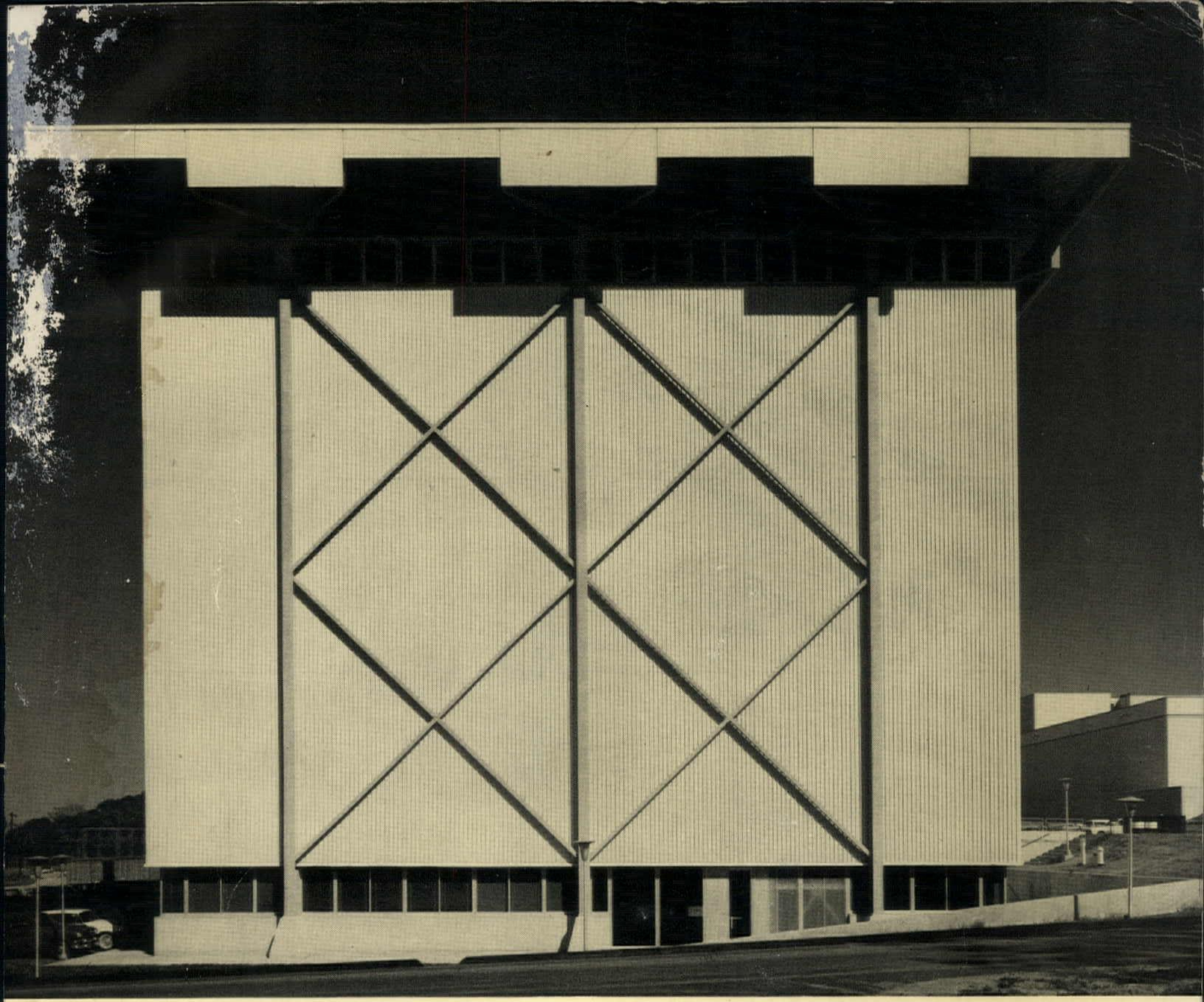


# ARCHITECTURAL RECORD

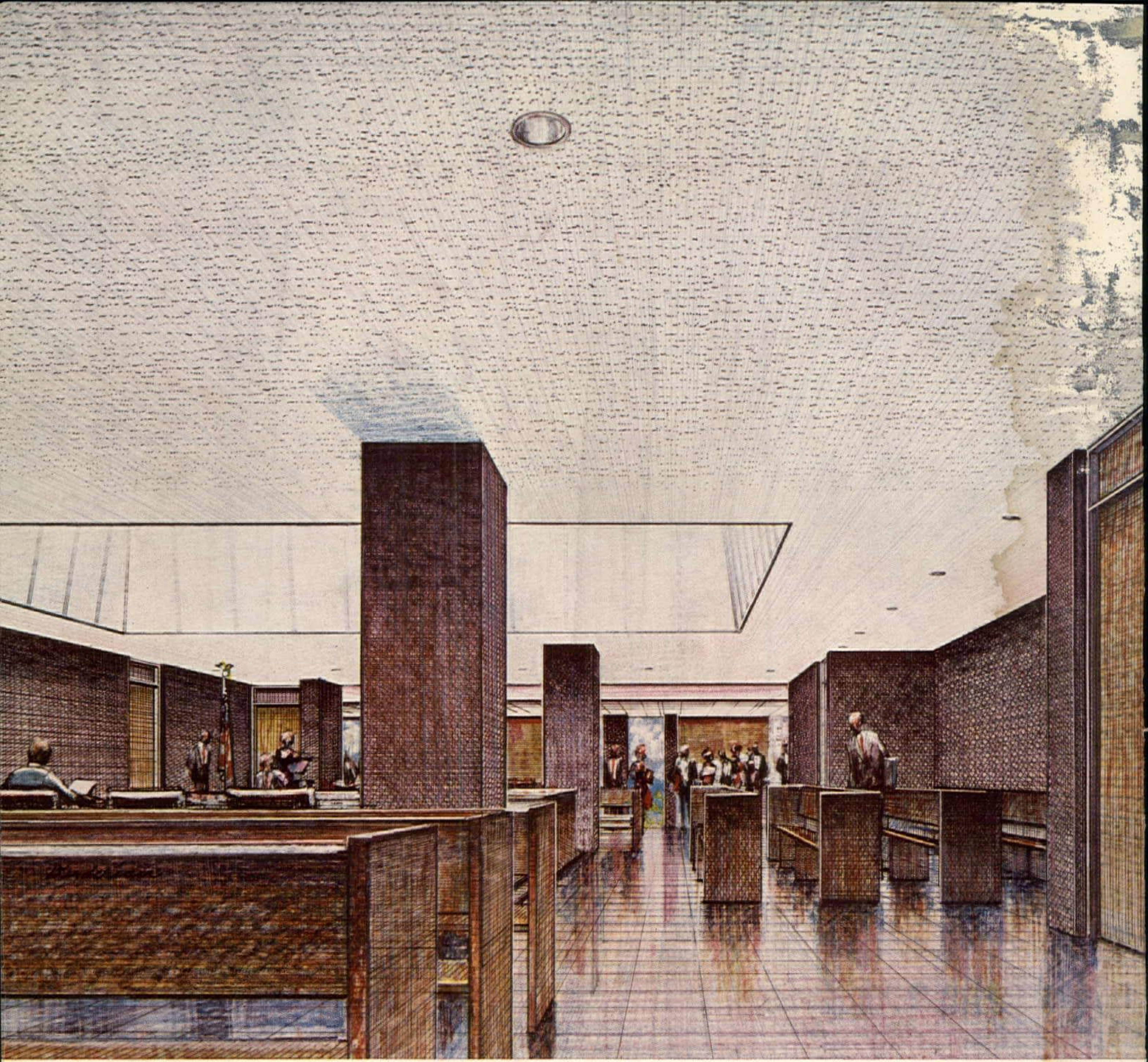
11 NOVEMBER 1962 • TWO DOLLARS PER COPY

BUILDING TYPES STUDY: INDUSTRIAL BUILDINGS

SIX NEW HOUSES BY PAUL RUDOLPH

"YESTERDAY'S CITY OF TOMORROW" BY LEWIS MUMFORD

FULL CONTENTS ON PAGES 4 & 5

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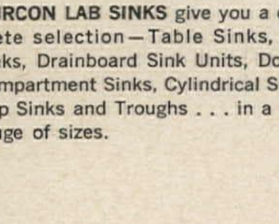

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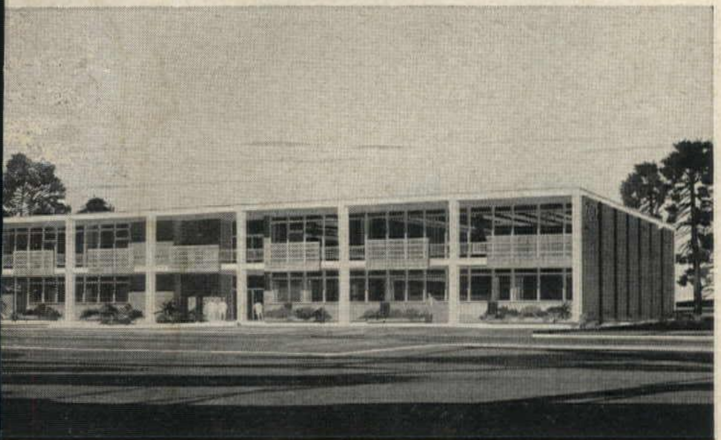

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Architect: Harold A. Berry

Hardware Mutuals Insurance Company
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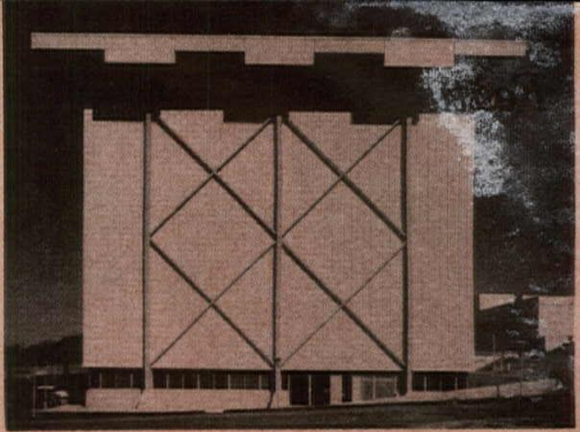

*Cover:*

Valley Forge Space Technology Center, King of Prussia, Pa. Architect: Vincent G. Kling, F.A.I.A. Photograph by Lawrence S. Williams




ARCHITECTURAL RECORD November 1962 Vol. 132, No. 5 Published monthly, except May 1962, when semi-monthly, by F. W. Dodge Corporation, a McGraw-Hill Company. This issue is published in national and separate editions. Additional pages of separate edition numbered or allowed for as follows: Western edition, 32-1 through 32-32.

Executive, editorial, circulation and advertising offices: 119 West 40th Street, New York 18, N. Y. Western Editorial Office: 2877 Shasta Road, Berkeley 8, Calif. Office of Publication, 10 Ferry Street, Concord, N. H.; second-class mail postage paid at Concord, N. H.

Subscription rate for individuals in the field served $5.50 per year in U. S., U. S. Possessions and Canada; single copies $2.00, except Mid-May 1962 issue $2.95. Further details on page 6. Postmaster: Please send Form 3579 to Circulation Manager, ARCHITECTURAL RECORD, 119 West 40th Street, New York 18, N. Y.


# ARCHITECTURAL

## Record Reports



*Architects and Buildings*



*Authors and Articles*

# *Features*



# RECORD

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*November 1962*

## *Building Types Study 313: Industrial Buildings*

# Coming in the Record

THE AIR FORCE ACADEMY CHAPEL—COMPLETED!
*One of the most embattled designs in the history of modern architecture, the U. S. Air Force Academy Chapel at Colorado Springs, is now a completed building. Next month's feature will provide extensive photographic coverage of a spectacular architectural accomplishment.*

SAARINEN'S "POLYGONAL MASONRY ARCHITECTURE" AT YALE
*For Yale's two new residential colleges the late Eero Saarinen felt a new architectural vocabulary was needed to achieve the wanted feeling of diversity and individuality with proper respect for the spirit and scale of neighboring pseudo-Gothic structures. His solution was what he called "polygonal masonry architecture" and he thought it had potentials beyond this single project. Now the colleges are completed and occupied, and architects will be studying the results with more than ordinary interest.*

BUILDING TYPES STUDY: BUILDINGS FOR THE AGING
*It is now six years since the architectural competition sponsored by the National Committee on the Aging of the National Social Welfare Assembly in cooperation with* ARCHITECTURAL RECORD *and* The Modern Hospital *sought to stimulate more imaginative planning for a type of building then relatively new to architects and clearly destined to increase in volume. Hundreds of sponsors and architects have meanwhile been concerned with such projects; how have they been doing? Next month's study will offer some critical evaluations of progress in the field, and a review of current work.*



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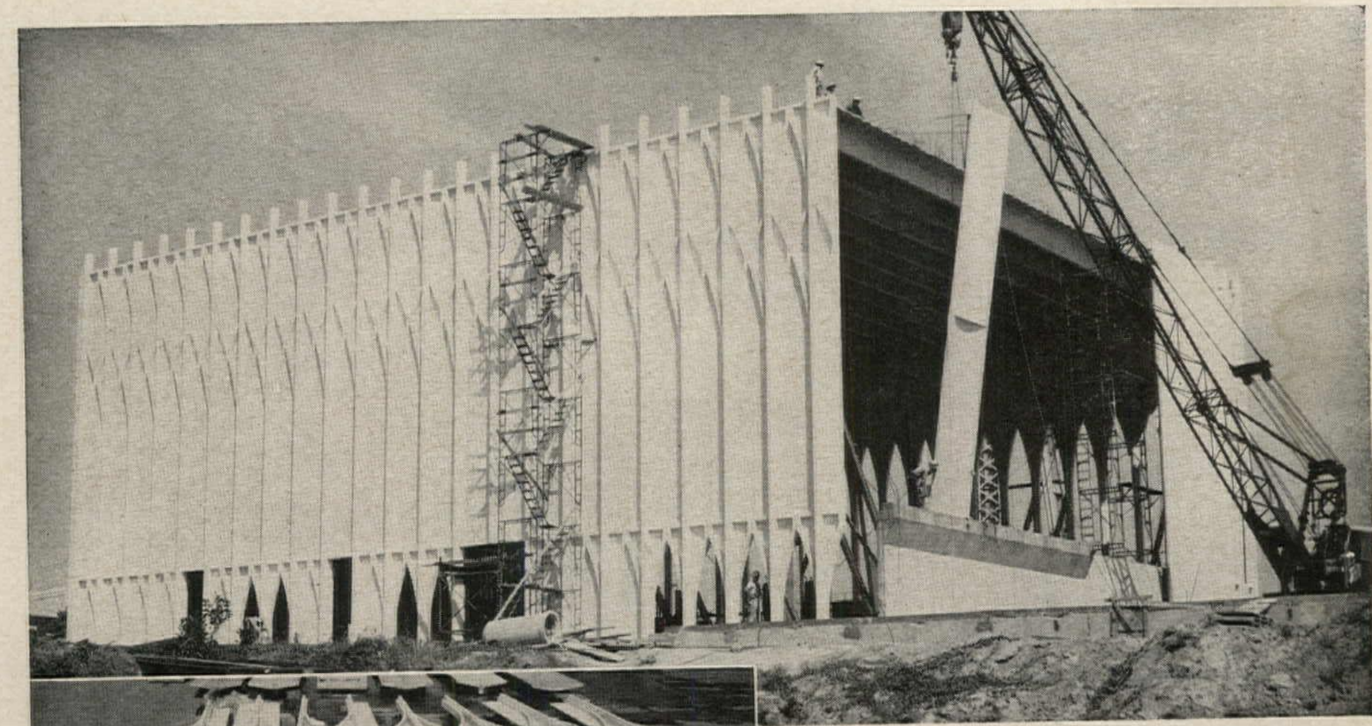
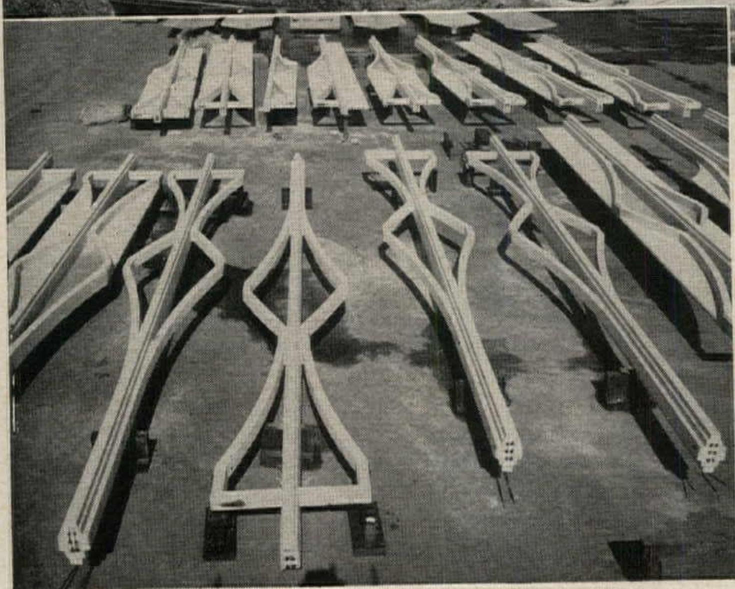
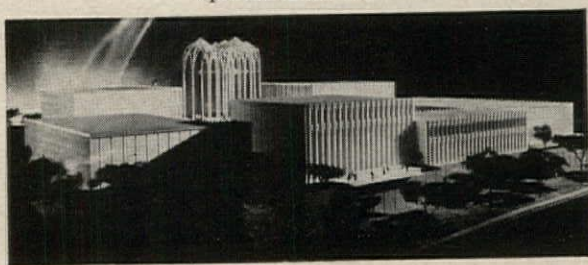




**ABOVE:** Swinging the panels into place
**LEFT:** The prestressed components
**BELOW:** Model of Science complex when finished

*Architects:* Minoru Yamasaki & Associates, Detroit
Naramore, Bain, Brady & Johanson, Seattle
*Precast Concrete Units:* Associated Sand & Gravel, Inc.,
Everett, Washington
*Engineers:* Worthington, Skilling, Helle & Jackson, Seattle
*General Contractor:* Purvis Construction Co.,
Spokane & Seattle



# ...wherever concrete must be beautiful

The United States Science Pavillion is one of two principal theme buildings of the Seattle World's Fair. After the Fair it becomes the city's cultural center.

The load-bearing S-type stud wall panels are 32 and 52 feet long. They are faced with Trinity White portland cement and white quartzite aggregate. They are prestressed. The high strength of Trinity White and the high-early-strength gray cement back-up permitted the forms to be stripped in 12 to 14 hours with steam curing. Panels are secured in place by either welding or bolting.

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# Claustrophobia for the Aged

One of the flurries of activity in our office of late has been the review of the plans of a considerable variety of homes for the aged (for a Building Types Study for December). It might seem that such a review would be one of the pleasurable prerogatives of an editor, particularly one who through the years has raised his small voice to urge more attention to homes for the "golden age" group. But this sensitive soul found himself becoming depressed.

We in this wealthy capitalist country are going to build thousands of units in great complexes of buildings, to give our elderly citizens a new way of life, a place of their own, a new dignity, and so on. But each one's place of his own is going to be a very small one. We are going to permit him the much-talked-about infirmities of old age; we will even allow him some psychological infirmities; but he had better not suffer from claustrophobia.

In the plans we saw there was an efficiency unit, or one-room apartment, measuring less than 14 by 14 ft. There was another unit 14 by 16 ft 6 in. In a public housing project there was a living room 12 ft square; though this one had a bedroom 10 by 12 ft.

Now you may join those who tell me that these sizes are not shockingly small. And I am well aware that you could show me plans of apartment houses with room sizes approaching these minimums. And I am not exactly unaware of building costs.

But I shall just set my feet and go right on sputtering. Those rooms are simply too small.

Older people inevitably become continually more house-bound, physically or mentally or both. Their satisfactions increasingly come from the little things of life, the immediate associations of place and environment. The small living unit represents confinement, an obvious cutback.

The storage problem is not the least of the concerns for older people. By the time you are grandparents, we are told, you tend to shed possessions as you shed responsibilities. You give up that big house in the country; you move to the city and "take it easy." But this perpetual country boy remains unconvinced. Presumably there will come a day when I must junk the garden tools, but I shall not cheer about it. I shall become quite stubborn about giving up a great many possessions and mementos—records, books, family albums, collections, and so on ad infinitum.

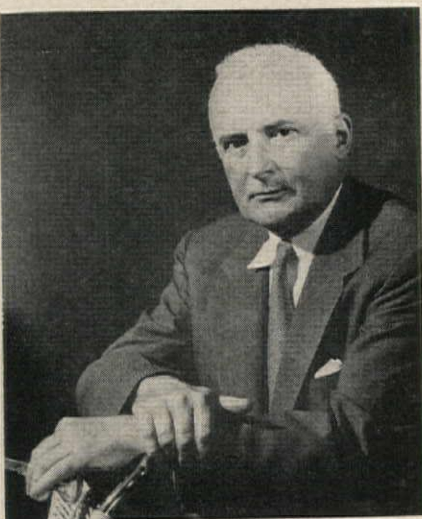
There is an assumption, too, in all of those plans, that what activities remain available to me in later years are to be carried on in the craft shops or the communal lounge or the community center. A dismal prospect. Well, I suppose I cannot expect to tinker with a piano in my own room, or stuff birds, or raise African violets. But it doesn't seem like asking too much to have a desk of my own, or nine square feet for an easel and a stool. If you could see what happens when I attack something on a drawing board you would understand why privacy is a must.

Yes, you cannot plan anything in the institutional manner and give everybody a six-room house and basement.

But I don't think I am being unreasonable. I am merely asking for a few more square feet in the cell that represents one's private preserve. The square feet that would be added would be the cheapest square feet in the house. The expensive things are already included—the sanitary fixtures and piping, the heating and air conditioning, the kitchen and the dining rooms, the offices, the personnel, the medical equipment and care. By cutting the actual living space to the barest minimum you cut costs by niggardly amounts, but also you seriously cut into the living.

*—Emerson Goble*

# LOUIS SKIDMORE DIES IN RETIREMENT AT 65


Katherine Young

One of the founding partners of the internationally renowned architectural firm of Skidmore, Owings and Merrill, Louis Skidmore, died September 27 in Winter Haven, Fla., at the age of 65. Mr. Skidmore, whose death followed a long illness, has been living since 1955 in his retirement home on Lake Eloise in Winter Haven.

When, in 1936, Mr. Skidmore and his brother-in-law, Nathaniel Owings, founded the firm of Skidmore and Owings, they were laying the groundwork for an architectural organization which was to set a new pace for commercial architecture in this country and, by extension, throughout the world.

The firm opened new frontiers for modern architecture by convincing influential corporate clients that its highly skillful use of contemporary architecture constituted a profitable "image" for business. It and its work have been a pioneering force in developing the conviction in the business community that: (1) good architecture is good business, and (2) good architecture is contemporary architecture.

Further, SOM has developed into one of the largest architectural firms in the U.S. without losing its capacity for recognizing, developing, and effectively using individual design talents of the highest order.

Skidmore and Owings became Skidmore, Owings and Merrill in 1940, when John Merrill was made a partner. At Mr. Skidmore's death, SOM had 17 general partners, 18 associate partners, 48 participating associates and some 600 employes, with offices in New York, Chicago, San Francisco and Portland, Ore.

In his years as a practicing architect, Mr. Skidmore's firm was responsible for planning and building the whole town of Oak Ridge, Tenn., housing 75,000 people; the United States Air Force Academy at Colorado Springs; the Ford Administration Building in Dearborn, Mich.; many of the buildings for the H. J. Heinz Company; and such notable buildings in New York as Lever House, the Fifth Avenue branch of Manufacturers Trust Company and Union Carbide. Overseas the firm's buildings ranged from the Istanbul Hilton Hotel in Turkey to the postwar air bases in Okinawa, consular buildings in Germany and complete towns in Venezuela and Sumatra.

Mr. Skidmore received the 1957 Gold Medal of the American Institute of Architects, its highest honor, and was a Fellow of the A.I.A. He had also received the gold medals of the New York Chapter of the A.I.A. and the Architectural League of New York. He was a past president of the New York Building Congress and had been chairman of the Advisory Council to Princeton's School of Architecture and on the visiting committee of the School of Architecture and Planning at Massachusetts Institute of Technology.

Mr. Skidmore was born in Lawrenceburg, Ind., and educated at Bradley Polytechnic Institute (now Bradley University), Peoria, Ill., and at M.I.T. In 1926 he won the Rotch Traveling Fellowship for two years of travel and study in Europe. He began his architectural work in 1933 as director of design, assistant to the general manager, for the Century of Progress Exposition in Chicago.

Besides his widow, Mr. Skidmore leaves two sons, Louis Skidmore Jr., a graduate student in architecture at Yale University, and Philip Murray Skidmore, an undergraduate at Georgia Institute of Technology.

# REPORT ON LONG-TERM CARE EXPECTED SOON

"Planning of Facilities for Long-term Treatment and Care," the report of a committee sponsored jointly by the American Hospital Association and the U.S. Public Health Service, is expected to be published before the end of this year.

The recent annual convention of the A.H.A. had a progress report on activities of the committee from Assistant Surgeon General Dr. Jack C. Haldeman, chief of the Division of Hospital and Medical Facilities of the USPHS Bureau of State Services.

Among the key "planning principles" developed by the committee and enumerated by Dr. Haldeman:

—Planning should include the entire complex of facilities and services for the long-term patient.

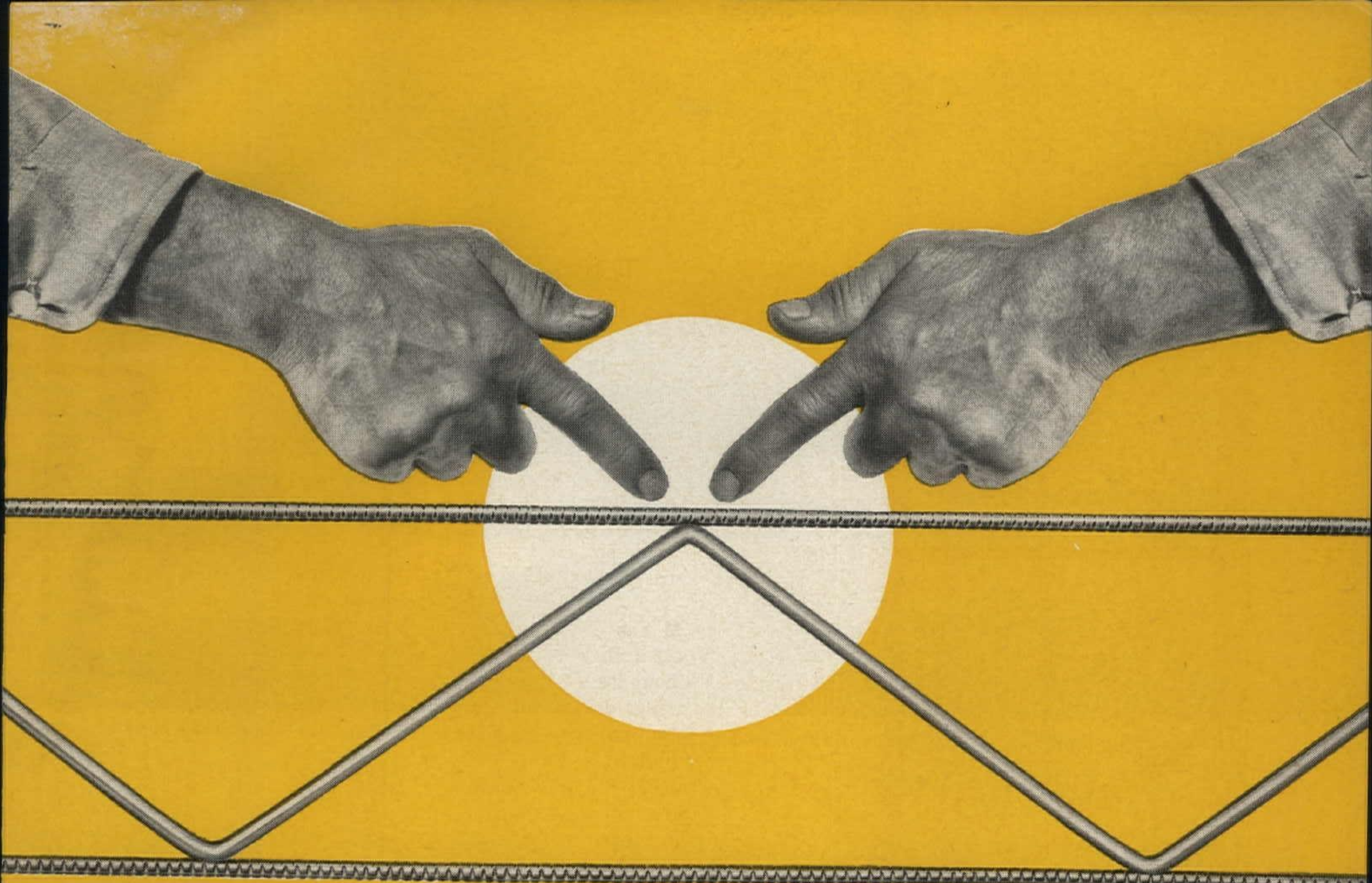
—The responsibility for planning for both short-term and long-term treatment and care facilities should be vested in the same areawide planning agency.

—Facilities should be organized to provide continuity of patient care and to minimize transfer of patients between institutions.

—The areawide planning agency should encourage the adoption and use of standards for construction, maintenance and operation, as advocated by recognized authorities.

—Planning should be based on patient needs rather than availability of funds.

—Planning should include provisions for research and evaluation.



