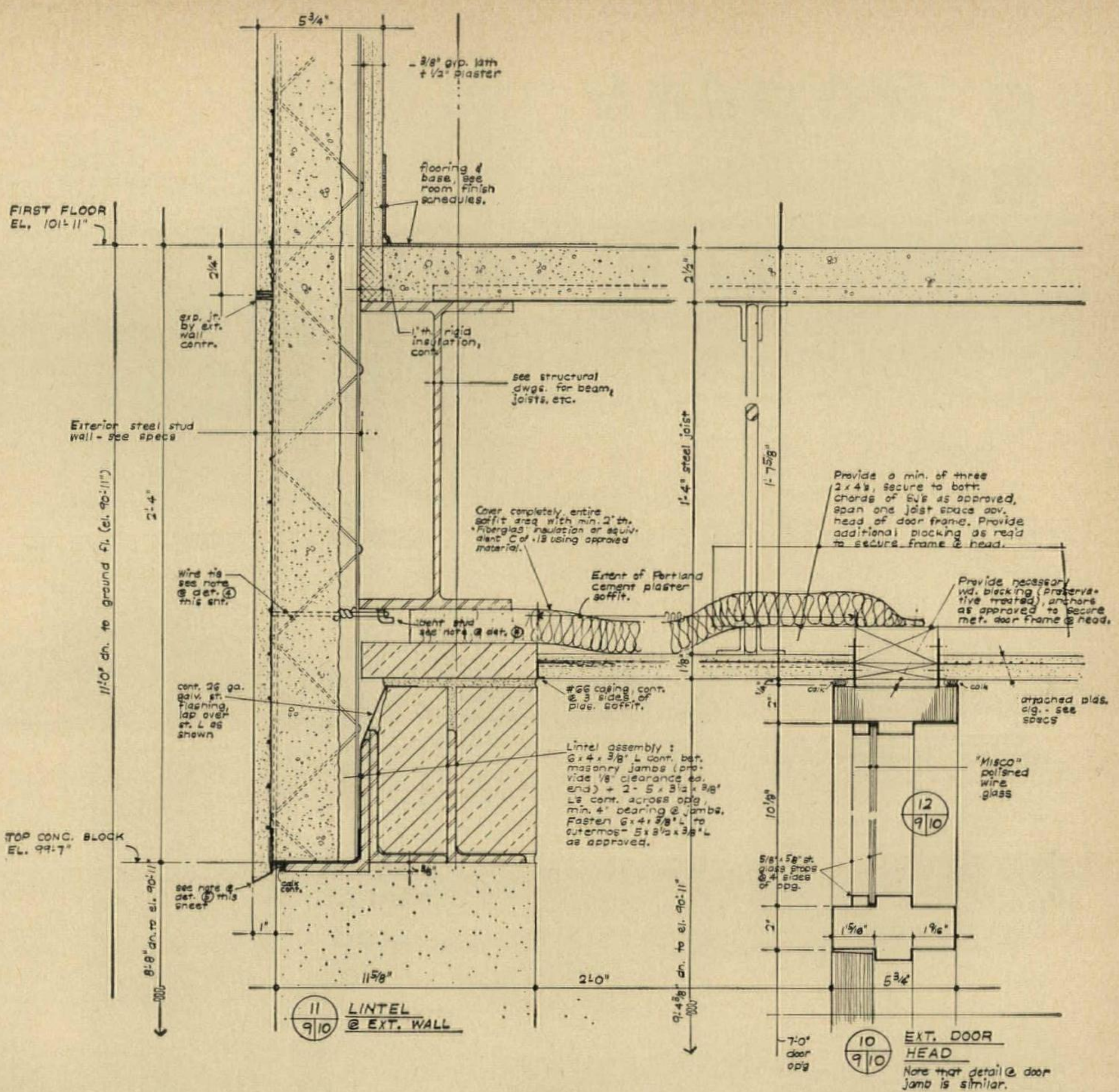
## Space-Heating Efficiency

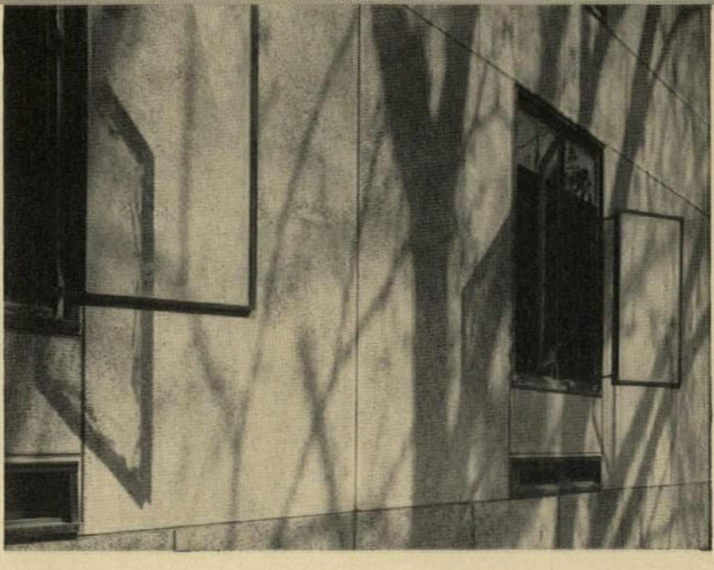
A unique infra-red generator, billed as "the world's most efficient space heater," has been introduced. Developed in France for industrial and commercial use in the United States and Canada, the gas-fired heater is 15% more efficient than existing infra-red units, and 50% more efficient than conventional heating systems. The new unit—in effect a ray gun for heat—bases its increased efficiency on a unique combination of a steel mesh grid, a serrated ceramic combustion surface, and a new venturi mixing tube. It may be installed without additional reflectors or other equipment, thus reducing costs by as much as 25%. As shown, 12 heating units are grouped into each of two "chandeliers." Solaronics, Inc., 6th and Dinwiddie Sts., Richmond 24, Va.

*On Free Data Card, Circle* **107**

For more information, turn to Reader Service card, circle No. 349

For more information, turn to Reader Service card, circle No. 343



Eureka Hospital addition,
Eureka, Illinois

Architect: Evan A. Thompson, A.I.A., of
Foley / Hackler / Thompson / Lee, Peoria, Ill.

Plaster Development: L. H. Hobson,
*Plaster Development Center*, Chicago, Ill.

Mechanical Engineer: S. Alan Baird, *Peoria, Ill.*

Structural Engineer: Edwin A. Lampitt, *Peoria, Ill.*

General Contractor:
O. Frank Heinz Construction Co., Inc., Peoria, Illinois

Plastering Contractor:
J. J. Kinsella & Son, Peoria, Ill.

(Note: Construction costs in Eureka, Ill., are approximately the same as those in Chicago, a high-cost construction area.)

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# AIR/TEMPERATURE

## New Formula for Radiant Heating

*Technical Publication TR-103* from the manufacturers of "Ray-Jet" radiant heaters involves a new way to estimate requirements for infrared radiant heating. The new formula is based on the assumption that heat input must equal heat loss in order to maintain a given temperature (regular procedure assumes that less heat can be put into a building than is lost). The 6-page folder has charts for determining requirements when heating an entire building, a specific zone within a building, and a single spot for an isolated employee. General Products are manufacturers of a gas-fired radiant-heating unit, as well as a unique oil-fired unit which is reported to save up to 35% in heating costs. Dept. of Engineering, General Products Co., Inc., P.O. Box 887, Fredericksburg, Va.

*On Free Data Card, Circle* **200**

## Wall Furnace for Schools, Apartments

Temco's new 20-page catalog on gas heating equipment presents a wide range of compact heaters for many uses. Of special interest is the "Pre-Vent" wall furnace, which is designed for schools, apartments, stores, motels. It is a counterflow forced-air system, with two-speed fan and adjustable automatic control. The pre-engineered telescoping vent of Pre-Vent permits easy installation, requiring no chimney, flue, or additional venting. A standard feature of Temco heating equipment is the "Ceramiclad" heat exchanger, with instant heat response and lifetime finish. All models in the catalog are presented with photos, installation sketches, and full specifications. Temco, Inc., Nashville 9, Tenn.

*On Free Data Card, Circle* **201**

## First Fully Hermetic Absorption Packages

Carrier, pioneer in absorption refrigeration, announces its new "16H" models as "the first completely hermetic absorption packages." The units use low-pressure steam, high-temperature hot water, or other hot liquids. Because they are completely hermetic, exceptional reliability is assured, and operating costs and maintenance problems are reduced considerably. Because they are completely automatic, no full-time attendant is needed. And because they are quiet, compact, and virtually vibration-free, they can be used without heavy bracing or support even in rooftop installations. The "Automatic Hermetic Absorption Liquid Chiller," as described in 4-page brochure, is available in capacities from 52 to 1000 tons. Carrier Air Conditioning Co., Syracuse 1, N.Y.

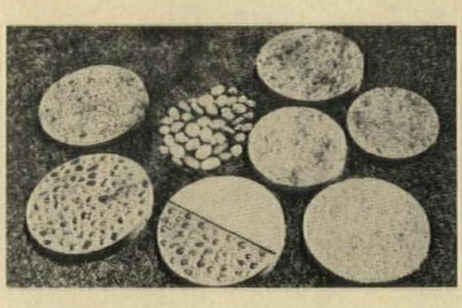
*On Free Data Card, Circle* **202**

# CONSTRUCTION

## Calcium Chloride Data

Third edition of *Calcium Chloride in Concrete*, 58 pages, gives basic data on the major effects of calcium chloride on concrete—initial and final set, early strength, and cold-weather protection. Technical information is also provided on other important effects—ultimate strength, air-entrainment, and calcium chloride vs. extra cement. Specific recommendations are outlined. Calcium Chloride Institute, 909 Ring Bldg., Washington 6. D.C.

*On Free Data Card, Circle* **203**



## Exposed Aggregate

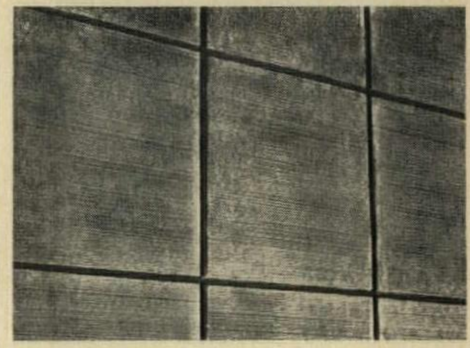
Latest information bulletin from PCA is a 4-page discussion entitled *Exposed Aggregate Finishes for Flat Slabs.* Photographs illustrate various construction procedures; text presents a brief guide to selecting the aggregate, preparing the slab, placing and embedding the aggregate, exposing, and curing. Portland Cement Assn., 33 W. Grand Ave., Chicago 10, Ill.

*On Free Data Card, Circle* **204**

## Trouble-Free Fascia

A patent-pending water dam and fascia system that will prevent leaks and drippage is described in 4-page bulletin. The system (which consists of a free-floating extruded-aluminum fascia (plus gravel stop and water dam) is leak-proof, prevents tar drippage on walls, prevents water run-over at eaves, is easily installed after all roofing construction and tarring has been completed, is economical, and has concealed cover plates for better appearance. In addition to description and specs, two pages of half-size details are provided for easy tracing. W. P. Hickman Co., 23100 Dequindre, Warren, Mich.

*On Free Data Card, Circle* **205**

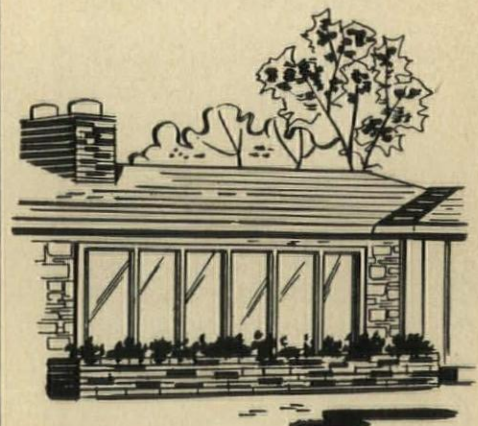


## New Methods in Forming

Symons' new 28 page catalog shows the features of various new methods and products in forming. Among the new products are one-piece connecting hardware, "Steel-Ply" forms now available with attached hardware, and a new rustication strip that also serves to form control joints. The complete line of forms and accessories for poured-in-place exposed concrete is illustrated in actual job histories. Symons Manufacturing Co., 200 E. Touhy Ave., Des Plaines, Ill.

*On Free Data Card, Circle* **206**

# DOORS/WINDOWS



## New Casement Windows

Folder on Woodco casement windows describes the many improved features of these new units. New concealed extension hinges give finer exterior sightlines; insulating glass is available in

*Continued on page 64*

*Continued from page 63*

all sash in one-light layouts; all-aluminum screens are standard on all venting sash; and wood is treated to reduce shrinking and swelling to a minimum. Folder, 6 pages, illustrates stock sizes and opening dimensions, also gives construction and installation details. Price list is included. Woodco Corp., Paterson Plank Rd. & 34th, North Bergen, N. J.

*On Free Data Card, Circle* **207**

## Glass Glossary

American-Saint Gobain has published a 7-page *Glossary of Glass Terms* to help the architect and designer in a number of ways—to give him a greater understanding of the unique properties of glass, to facilitate communication between him and the glass manufacturer, and to provide a background that will enable him to select the proper glass for a specific application. The glossary was derived from several sources: basic glass texts, Federal specs, ASTM, national associations, and the staff of A-SG. American-Saint Gobain Corp., Kingsport, Tenn.

*On Free Data Card, Circle* **208**

# ELECTRICAL EQUIPMENT

## Polarized Light Is Defined

The benefits of polarizing light panels are defined in new brochure as: (1) substantial reduction of reflected glare; (2) better task contrast; (3) truer color definition; and (4) pleasantly diffused illumination. Entitled *Polarizing Light Panels*, the 8-page brochure gives description of polarization, also shows recommended uses of polarized light. Photometric data and other information on "Fiberglas 45" panels are included. These panels are made for Day-Brite by the Owens-Corning Fiberglas Corp. Day-Brite Lighting. Inc., 6261 N. Broadway, St. Louis 15, Mo.

*On Free Data Card, Circle* **209**

## Multifaceted Collection

Lightolier's *Portfolio of Custom Design Lighting Coordinates*, 16 pages, illustrates some 80 selections from their pendant collection plus the spreders that enable the designer to make a choice according to precise needs of space and style. Completely flexible,

*Continued on page 69*

*From today's first family of construction adhesives...*

# JACKKNIFE PROOF!

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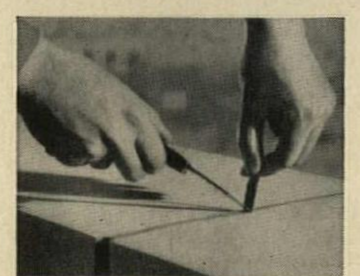

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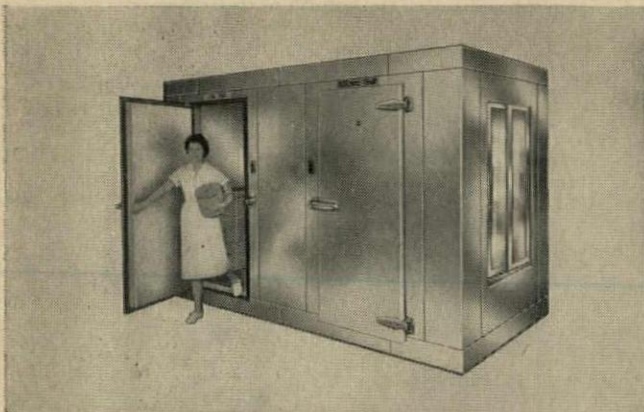

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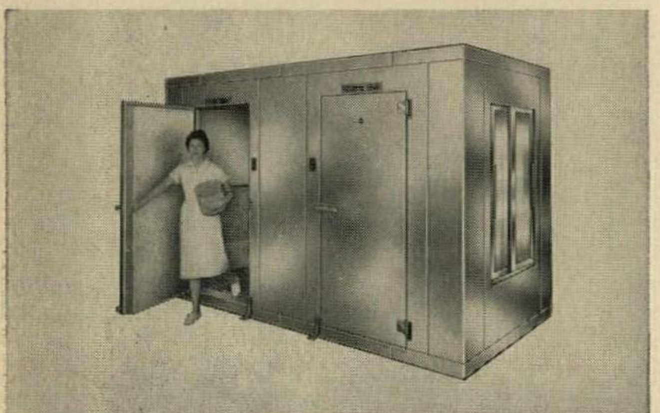

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Your choice of Aluminum or Galvanized as standard finishes. Sections have Bally's Speed-Lok for quick and accurate assembly. Easy to add sections to increase size . . . easy to disassemble for relocation. Hermetically sealed refrigeration systems eliminate installation problems . . . reduce service costs.

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# 3 NEW
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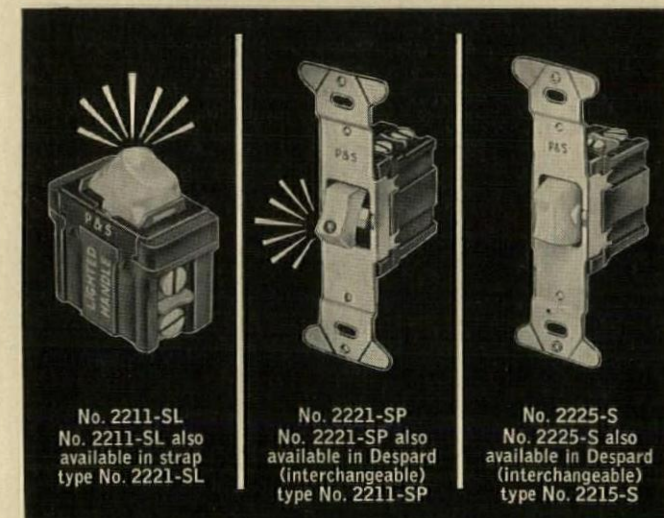


1

### LIGHTED HANDLE ROCKER-GLO

Pinpoints switch location in darkened rooms or hallways. Tiny, long-life neon lamp softly glows in OFF position only. Single pole or three-way. Rating: 15 Amperes, 120 Volts, A.C.

2

### PILOT LIGHT HANDLE ROCKER-GLO

Instantly shows when appliances or lights are on. Tiny red plastic jewel in rocker button lights in ON position only. Single pole only. Rating: 15 Amperes, 120 Volts, A.C.

3

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Momentary contact, center "off" switch. Designed especially for low voltage remote control applications — controlling large banks of lighting, operating stage curtains, etc. Single pole, double throw. Rating: 10 Amperes, 48 Volts, A.C.

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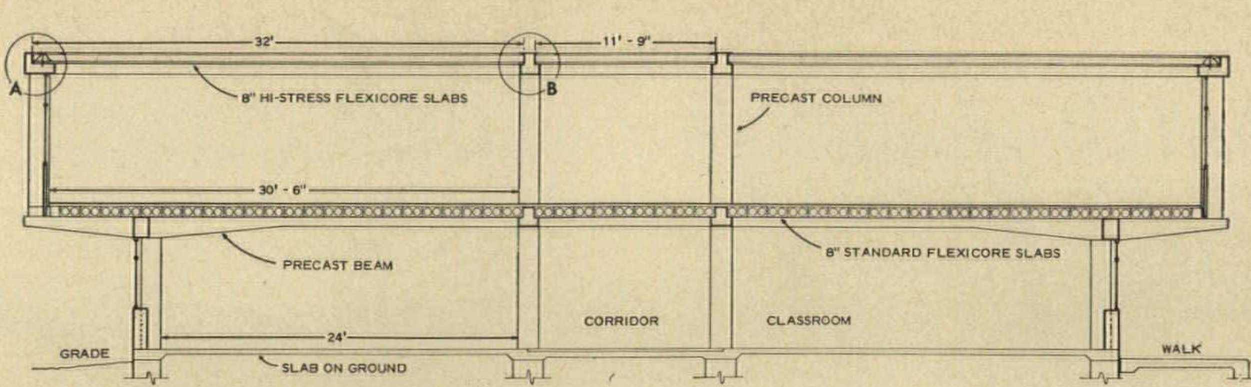
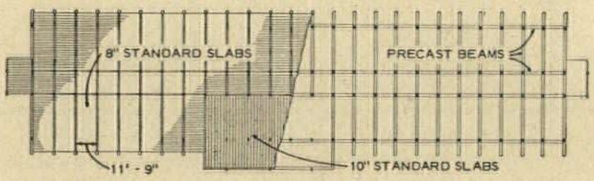
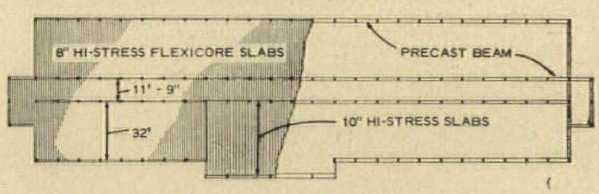



**LATERAL SECTION.** Hi-Stress Flexicore slabs, 32' in length, are used for long-span ceilings on second floor of classroom wing of Rutherford B. Hayes High School, Delaware, Ohio. The entire frame is precast concrete columns and beams.

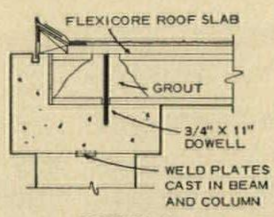
# New Hi-Stress Flexicore Slabs Give Improved Performance On 32-Foot Roof Span



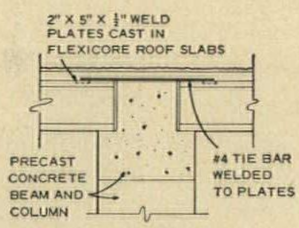

**SECOND FLOOR FRAMING, CLASSROOM WING.** Lateral precast beams serve as bearing for standard Flexicore slabs. Both 8" and 10" slabs used.




**ROOF FRAMING, CLASSROOM WING.** Longitudinal precast beams support Hi-Stress roof slabs which are tied to beams to provide lateral bracing.




**DETAIL A**



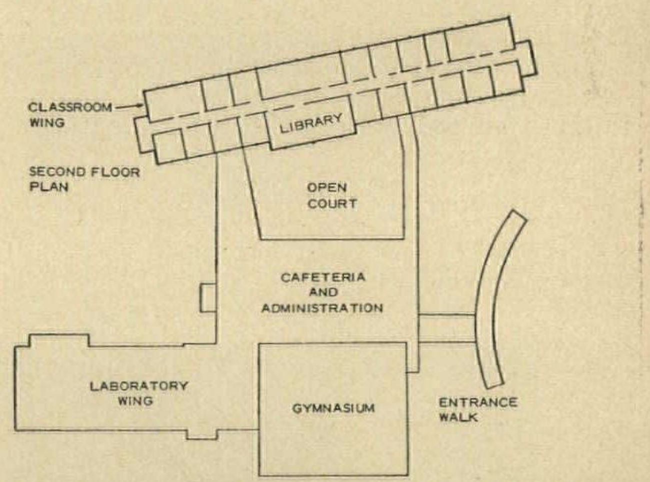

**DETAIL B**

New Hi-Stress Flexicore slabs use high-tensile 7-wire stress-relieved strands to produce fully prestressed units. These slabs provide long, clear spans, high load carrying capacity and give improved performance.

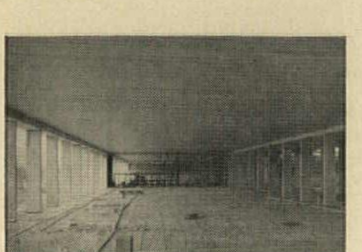
The steel strands are accurately pretensioned, before the slabs are cast, and introduce a controlled camber into the units.

In this project, Hi-Stress Flexicore slabs were used for 32-foot roof spans, and 12 months after erection, show excellent performance. Standard Flexicore units (with mildly pre-tensioned reinforcing rods) were used for floors at second story.

Ask for "Flexicore Facts 96" on this project and "Hi-Stress Flexicore" Bulletins. Write The Flexicore Co., Inc., Dayton 1, Ohio, the Flexicore Manufacturers Association, 297 South High Street, Columbus 15, Ohio, or look under "Flexicore" in the white pages of your telephone book.



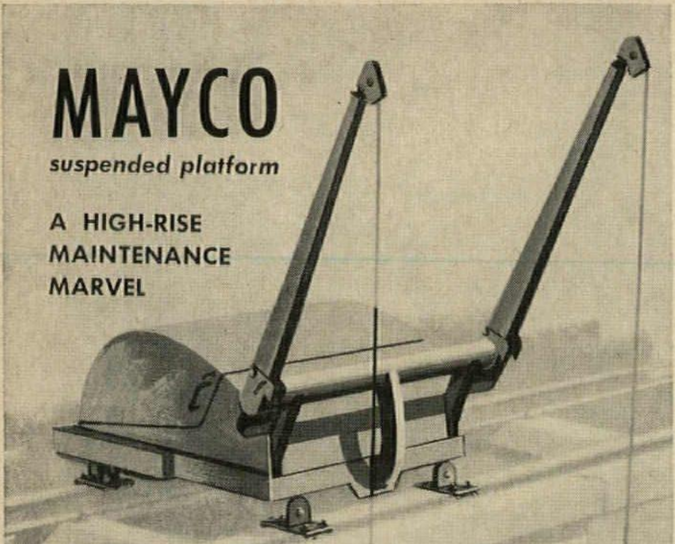

**RUTHERFORD B. HAYES HIGH SCHOOL,** Delaware, Ohio has frame of precast concrete columns and beams, and floors and roofs of Flexicore precast decks. Kline & Swartz of Chillicothe, Ohio are the architects.



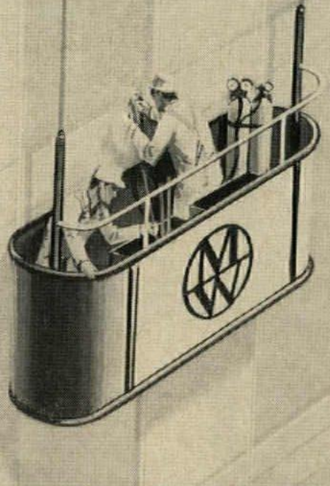
Long span Hi-Stress ceiling before partitions installed.

Lateral beams at second floor cantilever 7'-3".

**flexicore®**
PRECAST CONCRETE DECKS





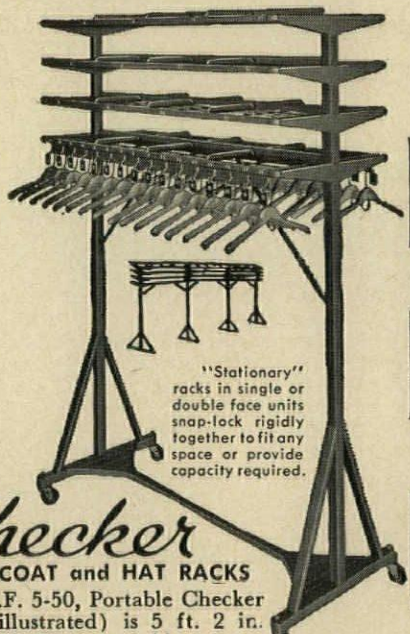






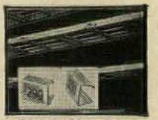
Spun-Tier
Patent Pending



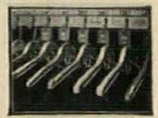



"Stationary" racks in single or double face units snap-lock rigidly together to fit any space or provide capacity required.

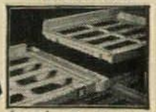










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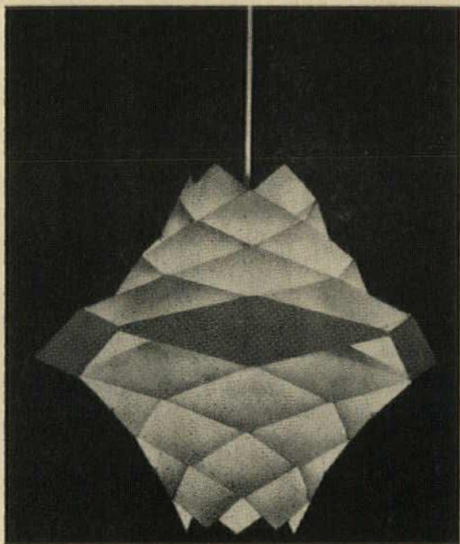

these components can be arranged in an endless variety of designs—suspended, surface-mounted, or wall-bracketed. Of note is the new "Symfoni" collection, its multifaceted structure reflecting the light from plane to plane, always shielding the bulbs from view. Symfoni is available in a broad range of handsome silhouettes. The pendant is a one-piece steel construction with matte-white finish. Publicity Dept., Lightolier, 11 E 36th St., New York 16, N. Y.

*On Free Data Card, Circle* **210**

## Line of Fixtures Is Expanded

New 44-page catalog presents Markstone's expanded line of incandescent and fluorescent fixtures designed for residential and commercial uses. A number of design innovations appear in this line. Newest item is the all-in-one "Roundel," a recent improvement on the patented "Twist-N-Turn" recessed mounting; Roundel is available with 29 different trims. Other items in the catalog are new "Di-A-Lum" wall brackets and ceiling fixtures in tapered, spherical, and acorn shapes, also numerous recessed, pendant, and surface-mounted fixtures. Markstone Manufacturing Co., 1531 N. Kingsbury, Chicago 22, Ill.

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**PROGRESSIVE ARCHITECTURE**
**NEWS REPORT**

REINHOLD PUBLISHING CORPORATION
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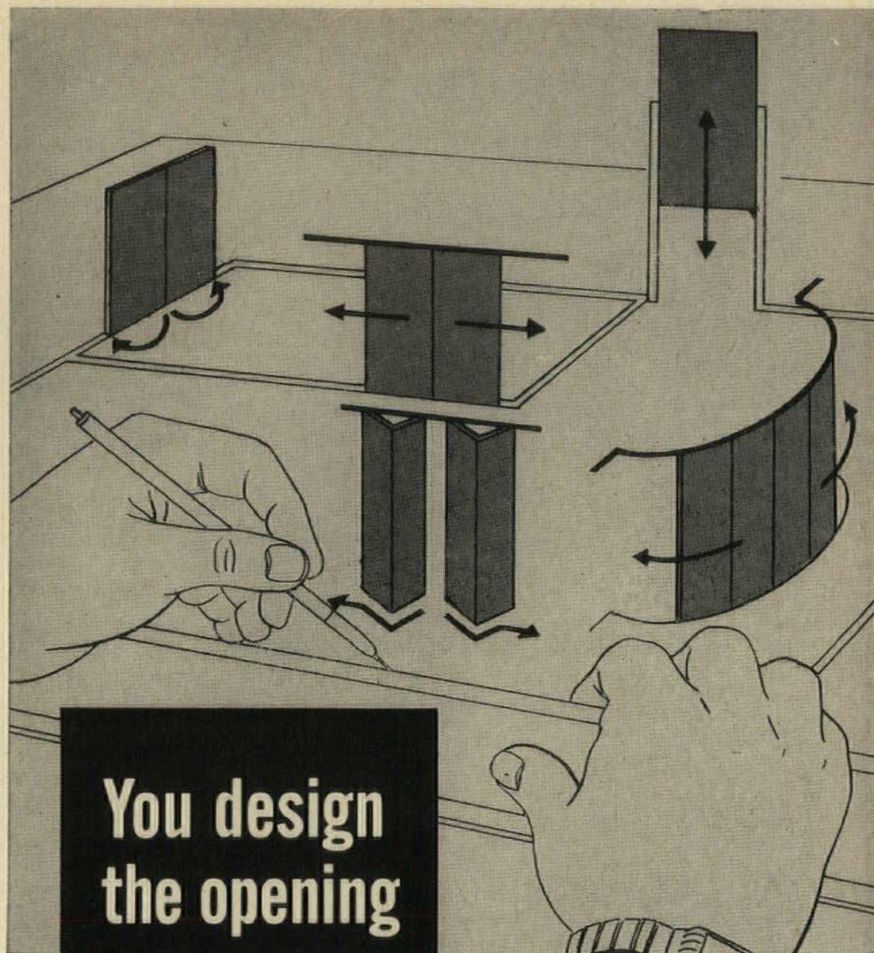
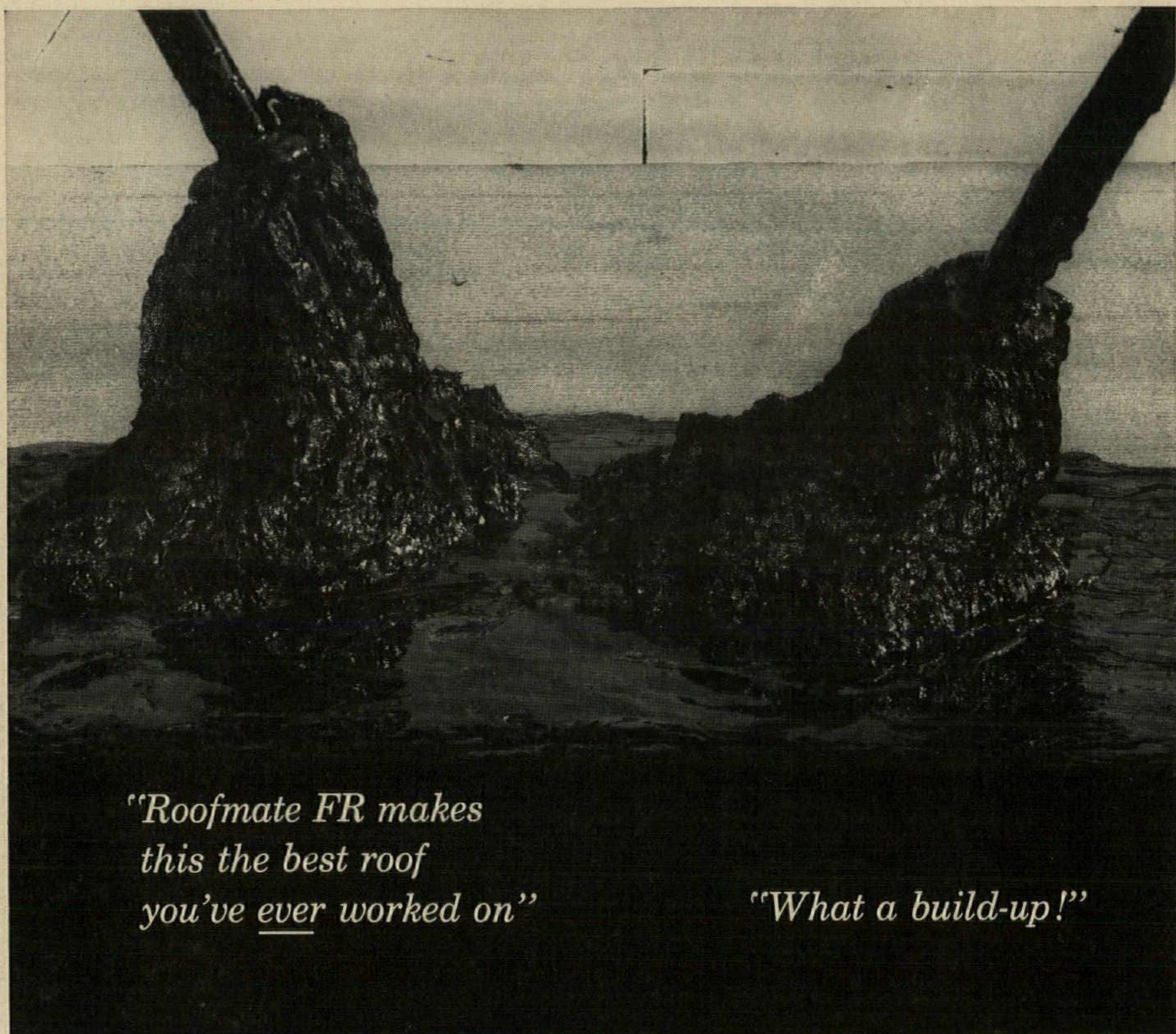





Matter of fact, this *is* the best insulated roof yet—right down where it counts! Based on Roofmate® FR roofing insulation, a new system builds up this superior roof *faster*.

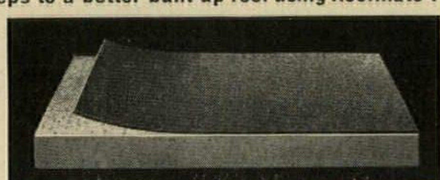
Roofmate FR flame-retardant polystyrene foam board has a high-density skin, good impact resistance and compressive strength. It can even span the flutes in a metal deck. Closed-celled and nonabsorbent, Roofmate FR is unaffected by water. So it has permanently high insulating value.

When you specify Roofmate FR, the roofer still works with conventional materials (see steps below). Using coated base sheets eliminates the disadvantages of unprotected moisture absorbent felts for the first ply and prevents wrinkling at the insulation joints. Roofmate FR is used as the vapor barrier. These roofs are bondable, of course.

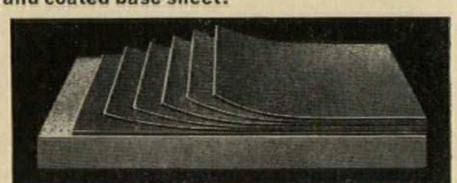
Extremely lightweight Roofmate FR saves preparation time and trouble, too. It comes in thicknesses for most roofing applications. To get more data and specifications, write us in Midland, c/o Plastics Sales Dept. 1307EB12.

**Here are the simple steps to a better built-up roof using Roofmate FR and coated base sheet:**

1. Roofmate FR is laid on concrete, gypsum, wood or metal structural deck over strip-mopped coat of hot asphalt.



2. It is covered with an approved coated base sheet. Next layer of hot asphalt bonds base sheet to Roofmate FR.

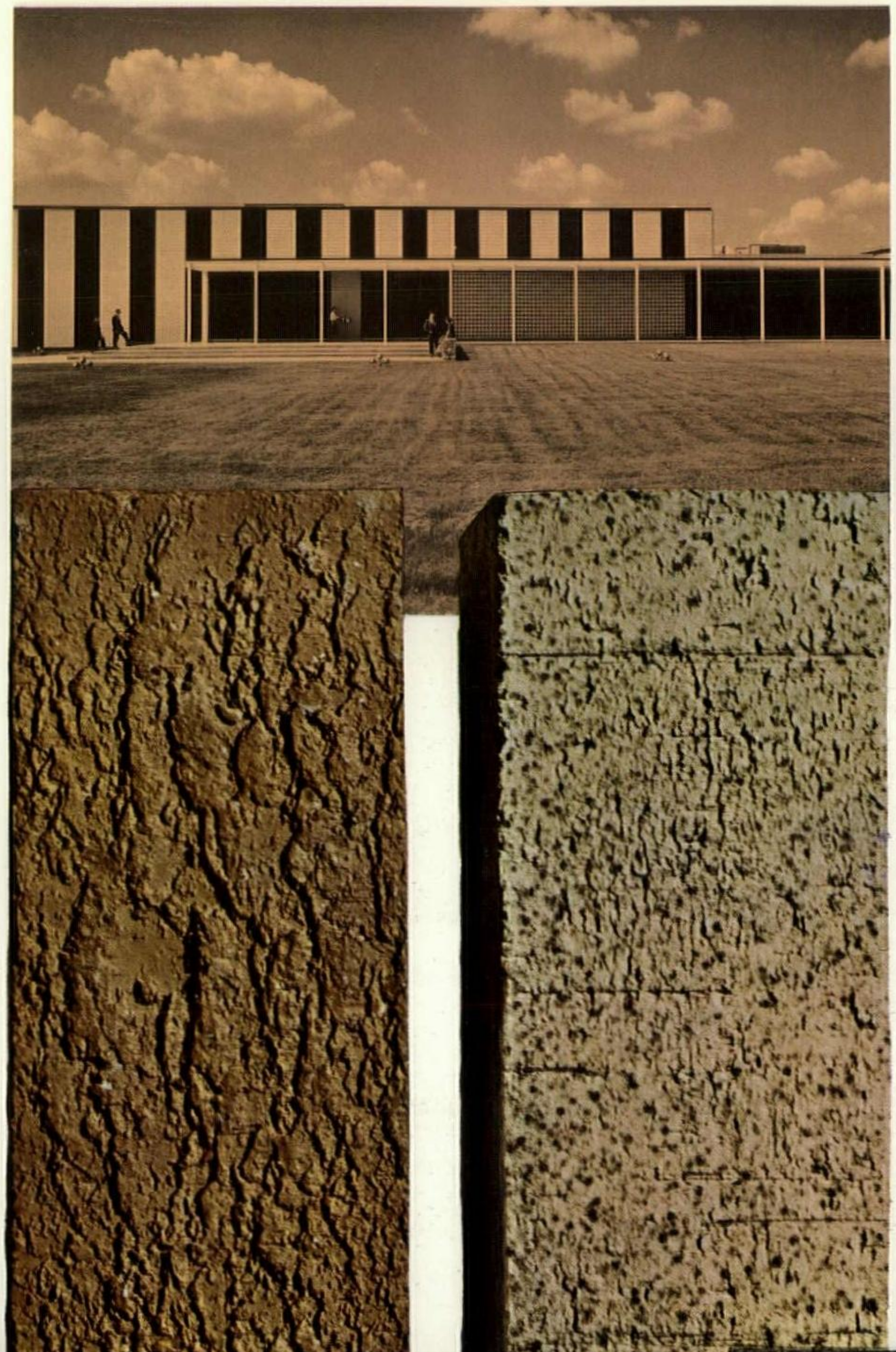


3. Roof is completed by building up standard roofing felts in conventional manner, either by hand or by machine.

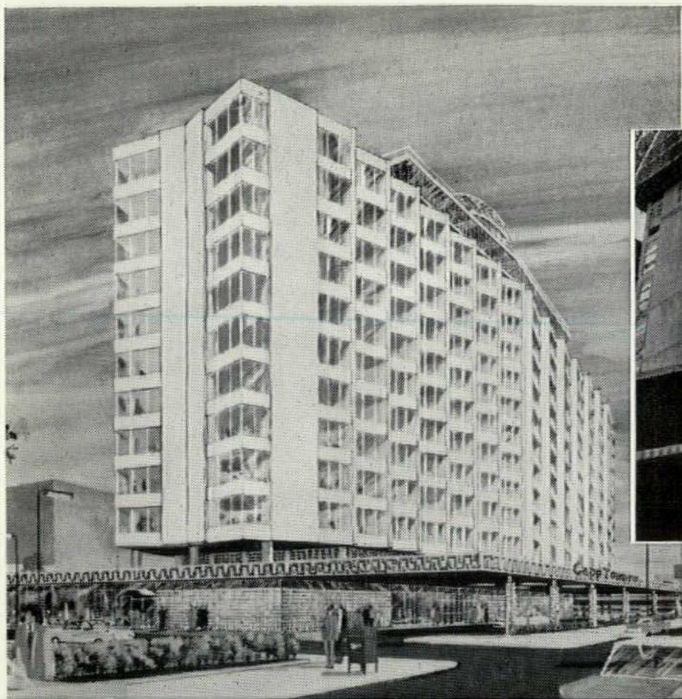
**THE DOW CHEMICAL COMPANY** DOW Midland, Michigan



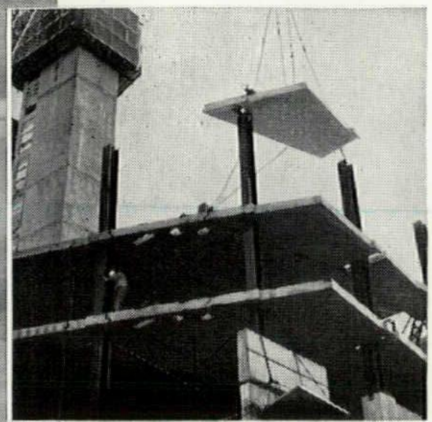
For more information, turn to Reader Service card, circle No. 328







This rendering shows the architectural beauty of the new Capp Towers Motor Hotel soon to be completed in downtown Minneapolis. Exterior curtain walls are precast concrete panels with embedded rustic stone and marble chips.

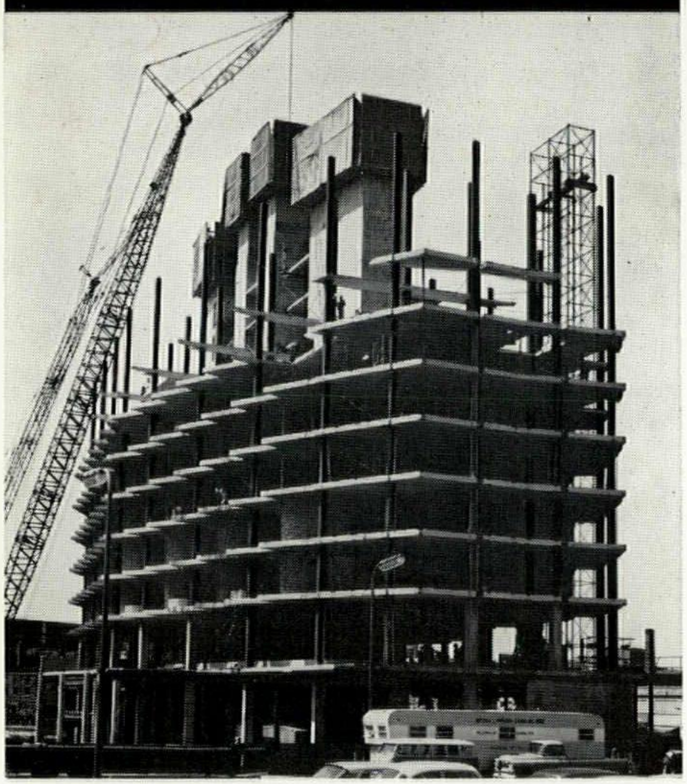


Here, a corner beam is raised for positioning on the column. Note the shiplap bearing detail between precast beams and prestressed slabs. Other precast and prestressed structural units required elsewhere in this project include columns, beams and double tees for a 7-level parking garage which is tied into the hotel.

***Owner***: Martin Capp, Minneapolis, Minn.
***Architect***: Ackerberg & Cooperman, A.I.A., Minneapolis, Minn.
***Contractor***: Robin Hood Construction Co., Minneapolis, Minn.
***Structural Engineer***: Ross H. Bryan, Consulting Engineer, Nashville, Tenn.
***Prestressed & Precast Concrete***: Prestressed Concrete Inc., St. Paul, Minn.

# BETTER THAN ONE FLOOR A WEEK—

## with Unusual System of Precast Concrete Beams and Prestressed Slabs



Near the top can be seen a row of precast beams in place. Note the absence of formwork or scaffolding as the structure rises. Complete, the building will have over 200,000 square feet of floor beams and slabs. Units are 8" thick. A 3" concrete topping, post-tensioned from end to end and side to side, ties the slabs to the service core shear walls. Bottom side of slabs was chemically treated to provide a roughened surface for direct application of plaster to ceiling.

The new 15-story Capp Towers Motor Hotel in Minneapolis utilizes a unique floor system of precast flat beams combined with lightweight prestressed floor slabs. The beams cast with structural collars were simply positioned and welded to the columns. With both types of units having shiplap edges, the slabs fit flush into the spaces between the beams.

Construction efficiency was impressive by anybody's standard. Placing of the precast and prestressed units progressed at better than one 86′ x 222′ floor per week. Each floor served immediately as a working platform for all trades and construction personnel.

The beams and slabs as well as all other precast units supplied by Prestressed Concrete Inc. for this building were made with Lehigh Early Strength Cement. Consistent use of this cement in their manufacturing operation helps them attain maximum production efficiency through early removal of units and quick re-use of forms.

This is another example of the way in which Lehigh Early Strength Cement can contribute to modern concrete construction. Lehigh Portland Cement Company, Allentown, Pa.