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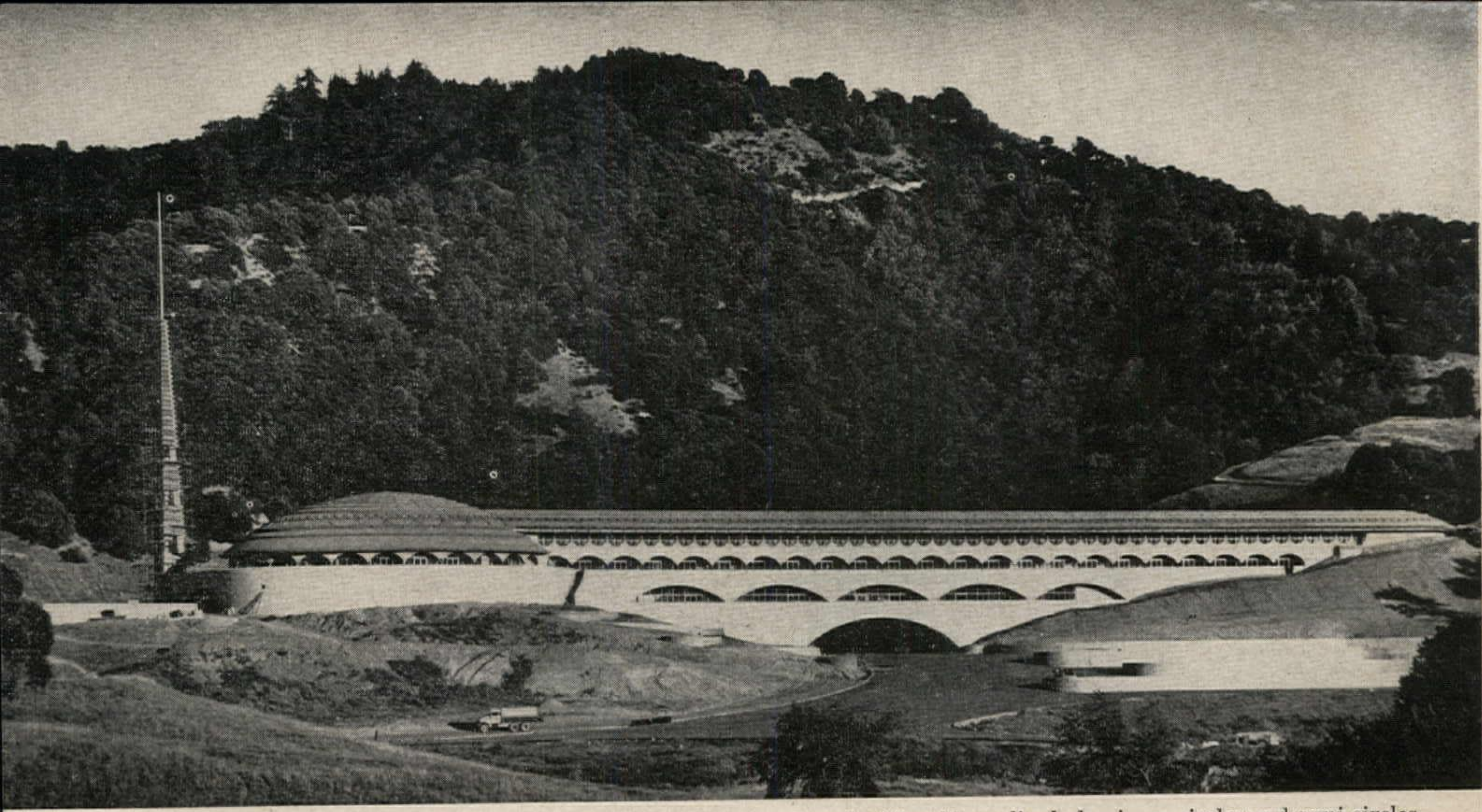


Karl H. Riek

Administration Building has sky blue roof, clay-toned walls glinted with gold anodized aluminum circles and semi-circles

# FIRST PHASE OF MARIN COUNTY CENTER IS COMPLETED

Five-foot balconies run the building's length on three floors. Third floor balcony has full-circle parapet openings

Karl H. Riek

First phase of the four-unit Marin County Civic Center, San Rafael, Calif., the Administration Building, was dedicated in mid-October. Last major work of Frank Lloyd Wright, the structure was designed "to make the landscape more beautiful than it was before that building was built."

The circle theme repeated through the center reflects the contours of Marin's hills. Wright liked to say that buildings should never be placed "on" hills, but rather "around" them. The Administration Building fuses two hills with a sweeping sky blue curve, supported by circles and earth-colored planes. Roof is a thin concrete shell covered by a sky blue sprayed plastic membrane and has a gold anodized aluminum facia. The 172-ft gold tower encloses the boiler stack and is surmounted by a 45-ft spire.

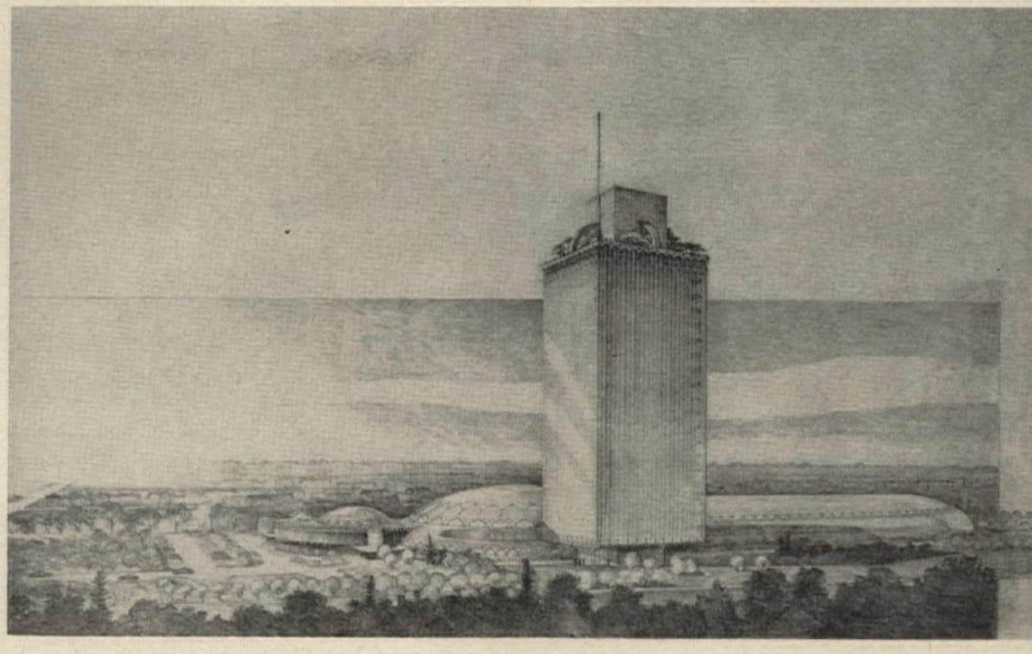
The 700-ft-long reinforced concrete structure, which cost $4,250,000, contains three floors with 160,000 sq ft of floor space. A central mall, lighted through a plastic skylight, runs the building's length. Rotunda space on the first floor is occupied by a cafeteria; on the second, by a room seating 204; on the third, by a circular library.

Construction on the remaining units of the four-part complex is not expected to begin for four years. The second unit for courts and law enforcement agencies will be identical and will join the Administration Building to share the rotunda and form an angled unit integrating a third hill. Third section will be located west of the main building and will house health and welfare agencies. An 80-acre fairgrounds to serve as a year-round cultural-recreational center will complete the plans. Included will be an outdoor amphitheater and a lagoon with an island.

Following Frank Lloyd Wright's death in 1959, a year after preliminary plans had been accepted by Marin County, his work was continued by Taliesin Associated Architects. William Wesley Peters, chief architect, supervised work on the drawing, assisted by Aaron Green, associate architect in San Francisco. Contractors are Rothschild, Raffin & Weirick Inc.

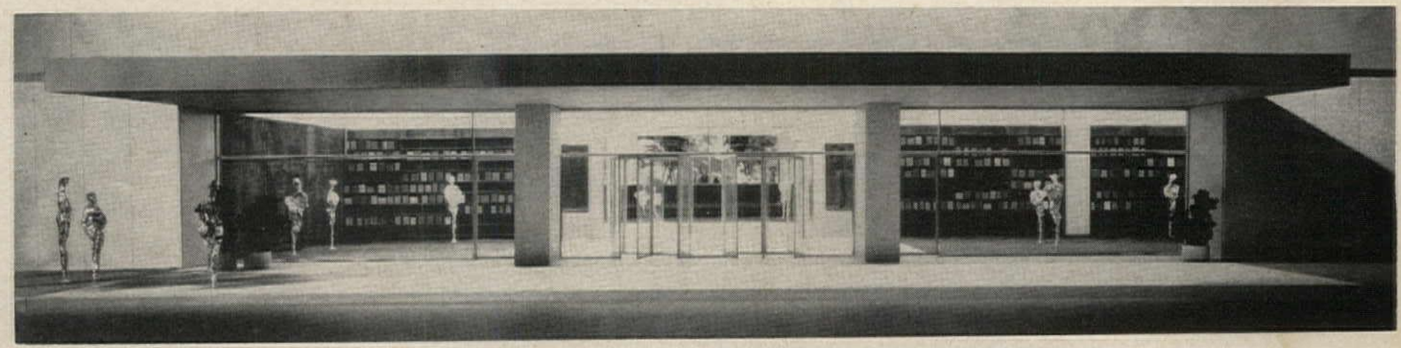
## Health Center Planned for Kentucky

Kentuckiana Center of Education, Health and Research was designed for the Kentuckiana Children's Chiropractic Center, Louisville, Ky., by Taliesin Associated Architects; architect, William Wesley Peters. The four-part plan includes: children's out-patient wing, a circular group of buildings around a central court covered by a domed canopy; ring-shaped administration wing; children's in-patient wing, two parallel bands of rooms facing a court; and a 20-floor tower for education, training, emergency and operating rooms, maternity and nursery departments, laboratories, solaria



## Concordia College To Be Built At Ann Arbor

Construction of the new, 23-building Concordia Lutheran Junior College along the Huron River in Ann Arbor, Mich., was begun in September and is scheduled to be completed next summer. Designed by Vincent G. Kling, F.A.I.A., the $6 million campus revolves about a triangular-shaped 116-ft-high chapel, tallest building on the campus. Academic buildings cluster about the chapel while dormitory communities, one for girls and one for boys, are to the east and west. All buildings except chapel are one- and two-story rectangular structures of residential scale and character. The chapel has a single space interior, the congregation area, an 800-seat capacity. Mechanical and electrical engineers are Pennell & Wiltberger Inc.; structural engineers, Severud-Elstad-Krueger Associates. Contractors are Huber, Hunt & Nichols Inc.



Museum of Modern Art's main entrance, flanked by recesses in front of the East and West Wings for sculpture

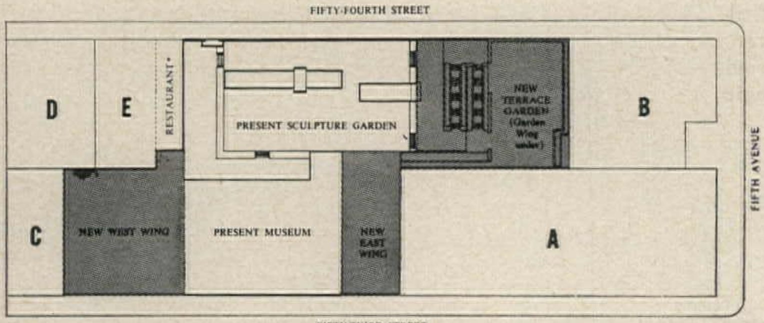
# NEW YORK'S MUSEUM OF MODERN ART EXPANDS

Three new wings and an enlarged Sculpture Garden are to be added to the Museum of Modern Art, New York. Ground is to be broken this month, and the first phase of the building program—a Garden Wing on 54th Street and an East Wing on 53rd Street—is scheduled for completion by spring, 1964, when the New York World's Fair opens. Philip C. Johnson Associates are the architects.

Together the new wings and enlarged garden give the museum collections four times their present exhibition space, increase space for temporary exhibits by more than 30 per cent, almost triple space for library and other research facilities, increase office space by over 50 per cent and member services areas by 65 per cent.

The two-story Garden Wing will provide a ground level a 60- by 75-ft exhibit hall; and underground, space for the Art Center of the Institute of Modern Art. The roof will serve as a connecting garden to the existing garden. A 50-ft-wide East Wing will replace the brownstone houses between the museum and St. Thomas Church. These additions will be built first because their construction does not involve demolition of buildings now in use by the museum.

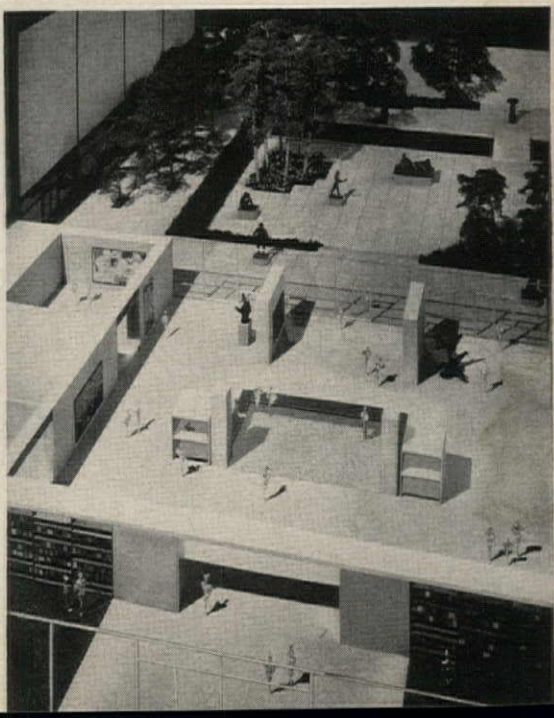
Phase two will see a new 100-ft-wide West Wing replace three other buildings on 53rd Street owned by the museum: Grace Rainey Rogers annex, former Theater Guild Building and a remodeled brownstone.




Site Plan: (A) St. Thomas Church; (B) Canada House; (C) Museum of Contemporary Crafts; (D) Dorset Hotel; (E) Whitney Museum

Enlarged Sculpture Garden looking east with new Garden Wing in background

New entrance lobby of the museum's Garden Wing



## A Church for St. Louis

**St. Louis Priory Church**, St. Louis, was recently completed and dedicated. It combines two basic building materials—concrete and a sandwich structure made with two sheets of fiberglass reinforced polyester bonded to both sides of an aluminum grid core. This latter light-transmitting material, used for both walls and roof, provides thermal insulation, is shatter-proof, lightweight, structurally strong. Architects were Hellmuth, Obata and Kassabaum

*Robert H. Murray & Associates*

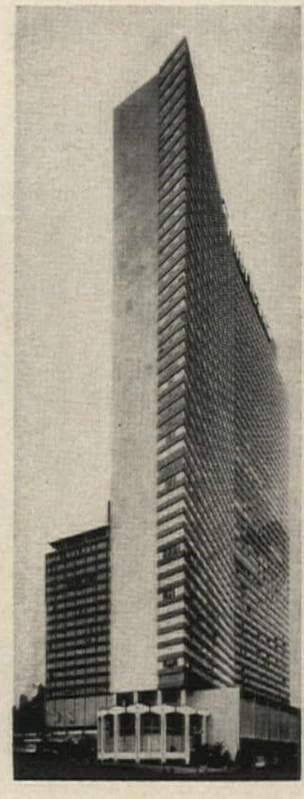
## An Office Building for Washington

**Reporters Building**, Washington, D.C., an 8-story reinforced concrete structure, will house firms related to shorthand reporting. Architects for the southwest renewal area project are Vosbeck-Ward & Associates. A unique feature of the $2.8 million two unit central core building is a perimeter façade of tilted exposed aggregate concrete panels extending one foot over and shading window glass areas. Two basement levels provide parking for 150 cars. Construction is expected to begin early next year

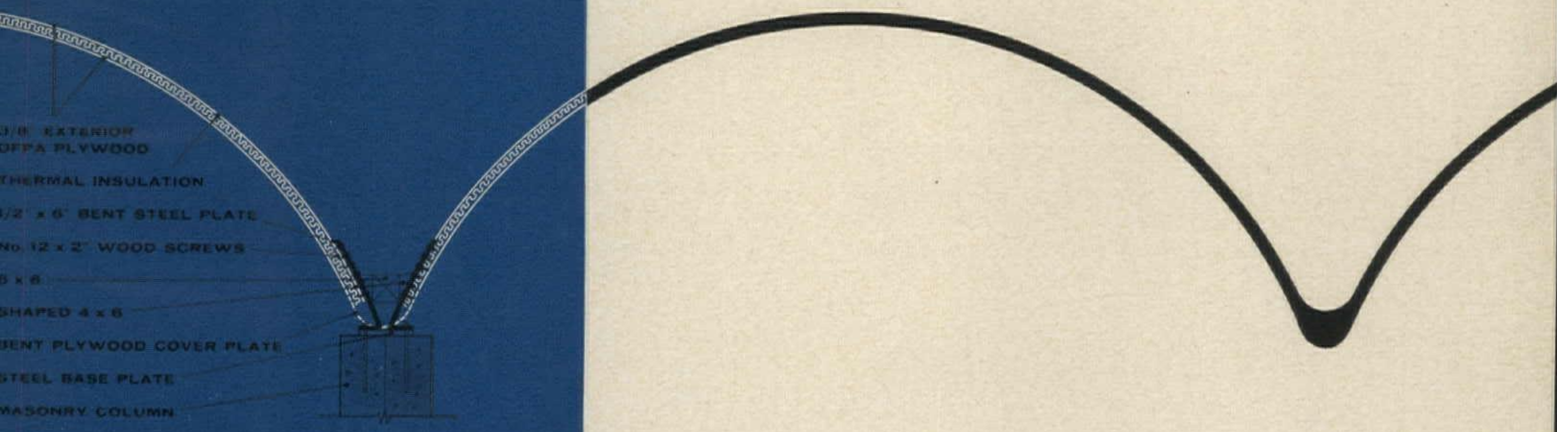
# Two New Hotels

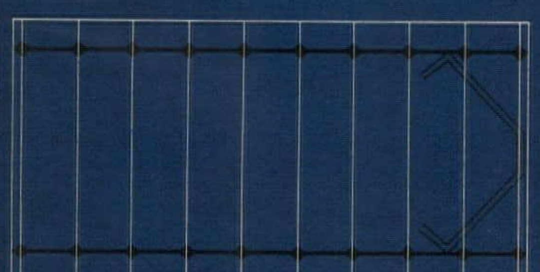
**Americana Hotel**, New York (*right*), designed by Morris Lapidus, Harle & Liebman, provides 1,100,000 sq ft of guest accommodations, 2,000 rooms and suites, 8 ballrooms, 30,600-sq-ft convention hall, shopping promenade and garage for 350 cars. The $50 million structure uses three reinforced concrete framing systems: from top floor to 29th, slabs are supported on columns; from 29th floor to fifth, reinforced concrete shear walls provide vertical support for slabs as well as wind resistance; from fifth floor down, wall load is transferred to composite steel core columns. Structural engineers were Farkas & Barron; contractor, Diesel Construction Company. Concrete work was by Dic Concrete Corporation

**Hotel Indonesia**, Djakarta, Indonesia (*far right*), has 409 rooms, 14 stories. Designed by architect Abel Sorenson and constructed by Indonesians with the help of the Taisei Company of Tokyo, the building's two wings form a "T" shape. The hotel has three restaurants, a tropical garden, two swimming pools, a gallery of shops. Sculpture and mosaic murals are placed about the grounds, which were landscaped by architects from the National Botanical Gardens at Bogor



**the most exciting ideas take shape in fir plywood**




ST. PAUL'S LUTHERAN CHURCH

| | |
|---|---|
| LOCATION: | MONROVIA, CALIFORNIA |
| ARCHITECTS: | SMITH AND WILLIAMS<br>SOUTH PASADENA, CALIFORNIA |
| FABRICATOR: | BERKELEY PLYWOOD COMPANY<br>SAN LEANDRO, CALIFORNIA |

NINE PLYWOOD VAULTS, seeming to float on panels of light, give this church its simple grace and elegance. They provide the additional, practical advantages of construction economy and a 51x135 ft. support-free interior.

Each vault rises to an apex of 27 feet and spans an area 15x51 ft.—longest span on record for an unsupported plywood vaulted roof system. The roof components were prefabricated, and were so carefully engineered that installation took only seven hours.

This church is one more example of the striking new architectural forms that are becoming a practical possibility with plywood: high in structural strength and integrity, economical of labor and materials, and offering superior design flexibility. For more information on plywood structural systems, write (USA only) Douglas Fir Plywood Association, Tacoma 2, Washington.

For more data, circle 7 on Inquiry Card

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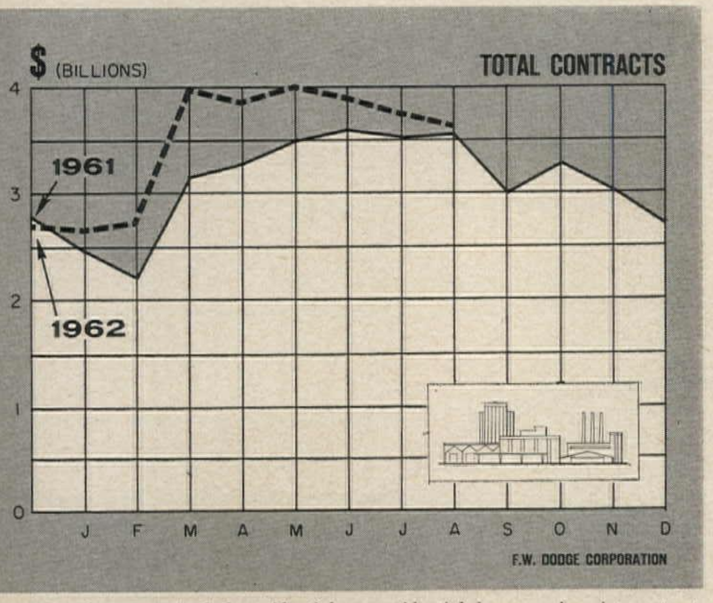
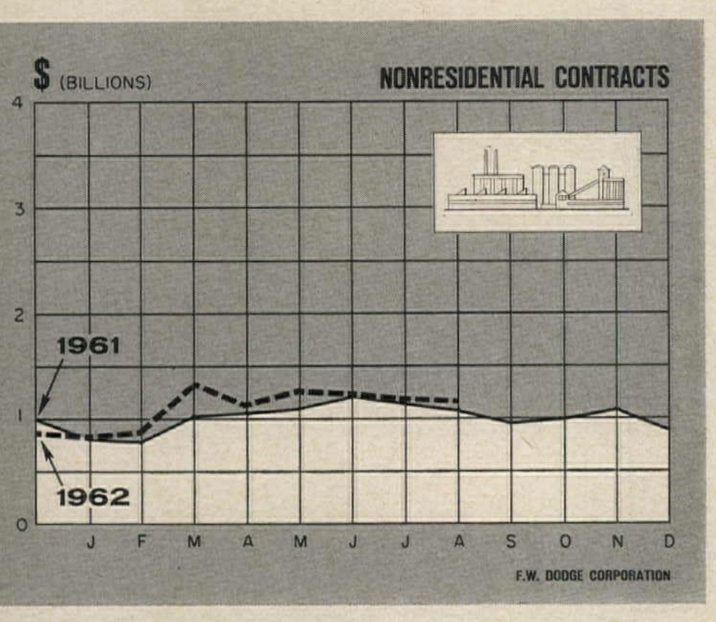



*Total contracts include residential, nonresidential, heavy engineering contracts*





# INDUSTRIAL BUILDING LAG IS EXPECTED TO END NEXT YEAR

The developments over the past half-dozen years in industrial construction (the subject of this month's Building Types Study) reflect a broader problem which is basic to our national rate of economic growth. Investment expenditures by business firms in new and more productive plant and equipment provide the means for increasing our future output of goods. Yet, in recent years there has been a decided slowdown in the volume of business capital spending in general, and in industrial construction in particular.

The postwar pattern of plant and equipment outlays shows vigorous expansion for more than a decade (interrupted briefly by two recessions), and then, since 1957, no further growth. And in this latter period the trend of manufacturing construction contract awards has been downward. As a consequence, our rate of total economic output (Gross National Product) has fallen below its average historical performance. Recoveries following recessions have been less vigorous and of shorter duration, and with the exception of a single month, unemployment has persistently remained above five per cent of the labor force for the last five years.

Many factors enter into the decision to expand manufacturing capacity. Chief among them are anticipated profits, the availability of capital funds, and the extent to which existing facilities are being put to use. Recent developments in these critical areas explain much of the sluggishness in business capital spending.

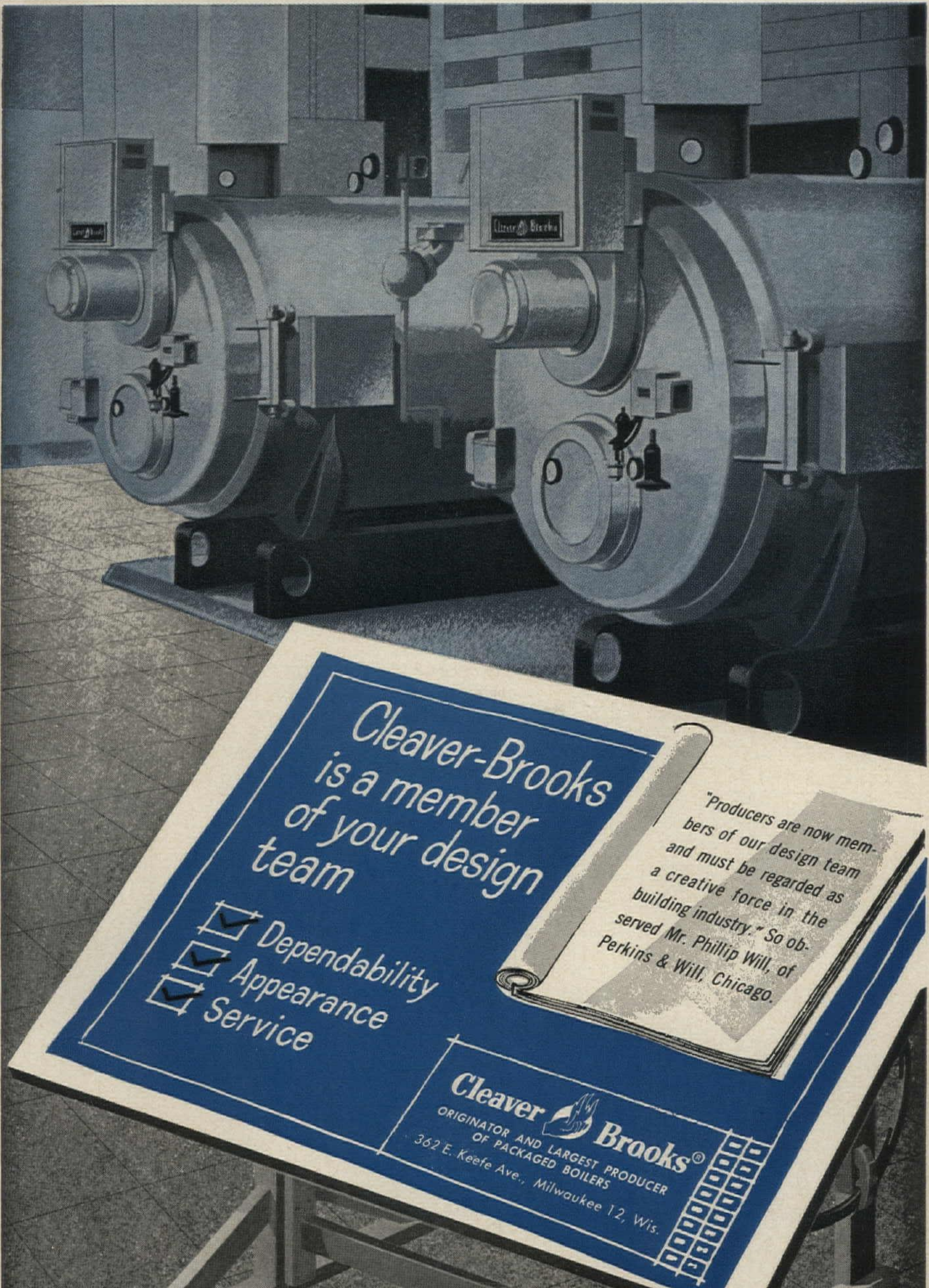
The steady decline of corporate profit rates over the last 15 years is one of the better known facts of economic life. From a level of 5 per cent in sales prior to 1950, after-tax profits have dwindled to below 3 per cent in the early sixties.

The existence of excess manufacturing capacity in many industries is a further deterrent to investment in new plant facilities. It is well to remember, though, that not all surplus facilities are modern and efficient, and some extra margin is always required to give our productive process the flexibility it must have.

One factor which is less likely to pose a problem in the years immediately ahead is the availability of investment funds. Depreciation allowances have risen steadily, and in combination with retained earnings stand at an all-time high. What is more, the July 1962 reduction (for tax purposes) of the allowable useful life of plant and equipment will serve to speed up the generation of internal funds. External financing, on the other hand, should continue to be in plentiful supply at stable, though not exactly bargain rates.

Much of the current outlay for plant and equipment has been devoted to replacement and cost-cutting modernization rather than primarily to expansion of output. This situation is not likely to change without a decided improvement in the profitability of new investment ventures. An across-the-board tax cut early next year (a strong possibility) would provide just that improvement. By adding to consumers' spendable income, it would boost total sales volume as well. Thus it is likely that the latter half of 1963 will bring a much-needed reversal to the sagging trend of industrial building.

GEORGE A. CHRISTIE, *Economist*
*F. W. Dodge Corporation*
*A McGraw-Hill Company*




For more data, circle 8 on Inquiry Card

# *Construction Cost Indexes*

Presented by Clyde Shute, Director of Statistical Policy, Construction News Div., F. W. Dodge Corp., from data compiled by E. H. Boeckh & Assoc. Inc.

Labor and Materials: U.S. average 1926-1929=100

| | NEW YORK | | | | | ATLANTA | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | RESIDENTIAL | | APTS., HOTELS, OFFICE BLDGS. | COMMERCIAL AND FACTORY BLDGS. | | RESIDENTIAL | | APTS., HOTELS OFFICE BLDGS. | COMMERCIAL AND FACTORY BLDGS. | |
| PERIOD | Brick | Frame | Brick and Concrete | Brick and Concrete | Brick and Steel | Brick | Frame | Brick and Concrete | Brick and Concrete | Brick and Steel |
| 1935 | 93.8 | 91.3 | 104.7 | 108.5 | 105.5 | 72.3 | 67.9 | 84.0 | 87.1 | 85.1 |
| 1939 | 123.5 | 122.4 | 130.7 | 133.4 | 130.1 | 86.3 | 83.1 | 95.1 | 97.4 | 94.7 |
| 1949 | 243.7 | 240.8 | 242.8 | 246.6 | 240.0 | 189.3 | 189.9 | 180.6 | 180.8 | 177.5 |
| 1950 | 256.2 | 254.5 | 249.5 | 251.5 | 248.0 | 194.3 | 196.2 | 185.4 | 183.7 | 185.0 |
| 1951 | 273.2 | 271.3 | 263.7 | 274.9 | 271.8 | 212.8 | 214.6 | 204.2 | 202.8 | 205.0 |
| 1952 | 278.2 | 274.8 | 271.9 | 265.2 | 262.2 | 218.8 | 221.0 | 212.8 | 210.1 | 214.3 |
| 1953 | 281.3 | 277.2 | 281.0 | 286.0 | 282.0 | 223.0 | 224.6 | 221.3 | 221.8 | 223.0 |
| 1954 | 285.0 | 278.2 | 293.0 | 300.6 | 295.4 | 219.6 | 219.1 | 233.5 | 225.2 | 225.4 |
| 1955 | 293.1 | 286.0 | 300.0 | 308.3 | 302.4 | 225.3 | 225.1 | 229.0 | 231.5 | 231.8 |
| 1956 | 310.8 | 302.2 | 320.1 | 328.6 | 324.5 | 237.2 | 235.7 | 241.7 | 244.4 | 246.4 |
| 1957 | 318.5 | 308.3 | 333.1 | 345.2 | 339.8 | 241.2 | 239.0 | 248.7 | 252.1 | 254.7 |
| 1958 | 328.0 | 315.1 | 348.6 | 365.4 | 357.3 | 243.9 | 239.8 | 255.7 | 261.9 | 262.0 |
| 1959 | 342.7 | 329.0 | 367.7 | 386.8 | 374.1 | 252.2 | 247.7 | 266.1 | 272.7 | 273.1 |
| 1960 | 351.6 | 337.2 | 377.7 | 395.8 | 380.6 | 259.2 | 253.3 | 274.7 | 282.5 | 278.8 |
| 1961 | 362.5 | 343.0 | 398.2 | 422.4 | 397.0 | 256.7 | 249.7 | 275.8 | 284.5 | 275.8 |
| June 1962 | 370.4 | 347.4 | 412.9 | 440.9 | 411.2 | 261.9 | 255.3 | 281.1 | 289.8 | 279.7 |
| July 1962 | 375.6 | 351.2 | 418.8 | 449.4 | 418.4 | 264.7 | 257 0 | 285.2 | 295.4 | 283.5 |
| August 1962 | 379.2 | 356.6 | 422.2 | 450.1 | 420.1 | 265.1 | 257.4 | 285.7 | 295.8 | 283.9 |
| | % increase over 1939 | | | | | % increase over 1939 | | | | |
| August 1962 | 207.0 | 191.3 | 223.0 | 237.4 | 222.9 | 207.2 | 209.7 | 200.4 | 203.7 | 199.8 |

| | ST. LOUIS | | | | | SAN FRANCISCO | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1935 | 95.1 | 90.1 | 104.1 | 108.3 | 105.4 | 89.5 | 84.5 | 96.4 | 103.7 | 99.7 |
| 1939 | 110.2 | 107.0 | 118.7 | 119.8 | 119.0 | 105.6 | 99.3 | 117.4 | 121.9 | 116.5 |
| 1949 | 221.4 | 220.7 | 212.8 | 215.7 | 213.6 | 213.0 | 207.1 | 214.0 | 219.8 | 216.1 |
| 1950 | 232.8 | 230.7 | 221.9 | 225.3 | 222.8 | 227.0 | 223.1 | 222.4 | 224.5 | 222.6 |
| 1951 | 252.0 | 248.3 | 238.5 | 240.9 | 239.0 | 245.2 | 240.4 | 239.6 | 243.1 | 243.1 |
| 1952 | 259.1 | 253.2 | 249.7 | 255.0 | 249.6 | 250.2 | 245.0 | 245.6 | 248.7 | 249.6 |
| 1953 | 263.4 | 256.4 | 259.0 | 267.0 | 259.2 | 255.2 | 257.2 | 256.6 | 261.0 | 259.7 |
| 1954 | 266.6 | 260.2 | 263.7 | 273.3 | 266.2 | 257.4 | 249.2 | 264.1 | 272.5 | 267.2 |
| 1955 | 273.3 | 266.5 | 272.2 | 281.3 | 276.5 | 268.0 | 259.0 | 275.0 | 284.4 | 279.6 |
| 1956 | 288.7 | 280.3 | 287.9 | 299.2 | 293.3 | 279.0 | 270.0 | 288.9 | 298.6 | 295.8 |
| 1957 | 292.0 | 283.4 | 295.2 | 307.1 | 302.9 | 286.3 | 274.4 | 302.9 | 315.2 | 310.7 |
| 1958 | 297.0 | 278.9 | 304.9 | 318.4 | 313.8 | 289.8 | 274.9 | 311.5 | 326.7 | 320.8 |
| 1959 | 305.4 | 296.4 | 315.0 | 329.8 | 323.9 | 299.2 | 284.4 | 322.7 | 338.1 | 330.1 |
| 1960 | 311.4 | 301.0 | 322.2 | 337.2 | 329.2 | 305.5 | 288.9 | 335.3 | 352.2 | 342.3 |
| 1961 | 315.1 | 302.0 | 329.0 | 346.8 | 332.2 | 308.7 | 290.2 | 345.1 | 362.9 | 350.2 |
| June 1962 | 323.6 | 308.9 | 342.4 | 361.9 | 343.3 | 313.7 | 294.4 | 352.7 | 370.7 | 356.1 |
| July 1962 | 323.6 | 308.9 | 342.4 | 361.9 | 343.3 | 316.0 | 295.7 | 356.3 | 375.9 | 360.3 |
| August 1962 | 324.4 | 309.7 | 343.5 | 362.3 | 343.7 | 317.0 | 296.7 | 357.6 | 376.9 | 361.3 |
| | % increase over 1939 | | | | | % increase over 1939 | | | | |
| August 1962 | 194.4 | 189.4 | 189.4 | 202.4 | 188.8 | 200.2 | 198.8 | 204.6 | 209.2 | 210.1 |

Cost comparisons, as percentage differences, for any particular type of construction, are possible between localities, or periods of time within the same city, by dividing the difference between the two index numbers by one of them; i.e.:

index for city A = 110
index for city B = 95

(both indexes must be for the same type of construction).

Then: costs in A are approximately 16 per cent higher than in B.

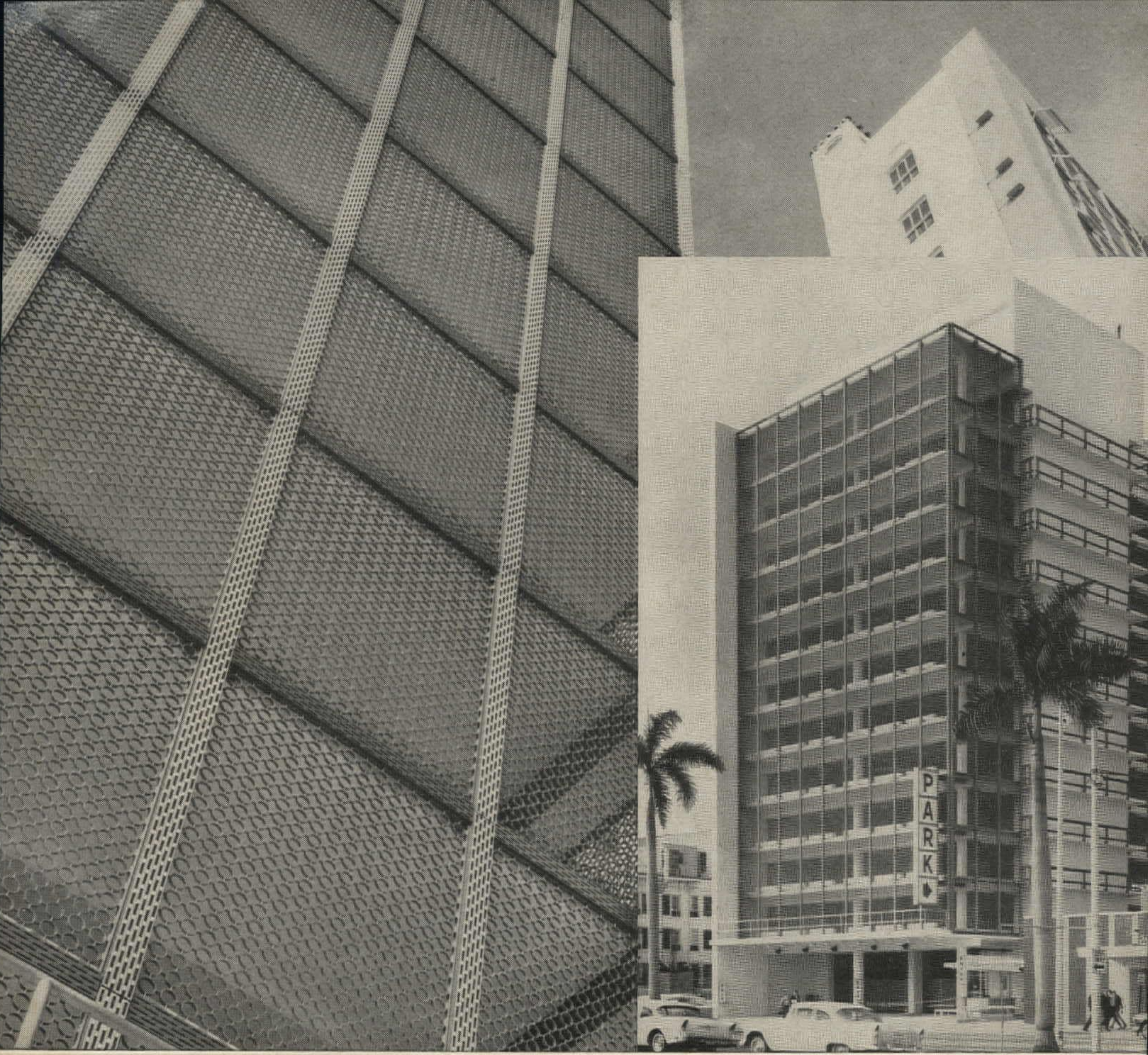
$$\frac{110-95}{95} = 0.158$$

Conversely: costs in B are approximately 14 per cent lower than in A.

$$\frac{110-95}{110} = 0.136$$

Cost comparisons cannot be made between different types of construction because the index numbers for each type relate to a different U. S. average for 1926-29.

Material prices and wage rates used in the current indexes make no allowance for payments in excess of published list prices, thus indexes reflect minimum costs and not necessarily actual costs.

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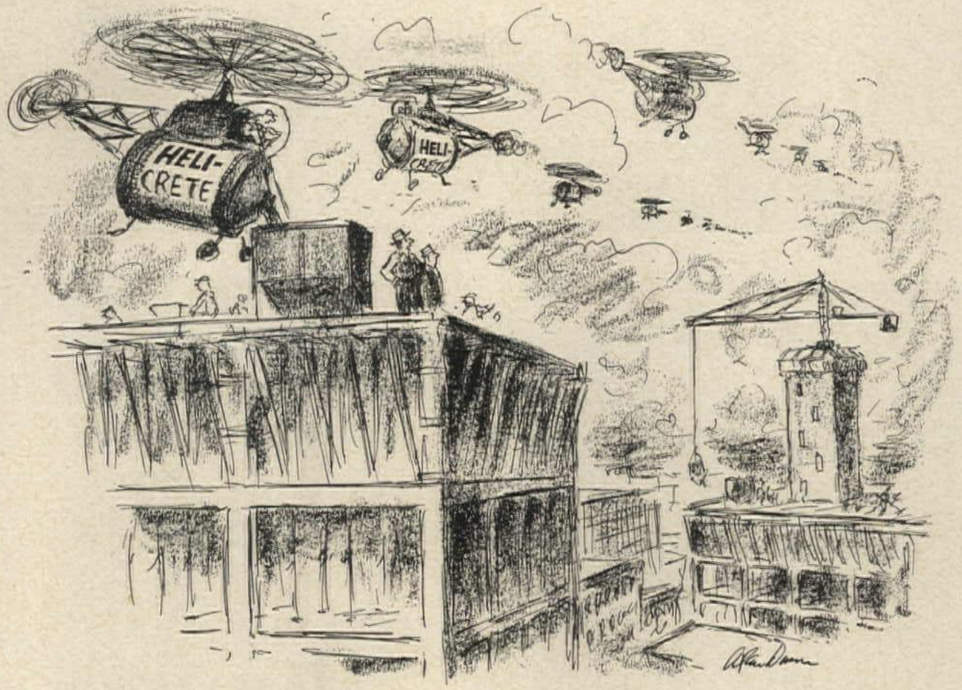
For more data, circle 9 on Inquiry Card

For more data, circle 10 on Inquiry Card ➔




—*Drawn for the* RECORD *by Alan Dunn*

"Well, I warned them slip-forming wasn't here to stay—"

# WORLD CONFERENCE ON SHELL STRUCTURES DRAWS INTERNATIONAL ATTENDANCE OF 700

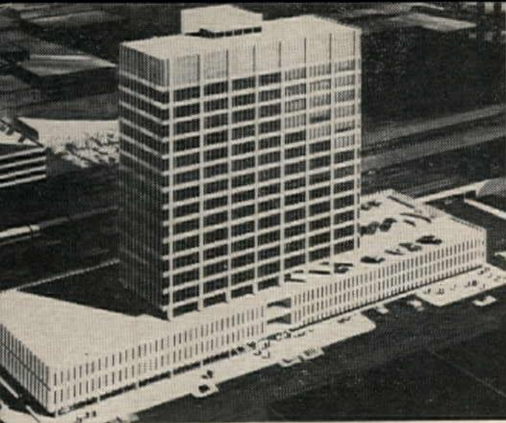
The plastic forms and unobstructed space obtainable with shell structures proved an irresistable attraction to well over 700 engineers and architects who came from all over the world to attend the World Conference on Shell Structures held last month in San Francisco. That one in 10 conferees was an architect—despite the preponderantly technical character of the program—evidences the great increase in interest in these structures predicted by the late engineering genius Eduardo Torroja on his last visit to the United States two years ago.

Four days of meetings, with 67 presentations of papers, were well interspersed with social occasions and opportunities for the visiting experts to get to know each other personally (most had previously known each other by reputation only) and to visit some of the San Francisco Bay Area's shell structures and to enjoy its famous natural beauty.

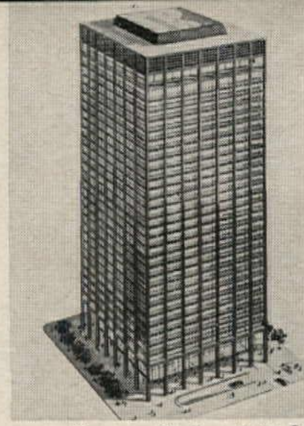
The program progressed from general architectural considerations ("structure, shells, architecture, form, environment, materials") through discussion of construction methods, economies of shells, computers and numerical methods of analysis, models, experiments and tests to the final two days which were given over to papers on highly theoretical aspects of shell analysis and general theory.

Particularly on these last two days, the program showed the names of men doing important work in the field of shells: A. L. Bauma of Delft, The Netherlands, on "Approximate Methods of Shell Analysis," Konrad and Ivo Hruban of Prague on "Effect of Volume Variations and Prestressing on a Surface of Translation," W. Zerna of Hannover on the "Exact Theory of Elastic Shells," Ronald Jenkins of London (whose firm is doing the engineering design for the Sydney Opera House) on "Shell Problem Solution by the Matrix Progression Method" and Waclow Olszak and A. Sawczuk of Warsaw on "Inelastic Shell Problems." Work in these fields, although out of the architect's world in its present state, will inevitably—if much later on—influence the potentials of design.

Architects, however, found much of interest in Frei Otto's description and slides of his imaginative and inventive tensile structures (tents and cables); in Joseph Allen Stein's thoughtful discussion of shells and their potential ("lively yet ordered variety in an otherwise monotonous aspect," with "special advantages when seen from the air, but in a hot and humid country like India the economics of enclosed space is greatly influenced by air conditioning"); Felix Candela ("with shells you must take the 'formalist' approach, you cannot follow the 'functional' approach: maybe this is why architects are so interested in shell structures"), who said he preferred moving formwork and pouring concrete to precasting and lifting and that he believed the practical span limit to be around 400 ft.

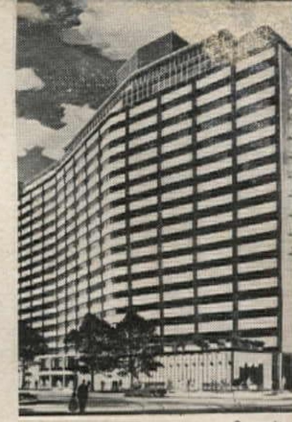


Bank for Savings & Trusts
Birmingham, Alabama



Tennessee Gas Transmission Co.
Houston, Texas

1180 Avenue of the Americas
New York, New York



Summit
New York, New

500 Jefferson Bldg., Cullen Center, Inc.
Houston, Texas

Americana of New York Hotel
New York, New York

The Bell Telephone Co. of Pa.
Philadelphia, Pa.

Univ. of Pittsburgh, Men's
Pittsburgh

BMA Tower, Business Men's Assurance Co.
Kansas City, Mo.

Standard Plaza
Portland, Oregon

Home Federal Savings & Loan Assoc.
of Chicago, Illinois

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Miners National Bank
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Occidental Life Building
Los Angeles, Calif.

Associated Press Building
Rockefeller Center, New York

International Building
efeller Center, New York

The New York Times Building
New York, New York

Standard Life Building
Jackson, Mississippi

Woodward & Lothrop Department Store
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Mark IV... introduced in June 1961 ...is already being installed in over 74 buildings.

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**For more data, circle 11 on Inquiry Card**

# *World Conference on Shell Structures*

*continued from page 23*

*John Haskett & Associates photos*

Conference officials Kenneth Downes Jr., University of California Extension; Prof. Egor Popov, general arrangements and program committees chairman; and Mrs. Popov, ladies' committee chairman

Acoustics expert Robert Newman and Mrs. Newman; architect Harold Hauf, BRAB representative on program committee, and Mrs. Hauf; speakers, Felix Candela, Mexico City, and Florencio de Pazo, Madrid

Mrs. Haas; Mrs. Ketchum; R. E. Rowe, London; Andrew Nasser, Los Angeles; Milo Ketchum, Denver; I.A.S.S. president A. M. Haas, Delft, The Netherlands

Speakers Frank Heger (plastics), Daniel H. Brown (plywood), Arthur Nilson (light gauge steel)

Speaker Joseph Allen Stein, New Delhi, formerly of San Francisco (second from left) and Bay Area friends Vernon De Mars, Mrs. Royston, Mrs. Marshall, Richard Marshall and Robert Royston

William Caudill's homespun presentation of "Shells and the Education Process," Robert Newman's straightforward statement on "Acoustics in Shell Structures" and Mario Salvadori's dynamic moderating were other features of the first day, but the slides on "Saw-Tooth Shell Roofs" presented by Waclow Zolewski of Poland and "Double Curvature Shell of Reinforced Ceramic" by Eladio Dieste and Eugenio Montanez of Uruguay were a vivid highlight of the opening day's sessions.

If little that was really new came from the two sessions titled "Creative Applications," it was perhaps a sign and a portent. To realize the potential suggested even in known methods of using shell structures, architects and engineers must—except in the rare genius like Candela—work in accord, mutual respect and trust. It's a wide open field, but neither architect nor engineer can do it justice alone.

*—Elisabeth Kendall Thompson*

# DESIGN IN URBAN RENEWAL: NOW IT'S OFFICIAL

The continuing concern with design as a controlling factor in urban renewal so often expressed by Commissioner William L. Slayton of the Urban Renewal Administration has now been formalized in an official statement of policy sent to all local public agencies concerned with urban renewal throughout the country.

The statement, entitled "Design in Urban Renewal," is contained in Local Public Agency Letter No. 249; copies are available from the URA, Washington 25, D.C.

An introductory note by Mr. Slayton says the statement "sets forth the URA position that high-quality design is a basic objective of the urban renewal program, and outlines the actions which LPA's can take to achieve quality design in urban renewal."

Content of the six-page statement itself follows very closely the ideas outlined by Mr. Slayton in his major address at last summer's annual Conference on Urban Renewal of the National Association of Housing and Redevelopment Officials (August, pages 23 and 26). Emphasis is on the need for attention to the role of design at every stage of the urban renewal process and for utilization in this process of the services of "skilled design professionals."

Another important development in URA's campaign for good design is the appointment of Roger Montgomery, a St. Louis architect and associate professor of architecture at Washington University, as "urban design specialist" for URA. This new staff position in the Project Planning and Engineering Branch of the URA Division of Technical Standards was established "to develop and implement policies for well-designed urban renewal projects."

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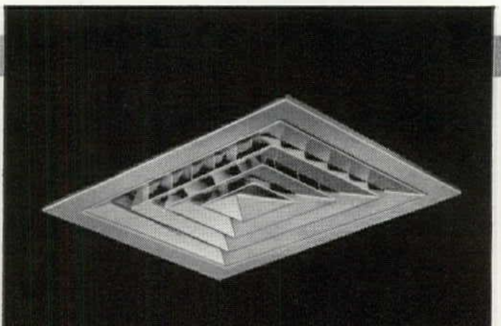
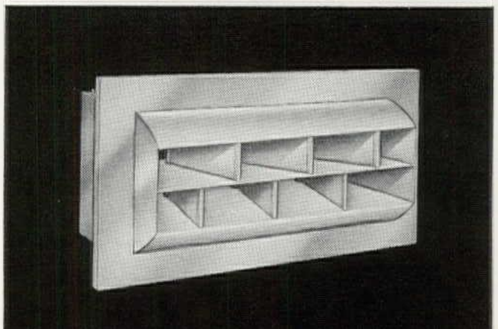
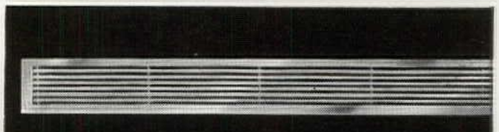


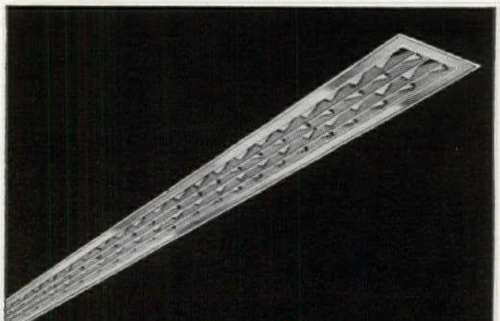
"RC" square and rectangular diffusers



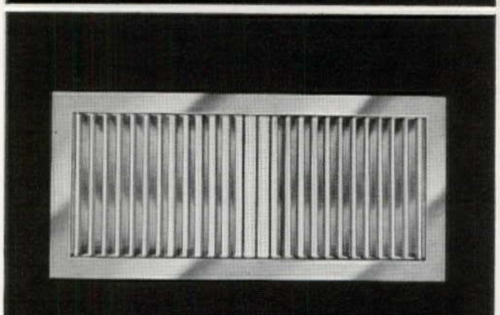
Roto-Jet cylinder type diffusers



Decoraire continuous grilles



Stripline slot-type diffusers



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**AIR DEVICES INC.**
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New York, New York

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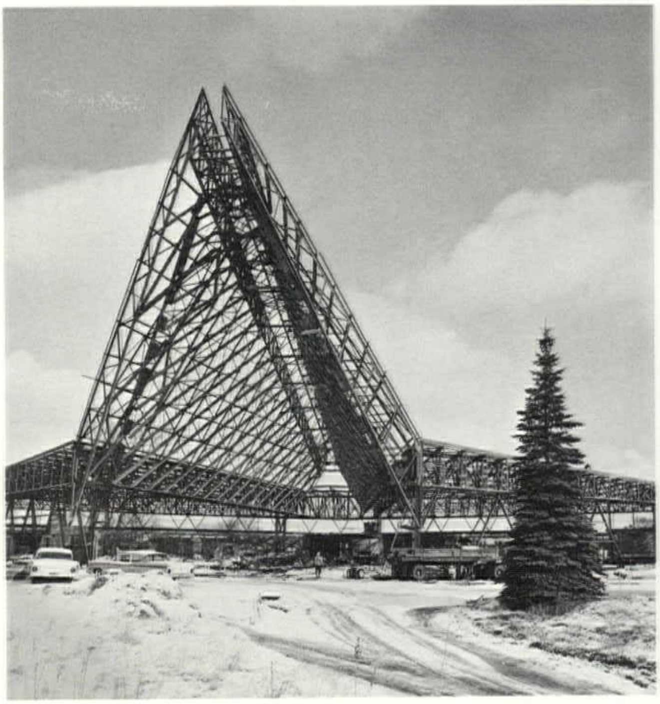
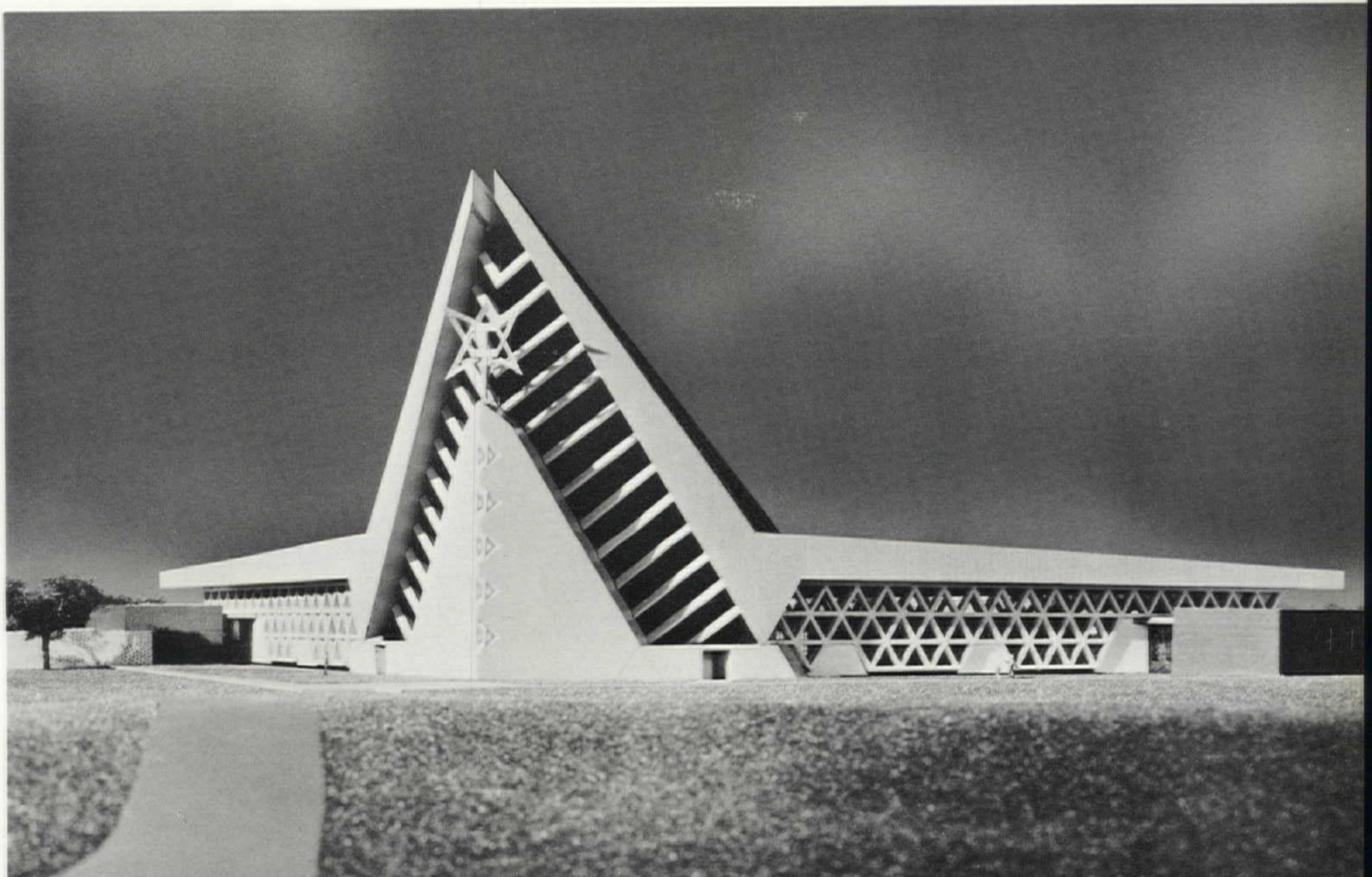
For more data, circle 27 on Inquiry Card →

# A House of Worship in Michigan

*by Albert Kahn Associated Architects and Engineers, and Percival Goodman, F.A.I.A., Associate Architect*

Synagogue of the Shaarey Zedek Congregation, Southfield, Michigan. This 100,000-sq-ft sanctuary seats 3,600 people—all within 120 ft of the Bema. 80 ft above grade at its highest point, the sanctuary is walled with precast concrete, and glass. Concrete was also considered for the structural frame, but steel was chosen, according to the designer, for its economy and because it was best suited to the general configuration.

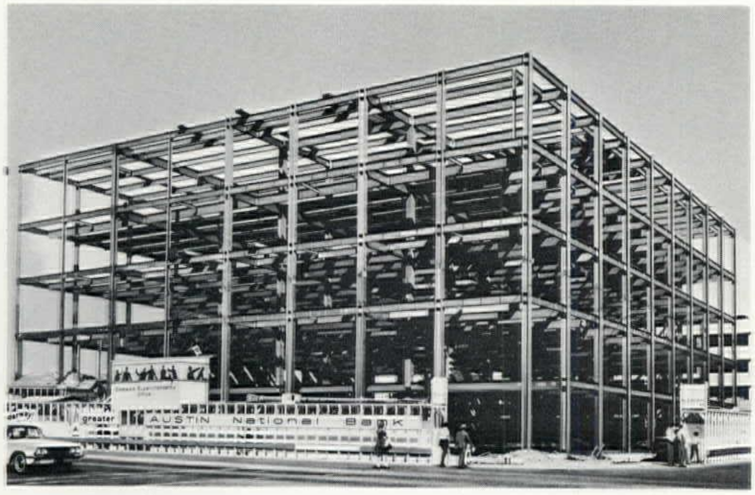




*Architects and Engineers:* Albert Kahn Associated Architects and Engineers.
*Associate Architect:* Percival Goodman, F.A.I.A.
*General Contractor:* O. W. Burke Co.
*Steel Fabricator and Erector:* Whitehead & Kales Company.
Steel for the 602-ton frame was supplied by Bethlehem (shapes and plates).

# A Bank Building in Texas

*by Page, Southerland & Page*



The Austin National Bank Building, Austin, Texas, is scheduled for completion in early 1963. This five-story structure will be sheathed with natural color aggregate sections and vertical metal sun shields.

It's the first multi-story structure in Austin in 20 years to be built on a steel frame, rather than on a reinforced concrete skeleton. Reasons for return to steel: (1) economy, thanks to higher-strength A36 steel, Bethlehem lightweight shapes, and a continuous, welded frame, (2) "thinner" steel columns, needed for maximum usable floor area in the future multi-story portion (three-column two-bay framing system), (3) the ease and economy of adding on to a steel structure in the future (in this case adding on 17 stories to 5).

*Architects:* Page, Southerland & Page.
*Associate Architects:* Fehr and Granger.
*General Contractor:* Rex D. Kitchens Construction Co.
*Fabricator:* Tips Iron & Steel Co. (1,035 tons).
*Erector:* F. B. McIntire Erection Co., Inc.