LEHIGH CEMENTS

*December 1962* **PROGRESSIVE ARCHITECTURE**®



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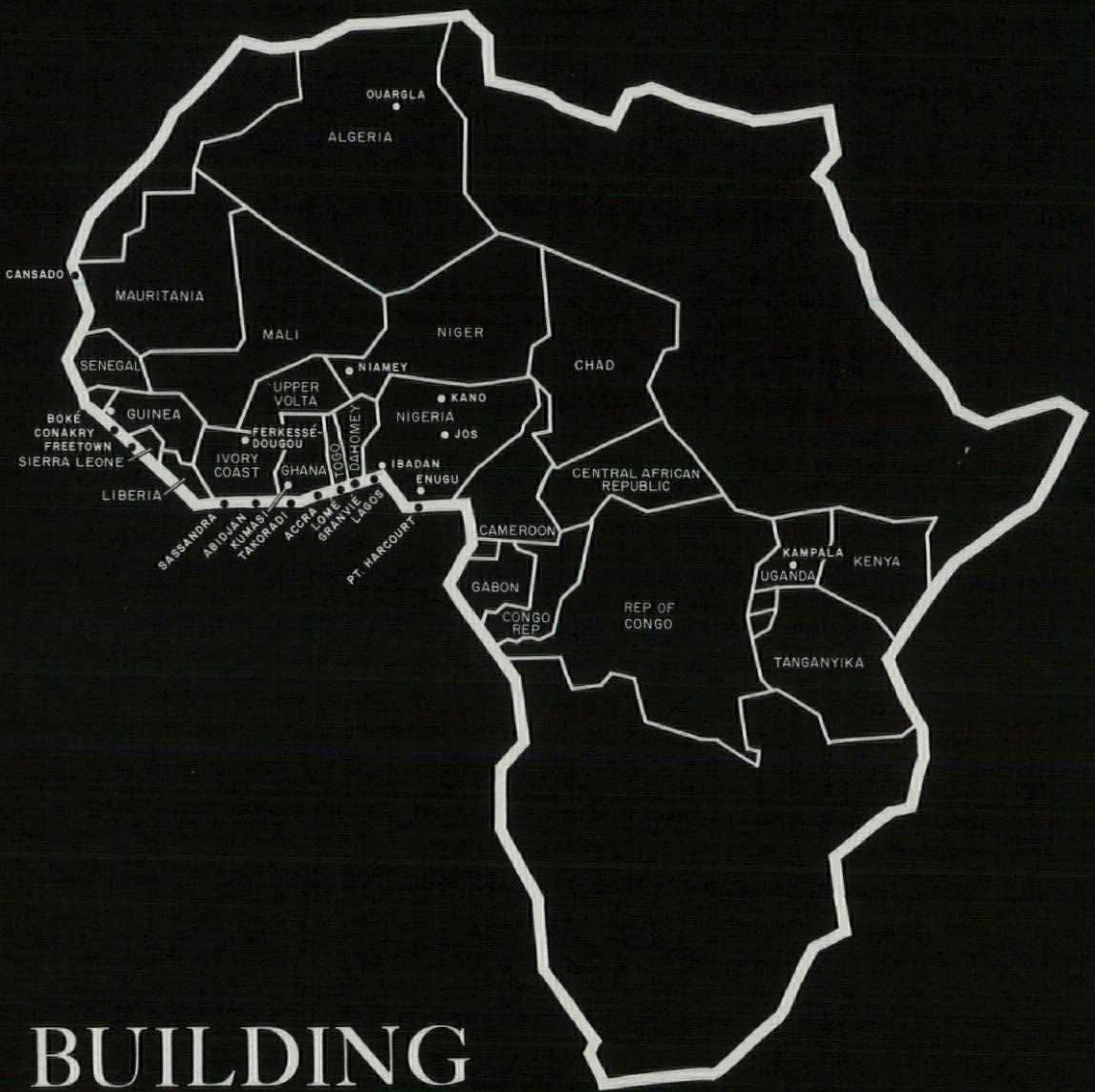
## EDITORIAL FEATURES



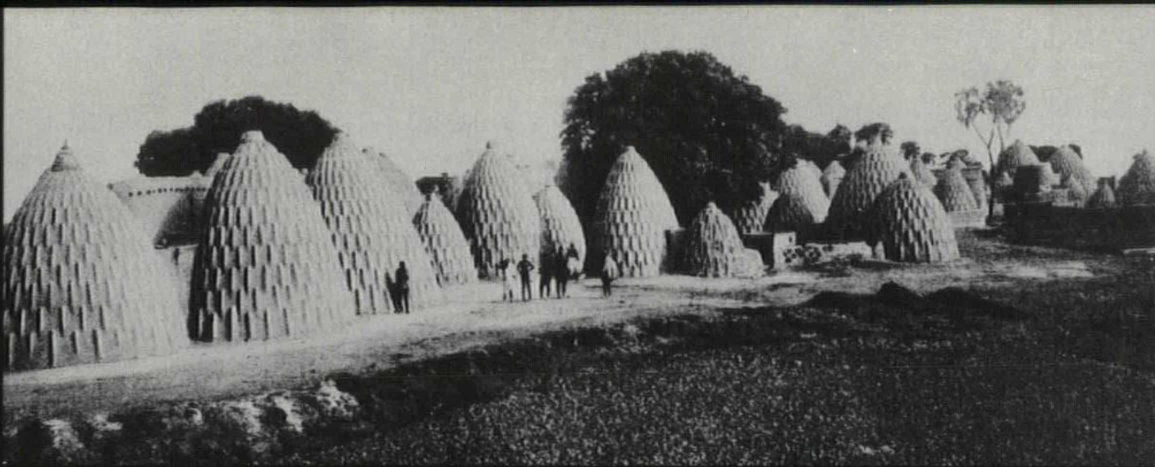

# BUILDING THE NEW AFRICA

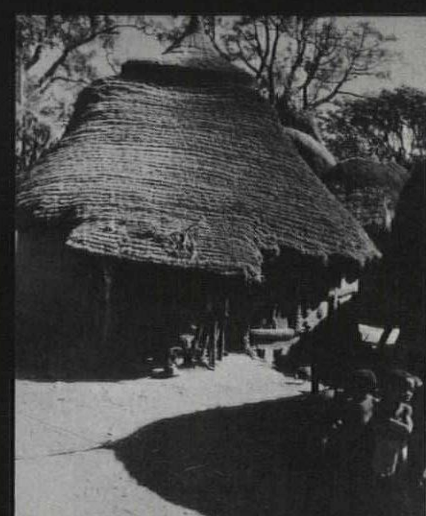
Africa appears in the news with increasing frequency today, but most Americans, and probably most American architects, know little about that vast continent besides its political upheavals and romantic tales of safaris. Africa is important today not only because of the growing political importance of its newly independent and rapidly developing nations, but also because it is one of the world's areas of greatest need for architecture and construction.

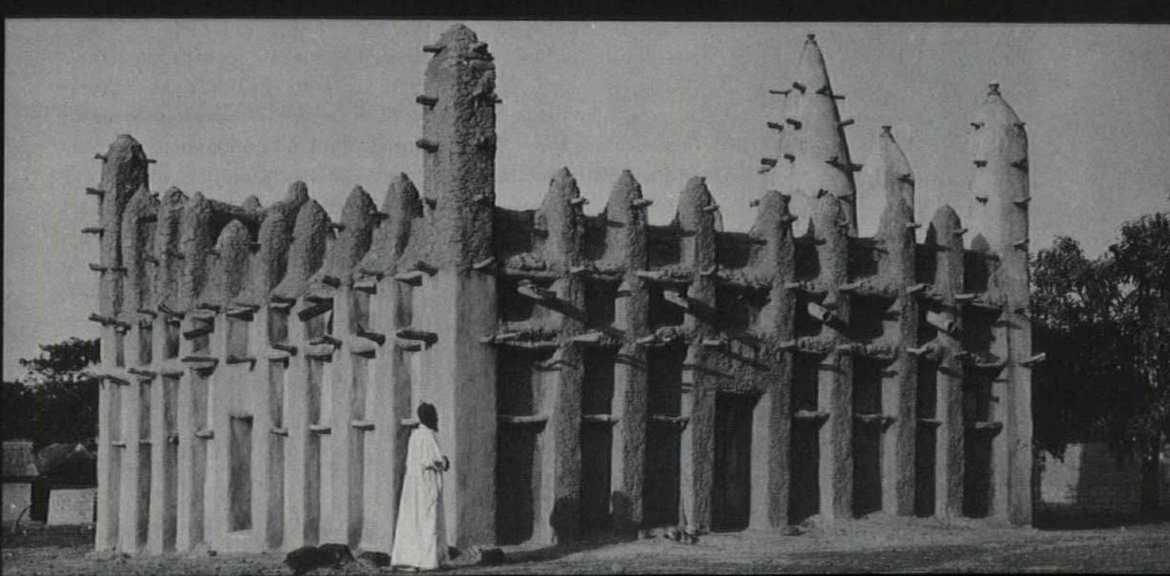
What must be recognized first in any discussion of Africa is that it is not a continent of a single and integrated people with a single culture. The diversity within that enormous area exists at every level; great climatic, geographic, economic, and religious differences, sometimes within short distances; a wide range of foreign influences introduced over many centuries (European, Moslem, and Asian); a broad social structure comprising Africans, landed white settlers, Mediterranean and Moslem traders, and, in the East, a large Asian population of traders and workmen. To discuss the New Africa as a single entity, therefore, is to do so in terms of fundamentals.

The cultures of these nations are centuries old, and rich traditions of indigenous building persist. Primitive building materials range from thatch and bamboo to mud and straw—formed either as blocks or ellipsoidal units called "tubali"—to wood and stucco. Some of the buildings exhibit a strong sculptural sense; some are fancifully etched and elaborately polychromed. Few of these buildings, however, can surive the numerous agents of decay, such as weather and insects, and it is unlikely that any of those illustrated on the following two pages is more than 20 years old. In one area, for instance, bamboo huts enclosed with woven mats are built to a considerable height, like silos. They are planned this way so that, after destruction by termites, the bottom strip of matting can be peeled away and the framing pushed further down into the ground.

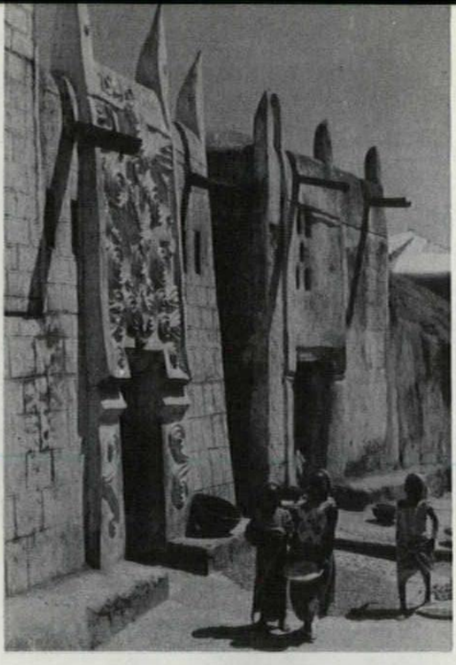
What makes traditional African building unsuitable for the development of a modern civilization, then, is its



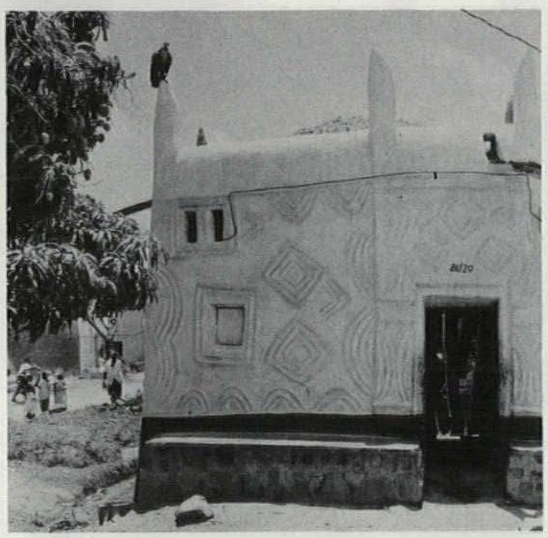


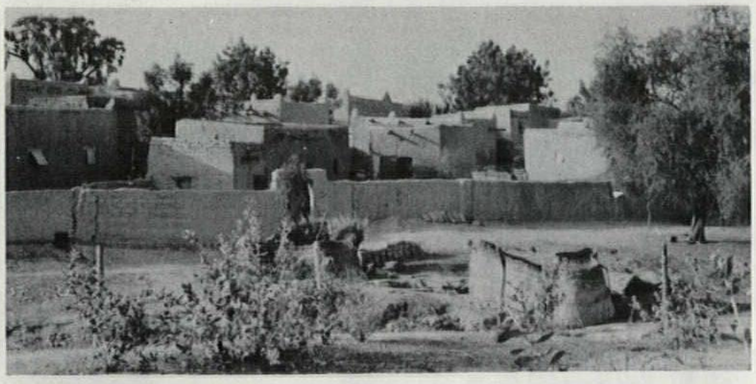


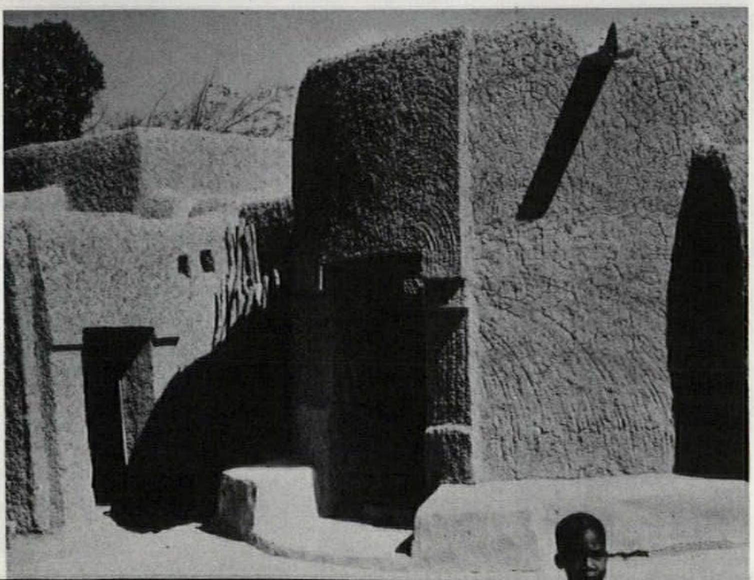
*African primitive building presents a great diversity of forms, construction techniques, and materials. The Mousgoum village in Cameroun* (top) *comprises mud huts with high-relief decoration. Stilt houses of the lagoon village at Granvié, Dahomey,* (second row, left) *have lattice walls with woven screens inside. Wattle and thatch is used in huts outside the walls of Naimey, Niger* (second row, right). *White stucco is scratched away to reveal red mud construction of a house near Kano, Nigeria* (third row, left); *doorway is polychromed. Compound with painted decorations is by the Ndebele tribe, South Africa,* (third row, middle). *Thatch-roofed mud hut near Jos, Nigeria,* (third row, right) *has low-relief decoration. A mosque in the village of Kong, Ivory Coast,* (bottom) *is of mud block construction.*



*Primitive buildings of northern Nigeria are often of egg-shaped "tubali"— red earth dried in the sun. Mortar is of the same clay, with chopped grass added. Many buildings are finished in white stucco. Town houses* (top and second from top) *have sculptural decorations and "zanko" (finials) derived from mosques; seating is built on the exterior. Village of Naimey, Niger,* (second from bottom) *uses mud and thatch construction. Mud huts in Kano, Nigeria,* (bottom) *have characteristic rainspouts.*







impermanence and also its inadaptability to mass-production and to high-density uses.

But not all buildings in Africa today are of primitive construction. Since World War II, the much-maligned "colonialist" countries have been pouring funds and experience into their territories under assistance programs. The aim has been both to introduce Western ways and technology to the peoples of Africa and to improve their living conditions with permanent buildings. So far, what has been built for Africans is mainly a transposed European architecture that shows deference to the varied climatic conditions of the continent. The history of this work in West Africa is described on the following pages.

The need of African nations for building materials is immense. Almost no African nation is self-sufficient in this respect, and the majority of building materials must be imported. Bricks and tiles are manufactured in the Congo, Guinea, Ivory Coast, Liberia, and Mali, but production is inadequate. Aluminum mills are to be found in Cameroun, Ghana, Guinea, Mauretania, and Uganda, and cement plants are in operation in Algeria, Angola, Cameroun, Congo, Kenya, and Nigeria. But Nigeria, for instance, imported 626,486 tons of cement in 1960 at a cost of £11 to £12 per ton, compared with £5 to £6 per ton in England.

Although African labor is cheap, productivity is low, and there is a great need for trained workmen. In a region where round and irregular lines are more traditional than straight lines, competent masonry work is often prohibitive, and simplified systems are almost mandatory. "Architects must recognize," says an official of the United Nations' Housing, Building and Planning Division, "that building in Africa must take place within a realistic economic and social framework." For example, housing suitable to local customs must be provided in permanent materials at a cost that Africans can afford.

Another great need of the New Africa is for architects. Many of the European architects have returned home as the new nations became independent. A few architectural and engineering schools in Africa are turning out graduates, but too few. Nor do all countries have adequate regulations for the registration of architects. The United Nations' Housing, Building and Planning Division feels strongly that there is an immediate need for African architects to be trained in Western firms.

Today African cities are burgeoning—without plans, without adequate water supplies, and often without sewerage—almost as squatter settlements do, and the majority of experts cite town planning as the most urgent problem facing the new African states. There is a suggestion that Western architects might develop town plans under grants from foundations.

In one significant area—the development of a truly native architecture—the African architects of the future must progress on their own. Non-African architects have made a few successful attempts toward a synthesis of modern technology and indigenous African elements, although the majority of such attempts have produced only a pseudo-regionalism. English architect Gordon D. Hindle states: "The remarkable character of indigenous buildings has been responsible for a romantic movement —incorporating characteristics of mud building in modern concrete structures. Fortunately, however, the requirements of climate have been appreciated by certain architects, and the affinity between their work and the traditional expression is interesting: a consciousness of solid masses and small dark voids, surface texture and bold relief."

So far, only the foundation has been laid in building the New Africa. Some of the most solid of its components are presented on the following pages.

*For sources of illustrations used in this article, see page 162.*

# EUROPEAN IMPORTATION

*The introduction of modern building techniques to Middle Africa is described below by* **E. Maxwell Fry,** FRIBA, *who played a most significant role in that process. His personal contribution to the architectural evolution of Africa began when he became advisor to the Resident Minister of the four British West African Colonies in the early 1940's. He and his architect wife, Jane Drew, have been working on projects throughout the former British African colonies ever since, except for a period in the early 1950's, when they went to India to take part in the design of the new city of Chandigarh. Their wide experience in adapting European architectural concepts to conditions of heat and humidity has been distilled in their widely known and authoritative book,* Tropical Architecture.

The continent of Africa, despite its having had a whole page to itself in school atlases since school atlases were first made, has occupied but a small corner of Western consciousness until very recent years, when it has been growing to its proper size.

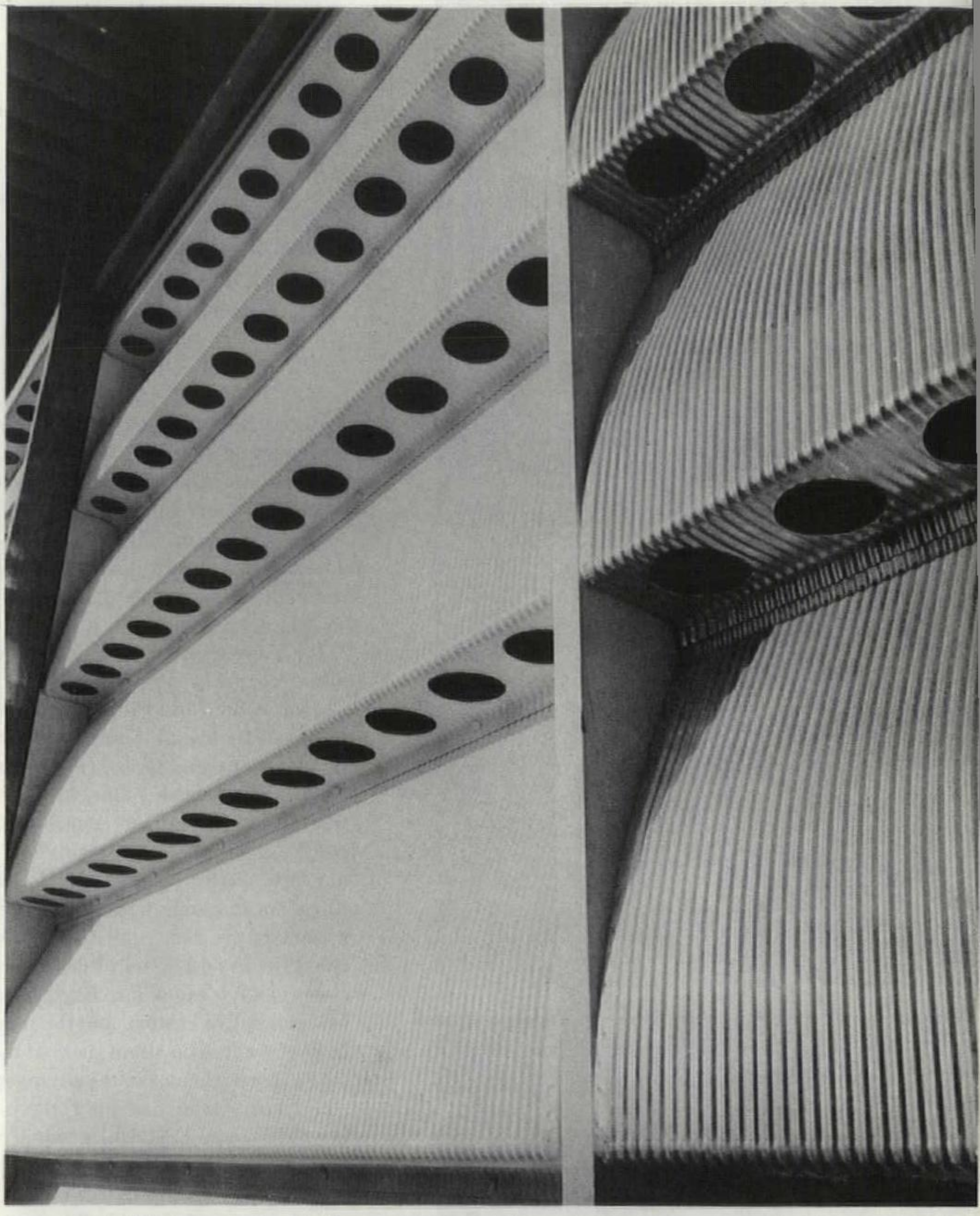
But it is a vast region. Even the central part we are considering here could take the United States comfortably into its boundaries, and contains such a variety of geological classifications, of climates, races, languages, and religions as to be impossible to fit into any one general conspectus.

It is to our eyes undifferentiated. Nigeria, with its 30 million or more inhabitants, gives the appearance of endless bush, or swamp, or scrub; it takes a long time to be able to see it as having any organization, and even as one sees it, it changes.

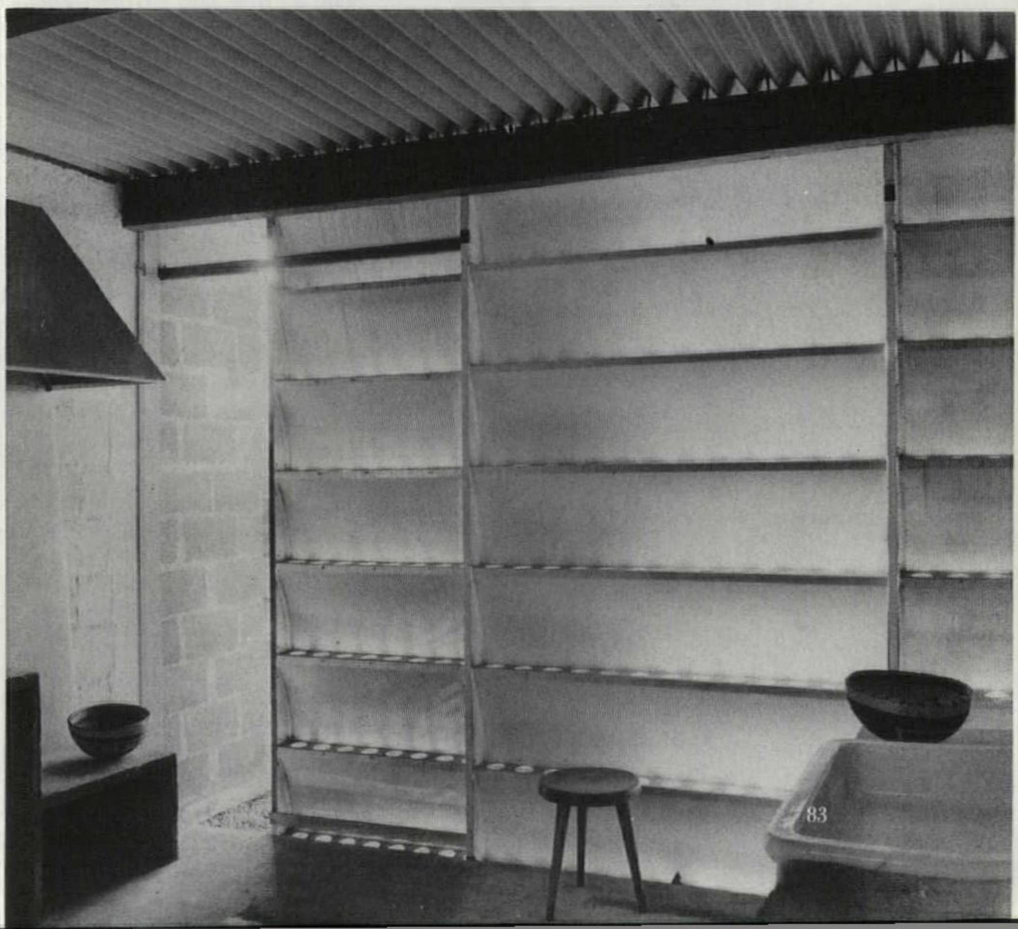
The continent is dominated by enormous geographic realities: the Sahara, the biggest single arid area, but one of a continuous chain of deserts stretching eastward to the gates of Delhi; and the mighty Niger and Congo rivers. All are too big for single contemplation—barely charted, imperfectly understood, relatively unused.

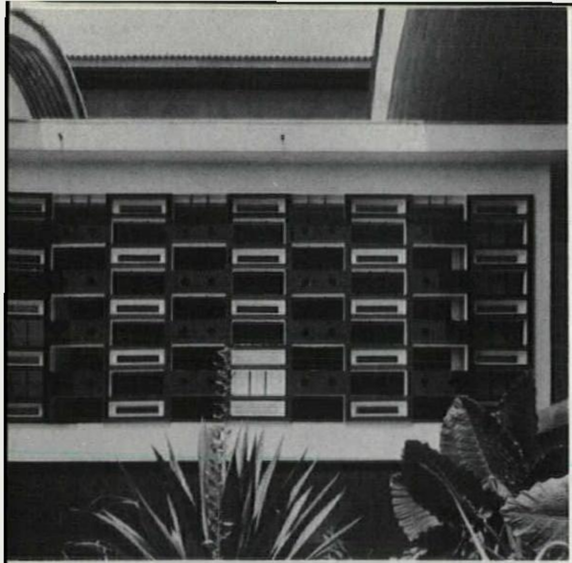
It is, by world standards, unvisited. When I first went to West Africa there were no hotels to speak of, since one only came for a purpose, stayed with officials or friends, and was sped from one primitive rest house to another over dirt roads —every moment an adventure.

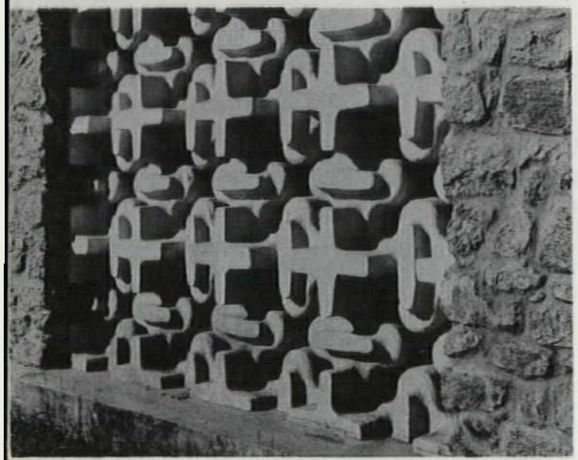
When I first went there it still belonged to the 19th Century, each country a European possession maintained for what it was



*Ventilation wall in prototype housing for Boké, Guinea, by Lagneau, Weill & Dimitrijevic.*







worth in terms of primary products such as oils and fats, gold, diamonds, tin, or rubber. Even the country dominated by the United States was used in the same way.

We ruled, by historical standards, not harshly, except in the Congo. We took and gave little in return. But in the British colonies land remained with the people. We traded and gradually we taught; and finally we shared.

It is a story of communications, urged forward by two wars—Western thought and method, Western ideals of government, Western notions of freedom finally taking root and burgeoning, with opportunity prompting, until the power of self-government passed to India, and from there to the erstwhile subjected tropical world.

It is 20 years exactly since I first stepped off a troopship onto Ghana soil. It was known as the Gold Coast and belonged to the past. Its five million inhabitants lived in the deep rain forests in tiny villages connected by bush paths, in little towns where the first contacts with Europe were made, or in the wide scrubland of the northern territories. Prolonged peace and Christian missions had robbed the tribal system of its kick, and the people were ruled by an odd blend of district commissioner and local chief, English common law and native custom, and the inexorable laws of trade. The atmosphere of the place —the forest, the coast, the shy people, the shimmering color and light, the murmuring calm—was beautiful beyond description. We spent happy years there.

In 1945 we started to build. Looking round we found three builders—a Scotsman, a Swiss, and a Greek. The Scotsman had a band-saw in his yard, but apart from that the equipment consisted of African workmen, each with his box of Stanley tools, a lot of energy and adaptability, and enormous cheerfulness. And this was, I imagine, the situation in the more advanced areas of this region.

Cement blocks were used freely but reinforced concrete rarely, and then unsuccessfully. Nothing was very well done. There was no pressure. Everything was personal. Contracts were made on envelopes and argued to a settlement at the end. Only the Public Works Department worked to a system and looked serious, but then not very.

A railway ran from the Port of Takoradi to the capital, via Kumasi in the interior, and took two days to do it; but you could do the 175 miles along a narrow tarmac coast road, the only tarmac road in the country, in five hours.

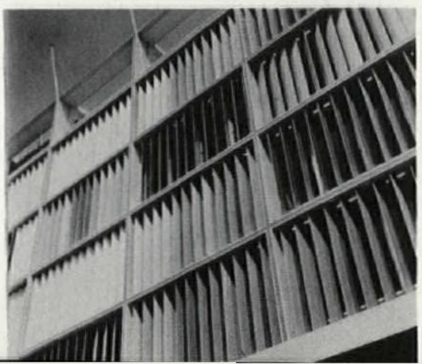
I took a trip at that time down the west and up the east of Africa, across to Uganda, north to Khartoum and back along the pilgrims' route to Kano and the West Coast. The impression I got was that, apart from the industrially rich centers of South Africa, the great mass of it lay dormant, used only for its primary products and the more obvious of its mineral riches.

What has happened in the 20 years of my experience depends a good deal on what happened before. It is no accident that Ghana should regard itself as the leader of pan-Africa. No land has ever been alienated in British West Africa, thanks largely to Mary Kingsley. There was the beginning of a University of Accra, a tolerable technical school at Takoradi, and mission schools everywhere. The cocoa crop belonged to the farmers and in everything there was a sort of jog-along live-and-let-live atmosphere.

Into this situation, before the close of the war, the British Government injected a fund of $550 million for immediate development, from which our program of secondary school and teacher training colleges in Ghana and the University of Nigeria were financed.

In French territories, development no doubt hinged on the direct connection between their possessions and metropolitan France; there must have been great value in that. It helps to explain why the territories of our two countries were able to make so great a leap forward in 20 years. And it explains why the richer, more populous and more politically conscious coastal areas are the chief beneficiaries of assistance: why, for instance, we should only have been building the first teacher training college in the north of Nigeria ten or twelve years after the program in the south of Ghana was half complete. Communications is the key.

When we started our work, there was no building industry worth the name—no bricks, no quarried stone, no steel or cement, no seasoned timber. Everything, in fact, was imported. Nor was there any architecture worth the name, nor any background of architecture, nor any art that was not drawn from the recesses of a tribal system and an animistic religion



already fragmented by the impact of Western thought and a cash economy. This art was as rich and genuine as the life it was drawn from. It has fertilized the art of the West. But it was as inapplicable to the newly adopted life as mud building is to a cash economy.

We had to make an architecture to fit the circumstance of educational building, which was first to make it fit a climate of extreme humidity—an architecture that, having kept off the sun and driving rain, allowed the cooling breeze to penetrate it everywhere. It was this and the absence of bricks and the vulnerability of timber to the degredations of white ants that led us to develop a system of reinforced concrete post and slab, with an infilling of perforated blocks.

That was the logic of a situation of extreme humidity that obtains over a great part of the area under review and ceases to apply as the region shades off to the Sahara, where the critical design condition is one of extreme heat and minimum rainfall.

The choice of materials and structures, and later decisions affecting equipment, such as a turnover from wood to metal windows, involved a forward look in line with our decision to use the instruments of a developed building industry—specific contract documents, cost accountancy, complete architectural and engineering drawings, bending schedules, etc. It had to be assumed that in the course of time the region would make its own cement; that it would at least fabricate its own metal work; and that it would fulfill the destiny of all tropical countries to become industrialized, socialized, and nationalized.

This has already taken place. In the early '40's, our stone aggregate was broken by women and children with hammers, but toward the end of the '40's power crushers were introduced; metal windows replaced timber at about the same time. In 1942, there were perhaps two or three elevators in the whole of West Africa. We built the first little West African skyscraper in Ibadan in 1958, but by that time elevators were becoming common.

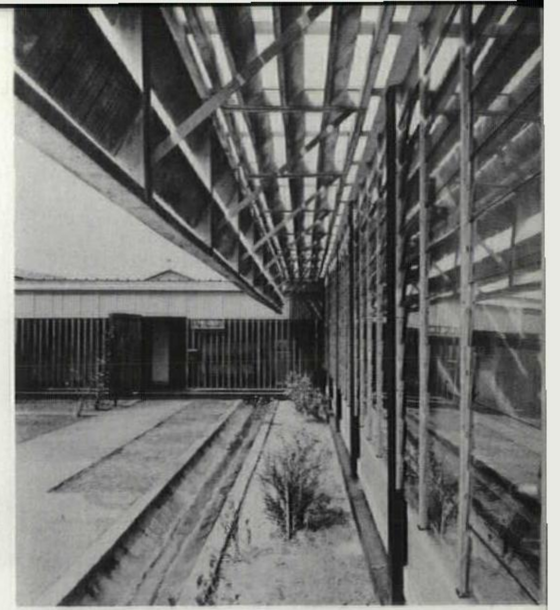
But as our building industry was re-equipping itself with plant and machinery, new roads were spreading out over the region, domestic airlines were started, telephone services improved, radio and television introduced, and nearly in the same order of things, independence from European colonial powers was achieved.

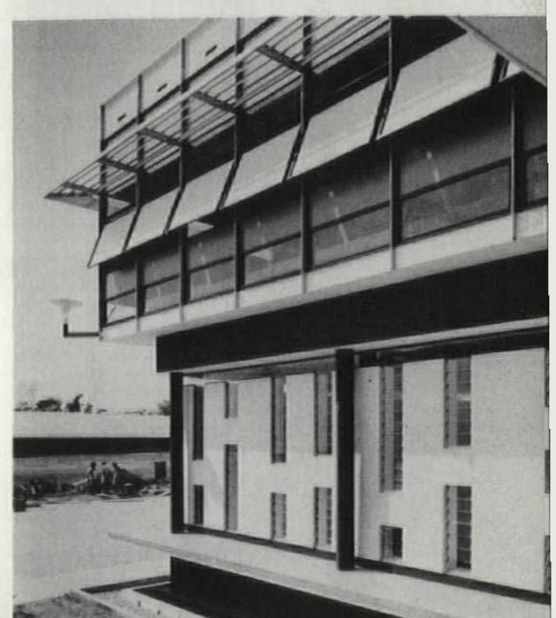
With these changes came urbanization. Large towns are not unknown in Africa. Ibadan in Western Nigeria was an all-African town of 300,000–400,000 people 20 years ago. What I speak of is the expansion of capital cities such as Accra or Lagos by 300–400 per cent over a few years, and the failure in new African governments, as with our own, to see town-planning as an important organ of government, the means of converting potential expansion into human welfare.

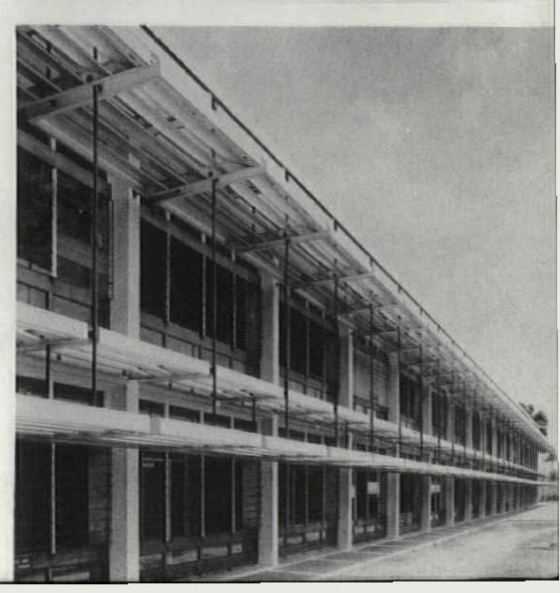
We got town-planning moving in the years 1942–1944 when we were advising the then-Resident Minister of West Africa. Thus a good deal of the expansion of Accra and other British West African towns is provided for. The French, as one might expect, were more farsighted and established their planning policy at an earlier date. But nowhere is town-planning being used hand-in-hand with development policy to canalize potential as it becomes realizable.

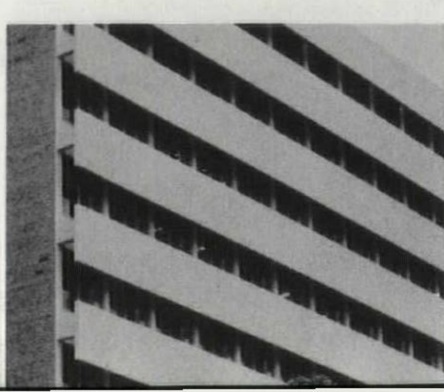
One might say, nevertheless, that an architecture fitting the circumstances of the region has been established in the more highly developed parts of it and can take the load of further development. To do this successfully requires the continuous application of the best minds and a store of sympathy and imagination. What is being done there affects the lives of whole nations. That it should be well done is no longer the direct responsibility of the Europeans, but where we can help we should do so as if it were for ourselves.

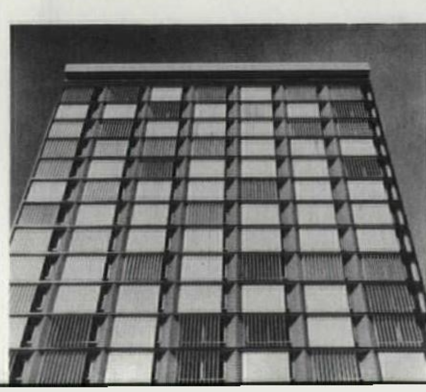
*The vital problem of climate control has called forth a wide variety of interesting architectural treatments. Pierced block walls have been used to exclude direct sunlight and admit air, as in four examples of Maxwell Fry's work at the University College at Ibadan, Nigeria* (facing page, left column). *Sunshades and louvers—both fixed and operable—have been used on high-rise structures. Shown in bottom row of photos* (left to right) *are office buildings in Lagos, Nigeria, by four firms: Godwin & Hopwood; Fry, Drew & Partners; the Architects Co-partnership; and Nickson & Borys. Other characteristic applications of sun-control devices include* (right, top to bottom): *an oil terminal building in Lagos by the Architects Co-partnership; an apartment block at Conakry, Guinea, by Lagneau, Weill & Dimitrijevic; a library by James Cubitt & Partners and dock offices by the Architects Co-partnership, both at Port Harcourt, Nigeria.*

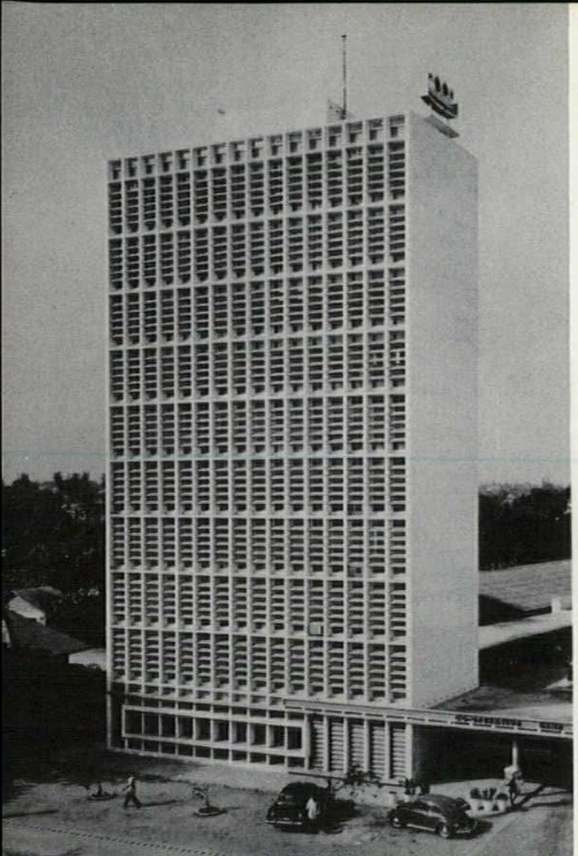
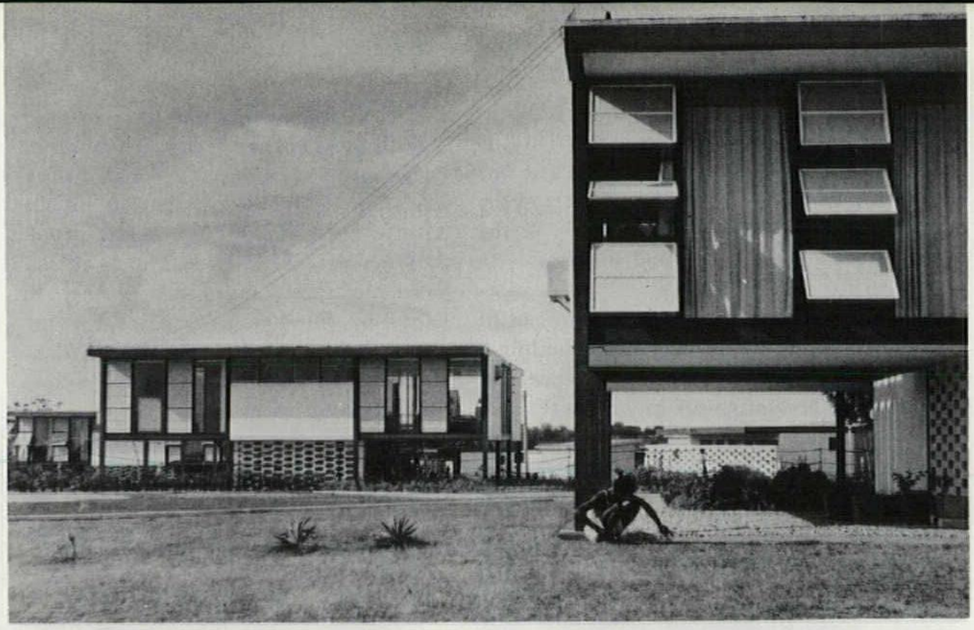
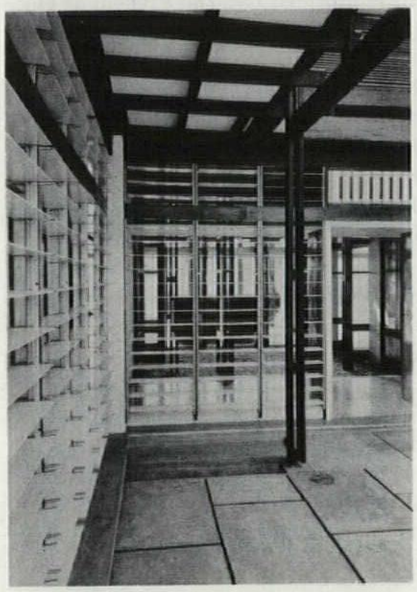
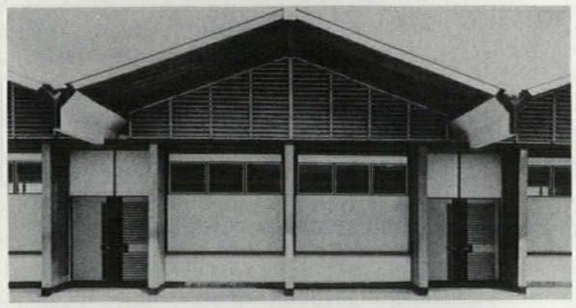
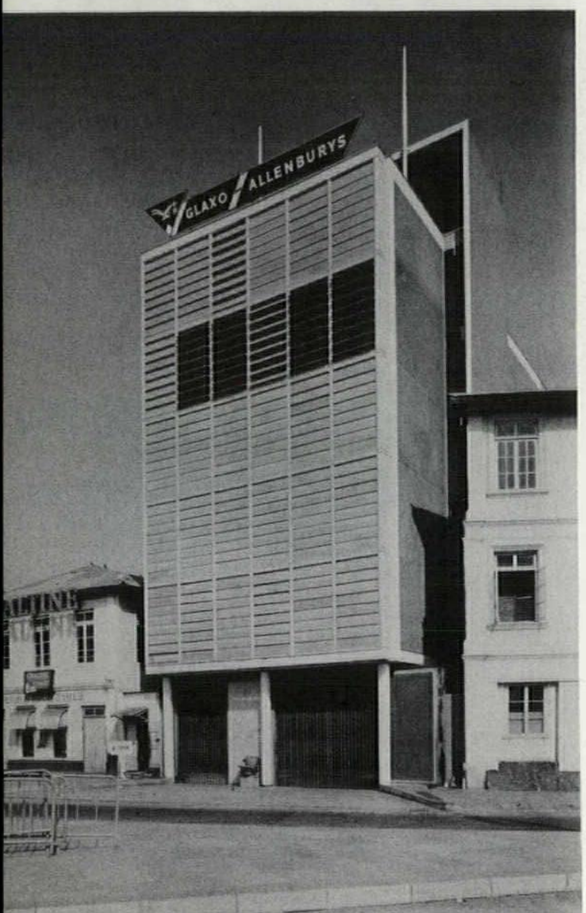








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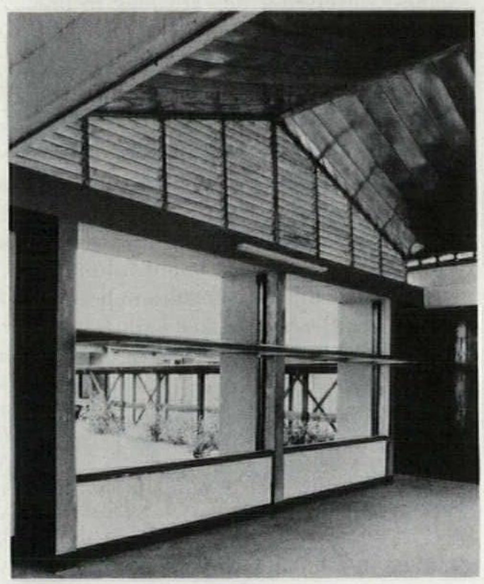
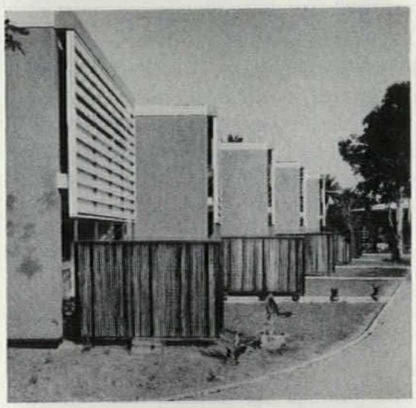
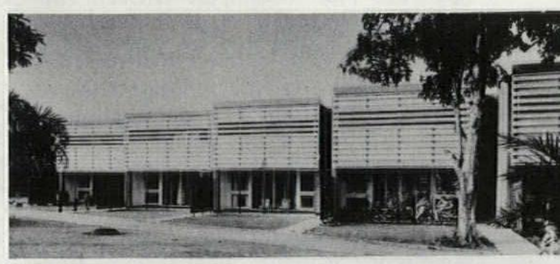
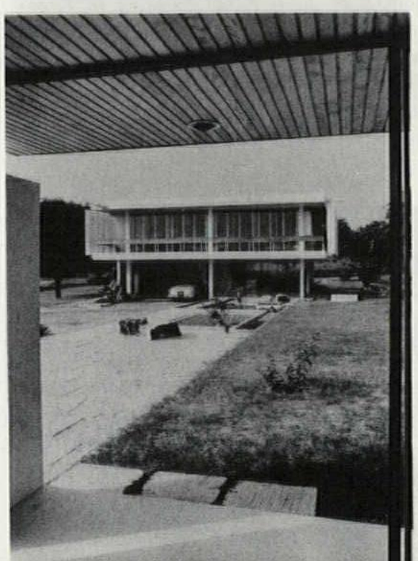
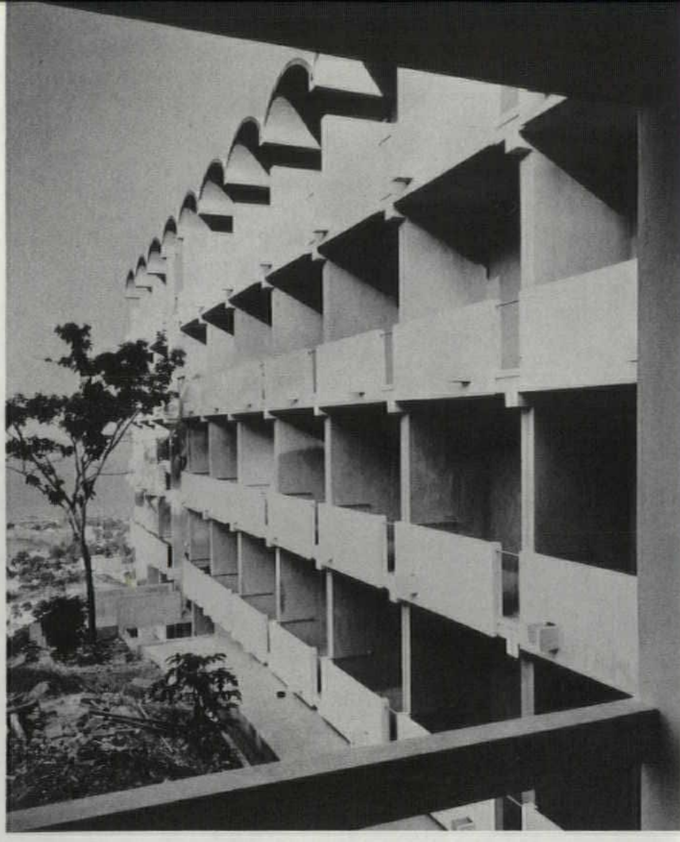
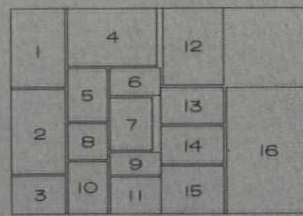
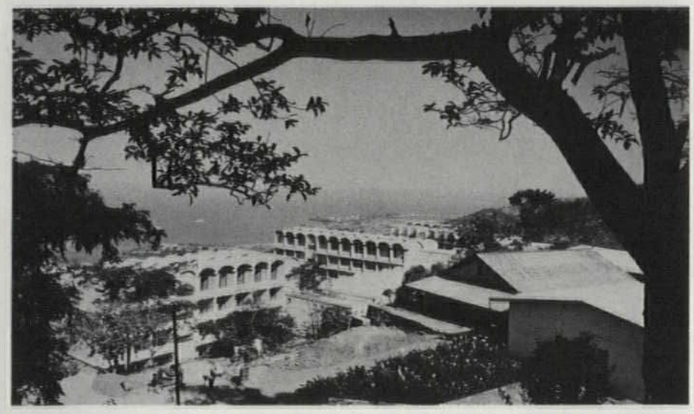