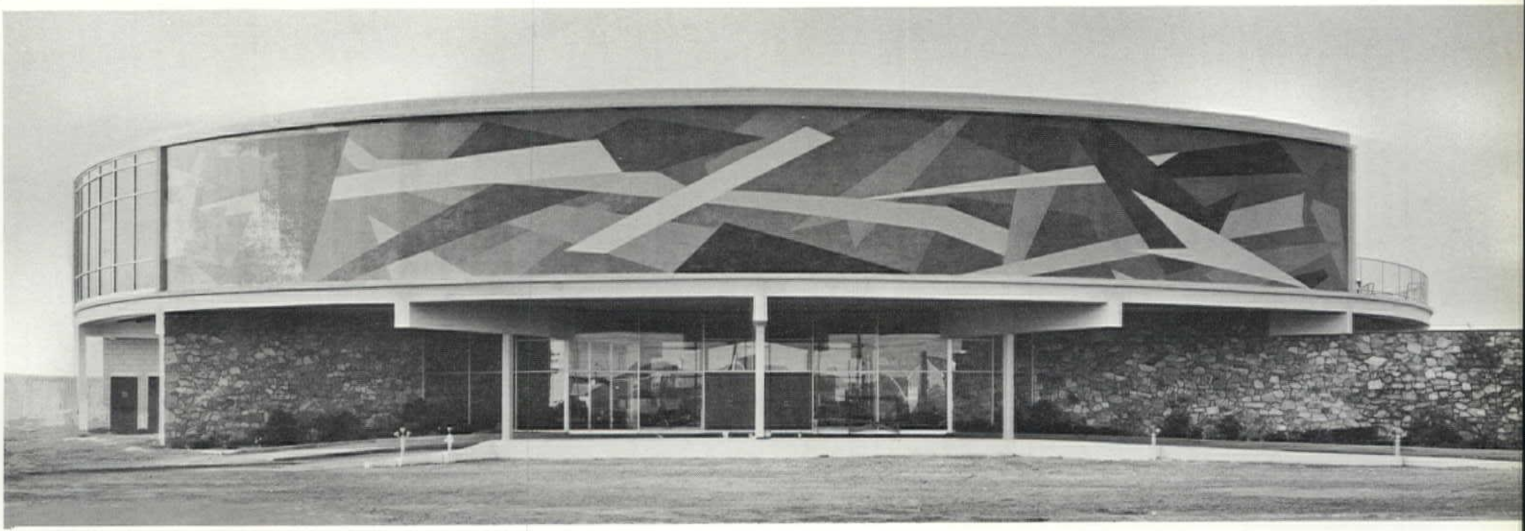
BETHLEHEM STEEL

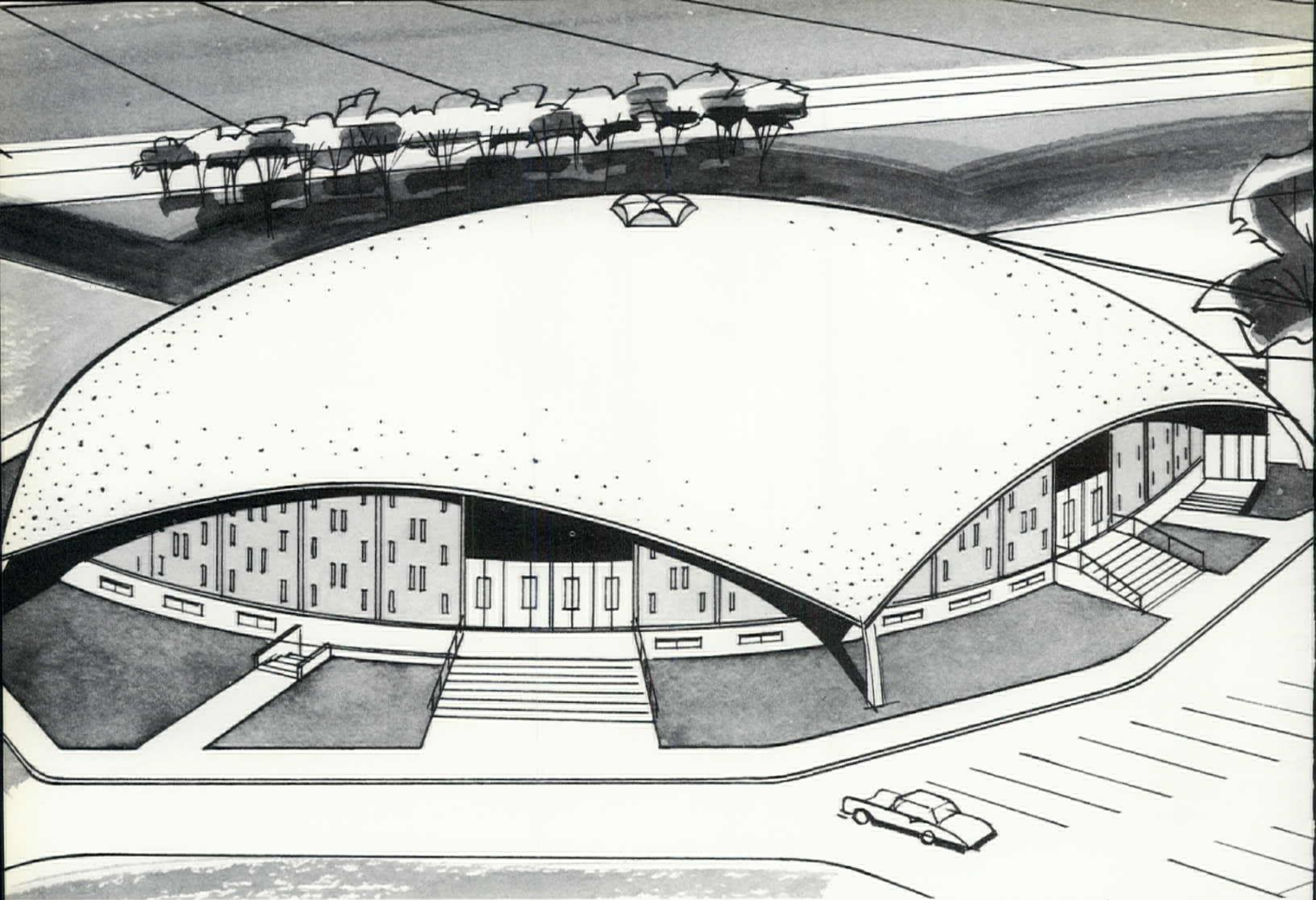
# A Cabana Club in New York

*by Richard I. Pezenik*

El Patio Cabana Club, Atlantic Beach, L.I., N.Y. Circular restaurant on second floor (22,000 sq ft per floor) can seat over 1,500 diners. Walled in tinted glass, except for a 200 x 20 ft mosaic-tile mural, it's cantilevered 20 ft in the front of the building and 10 ft in the back on steel beams. Central core, built around the four interior steel columns, contains the kitchen and all utilities. All dining rooms, readily accessible to the kitchen, are free of cluttering columns.

*Consulting Engineer:* Richard I. Pezenik.
*General Contractor:* Royal Land & Development Corp.
250 tons of Bethlehem structural steel were quickly fabricated and erected by *Standard Structural Steel* to help speed completion of this building needed to replace the previous building which burned down.





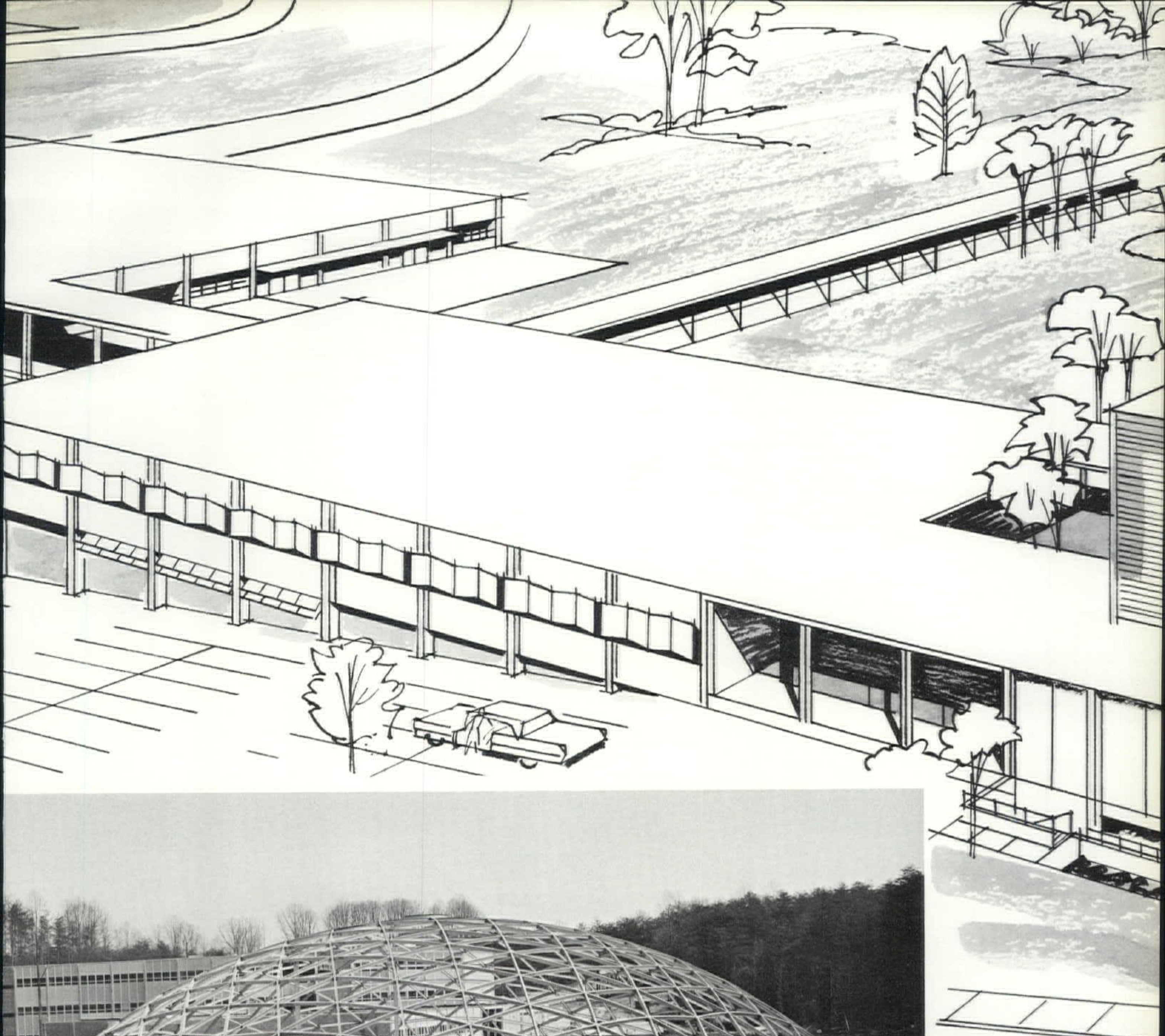
# *A Field House in Maryland*

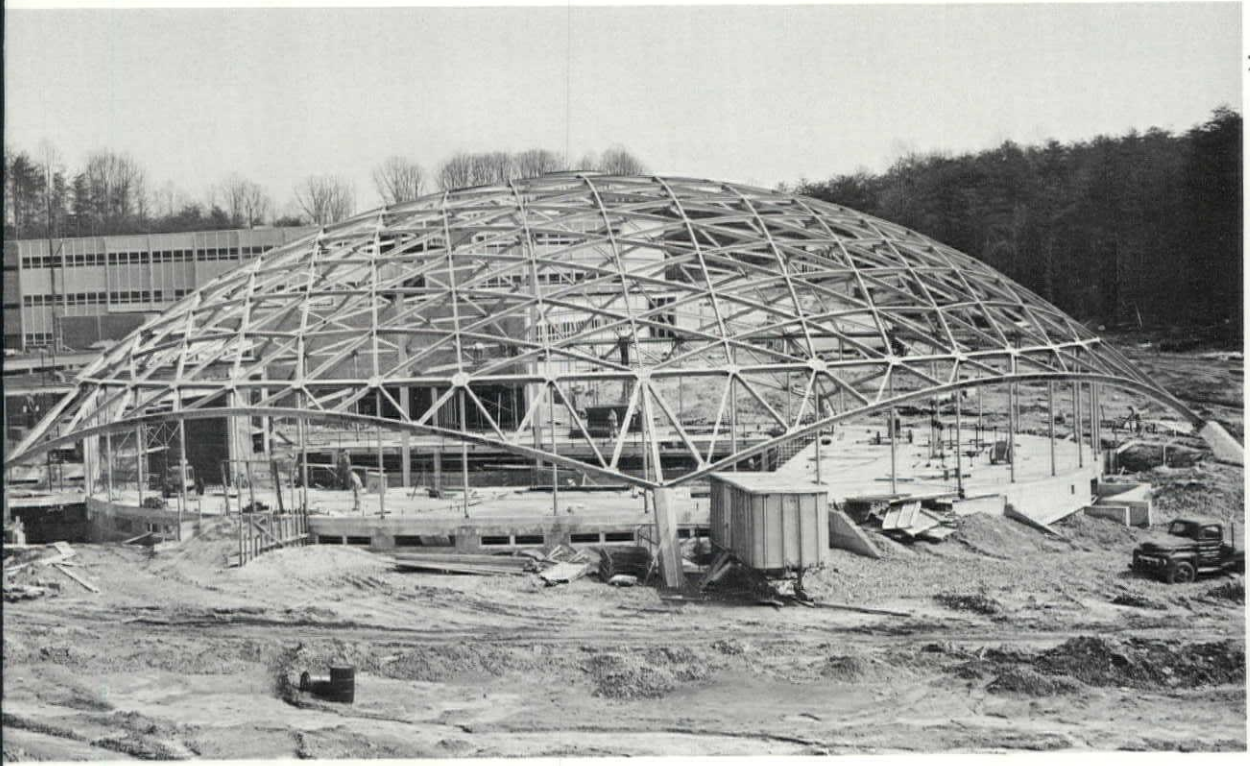
*by McLeod and Ferrara*

Field House, Walt Whitman High School, Bethesda, Md. Geodesic-dome design chosen by Montgomery County Board of Education when several advantages over alternate designs were noted in preliminary research studies conducted by Educational Facilities Laboratories, Inc., an agency of the Ford Foundation. Compared to a conventional box-shaped gymnasium, the dome provides (1) about 4,200 more sq ft of free interior, (2) no interior columns to block spectators' vision, (3) seating space for 1,200 more spectators, (4) a slightly lower cost.

From the many design studies and cost analyses made by Synergetics, Inc., consultants for the design of the structural characteristics of the dome, the most practical and economical type of superstructure proved to be the combination of a structural steel framing system, covered with a gypsum roof deck and composition roof covering. The structural steel framing was left exposed on the underside of the roof, thus giving a honeycomb effect to the domed ceiling.

The slender steel frame rests on five concrete pylons around the base of the 157-ft-diam dome. Steel members were curved in the fabricating shops to speed erection, which took less than five weeks.





*Architects:* McLeod and Ferrara.
*Consulting Engineers:* Synergetics, Inc.
*General Contractor:* Merando Inc.
*Steel Fabricator and Erector:* Atlas Machine & Iron Works Inc.
150 tons of structural steel supplied by Bethlehem.

Two entry courts (small bridge crossing retaining wall, and circular stairway from carport), along with enclosed entry hall, divide the plan into two distinct parts—living areas to the east, bedrooms to the west.

# A Home in New Jersey

## by Davis, Brody & Wisniewski

Philip Drill house, West Orange, N.J., winner of a 1962 architectural award of excellence from the American Institute of Steel Construction.

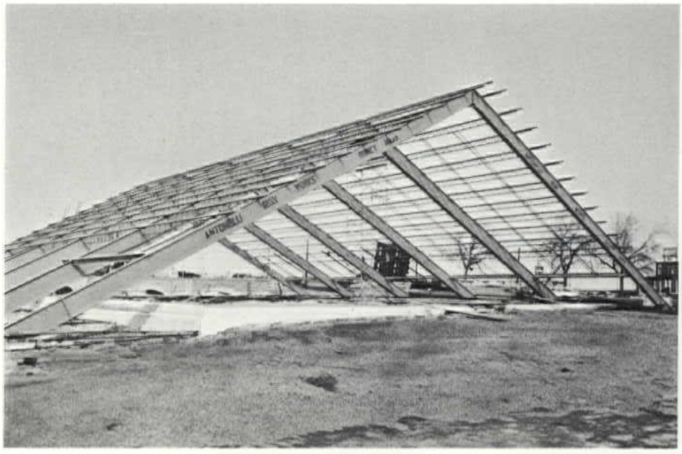
Award jury praised the house for combining steel framing with other materials: glass window-walls; pivoted redwood grilles; exterior wall surfaces of oriental stucco; structural decking fabricated of alternate 1 x 4's and 2 x 5's, glued together; and interior panels of smooth plaster.

Bethlehem steel frame is composed of star columns, made up of four steel angles spaced two inches apart. Beams are built-up tubes of steel plates with continuous bar separators.

*Architects:* Davis, Brody & Wisniewski.
*Structural Engineers:* Wiesenfeld & Leon.
*General Contractor:* Max Drill, Inc.
*Fabricator and Erector:* Interstate Iron Works.

# A Motor Hotel in Massachusetts

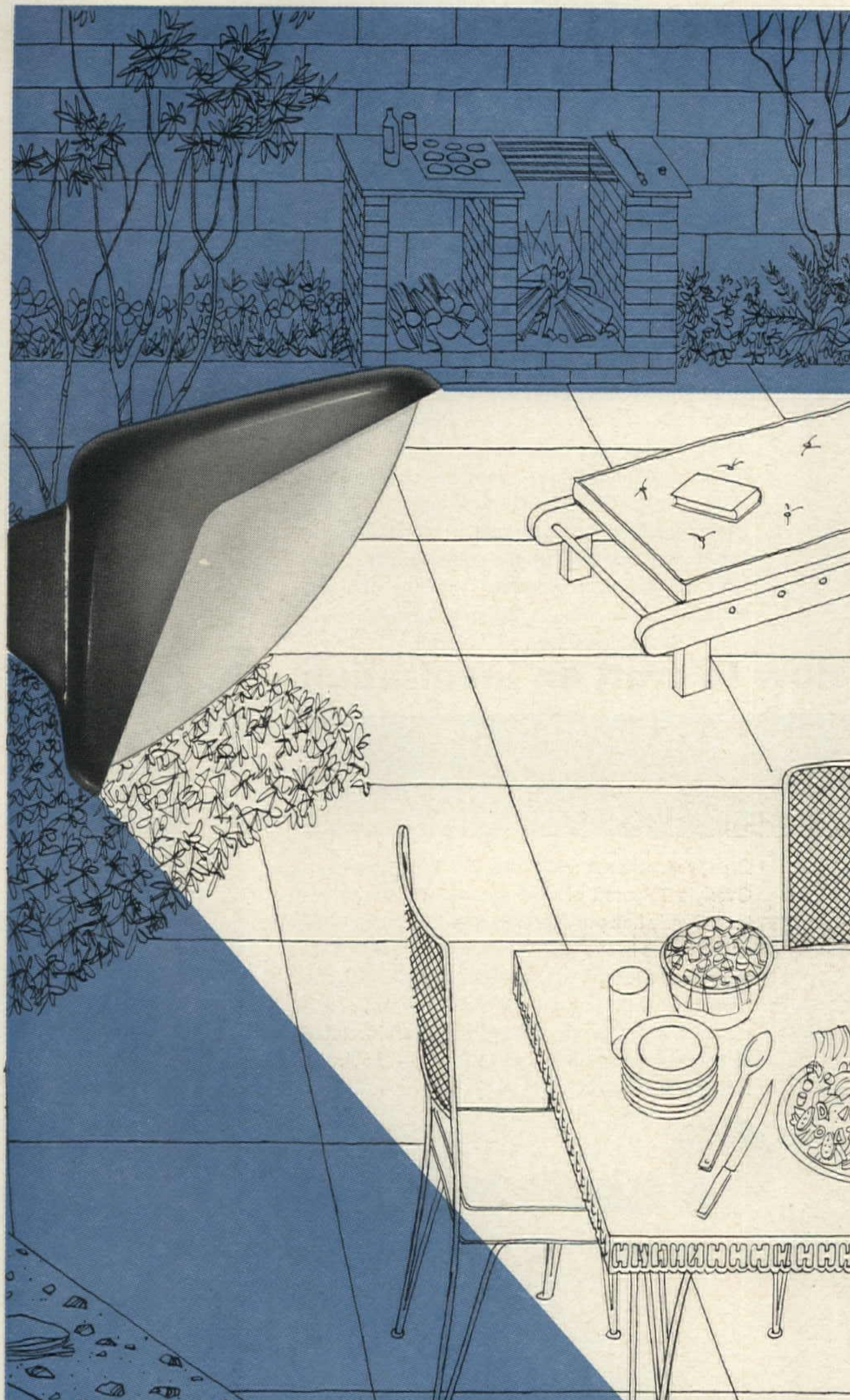
*by Bedar & Alpers*



*Architects:* Bedar & Alpers.
*General Contractor:* Oxford Construction Corp.
*Steel Fabricator:* Antonelli Iron Works, Inc.
*Steel Erector:* Daniel Marr & Son Co.

Dolphin Motor Hotel, Quincy, Mass. This 120-ton steel tent frames a restaurant, cocktail lounge, and three multi-purpose rooms. It took just 3½ days to erect the steel A-frame, which is 37 ft high, 125 ft long, and 142 ft wide. Bethlehem supplied all the structural steel used in this and the second phase of the 104-unit motel's construction.

BETHLEHEM STEEL

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Throughout the centuries of Christendom, the church spire and the cross have served as an inspiration and an invitation to worship. Modern forms of architectural design, however, invite religious symbolism to adopt new shapes and still retain its traditional spiritual meaning. Overly has pioneered new fabrication techniques for spires and crosses, artfully combining the symbolic "welcome to worship" with the church's architecture—in effect, crafting an inspiration.

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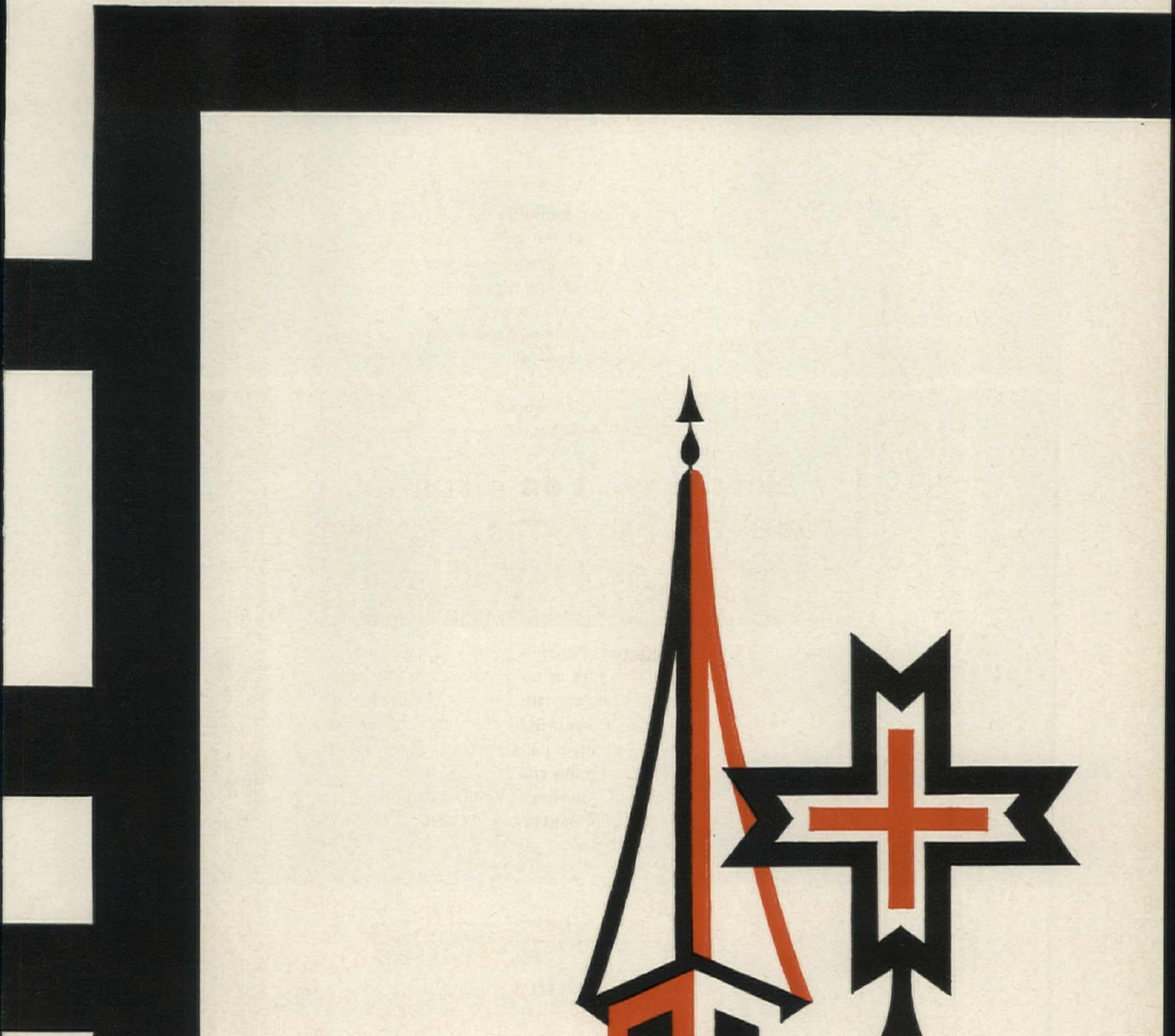
For complete references on Christian symbolism, send for the 36-page booklet, "The Cross, A Symbol of Faith," and a 28-page brochure on spires, "Pointing to God."



WESLEYAN UNIVERSITY SCHOOL SERVICES AND PUBLICATIONS BUILDING, MIDDLETOWN, CONN. ARCHITECTS: WARNER, BURNES, TOAN, LUNDE AND BROWN, LAWFORD & FORBES, ASSOCIATED ARCHITECTS.

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# ARCHITECTS IN THE NEWS: FELLOWSHIP, AWARDS GIVEN

**Robert Keith Adams,** 28-year-old graduate student in architecture at the Illinois Institute of Technology, has been presented the Third Annual Material Service Foundation Fellowship, sponsored by Material Service Division of General Dynamics Corp., Chicago. The $2,500 scholarship award was based on high scholastic achievements, excellence of character and Mr. Adams' proposed plan of research in the development of a prestressed precast concrete building of long span and constructed of modular elements.

**Armistead Fitzhugh,** site planning landscape architect, Jamaica, N.Y., has been awarded a citation for "outstanding performance," a Superior Service Certificate and a cash award of $300 by the New York Regional Office of the Public Housing Administration. The awards recognize Mr. Fitzhugh's contributions both to esthetics and economy in low cost housing projects.

**Frank Hope** of San Diego and **Charles Luckman** of Los Angeles have received the Distinguished Service Citation of the California Council, The American Institute of Architects, at the 17th annual convention of the California Council, A.I.A. held early last month in Monterey. Also receiving the citation, which recognizes outstanding service to the architectural profession in the state, was **John Hirten,** San Francisco, executive director of SPUR, San Francisco planning and urban renewal association.

**Thomas W. Williamson,** 74, senior partner with Williamson, Loebsack and Associates, Architects, Topeka, Kans., recently observed an anniversary marking 50 years in the private practice of architecture.

President and still fully active in the operation and management of his firm, Mr. Williamson first opened his own firm, then known as Thos. W. Williamson and Company, Architects, in April, 1912. The firm has designed hundreds of schools through the years in Kansas and other midwest states, and in Topeka alone, 31 schools, 12 churches, 31 office buildings, some 20 other various buildings plus many residences.

**John Noble Richards,** F.A.I.A., of Richards, Bauer & Moorhead, Toledo, was general chairman on the Toledo Committee which made arrangements for the 1962 Amateur Wrestling World's Championships held in Toledo (celebrating its 125th birthday) in late June. This was the first time the championships were held in the Western Hemisphere.

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# demountable classroom

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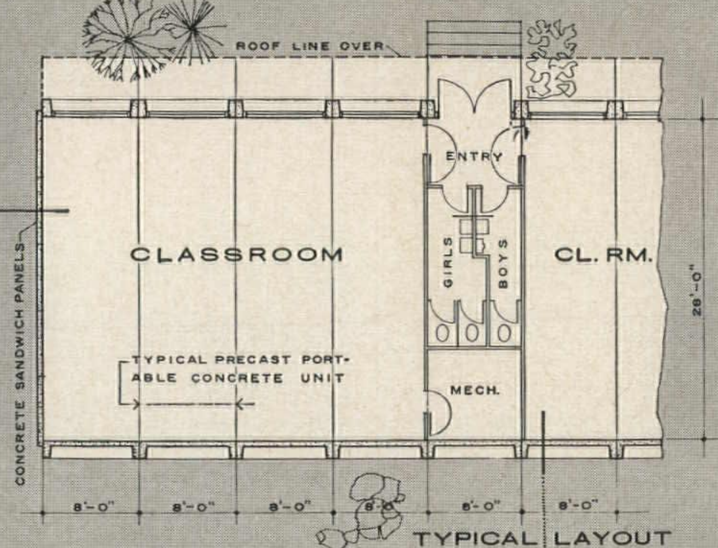
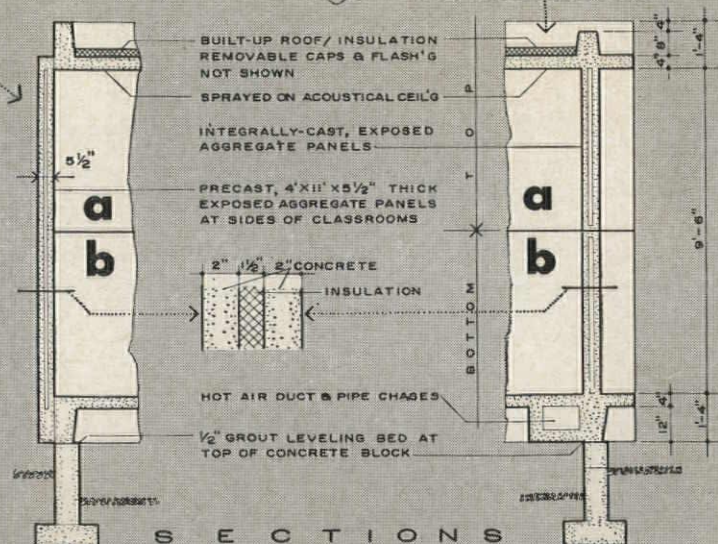
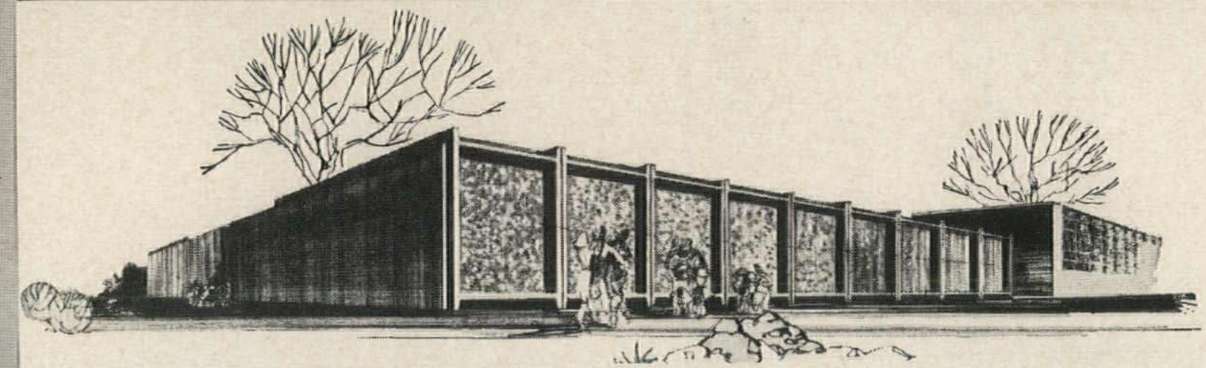
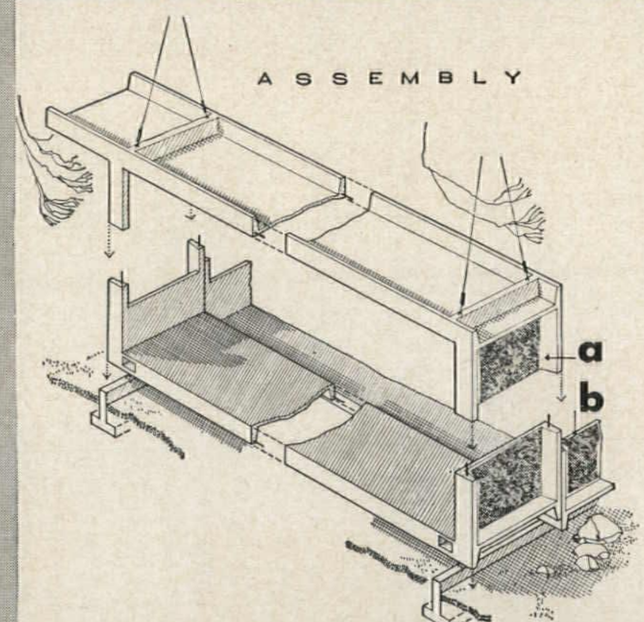


*Pittsburgh Architects: John Pekruhn, A.I.A., Deeter and Ritchey, A.I.A., and Lawrence & Anthony Wolfe, A.I.A. Consulting Structural Engineer: R. A. Zern, Pittsburgh*




**Entire classrooms precast in concrete** make up the new addition to the Homewood Elementary School, Pittsburgh, Pa. The design brings beauty, extra utility and easy upkeep to what is usually a "temporary" type of construction. Moreover, a degree of portability is achieved which allows future transportation to another site at very nominal cost.

The concrete segments—each 8′ wide by 28′ long—include a roof or floor section combined with half of each side wall. The precast units were designed for mass production and contain all the essentials of classroom planning. Air ducts, concealed conduits and pipe chases provide a finished room without unsightly exposed utilities.

Oriented to enclosed, planted playgrounds, the structure is completed by a street facade of integrally cast exposed aggregate panels that enhance aesthetic values . . . keep out dust and noise . . . discourage vandalism.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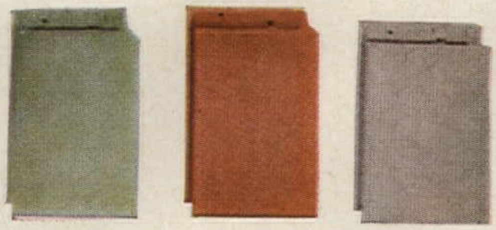
*A national organization to improve and extend the uses of concrete*



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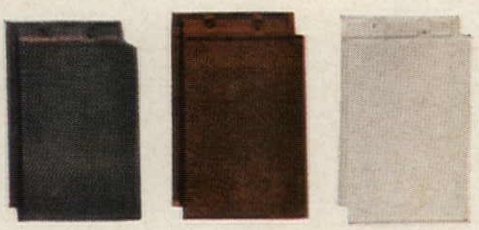
WEATHERED GREEN | SMOOTH BUFF | WEATHERED RED



WEATHERED BLACK | WEATHERED BROWN | SMOOTH WHITE

BLUE GLAZE ON DESIGNER PATTERN | YELLOW GLAZE ON SPANISH PATTERN | GREEN GLAZE ON DESIGNER PATTERN

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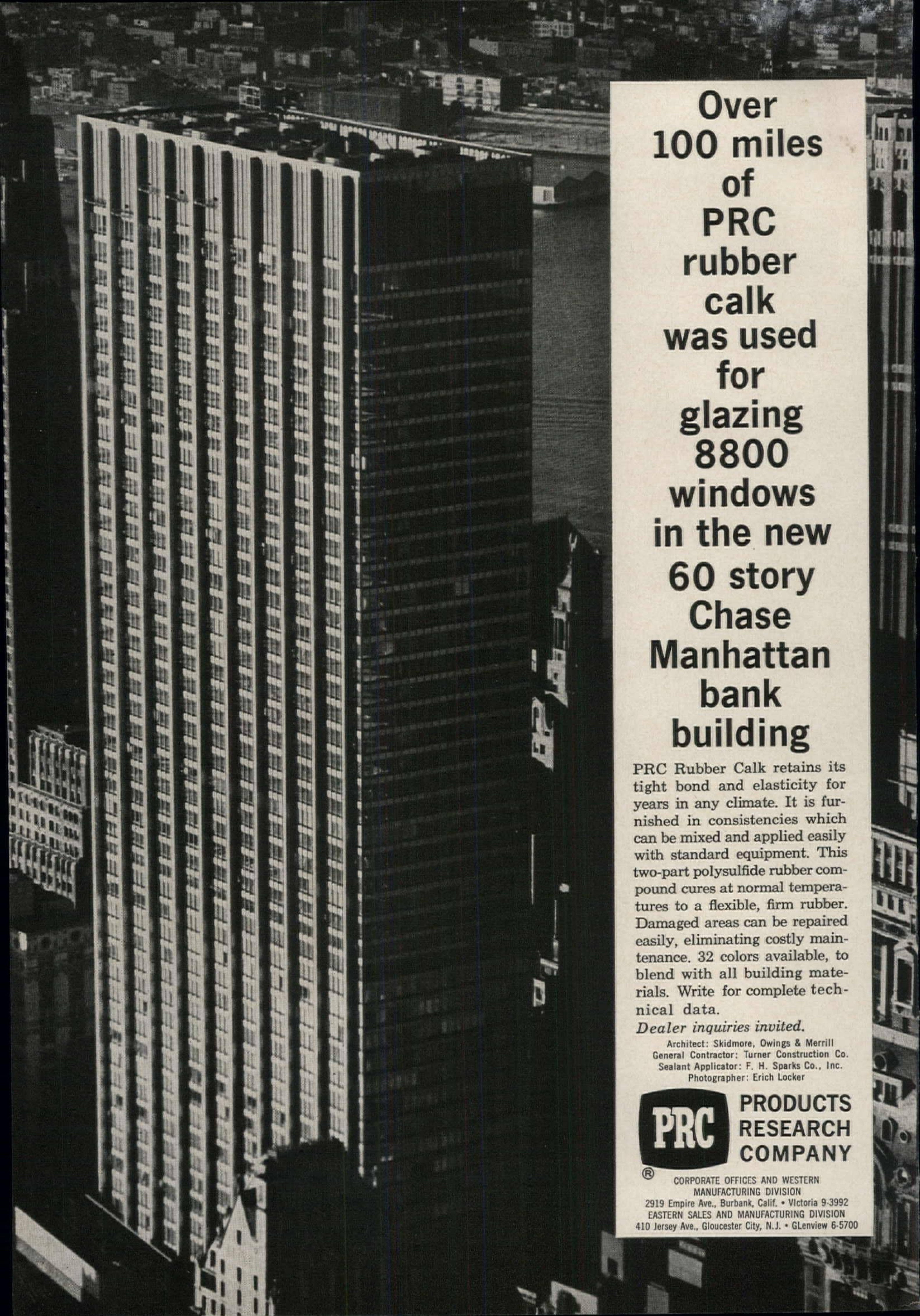
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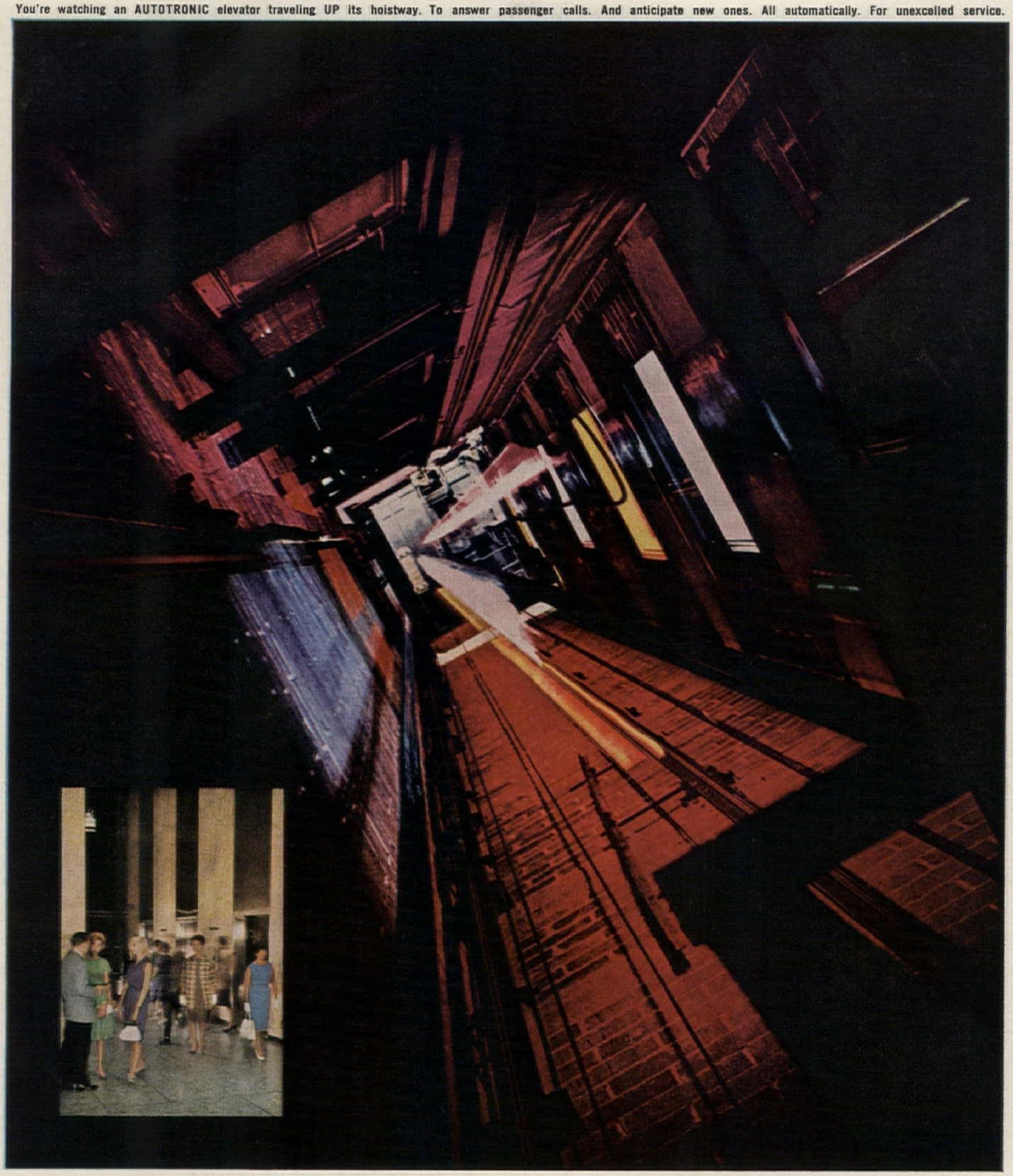

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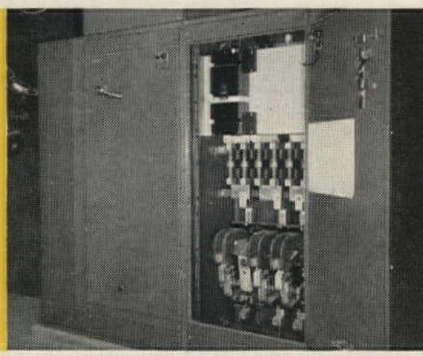
## electricity is distributed and controlled

# WORLD'S TALLEST MARBLE SKYSCRAPER

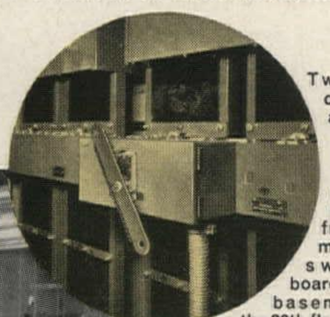
• Towering 41 stories over the Loop, this newest addition to the Chicago skyline is the highest marble office building ever built. 16 high-speed, self-operated elevators; high-intensity lighting; year 'round air conditioning—these are among the modern features that make the UNITED OF AMERICA BUILDING a model of comfort and convenience for tenants. Its location at State Street and Wacker Drive gives easy access to subways, elevateds and buses, and makes this impressive structure a focal point of Chicago's central business district.

***Square D electrical distribution and control equipment is on duty throughout this new building.***

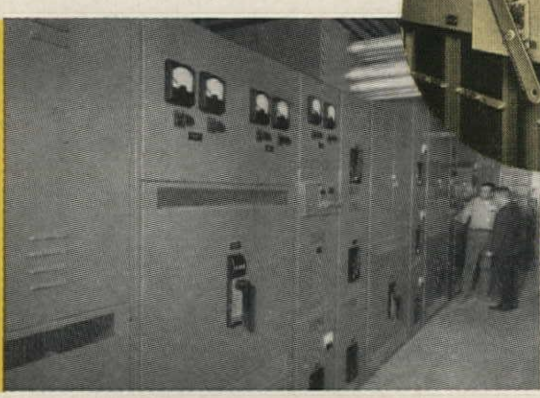
This motor control center, one of many supplied by Square D, contains Size 1 through Size 5 combination starters for control of exhaust fans, boiler feed pumps and condenser pumps. Ronald Martinec, Estimating Engineer for the electrical contractor, inspects this installation with Bob Kunz, Square D Field Engineer.



NEMA Size 6 starters, built by Square D's EC&M Division, control the motors and pumps which circulate chilled water through the air-conditioning system.



Two runs of 4,000-ampere Square D feeder duct carry power from the main switchboard in the basement to the 39th floor. Tap-offs on each floor feed Square D panelboards for lighting and other needs.



George Allroth, Job Superintendent, and Square D Field Engineer Bob Kunz inspect the main switchboard which distributes the 20,000-ampere service throughout the building.

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### A *Complete* LINE OF ELECTRICAL DISTRIBUTION AND CONTROL EQUIPMENT

ADJUSTABLE SPEED DRIVES
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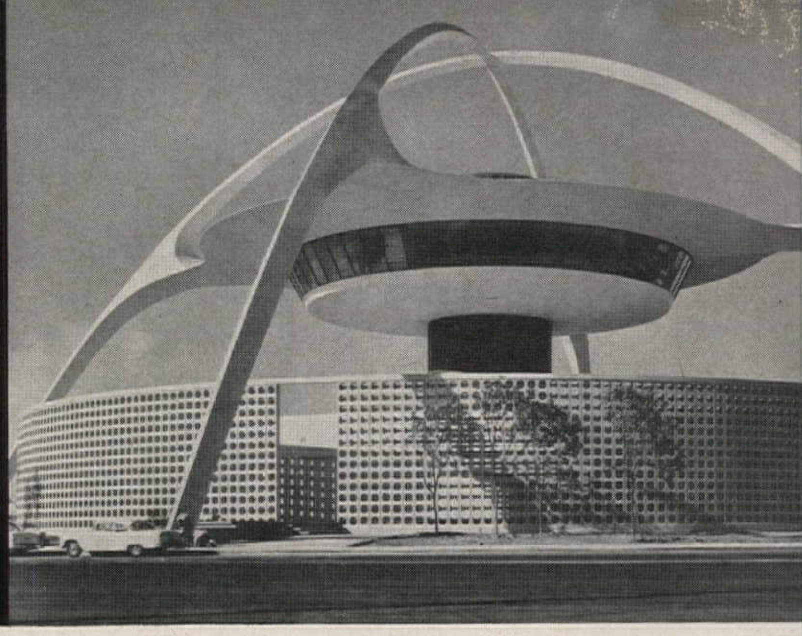
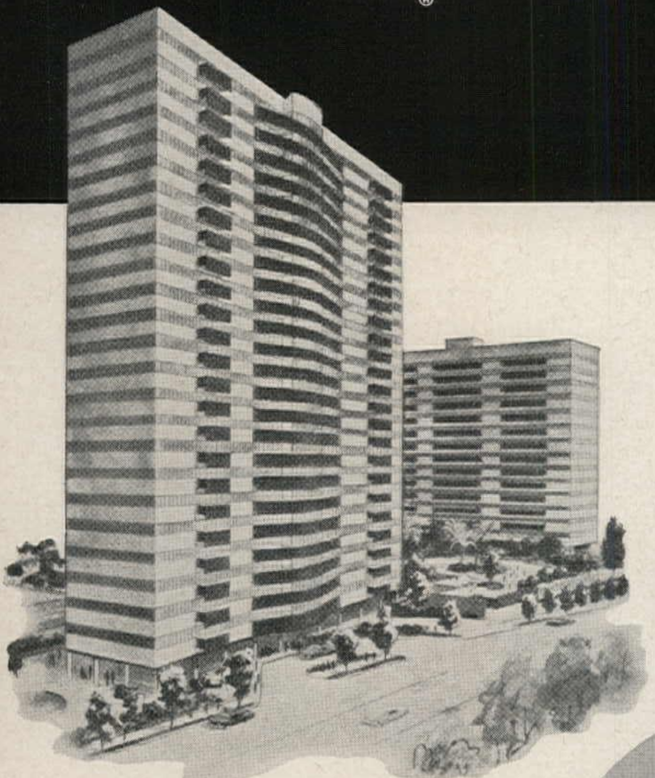
*the silent drapery track*®



*SILENT GLISS . . . the drapery track selected for the elegantly modern Los Angeles International Airport Restaurant.*



*Here you see Barrington Plaza, Los Angeles, developed and owned by Louis Lesser Enterprises, Inc., and consisting of 712 luxury apartments in which almost 5 miles of Silent Gliss track is used.*

## New choice of the discriminating professional for prestige installations

Whatever the job . . . if it calls for drapery track, you owe it to yourself to get the facts on SILENT GLISS. This revolutionary new product development sets entirely new standards of track performance, construction and styling. All anodized aluminum with nylon fittings throughout, with the first *tensionless* cording system, it is virtually maintenance-free . . . and the smoothest, quietest track yet known. A complete range of track styles is available for every application, including both recessed and surface mounted models, cord traversing or hand drawn. Find out for yourself why SILENT GLISS is causing so much excitement; write for full information today.

*As specified by Arthur Swanson, AIA, for the Motelrama Idea Room, 1962*

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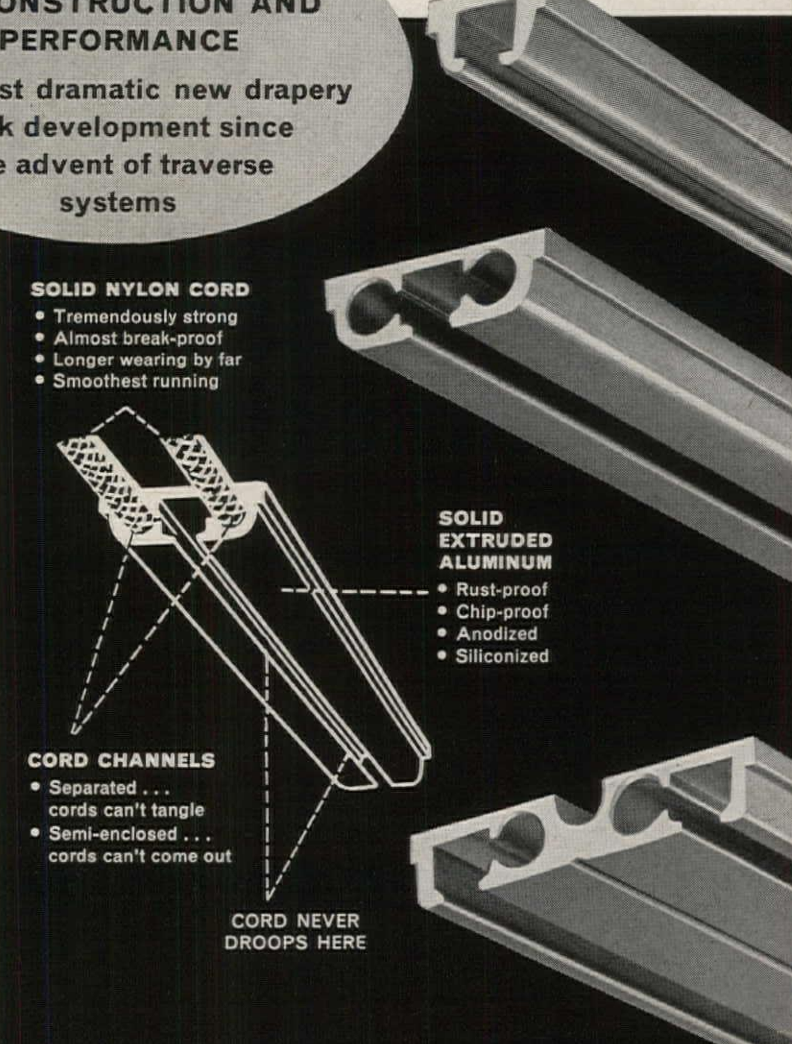
**The most dramatic new drapery track development since the advent of traverse systems**





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*This catalog gives you the facts on Silent Gliss models, construction, installation. A request on your letterhead will bring it promptly. Write today: attention Dept.* **AR-11.**

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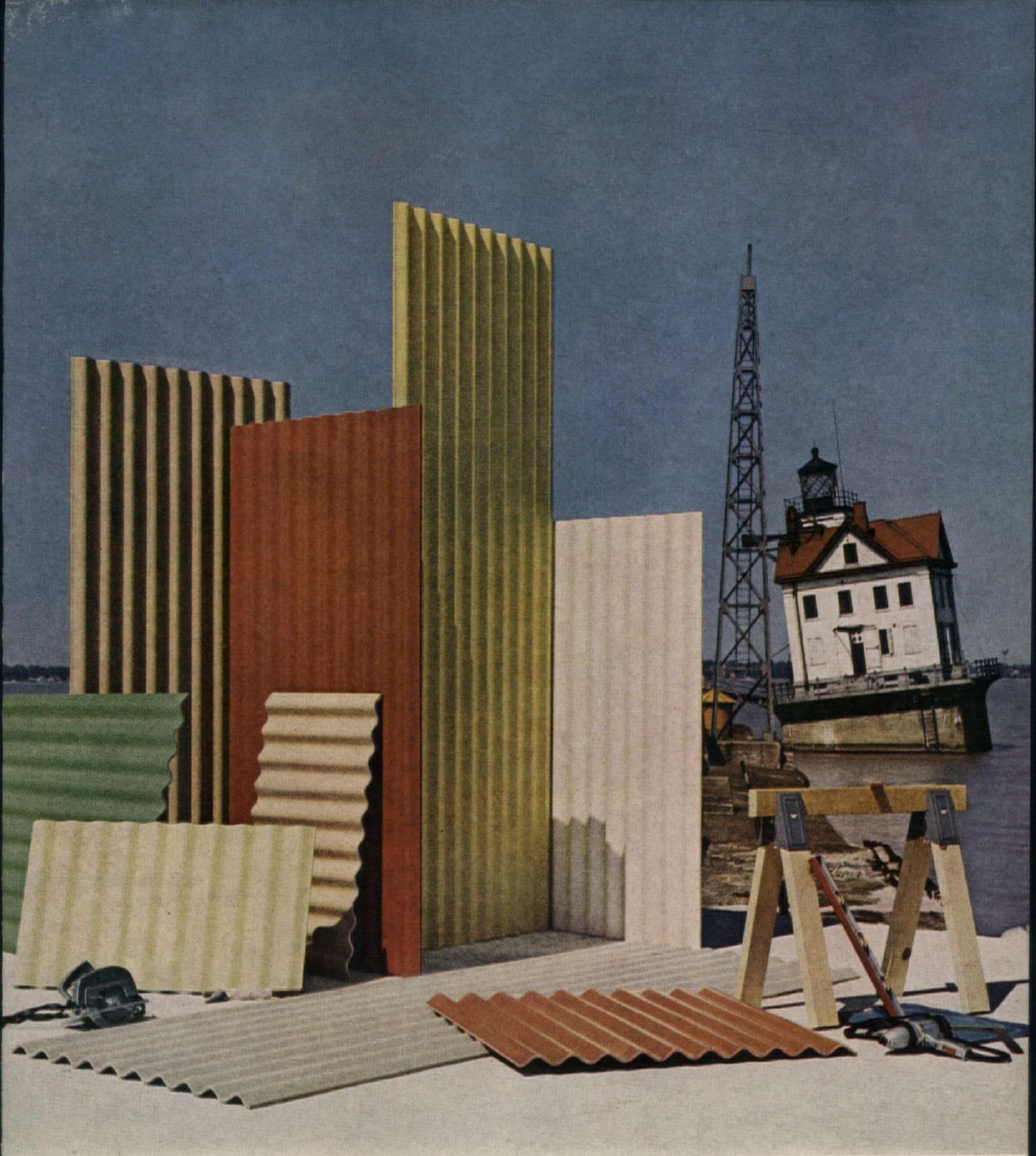

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**New Gold Bond Corrugated "400" costs much less than comparable competitive materials.** Yet it carries a 10-year written guarantee against peeling, blistering or crazing.

"400" is the first corrugated asbestos-cement product with a durable predecorated finish. The Plasti-Clad finish is a heavy polyvinyl chloride coating that gives maximum resistance to weathering. It is virtually inert, so airborne dust, acid and alkaline fumes will not affect the appearance. And the glossy, pebbled surface is impervious to water, so it tends to be self cleansing... resists dirt accumulation.

The integrity of Plasti-Clad is assured through the use of an epoxy primer which permanently bonds the plastic surface to the asbestos-cement base. What's more, Plasti-Clad is oven baked to harden and cure it. Do you know of any similar prefinished siding or roofing products so reliable and so fully guaranteed?

Six tasteful colors are now available; Dawn Gray, Fawn, Green, White, Goldenrod and Tile Red. For technical information and samples, call your Gold Bond® Representative, or write to Dept. AR-112, National Gypsum Company, Buffalo 13, N. Y.

Gold Bond
CORRUGATED 400

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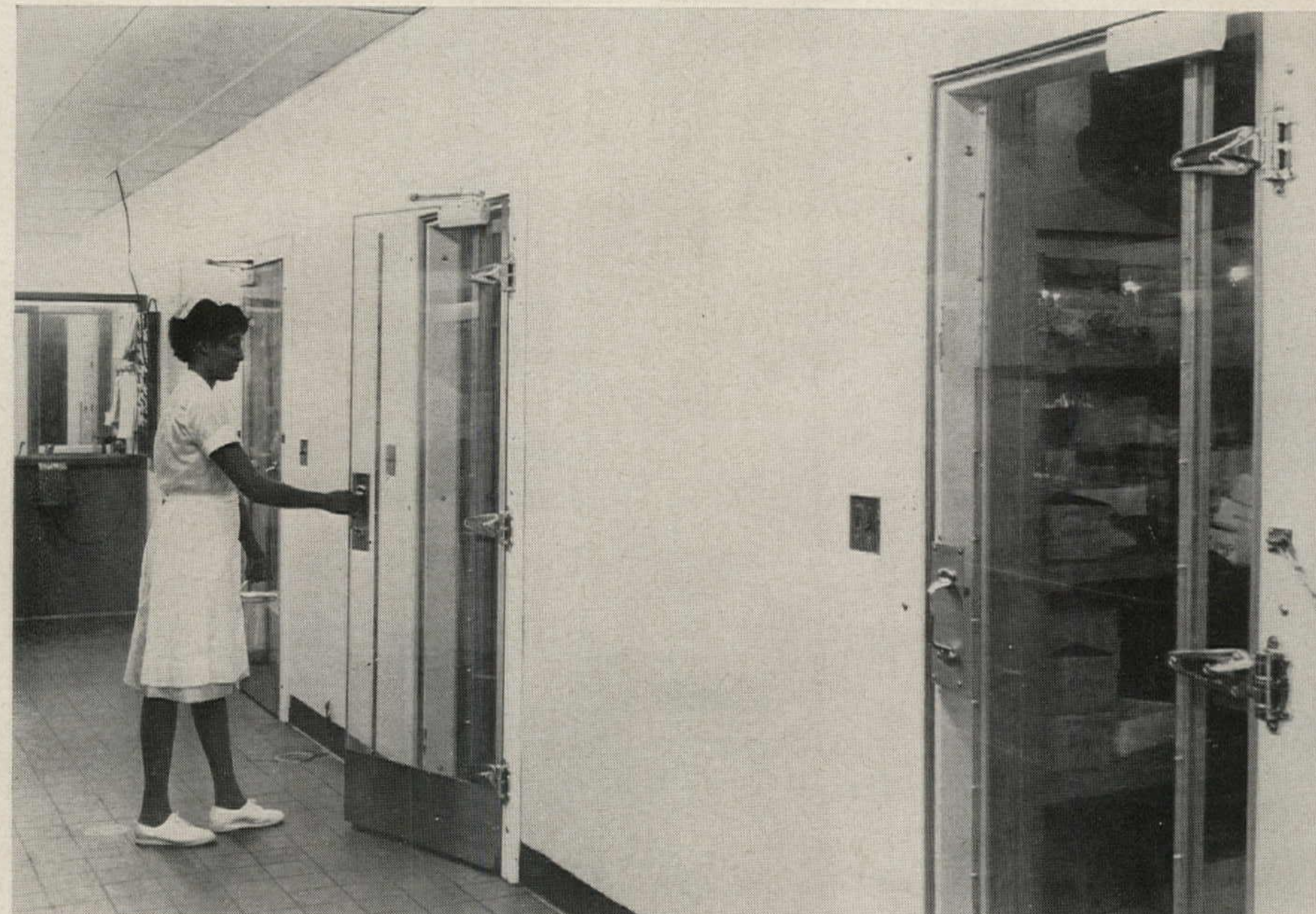
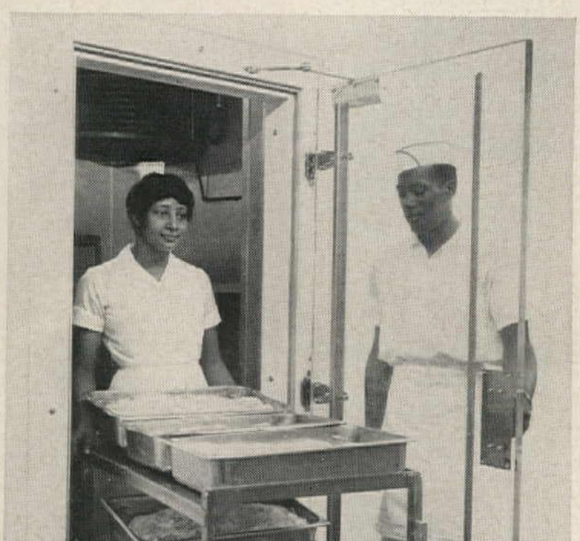
# Jamison See-Thru Acrylic Plastic Doors add efficiency and convenience in large motor hotel kitchens



TRANSPARENT Jamison See-Thru acrylic cold storage doors installed in large kitchens of Marriott Motor Hotel provide easy access to cooler rooms.