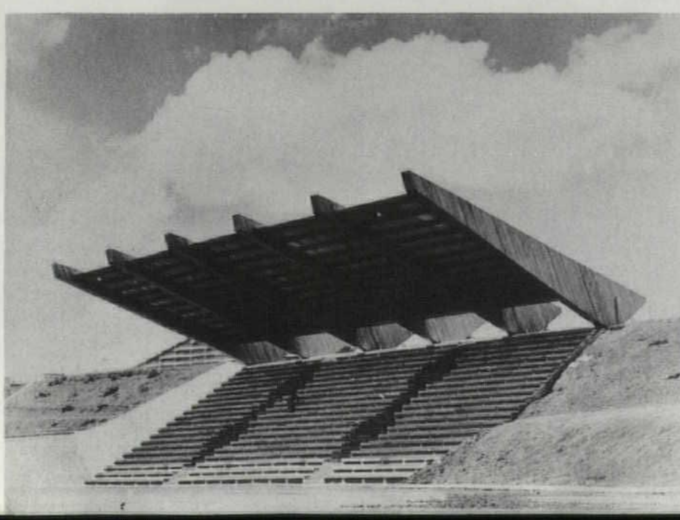


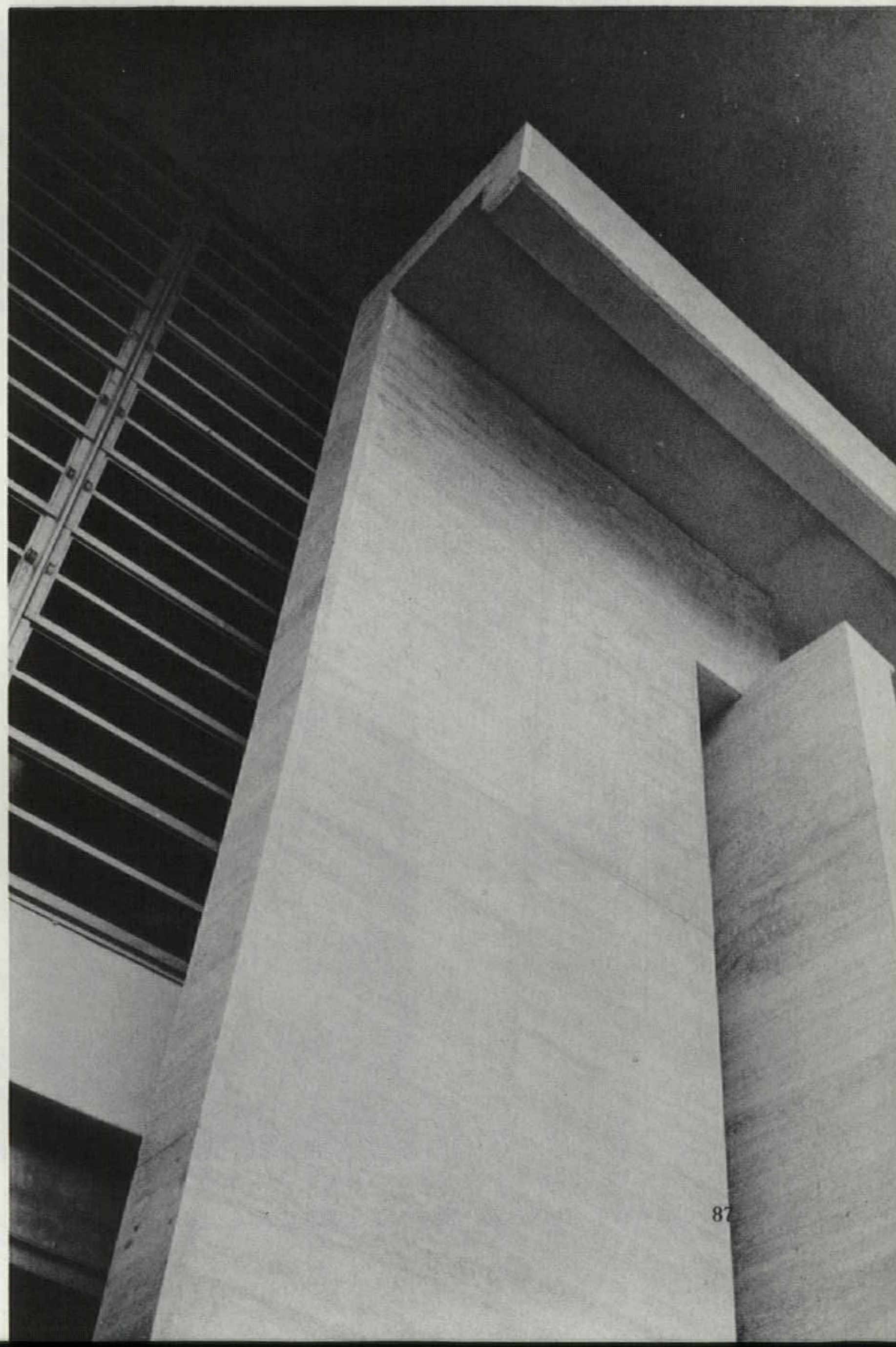






*The work of British architects in Middle Africa is diverse and technically sophisticated. Representative urban buildings include the Co-operative Bank in Ibadan, Nigeria* **(1)**, *by Fry, Drew & Partners; Hanbury House in Lagos, Nigeria* **(2)**, *by Godwin & Hopwood; and the Co-operative Bank Group, three office blocks in Accra, Ghana* **(3)**, *by James Cubitt & Partners. Detached dwellings near Accra by Kenneth Scott Associates* **(4)** *and terrace housing in Lagos,* **(8, 9)** *by Godwin & Hopwood illustrate devices for climate control; both projects have air-conditioned bedrooms. The interior of a house at Enugu, Nigeria* **(5)**, *by the Architects Co-partnership (ACP), is designed for natural ventilation. Kenneth Scott's own house at Accra* **(10, 11)**, *although completely air-conditioned, shows attention to sun-control. A secondary school at Accra, by ACP,* **(6, 7)** *has louvers and pivoting wall panels [p. 100, SELECTED DETAIL]. The Men's Residence Halls of Fourah Bay College* **(12, 13)**, *Freetown, Sierra Leone, by Frank Rutter, were constructed of concrete without the use of complex formwork. Dramatic cantilevered roofs have been designed for two stadium grandstands: one at Kumasi, Ghana, by Kenneth Scott Associates* **(14)**, *built entirely of concrete; the other at Kampala, Uganda, by Peatfield and Bodgener* **(15)**, *with cedar decking between concrete beams. Travertine-faced wall-fins give strong sculptural quality to the façade of a bank at Takoradi, Ghana, by Drake & Lasdun* **(16)**.







**UNIVERSITY COLLEGE • IBADAN, NIGERIA • FRY, DREW & PARTNERS, ARCHITECTS**

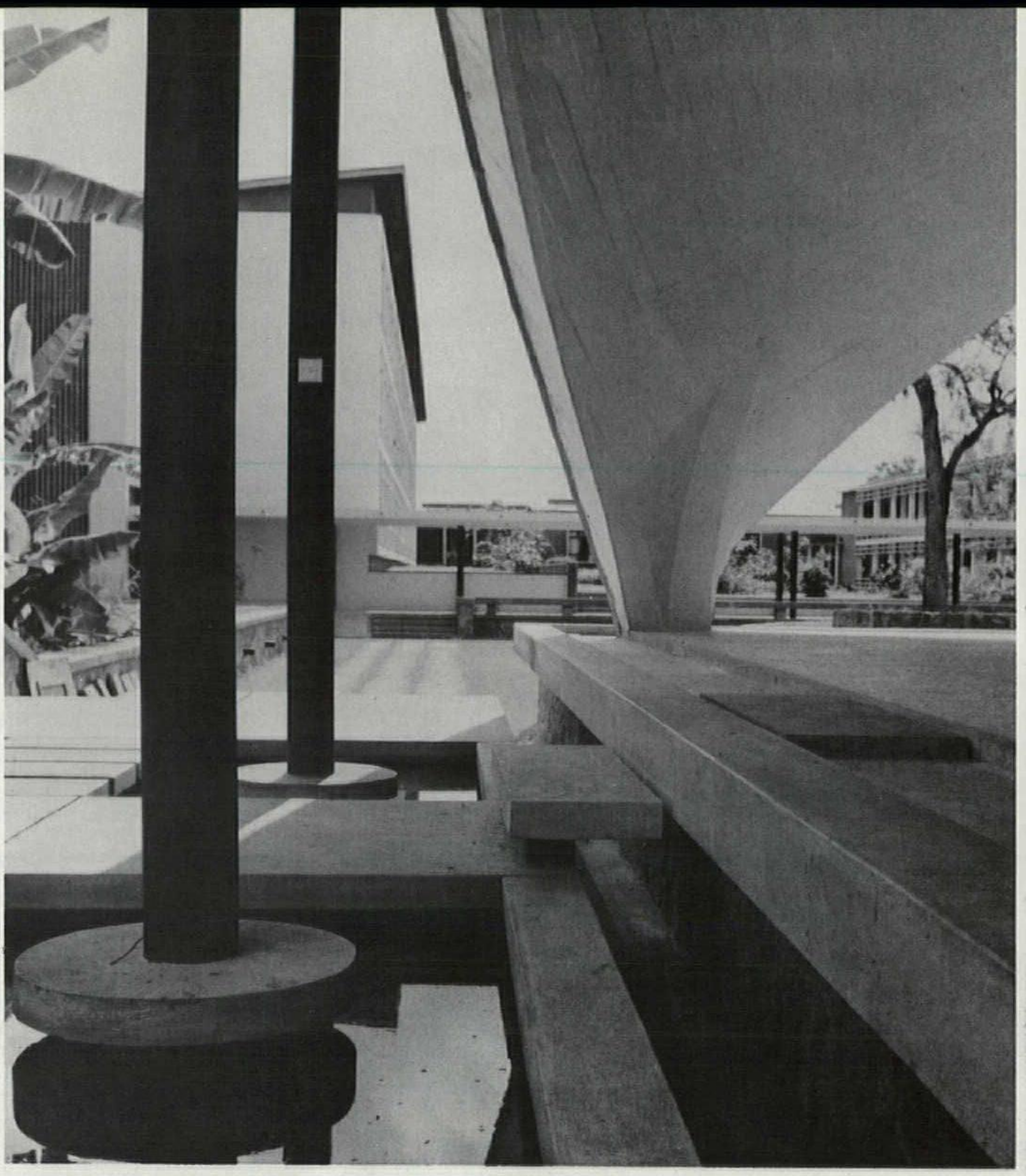
The University College at Ibadan is probably the best known project by an English architect in Africa. Developed over the past ten years under the guidance of Maxwell Fry and his associates, the college exemplifies his approach to design for humid, tropical regions.

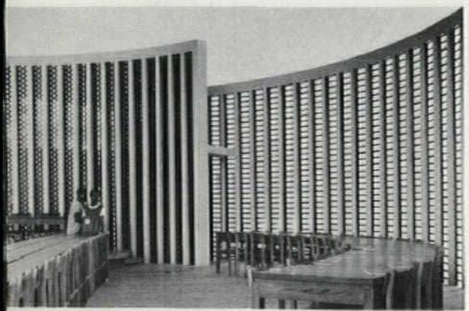
Although the campus comprises five square miles of rolling land on the outskirts of the city, the buildings have been laid out in a compact cluster to facilitate communication among departments and among living units.

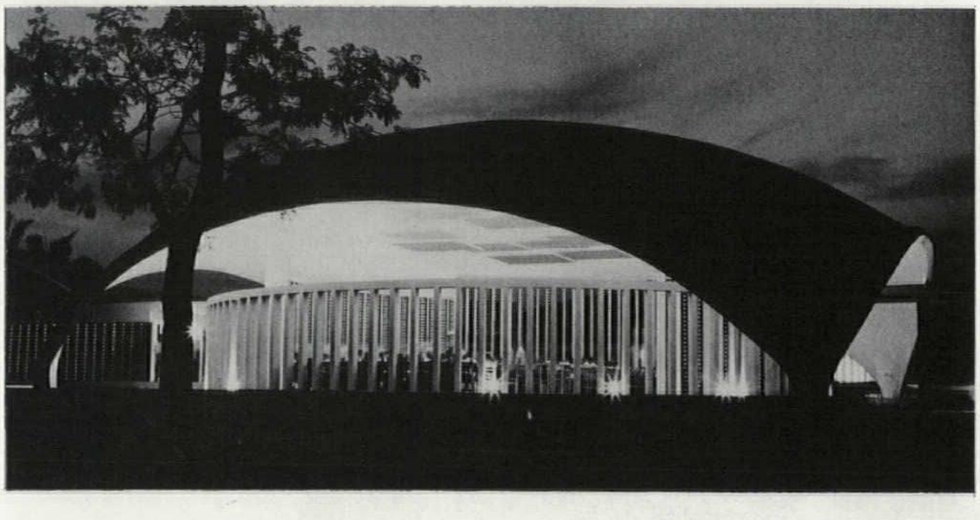
Among the recently completed increments to the complex is the Sultan Bello dining hall, an addition to one of the residential colleges (*photos this page*). It is covered by a concrete shell and enclosed only by pierced block walls and a stockade of concrete columns. Square panels, suspended beneath the vault, act as acoustical baffles and lighting reflectors (*photo below right*).

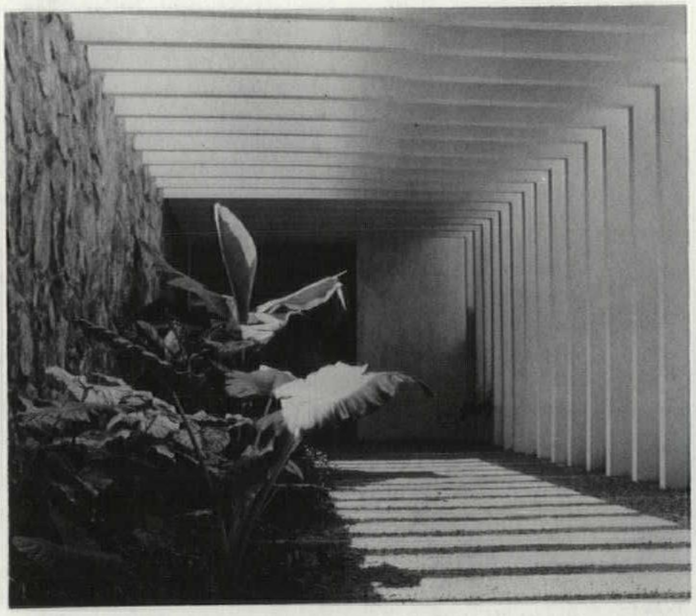
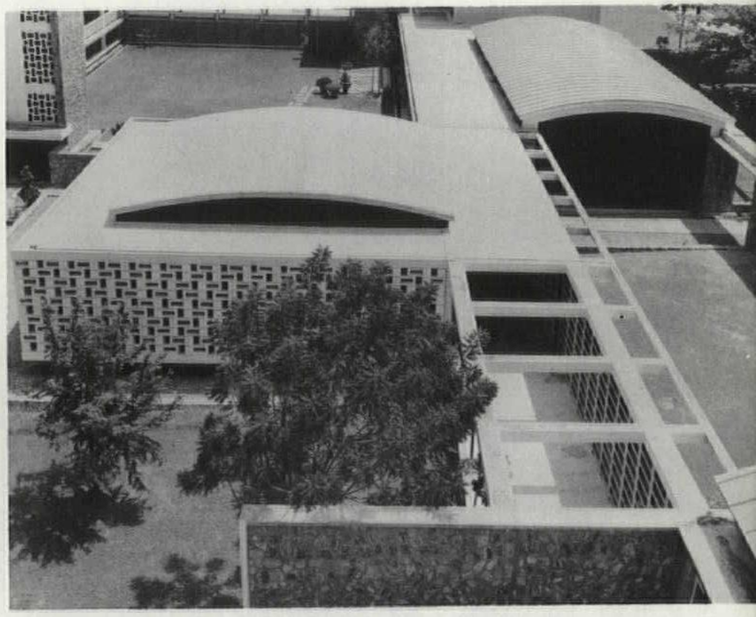
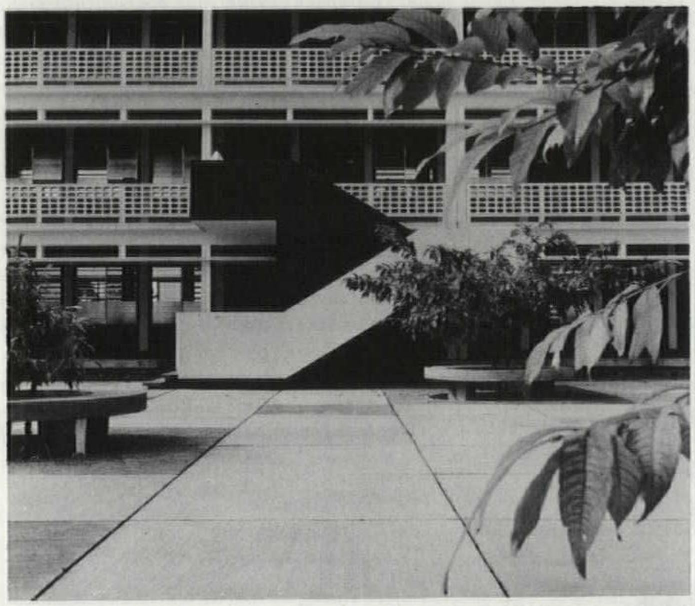
The new Arts quadrangle includes several lecture halls connected by covered and shaded walks (*facing page, top right*). Shadow patterns and planting add interest to the passages between buildings (*facing page, top left*). A landscaped court at the center of the group (*facing page, middle photos*) is surrounded on three sides by office and classroom structures. Open galleries overlooking the court are used for circulation.

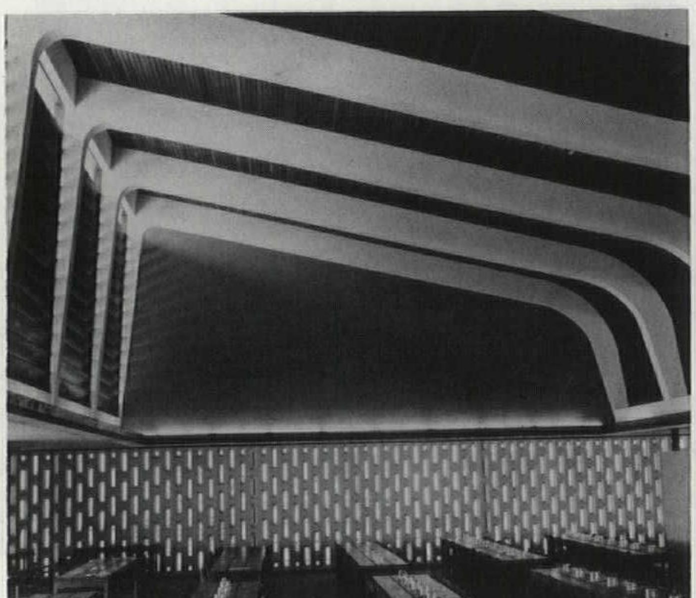
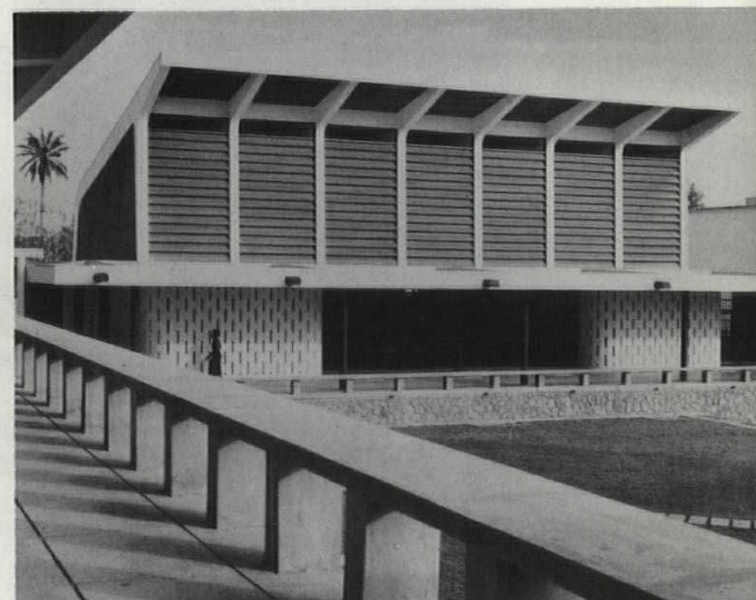
The dining hall of Queen Elizabeth College, a women's residence college, (*facing page, bottom photos*) is designed to trap the prevailing breezes. The walls are built of a special pierced block, which is one of a variety of designs used for different college buildings (*see page 84*).

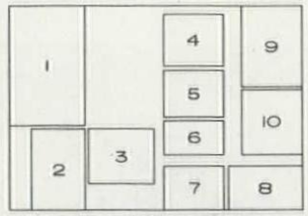




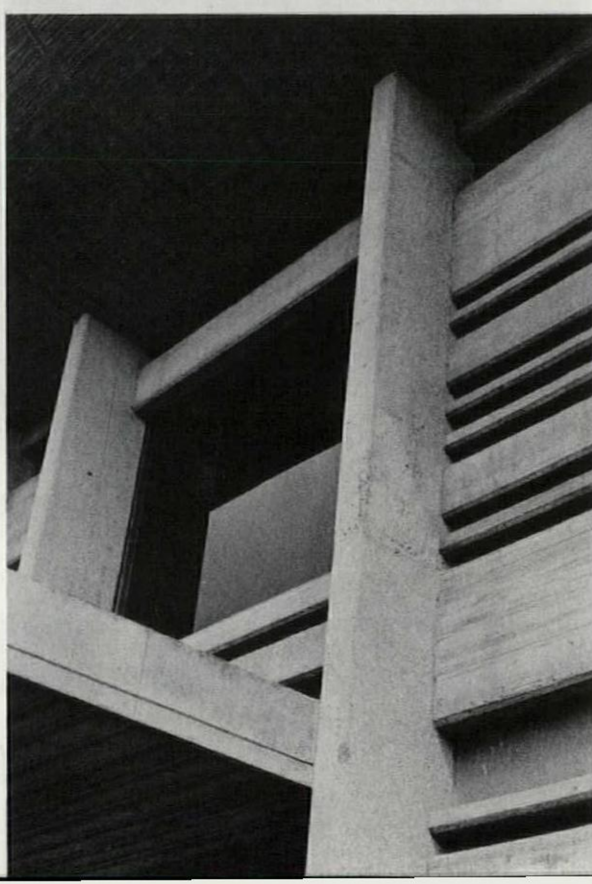


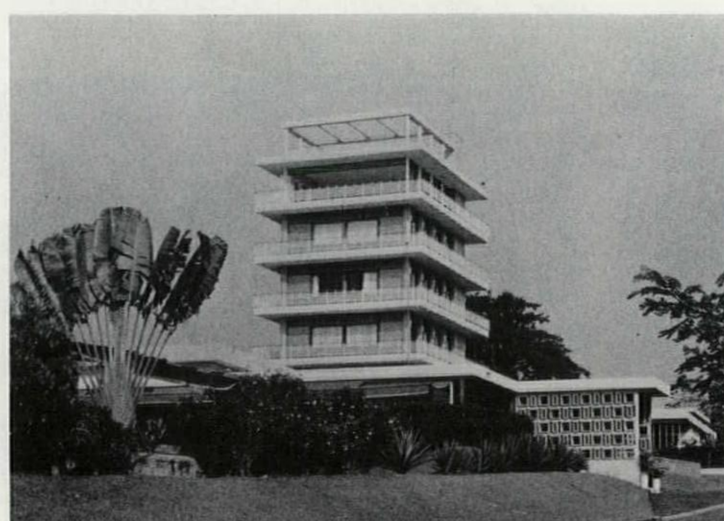




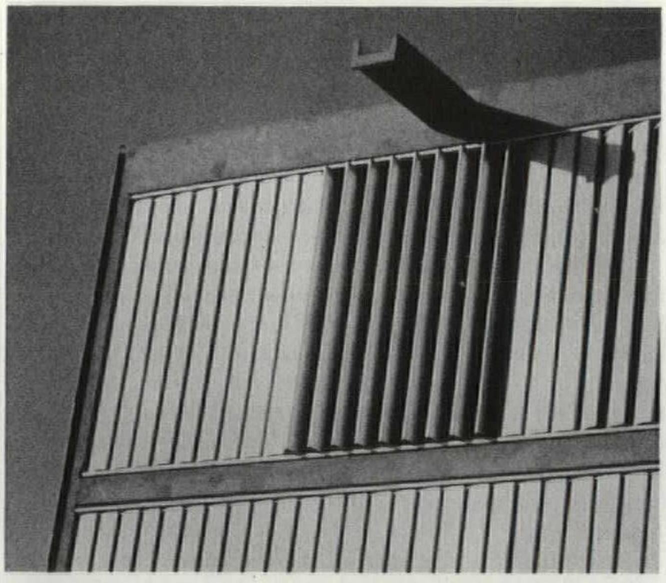
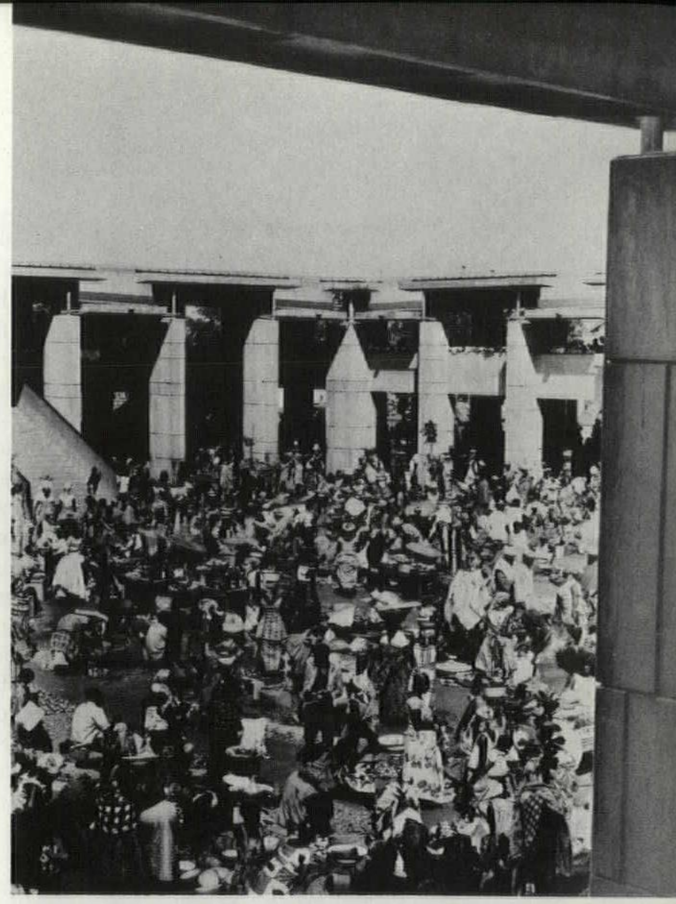



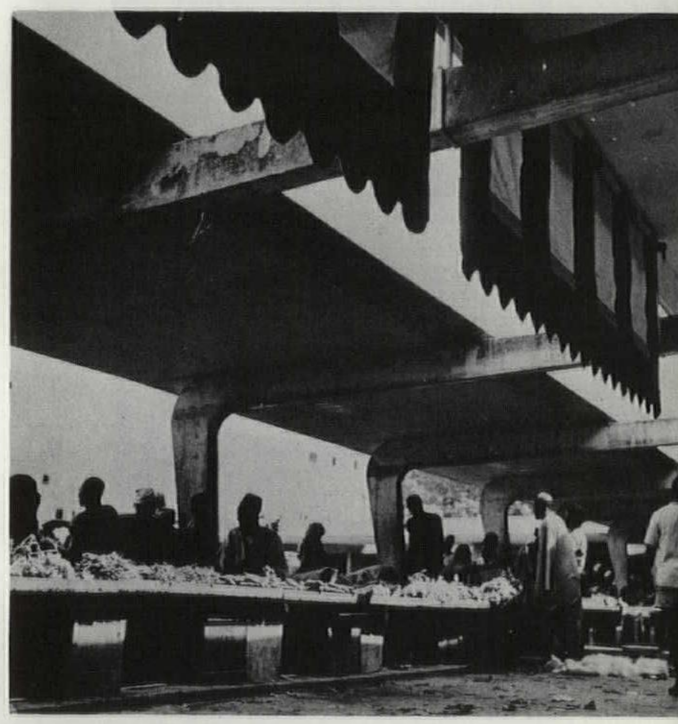
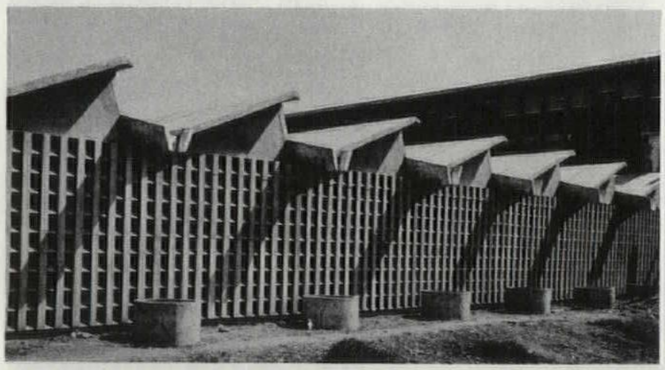
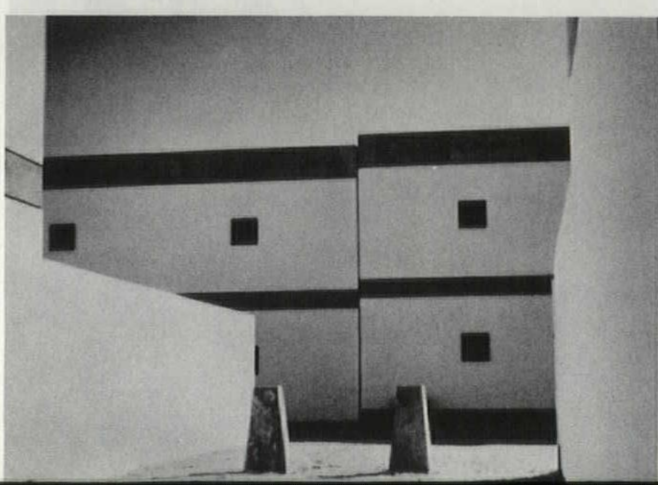


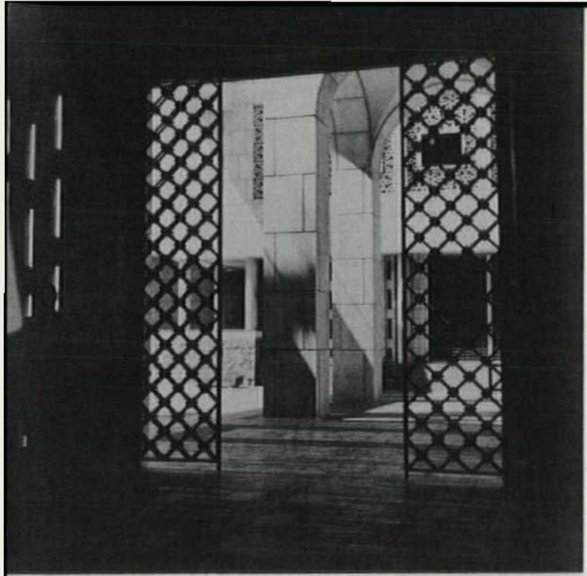

*French architects have expressed a preference for strong plastic forms in their recent African work. The office of the Vice-President of the Ivory Coast at Abidjan* **(1)**, *by Michel Ducharme, is reminiscent of Le Corbusier's work at Chandigarh in its use of massive, rough-textured concrete piers and an up-turned roof edge. Deep concrete louvers, irregularly spaced* **(2)**, *avoid the delicacy of most sun-control devices. Ducharme's Presidential Residence* **(3)**, *also at Abidjan, is in a more conventional modern European idiom, with overhangs and screens as concessions to the climate. A 47-room, air-conditioned hotel at Ouargla, Algeria, by Lagneau, Weill & Dimitrijevic* **(4, 5)**, *is one of a chain of post houses stretching across the Sahara. Operable aluminum louvers have been set within the reinforced concrete frame on the south side. A kitchen and laundry block at the College of Sassandra, Ivory Coast* **(6)**, *by Henri Chomette and Antoine Laget, has rainspouts between sections of its saw-tooth roof to carry off heavy rains into cylindrical basins. The new port city of Cansado, on the arid coast of Mauretania* **(7, 8)**, *has been planned for an eventual population of 37,000. Layout and building design were done by Lagneau, Weill & Dimitrijevic, working with other members of S.E.T.A.P. (Société pour l'Etude Technique d'Aménagement Planifiés), with which the firm is associated. The houses have been constructed of concrete block with reinforced concrete beams that have been articulated on the exterior by painting them white. The Treichville Market at Abidjan, by Michel Ducharme* **(9)**, *has monumental concrete piers surrounding an open central space. The two-story enclosing structure has an aluminum-clad roof broken into sections at each column and set alternately at the levels of the top and the bottom of the transverse trusses. There are openings for natural light and air circulation between the sections. The Central Market at Abidjan* **(10)**, *by Henri Chomette, has been built along two sides of the main city square. A prominent framework of exposed concrete bents ties together an inner row of temporary stalls for food vendors and an outer row of permanent shops, both accessible from a central, open walkway.*





1

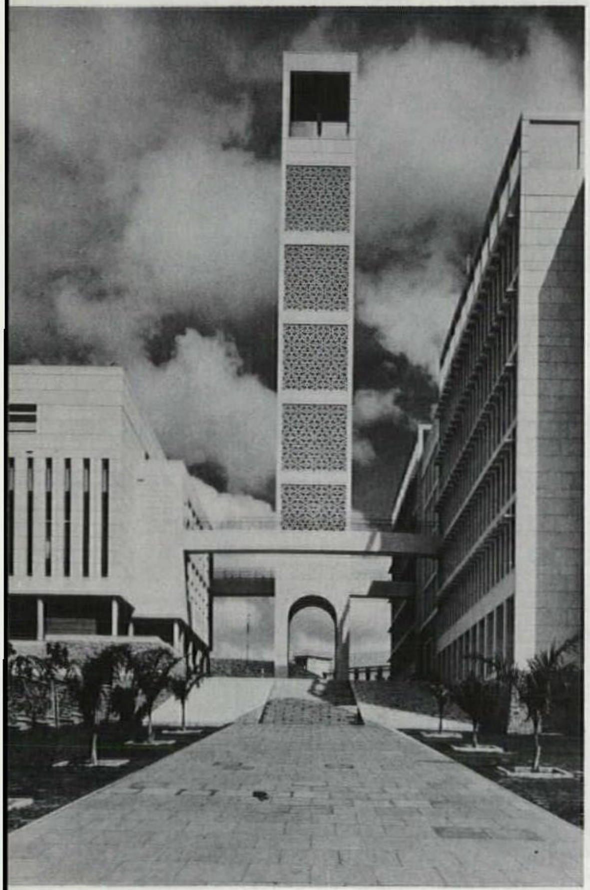
# INDIGENOUS SYNTHESIS

Western architects have made a few fairly successful attempts to design buildings that have a distinct African flavor, reflecting the *genius loci.* Local traditions to chose from are nearly as varied as the continent itself: the rich tradition of primitive building, and Mediterranean and Moslem influences, which have spread along the coast for centuries.

Frequently, the attempts appear only as modern buildings overlayed with decorations of African inspiration. Several better-integrated buildings have avoided this censure of "pseudo-regionalism."

The U.S. Embassy at Accra, Ghana **(7)**, by Harry Weese & Associates, has been acclaimed for its reflection of the spirit of the place. German architect Justus Dahinden has designed a prototype church for the Catholic Missions of Africa that is reminiscent of native building in Upper Volta **(6)**. According to the program, under no circumstances was the church to suggest a European import. Cladding is to be of asbestos-cement sheets, which can be applied without special skill.

In the Parliamentary Buildings at Kampala, Uganda, **(1, 2)** by Peatfield & Bodgener, traditional Moslem details are incorporated to relate the buildings to the predominantly Moslem background of the country. Low-cost housing **(3, 4)** designed for the government of the Ivory Coast at Mona by Lagneau, Weill & Dimitrijevic is composed of two independent structural systems: the galvanized steel roof and its wood supports have been designed for Government-financed prefabrication; the masonry walls, which can be freely laid out to meet specific needs, are to be built



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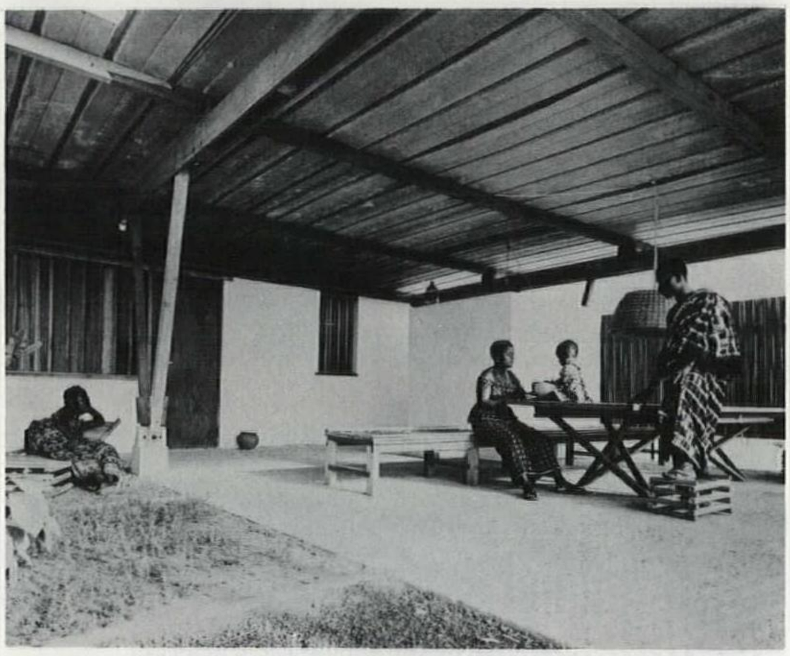

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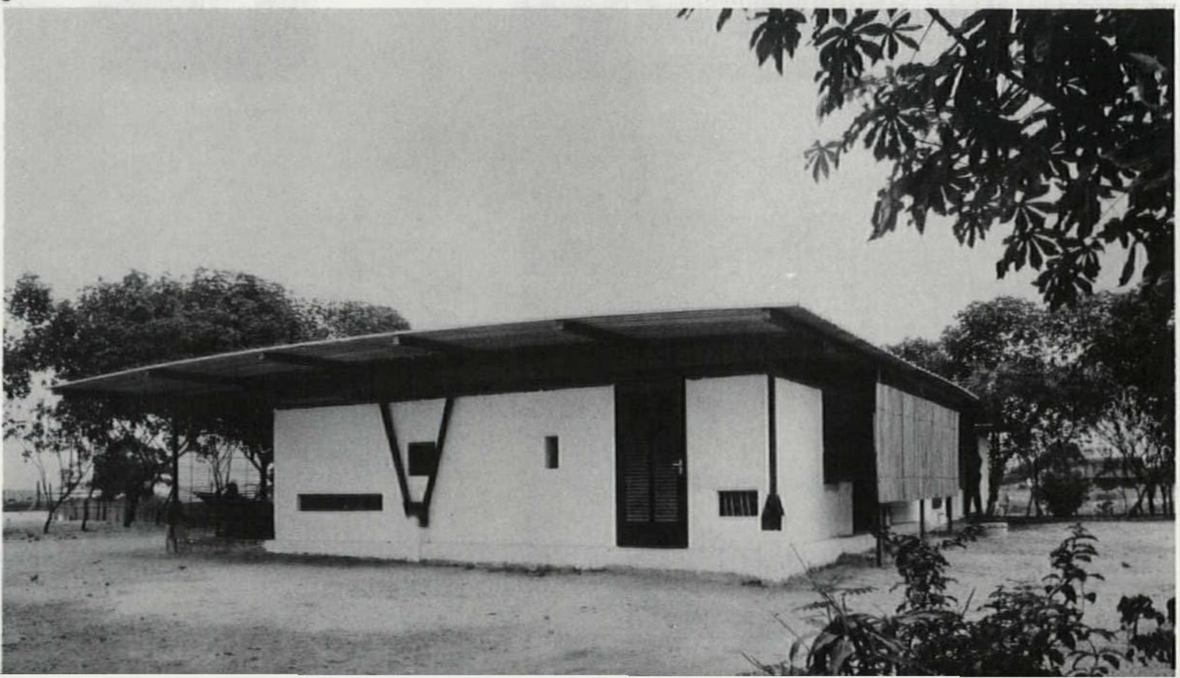
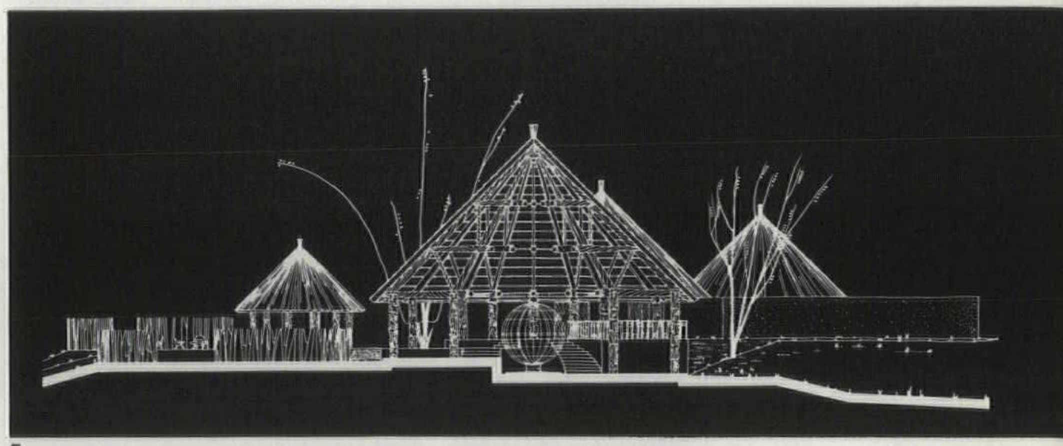


of native materials using communal labor.

Henri Chomette, A. Laget & J. Benoit-Barnet, Architects, planned a group of buildings for the office, bar, restaurant, and kitchen of the Hotel de Sassandra (5) at Sassandra, Ivory Coast. The group was designed to be built of local woods and to give the general impression of native thatch huts. The same architects have surfaced the walls between reinforced concrete columns of the First-Class wing at the Hotel de Cocody, Abidjan, Ivory Coast (8), with bamboo panels (10). A central opening (9) in the thin-shelled concrete roof of the restaurant has sculptural waterspouts to carry rainwater onto a central garden. The form of the vaults and the rainspouts are a functional response to the climate, but they also recall leaf and stem forms of local flora.



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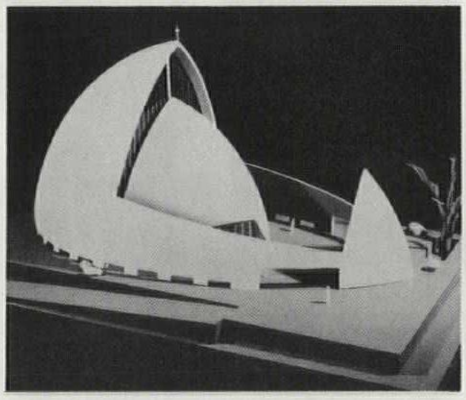

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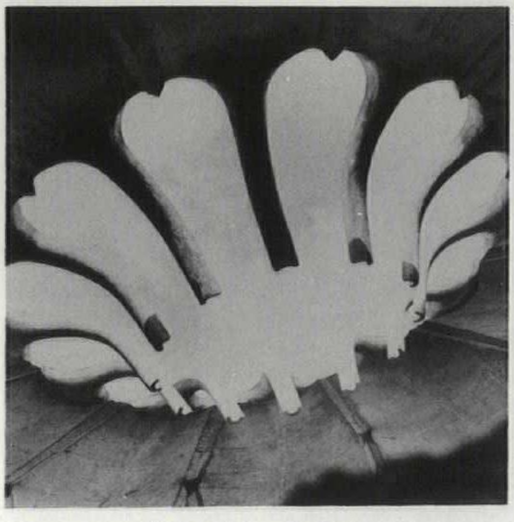

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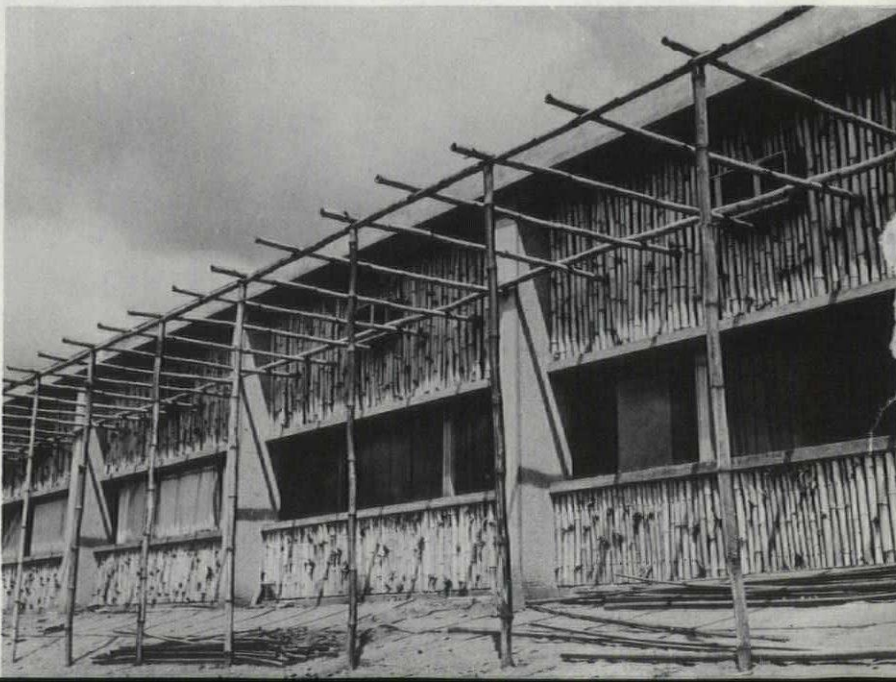
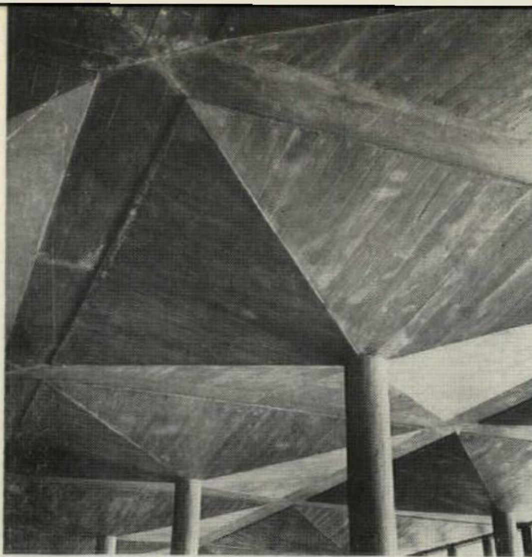
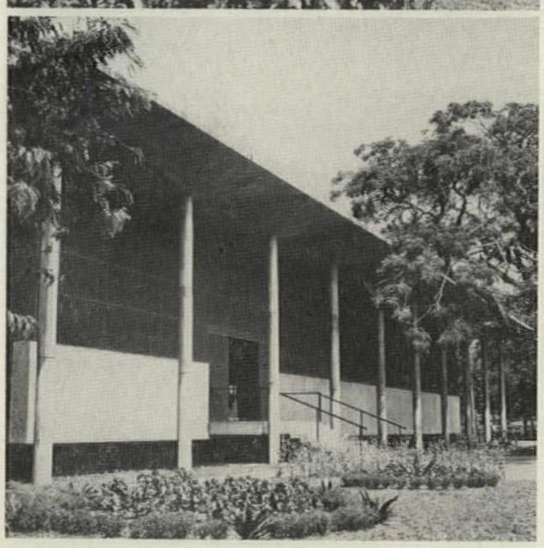






**BANQUE CENTRALE DES ETATS DE L'AFRIQUE DE L'OUST • LOME, TOGO • G. LAGNEAU, M. WEILL & J. DIMITRIJEVIC, ARCHITECTS • IVAN SEIFERT, ASSOCIATED ARCHITECT**

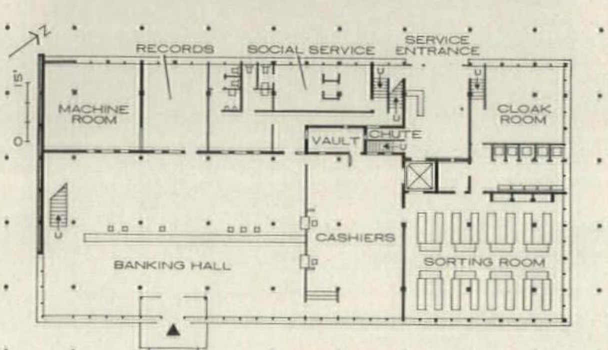
The Central Bank of the West African States (BCEAO) built its Togo headquarters in 1960 on Independence Square at the center of Lomé. The bank was situated to respect some particularly handsome existing vegetation. The site also includes housing for personnel and a residence for the director, connected to the bank by a passageway (*left, middle*).