See-Thru acrylic cold storage doors are sturdy, rigid doors which provide attractive, sanitary appearance.

The need for rapid access, supervision of personnel and maintenance of sanitation in the busy kitchens of the new Marriott Motor Hotel in Philadelphia made desirable the use of five Jamison See-Thru acrylic plastic cold storage doors. Jamison See-Thru doors can be opened as easily as insulated doors and give the additional advantages of improved employee supervision, convenience in identifying stored materials, elimination of accidental lock-in. The See-Thru door is just one of many Jamison doors developed to help cut costs and save time in the food service industry. For additional information write to Jamison Cold Storage Door Company, Hagerstown, Maryland.

**JAMISON**

COLD STORAGE DOORS

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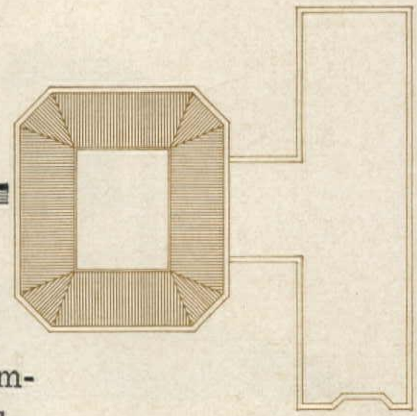
## MAGIC UNDER THE ROOF

# AND IN IT



In his Arena Stage, as one critic commented, Harry Weese "has produced a handsome structure, both simple and spare, creating an ambiance which suggests . . . that magic is made, after all, in a working place." We wholeheartedly agree, and are indeed proud that this distinguished architect should have chosen terne roofing for so notably distinguished a building, merely adding (however diffidently) our not unselfish belief that there is also some slight element of magic in a material which can provide so much—form, color, function—at such relatively modest cost. Whether architect or prospective builder, we will be very happy to send you detailed information on Terne.

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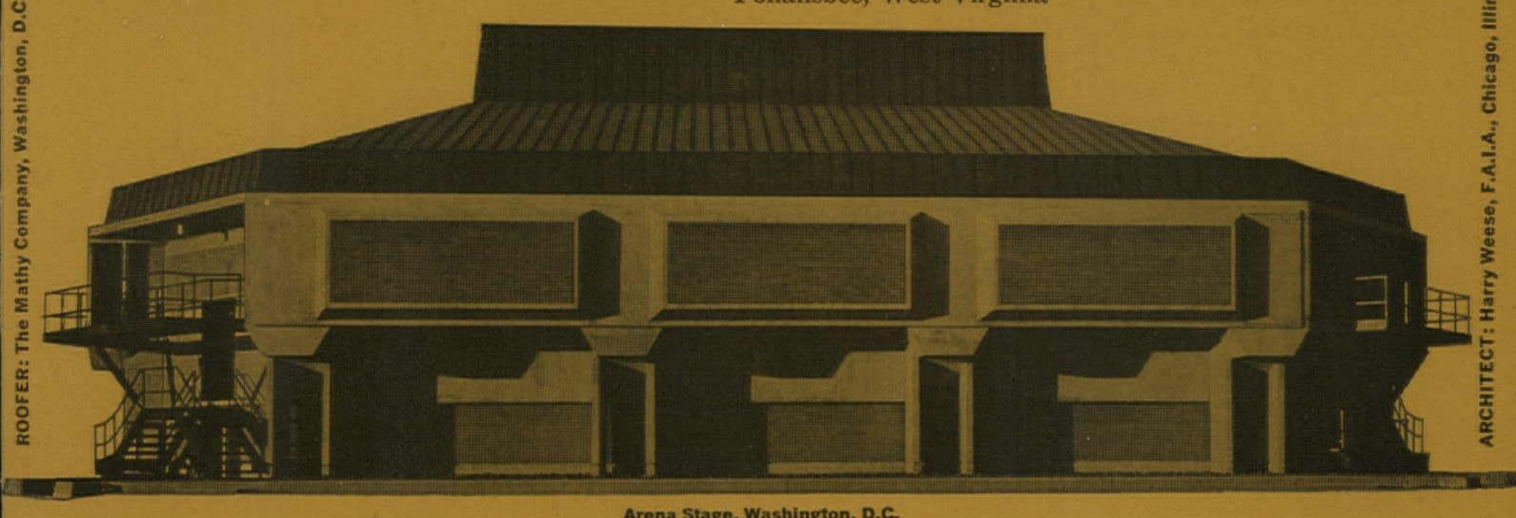
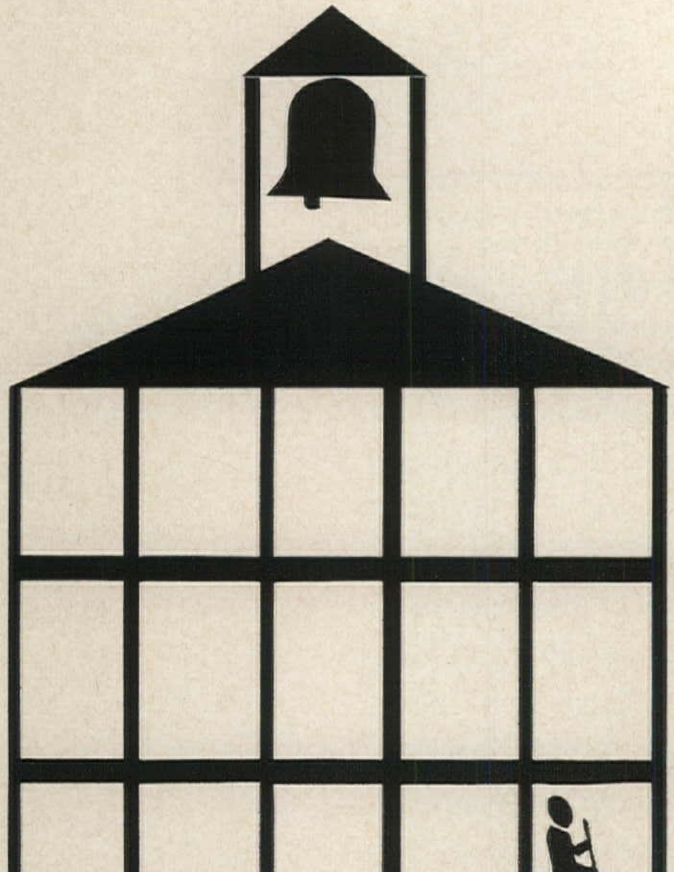
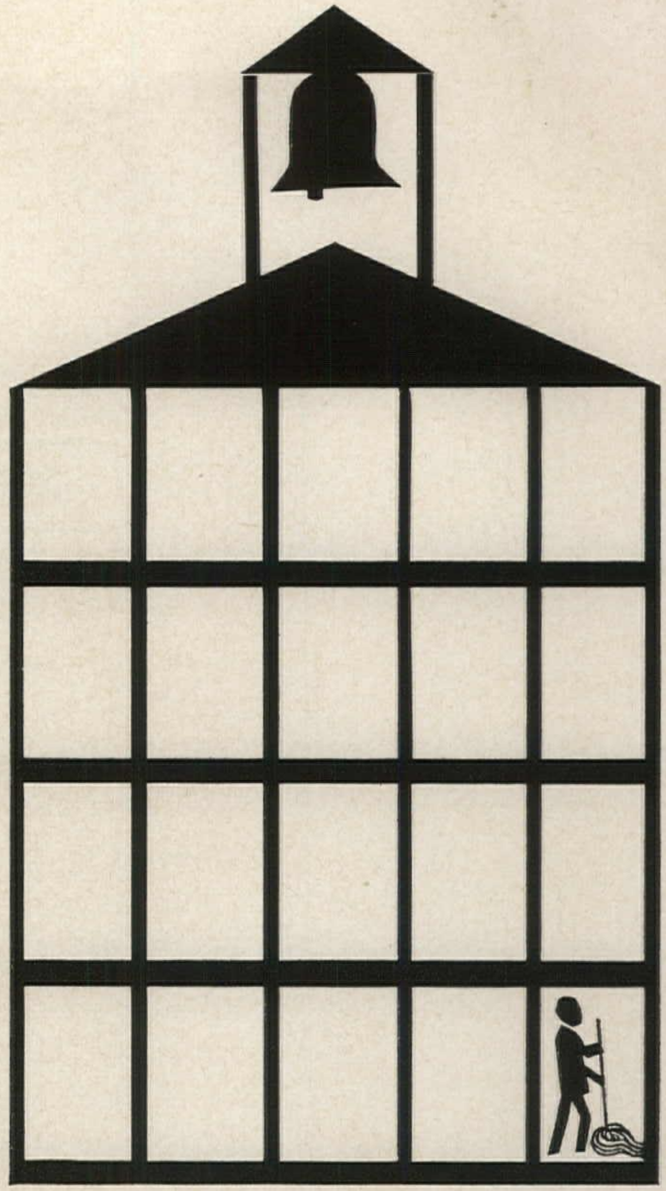


ARCHITECT: Harry Weese, F.A.I.A., Chicago, Illinois

**Arena Stage, Washington, D.C.**

*Follansbee is the world's pioneer producer of seamless terne roofing*





## 1 man cleans only 15 classrooms

### with composition floors

## The same man cleans 20 classrooms

### with Terrazzo floors*

And there's more to be saved than manpower alone. Take the case of the Henrico County, Virginia Schools. This 688-classroom system saves $37,165 per year on manpower plus materials for floor cleaning and maintenance (repairs and replacement are not included). *These figures are the result of a study completed by the Henrico County school system. After a close hard look at initial dollars and ultimate costs, Mr. George H. Moody, superintendent of schools, decided to use Monolithic Terrazzo floors throughout all 14 campus-planned schools. That's approximately 834,000 square feet of beautiful, durable, ageless Terrazzo. At this rate, declares Mr. George Eitel, Director of Construction & Maintenance, the higher original installation cost of Terrazzo (30c per sq. ft. more than the next best floor) will be justified in just a few years. These savings are based on cleaning and routine maintenance only. County officials state that in 8 or 10 years, when asphalt tile would have to be replaced, savings with Terrazzo will be sharply increased.

**Henrico Study Proves $37,165 Savings in Manpower, Materials and Maintenance**

| | |
|---|---|
| Typical 30-classroom elementary school | |
| Asphalt tile—annual cost of cleaning and maintenance | $4,505.00 |
| Terrazzo—annual cost of cleaning and maintenance | 2,880.00 |
| Annual savings with Terrazzo: | $1,625.00 per school or 54.16 per classroom |

Write for the "Ultimate Costs" study based on a 78-school survey by Clayford T. Grimm, P.E.:

# NATIONAL TERRAZZO & MOSAIC ASSOCIATION

Suite 503-A, 2000 K Street, N. W., Washington 6, D.C.

Free AIA kit upon request. Cataloged in Sweet's. Member, The Producers' Council, Inc.

*"Use Members of NTMA for Quality Terrazzo"*

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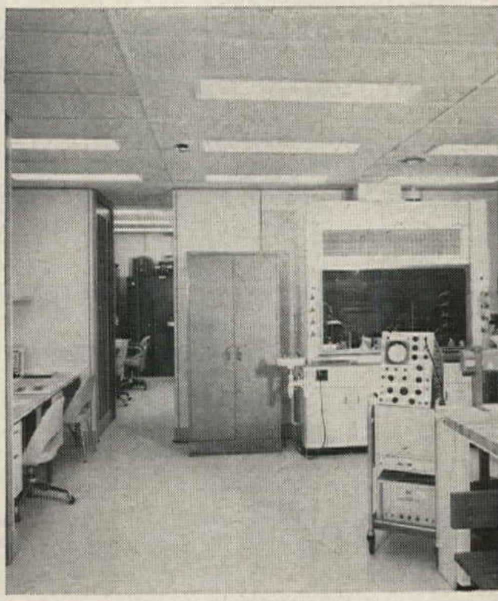
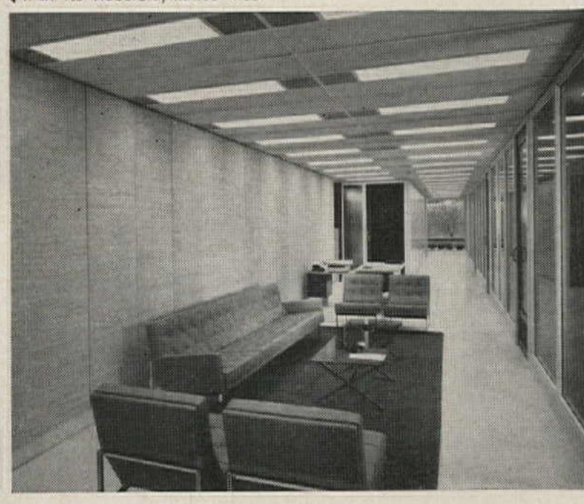


A typical laboratory in the Center with its Ruberoid/Matico floor

The Research Center, in a 240 acre setting, looks out on wooded rolling country-side.



The floor tile in corridors and offices is Ruberoid/Matico Vinyl Asbestos. Over 300,000 sq. feet were installed.


## *The resilient flooring in IBM's Thomas J. Watson Research Center at Yorktown, New York, is Ruberoid/Matico Vinyl Asbestos Floor Tile*

International Business Machines Corporation's Thomas J. Watson Research Center at Yorktown is one of the most advanced laboratories in the world for the study of computer science. Its design has evoked wide interest. The floor tile is beautiful practical Ruberoid/Matico Vinyl Asbestos. Have you seen the entire *new* line of Vinyl Asbestos by Ruberoid/Matico? For samples call your Ruberoid Architectural representative.

*Architect: Eero Saarinen Associates*
*General Contractor: William L. Crow Const. Co.*
*Flooring Contractor: Circle Floor Co.*

Through The Magic of Ruberoid Research

**RUBEROID MATICO**
*Vinyl Asbestos Floor Tile.*
The RUBEROID Co., 733 Third Avenue
New York 17, New York

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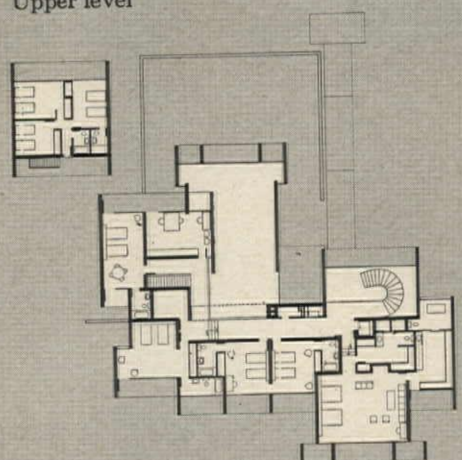
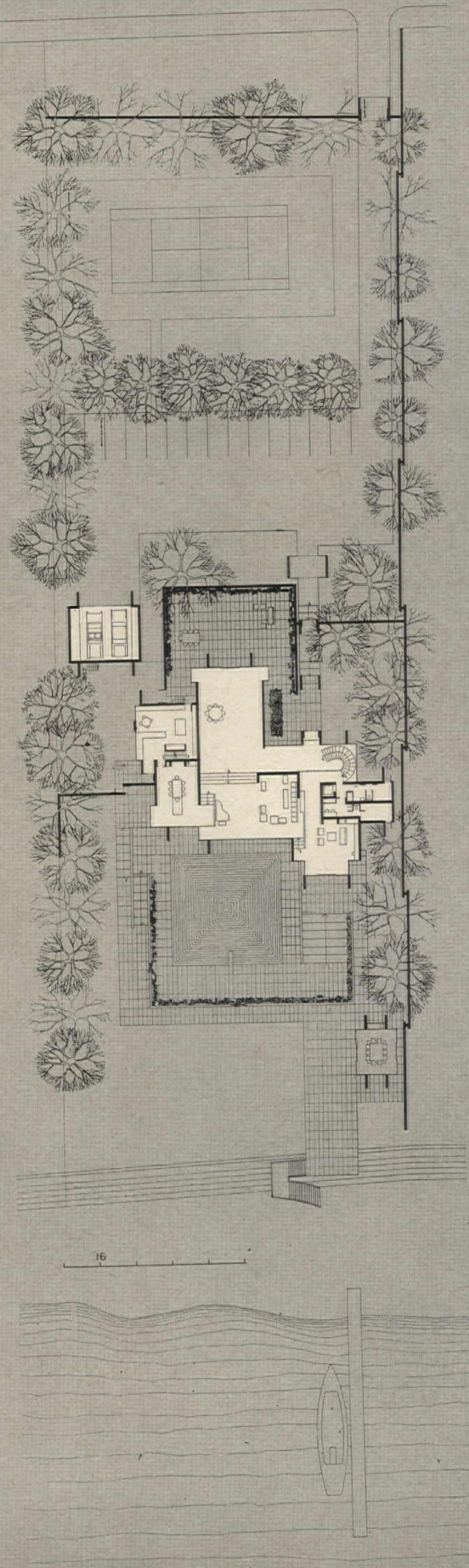
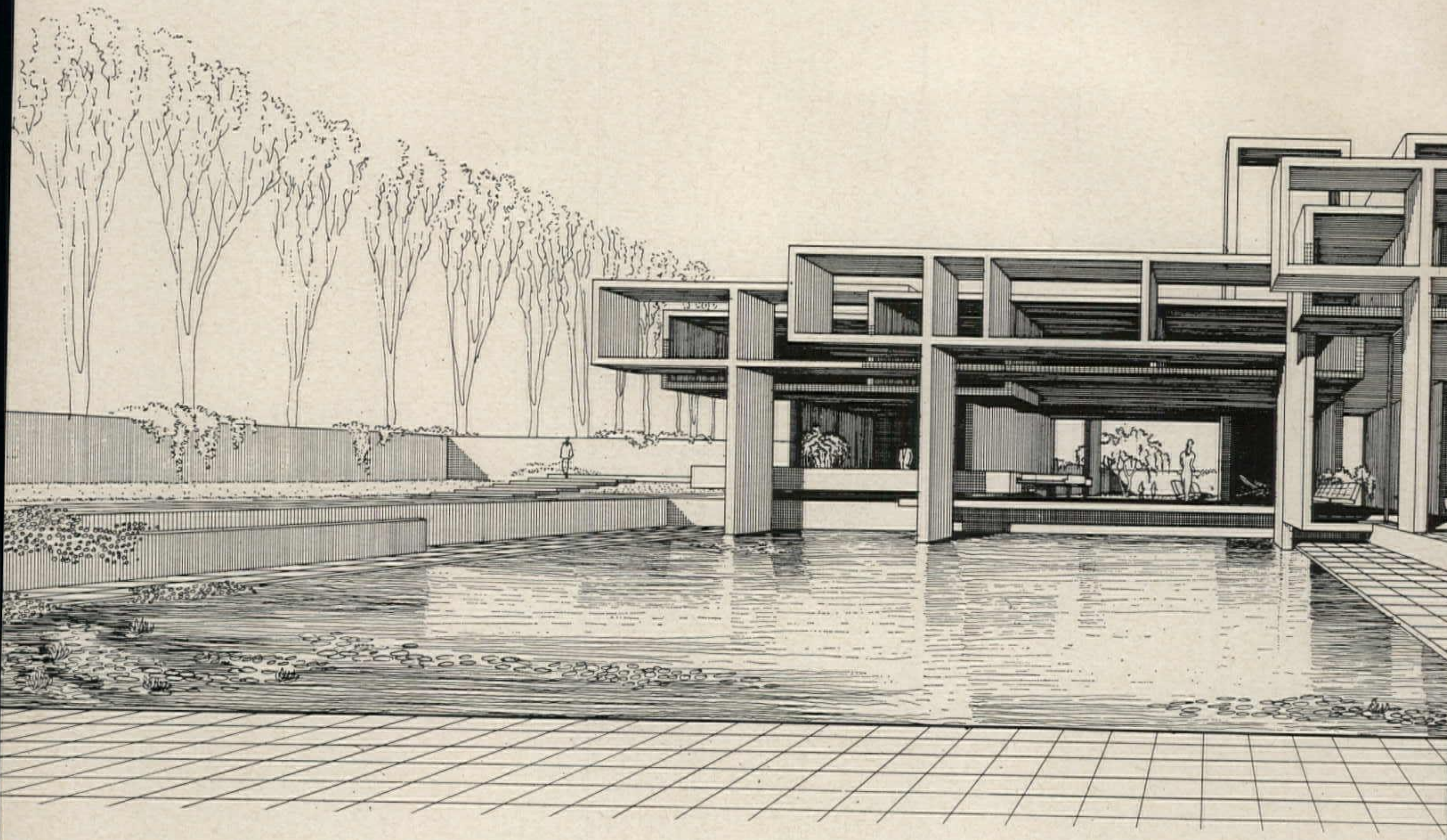
A house for Palm Beach
Upper level



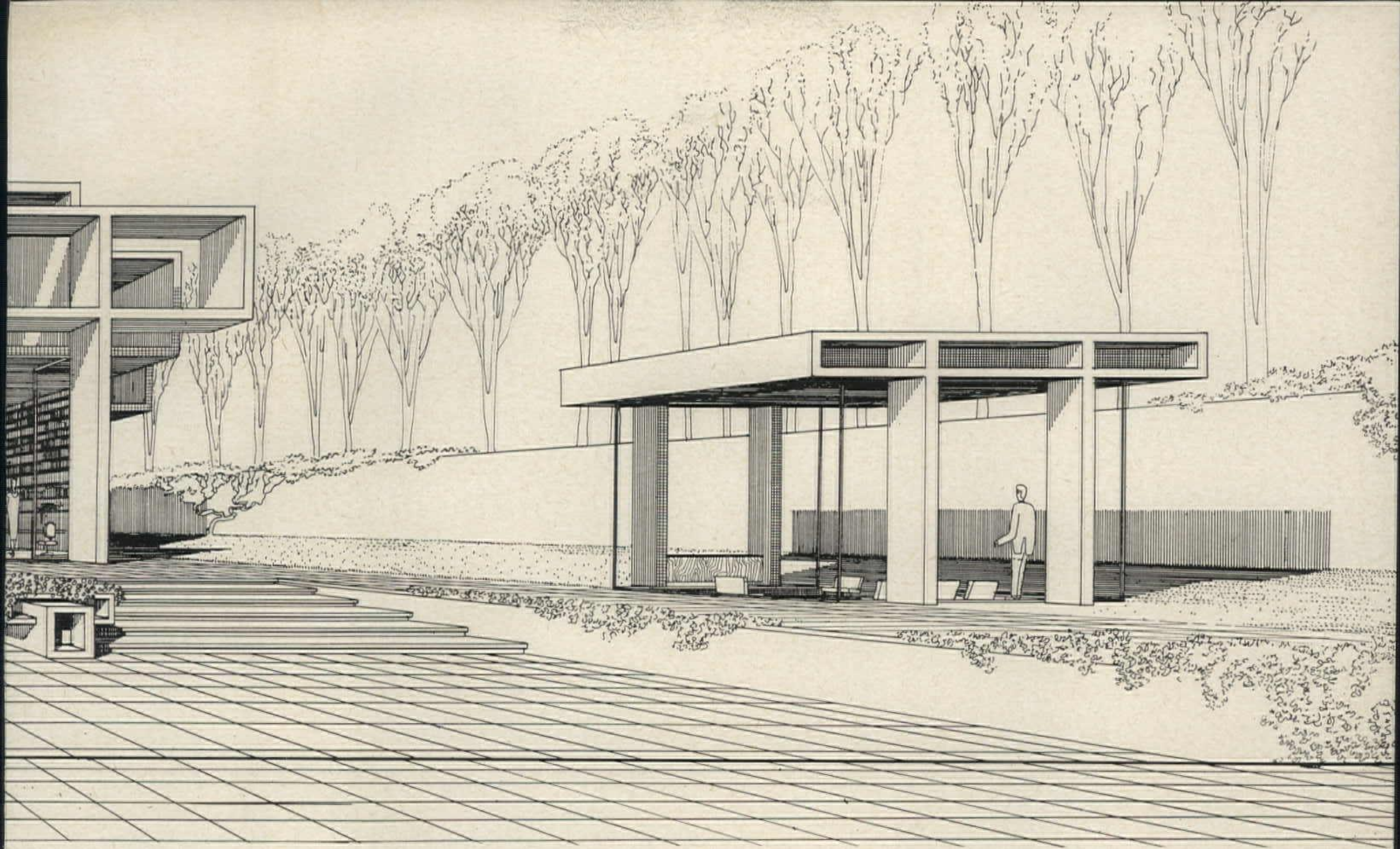



# SIX NEW HOUSES BY PAUL RUDOLPH

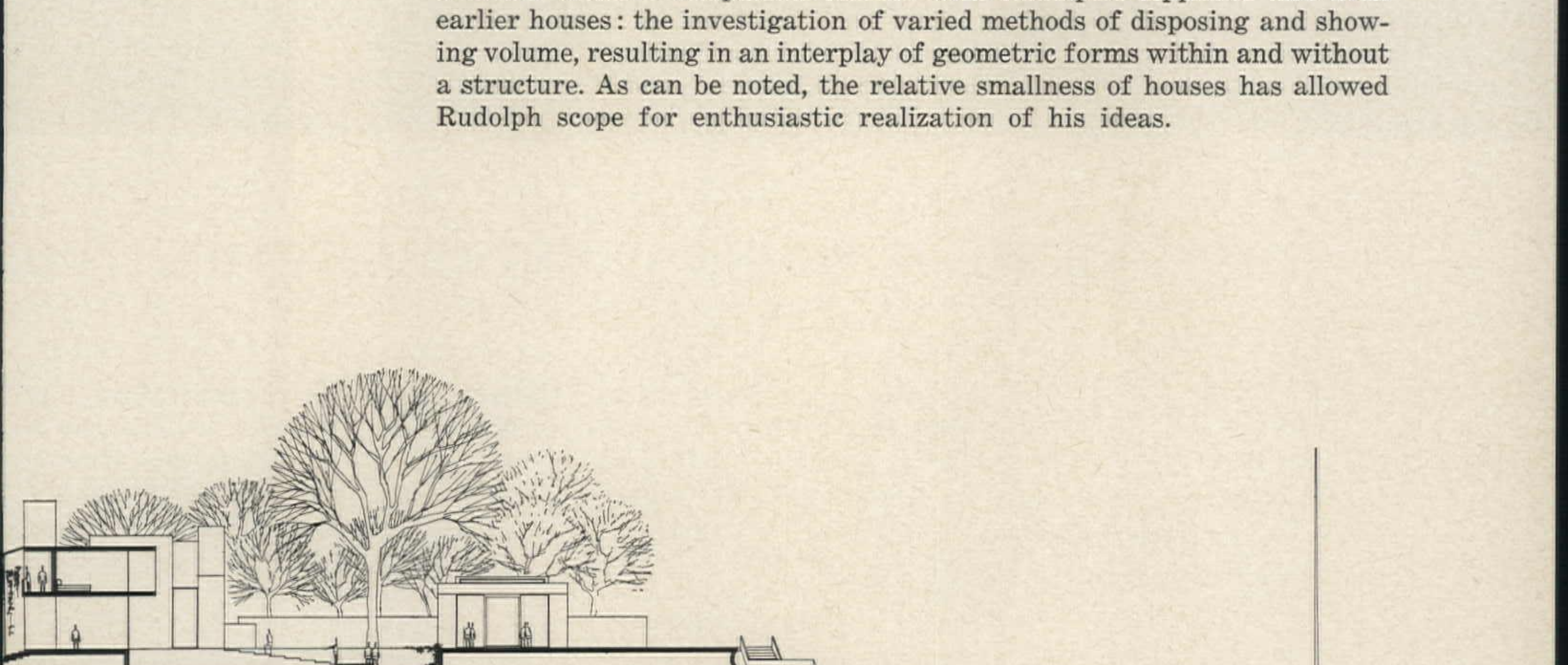


# BOLD GEOMETRY FOR A MANSION IN PALM BEACH

*Project for a residence,*
*Palm Beach, Florida*
ARCHITECT: *Paul Rudolph*
RENDERING: *Der Scutt*



This project is Rudolph's largest and most dramatic house to date. An elaborate variant of his completed Milam house (next page), it was planned for a very special and informally grand way of life in a still rather special community. A local "white with greenery" quality is echoed in continuous concrete surfaces and lush landscape. The design emphasizes the big rooms and volumes of the house, with great sculptural sunshades forming a counterpoint to the basic structure. The six houses shown in this portfolio have a strong underlying theme, however superficially different they may seem, a theme whose developments started with Rudolph's Applebee and even earlier houses: the investigation of varied methods of disposing and showing volume, resulting in an interplay of geometric forms within and without a structure. As can be noted, the relative smallness of houses has allowed Rudolph scope for enthusiastic realization of his ideas.



Joseph W. Molitor photos

# THE "HOUSE OF SEVEN LEVELS" IS COMPLETED

*The Arthur W. Milam House*
*St. John's County, Florida*

ARCHITECT: *Paul Rudolph*

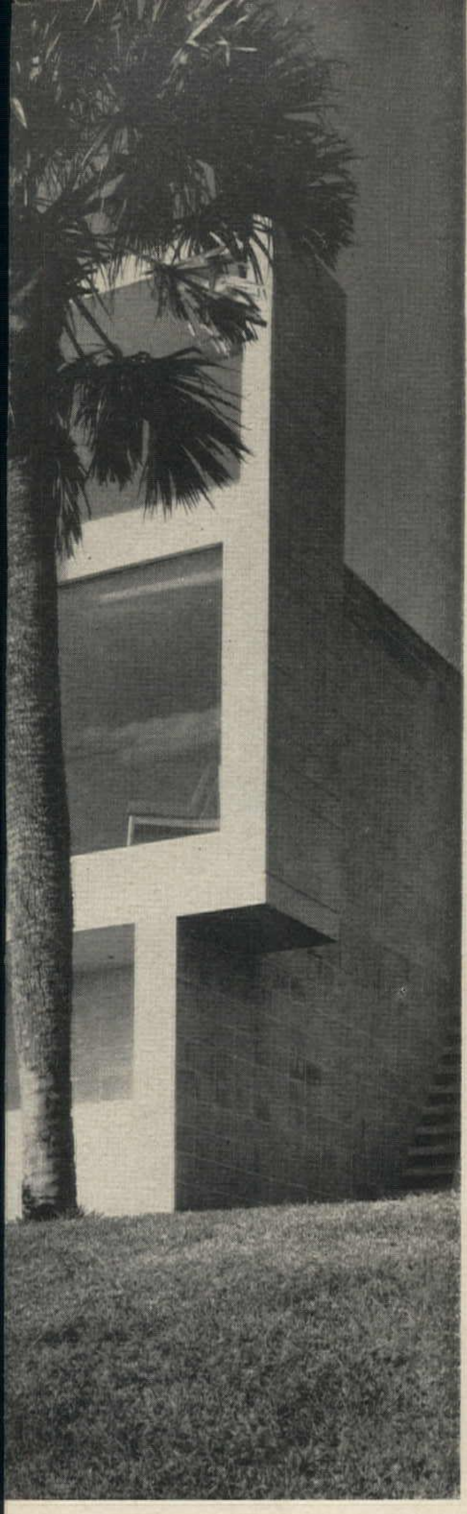
SUPERVISING ARCHITECT: *Robert Ernest*

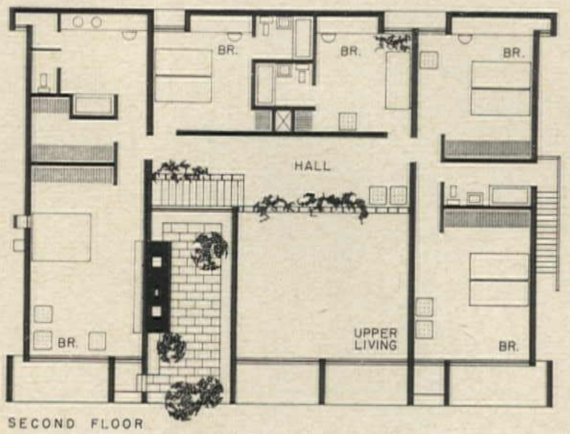
STRUCTURAL ENGINEER: *Herman D. J. Spiegel*

MECHANICAL ENGINEER: *Frank B. Wilder & Associates*

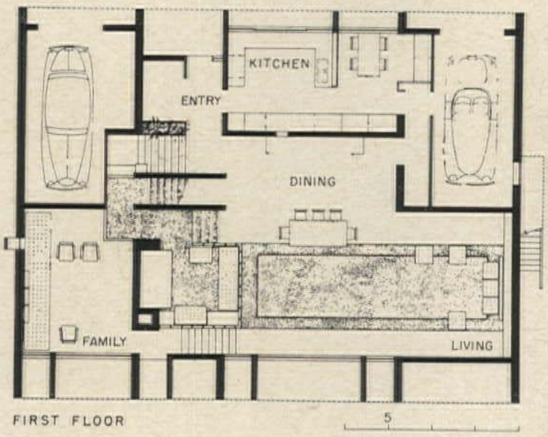
CONTRACTOR: *William E. Arnold Co.*

Amazingly faithful to its preliminary design (see ARCHITECTURAL RECORD, March 1961), Rudolph's much-discussed Milam house turns out to be a powerful distinctive, and according to the owners, a very successful structure. Besides expressing pleasure in its functional qualities, Mr. Milam states that the house "can, to a certain extent, dictate one's moods. Ill-humor, irascibility, gloom, little irritations, etc., never seem quite so long-lasting or so unbearable when, as here, the surroundings are so esthetically pleasing." The interiors certainly do have a spatially-varied and tranquil quality (note next page), with cube volumes defined and emphasized by the attenuated forms of the sun screen. The big-scale sculptural quality of the screen seems equally as valid (where, as here, privacy is not required) as popular more intricate ones.

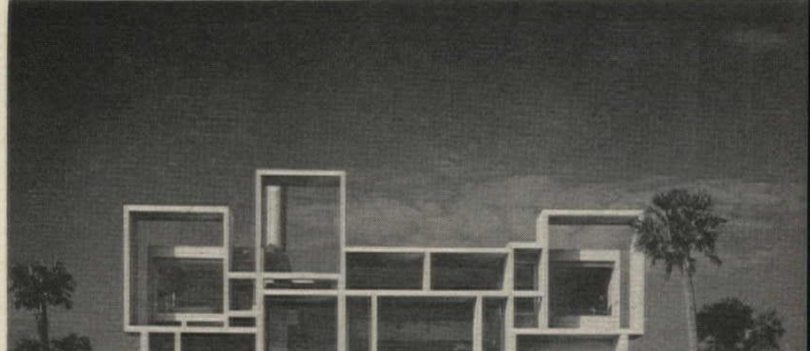




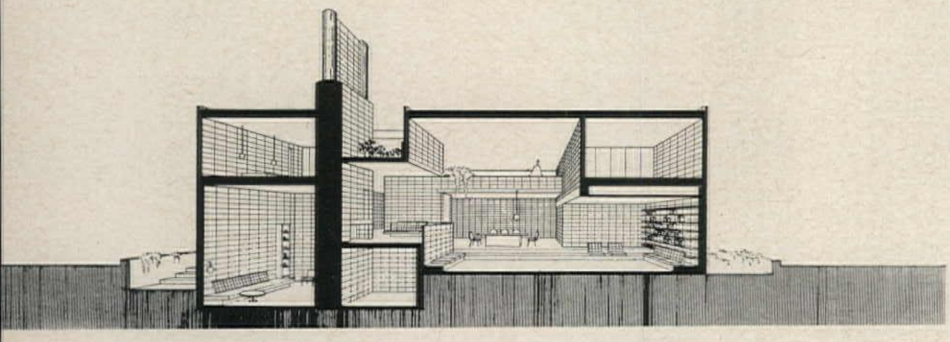

SECOND FLOOR

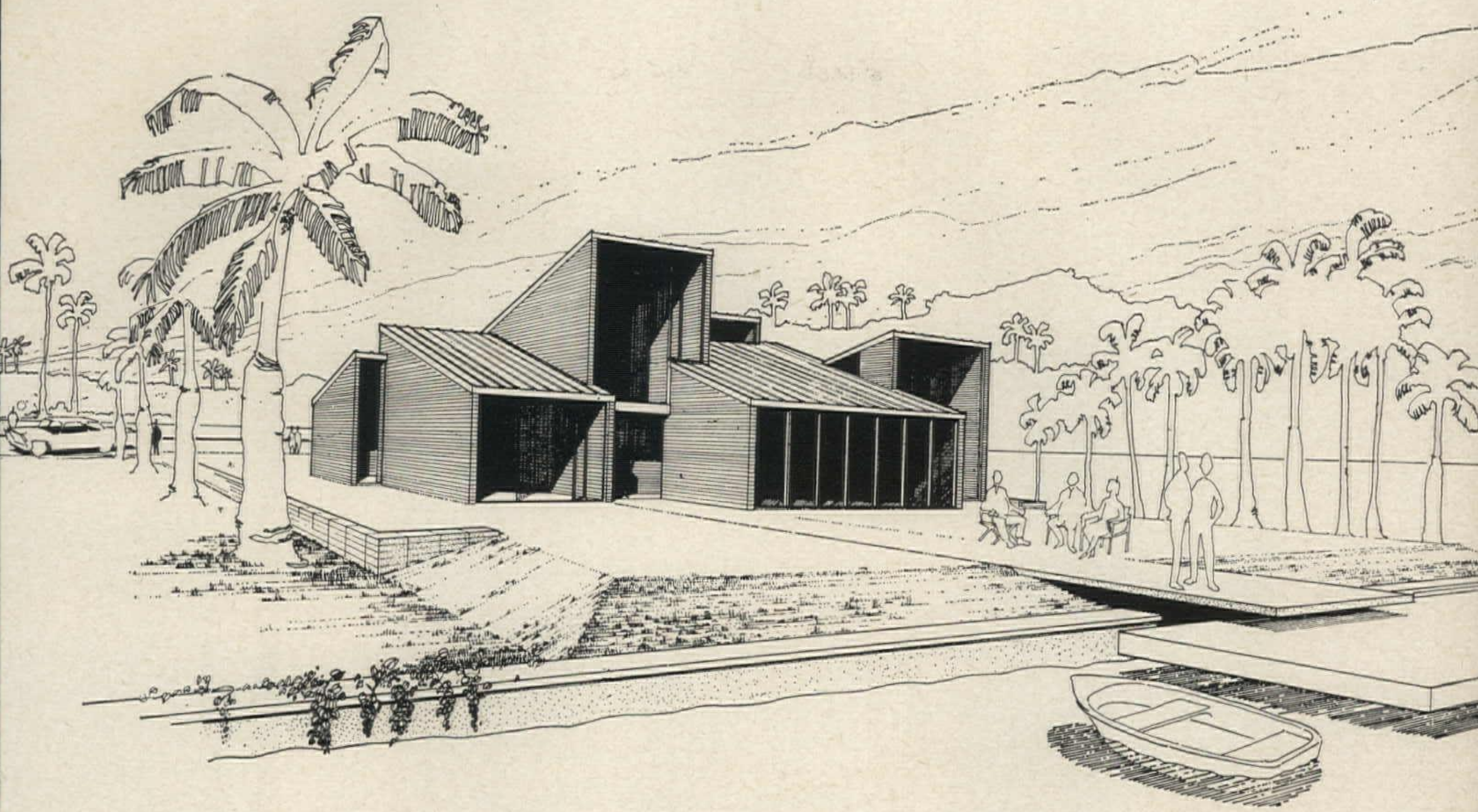



FIRST FLOOR



The Milam house is constructed throughout of beige concrete block, with exposed natural finish. Floors are terrazzo and ceilings are acoustical plaster. These simple, monochromatic interiors require little upkeep, and lend themselves to furnishings of any age. In the dining area is a sixteenth century refectory table; the living room is furnished entirely with built-in furniture designed by the architect; medieval rubbings are hung on the downstairs walls. The house is air conditioned, and daylighting is carefully controlled by sun shades. The baths have skylights

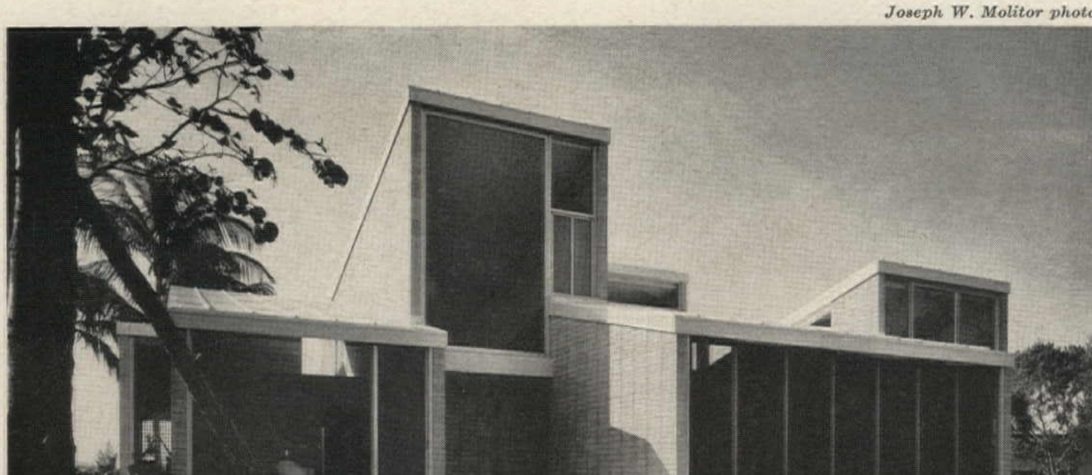




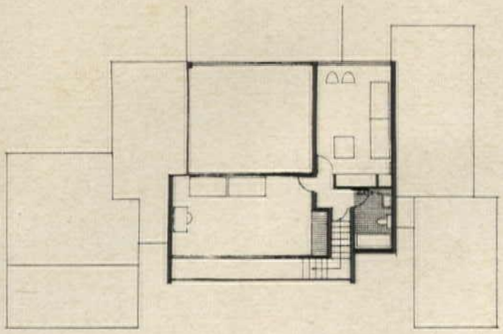
# UNDULATING ROOF PLANES SET THEME

*The R. H. Daisley House*
*Inlet Cay, Florida*
ARCHITECT: *Paul Rudolph*
SUPERVISING ARCHITECT: *Richard T. Hanna*
LANDSCAPE ARCHITECT: *Boynton Landscape Co.*
AIR CONDITIONING AND HEATING: *Air Conditioning Designers*
CONTRACTOR: *Warren D. Reiff*
RENDERING: *Bryant L. Conant*

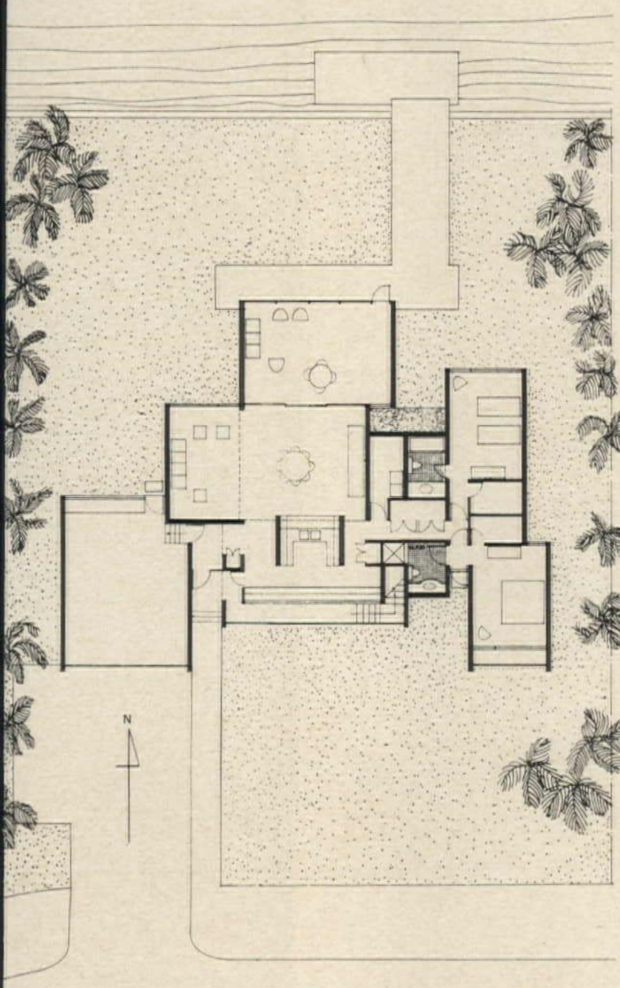
*Joseph W. Molitor photos*



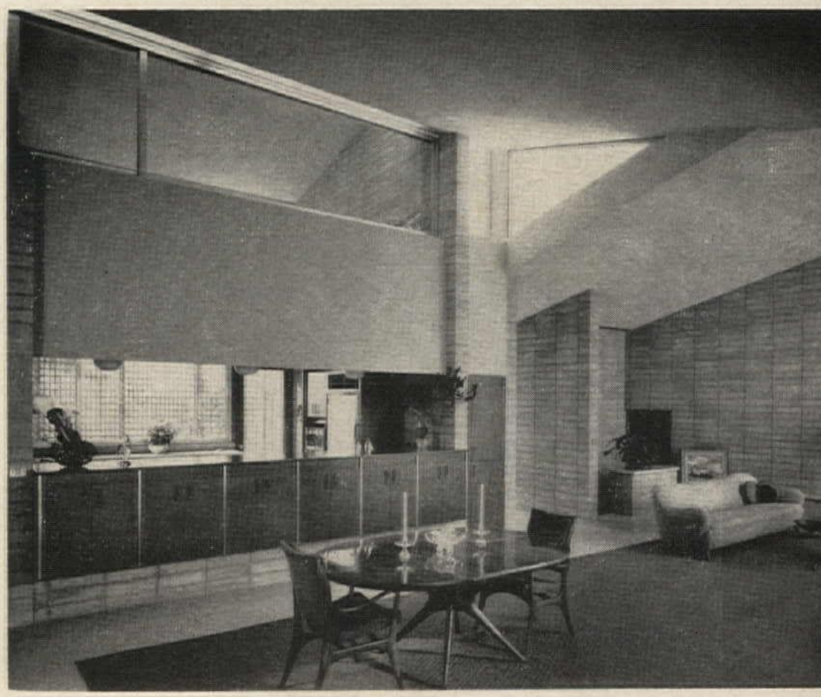
The Daisley house was planned for a subdivision requiring all roofs to be pitched. This "restriction" was turned into a prime design feature of the house: the shed roofed units of the house were, in effect, pulled apart, and re-combined in a way that gives a forceful counterplay of the sloping planes. All the structural bearing walls, built of sand-colored concrete brick, run in the same direction, and are offset from each other. The dominant roofs are surfaced with off-white enameled aluminum. In keeping with his theory of keeping all materials in a house as unified as possible, Rudolph has finished the interiors with cement-like materials: terrazzo for floors, acoustic plaster for ceilings. Spaces are clearly delineated, but varied.

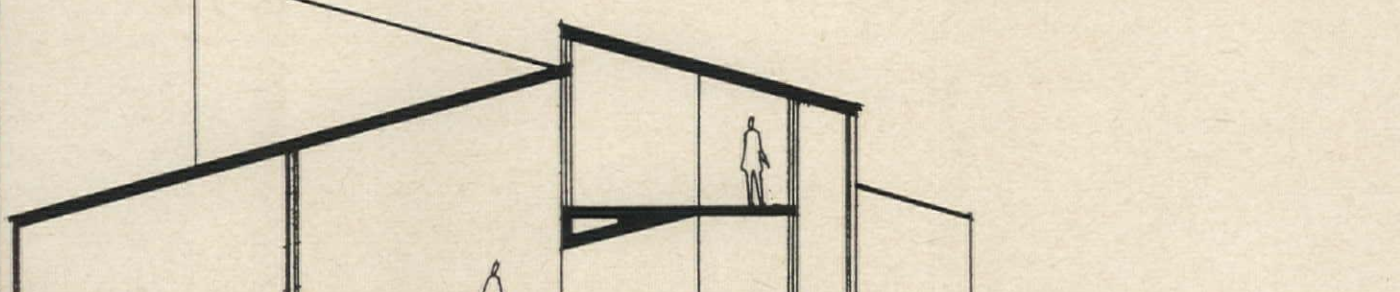


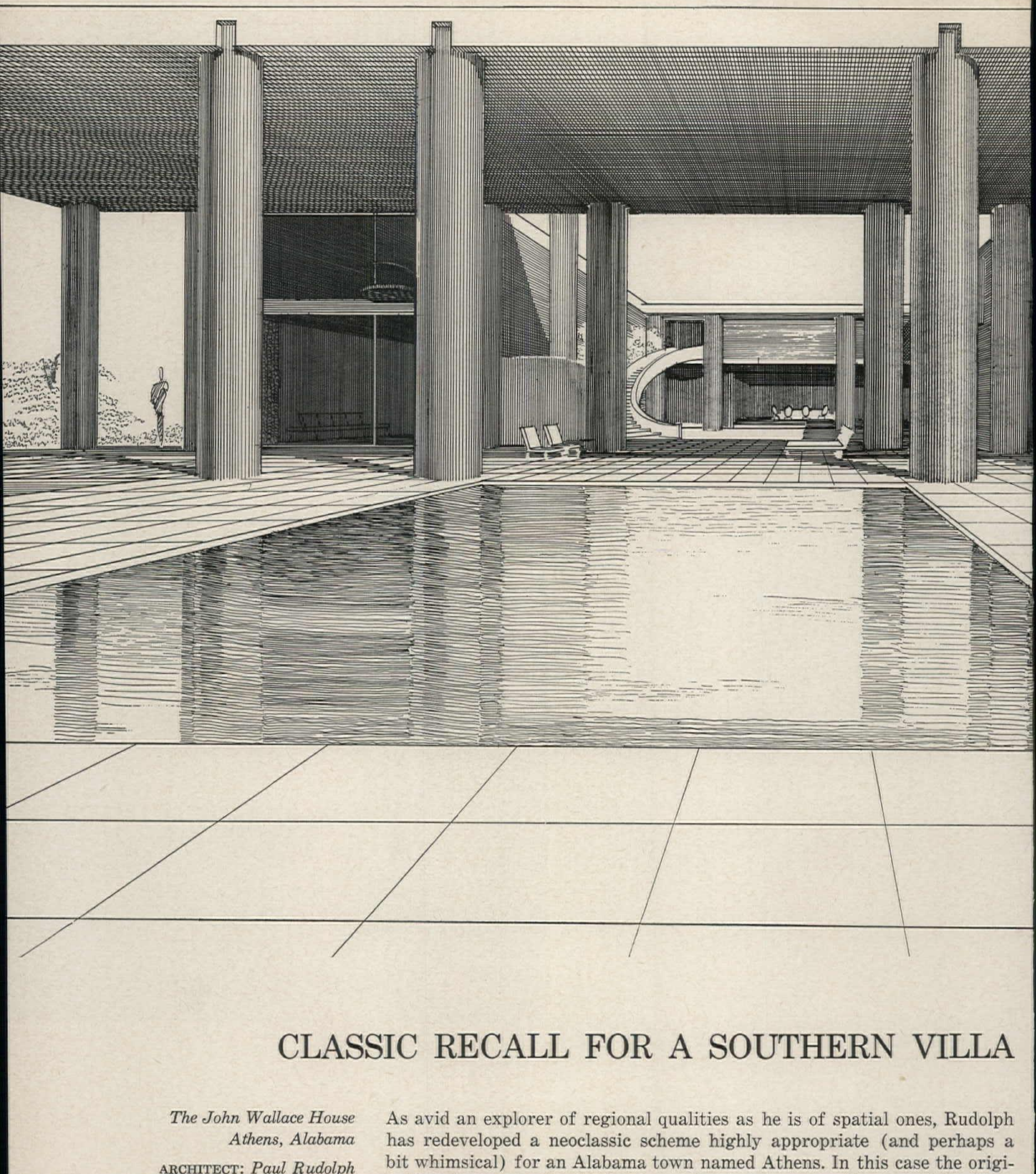
SECOND FLOOR




FIRST FLOOR







# CLASSIC RECALL FOR A SOUTHERN VILLA

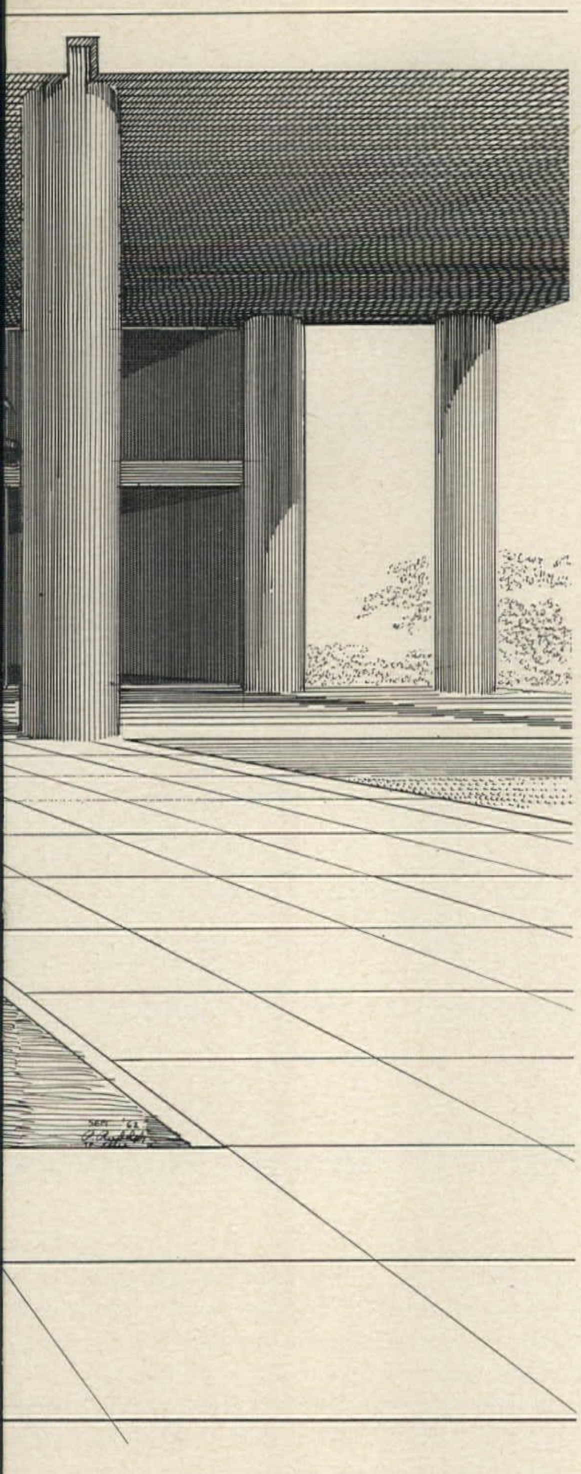
*The John Wallace House*
*Athens, Alabama*

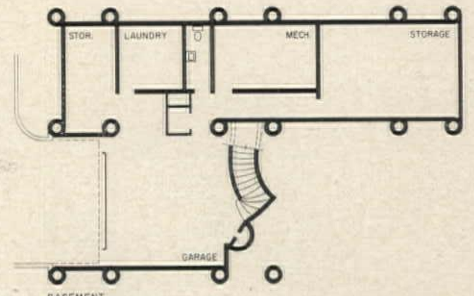
ARCHITECT: *Paul Rudolph*

STRUCTURAL ENGINEER: *Herman D. J. Spiegel*

MECHANICAL ENGINEER: *John L. Altieri*

As avid an explorer of regional qualities as he is of spatial ones, Rudolph has redeveloped a neoclassic scheme highly appropriate (and perhaps a bit whimsical) for an Alabama town named Athens. In this case the originating device in the design was structural rather than spatial white-painted brick columns and wood joists. Even so, a certain by-play of forms is introduced by repeating the curved shape wherever reasonable in the brick veneer curtain walls, and in the stairs. The house has an extremely imposing character, added to by the use of a raised base; the garage is countersunk in this podium on one side. The entrance façade is shown in the elevation at right, and is approached by a long curving drive. The main entrance is to the left of the sketch, the service entrance by the little stairs to the right. At the rear, the plan centers on a great open court.





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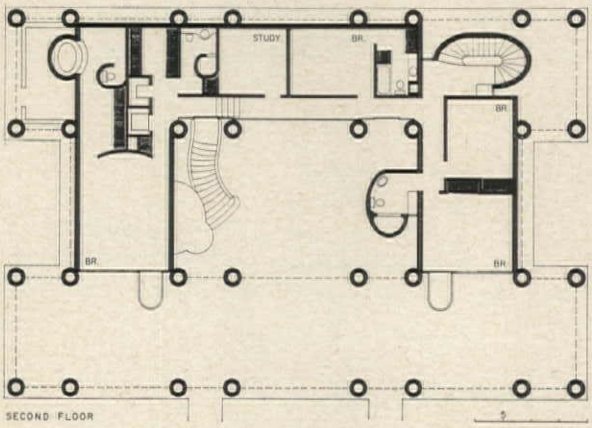
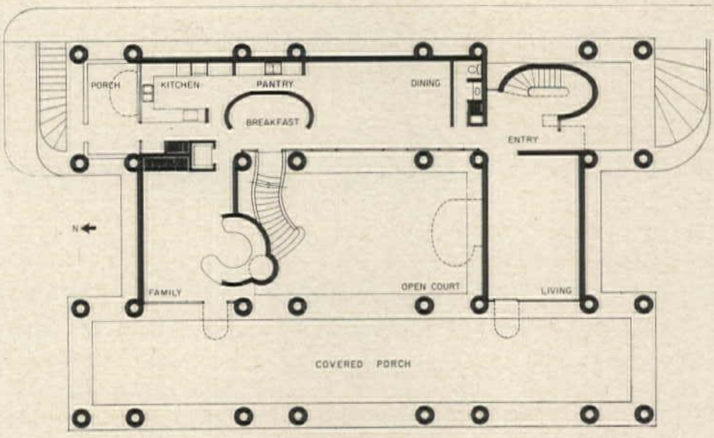
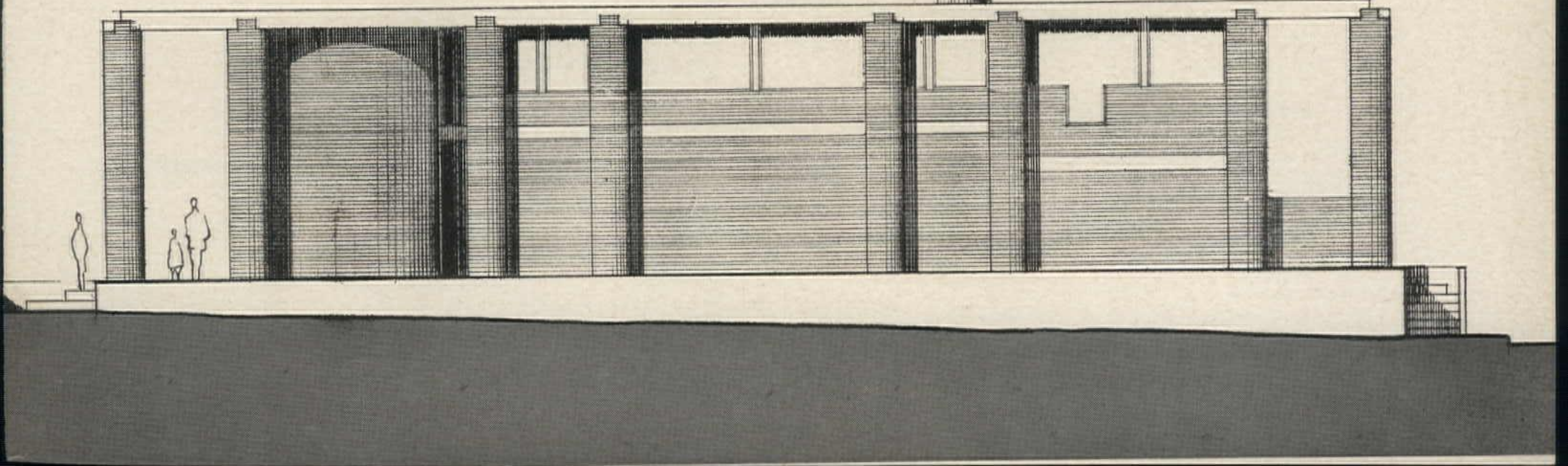
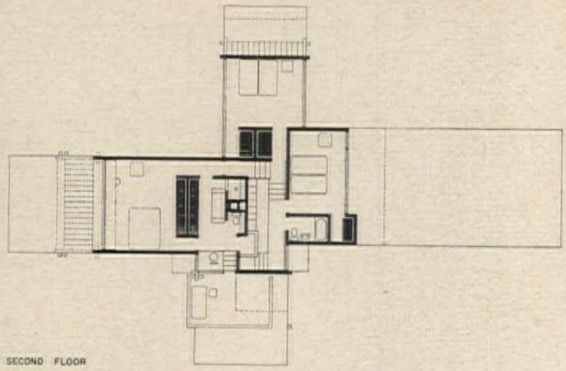