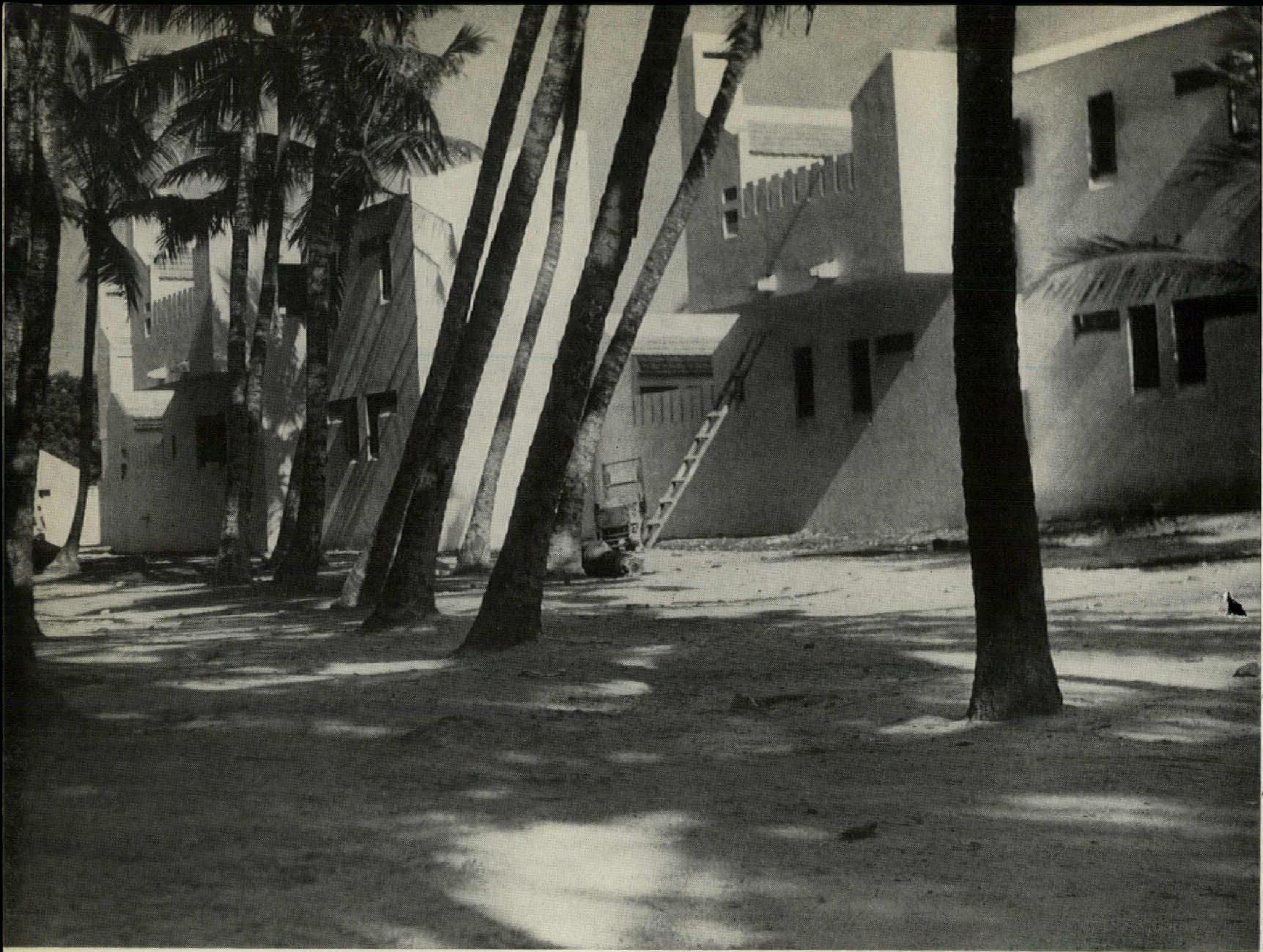
The structure of the bank is of concrete columns that support a roof of concrete parasols. The exterior walls are set back behind the first row of parasols so that the columns on the periphery form a colonnade surrounding the building. Exposed aggregate panels are used at the base of the walls extending up to a height of 6½ ft. Above them the walls and windows are protected by a simple steel grille—one of the requirements of the program.

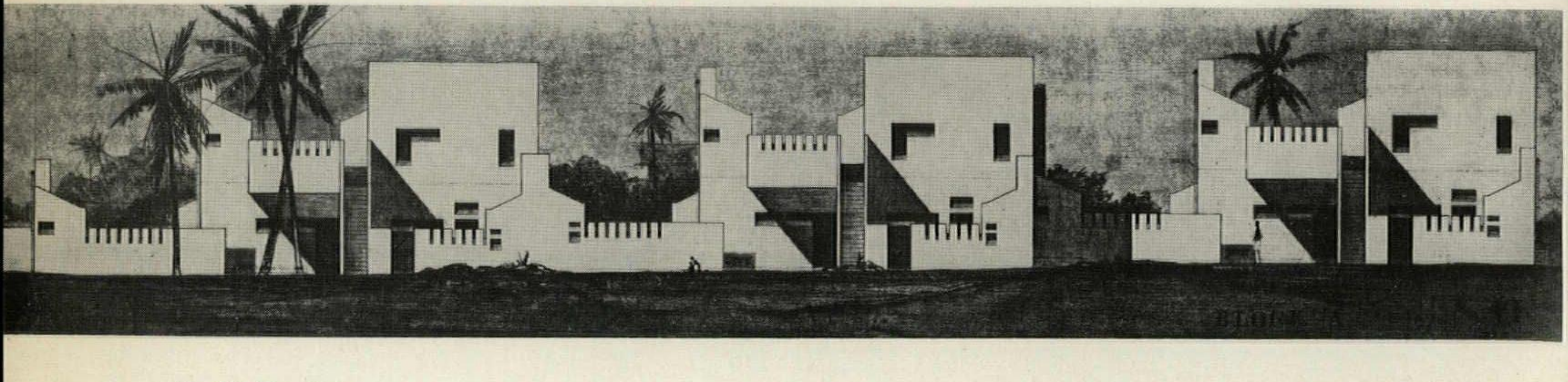
On the interior, flooring and finishing are of Moroccan marble. The entire complex is air conditioned to compensate for the humid, tropical climate.

Concrete has been left rough, with the texture of the carefully constructed formwork. The horizontal bands around the columns, produced by the joints in the formwork, establish the scale of the attenuated columns.

The bank is patently international architecture insofar as its materials and construction are concerned, but the connotations of regionalism engendered by its forms and proportions are immediately apparent.







**JUNIOR STAFF QUARTERS • GOVERNMENT HOUSE, ACCRA, GHANA • DIVISION OF PUBLIC CONSTRUCTION, ARCHITECTS**

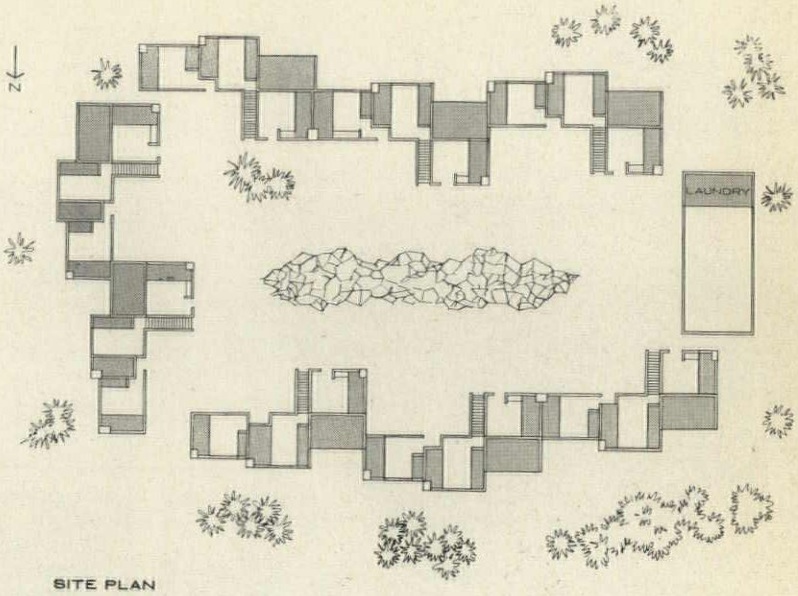
The program for this housing for servants and their families was to provide 24 dwellings that would in appearance be sympathetic to Government House, the official residence of the President of Ghana, which adjoins the one-and-a-half acre site. Government House is a 17th-Century Swedish fort, built on the site of an earlier Portuguese fort; it had been added to by the Danes and British. A considerable part of the original building remains. The architecture also relates to the traditions of the region. The Mediterranean influence, which has affected the architecture of coastal Africa for centuries, can now be recognized as indigenous.

The dwellings are on two levels in groups of three's: two units at ground level and one on the upper level. The groups are arranged as row houses around three sides of a common square. The fourth side is enclosed by a laundry unit.

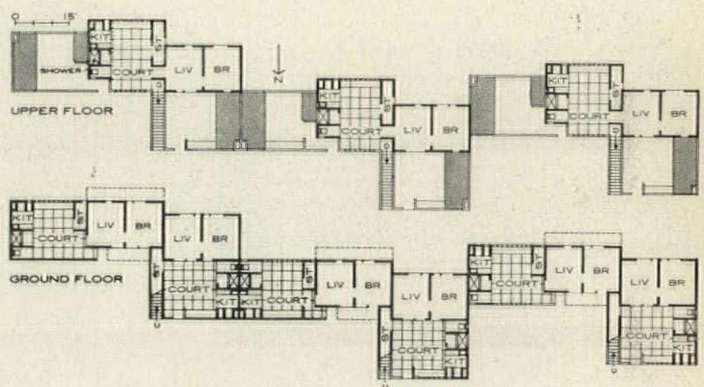
Each dwelling comprises two rooms, kitchen, shower, toilet, and storage facilities, and a walled courtyard for outdoor living and sleeping. The courtyard of each upper-level unit is built on the roof of one of the units below. Deep crenelations in the courtyard walls admit air and permit a view out but at the same time afford privacy and safety.

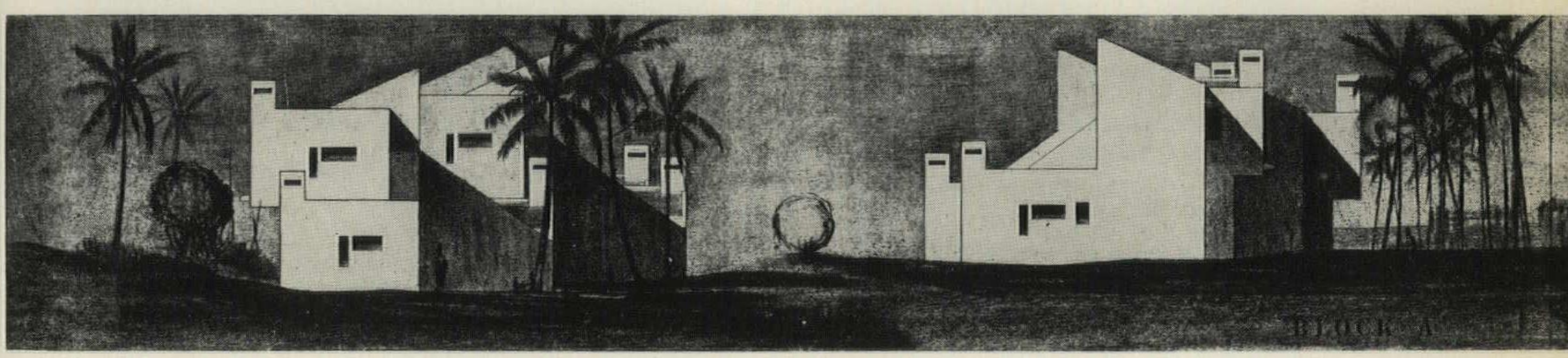
Load-bearing walls are of stuccoed concrete blocks. Floors are of reinforced concrete; the wood-framed roofs are clad with locally made clay tiles.

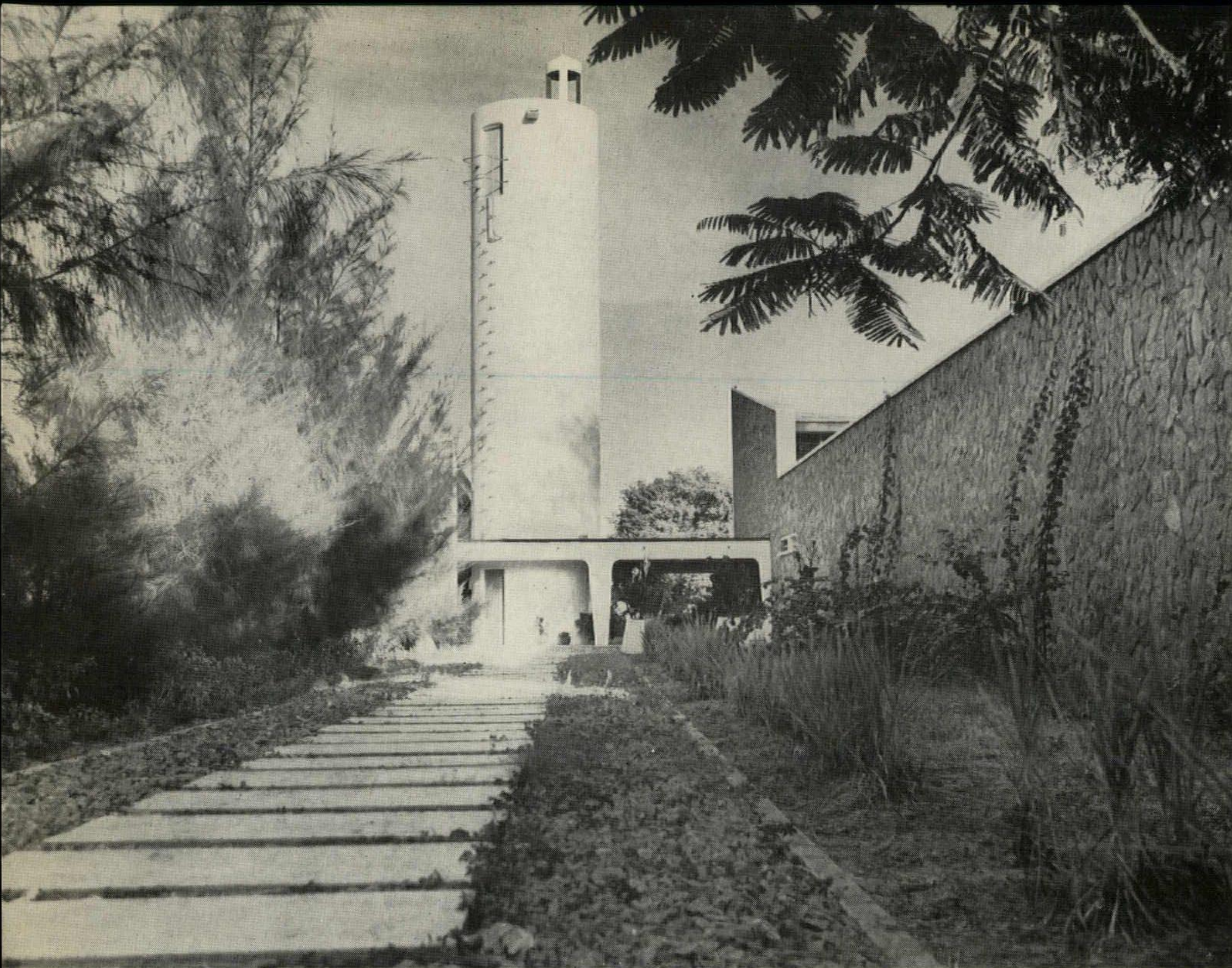
The design is given variety by the staggered setbacks and the overhanging second-story courtyards. The strong diagonals of the stairs to the upper levels echo the lines of the shed roofs.




SITE PLAN





PHOTOS: CORRY BEVINGTON

MEN'S TEACHER TRAINING COLLEGE • WUDIL, NIGERIA • WOMEN'S TEACHER TRAINING COLLEGE • KANO, NIGERIA • FRY, DREW & PARTNERS, ARCHITECTS

The two separate Teacher Training Colleges, elements of which are shown on these pages, are situated in the hot dry zone of northern Nigeria, on the southern fringe of the Sahara. Because of the frequency of dust storms in this region, the architects have enclosed most of the buildings with windows rather than using open screens or louvers as in the humid, rainy zones. Here, also, the daily range of temperatures is greater than in the south; light asbestos roofs have been used, therefore, so that the heat gained during the day will be dissipated rapidly when the sun goes down.

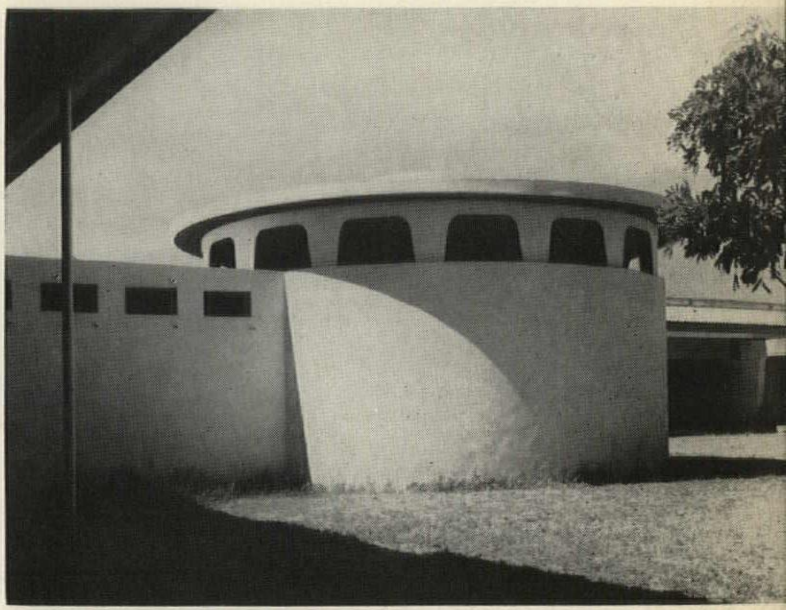
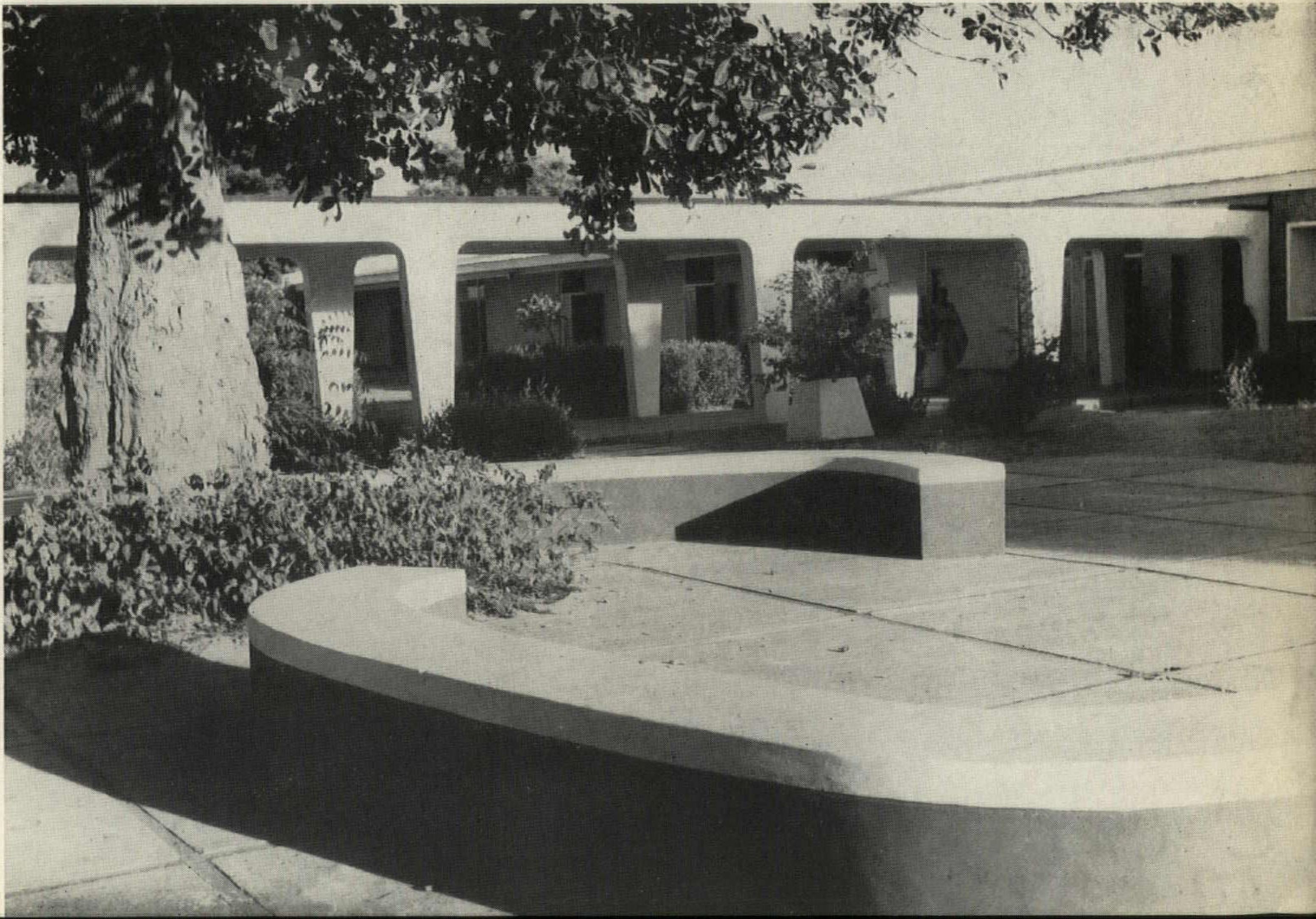
The Women's College is located just outside the walls of Kano and the Men's College is about 30 miles from the city. The location for the latter was chosen for its proximity to a river. Water from this source, which is underground most of the year, is pumped to a water tower *(above)* adjacent to the assembly hall and the kitchen area.

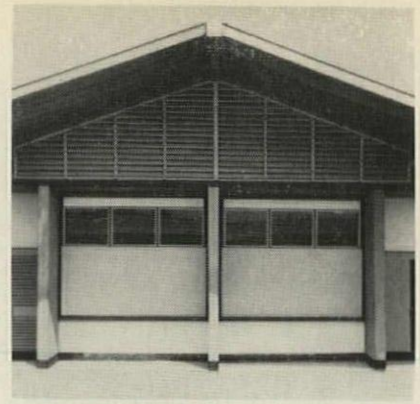
Each college comprises teaching and dormitory wings, dining and assembly halls, kitchens, classrooms, craft rooms, and housing for junior and senior staff. Buildings are grouped around landscaped courtyards *(facing page, bottom)*.

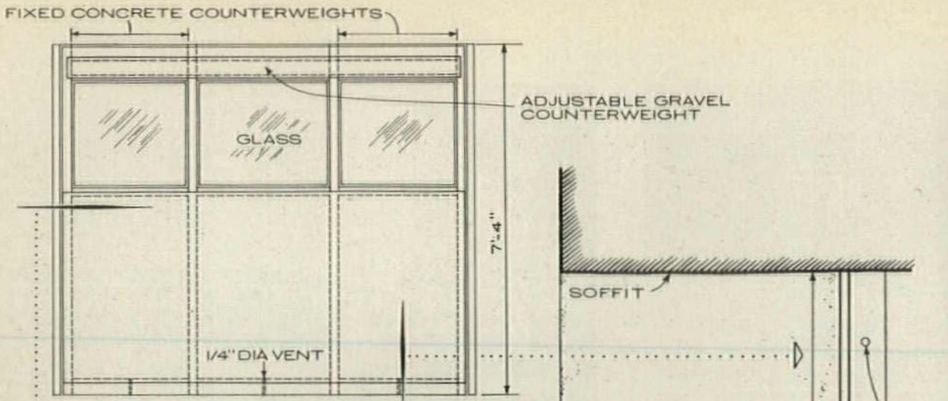
Construction of both colleges is of concrete block, reinforced concrete, and local stone. The juxtaposition of these textures and the sensitive use of native vegetation give the colleges a distinguished yet appropriately simple atmosphere.

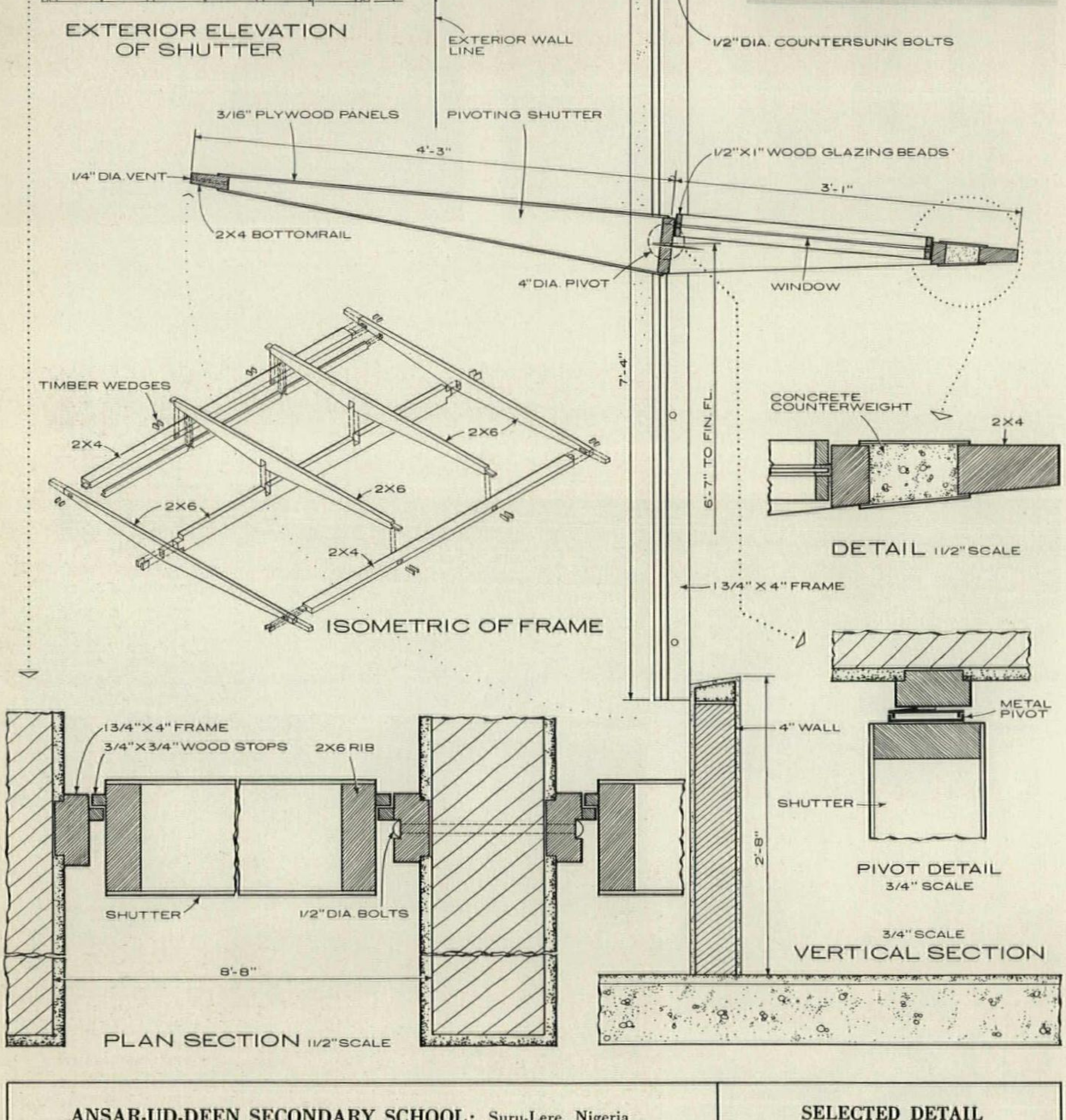
What seems most to give the colleges their distinct indigenous feeling is the use of round forms and the trapezoidal openings with radius corners that are used in the covered passageways and for the windows of the circular buildings at the Women's College *(facing page, top, right)*. The trapezoidal shape recurs in primitive African building: in the doorways of mud huts and, inverted, in the voids between the "zankos" or finials of mosques. In these colleges, both forms are integrated into the design. There is no facile overlay here of decorative details, but a sure step toward a synthesis of modern techniques and indigenous elements.

Whatever lasting synthesis emerges as a perceptibly African architecture must be the development of native African architects trained by Africans in local architectural schools. For the moment, however, one can find satisfaction in the fact that a small group of non-African architects has made solid achievements that point the way toward an architecture for the New Africa.





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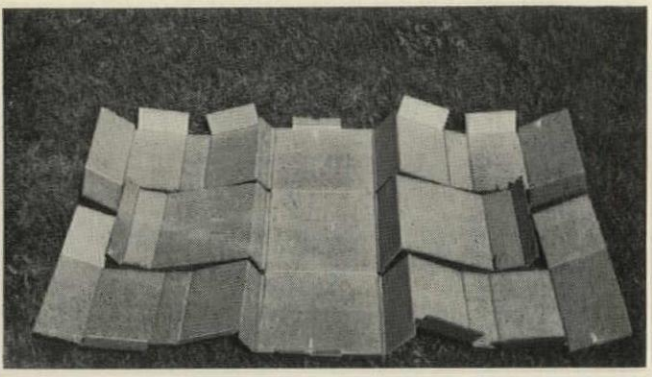
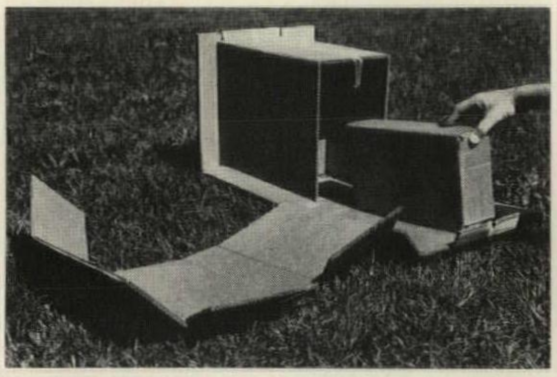
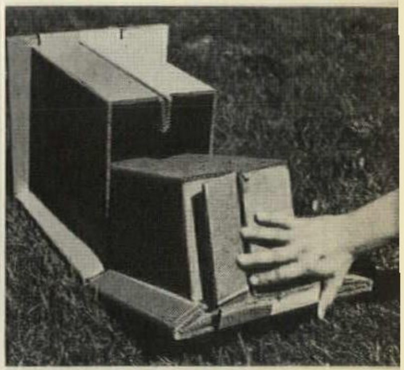
| **ANSAR-UD-DEEN SECONDARY SCHOOL:** Suru-Lere, Nigeria<br>THE ARCHITECTS CO-PARTNERSHIP, Architects | SELECTED DETAIL<br>PIVOTING SHUTTER |







# THE CARE CHAIR

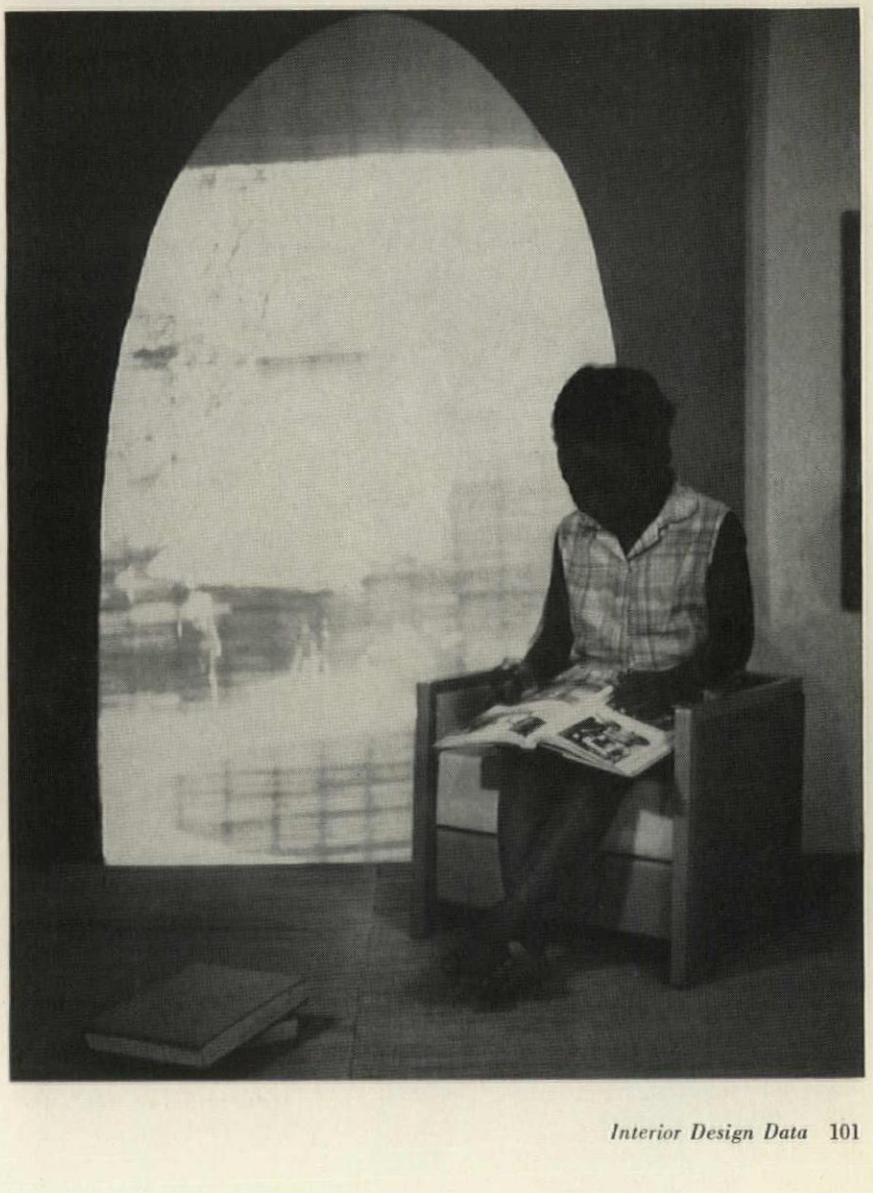
CHAIR FOR UNDERDEVELOPED COUNTRIES • RONALD BECKMAN, DAVID GILCHRIST, AND HOWARD YARME, DESIGNERS

The child in the photograph at right is sitting on a reinforced paper chair whose four different seat heights make it adaptable for children of all ages and sizes. The chair was developed to provide quantities of durable but inexpensive furniture for the world's needy areas.

The manufacture of this furniture makes use of the American technology now devoted to the production of low-cost packaging. Wire mesh reinforced paper panels are die cut, printed with assembly instructions on the inside, and coated with a polyethylene skin on the outside (to withstand moisture, like a milk carton); panels will be shipped flat in stacks. Assembly is a simple folding procedure (*above*); the unit is then secured along its edges by a neoprene strip gasket, which acts as a tension ring.

The boxlike construction has no adjustable parts; a different side is turned uppermost to produce a low-backed chair (10 in. or 12 in. high) or a stool (14 in. or 16 in. high). Each is color-keyed for identity.

The chair was developed under a grant from the Educational Facilities Laboratory to the Industrial Design Department at Pratt Institute. Care, Inc., for whom the chair is named, will send the first hundred chairs to Africa.



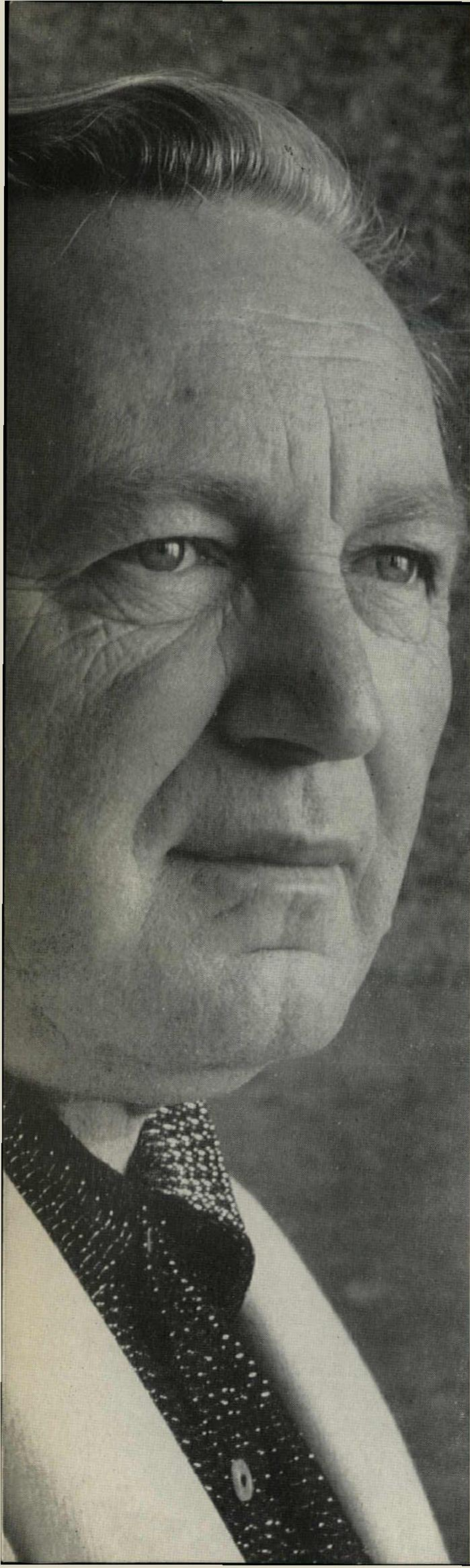


PHOTO: PHILLIP B. WELCH

# Goff on Goff

***"A beautiful idea in embryo has in it something absurd for fools." This quotation of a remark by Debussy is used by Oklahoma architect Bruce Goff in explaining his own approach to design. That many architects will consider Goff's work "absurd" is inevitable. It is also inevitable that Goff will call them "fools." Both these statements, however, have little significance to the development of architectural thought. Of greater significance is whether Goff's ideas, "embryonic" as they may be, are truly "beautiful" and therefore solid contributions to man's enjoyment of his environment. Although Goff is well known throughout the world for his unusual designs, the large output of work coming from his Bartlesville office has received little publicity in the U. S. professional press, and consequently the American architect's knowledge of his work is quite limited. To correct this situation, we present an article recently written by Goff for P/A in which he discusses architecture as an art, and, on the following pages, a representative selection of Goff's designs built during the last ten years.***

Change is part of a scheme of time thought of as the continuous present and, no matter how excellent or well-established things may seem to be, creative artists are always restless and forever seeking new expressions. If they are innovators and extend the horizon of their art, they are usually branded as revolutionaries or radicals by their contemporaries, who fail to realize that what seems to be revolution may only be evolution made apparent. Change brings with it the unexpected and it is this quality of surprise which engages our attention in a work of art; but since we cannot continue to be surprised by the same thing, the quality of mystery becomes necessary to sustain our interest. Mystery, however, defies analysis; no matter how well we come to know a work possessing it, such a work, like Nature, never gives up its secrets.

We are apt to regard surprises of a more violent nature as characteristic of the most revolutionary art, but history teaches us that this is not always the case. Some works which seem at first acquaintance to be most shocking are found upon better acquaintance to be less radical than those of a quieter nature. For example, Stravinsky's **Le Sacre du printemps**, for all its violence, is not more revolutionary than Debussy's more subtle **L'Apres-midi d'un faune**, which has, besides, more of mystery to sustain its freshness.

In the ever-changing, continuous present, there are always those who are part of the cultural lag—those who resent change and are inclined to ridicule what they do not bother to understand. Debussy observed: "One must not forget that a work of art or an effort to produce beauty is always regarded by some people as a personal affront," and: "A beautiful idea in embryo has in it something absurd for fools." Such people accuse the great artists of "going too far" without having the least idea of how far "too far" is. What real artists ever went too far, when judged from the perspective of later years? We usually wish that they had gone further.

Such artists are also said to be "ahead of their time." But how can this be, when necessity forces them to be so much a part of their time? Any idea that can be conceived in our time can also be executed in our time.

Another charge is that artists are "doing things for effect." Any artist must strive for honest effects if his work is to have effect; the important—and unusual—occurrence is when the effects come about.

An artist is sometimes accused of "trying to be different." How can he help being different when he is true to himself and his problem? And are we not grateful for the difference? This charge has been leveled at most of the great artists of the past. Today we think it ridiculous as applied to them. There is always a new group of artists emerging that is blamed for nonconformity—especially (and ironically) by the "avant garde" groups of former days. Those people who are bewildered by the variety of artists and their works forget that we can have harmony in diversity as well as in conformity, with Nature as a supreme example.

The nonconformist artist is under

further suspicion because he may not have a recognizable influence (in his own time) as a "form-giver." Actually there are no form-givers—only form-takers, those who are without the ability or the desire to create something of their own, who can only imitate what inspires them or what is fashionable, who blow with the wind and always play it safe, who are cautioned not to imitate Gaudí because a bad imitation of his work can only end in disaster but are encouraged to ape Mies on the theory that by so doing they can go less wrong. I know an architect who boasts that he copies only the best, but I doubt if he knows what the best is.

We should distinguish between Inspiration, Influence, and Imitation. We are influenced by that which inspires us and this shows at first as imitation; but, unless assimilated, it cannot become our own. If we stop with imitation, we are on a dead-end street, no matter how fine our model. If "imitation is the sincerest form of flattery" it only proves that sincerity is not enough. Debussy complained: "The Debussyists are killing me!" The Japanese have a proverb: "When imitation comes, Beauty goes."

A genuine architect is not a form-giver, or form-taker, but a form-creator. Wright said: "Form therefore shall be the man. Let his forms alone," and: "We must destroy the old before we can begin the new," and: "Every architect must be a radical." Musorgski exclaimed: "Forward to uncharted shores," and when someone complained that his music was too dissonant he said: "Ah! if you only knew what is coming!" Debussy stated: "I am obliged to invent new forms," and: "The anarchists of music are organizing meetings in my head and are stirring my poor brain with their red flag of revolt." He continued: "Each period must possess its own peculiar art, harmonizing with everything else. The age of aeroplanes has a right to its own music. Every musician should create the forms necessary to the expression of his genius. He should not employ standard forms, no matter how admirable may have been the masters who established them in other days, with different motives and without realizing that they would become rigidly stereotyped." Debussy knew "how much we must first discover and then reject before we reach the naked truth of inspiration."

Even though Sullivan was inspired by Richardson and Wagner; Wright by Sullivan and Beethoven; Gaudí by Spanish Gothic and Arab work; Mendelssohn by Wright; Corbusier by Perret; Mies by Schinkel and Wright; Wagner and Musorgski by Liszt; Debussy by Wagner, Rameau, and the Javanese gamelans; and Varese by Debussy, each of these men had the good sense to take a stand of his own. That is why we know of them, for their works stand as individual creative efforts of individual creative artists. This has always been so, but sometimes the names are lost in history and we lump them together as those Egyptians, those Chinese, or those pre-Columbians. However, we may be sure that somewhere someone had an idea. Before we became so familiar with Japanese art, people spoke of such different individuals as Hokusai, Hiroshige, Okyo, and Korin as "those Japanese." Imagine classing Leonardo da Vinci, Rembrandt, Klimt, and Duchamp as "those Europeans." The temples of Karnak, Poseidon at Paestum, and Angkor Wat, Rheims Cathedral, the Ise Shrine, the Governor's Palace at Uxmal, and the Golden Pagoda at Rangoon—all had their architects, whether we now know their names or not. Any work of art has necessarily had a creator and we may be certain that he was an individual and not a team. What masterpiece of music, literture, sculpture, or architecture was ever conceived by more than one individual with a single idea?

Those who insist that art be the work of teams and worship the concept of anonymity do so because they have nothing of their own to offer. They want to establish an architectural vernacular so that all can speak, whether they have anything to say or not, working with predetermined forms established by others. Such predetermined forms, into which ideas are forced by the cunning hands of the manufacturers of art, are, at best, inadequate and artificial. This is because the ideas themselves must generate drive or compulsion to create their own forms, guided, controlled, and disciplined by the artist's creative imagination into an ordered whole. In this way every creation becomes its own style and its maker is unafraid of change. His individual works will, of necessity, be different from each other. How much more rewarding than works all cut from the same bolt of goods, no matter how fine the pattern! Some artists believe that they must have a trademark so that from the sameness of their work others will know it is theirs. Debussy once warned: "The struggle to surpass others is never really great if disassociated from the noble ideal of surpassing oneself, though this involves the sacrifice of one's cherished personality. Why cling to something one knows only too well?" What an artist says with each new work is then more important than his handwriting.

Today, as always, there are in all the arts many different individuals doing different work—so many that, to some, there is only confusion. Philip Johnson has said: "Around me is confusion—I am happy." A critic of the stature of Mumford can see no way out but to return to the early work of Wright and Maybeck as inspiration. Many believe that artists have, to paraphrase Stephen Leacock's famous quip, "leapt upon their horses and ridden madly off in all directions." We are indeed fortunate to have all these creative activities in our time, but because we are so close to them, it is difficult for us to see the trees for their leaves, and to see the forest for its trees. But is it not possible that in all of this diversity we can find a new harmony? Debussy had this to say of the same situation in his time: "Where have we anything in the way of joint action, general direction? In former times there were perhaps periods of discipline or what appears so to us from the distance, where individual efforts harmonized. But today each goes his way, seeks to develop his own personality—if he has one—or endeavors to imitate the personality of his neighbor, exaggerating it to the point of exasperation—and that is all. As for tomorrow, I do not know: Who can foretell? Does the keen competition which creates such intense rivalry among artists portend the birth of a common deal? Does it spell despair? Nothing of the sort. Music will come to life again. Let us work, each according to his inspiration. The future will decide which works are masterpieces."

As for Inspiration, most artists are free to pursue it when and if they feel it, but the architect must summon it to order. If he is inspired to do a beautiful cathedral, and must instead design a skating rink, he must quickly gather the inspiration to design a beautiful skating rink. He must constantly take in, in order that he may give out. Many who have inherited their talent treat it as they would an inheritance of money in the bank; they continue to write checks on it without depositing more or compounding interest, until their account is overdrawn and they are writing bad checks. The possession of creative talent is not rare, but using it toward some end is rare indeed.

Wright quotes Lao-tze as proclaiming: "The reality of Architecture is the space within," but this is only part of it. There is also the "space without" and the medium defining this space. Wright cautions us to recognize and respect the "nature of materials" and reminds us that: "A board must be a board-board and a brick a brick-brick," but this, too, is only half the truth if we merely fill in predetermined forms with such materials. Our materials must be so integral with the concept of the forms that they help determine the character of the forms. Most materials are more interesting before they are used; their individual character, which is full of potential suggestion, is immediately lost when they are enslaved by predetermined forms. Debussy's flute melody at the beginning of **L'Après-midi d'un faune** could be played on a clarinet or a violin but not without loss of effect because the color and timbre of the flute help shape the melody itself. The forms of concrete at Taliesin West could have been of brick or other material but not without loss of character, nor would Corbusier's **Poeme Electronique** have been the same if of any other material. In any work of art, the character of the media must be considered a part of the initial concept.

And so, as Edith Sitwell wrote: "Man must say farewell to parents now." Enough of Sullivan, Gaudí, Wright, Mendelssohn, Corbusier, Mies, and all the others who have contributed so much to the splendor of the present. We of the present have our own work cut out for us; we too must continue to reevaluate principles and to discover and invent new ones. We can never afford to become immune to commonism, which is just as dangerous to free individuals as communism. Architecture is for people and not only an abstraction; but it is an art and not only a commercial commodity. Architects must learn more of the mechanics of design, of their media, and must develop their technics. Debussy gave music freedom from outworn formulas. Who will give it to Architecture? We must continue as part of the continuous present. If we stop moving, we are dead!

"Neither old or new, so far as architectural fashion is concerned, but timeless," says Goff, describing his best known project, which was begun in 1951 and "will probably never be completed, because it is intended to keep growing." Although known throughout the world, the house has nevertheless remained something of a vague legend to American architects.

The Bavingers brought to the project some unusual ideas and requirements: They "disliked the idea of living in the usual conglomeration of little boxes with holes cut in for doors and windows." They wanted a single large open space which would fill all the functional needs of a family of three and accommodate a large collection of interior plants. They were willing to build the house over a period of years, largely by their own labor, with the help of students from the University of Oklahoma.

Goff describes the evolution of the design: "They chose to build outside of town, on a site characteristic of this part of Oklahoma. The natural beauty of the site was disturbed as little as possible. There was a clearing at the edge of a lake, which was scooped out and became the first level of the house.

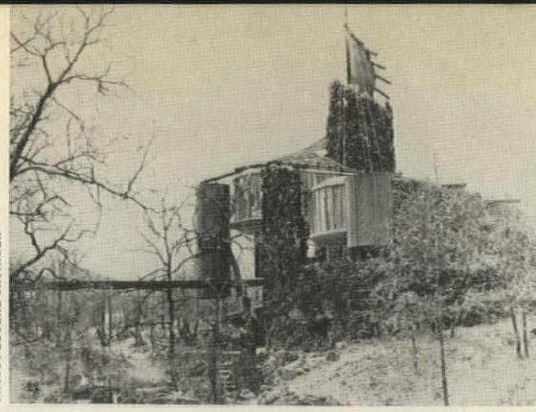
"The sandstone rock on the site was used in a continuous wall 96 ft long, which takes the form of logarithmic spiral crawling up and out of the ground near the entrance and coiling around a steel pole, from which the entire roof, the interior stairs, the living area bowls, and the bridge are suspended.

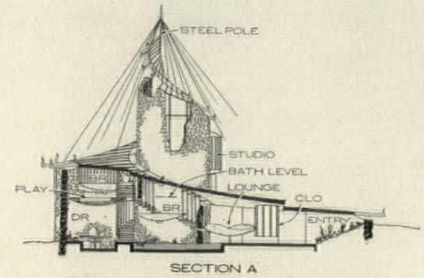
"The ceiling spirals upward to a height of three stories at the center. At no time can we see the entire interior space. It is treated as a conservatory for plants and birds, with five living areas in the form of carpeted bowls, suspended from the center coil and stepped up at intervals of 3 ft, each one having its satellite circular closet, sheathed in copper.

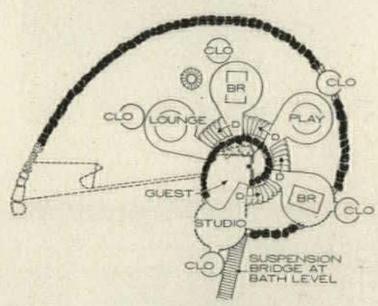
"The planting areas around the perimeter are lighted by a continuous glass skylight that follows the spiral roof upward. Another skylight follows the stairway around the inner coil wall.

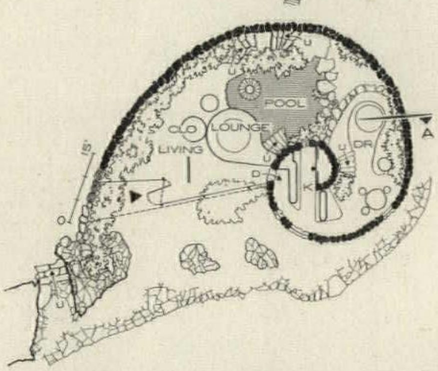
"Thus the entire interior is a continuous flow of space, wherein neither walls nor floor and ceiling are parallel. Here, more completely than in any other house of its time, is an architectural expression of the way of life of the client, a sense of living in space three-dimensionally, with furniture integral with the house itself, and close integration with nature indoors and out."

PHOTO: EUGENE BAVINGER

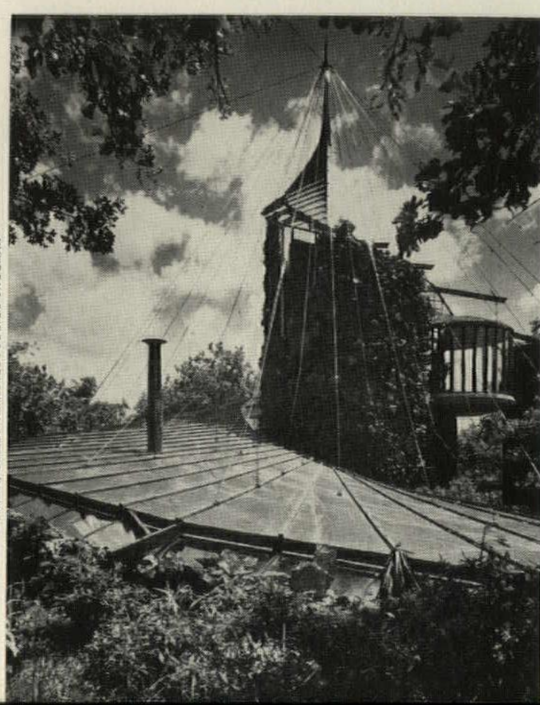


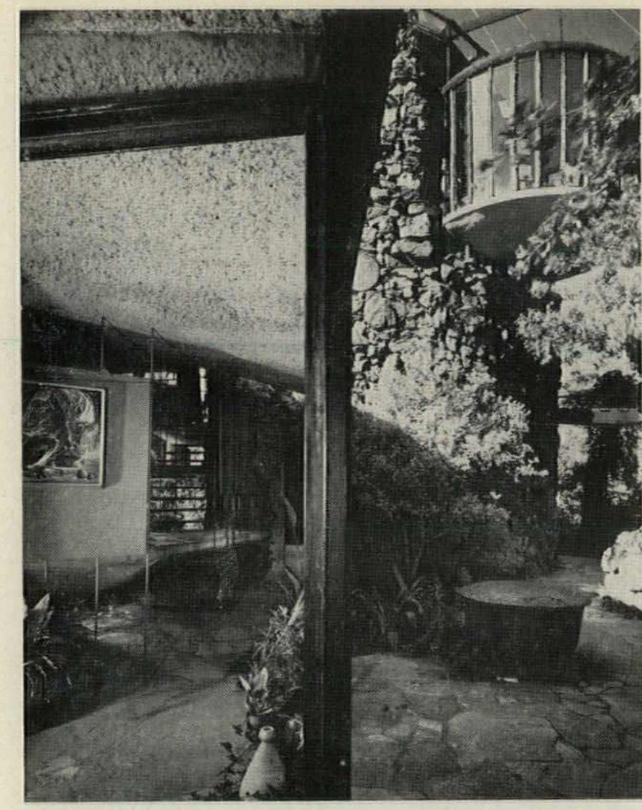


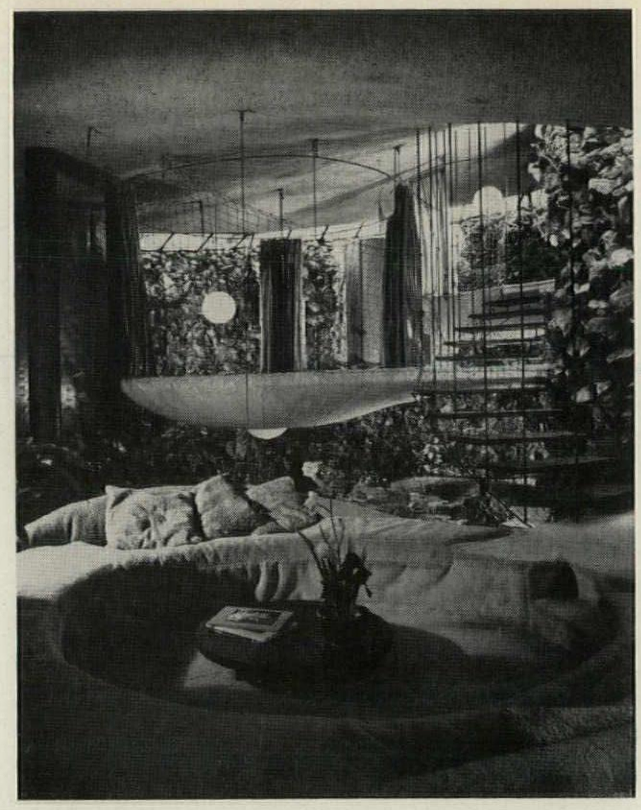



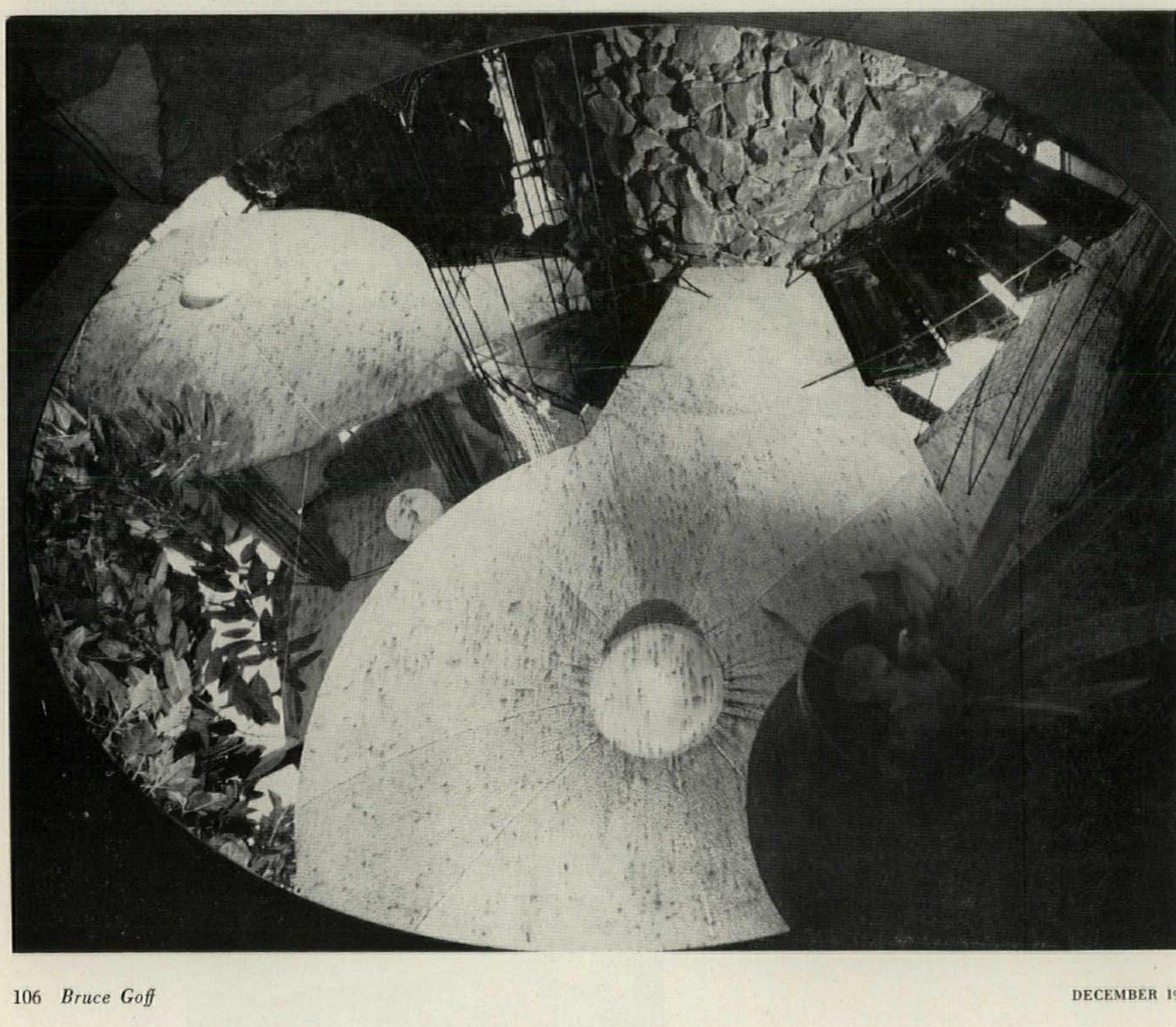




PHOTOS, EXCEPT AS NOTED: JULIUS SHULMAN









*From the entrance door* (facing page, top left) *one can see the circular studio cantilevered over the terrace. Overlooking the elevated circular lounge* (facing page, top right), *is the suspended saucer of the parents' sleeping space, which can be curtained for privacy. Across a pool from the lounge is the dining circle* (above), *with the child's play space directly above it. The mirrored top of the dining table* (facing page, bottom) *reflects the carpeted undersides of the hanging saucers.*

PHOTOS: JOE PRICE

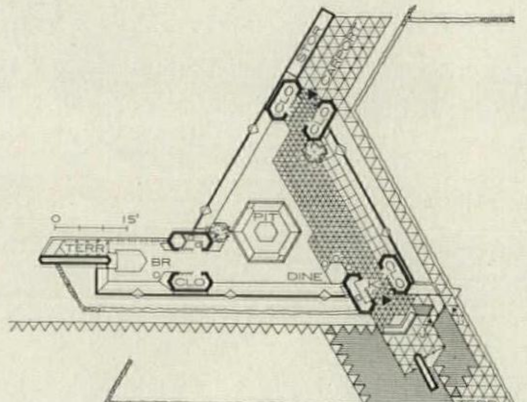
BACHELOR'S HOUSE • BARTLESVILLE, OKLA.

"A bachelor's home is basically different in requirements from a family home," says Goff in speaking of this recent house (hitherto unpublished in the United States), "especially if the bachelor is an internationally known photographer and world traveler whose sensitivity to beauty has made him a continual collector of art objects. He advised me, if I ever had to choose between beauty and utility, to choose beauty. Fortunately, this distinction did not have to be made."

The design of his house is based on a 3-ft triangular module in both plan and section. The large triangular studio extends outward in three wings, each of different function and design. One is a carport, another is the bedroom, and the third is a screened porch, the floor of which is a story lower and opens onto a terrace, barbecue pit, and water garden.

Three large laminated wood beams are cantilevered to support the ceiling of the main room and extend outward to terminate in outdoor lanterns. The exterior of the sloping walls and roof is covered with gold-anodized aluminum; hard coal and glass cullets are used for the masonry, inside and out.

The walls slope outward so that one may recline against them while sitting on the floor. There is a conversation pit with a mosaic-topped bar and record player. Thick white nylon carpet over sponge rubber padding covers the floor, the banquettes of the conversation pit,




and the lower part of the wall. Part of the floor is white vinyl, for dancing.

Two ceiling panels near the roof window of the studio are covered with white goose feathers. Indirect lighting comes from stamped gold-anodized aluminum coves and from behind glass cullets in the walls and water garden.

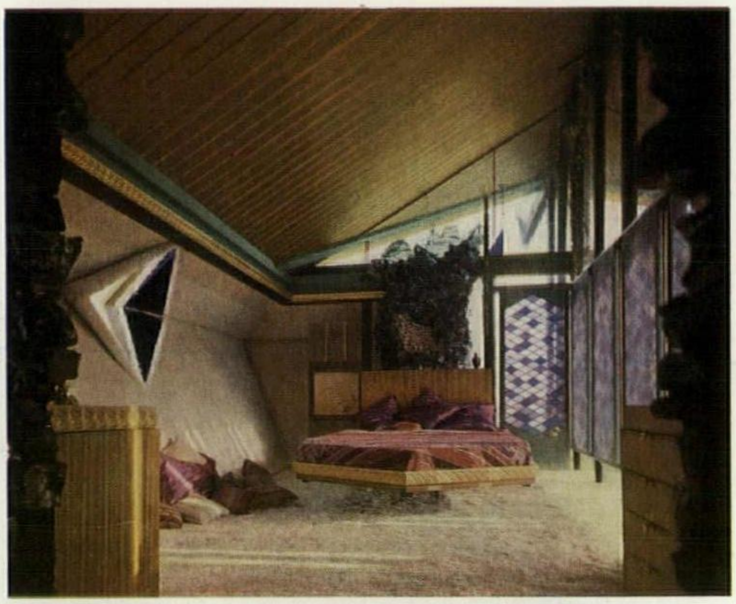
All furnishings were designed by the architect, who also executed the large pivoted glass doors, which are made up of laminated tile, glass, mirrors, beads, sequins, etc. Cabinets are of African zebra wood. The photograph storage cabinet has a double top that opens up to exhibit photographs against the sloping wall. Stools, porch trellises, fences, and table supports are made of cast aluminum. The hanging plastic "rain" above the conversation pit sways gently with the air currents.

"Although the effect is rich and luxurious, the house meets all requirements of the owner. He required a place where he would not feel lost, when in it by himself, and yet capable of accommodating many people comfortably for entertaining.

"The owner's love for the Orient and the South Seas is reflected in his way of living on the floor and in the many art objects. The owner says the house is always nice to come back to from his travels; he calls it his 'cultural refuge'."

COLOR PLATES: COURTESY L'ARCHITECTURE D'AUJOURD'HUI

*The triangular main room* (facing page) *is the center of all activities. The hexagonal dining table is surrounded by stools with delicate aluminum frames, upholstery in jewel-like shades of blue and green. Above the conversation pit* (below), *are rustling curtains of gold-colored plastic "rain." A continuous carpet of white nylon covers the floor and seats. The only other major room is the owner's bedroom* (right), *where light admitted through colored glass windows enhances the rich fabrics of bedcover and pillows.*



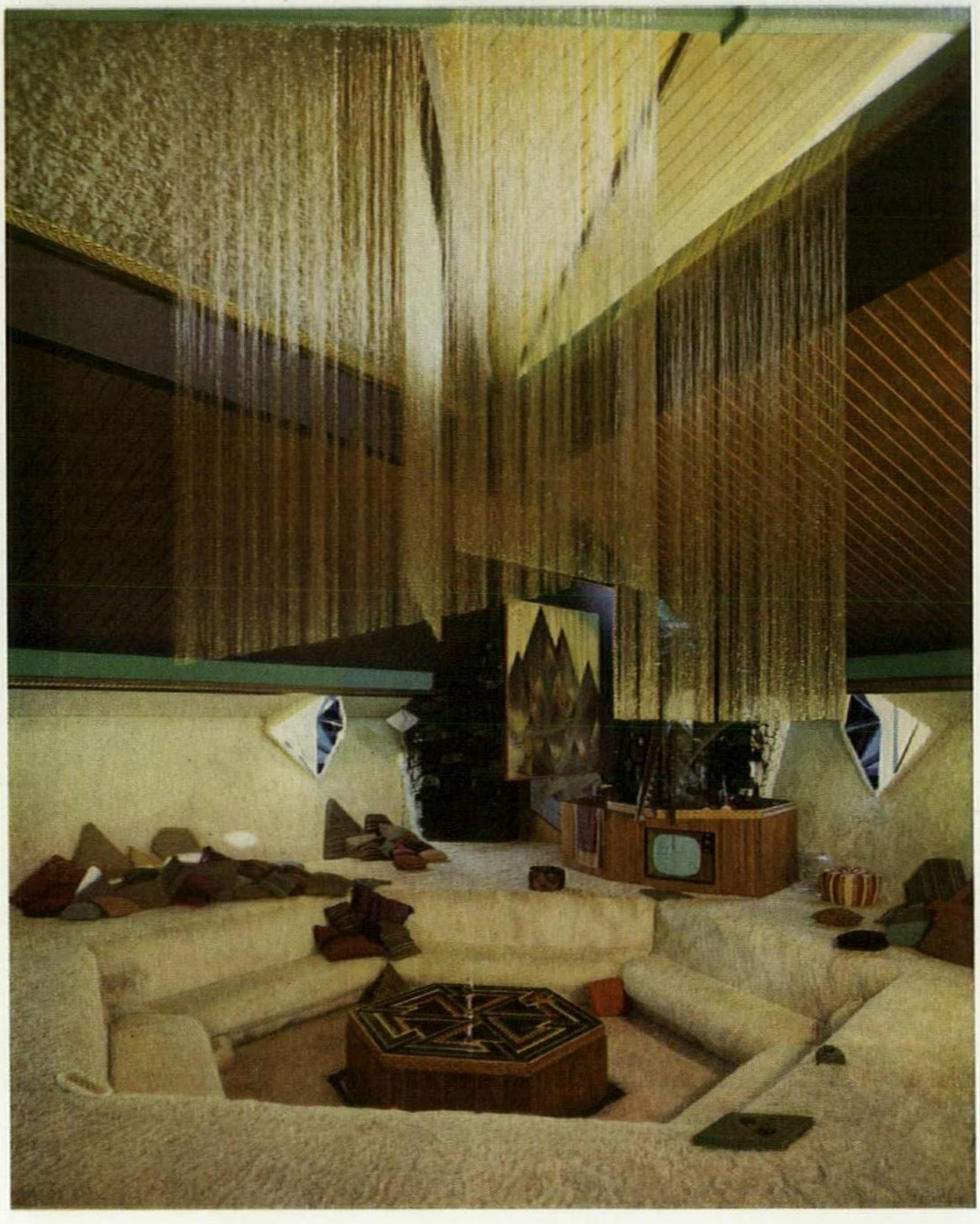
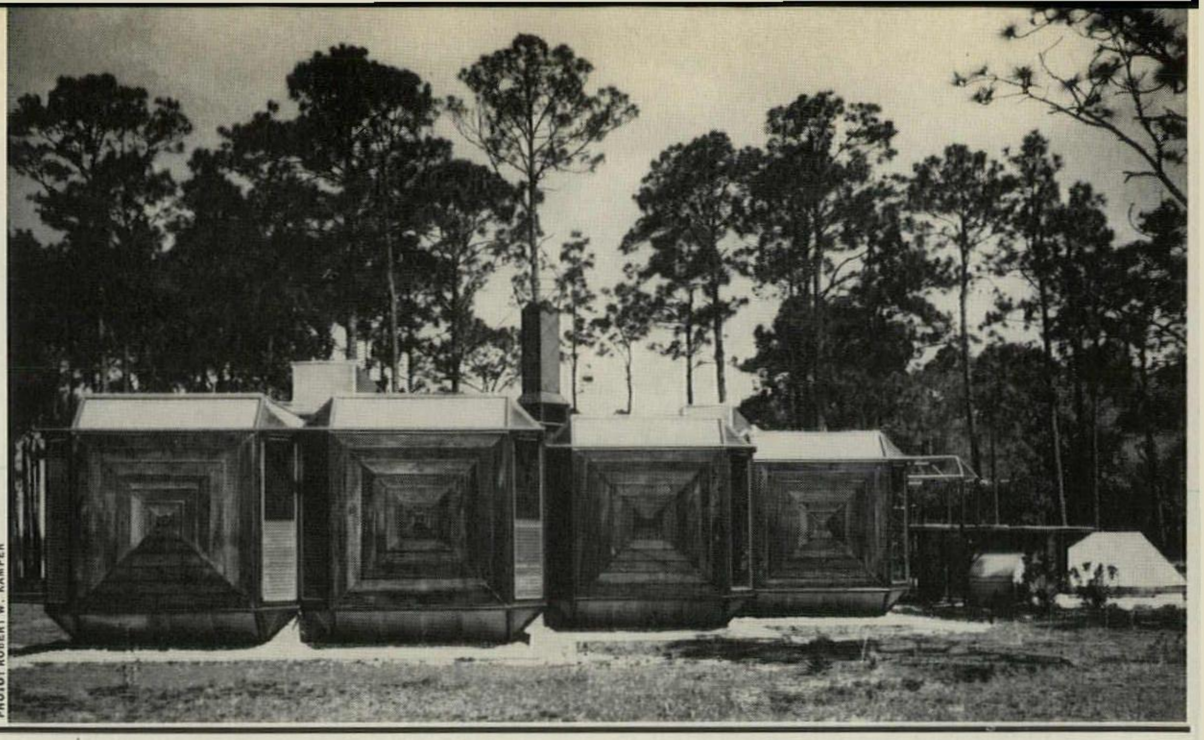
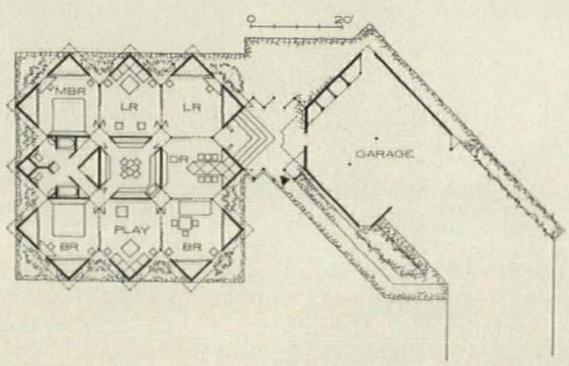


PHOTO: ROBERT W. KAMPER

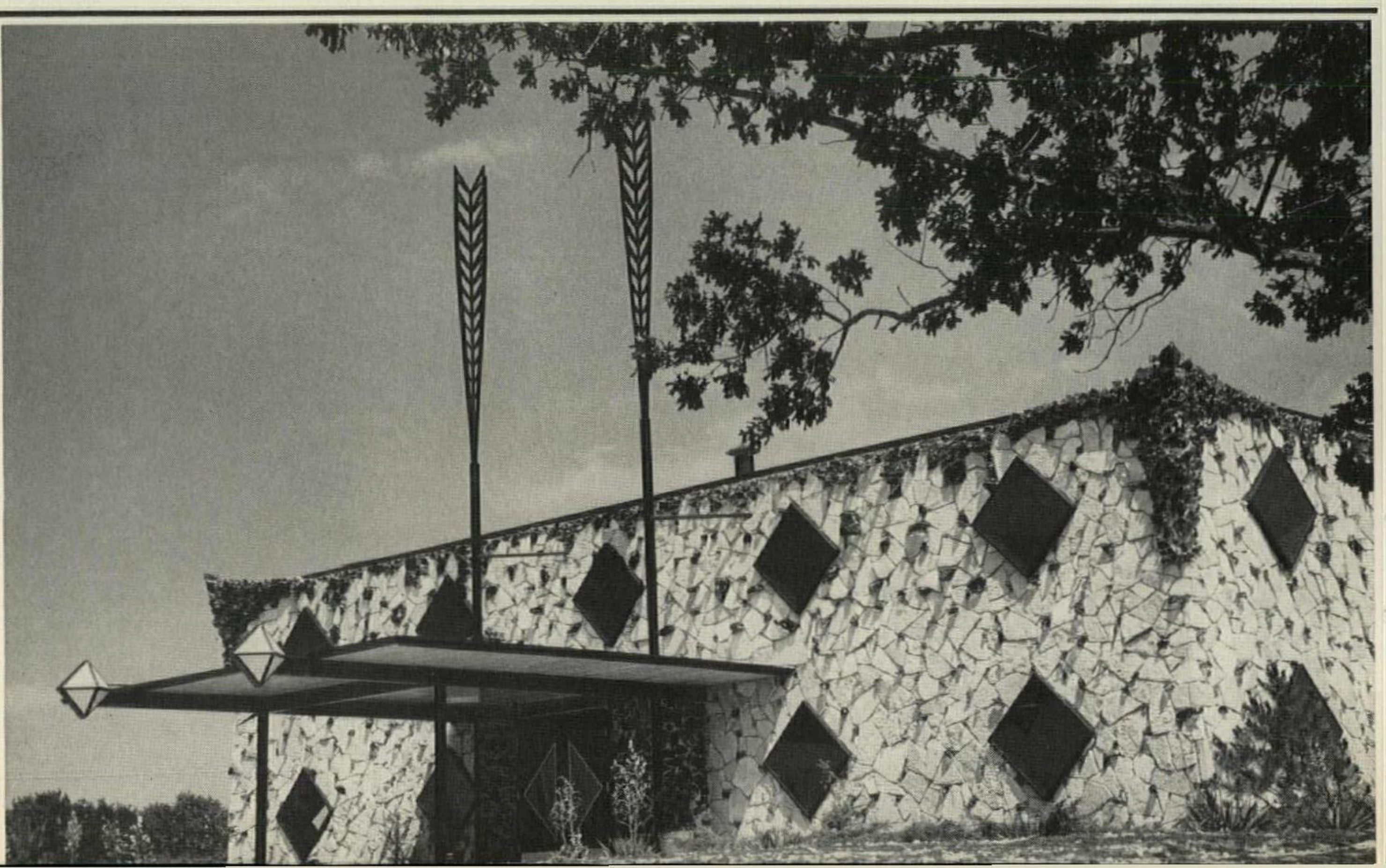





POLLOCK HOUSE • OKLAHOMA CITY, OKLA.

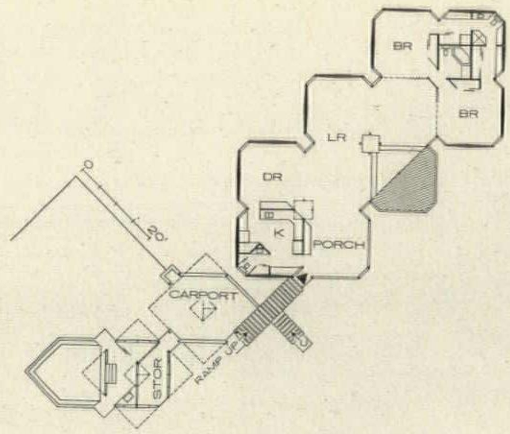
Nine interlocking squares, each corresponding to a room or functional area, make up the compact plan of this suburban house. Each modular space has its own hipped roof, set diagonally over the walls so that the corners dip almost to the ground. A central skylight over each space repeats the shape of the roofs. Similar forms recur in the translucent plastic canopy over the screened entrance porch. Windows in the re-entrant corners, screened by foliage in stone planters, assure privacy from the close neighbors.

PHOTOS THIS AND FACING PAGE: JAN C. ROWAN



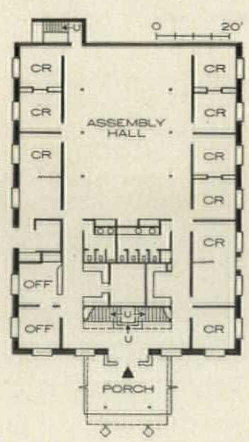
WILSON HOUSE • PENSACOLA, FLORIDA

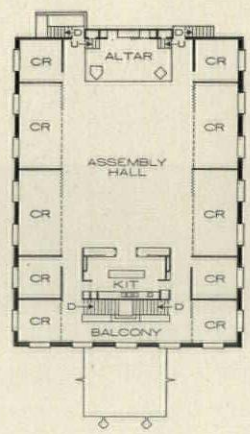
A cube 14 ft on a side is the space module of which this entire house is composed. Each of the modular spaces is sufficiently intimate for one or two people, yet added together they provide an appropriate space for large-scale entertaining. Each cube is framed in welded boiler tubing. Clipped to the framing are prefabricated redwood-faced wall panels, similar in appearance inside and out. The beveled corners have been filled in with glass jalousie units to provide cross ventilation and a sense of spatial continuity. Corrugated translucent plastic panels at the roof-line provide additional light.



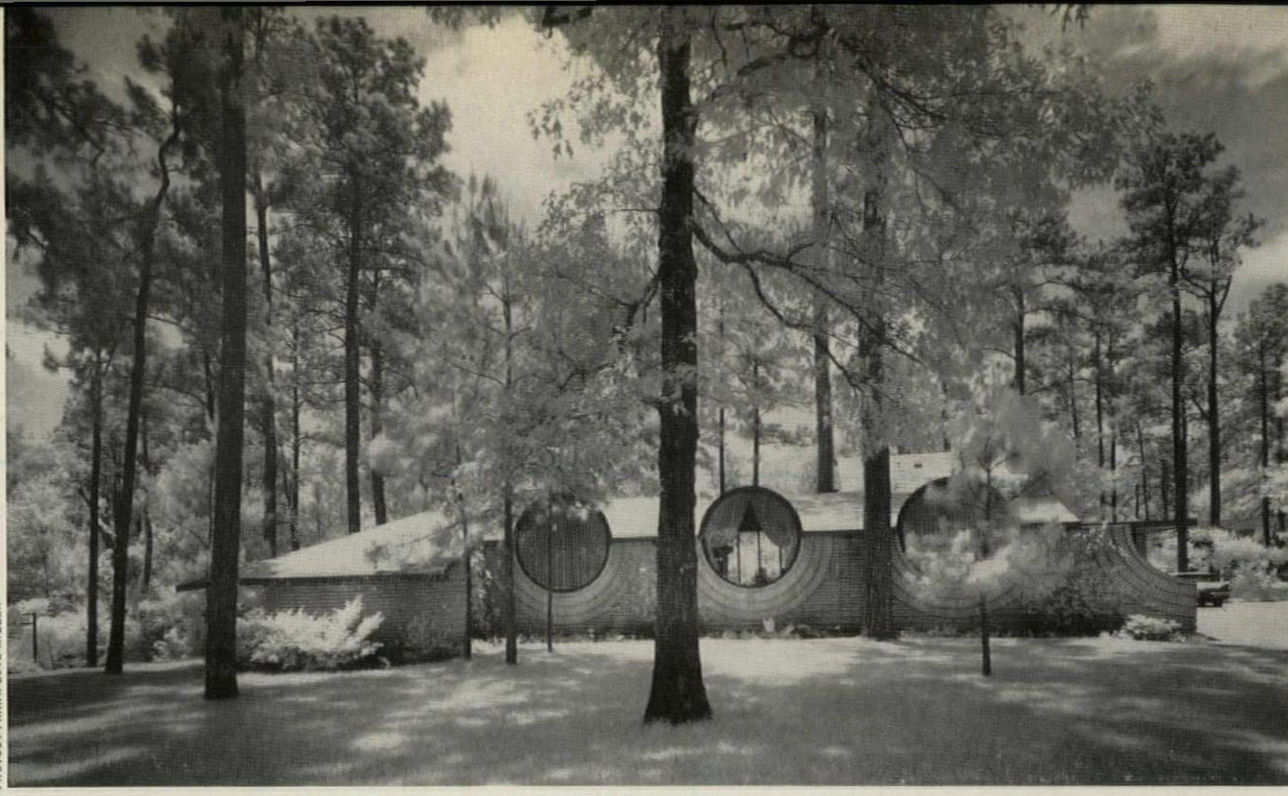

REDEEMER LUTHERAN CHURCH EDUCATION BUILDING • BARTLESVILLE, OKLAHOMA

The first element of a projected complete church plant, this building was designed to provide education space within a low budget (final inclusive cost: $10.25 per sq ft). The walls of the simple rectangular structure are built of reinforced core-filled concrete block. A facing of random stone, with glass cullets along the roof-line sweeping up into ears of glass at the corners, lends it some of the spirit that one expects in Goff's work. The square windows turned diagonally give children of all sizes an opportunity to see out. The flame-like finials of the steel canopy supports rise on either side of the glass-cullet-walled vestibule (*see cover*). The future sanctuary will be built entirely of glass cullet.

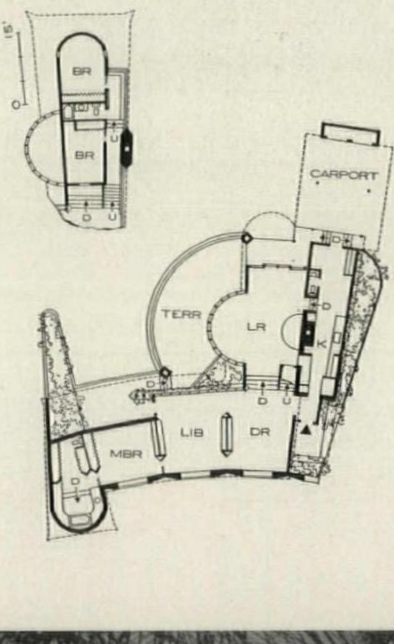


PHOTOS: FRANK LOTZ MILLER

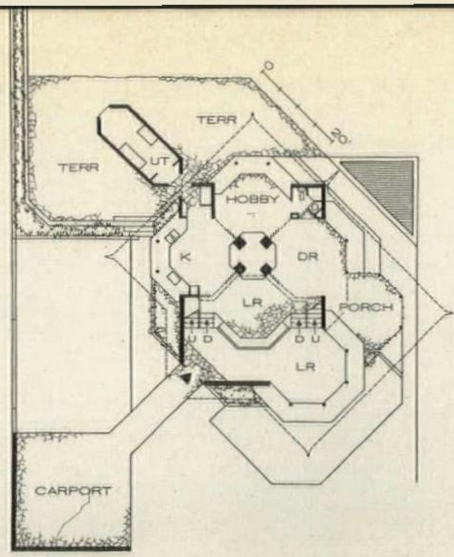


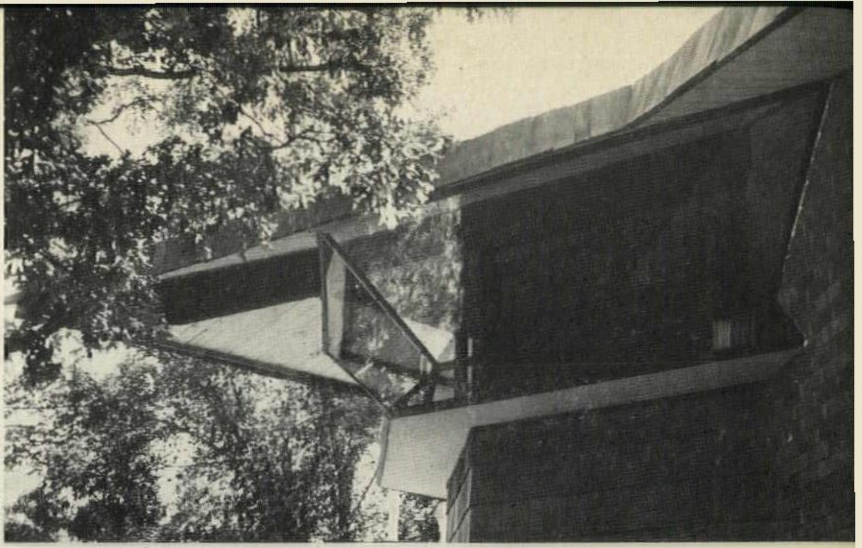
DURST HOUSE • HOUSTON, TEXAS




The design theme of this house derives from its location on a turnaround at the end of a cul-de-sac. The principal lines of the plan radiate from the center of the turnaround, and the roof plane rises steadily away from it. Within this geometrical framework, however, the house has been freely laid out to meet the owners' specific needs and to preserve the existing pines.

The circular motif is taken up in the three front windows, the apsidal ends of two wings, the terrace, and the circular bay of the recreation room. It also appears in details such as the joints of the carport frame, the planters on the terrace, and the cutout where a pine passes through the roof overhang. The theme is accentuated by the radial pattern of bricks around the front windows and the deep shadow lines of bricks and shingles on the curved wall surfaces.



PHOTOS: JAN C. ROWAN

JONES HOUSE • BARTLESVILLE, OKLAHOMA

The plan of this house is based on an octagonal module large enough to constitute an entire room. Four of these modular spaces are clustered about a central four-way fireplace. Rectangular areas at the corners of this cluster are used for stairs, storage, and a lavatory; additional octagonal modules contain an extension of the living room and a screened porch.

Floor levels vary to follow the slope of the site. A mezzanine above three of the central rooms contains bedrooms and baths.

Windows of unusual faceted design, with wide sills, provide excellent display places for the owners' collection of early American glass. A skylight around the central chimney lights the interior.

MOTSENBOCKER HOUSE • BARTLESVILLE, OKLAHOMA

The owners of this house wanted all rooms to be on one level, even though the site had a substantial slope from one side to the other. The house is laid out along the contours with a walled patio and watergarden sunk into the slope on the uphill side. The entrance from the carport is a half-level below the main floor and a half-level above the basement recreation space.

The interior is divided into the seven equal trapezoidal areas, each of which contains a major room, (except for the two which make up the family room). The children's sleeping spaces are located at one end of the house; the parents' bedroom and living room, at the other end, can be opened to the central living space by folding partitions. Large baths and dressing rooms occupy tower-like projection at each end of the house. Although the plan is basically symmetrical, the house appears to be asymmetrical when seen from the street (*photo below*).

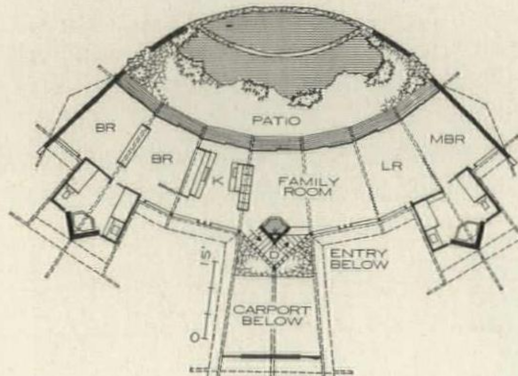
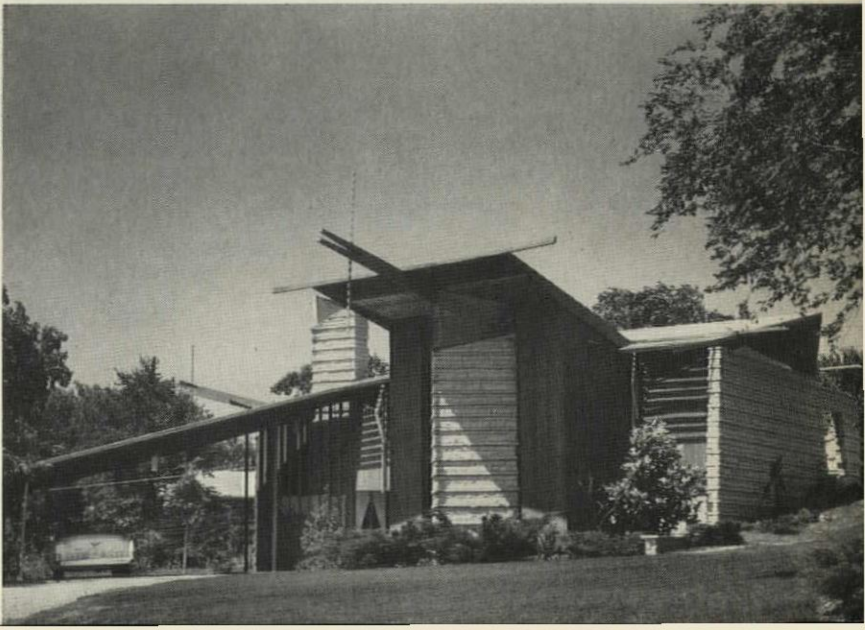
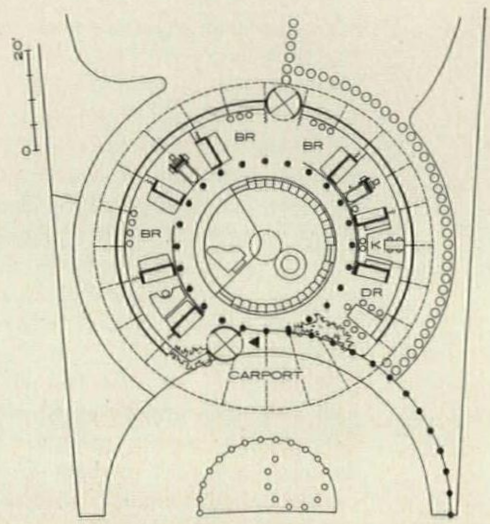



PHOTO: JAN C. ROWAN

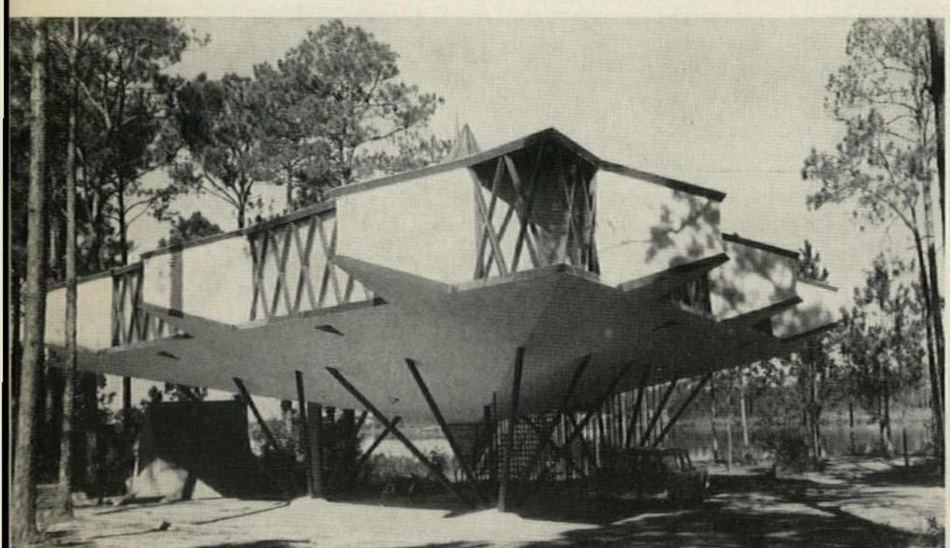


PHOTOS: ED WOJTAS




GARVEY HOUSE • URBANA, ILLINOIS

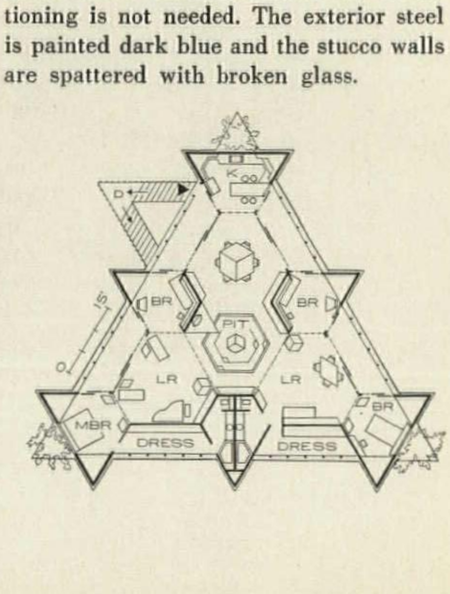
The core of this circular house is a central room where the clients—a professor of music and his pianist wife—can present performances of live or recorded music. The wood roof structure rests on columns of spun concrete sewer pipe, painted salmon pink, which are also used to support a fence of plastic sheet around the driveway. Earth is banked up to window-sill height around most of the perimeter. The windows are plastic panels tilted out to the edge of the roof.

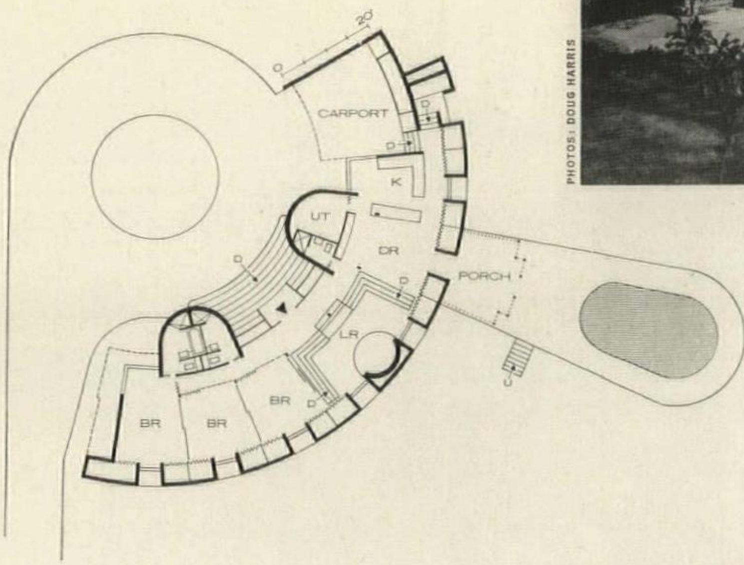


PHOTOS: ETHEL FLOYD

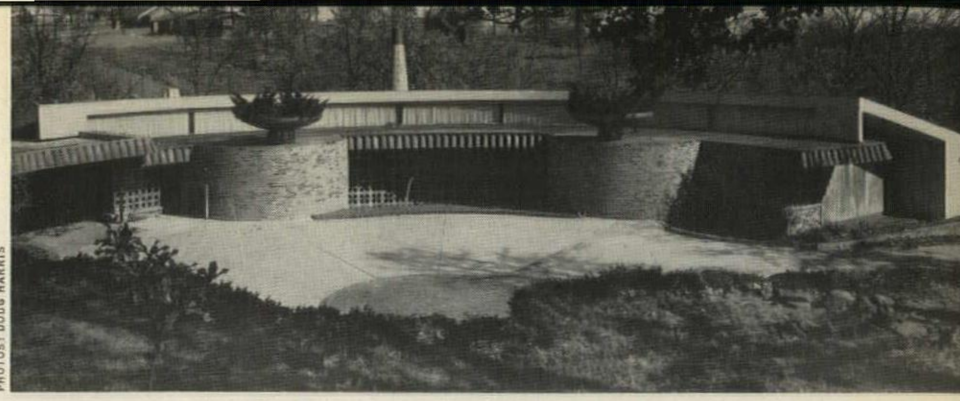
GUTMAN HOUSE • GULFPORT, MISSISSIPPI

In order to take advantage of a lake view and maintain privacy, the house has been raised 15 ft above ground on steel supports. Three 80-ft steel trusses are built into the outer walls. The pyramidal form of the roof is repeated below the floor, creating "an upside-down attic," to house air-conditioning equipment. Folding wood partitions and sliding glass exterior doors afford cross ventilation when air conditioning is not needed. The exterior steel is painted dark blue and the stucco walls are spattered with broken glass.

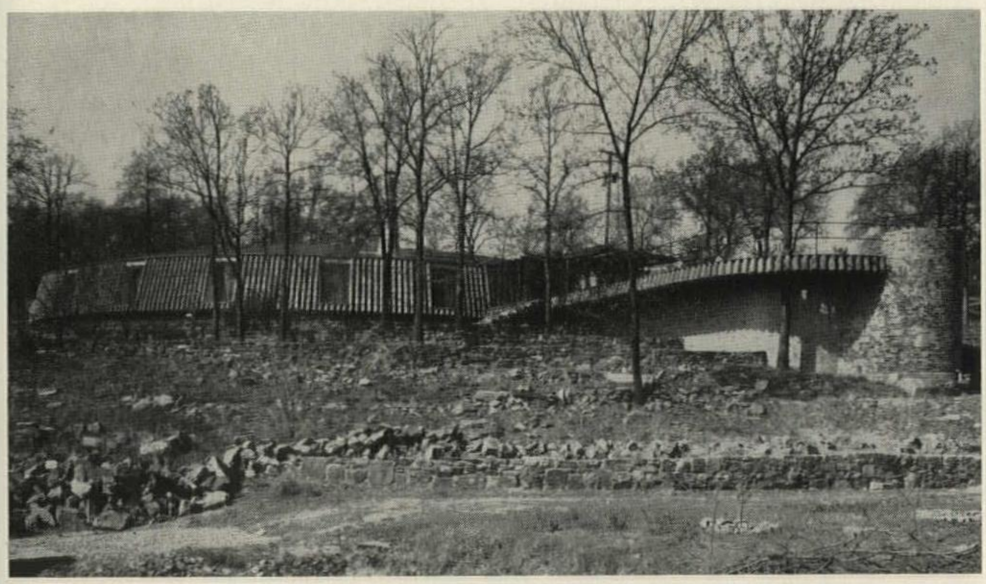





PHOTOS: DOUG HARRIS



## FRANK HOUSE • SAPULPA, OKLAHOMA



The clients, who operate a pottery works, wished to make extensive use of ceramic products in their house. The entrance side (*above*) has wall of local brick glazed in the owners' kiln and a fascia of red clay roof tiles. The doors and wall of the entrance are of polychrome pierced tiles cemented to a core of plate glass. The same treatment will eventually be applied to the clerestory. Planters above the bathroom skylights are made of steel boiler ends.

On the opposite side of the house (*left*) the tile of the fascia extends down the inclined wall. The hillside below the house is terraced with walls of native stone. The pool has been built above ground, with its quarry tile deck projecting out into the trees.

Sliding and folding walls permit almost the entire interior to be thrown together into a single space.

## COMER HOUSE • DEWEY, OKLAHOMA

"A symmetrical problem with a symmetrical solution," Goff calls this house for a confined suburban lot. Brick-walled closets form a barrier along the front of the house and glass areas are placed high to maintain privacy.

Two massive laminated wood beams, the principal roof supports, cantilever out from the pier-like bathroom projections to carry the suspended carport canopy.

The central space is divided into three functional areas by a Y-shaped brick wall; skylights along the wall highlight the brickwork and balance illumination from the exterior glass areas.

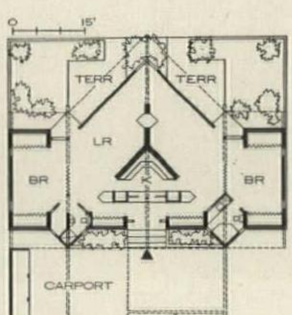
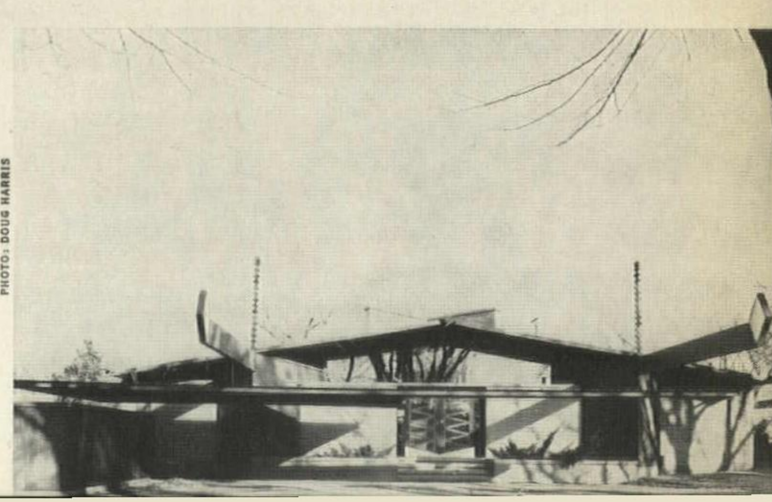



PHOTO: DOUG HARRIS



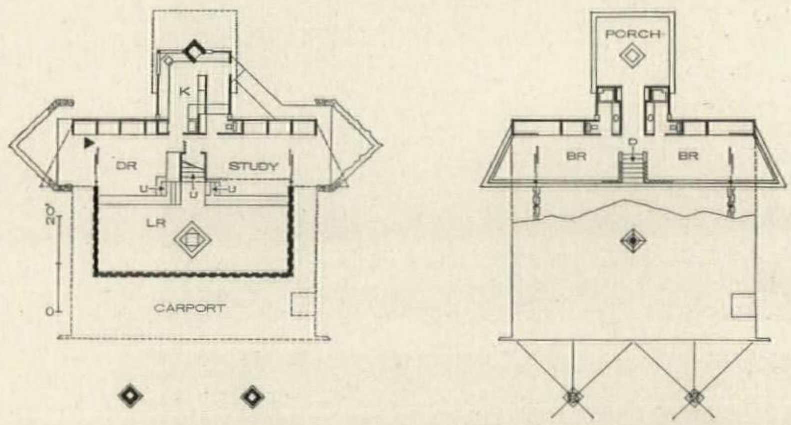
FREEMAN HOUSE • JOPLIN, MISSOURI

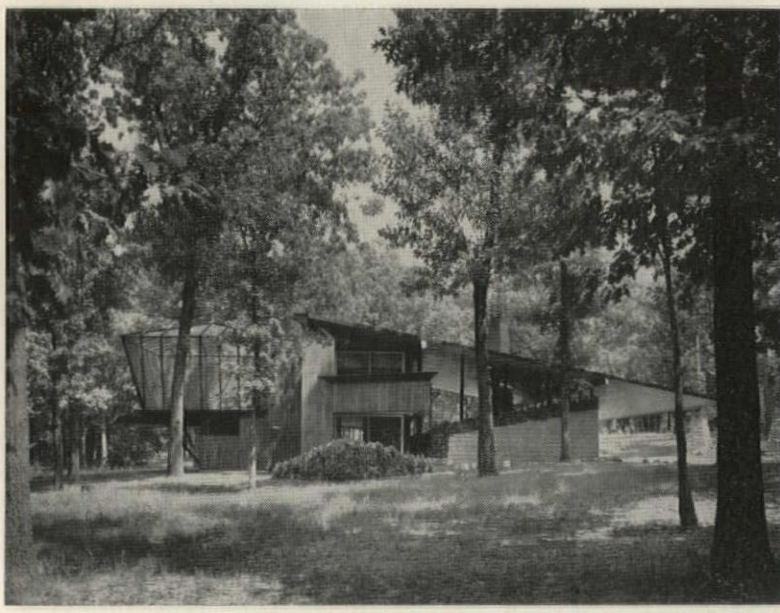
This recent house embodies many of Goff's characteristic design devices, which have been illustrated on the preceding pages. The plan has an obvious and distinctive geometry, and, as in many other examples, it is symmetrical. The floor levels follow the contours of the terrain. The entire interior can be opened up into a single space, in which the individual rooms are defined only as geometrical units.

A single element often dominates the design of a Goff house. In this case it is the vast sloping roof plane to which all other elements are related. This single plane shelters almost the entire house and extends out over the carport, where it is picked up by a suspension system supported on two freestanding piers of stone and glass cullet.

As a counterpoint to the severe line of the main roof, Goff has designed a screened porch of a jewel-like form, with delicately proportioned wood framing. A diamond-shaped stone pier at the center of the porch contains a dumb-waiter communicating with the kitchen below. The mast that rises from this pier supports a lighting fixture and a television aerial, an element rarely provided for in house design.

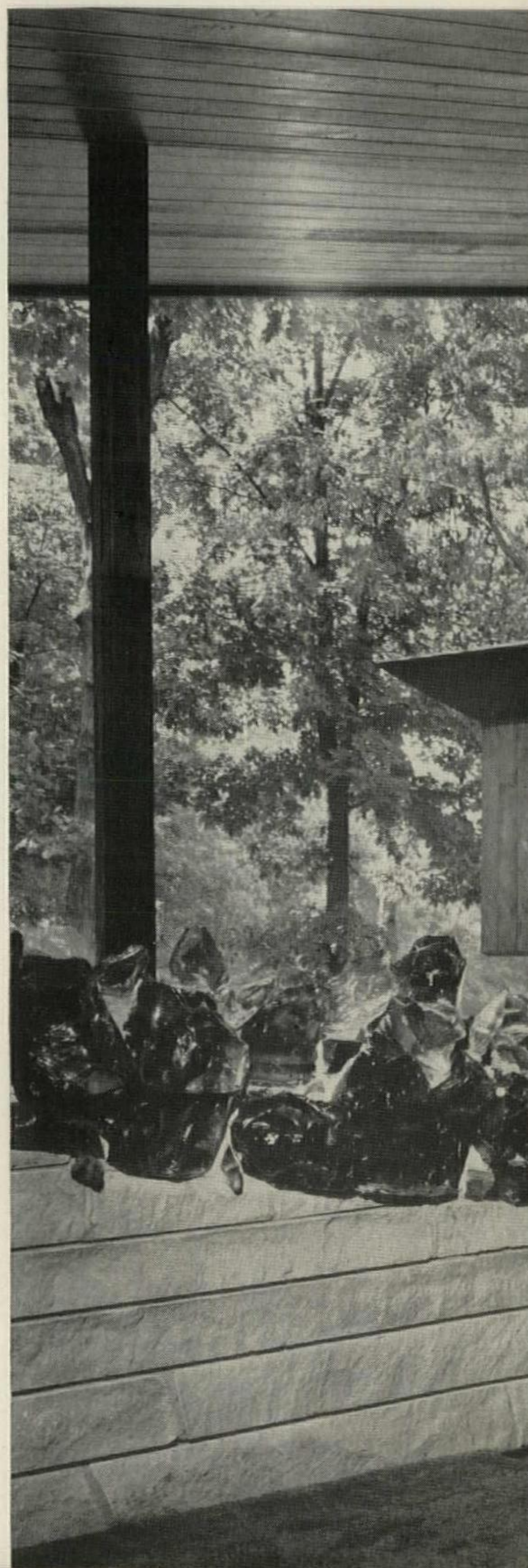
As in many other Goff houses, glass cullet masonry is used to make a transition between stone masonry and clear glass. Surface materials, both inside and outside are somewhat plainer, less decorative, than in most Goff works. This effect is emphasized by the lack of furnishings in the photographs. The original clients were never able to occupy the house, since their business took them away from Joplin just as the house was completed.

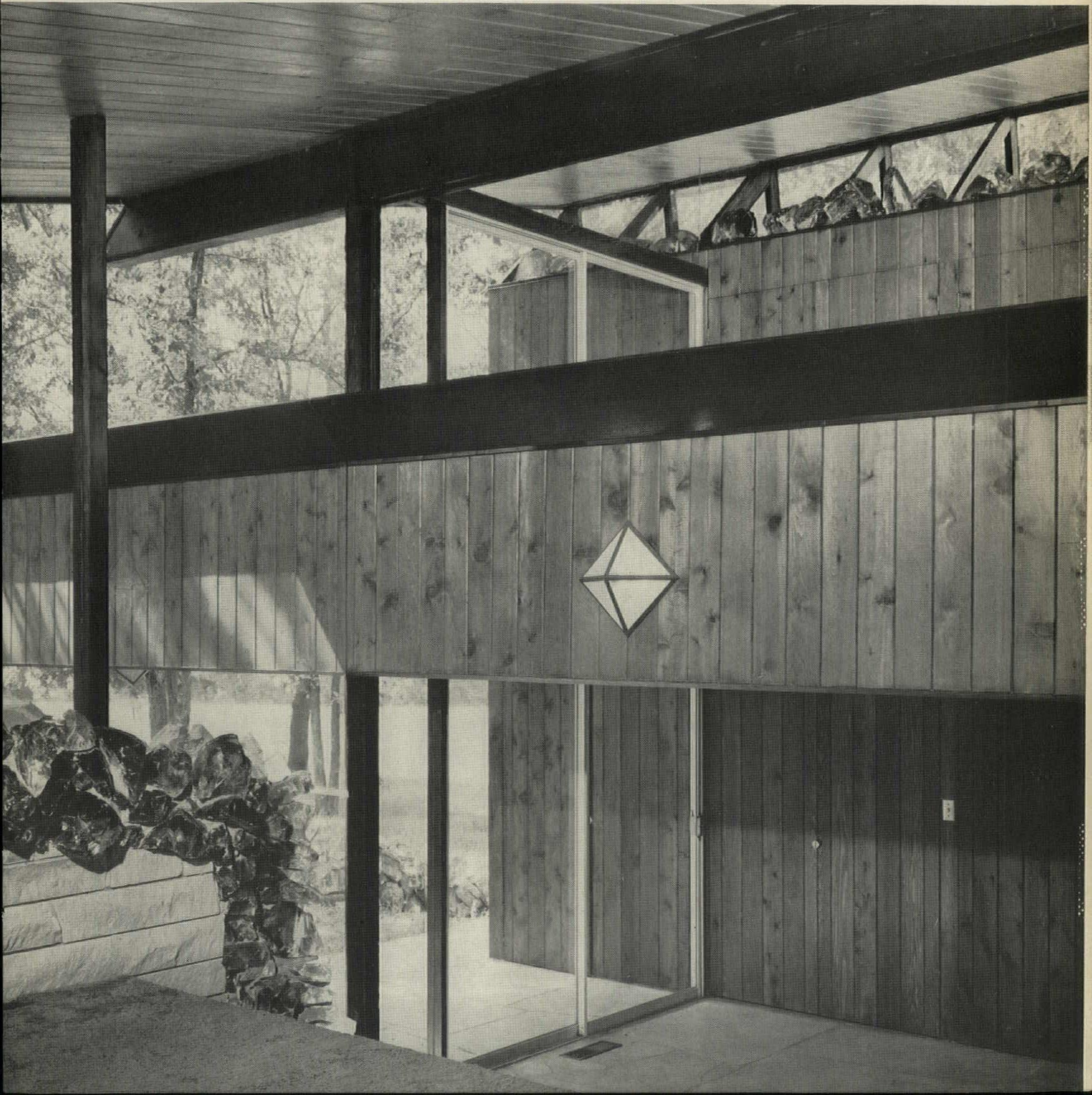


PHOTOS: WARREN REYNOLDS—INFINITY, INC.

*The cedar bulkhead of the bedroom balcony (left), continues on the interior (below), where the bedroom overlooks the living area. The angular fireplace (below, left), constructed of steel and glass cullet, is the focal point of the interior. From the approach side (right), the steel chimney can be seen piercing the glass-studded roof.*





# CALCULATING SOLAR HEAT LOADS

BY DAVID W. MacCURDY

*Equipping a building with year-round air conditioning often represents from 20 to over 50 per cent of the total cost of the structure. A knowledge of the fundamentals of heat transfer and the thermal characteristics of different kinds of building shells can disclose various opportunities for obtaining the best performance of the air-conditioning system at optimum savings. Although it is recognized that design responsibility of the air-conditioning system is customarily delegated to the mechanical engineer, there are, nevertheless, certain basic decisions that must be made by the architect, as early in the design process as possible, if maximum benefits at minimum cost are to be obtained. How much insulation should be used? What type of glass is most economical? What is the effect of the opaque-glass ratio of the walls on the air-conditioning tonnage required? Where should occupancy areas requiring maximum amounts of daylighting be located? Should exterior or interior shading devices be used?*

*To assist architects in resolving these and many other questions, the Owens-Corning Fiberglas Corporation has prepared a visual presentation consisting of 60 color slides and accompanying commentary. It reviews the fundamentals of heat flow as they pertain to the design of building shells, analyzes the problem of heat gain and loss, and provides a systematic method of evaluating these facts as they apply to the initial and annual operating costs of air-conditioning systems.*

*To broaden the serviceability of these materials to practitioners and students of architecture alike, an extensive bibliography of over 100 items has been used. It includes the* American Society of Heating Refrigerating and Air Conditioning Engineers Guide, *as well as numerous reports and articles that have appeared during the last 10 years in leading architectural and engineering periodicals.*

*The presentation is in two parts: Part 1 is a review of theory, while Part 2 introduces economic factors closely related to the thermal performance of the building shell. It is available to schools of architecture for classroom use and to professional organizations, such as local chapters of The American Institute of Architects, for workshop or seminar sessions. Titled "Economics of Sensible Heat Control," it will be distributed by the Association of Collegiate Schools of Architecture and The Producers' Council in January. The following article is an abridgement of the discussion on solar heat loads.*

The main factor governing the demand for cooling is the average number of sunshine hours for any given period. At the summer solstice, the daylight period is almost twice as long as that of midwinter. This prolonged exposure of the earth's atmosphere and surface to the sun causes the range in daily temperature, and the fluctuations in the moisture content of the air, to be much greater than those of midwinter. These effects, in turn, result in an unsteady heating of the exterior surfaces of a building.

A secondary factor determining the cooling demand is the heat-storage properties of the building shell. High density materials (such as a 12-in. brick wall) retard the flow of heat much longer than light materials (such as metal panels), while transparent glass transmits large portions of solar heat almost instantaneously.

Prior to the extensive use of glass as an exterior wall material, the cooling season was regarded as a 5½-month period, starting about April 1 (in the southernmost latitudes of the United States) and ending about the middle of September. With many buildings now being enclosed with 60 per cent or more of glass, however, the cooling season may extend over 10 months of the year.

The rate of heat flow through opaque constructions is governed by: (1) the intensity of solar heat imposed on the building's surfaces; (2) the temperature of the surrounding air; (3) the temperature of the exposed surface; (4) the heat storage capacity of the material; and (5) the indoor design temperature.

The first two of these factors are the most variable, due to hourly changes in the position of the sun, daily fluctuations in humidity, and the fact that the temperature of the air and the rate of radiation generally do not peak simultaneously. The temperature of the exposed surface will vary among materials depending upon texture and color, as well as wind velocity. Heat-storage capacity is indicative of the density, conductivity, and thickness of the materials comprising the roof or wall assembly. Standard indoor design temperature is assumed to be 80 F.

Although various methods of calculating heat gain are in use, all are derived from the "analytical" method described acrosspage.

## *Analytical Method*

Three stages of analysis comprise the analytical method (developed by C. O. Mackey, Member of ASHRAE, and L. T. Wright, Jr., Associate Member of ASHRAE): (1) determining the maximum solar heat load on the building; (2) determining the maximum temperature differential; and (3) ascertaining the time when the heat penetrates the walls and roof.

### *Solar Heat*

Scientists studying the solar spectrum have calculated the amount of heat received by a plane perpendicular to the sun's rays, at the outer surface of the earth's atmosphere, to be from 415 to 445 Btu's per sq ft per hr—the maximum amount being received during the winter, when the earth, in its eccentric orbit, is nearest the sun. For practical engineering purposes, an average value of 420 Btu's per sq ft per hr (the mean solar constant) is taken as the standard rate. Fortunately, the earth's surface is shielded from the full brunt of the sun's heat by an insulating blanket extending about seven miles above sea level. This blanket (the troposphere) is composed of 10 layers, the density of each layer depending upon the moisture content of the air. The six outer layers contain virtually no water vapor and consequently offer little resistance to the sun's rays. The inner layers, however, contain most of the moisture in the tropospere, and therefore diffuse a portion of the rays entering the atmosphere. The depletion of the sun's rays varies with the depth of the air mass through which these rays must pass **(1)**.

*Duration of Solar Exposure.* The period of solar exposure is shortest at the winter solstice (December 21), when the North Pole is inclined furthest from the sun **(2)**. At the beginning of spring, with the polar axis perpendicular to the earth's orbital plane, the northern and southern hemispheres are illuminated for equal periods of time. Maximum exposure occurs at the summer solstice (June 21), when the North Pole is tilted toward the sun, causing 15 hours of daylight at 40 degrees north latitude, as compared with only nine hours during the shortest day of the year.

The magnitude of insolation will vary with the duration of solar exposure, and, in combination with meteorological phenomena, will determine the actual number of hours of sunshine daily in any given period or locality. The average number of hours of sunshine daily for June to August, and for December to February, are given in map form in the *Handbook of Air Conditioning Heating and Ventilating*, published by the Industrial Press. These maps are based on U.S. Weather Bureau reports from the period 1899-1938.

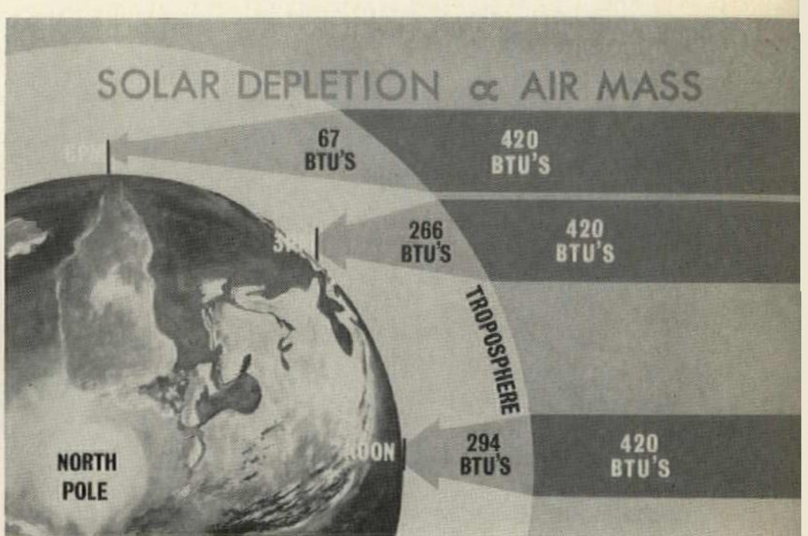
*Direct Radiation.* The amount of direct radiation received by a surface perpendicular to the sun's rays depends primarily on the air mass through which these rays pass. This, in turn, depends on the altitude of the sun above the horizon. The altitude is a function of three factors: declination, latitude, and solar time. The exact value for the solar altitude ($\beta$) may be determined from the equation shown **(3)**; where $\beta$ = solar altitude, degrees; L = latitude, degrees; D = polar declination, degrees; A = solar time angle, degrees westward from noon (6:00 A.M. = 90°, noon = 0°, 6:00 P.M. = 270°; one hour = 15°).

Under certain circumstances, this equation will yield a negative value for sine $\beta$, indicating that the sun is below the horizon.

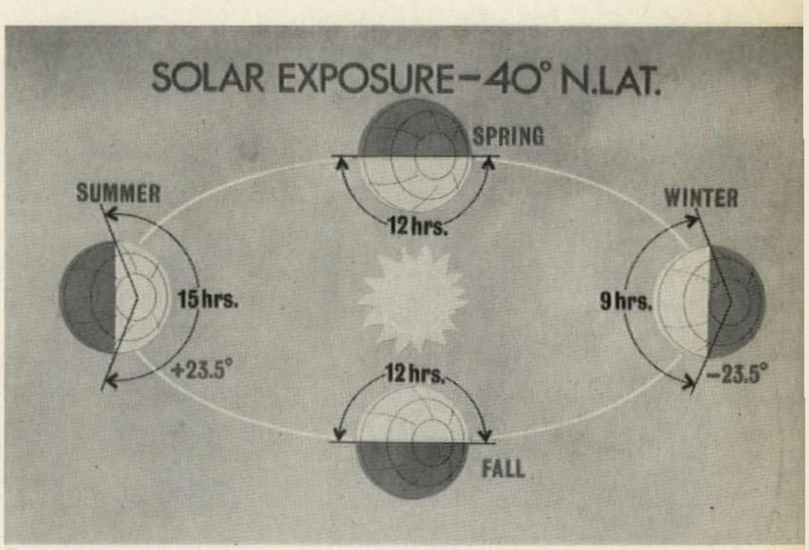
The polar declination is the angle between the earth's axis and a plane perpendicular to the sun's rays. It varies seasonally; the angle of declination for each day of the year may be found in *The American Nautical Almanac*, published by the U.S. Naval Observatory. From mid-September to mid-March, in the northern hemisphere, the value of sine D will be negative. The remainder of the year, it will be positive.

The approximate latitude of a location may be found in atlases; more precise values will appear in the surveyor's report prepared for the specific building site.

The third factor, the solar time angle, is the most complex of the functions. During a single rotation of the earth (360 degrees), any given meridian passes once through the point nearest to the sun—the solar zenith. Accordingly, each 15-degree rotation equals one solar hour, or one-twenty-fourth of the daily time cycle. The solar time angle is the distance westward, in degrees, from the solar zenith to the given meridian. Thus, for a solar time of noon, this angle would be 0°; for 6 A.M. 90°; for midnight, 180°; and for 6 P.M., 270°. For intermediate times, 15° must be added or subtracted for each hour of difference; for example, 3 P.M. would be 270° (6 P.M.) plus 45° (3 hours), or 315°. In determining the




1

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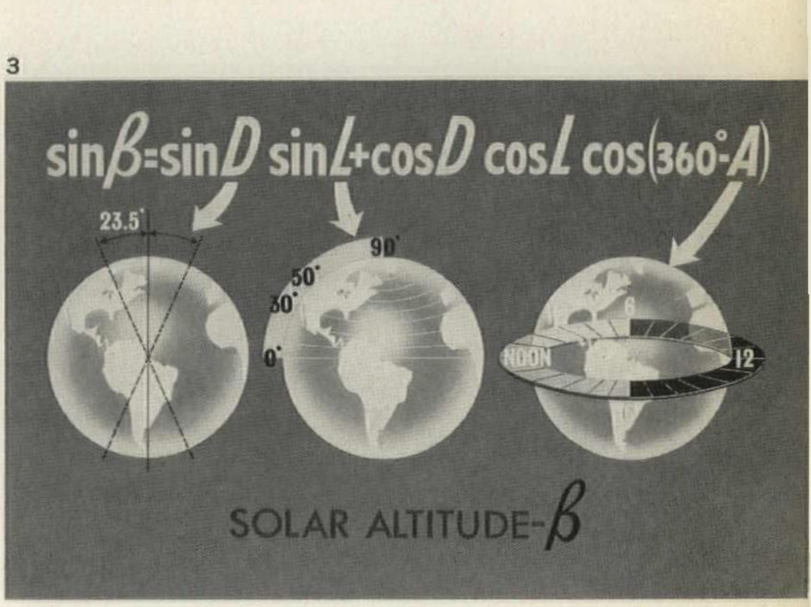
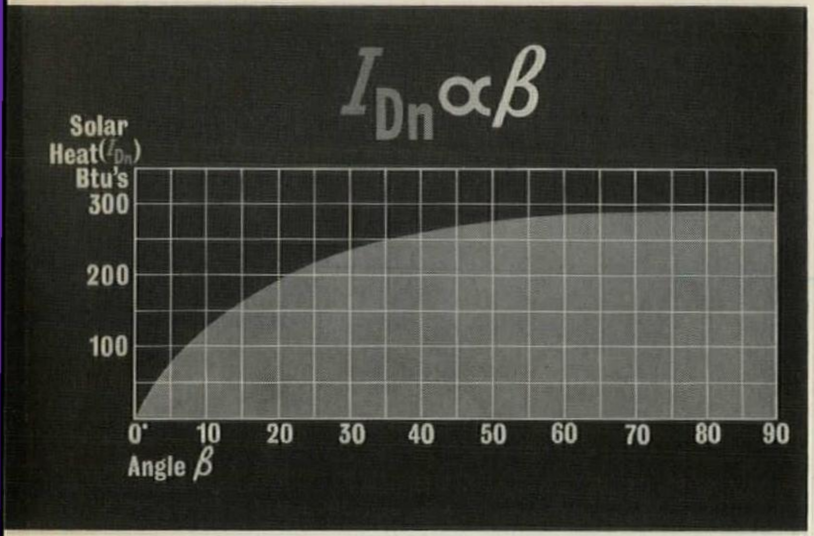
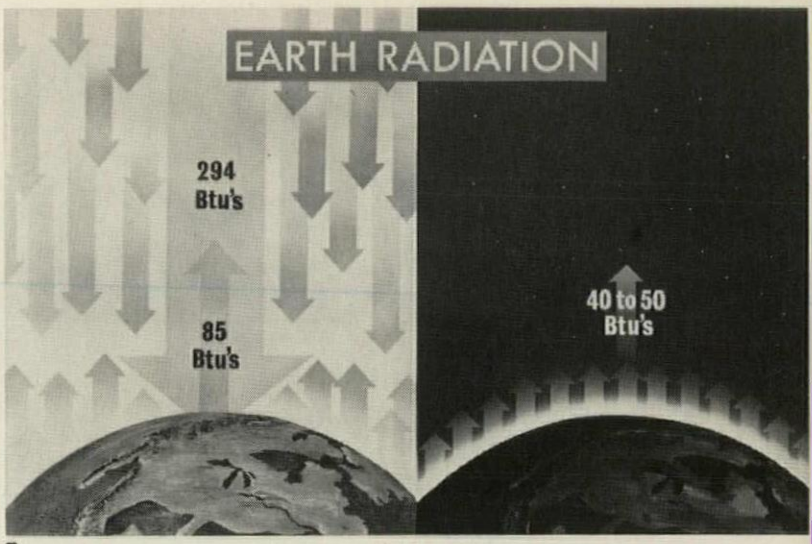
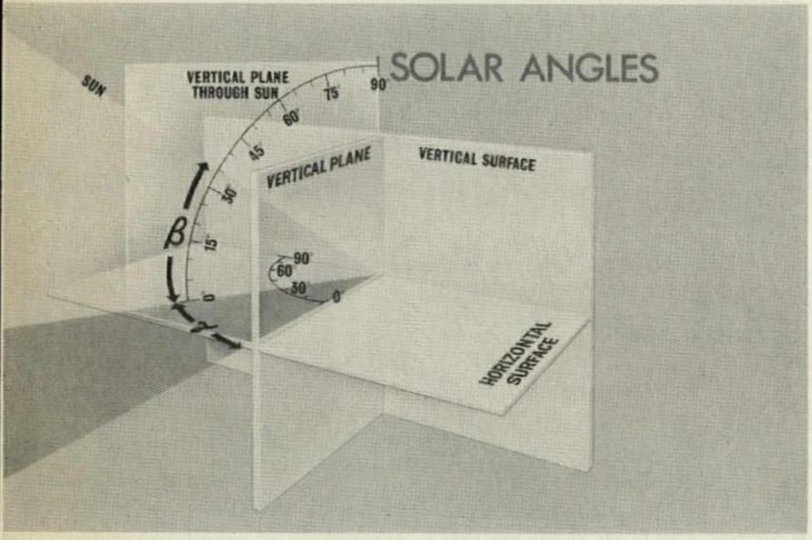



$I_{Dn} \propto \beta$
Solar Heat($I_{Dn}$) Btu's
300
200
100
0° 10 20 30 40 50 60 70 80 90
Angle $\beta$

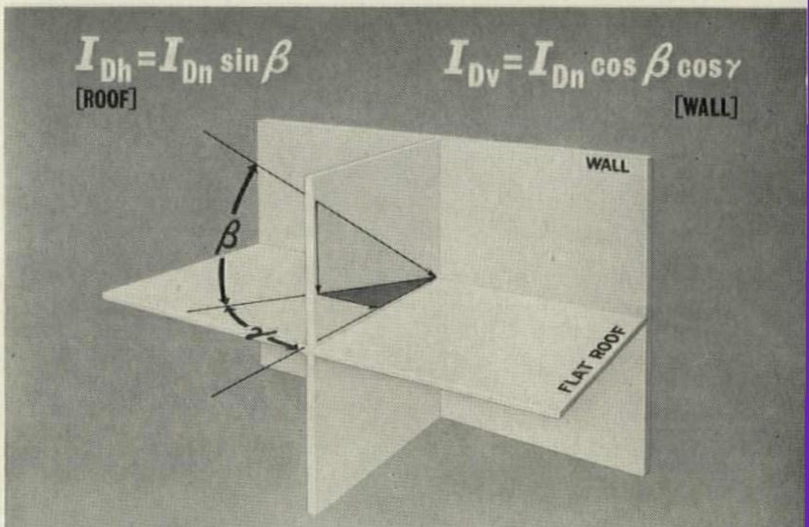
4


EARTH RADIATION
294 Btu's
85 Btu's
40 to 50 Btu's

5

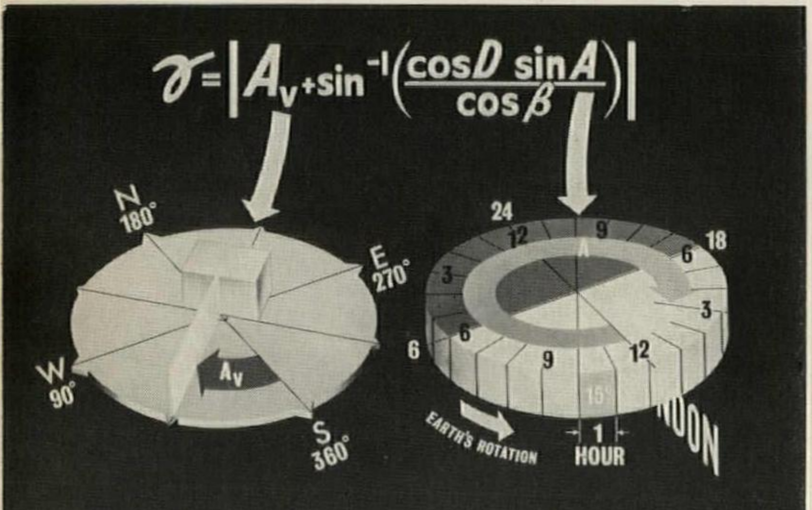

SOLAR ANGLES
SUN
VERTICAL PLANE THROUGH SUN
VERTICAL PLANE
VERTICAL SURFACE
HORIZONTAL SURFACE
$\beta$
$\gamma$

6

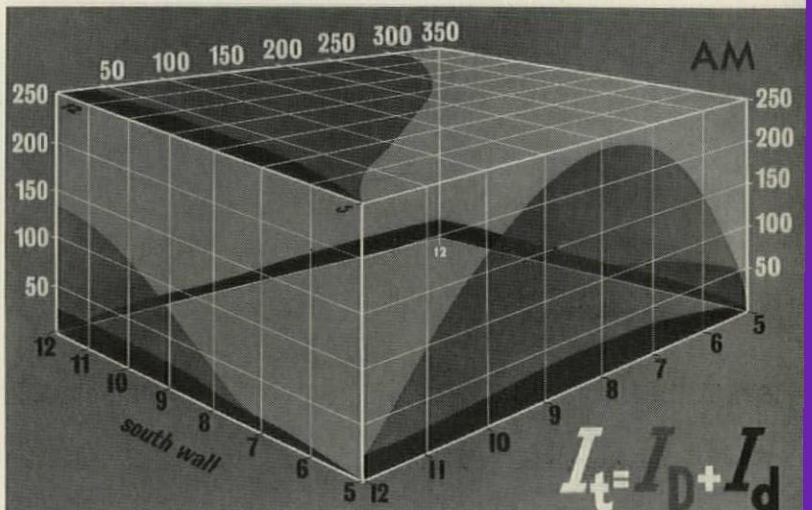

$I_{Dh} = I_{Dn} \sin\beta$
[ROOF]
$I_{Dv} = I_{Dn} \cos\beta \cos\gamma$
[WALL]
WALL
FLAT ROOF
$\beta$
$\gamma$

7

8


$\gamma = \left| A_v + \sin^{-1}\left(\frac{\cos D \sin A}{\cos\beta}\right) \right|$
N 180°
E 270°
W 90°
S 360°
$A_v$
24
NOON
EARTH'S ROTATION
1 HOUR

9


AM
50 100 150 200 250 300 350
250
200
150
100
50
south wall
$I_t = I_D + I_d$

solar time angle, local time must be converted to solar time.

The solar time angle is also the only angle appearing in the equation that may occur in any quadrant; to obtain the cosine value from standard tables, the solar time angle should be reduced to a first quadrant value. The above version of the equation yields first-quadrant angles from noon to 6 P.M.

In 1940, Perry Moon, of the Massachusetts Institute of Technology, successfully correlated the angles of solar altitude with the rate of solar irradiation at direct normal incidence at the earth's surface. His data, derived from an analysis of the solar spectrum under atmospheric conditions simulating a clear day at sea level, was subsequently verified by pyreheliometer readings. They have been modified for use as standard engineering value, and may be found in the "Cooling Load" chapter of the *ASHRAE Guide*. The rate of irradiation increases with the angle of solar altitude (4).

*Diffuse Radiation.* The principal absorbing agents that diffuse the sun's rays as they pass through the atmosphere—in addition to water vapor—are ozone and cloud particles. Because their concentration in the air is extremely variable and unpredictable, no theoretical method for calculating the quantity of diffuse radiation has been developed. The data currently available has consequently been obtained from instrument readings recorded over a sufficiently long period of time to provide statistical averages.

On clear days, at sea level, the proportion of direct radiation to diffuse radiation received throughout the daylight hours remains at a fairly constant ratio of 70:30. On cloudy days, the diffuse ($I_d$) component increases with a corresponding decline in direct radiation ($I_D$). Atmospheres contaminated by industrial gases and particulate matter, as well as by dust, will also reduce the direct radiation component; the ratio for New York City, for example, is about 45:55.

The standard rates of exposure for a horizontal surface and north, east, south, and west walls are given in the "Cooling Load" chapter of the *ASHRAE Guide*. The values are correlated with direct radiation rates recorded for a clear atmosphere at 40 degrees north latitude. Rates are also given for industrial atmospheres.

A convenient source for determining the average number of clear days per year, when the diffuse component is relatively low, is given in the *Handbook of Air Conditioning Heating and Ventilating*.

*Earth Radiation.* According to some authorities (Ivor S. Groundwater, *Solar Radiation in Air Conditioning*, Crosby Lockwood & Sons, Ltd., 1957), the heat radiated by the earth can have significant effects on the thermal performance of a building, especially if the building is situated in an environment having a high coefficient of solar absorptivity (such as a large asphalt-surfaced parking lot, black soil, or pine and spruce forests). Although extensive data suitable for engineering use is not available, the estimated average rate of earth radiation during daytime is 85 Btu per sq ft per hr, or about 30 per cent of the maximum amount of direct solar radiation receivable at normal incidence (5). On clear nights, the rate drops to about 45 Btu per sq ft per hr, while on cloudy nights the rate will be even lower.

## *Solar Heat on Buildings*

The total solar heat load on a building exterior consists of the sum of the direct and diffuse loads on roofs and walls exposed to sunlight, plus the diffuse load on shaded surfaces. The magnitude of a load on a sunlit surface will vary with the angle of impingement of the sun's rays.

Regardless of the magnitude of the solar radiation transmitted to the earth's surface, the proportion of the available radiation received at a building surface depends on the obliquity of that surface to the sun's rays. A surface will receive the maximum radiation when it is perpendicular to the sun's rays, and the minimum when it is parallel to those rays.

The angular relationships between the sun's rays and horizontal and vertical surfaces are shown (6). The solar altitude (angle $\beta$) is indexed to an imaginary vertical plane parallel to the sun's rays. This view shows the sun's rays impinging on the horizontal surface at about 35 degrees. The vertical plane through the sun also serves as a reference point for indexing the angle of impingement (measured from the normal vertical plane) on the vertical surface —here the wall solar azimuth (angle) is also about 35 degrees.

The equations for calculating the directly-radiated solar heat loads on flat roofs and walls are presented (7). The rate of radiation on roofs ($I_{Dh}$) equals the product of the sine of angle $\beta$ (solar altitude) and the corresponding rate of radiation at normal incidence ($I_{DN}$); where ($I_{Dh}$) = rate of direct radiation on horizontal surface, Btu per sq ft per hr; $I_{DN}$ = rate of direct radiation at normal incidence, Btu per sq ft per hr; $\beta$ = solar altitude degrees. The rate for walls ($I_{Dv}$) is the product of the rate of radiation at normal incidence ($I_{DN}$), the cosine of angle $\beta$, and the cosine of angle $\gamma$; where ($I_{Dv}$) = rate of direct radiation on vertical surface, Btu per sq ft per hr; $\gamma$ = wall solar azimuth, degrees from the wall perpendicular. A zero or negative value of the cosine of angle $\gamma$ indicates the vertical surface is receiving no direct solar radiation.

To determine angle $\gamma$, an equation that combines the wall azimuth and the solar azimuth is used (8); where $A_v$ = wall azimuth, degrees westward from south to wall perpendicular (south = 0°, west = 90°, north = 180°, east = 270°). As in the equation for solar altitude (3), the solar time angle (A) may occur in any quadrant. To simplify computation, the functions should be reduced to values of the first quadrant.

Evaluation of the arcsine term in the equation yields the solar azimuth angle (measured westward from south to a vertical plane through the sun). Since the arcsine function is indeterminant, this angle may also occur in any quadrant, necessitating a reduction to a first quadrant value.

*Diffuse Radiation.* The rates of diffuse solar radiation on horizontal and vertical surfaces facing north, east, south, and west are given in the "Cooling Load" chapter of the *ASHRAE Guide*. For vertical surfaces at other orientations, the rate is obtained by linear interpolation of the given values. The preponderance of diffuse heat is received between solar altitudes of 20 and 50 degrees, or between 6:30 and 9:30 (sun time) during the morning and 2:30 and 5:30 during the afternoon at 40 degrees north latitude at August 1.

*Total Solar Radiation.* The rates of solar heat exposure on a building at 40 degrees north latitude at August 1, for a clear atmosphere during the morning hours, are illustrated (9). The black scales at the bases of the east and south walls indicate solar time at hourly intervals, while the white scales indicate the rates of solar radiation. Direct radiation ($I_D$) is indicated by light gray, and diffuse radiation ($I_d$) by dark gray. The maximum rate of total radiation ($I_t$) on the east wall, for example, occurs between 7 A.M. and 8 A.M.—about 240 Btu per sq ft pr hr. The diffuse component at that time, however, is only about 25 Btu per sq ft per hr, or roughly 10 per cent of the total. The south wall is not exposed to direct radiation from sunrise to around 7:30 A.M.; while, surprisingly, the north wall is exposed to direct radiation from sunrise to around 7:30 A.M. During this period, the west wall is completely shaded from the sun's rays, receiving only the diffuse component. From this illustration, the load conditions for each wall and the roof may be considered separately for each hour of the morning, or the hour when the maximum solar load is imposed on the entire building may be derived by determining the rates for each surface which, when added together, give the greatest rate.

## *Determining Temperature Differential*

The potential for heat flow through opaque materials is primarily a function of the outdoor temperature in the shade, the absorptivity factor of the material, total solar heat imposed, and the rates of combined convective-radiative heat exchange at the surfaces. Absorption rates of materials will depend on color, as shown below:

**Absorption Factors for Exterior Finishes**

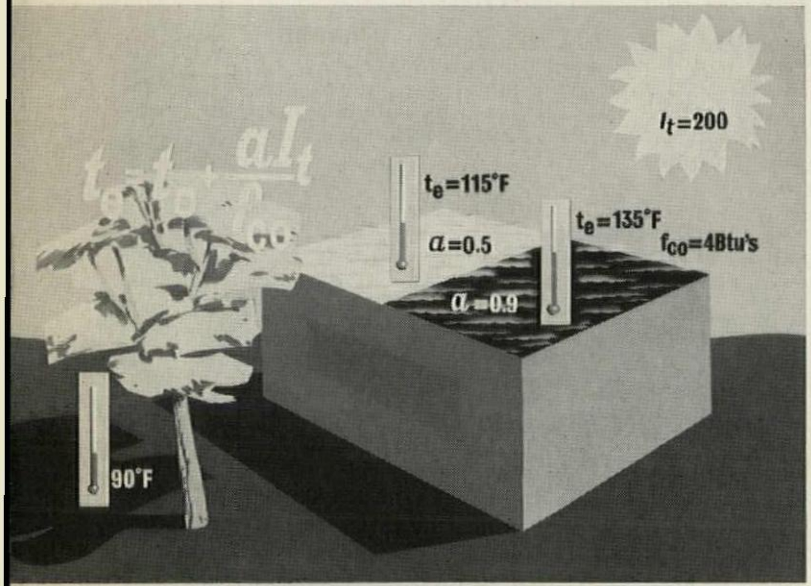
| Material | Absorption Factor |
|---|---|
| Paints | 0.21 (white wash) to 0.97 (black) |
| Roof Sealers | 0.50 (white-asbestos cement) to 0.95 (asphalt) |
| Brick Tile | 0.30 (white) to 0.88 (blue) |

Allowance must be made, however, for the darkening effect that dusty and industrially contaminated atmospheres have on light-color finishes. The absorptivity for white-asbestos roof cement, for example, may increase from 0.50 to 0.70 twelve months after application, and may go as high as 0.83 after prolonged service. Unless light-colored materials are self-cleaning, or may be cleaned inexpensively at frequent intervals, average factors should be used. The standard values recommended by the *ASHRAE Guide* are: 0.9 for roofs and dark walls, and 0.5 for light walls.

A surface conductance rate of four Btu per sq ft per hr, per degree F, based on a 7.5 mph wind, is also recommended for the exterior surface; the conductance for interior surfaces is 1.65 Btu per sq ft per hr, per degree F.

The combined effect of these factors on the temperature of exterior surfaces exposed to the sun may be computed by using the equation shown **(10)**; where t = outdoor-air temperature, F; a = absorptivity of outer-surface for direct and diffuse solar radiation; $I_t$ = total solar radiation, Btu per sq ft per hr; $f_{eo}$ = unit of surface conductance (radiation and convection combined), Btu per sq ft per hr per degree F difference between surface temperature and the ambient air (in shade).

Values of $t_e$, the sol-air temperature, are presented in the "Cooling Load" chapter of the *ASHRAE Guide* for light and dark walls ($a/f_{eo}$ ratios of 0.125 and 0.225 respectively), and a dark flat roof ($a/f_{eo}$ ratio of 0.225). Values of $t_e$ are statistical averages recorded at representative weather stations throughout the United States for a 10-year period; they are given at hourly intervals for a 24-hour cycle. Twenty-four hour averages, or mean temperatures ($t_m$), also are given.




10

## *Delayed Heat Gain*

The maximum rate of heat entry into the exterior surfaces of a building will occur when the sol-air temperature ($t_e$) peaks at each surface during the 24-hour cycle. This will happen around 1:00 P.M. on a flat roof and on a south wall, at 8 A.M. to 9:00 A.M. on the east wall, and at 4:00 P.M. on a west wall. The rate at which heat will continue to flow through the roof or wall, however, is governed mostly by the heat-storing capacity of the material. Moreover, the rate of heat flow within the material will pulsate at varying intensities as the sol-air temperature fluctuates. For example, it takes approximately eight hours for the load received at 1:00 P.M. on the weather-side of a south wall, made of 12-in. stone, concrete, or brick, to penetrate to the interior surface. Some time-lags for construction materials having lower heat-storing capacities are: 1-in. wood, 0.17 hours; 2-in. concrete, 1.1 hours; and 4-in. common brick, 2.3 hours.

The periodic distribution of heat through a wall having a relatively high heat-storing capacity during intermittent solar-load conditions is shown **(11, 12, 13)**. (For the sake of simplicity, the hourly variations in the rate of solar radiation caused by changes in solar altitude and angle of impingement on the wall have not been considered in these illustrations.)

The 12-in. brick wall is divided into four imaginary layers of equal thicknesses **(11)**. The view at the left represents the first time interval of solar exposure in which a load of 150 Btu per sq ft has been imposed on the outer layer. The second interval, on the right, shows a temporary obstruction of the solar load by clouds; note the distribution of the load originally imposed: 50 Btu have been absorbed into the second layer while 20 Btu have been dissipated into the air by convective-radiative exchange. During the third time interval **(12)**, a second load has been applied. The fourth time interval shows the distribution of the first and second loads while the sun is temporarily obscured: of the first load, 30 Btu have penetrated the third layer with a proportionate decrease in the quantities absorbed by the first and second layers, and a rise in the convective-radiative exchange at the exterior surface. The fifth interval shows the application of a third load and further cyclic distribution of the first two loads **(13, left)**.

The equation for determining the actual portion of a solar heat load that penetrates the interior surface of an opaque roof or wall, and the time of its emergence, is shown **(13, right)**. Heat gain ($H_G$) equals the product of the exposed area, the "U" value of the construction, and the combined functions of the cyclic variation of the sol-air temperature and the heat storing characteristics of the wall.

Terms $t_m$ (mean temperature) and $t_e$ (sol-air temperature) have been defined under "Determining Temperature Differential." The term $t_i$ is the indoor design temperature (usually 80 F), while $\lambda$ is a factor indicating the reduction in the quantity of heat flow through the material caused by heat storage; the effects of the convective heat exchange at the interior surface (unit conductance of 1.65) and the "U" value have been integrated in this factor. Twenty-four-hour average values for $t_m$ for flat roofs and for north, east, south, and west walls for $a/f_{eo}$ ratios of 0.225 (dark color) and 0.125 (light color) are given in the "Cooling Load" chapter of the *ASHRAE Guide*. Heat-flow reduction values (lambda factors) and time lag in hours for masonry and concrete base construction, as well as for wood and insulating board of various thicknesses, are given in the 1951 edition of the *ASHRAE Guide*, page 276.

The equation is most useful in determining the magnitude of reduction in the maximum exterior-surface load (the maximum load is imposed at peak sol-air temperature) when it emerges at the interior surface.

This equation may also be used to determine the rate of heat emission at the interior surface for any given hour in the 24-hr cycle by deducting the time-lag period from the time under consideration, and using the $t_e$ value of the earlier hour.

Time lags and the values of $\lambda$ given in Table 10 of the 1952 edition of the *ASHRAE Guide* are for homogeneous construction only. For composite roof or wall assemblies made of a combination of different materials, the appropriate values for each material are added together along with safety factors. An additional one-half-hr time lag is recommended for two-layer and lightweight construction, while a one-hr lag is added for three or more layers, or for very heavy construction. Heat-flow reduction factors ($\lambda$) are obtained from a graph integrating the factors for horizontal and north-facing surfaces, and for east, west, and south walls with light and heavy-weight construction. The sum of the $\lambda$ factors should not exceed the product of the factors for the individual layers. The time lag, if carefully calculated, should be accurate to within one hour.

## *Zoning*

Because of the cyclic nature of the solar heat load, the cooling demands to balance sensible heat transfer at the interior perimeter areas of a building are never equal—assuming identical design treatment of each wall. This disparity, if accurately assessed, can be used to great advantage in designing the air-handling and distribution system. Floor areas may be divided into "cooling-demand zones," and the supply of conditioned air continually reapportioned to meet changing conditions during the occupancy period. As demonstrated, the analytical method effectively provides the data required for determining the time when the maximum cooling demand shifts from zone to zone. Moreover, no other method reveals so precisely the peak loads in different zones at different times—an important consideration where two peaks may occur simultaneously (because of interior heat loads) to throw a sudden, heavy load on the air-conditioning system. This knowledge may also be used beneficially in considering the means to prevent simultaneous peaking—such as providing extra insulation or shading devices at certain walls, or re-allocating space assignments to reduce interior heat loads caused by people or equipment.

## *Equivalent Temperature Differential Method*

This method of calculating the cooling load uses temperature differential values derived from an equation (*below*) that combines the effects of the daily average sol-air temperature ($t_m$), the heat-flow reduction factor ($\lambda$), the unit conductance of the interior surface, the "U" value, and the sol-air temperatures ($t_e$) that are compensated by the time lag of the roof or wall material comprising the base construction.

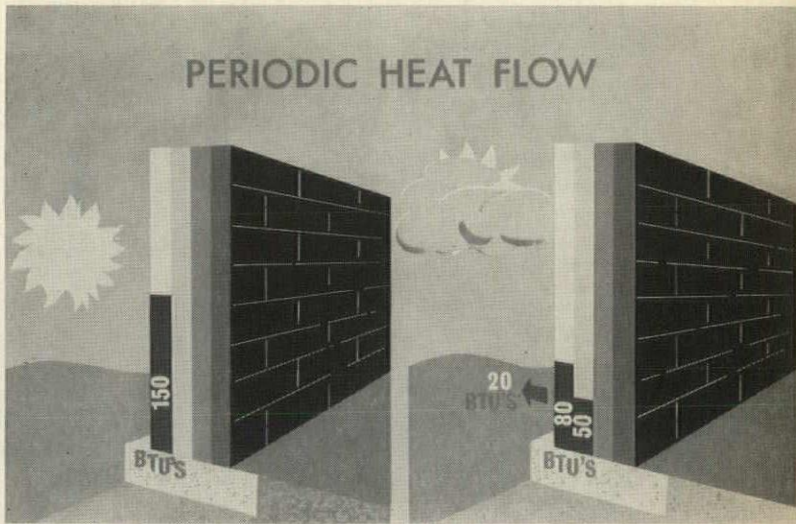
$H_G = (A)\ (U)\ (ETD)$

where: $ETD = t_m + \frac{1.65\lambda e}{U} \times (t_e - t_m) - t_i$

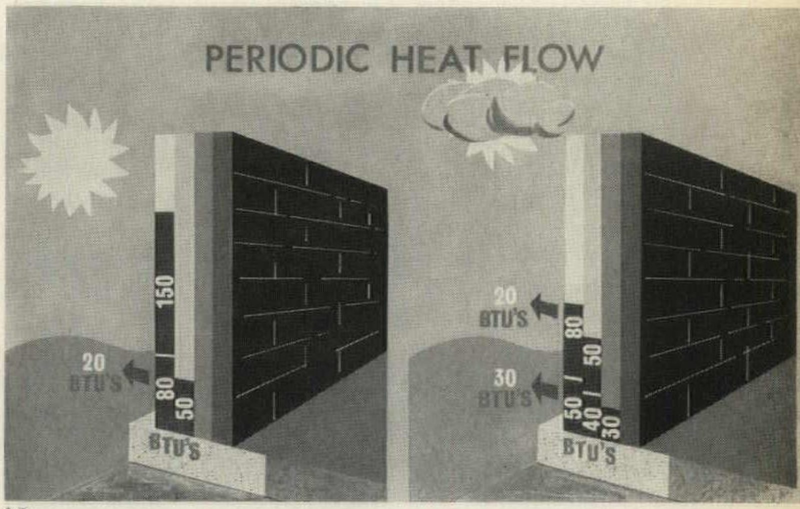
The ETD method (developed by James P. Stewart, Associate Member of ASHRAE) is favored by many engineers, because it requires less time, and because it includes an allowance for low-temperature radiant energy emitted to the sky by roof surfaces. Also, some authorities believe it to be a more accurate technique for buildings equipped with systems that operate intermittently; for example, one 8-hour or 10-hour period in the 24-hr cycle.

Equivalent temperature differentials at 2-hr intervals covering the period from 8 A.M. to midnight, for various types of roof and wall construction, are tabulated in the "Cooling Load" chapter of the *ASHRAE Guide*. Construction materials are classified by weight—light, medium, and heavy. Values for both dark and light exterior colors are included as well as values for walls facing the cardinal and ordinal points of the compass. Although the tabulated values are for conditions prevailing only at August 1, 40 degrees north latitude, a maximum outdoor temperature of 95 F and an indoor design temperature of 80 F, footnotes are provided that indicate the adjustments to be made for other conditions.

The ETD values may be used to determine the time of the maximum rate of heat flow through the entire building, by selecting the ETD values for each surface at a time that, when added together, gives the greatest hourly total during the 8 A.M.-to-midnight period.




11

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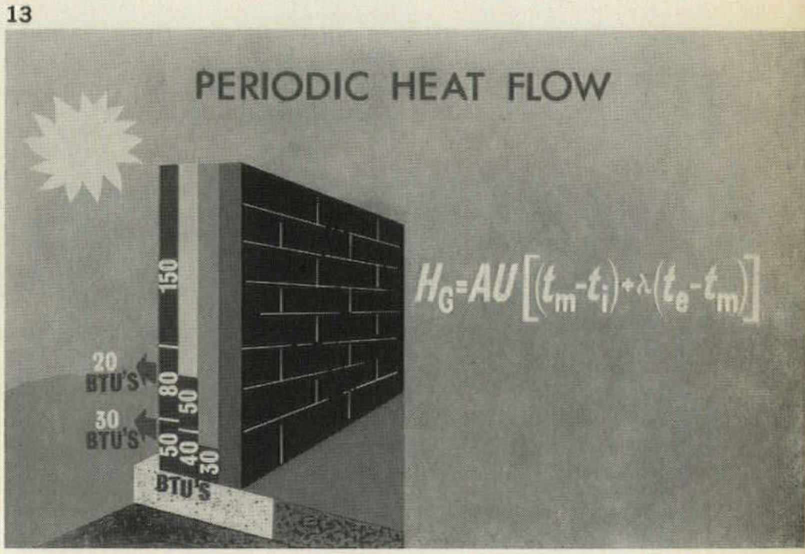


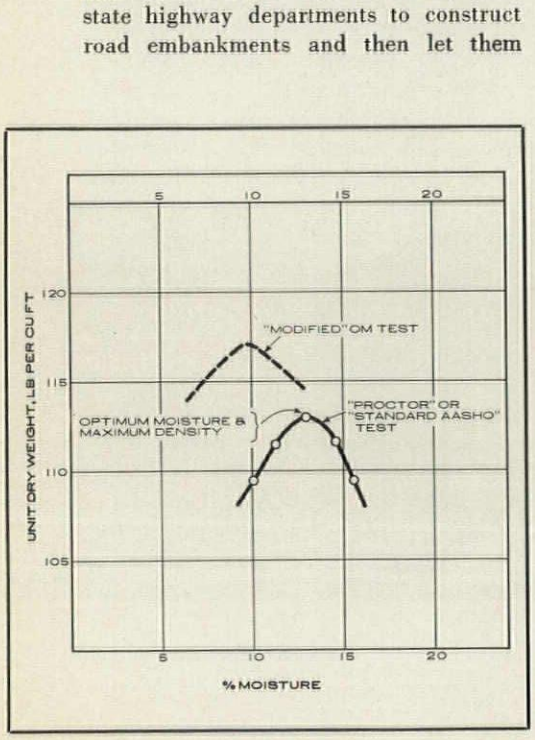
# LOAD-BEARING FILL

BY DAVID M. GREER, P.E.

*This article discusses earth-fill engineering, describing the principles by which a compacted fill can equal or surpass the strength and density of natural soils. The author discusses fill materials, compaction machinery, engineering control, and construction practices, concluding that if his remarks are a plea for the soils engineer they are also a plea for better and more economical construction. Greer is Vice-President of Woodward-Clyde-Sherard & Associates, Consulting Engineers of Montclair, N.J.*

Although earth fills have been used for centuries—for dams, highway and railway embankments, fortifications, and many other engineering purposes—it was not until 1933 that the principles governing the construction of stable and relatively incompressible earth fills were discovered. In that year, *Engineering News-Record* published a series of four articles by Ralph R. Proctor on the design and construction of earth dams, in which he outlined the relations he had discovered between the moisture content of a soil and the density to which it could be compacted. The publication of these articles sufficed to put the construction of earth fills on a sound engineering basis; and to this day the compaction test that is used to control such work is usually referred to as a "Proctor" test.

Before this time, it had been the expectation of every constructor of an earth fill, whatever its purpose, that the fill would settle substantially at completion. It was customary, for example, for state highway departments to construct road embankments and then let them settle for one or more years before attempting to lay pavement. Everyone knew that fill, no matter how placed, was not as dense, strong, or reliable, as natural earth; and no prudent man would rest footings on fill, lay floors on fill, or support any substantial structural load upon it. This attitude, which was perfectly correct in view of the limited knowledge of the subject at that time, is reflected even today in the building code of the City of New York, which declares that the "presumptive" bearing capacity of "fill" is zero. No distinction is made in the code between the honest kind of trash fill, and good dense soil fill of the best material placed under engineering supervision.




### *Natural Soil vs. Fill*

Nowadays, the assumption that fill can never be equal in density or strength to the same soil in its natural state is a grossly mistaken idea. Many natural deposits are very loose. Conversely, fills of the same material, placed at suitable moisture content and compacted by suitable machinery, may be quite dense, and capable of carrying structural loads without measurable settlement.

It must be conceded that there are some natural soils which exist at densities that we cannot readily duplicate in laboratory preparation or in field compaction. For example, any soil that the construction man calls "hardpan" is likely to fall into this category. But hardpan is very much stronger than is necessary to support most buildings; and most soil-supported buildings—probably 90 per cent of all structures—rest on soil that is no better than good compacted fill. Indeed, it is relatively easy to prepare a compacted soil fill that is stronger and less compressible than most natural soils.

### *Proctor Test: Optimum Moisture*

The graph on this page illustrates Proctor's discovery of nearly 30 years ago *(see graph)*. The diagram shows the density of solids in a sample of soil compacted under standardized conditions, plotted against the moisture content of the soil at the time the compaction was undertaken. The curve shows a marked peak (the *maximum density* for the particular compactive effort used) at a specific moisture content (the *optimum moisture* content, or OM, for that compactive effort).

Study of this curve indicates at once the need for moisture control when attempting to compact soil into a dense mass. When the soil is too dry, the density is low (although the compacted mass may appear hard and strong); the trouble is, of course, that it needs the "lubricating" effect of more water to help the soil grains move relative to each other to fill up the air-voids in the mass. And when the soil is too wet, those voids are filled with water, and all the compaction machinery in existence could not force the solid particles closer together (i.e., mud cannot be compacted).

It should be mentioned at this point that the Proctor test referred to above (which is the same as the AASHO Compaction Test) was designed to duplicate in the laboratory the densities which could be achieved in the field by the rather lightweight compaction machinery available in 1933. When it became evident during World War II that higher densities were necessary to support the heavy aircraft and high wheel pressures that came into use at that time, heavier compaction machinery was developed, and the Modified AASHO Compaction Test was developed to provide a new laboratory standard, with higher maximum densities and lower optimum moisture content than before (dotted curve in diagram). Readers interested in the details of the two tests may refer to ASTM *Tentative Methods of Test D698–58T* and *D1557–58T*.

Since the development of heavier and more efficient compaction machinery has made it relatively easy to achieve the higher densities specified by the Modified Test, this test has come to be the one most used today for the control of compacted fill for load-bearing purposes.

### *Relative Density Test*

A limitation upon the use of the compaction (or optimum moisture) tests arises when the soil to be compacted consists of clean sand, or gravel, or a mixture of the two. The trouble is that these soils can usually be compacted to 90 or 95 per cent of their maximum density with ease; but in soils of this class, 95 per cent of maximum density may correspond to a loose, unstable condition. This comes about whenever the characteristics of the soil are such that there is a difference of only a few pounds per cubic foot between the loosest state and the densest state at which the soil can be prepared in the laboratory (or in the field). This has led to the concept of relative density.

Suppose, for example, that a fine, dry, uniform beach sand were poured loosely into a container, and its density proved to be 97 pcf; and that the same sand, compacted as densely as possible in the laboratory (by wetting, pressing, pounding, vibrating, or whatever procedure produced the highest density) proved to be 107 pcf. In this case, 97 pcf is taken as 0 per cent relative density (the loosest state); 107 pcf is called 100 per cent relative density; and if prepared at 102 pcf, the soil would be at 50 per cent relative density (or half-way between loosest and densest states). Now suppose we subject the same soil to the modified compaction test; we may get a maximum density of 105 pcf. Because the procedure of this test is not the most effective process for producing high densities in a uniform fine sand (vibration is better, for example), we will not achieve 100 per cent relative density. Consider, then, the specimen that we prepared at the intermediate density of 102 pcf; its density is $100(102/105) =$ 97 per cent of maximum; and for most soils, this indicates a strong, dense, well-compacted mass. But examination of the specimen itself will show that it is still fairly loose, and that it will compress appreciably under relatively light loads. Study of the load behavior of cohesionless soils has led to the general rule that most cohesionless soils must be compacted to a *relative density* of 70 per cent or more, regardless of its density as indicated on a per-cent-of-maximum scale.

For this reason, sand fills that are expected to carry structural loads should be controlled by measurement of relative density rather than by comparison with OM test results.

## *Selection of Fill Materials*

In general, nearly any soil that forms stable natural ground can be used to make a stable load-bearing fill.

Marterials generally unsuitable for construction of load-bearing fill are: organic soils; peats; soils containing trash, vegetation, roots; silt (unless it happens to be at optimum moisture content); wet clay (in a climate in which it cannot be dried back to optimum moisture content); any soil containing boulders so large that the available compaction machinery will not incorporate them into the fill without leaving voids; and "active" or "swelling" clays (in circumstances where the fill would have an opportunity to absorb water later, and where the resulting swelling would be detrimental to the structure).

Some of the best fill soils, from the standpoints of ease of compaction and stability after construction, are: sand and gravel (bank-run, with or without fines); clean and well-graded sands; well-graded cohesive soils (e.g. glacial tills); fine sands; and special materials such as caliche, mine tailings, etc.

In some cases, the selection of the most suitable fill material will be governed entirely by the nature of available borrow sources; in others, the suitability of available construction machinery will govern selection of the fill material.

Rubble and stone from demolition, road cuts, tunnels, etc., are often available for use as fill, and may sometimes be used to advantage. In using this kind of fill, however, careful consideration must be given to the nature and size of the fill particles, and to their effect on construction and on the subsequent usefulness of the fill. Rubble and large stones are particularly useful for making the first course of a load-bearing fill on soft ground or under water. However, coarse rubble or stone fill on top of ground so soft that piles will have to be driven later produces a condition where piles cannot be driven; such fill, thoughtlessly placed, may seriously reduce the value of a property.

## *Compaction Machinery*

The type of compaction machinery for a job depends on many factors besides the soil type; but soil type will be the governing factor in many cases. For example, no experienced contractor would select a sheepsfoot roller to compact a sand fill; he might use any of several other types successfully; but he would certainly select one of the vibrating compactors if such were available.

| Compactor Type | Soil Suitable | Lift Thickness |
|---|---|---|
| Smooth-wheel rollers | Sands, silts, base materials | 4 to 8 in. |
| Penumatic, light | Sands, lean clays, gravelly soils | 4 to 8 in. |
| Pneumatic, heavy | All soils | 12 to 24 in. |
| Sheepsfoot (and variants) | Soils with some cohesion | 6 to 12 in. |
| Vibratory | Cohesionless soils (sands, gravels) | Varies; as much as 3 ft for heaviest machinery |

Another major consideration, in addition to the type of machine, is its size and weight. Large and heavy machines are usually best for large jobs, large areas, or deep fills. And small, hand-manipulated compactors are required for use in limited space, or for compacting fill next to walls, in trenches, etc.

## *Field and Lab Tests*

In general, control of an earth fill involves three basic steps: (1) predetermining the moisture-density relationships for the fill material (compaction properties); (2) making field measurements of moisture content and density of the fill during construction; and (3) comparing the field test results with the laboratory data.

On the basis of the comparison, instructions are issued to the contractor regarding thickness of lifts, number of passes, weight of compaction machinery, moisture control, and other factors, with the object of holding the fill density to at least the minimum required by specs.

Laboratory tests are made in advance; but field density tests have to be made concurrently with construction; and they are laborious to perform and slow to complete. Because field density tests involve laboratory drying of a rather large soil sample, several hours in the oven are required. Therefore, the results of density tests started on one day are not usually available until the next morning. By that time, the compaction lift which was being tested may be buried beneath one or more new lifts.

This delay is obviously a handicap to proper control of the job. Much thought and ingenuity have been—and are being—given to the development of "quick" moisture and density tests. On many jobs, the density samples are dried in a few minutes' time, either by spreading them on a hot plate, or by mixing them with alcohol, then burning it off. In either case, the procedure destroys organic compounds, and drives off water of crystallization from some minerals, thus yielding results which do not reflect the true free-water content of the soil. Another "quick" method for moisture content measurement involves mixing the soil sample with pure alcohol, allowing the solids to settle, then measuring the density of the alcohol-water mixture by means of a hydrometer. This method can be made to yield good results; but it involves the most finicky determination of test temperature, and of impurities in the alcohol, so it can be trusted only with highly trained personnel.

Another system which shows promise, but which has not yet come into general use, is a pair of nuclear energy instruments, one of which, by measuring scattering of neutrons from a radioactive source, gives an indirect measurement of moisture content; and the other of which, by measuring absorption of gamma rays from the same source, gives an indirect measurement of density.

At the time of this writing, the best method of field test usually constitutes either the sand or the balloon density test for volume, with standard laboratory drying for moisture content, supplemented in some cases by the carbide bomb or some other "quick" test where the soil is suitable.

## Test Fills

As mentioned above, the laboratory compaction tests are designed to simulate field compaction. However, compaction machinery comes in a thousand different varieties and sizes; and soils in ten thousand. The project soils engineer will often find that his experience will not tell him just how effective a particular type of construction machine will be on a particular type of soil. In such a case, it is necessary to construct a test fill in the field, in which the engineer has an opportunity to vary such things as the loading of the construction machinery, the thickness of lift of soil, and in some cases the type of construction machine.

The economies which can be effected by the use of such a test fill, when the job is very large, are very important indeed. With some soils and a particular type of construction machinery, a 9-in. lift of loose soil and 6 passes of the compaction machine might be quite adequate; with another type of soil and the same machine, however, even 12 passes of the machine might not serve to obtain the desired compaction, while a reduction in thickness of the lift might insure that 4 or 5 passes of the machine would have the desired effect.

## The Soils Engineer

The only system of field control that can be relied upon to produce a dense, strong load-bearing fill is the application of the appropriate procedures described above, oy or under the direct supervision of an engineer or technician with sufficient experience in the compaction of earth fills that he can give directions to the contractor ("Hold up here: this area is too wet, or too dry, or too loose") without waiting for test results.

Indeed, there are some good to excellent fill materials, in which tests are not practicable at all, but where a soils engineer with a "feel" for the condition of a fill can control moisture and compactive effort so as to end with a dense, strong, and incompressible fill. Examples of such material are: very gravelly soils, or gravel and cobble mixtures, such as some of the glacial stratified drifts in New Jersey; or a weathered rock, where the weathered portion takes the form of a well-graded soil which compacts readily to fill the voids between the harder rock particles, such as some of the weathered Triassic shale from pits in New Jersey.

## Construction Practices

*Preparation of Base for Fill in Water.* Whenever it is proposed to construct a load-bearing fill, consideration must be given to the preparation of the surface on which the fill is to be placed. Organic soils, roots, grass, and trash should be stripped. If the surface thus prepared is below the water table, the area to be filled must be dewatered, or if it cannot be, then the fill, up to water level, must be of clean sand and/or gravel, which can be compacted in place by the operation of bulldozers as soon as the fill level has been brought up to a point where water is not too deep for the operation of the machines. It must be emphasized that such underwater fill should be kept to a minimum; that the uncompacted lift should be as thin as possible; and that it should be given as much working as practicable by the heaviest tractor equipment available, or by a heavy vibrating roller if possible. Such fill will usually be inferior in strength and load-bearing ability to the controlled compacted fill which will be built up upon it, above water level; but it can usually be made strong enough to carry the proposed structural loads, which will be spread and diminished in intensity by the denser, stronger fill above.

A common example of this problem is in the preparation of sites for compacted fill in the Jersey "Meadows." In these sites, several feet of peat and organic soil are stripped off, exposing a crust of stiff clay or of medium-dense sand. The stripped surface is several feet below water table. The excavation can be kept dry by pumping; but the excavation bottom (especially in sites of several acres in extent) cannot be drained perfectly, and is at best in a "sloppy" condition. In order to provide a firm base or "working platform" for construction machinery, an initial course of 15 to 18 in. of clean rubble, stone, or bank-run gravel is required; then the compacted fill can be built up on top of this layer, using suitable compaction machinery.

*Puddling.* Many people have the idea that the way to obtain density in a soil fill, regardless of the nature of the soil, is to flood or "puddle" it at the time of construction. This notion has led to many building failures ranging in scope from the annoying to the disastrous. If there is any appreciable clay or silt content in a soil, puddling it guarantees that the fill will be weak and compressible. If the fill is of sand or gravel, puddling will have no effect unless the soil is vibrated as it is placed; in this case the combination of flooding and vibration can be quite effective.

*Drainage During Construction.* Many otherwise satisfactory fill soils become quite unworkable when allowed to become saturated. When such soils are being used for fill construction, much lost time can be avoided by keeping the fill shaped to drain, by maintaining peripheral drainage by pumping where necessary, and by ditching to get rid of local ponding promptly after a rain.

*Backfill Next to Walls, Footings, etc.* Wherever fill is to be placed next to footings or walls, or in spaces so limited that tractor-drawn compaction machinery cannot operate satisfactorily, hand-manipulated compaction devices must be used. These devices include air rammers; small gasoline-driven ("Barco") tampers; small vibratory compactors; and a host of machines of various sizes and operating principles.

These devices are very often misused. Most of them, to produce densities comparable with those produced by large compaction machinery (and satisfactory for support of floor loads), cannot compact more than a 2 or 3 in. loose lift of soil at one time; more often than not, however, the operator tries to compact a lift of 6 to 12 in. in depth.

The common result of careless compaction adjacent to walls and footings is that, after the structure is put into use and the design floor loads come to bear, floor slabs crack a few feet from the wall, with the wall edge of the slab down with respect to the rest of the slab.

The least expensive way for a contractor to backfill a space of this sort is to throw the fill in loose, make a few passes over the top with a light compactor to form a crust, and hope that nobody discovers it until the building is complete. This is a part of the operation that requires constant vigilance on the part of the soils engineer or inspector. Failure to control it will result in trouble and expense later.

When the fill soils are clayey, rainfall draining off the fill into unfilled spaces of this sort often causes serious trouble and delay. For this reason, it is often more economical to fill such areas quickly with selected sand or gravel fill, which can be densified quickly, in much thicker lifts, by the use of small vibrating tampers. The extra expense of bringing in such fill may be more than compensated by the saving in time.

*Backfill of Utility Trenches.* Trenches for utility lines of various sorts are often cut by the plumbing contractor, after the fill contract is complete and the filling contractor has left the job site. The specifications should clearly require the plumbing contractor to place his trench backfill to the same specifications as the general subfloor fill. This, too, requires vigilance on the part of the soils engineer.

*Effect of Freezing Weather.* Fill must not be placed or compacted in severe freezing weather. Not only is there likelihood of inclusion of frozen loose lumps, or even ice or snow; but the fill already placed may be frozen, with a loose surface crust of ice which will melt and permit subsidence later. Also, care must be taken to avoid letting snowmelt or rain water get into unfilled excavations adjacent to walls, footings, etc., or in open trenches in the fill, during winter weather. The writer recalls one large industrial building where such excavations were backfilled loosely by the contractor; melt-water saturated this fill, then in a series of freeze-thaw cycles, worked its way laterally into the natural ground adjacent and built up ice lenses; then, after a long period of freezing weather, the contractor poured the floor on top of the frozen ground. Result: when the building was occupied (in March), and heat turned on, the frozen ground thawed, and the floor subsided, irregularly, as much as 2 in., producing a floor crack that paralleled the side of the building for a distance of about 350 ft. Here, the under-floor soil was not fill but dense hard glacial till with a safe bearing capacity in excess of 5000 psf. Nevertheless, lack of technical supervision (of the backfilling of the trench cut for placing the continuous wall footing) produced a result that was distressing to the new owner, and very embarrassing to the builder and architect.

*Fill Placed Too Dry.* We have described the concept of optimum moisture content, and the necessity for moisture control in order to get close to maximum density in the field. The effect of compacting fill when the soil is too dry should be discussed. Nearly any soil can be rolled or tamped to form a hard, strong fill when it is dry. The trouble is that it will not stay dry. Unless such a fill is cut off from all sources of moisture—i.e., hermetically sealed (a practical impossibility)—it will become wetter after construction is completed. Water will reach it by one or more of the following agencies: capillary rise; surface drainage; leaky water, sewage, or drainage pipes; condensation; changes in groundwater level.

The effects of such wetting are various, and can be quite disastrous. In some soils, wetting of a dry fill will produce prompt subsidence, and loss of bearing capacity. The writer observed one plant where a strong hard fill, about 12-ft thick, was formed by compacting a dry, sandy, clayey silt. As placed, this material probably had a safe bearing capacity in excess of 6000 psf. Surface drainage found its way under the grade beam and saturated the fill, even before the plant was completed. The fill settled 1 ft under its own weight, leaving the plant floor suspended by its edge contacts with grade beam, piers, pedestals, etc. The saturated fill probably had a safe bearing capacity of about 200 psf.

A properly controlled fill of the same soil would have had a permanent safe bearing capacity of more than 3000 psi, and would not have settled at all under its own weight, plus floor loads. ("Bearing capacity," as used in this article, means the allowable load on the soil which will not exceed the settlement tolerances of the structure.)

In another instance, an uncontrolled fill made of compacted dry active clay absorbed enough water from atmospheric condensation cycles and capillarity, in 10 years, to swell and heave the building floor—including interior ceramic-tile partitions—about 2 in. Properly selected and controlled fill would not have moved.

## Technical Supervision

The instances cited above are extreme; but they happened. They could have been avoided if a soils engineer had been employed to supervise those aspects of the job which governed subsequent fill and foundation behavior. The writer has seen dozens of less striking instances where structural damage resulted from improper design or (more commonly) improper construction practices. Every one of them could have been avoided.

The use of load-bearing fill is recommended as a way of expediting construction time, but it cannot be used blindly. Indeed, it should not be employed at all, except under the supervision of someone especially trained in the field. Fills can be made dense, strong, and incompressible. But soils have a variety of properties that are not necessarily well known to the architect, or builder, or even to the structural engineer. This has been recognized recently by the FHA, which, in its *Data Sheet 79: Land Development for Buildings on Fill,* paragraph C-5, offers the following definition: "Soils Engineer: A registered professional engineer experienced in soils mechanics, retained by the developer and responsible for the soils engineering work outlined in this data sheet, including supervision, analysis, and interpretation of field investigations and laboratory tests for a specific project, prepartion of soils engineering recommendations and specifications, and supervision of the grading work."

Perhaps the reader will think this article is a plea for the use of a soil engineer. It is. But it is also a plea for economy in construction, for uncracked floors and walls, and for the best use of the materials at hand.

# Product R & D

BY HAROLD J. ROSEN

*Failure of many building component manufacturers to take advantage of the experience of architects in their research efforts for new products, is deplored by the Chief Specifications Writer of Kelly & Gruzen, Architects-Engineers.*

Building materials and the techniques involved in using them successfully have helped shape today's architectural design. The new building products and the equipment required for handling these materials, particularly those that have become available in the last century, have played a major role in this development.

For example, the advent of structural steel, along with vertical transportation, enabled architects to bridge the limitation of wall-bearing structures and permitted them to create skyscrapers. The development of new concrete form materials and concrete admixtures has released concrete from its concealment as a structural element, and now permits architects to mold this plastic material into unlimited sculptural shapes as a finished façade. Wood products, together with new adhesives and fastening devices, have created laminated beams, stressed-skin plywood beam sections, and other end products that give the architect more freedom in design, thereby permitting architecture to develop. Plastics, too, even though their significant use in buildings is relatively recent, could have a great influence in architectural design, if properly researched and developed.

Although building materials exert an influence on the development of architecture, occasionally it is the architectural profession that leads the building materials industry in the development of new products—as witness the metal-and-glass curtain-wall concept. Here, the designer forced the manufacturer to carry out research in sealants, metal finishes, and metal alloys to overcome the problems he was encountering in weatherproofing, expansion, and appearance, so that the curtain-wall expression might become feasible.

In any event, product research and development cannot be carried on in the laboratory by the chemist or laboratory technician without consultation and close association with architects and their needs. This narrow approach, excluding the architect from the research team, results mainly in the creation of ersatz materials. Such an approach does not envision greater potentiality for a product. The chemist and technician can only imitate. They can find a replacement for an existing product, but they are not equipped to visualize how their basically new material can be utilized, on its own merits, for something completely different in another area of the building structure.

Structural steel was for a long time a hidden element. Yet the cables used in suspension bridges offer possibilities in suspended building construction that are unlimited.

Reinforced concrete was for decades hidden as structural elements, or disguised with stucco until its potential as a finished material in its own right was recognized. There are unlimited possibilities in concrete today in form and appearance, because the architect has worked with manufacturers in the development of form materials, form linings, and admixtures.

What we are witnessing today in the products emanating from many building materials manufacturers, is a slight variation from their competitors' product to make their product more "or equal." In the plastics field, we are confronted with manufactured products that are imitations of the basic structural materials—i.e., wood, steel, masonry—instead of taking advantage of the inherent properties of these new plastics to develop products that can exploit their own characteristics rather than imitate the old.

The building materials manufacturer who does not consult with the practicing architect to get his ideas is also missing the boat in that the manufacturer can only see the one end product which he is striving to improve or perfect, without being aware that his basic material might be utilized elsewhere in a structure in a completely different use and form.

The chemical industry has in recent years paid more attention to the development of building products from chemicals, and we are now entering a new era in the use of materials made from plastics in the design of structures.

We find chemicals being utilized in such diverse products as vinyl flooring, latex, acrylic and vinyl paints, plastic skylights, plastic roofing, lighting fixture lenses, plastic wall panels, and a host of other products. The chemical industry has always had an appreciation for research and it is utilizing its awareness of research for end products of chemicals. Yet even in this endeavor the chemical industry must obtain the judgment and perspective of architects in making decisions on new product developments. They cannot create products in a vacuum.

Although the architect may not be a product designer, or have the necessary background in manufacturing, testing, and marketing of a product, he does know the limitations of current products. He can indicate to manufacturers in what ways their products are deficient, and in what areas improvement is required. The architect also knows where a completely new product is needed to fulfill a basic requirement not served by anything currently on the market.

What industry really needs is direction in the development of products, in addition to product design know-how. And this direction and definition of the problem can only come from practicing architects who are confronted with these problems and who can supply the missing link in a team effort.





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# Apartment Building Intercom

BY WILLIAM J. McGUINNESS

*An independent intercom system, used primarily for service calls, takes advantage of crossbar switching. Such a system, as installed in a New York apartment building, is discussed by the Chairman, Department of Structural Design, School of Architecture, Pratt Institute.*

At Carnegie House, a new apartment building in New York City, the 330 tenants have available, for their convenience, a speedy and efficient intercommunication system. Entirely independent of the public telephone system, it links each tenant with 20 building services and many nearby shops. Tenants can also call each other up, if the person called has exercised his option to have his intercom listed in the house directory.

Since these house-telephones are employed principally for service calls, they are located in apartment kitchens. The tenant may, however, elect to have a lateral extension installed to permit another location. Possible service-calls a tenant may make include speedy contact with laundry, valet, superintendent, doorman, or desk clerk, restaurant, food service, beauty parlor, car rental, and garage. By dialing a special number that triggers a signal at the main entrance, tenants can "flag down" taxicabs before leaving their apartments.

This completely automatic network was designed and installed by the Ericsson Corporation, North American subsidiary of L.M. Ericsson Telephone Company of Stockholm, Sweden. Its automation eliminates the need for two operators, one for each shift and the part-time attention of the night doorman. In the opinion of Ragnar Stalemark, president of the corporation, rental of comparable facilities from a local utility would add considerably to operational costs.

Among the many advanced features of the installation is the use of crossbar switching. This fast method of call-routing, originally a development of the Ericsson Group, has been in use by public telephone companies in the United States for 30 years. Its use in a private apartment intercom system, however, is unique. It is an electromechanical system providing greater speed, reliability, and lower maintenance costs than the conventional mechanical systems usually chosen for intercom use.

In the crossbar system, the quickest and most direct path for the call is determined while the number is being dialed. Only when the dialing is complete does the switching equipment go into action. The person making the call will hear, within a fraction of a second, either a ring at the called station or a busy signal. In older systems, the caller actually operates the switching equipment with each dial pull. If he hangs up before dialing a full number or if his call is routed along a congested trunk line, time is lost while the equipment returns step by step to its stationary position.

The white telephone instrument is an interesting one. Its use in public systems is world-wide and it is available to subscribers in some 4000 private companies in the United States. As installed at Carnegie House and adapted to intercom dialing, it is a handsome addition to apartment equipment. In this one-piece instrument, 15 oz in weight and 9¼-in. high, the dial is in the bottom of the base (*left*). A large central button, actuated by a light spring, turns the instrument on when it is lifted from a level surface, and off when it is returned. Wall-type telephones of conventional style are used in a few service locations where level working areas might become cluttered. This is a three-digit system and the dialing is extremely silent.

The 21 stories of the building are served by 18 risers of rigid conduit, ¾ in. to the eighth floor and ½ in. between the eighth and twenty-first. They enclose a pair of wires for each instrument. At the central equipment room in the basement (*partial view at right*), intercom wires for the entire building are enclosed in a metal raceway less than 2 sq ft in area. It is felt that the wiring could be simplified in some installations by locating the central control at mid-height of the building, and routing the intercom wire-pairs down and up.

Cost of the system was $40,000 and the number of extensions 400. Many features, including dust-resistant contactors, minimize trouble. The Ericsson Corporation will be busy with adjustment and changes during its one year of guaranty. After that, the owner may elect to retain maintenance service on a yearly fee basis. The system is expected to operate without major changes and with minimum maintenance for 25 years.

Architects for this building were Schuman and Lichtenstein.



# Public Agency Form Contracts: Part 1

BY JUDGE BERNARD TOMSON AND NORMAN COPLAN

*In the first of two articles, Nassau County District Court Judge and a New York attorney discuss recommendations to amend inequities in form contracts of public agencies.*

Many public agencies have developed form contracts for the furnishing of architectural services for the construction of public projects. It is contended by many members of the profession that all too often these documents reveal a misconception and lack of understanding of the nature of architectural practice. In some areas it is charged that the tendency is for the public agency to require more extended services from the architect, accompanied by no increase, or a decrease, in the architect's compensation.

The architect, faced with such an inequitable agreement for public work, generally "throws up his hands" and surrenders to the inequity because he has no real alternative. He knows that the contract in question, having been developed and approved by various public officials and bureaus at different bureaucratic levels, cannot, as a practical matter, be modified, even when its inadequacies are recognized by the public contracting agency. Relief, if it is to be forthcoming, must be obtained through the joint efforts of the members of the profession acting through their professional society, working toward a revision of the form in use, rather than through the individual effort of the architect, who is presumably anxious to obtain the particular commission.

The New York Chapter of the American Institute of Architects has been concerned with the contracts and fee schedules of several New York municipal agencies, among which is the Board of Education of the City of New York. Prior to 1950, the Board of Education of New York City utilized its own architectural staff for the design of city schools. However, to meet the increasing needs of the city, a policy was adopted in the early 1950's to retain outside architectural firms to design school projects for New York City. The quality of this work was excellent and many new and progressive ideas were introduced.

The Fees and Contracts Committee of the New York Chapter of the American Institute of Architects, in its report to the Executive Committee, stated that political attacks based upon claims of unnecessary expenditures of taxpayers' monies for so-called luxury schools, and claims of high architectural fees, have given the public a false impression and have led to pressures for a return to the system of internal design which prevailed before the employment of independent, private architects for the school program. The Committee has charged that as a consequence of these and other pressures, the tendency in the City of New York has been to demand increased services from the independent architect for less compensation, which, if continued, can only result in inadequate services or bankrupt architects.

To bring forcefully to the attention of the Board of Education of the City of New York the inadequacy of the prevailing rates of compensation for school design, the Fees and Contracts Committee of the New York Chapter of the American Institute of Architects has made a study of 19 school commissions which were undertaken by various architects over a 7-year period during the 1950's. This study revealed that the fees for 6 of the 19 commissions failed to cover expenses and provided no compensation to principals. One firm suffered an out-of-pocket loss of approximately $44,000. In respect to four high schools which were studied, fees failed to cover the costs of three. The average compensation for all 19 projects was 5.34 per cent of budget costs and 2.31 times technical salaries. In only seven commissions did the architectural firm receive fees equivalent to at least 2.50 times the salaries of technical employees.

The Fees and Contracts Committee of the New York Chapter of the American Institute of Architects, in its report, pointed out that a competent architect cannot render adequate service without competent mechanical and structural engineers, but that a study made by the New York Association of Consulting Engineers relating to nine school projects, indicated the inadequacy of their compensation. This study showed that not one mechanical engineering firm received fees equal to 2.50 times technical salaries and only one structural engineering firm received this level of compensation. The average ratio of drafting cost to fees was 1.86 for mechanical engineers and 1.89 for structural engineers.

The conclusion of the Fees and Contracts Committee was that the fees paid during the 1950's were barely adequate and in the average situation were below the accepted norm of compensation for both architect and engineer. More alarming, however, as the Committee points out, is that the fees for design services which were paid by the New York City Board of Education in the 1960's were even lower than those paid during the 1950's. These rates, states the Committee, provide little chance of compensation for the architect and a high probability of sustaining an out-of-pocket loss.

The Committee has urged that architectural fees not only be increased, but that they bear a relationship to the type as well as the size of the project involved. Under the present contract, there is no distinction in fee for the design of upper grade schools and elementary schools, even though the former requires a more complex program because of specialized classroom functions. These recommendations are now under consideration by the Board of Education.

This discussion will be continued in next month's column.

### *Reactions to Interior Design Issue*

Dear Editor: I find the Symposium [OCTOBER 1962 P/A] very fruitful for quotes and arguments, and especially Edgar Kaufmann's point: Decoration Independent of Architecture. I'm not fully convinced, however, since I am suspicious of words, which can so often be used to set up a point of view and prove it.

EDWARD WORMLEY
New York, N.Y.

Dear Editor: We have been reading various articles in this area, but your story ["Carpeting Is in the Specs"] is undoubtedly one of the finest we have seen.

JOHN M. ROUGHAN
Chemstrand Company
New York, N.Y.

Dear Editor: I would like to congratulate you on your article, "Carpeting Is in the Specs." How you managed to cram in so many pertinent facts and data is beyond my ken. It is a very clear and authoritative piece and well illustrated.

LEONARD MOZER
American Carpet Institute
New York, N.Y.

Dear Editor: The entire October issue is the best coverage of interior design I can remember in at least two decades —not excluding those journals solely dedicated to the subject.

HENRY ROBERT KANN
New York, N.Y.

Dear Editor: Many thanks for the handsome and interesting TWA presentation in your fascinating issue.

ALINE B. SAARINEN
Hamden, Conn.

Dear Editor: Congratulations on a very handsome issue.

ALEXANDER H. GIRARD
Sante Fe, N.M.

Dear Editor: Your Symposium was most interesting and informative. However, I think that one reason for the existence of *decorators* was overlooked. The architect designs the interiors of public and semipublic places, where he has ample corporate funds available, and where all the furnishings are new or built-in, so that every detail is under the control of the Master Builder to attain the desired unity of architectural expression. In the case of residential buildings, however, this situation does not exist. What family could afford, or would want to buy, a totally new set of furnishings? And besides, what family would want to part with its oldest and most cherished possessions, toward which they have a sentimental attachment, and which so often are a collection of aesthetically unrelated objects?

Who but the decorator can take pleasure in combining, through the magic of color, line, and scale, such a heterogeneous collection of objects, and through art make it look perfectly at home in architecture not designed to receive it? The architect does not have the patience for this, nor the artist's skill with line and color. Architecture can be impersonal, but decorating is invariably very personal.

Please continue to explore important themes in your Symposiums. It is always fascinating to read various points of view on any significant topic.

T. LOFTIN JOHNSON
Mt. Kisco, N.Y.

### *Plaudits to Van Eyck*

Dear Editor: The opening lines of "Place and Occasion," the article about Van Eyck's Amsterdam orphanage [SEPTEMBER 1962 P/A] should be savored by all those who seek to design for people.

I admit to reading the accompanying text in fits and starts. I could not take my eyes off the photographs: Van Eyck's concern for human values fairly jumps out of each view. Plaudits to Van Eyck and to the photographer who captured the spirit of this work. Above all, thanks to PROGRESSIVE ARCHITECTURE for the sensitivity with which the presentation was done. When will we see more of Van Eyck's work?

JIM LUCAS
Herman Miller, Inc.
Zeeland, Mich.

### *A Note of Regret*

Dear Editor: I regret that James C. Rose, in his review of John Simonds' book *Landscape Architecture: The Shaping of Man's Environment* [AUGUST 1962 P/A], felt it necessary to be so vehement and personal in his attack. Any book, to be sure, can be criticized, but I am certain that Simonds tried to write his book with as much sincerity and integrity as Mr. Rose himself did in his book, *Creative Gardens*. For anyone wanting a nongratuitous evaluation of each man's ideas, he need only read the two books.

I believe the Simonds book is far superior and ranks as one of the best on the subject written in recent years.

HIDEO SASAKI
Watertown, Mass.

### *The New York World's Fair and Mass Architecture*

Dear Editor: The unfortunate debacle that is the coming New York World's Fair has been extensively displayed and adequately criticized by the architectural press — although apparently it had been calmly accepted by the public at large.

One particularly dismaying building often published is that of the G.M. Futurama, designed by that company's styling staff. I believe that this building is suggestive of a very significant and portentous phenomenon yet to come. I refer to the specter which will arise in our midst when "mass-production design" teams up, as it inevitably must, with the sleeping giant of factory built homes. At the moment, the prefabricated homes industry is timidly catering to the current "tastes" of the public by offering mass-produced "Colonial," "California Split-Ranch," and so on. However, when the problems of overproduction hit what will by then be an enormous industry of fixed plant and equipment, the inevitable concept of "designed-obsolescence" will take hold in the home industry as has long been the case with the auto industry. Then the former will at long last heed the exhortations of many of its present leaders to *use* advertising on a *national scale*. The results may well prove catastrophic.

Most architects will scoff at these suggestions and turn a deaf ear. They ask, "Why should we care about mass production? We are not industrial designers." The Bauhaus is looked upon as an historical exercise, its lesson of understanding and sensitive control of the machine is long forgotten—if, indeed, it was ever learned. Those who carry on this plea for man's control over the machine, before it is too late, are often looked upon as heretics opposed to change and are largely ignored.

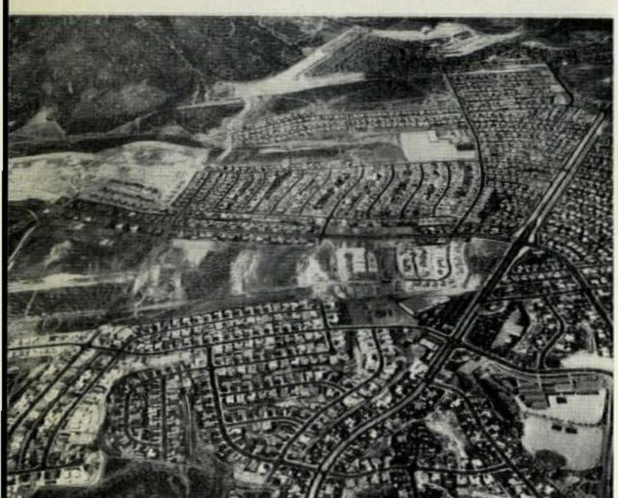
Architects also seem to say, "Why should we care about mass tastes in housing? Only 7 per cent of the population even wants our houses. Besides, only a small portion of the upper class cares to build a creative personal expression of their lives." Even now, most architects are content to let the machine simulate their handcrafted productions.

If architects refuse to heed the warning that seems to be so implicit in the G.M. Building and others of its type, then they should at least refrain from the hypocrisy of criticizing the general grossness that is evident everywhere in our environment. And to those who abdicate their responsibility entirely and who retreat to the security of their "7 per cent," I close only with the reminder that the most expensive and befinned Cadillac is *not* bought by the "unknowing masses."

RICHARD SCHOEN
Washington, D.C.

# The Call to Action — from ACTION

PHOTOS: COURTESY OF ACTION, INC.



BY DAVID A. GROSSMAN

HOUSING, PEOPLE, AND CITIES *by Martin Meyerson, Barbara Terrett, and William L. C. Wheaton. ACTION Series in Housing and Community Development. Published by McGraw-Hill Book Co., Inc., 330 W. 42 St., New York 36, N.Y. (1962, 386 pp. $9.75). Until recently in private practice as a planning consultant, Mr. Grossman is now Director of the Community Development Branch, Urban Renewal Administration.*

ACTION, which was originally the American Council to Improve Our Neighborhoods, has changed its name to the National Council for Good Cities while retaining its original eye-catching initials. The organization is made up of industrial and civic leaders who joined together in 1954 with a common interest in improving the urban environment. Their activities, which have benefited from Ford Foundation grants, have covered a wide variety of approaches to community improvement, ranging from the merely hortatory (an impressive array of bus and subway advertisements) to the undertaking of substantive research. The bulk of ACTION's emphasis, however, as befits a private improvement society, has been in the form of aid and encouragement to local civic-betterment groups. To their credit, much of the citizen participation effort in the nation's urban renewal programs has received assistance, in one form or another, from ACTION.

From the viewpoint of the person interested in urban research, ACTION's most notable contribution is the series of eight volumes of which *Housing, People, and Cities* is the final summary. Martin Meyerson, Director of the Joint Center for Urban Studies at Harvard and MIT (and formerly Research Director for ACTION), directed and edited the series. In the preparation of this summary volume he was aided by Barbara Terrett, ACTION's current Director of Research Activities, and by William L. C. Wheaton, Director of the Institute for Urban Studies at the University of Pennsylvania. This able trio has drawn heavily on the work done by the authors of the rather more specialized preceding volumes, a group that includes many of the best-known and most competent scholars in the fields of housing, planning, and urban economics. (See the end of this review for a list of the titles of the earlier books in the series and their authors.)

The ACTION Series in Housing and Community Development, as the group of eight books is known, has already achieved significant stature as a major addition to our knowledge about the problems that must be confronted in urban renewal, and as a source of a number of original ideas as to possible next steps that can be taken by both public and private groups. The availability of this single-volume summation will make much easier the perusal of this body of knowledge and ideas by anyone whose interests are not those of the specialist. To the latter, the individual studies will prove more rewarding.

The purpose of the Series, as Meyerson notes in his foreword, is "to inform and stimulate the growing body of influential businessmen, professionals, and citizen leaders whose opinions on many facets of urban life are having a profound effect upon policy and action for housing and community development." Surely to be included in this group are the nation's architects, although their contribution to the creation of better housing and community patterns has not yet been nearly as great as it should, as the authors note at several points in their discussions of the minimal role played by good design in the production of most housing.

The six headings under which the authors have grouped the findings and recommendations of the Series provide a convenient basis for discussion: the setting, the consumer, the producer, the investor, the Federal Government, and the community.

1. *The Setting.* The setting for housing and community development is, of course,

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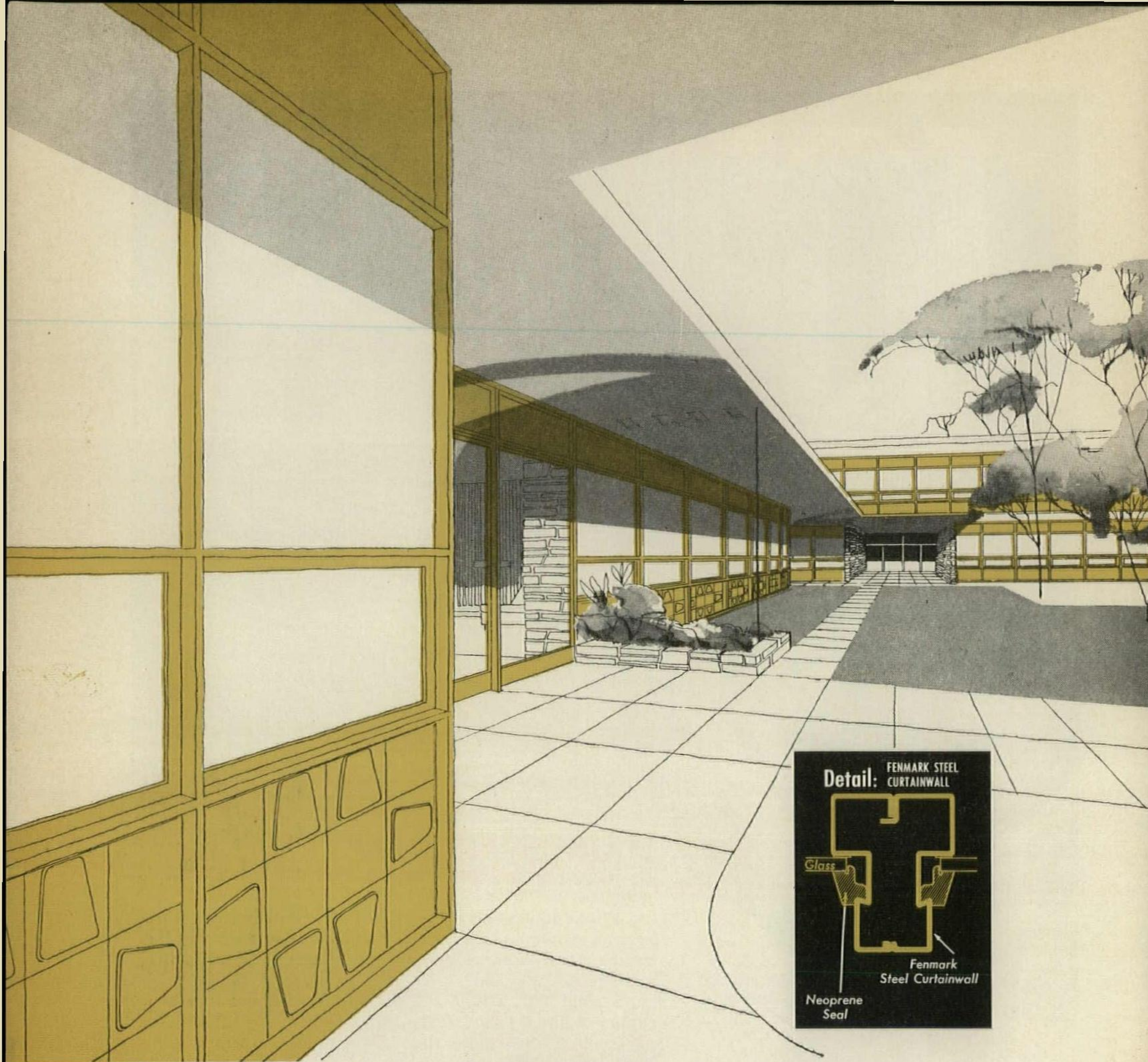


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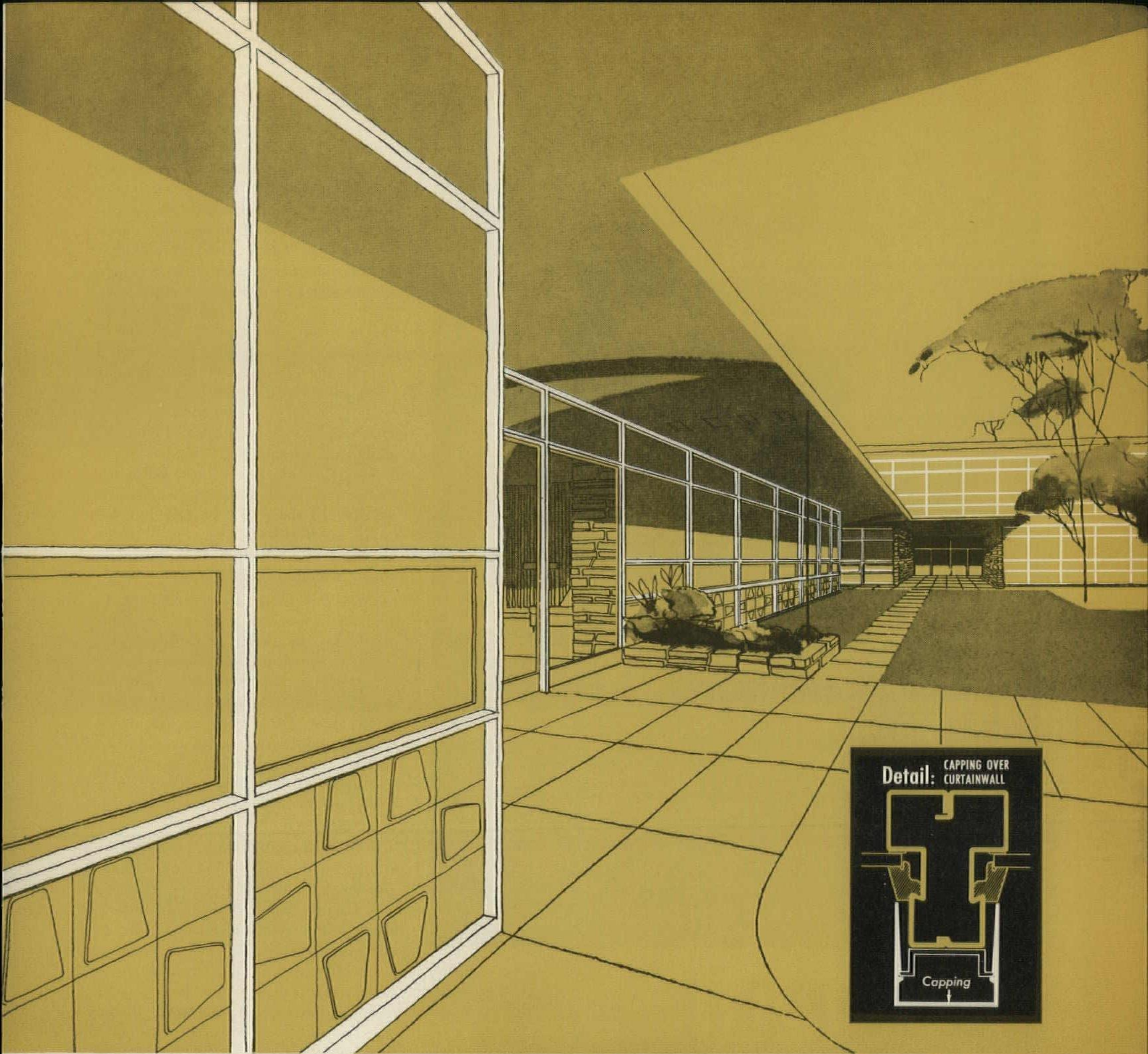


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*Continued from page 144*

of trailers (or mobile homes). Nearly four million people now live in mobile homes, and one-tenth of annual housing production is accounted for by this too-often-scorned type of dwelling. It is possible that part of the growing use of mobile homes is by families who, forced to move often, find it easier to take their shelter with them, rather than buy and sell anew at every move; but other families have no doubt found the competition in space and price to the favor of the mobile-home industry, which shares some of the capabilities of the automobile manufacturers.

3. *The Producer.* Responsibility for the production of housing, which includes design, is characterized by ACTION's analysts as "divided among many poorly co-ordinated elements." Despite improvements, there are still many gaps in the production process that are filled, if at all, by handcraft methods.

Since World War II, the development of both on-site and off-site assembly procedures, by merchant builders such as Levitt and prefabricators such as National Homes, has resulted in major advances in the production of moderate-price houses. These processes are limited in scope, however, and can meet only a part of the varied market for housing, although they have been the most promising forward steps that the housing industry has seen.

Further progress, notes Meyerson, will require additional capital investment (too many builders are one-shot speculators, too few are well-financed businessmen), better communication among the many participants in the industry, and above all further advances in the processes of structural assembly, land acquisition and development, mortgage financing, and provision of community facilities and utilities. A major prerequisite to such advances, he suggests, is the expansion of technical research in all of these fields.

For architects, the most pressing need is to find a suitable role in the housing process. At present, the architect performs only peripheral functions: the design of the tiny fraction of truly custom-built houses, and the anonymous production of package plans. In the best of situations, architects have played a valuable role as designers of houses and subdivisions for enlightened builders, but such instances are relatively few, as is seen on any visit to burgeoning suburbia.

4. *The Investor.* Anyone interested in

housing, as differentiated from the house, soon finds that the invisible role of finance is of major significance. The ways in which house production is financed, from land development through the rehabilitation of existing structures, is a major determinant of what can be done by whom and what it will cost.

The review of residential financing provided in this volume, and the imaginative suggestions for changes—including suggestions for basic revision of the mortgage instrument itself—are among the most worthwhile chapters in the book. They are also among the most difficult to summarize and analyze.

Particularly interesting is the discussion of investment practices and procedures with respect to housing rehabilitation. This is an area in which private enterprise, unaided, has been conspicuously unable to achieve very much. In recent years, and especially since the Housing Act of 1954 broadened the concept of urban redevelopment to a wider vision of urban renewal, including the rehabilitation of entire neighborhoods, a variety of Federal aids to rehabilitation have been created, most of them in the form of easier mortgage terms. The body of experience in this field is still small, but it promises much, and changes are constantly being made (as in the Housing Act of 1961) that should make feasible the salvation of many urban neighborhoods that otherwise would be doomed to gradual decay.

5. *The Federal Government.* The history of Federal intervention in the housing market, for the dual purposes of improving the provision of housing and because of the importance of the housing industry in the national economy, dates back to the 1930's. *Housing, People, and Cities* provides a useful brief record of Federal actions that have affected the housing industry, and that have varied both as national needs have changed and as Federal programs have either worked too well or not at all. At present, of course, the manifold forms of Federal aid in housing and community development are largely concentrated in the Housing and Home Finance Agency and its constituents, URA, PHA, FHA, FNMA, and CFA, which have responsibilities respectively, in the fields of urban renewal, public housing, mortgage insurance, secondary mortgage market, and the provision of community facilities.

A vital, if sometimes neglected, reality of the Federal role in housing is its

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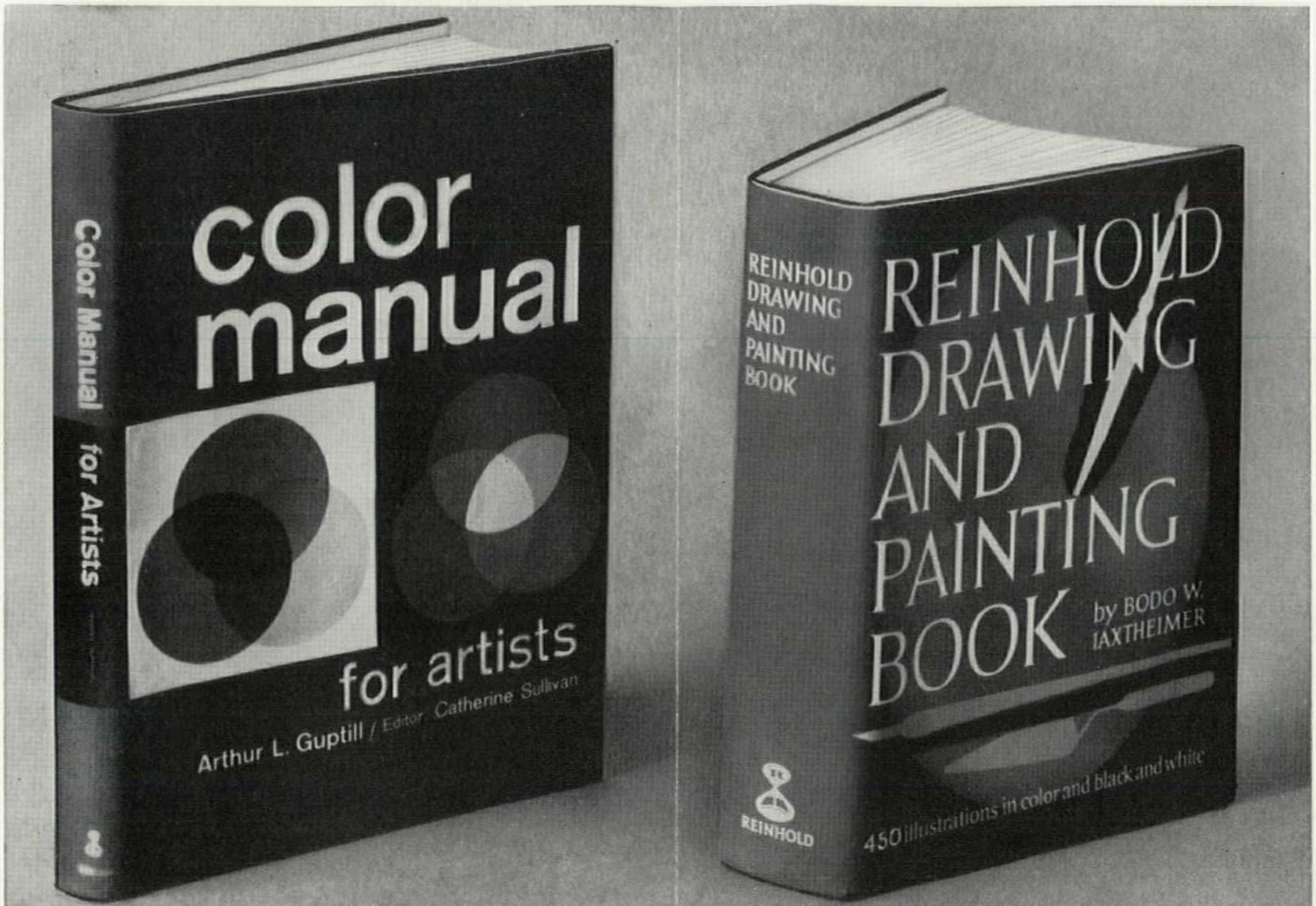


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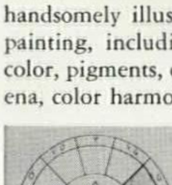

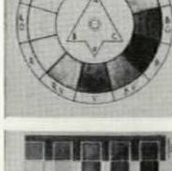

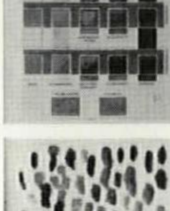

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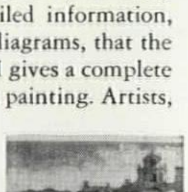

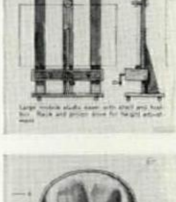

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*Continued from page 149*

bipartisan nature. Although the Federal Government first entered the housing field in a major way during the Democratic New Deal, some of the most basic housing legislation was co-sponsored by the late Senator Robert A. Taft. And even more recently, the introduction of the urban renewal concept occurred during the Eisenhower Administration. Housing questions do involve politics, and often vigorously fought politics, but these politics have generally been concerned with rather different issues than the traditional partisan ones.

6. *The Community.* In this culminating section, the ACTION study concentrates on the role of housing the community as a whole, and suggests some of the kinds of steps that have been and will have to be taken if our urban areas are to be improved. The final chapter, entitled "Opportunities," is devoted to suggestions for lines to be followed in future public and private actions. Of these, three are especially worthy of mention. The first two relate to needs that are not now being met: the need for greatly expanded program of urban research and for greater diversity and experimentation in housing and renewal. The third refers to a relatively new form of Federal assistance to localities, the Community Renewal Program. By using the CRP approach to examine their total renewal needs, most of our major cities (and many smaller ones as well) are undertaking the kind of comprehensive study on which sound and continuing renewal action must be based. The widening of the renewal concept to the level of the entire community should result in the development of a varied and integrated program of remedial action that can halt the spread of blight and make possible a real start toward the creation of a truly satisfactory urban environment.

In summary, *Housing, People, and Cities* is a well-written, highly useful book that should take its rightful place as a basic reference volume in the field of housing and community development.

The preceding seven volumes in the ACTION Series, all published by McGraw-Hill, are: *Government and Housing in Metropolitan Areas* by Edward C. Banfield and Morton Grodzins; *Capital Requirements for Urban Development and Renewal* by John W. Dyckmann and Reginald R. Isaacs; *Housing Choices and Housing Restraints* by Nelson Foote, Janet Abu-Lughod, Mary Mix Foley, and Louis Winnick; *Federal Credit and Private Housing* by Charles M. Haar; *Design and the Production of Houses* by Burnham Kelly and Associates; *Residential Rehabilitation* by William W. Nash; *Rental Housing* by Louis Winnick.

### *Ponti Pontificates*

IN PRAISE OF ARCHITECTURE, *by Gio Ponti. Translated by Giuseppina and Mario Salvadori. Published by F. W. Dodge Corp., 119 W. 40 St., New York 18, N.Y. (1960, 270 pp., illus. $6.95)*

In *In Praise of Architecture*, Gio Ponti seems to have discovered the sodium pentothal aproach to architectural commentary. This collection of intensely personal ramblings on architecture, architects, personal reminiscences, and other matters both related and unrelated to the title, will interest some and infuriate others, just as Signor Ponti's subjective approach to design does.

J.T.B., Jr.

### OTHER BOOKS TO BE NOTED

**A Time of Gods.** Roloff Beny. The Viking Press, 625 Madison Ave., New York 22, N.Y., 1962. 248 pp., illus. $20
*Poetic photographs recalling the ancient lands of the Mediterranean—the paths, mountains, and buildings that were either inhabited by the gods or were built in their honor.*

**Chinese Household Furniture.** George N. Kates. Dover Publications Inc., 180 Varick St., New York 14, N.Y., 1962. 124 pp., illus. $1.50 (paperbound)
*A survey of the unique, functional, and often surpisingly simple furniture designed by Chinese craftsmen over the last century. Author is Curator of Oriental Art at the Brooklyn Museum; book was originally published in 1948 by Harper & Brothers.*

**Color Atlas: A Guide to Accurate Color Matching.** A. Kornerup and J. H. Wanscher. Reinhold Publishing Corp., 430 Park Ave., New York 22, N.Y., 1962. 224 pp., illus. $8.75
*A systematic arrangement of 1266 color swatches, plus a color dictionary that provides a simple cross-reference between name and swatch.*

**Design Graphics.** C. Leslie Martin. The Macmillan Co., Div. of Crowell-Collier Publishing Co., 60 Fifth Ave., New York, N.Y., 1962, 274 pp., illus. $8
*A step-by-step guide to effective graphic representation. Text and examples consider multi-view drawings. paraline drawings, perspective drawings, and renderings. Author is Professor of Architecture at the University of Cincinnati.*

**Modern Kitchens (2nd Edition).** Editors of Sunset Books. Lane Book Co., Willow Rd. at Middlefield Rd., Menlo Park, Calif., 1962. 112 pp., illus. $1.95 (paperbound)

*Continued on page 156*


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*Continued from page 153*

*Photos and plans of 59 kitchens—grouped into five basic types of pullman, L-shape, U-shape, island, and compact. Other chapters present ideas on storage, pass-throughs, snack bars, kitchen barbecues, kitchen offices, and laundry space.*

**Persian Gardens and Garden Pavilions.** Donald N. Wilbur. Charles E. Tuttle Co., Rutland, Vt., 1962. 239 pp., illus. $12.50

*A survey of the traditional Persian garden —its historical development, basic features, and the literature behind it. Illustrations include photos and plans of surviving gardens, plus paintings and lithographs (particularly miniatures) in which important aspects of Persian landscape are featured. Author is an architect and archaeologist who has long been a student of the Middle East.*

**Photographing Architecture and Interiors.** Julius Shulman. Introduction by Richard J. Neutra. Whitney Library of Design, 18 E. 50 St., New York 22, N.Y., 1962. 154 pp., illus. $15

*To be reviewed.*

**Primitive Art: Its Traditions and Styles.** Paul S. Wingert. Oxford University Press, 417 Fifth Ave., New York 16, N.Y., 1962. 448 pp., illus. $7.50

*An examination of the art produced by the major areas of Africa, Oceania, and North America (with reference also to Indonesia, Micronesia, Australia, and South America). The author analyzes the numerous styles within the regional traditions, discussing aesthetic qualities against the background of the particular culture. Wingert is Professor of Art History and Archaeology at Columbia University.*

**Scope of Total Architecture.** Walter Gropius. Collier Books, Div. of Crowell-Collier Publishing Co., 111 Fourth Ave., New York, N.Y., 1962. 158 pp., illus. $.95 (paperbound)

*Reprint of the 1955 book by Harper & Brothers, which was itself a reprint of selected articles and lectures written by Gropius during his years at Harvard (1937-1952). Essays are grouped under three headings: "Education of Architects and Designers," "The Contemporary Architect," and "Planning and Housing."*

**Space, Time and Architecture: The Growth of a New Tradition (4th Edition).** Sigfried Giedion. Harvard University Press, 79 Garden St., Cambridge 38, Mass., 1962. 778 pp., illus. $12.50

*Latest addition to this classic (which dates from 1941) is a new 24-page introduction—an essay entitled "Architecture in the 1960's: Hopes and Fears." The considerably expanded 3rd edition of 1954 consisted of several new chapters—on Mies, Gropius in America, Urbanism, and Baroque Rome—plus 70 new illustrations The entire book was reset at that time.*

**Structure and Form in Modern Architecture.** Curt Siegel. Translated by Thomas E. Burton. Reinhold Publishing Corp., 430 Park Ave., New York 22, N.Y., 1962. 308 pp., illus. $15

*To be reviewed.*

**Treasures of the Vatican.** Maurizio Calvesi. Translated by James Emmons. Skira, New York, 1962. Distributed by World Publishing Co., 119 W. 57 St., New York 19, N.Y. 207 pp., illus. $27.50

*Newest in the Skira group of magnificent art books; many full-color illustrations.*

**World and Dwelling.** Richard Neutra. Universe Books, Inc., 381 Fourth Ave., New York 16, N.Y., 1952. 160 pp., illus. $15

*To be reviewed.*

**The World of Leonardo da Vinci: Man of Science, Engineer, and Dreamer of Flight.** Ivor B. Hart. The Viking Press, 625 Madison Ave., New York 22, N.Y., 1962. 384 pp., illus. $7.95

*The scientific genius of Leonardo da Vinci, seen against the background of the world in which he lived—its politics, culture, and technology. Leonardo's own notebooks provide illustrations.*

## NOTICES

### *New Branch Offices*

BILL J. BLAIR AND ASSOCIATES, Architects, Phoenix, Ariz. Associate in charge of this office is M. L. VANLANDINGHAM.

### *New Addresses*

KAPLAN & SPRACHMAN, Architects, 17 Davenport Rd., Toronto 5, Ontario, Canada.

*Continued on page 160*

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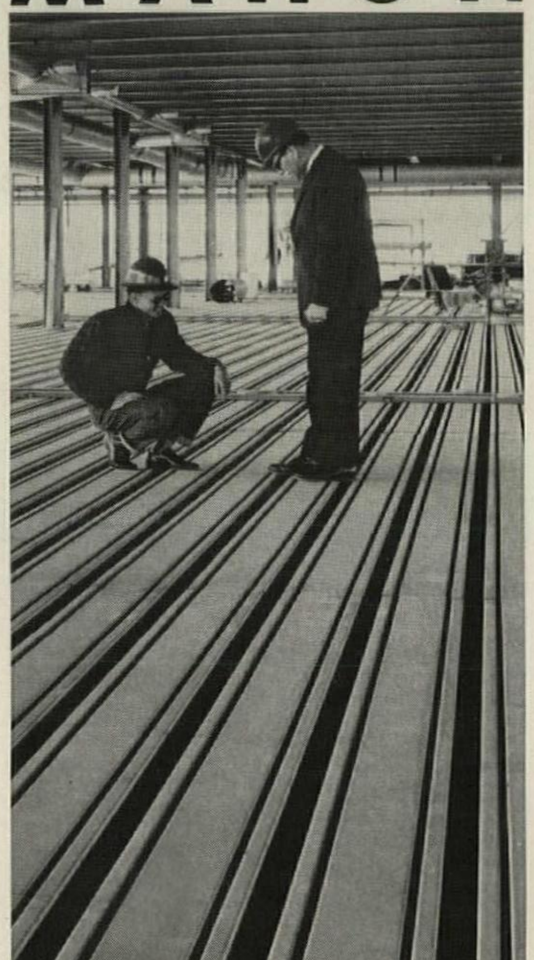

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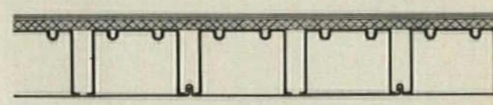

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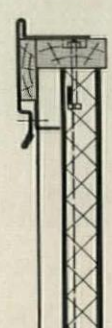

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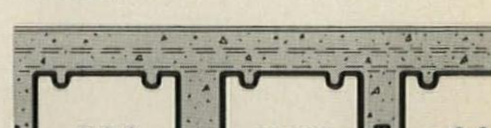

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*Continued from page 156*

KATZMAN ASSOCIATES, Research-Planning-Design, 147 E. 50 St., New York, N.Y.

KING & LEWIS ARCHITECTS, INC., 1555 Lafayette East, Detroit 7, Mich.

LANE & SCHLICK, Architects, 15840 Ventura Blvd., Encino, Calif.

ALLISON M. LEVY, Box 21, Pensacola, Fla.

OSCAR W. LOUDERBACK, JR., Architect, 1719 W. Malvern Ave., Fullerton, Calif.

MCDOWELL-GOLDSTEIN ASSOCIATED ARCHITECTS, Hilltop, Morristown, N.J.

ROSE, BEATON & CORSBIE, Architects-Engineers, 95 Church St., White Plains, N.Y.

SIEGMUND SPIEGEL, Architect & Planner, 2035 Hempstead Turnpike, East Meadow, N.Y.

WARZYN ENGINEERING & SERVICE COMPANY, INC., Engineering Offices and Laboratories, 1409 Emil St., Madison 15, Wis.

### *New Association*

PAUL MCCOBB, New York based designer, has been retained by Miami-based sliding door manufacturer, DARYL PRODUCTS CORP.

### *P/A Congratulates . . .*

JOHN F. BATES, General Sales Manager, STANLEY HARDWARE, succeeding JOHN W. BAMERT who has been appointed Manager, National Accounts Sales for THE STANLEY WORKS. CASIMER W. WOJACK, appointed Manager, Builders Hardware Sales, STANLEY HARDWARE division, to succeed MR. BATES.

ROBBERT W. DELAZZERO, re-elected President of the NATIONAL TERRAZZO AND MOSAIC ASSOCIATION, INC.

### *Elections, Appointments*

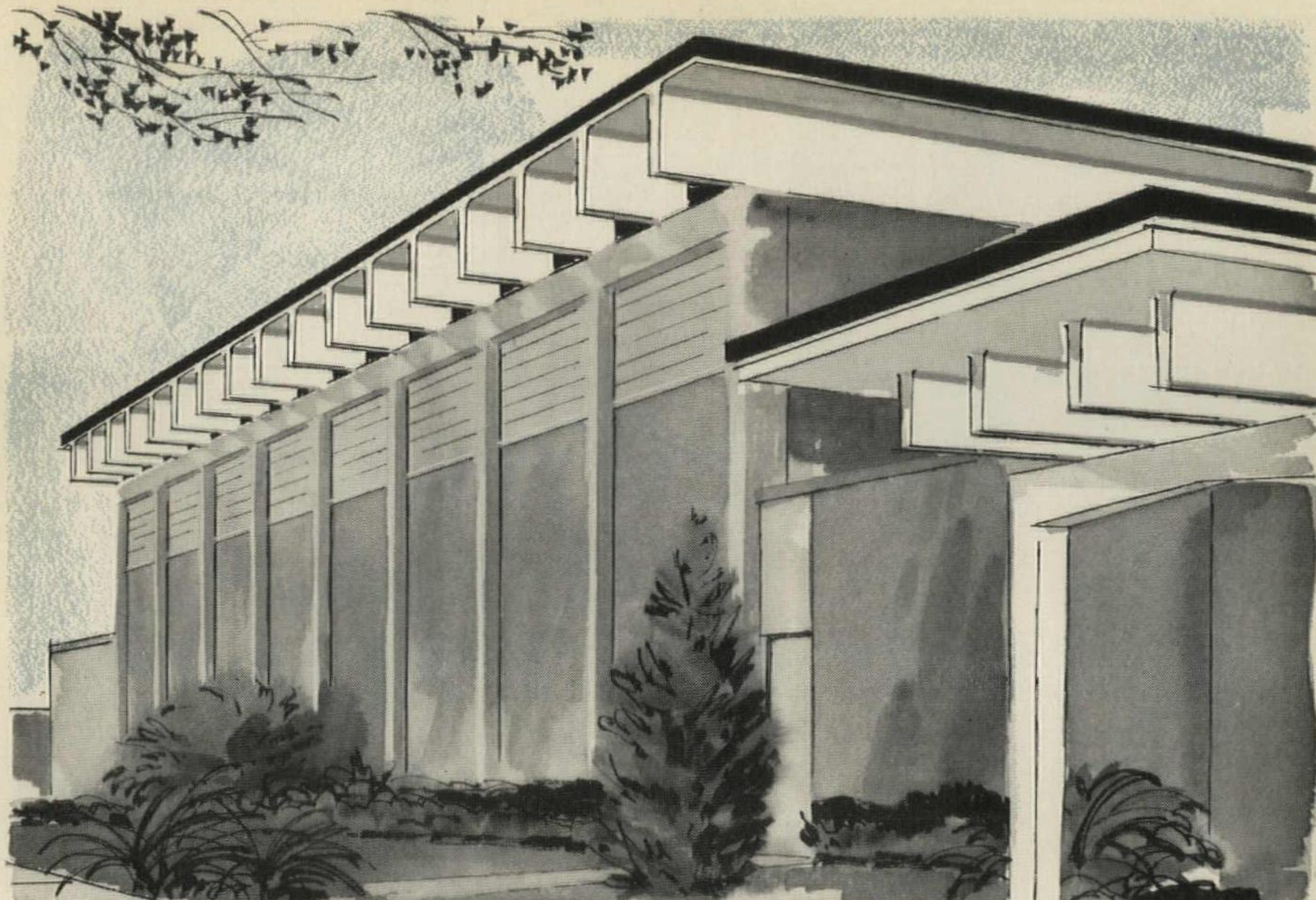
SANFORD L. BERGER, named Design Director in firm of STONE, MARRACCINI AND PATTERSON, Architects, San Francisco, Calif.

RAY DONLEY, appointed Senior Engineer in firm of LEWIS S. GOODFRIEND & ASSOCIATES, Acoustical Engineers, Little Falls, N.J.

ANTHONY V. GENOVESE, ROBERT WAGENSEIL JONES, JOHN HILL, appointed Project Architects in firm of CHARLES LUCKMAN ASSOCIATES, Planners, Architects, Engineers, New York City and Los Angeles.

JOHN R. HAGELY, made Research Architect of BATTELLE MEMORIAL INSTITUTE, Columbus, Ohio.

ARTHUR K. HYDE, named Director of Public and Client Relations in firm of EBERLE M. SMITH ASSOCIATES, INC., Ar-



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chitects and Engineers.

Milton E. Lawrence, promoted to Chief Electrical Engineer in firm of Fred S. Dubin Associates, Consulting Engineers, Hartford, New York, Boston, San Juan.

David McCandless, Jr., Architect, appointed Architectural Consultant in the Acoustics Division of Tracor, Inc., Austin, Texas.

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PAGE 81
*Top:* Collection Musée de l'Homme, Paris
*Second Row:* Ann Rosten Renehan
*Third Row:* Jack Lenor Larsen
*Bottom:* Photo Information Cote d'Ivoire

PAGE 82
*Top:* Gordon D. Hindle, Architect
*Second from Top:* Gordon D. Hindle, Architect
*Third from Top:* Ann Rosten Renehan
*Bottom:* Jack Lenor Larsen

PAGE 83
*Both:* Jean Beaugeaud

PAGE 84
*Top:* Corry Bevington
*Second from Top:* Courtesy E. Maxwell Fry
*Third from Top:* Corry Bevington
*Bottom Left:* Corry Bevington
*Bottom Middle and Right:* Sam Lambert

PAGE 85
*Bottom:* Elizabeth Wilcox, Courtesy Chase Manhattan Bank
*Second from Top:* Courtesy Lagneau, Weill & Dimitrijevic
*All Others:* Sam Lambert

PAGE 86
*(4)* Courtesy Kenneth Scott
*All Others:* Sam Lambert

PAGE 87
*(12, 13)* Sam Lambert
*(14)* Courtesy Kenneth Scott
*(15)* Courtesy Peatfield & Bodgener
*(16)* Courtesy Denys Lasdun

PAGE 88 & 89
*All:* Corry Bevington

PAGE 90
*All:* Courtesy Michael Ducharme

PAGE 91
*(4, 5, 7, 8)* Courtesy Lagneau, Weill & Dimitrijevic
*(6)* Courtesy Henri Chomette and Antoine Laget
*(9)* L. Normand, Courtesy Michel Ducharme
*(10)* Courtesy Henri Chomette

PAGE 92
*(1, 2)* Courtesy Peatfield & Bodgener
*(3, 4)* L. Normand, Courtesy Lagneau, Weill & Dimitrijevic

PAGE 93
*(6)* Courtesy "International Asbestos-Cement Review"
*(7)* Sam Lambert
*(8)* L. Normand, Courtesy Henri Chomette
*(9, 10)* Courtesy Henri Chomette

PAGE 94 & 95
*All:* Courtesy Lagneau, Weill & Dimitrijevic

PAGE 96
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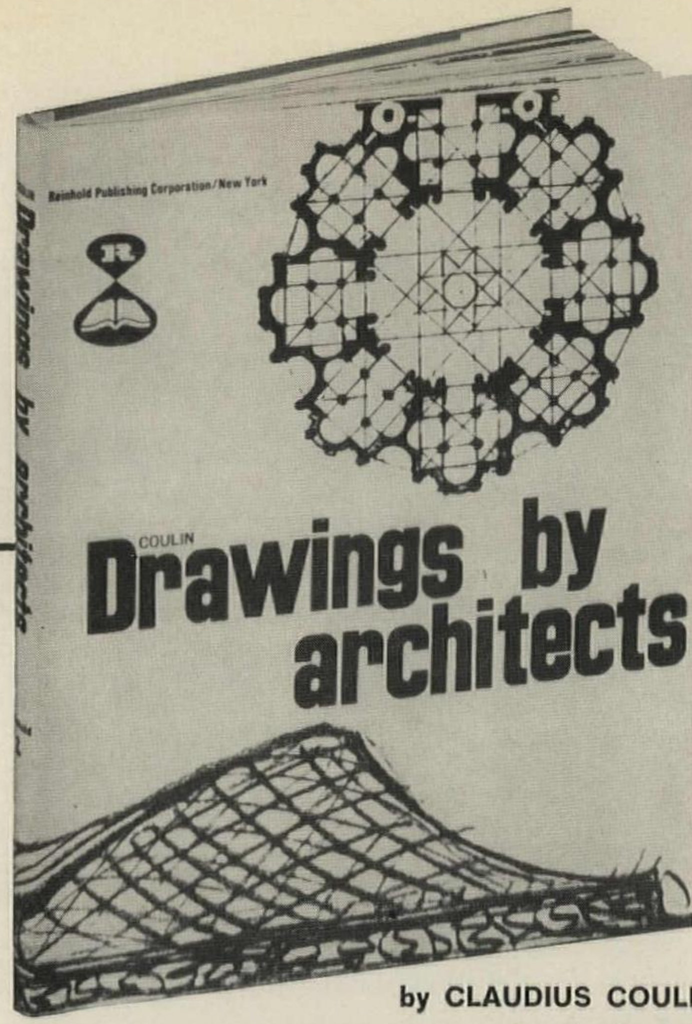


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P.S.

**Design Responsibility for the New York World's Fair** was the subject of a debate in which I recently found myself involved. The Architectural League of New York had planned a symposium on design at the Fair, but all the participants had chickened out except for me and Stuart Constable, right-hand man to Robert Moses (who, in addition to half a dozen other state and city jobs, is president of the Fair). The debate ultimately was about responsibility, because there seemed to be no disagreement (not even Mr. Constable dissenting) as to the sad quality of design so far evident. Comments on this aspect of the Fair ranged from a description of it as low-level package design rather than architecture, to unprintable epithets. The only disagreement between Constable and myself was that he insisted that the Fair's responsibility is solely to rent space, while I tried to say that there was an over-all responsibility to control quality, prevent horrors, and point some direction. Much to my surprise, Ulrich Franzen, the "moderator," sided with the Fair's point of view and described my attitude as "old fashioned." I may say, however, that I had articulate supporters from the floor.

Mr. Moses has made it clear in many statements that the Fair feels it has no duty to provide a demonstration of the progress or the present position of architecture, as the great Fairs of the past have done. "We aim not at the Grand Plan which will influence all architecture for generations," he has said, explaining that the Fair officials "have no position at all except as benign spectators." He has amplified this by adding: "We cannot prevent the maker of condiments from building his pavilion in the form of a pickle, or the business-machine manufacturer from putting up a structure in the form of a huge typewriter." Obviously, this is not architecture that is being discussed, but an extremely arrogant form of display technique. The great fact that Mr. Moses and Mr. Constable overlook, however, is that, whether they desire it or not, there will be an influence emanating from the structures for which they rent space. Every important, well-attended Fair *has* had an influence on the architecture of its time, through the millions of lay people—the ultimate sponsors of architecture—who come to look. As Sibyl Moholy-Nagy pointed out at the League affair, the great tragedy will be the effect on the children who will visit Flushing Meadows. No one will be there to tell them that this is not architecture, that this is not where our knowledge of space and technology and contemporary aesthetics can lead us. They will take away the visual impressions of what they see; willy-nilly the Fair officials will have influenced architecture "for generations."

In shying away from the responsibility of influence, the Fair, as I said that evening, is going to make a fool of itself. Moses has written: "I get a little weary of the avant-garde critics who see in a World's Fair only an opportunity to advance their latest ideas, to establish a new school of American planning, architecture, and art which will astonish the visitors from the hinterland and rock the outer world." The three parts of this comment are interesting. In the first place, it implies a shying away from "new ideas," which seems odd in relation to a World's Fair. Then there is an expressed fear of assisting a "new school of American planning, architecture, and art," which to many of us would seem a desirable aim. And finally, there is the insulting reference to visitors from places other than New York. I strongly suspect that guests from many "hinterland" cities are going to be "astonished" only at the lack of taste and understanding that the Fair promises to show ("Peter Paul Rubens' Descent from the Cross will be reproduced in colored sand," a recent release brags); and I believe that our visitors from "the outer world" are so concerned with their developing needs in architecture and planning that they will be "rocked" only by the crass, commercialized architectural indifference that the Fair is exhibiting toward these world-wide efforts. But then I suppose that's an old fashioned attitude also. Up with the pickle pavilion!

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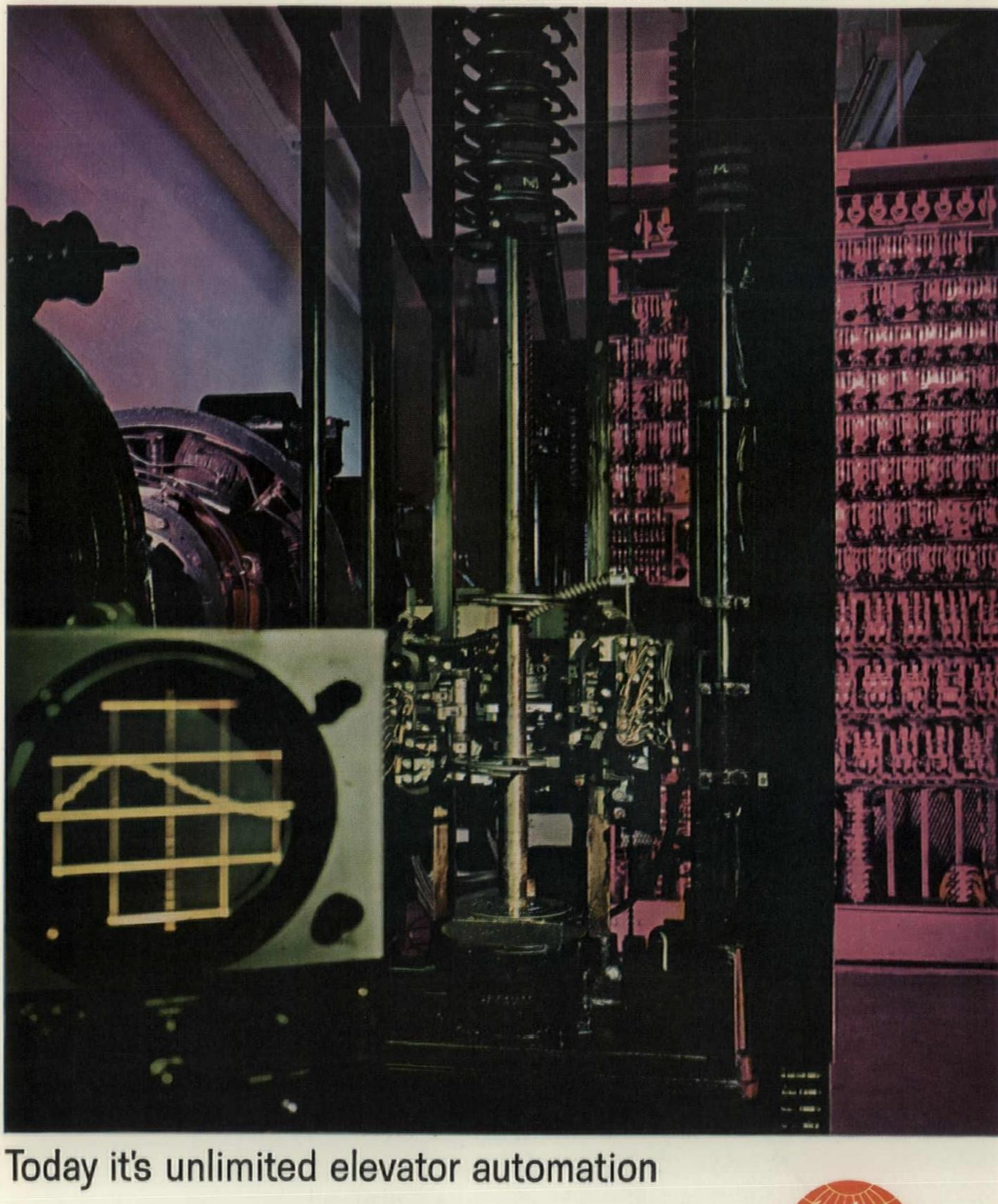

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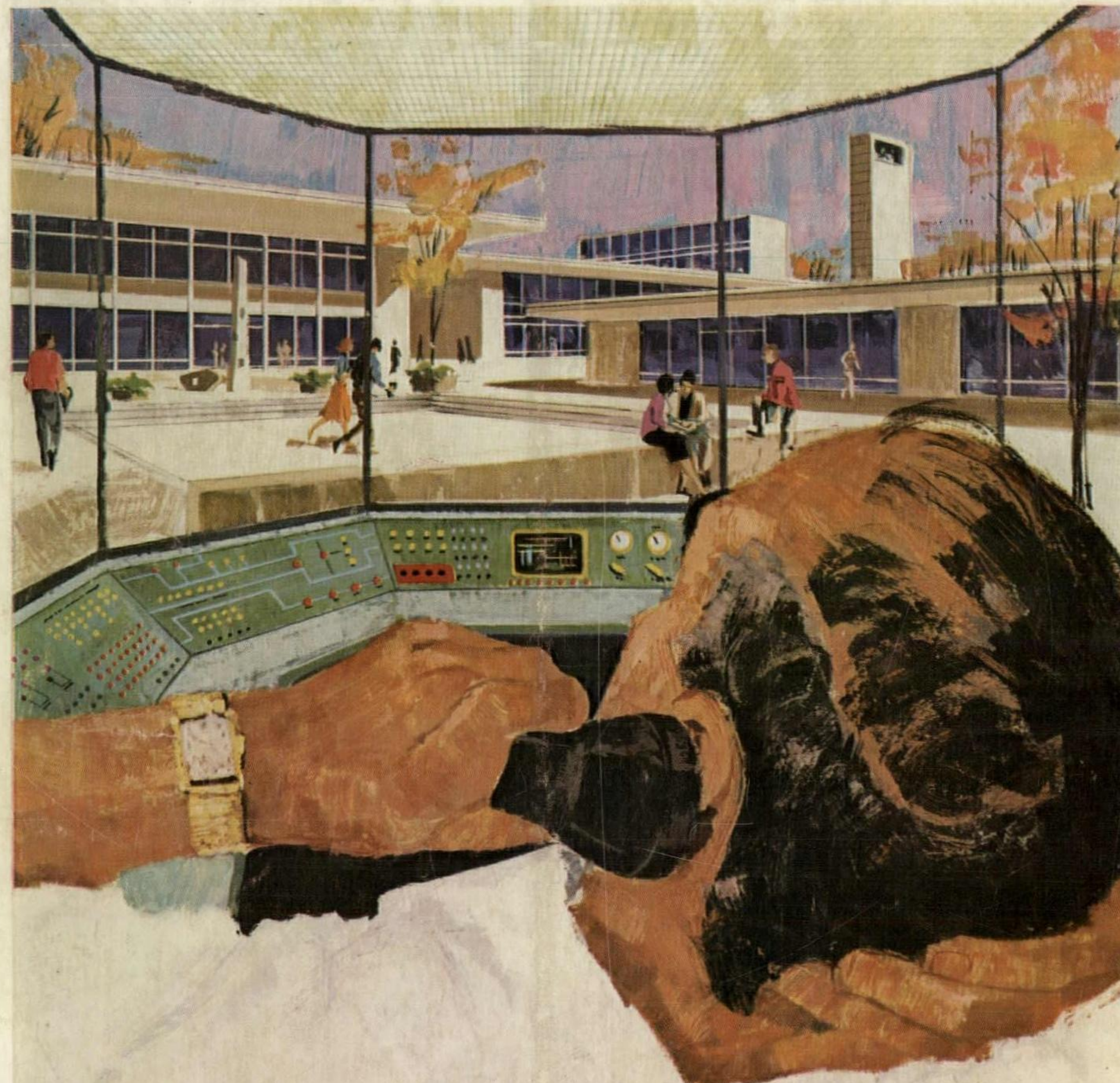

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