SECOND FLOOR



FIRST FLOOR





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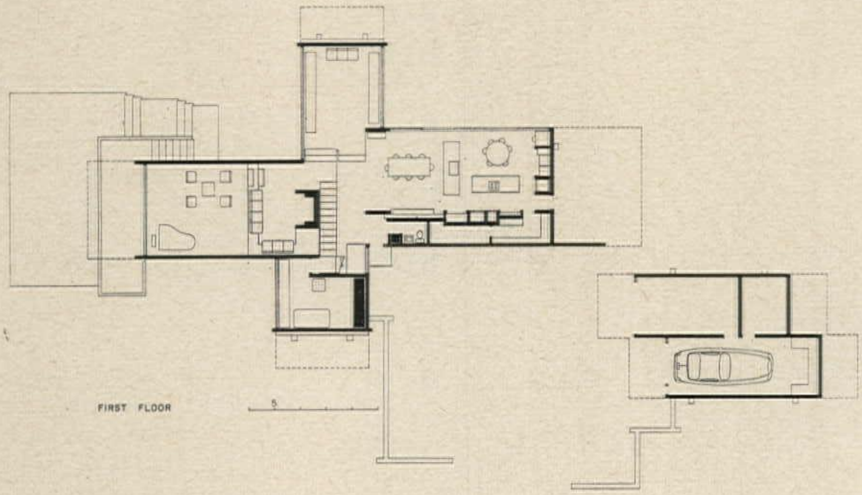


FIRST FLOOR

# A SPIRAL OF NINE STEPPED-UP ROOF PLANES

*The N. Leslie Silvas House*
*Greenwich, Connecticut*

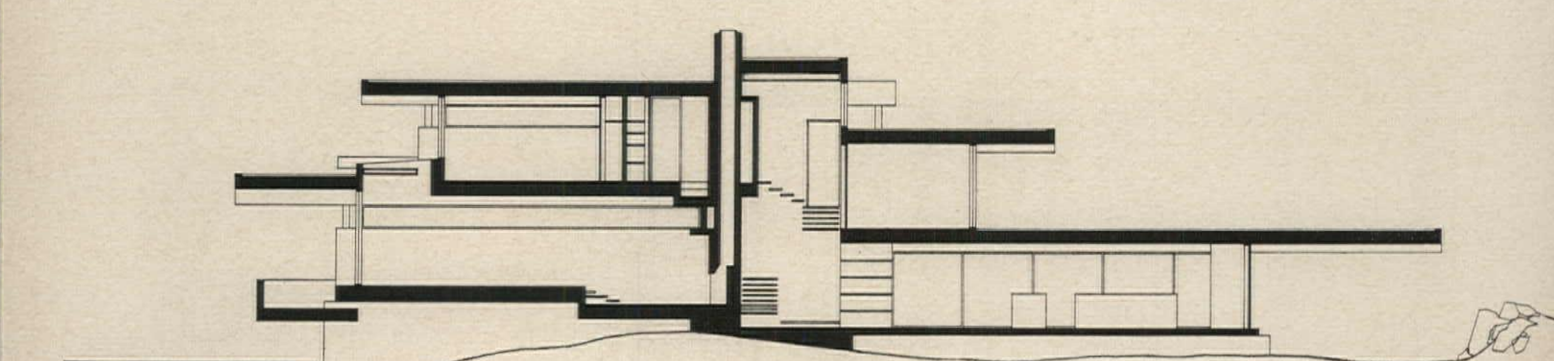
ARCHITECT: *Paul Rudolph*

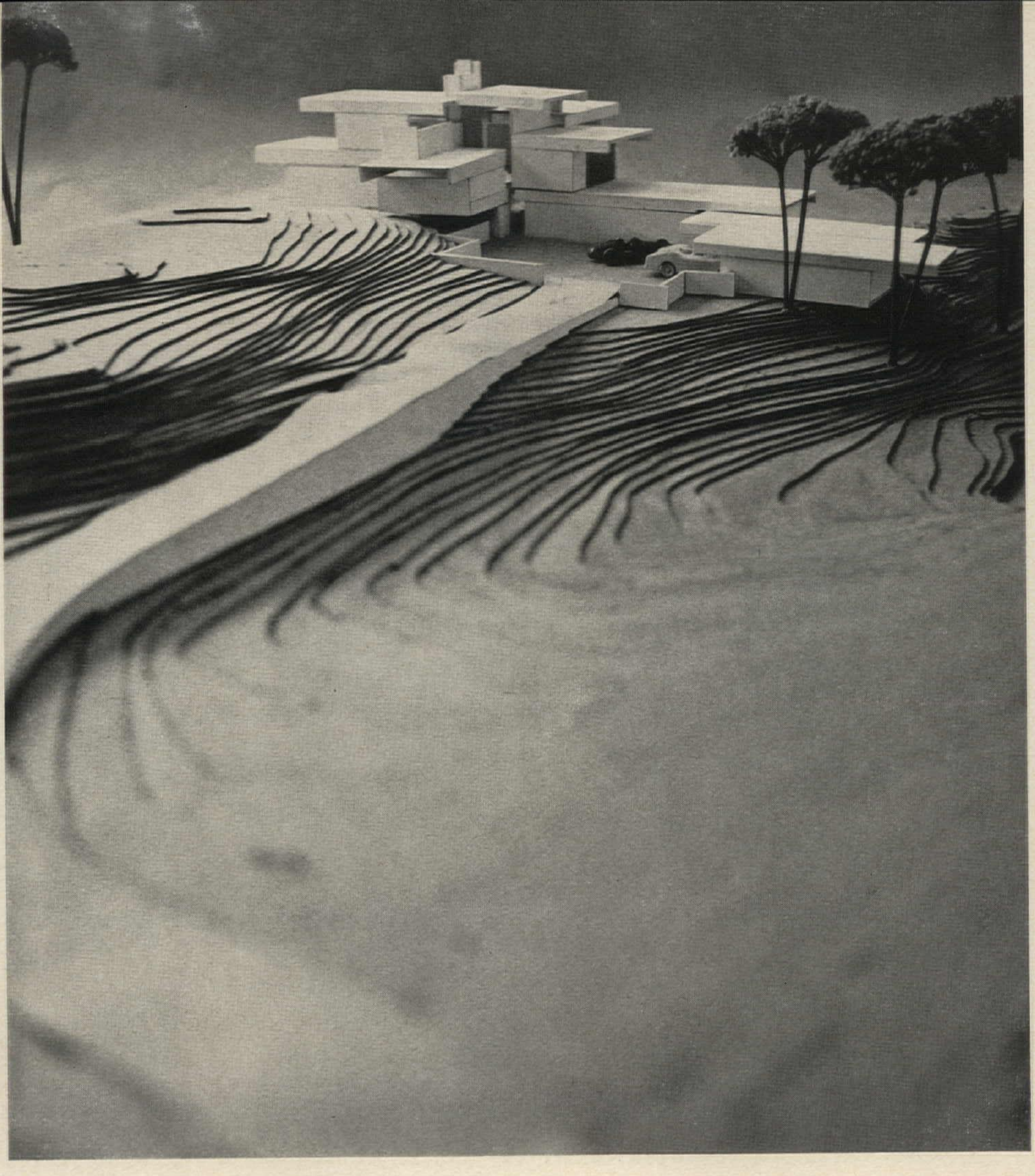
STRUCTURAL ENGINEER: *Herman D. J. Spiegel*

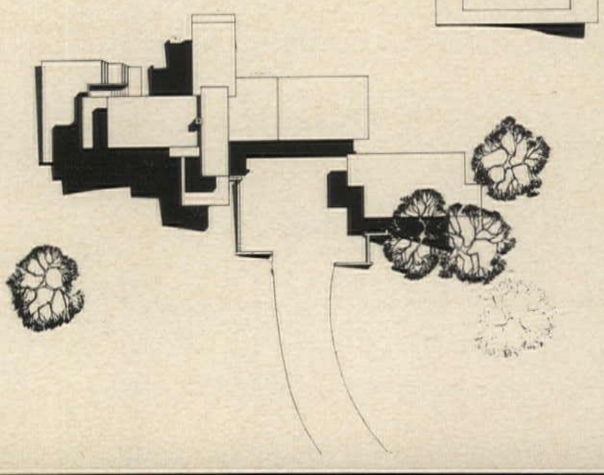
MECHANICAL ENGINEER: *John L. Altieri*

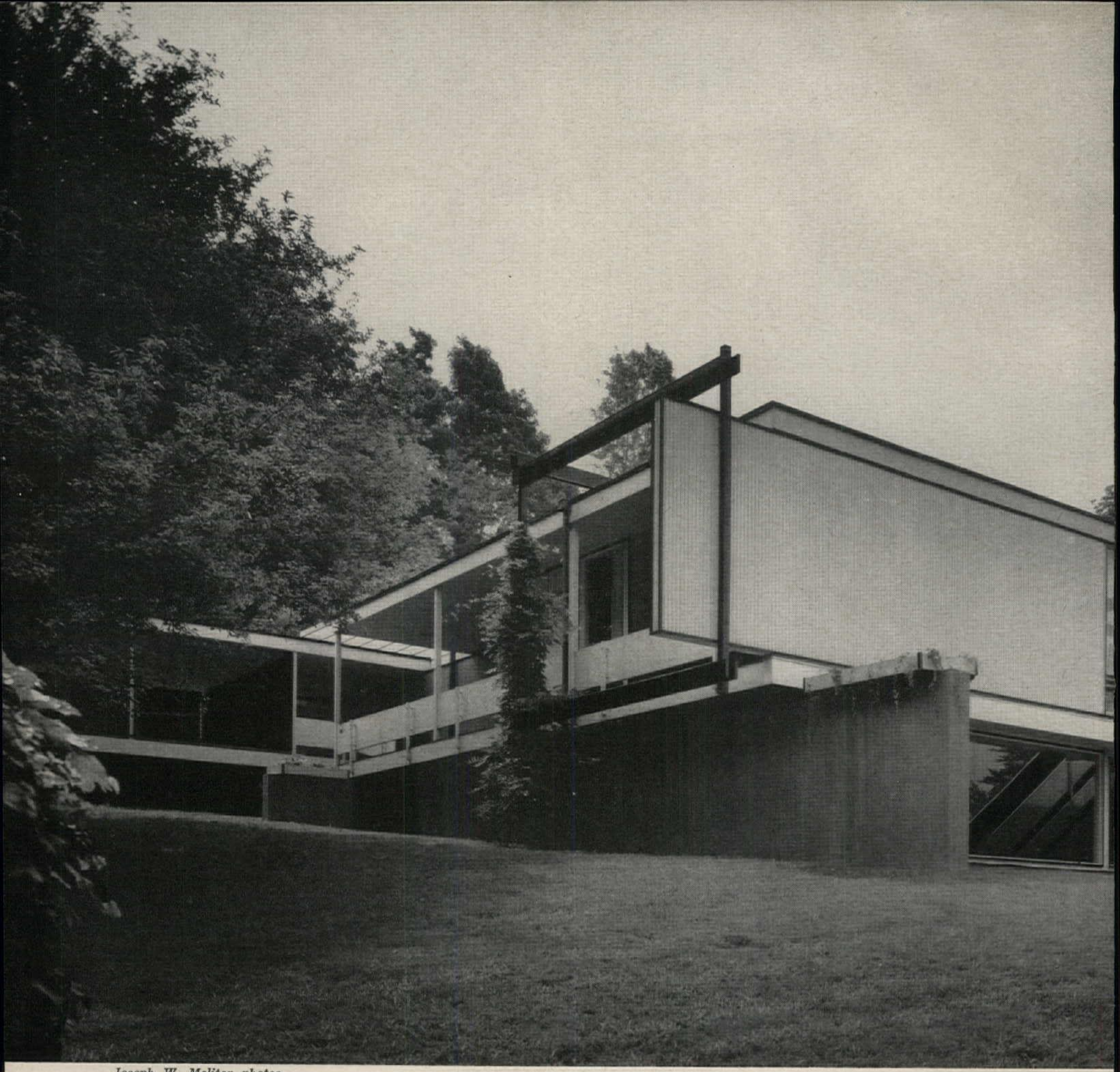
RENDERING: *Der Scutt*

The latest in design of the houses shown here, this one was planned with "much more freedom provided by eight acres of rolling land." Each area or room has its own level, arranged in a spiral step-up around the chimney. The difference in levels was fixed by the use of 2-ft beams. Plaster will be sprayed over the light wood structure to provide a continuous surface. This will give a quiet foil to the play of the shades and shadows from the many cantilevered overhangs. Interiors will also be finished in plaster; floors will be hardwood in living areas, vinyl asbestos tile in the kitchen, ceramic tile in the baths. Skylights will be used to give added light to the inner part of the living areas. The house will be air conditioned.









*Joseph W. Molitor photos*

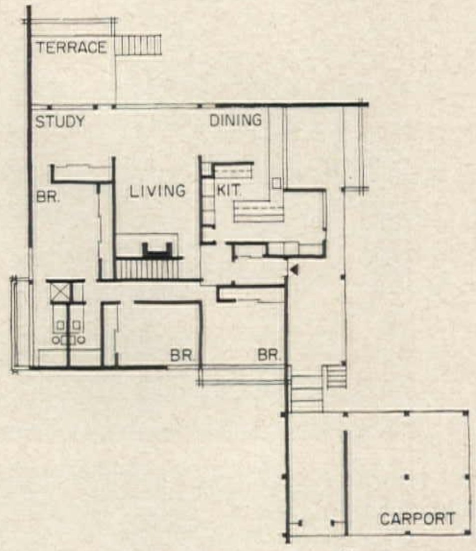
# PIN WHEEL SHAPES FOR NEW ENGLAND

*The Barnet Yanofsky House*
*Newton, Massachusetts*

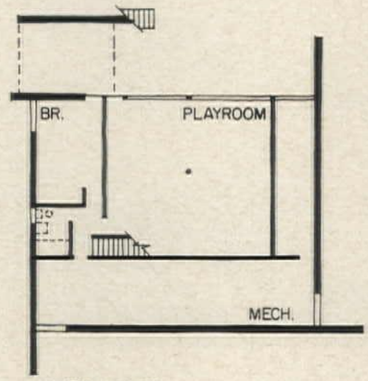
ARCHITECT: *Paul Rudolph*

BUILDING CONTRACTOR:
*Stanley I. Phalen*

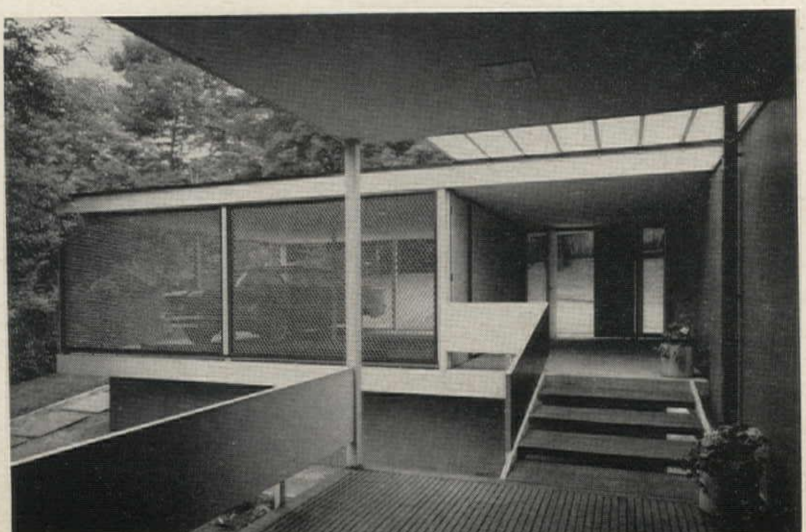
Although the earliest in design of this group of six houses, Rudolph's concern with forms, materials and regional qualities is still quite evident. It seems, at first glance, a more conservative scheme, but the house is planned as a "pinwheel which turns." The foundation walls are arranged in a pinwheel shape, with walls extended for emphasis; the upper floor has a similar shape, turned 90 degrees from the foundation, and accented by an extended roof trellis. As the house is first seen from above on approaching, the trellis (to be covered with vines) was further intended to relieve the bareness of the roof planes. The house is totally of wood construction above the foundations, and planned by Rudolph to reflect "the spareness of New England." The living area, however, has its share of drama: one screen-wall is gold to augment the glow from the skylight.

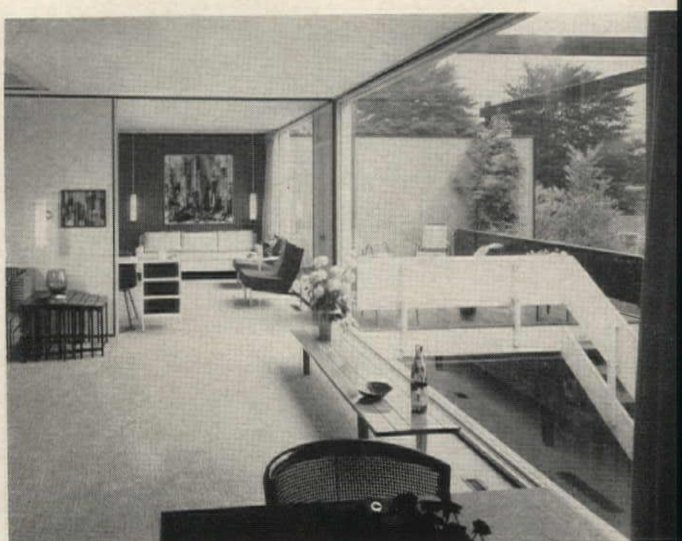


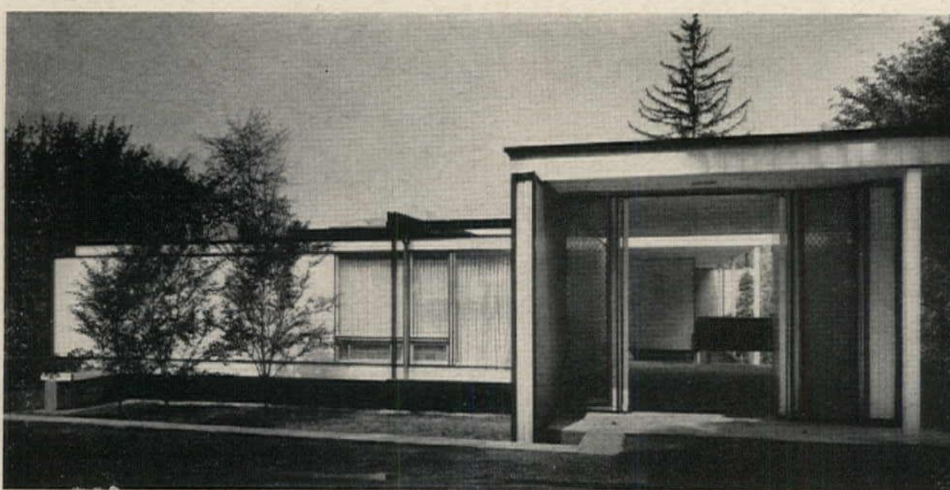

UPPER LEVEL

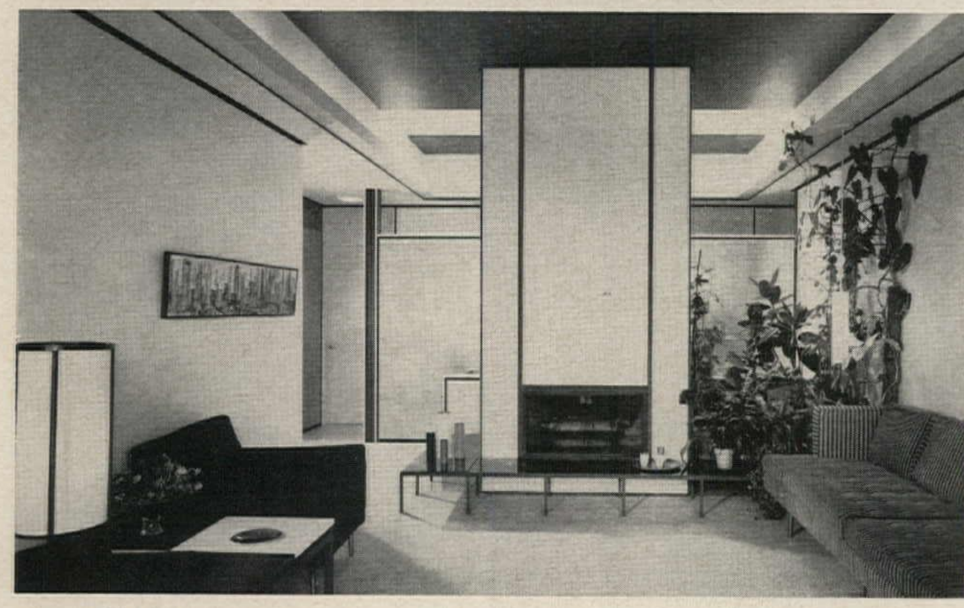



LOWER LEVEL

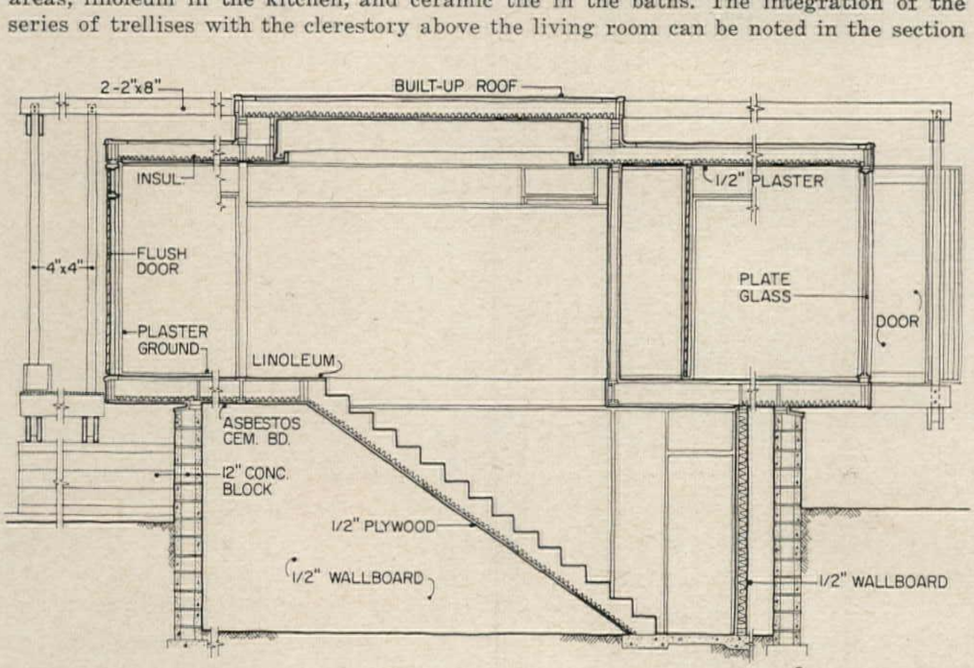








The Yanofsky house is entered (top photo) through an open gallery flanking the carport. The exterior is textured plywood, painted white, with black trim. This scheme continues into the interiors, as in the living area (center) which has white plaster walls, and adds the gold screen noted before, as a backdrop for fireplace and stairway. The roof is tar and white marble chips. Floors are carpet over plywood in the living areas, linoleum in the kitchen, and ceramic tile in the baths. The integration of the series of trellises with the clerestory above the living room can be noted in the section



The Future of the City: a five-part series

By LEWIS MUMFORD

# 2. YESTERDAY'S CITY OF TOMORROW

In a previous article I dealt with the continued dissolution of the city into an amorphous, over-mechanized urbanoid mass, lacking both esthetic identity and social character. Even the biggest metropolises seem fatally doomed by this process, if we allow it to continue. Private transportation by motorways, during the last two decades, instead of assisting the reorganization and reintegration of urban life on a regional scale, has only lengthened distances, slowed down transportation within the city, and dispersed useful facilities that were once close at hand and constantly available. Therewith the city and all its organs have been dissolving into the formless nonentity miscalled Megalopolis.

## THE INFLUENCE OF THE SUBURB

Meanwhile the major reaction against the misdemeanors of the city has been the escape to Suburbia. For more than a century, families that were content to do without the social advantages of the city profited by the cheap land and the natural landscape to create a biologically more adequate environment, with full access to all the things now missing from the city: sunlight, untainted air, freedom from mechanical noises, ample lawns and gardens, accessible open country for walks and picnics; finally, individual houses, specially designed for family comfort, expressive of personal taste.

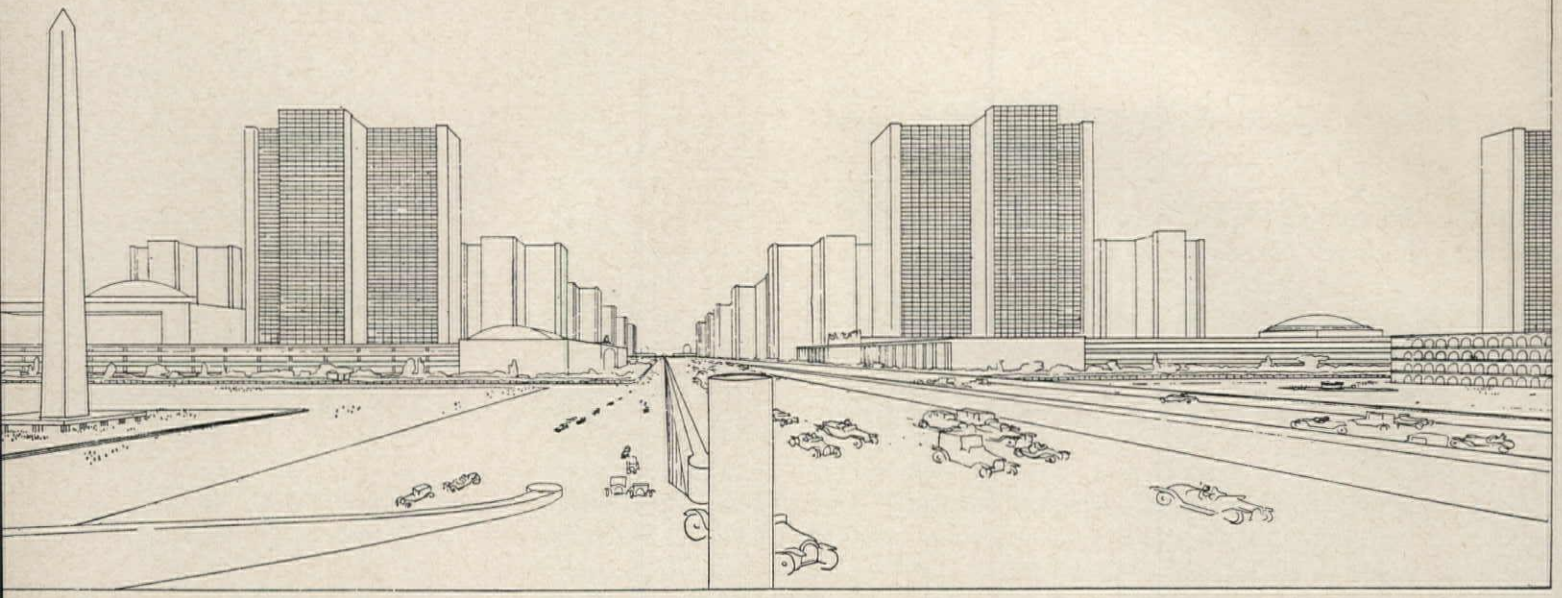
This impulse to have closer contact with the rural scene was fed by the literature of the Romantic movement, from Rousseau on to Thoreau; but it did not originate there. For the rich families of Florence, Rome and Venice, in the fifteenth and sixteenth centuries, did not wait for either romanticism or the railroad age to build their country villas in Fiesole, in Frascati, or on the Brenta. What marks the modern age is that both the impulse and the means of achieving it have become universal.

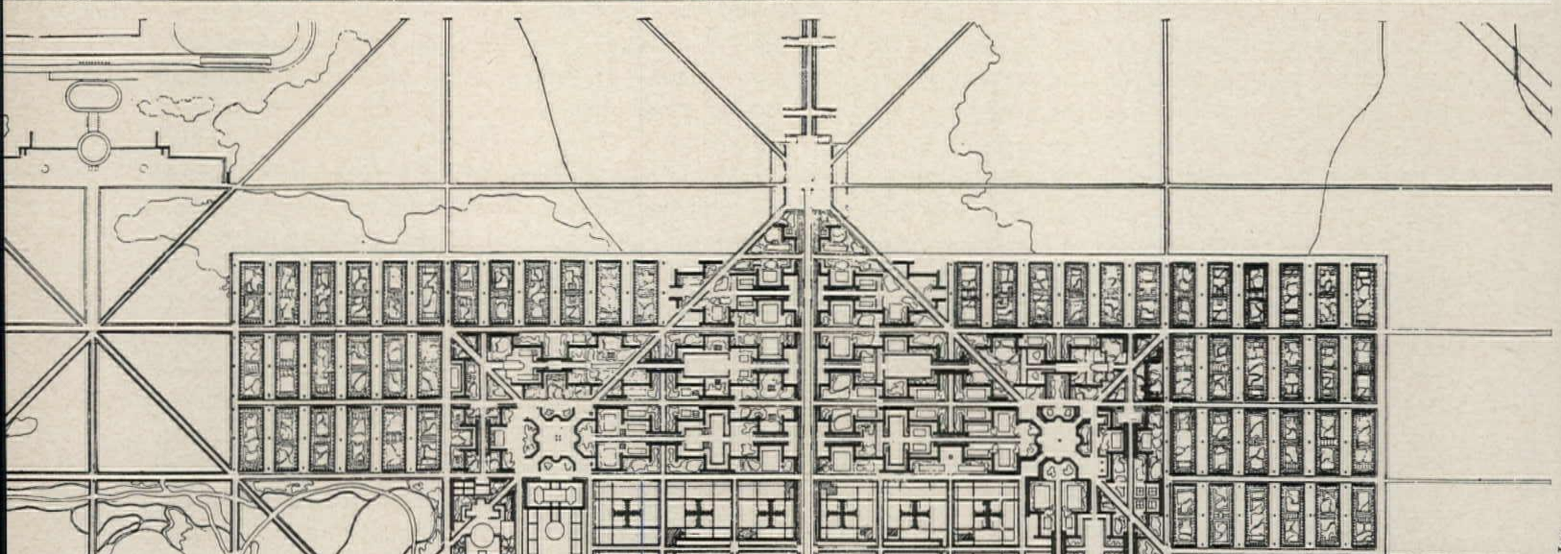
Though the ultimate outcome of this suburban retreat on a large scale has proved to be a non-city, if not an anti-city, just because of the very isolation and separation it proudly boasted, one must not underestimate its architectural results or its great human attraction; in fact, no adequate image of the emerging city will arise until these are both fully reckoned with. From William Morris's Red House to the shingle-houses of H. H. Richardson, W. R. Emerson, and their colleagues, from Frank Lloyd Wright's prairie houses on to the work of Voysey, Parker, and Baillie-Scott, from Olmsted's Riverside and Roland Park to Unwin's Hampstead Garden Suburb, most of the fresh forms of domestic architecture and planning grew out of the suburb. This still holds true today: not merely in houses, but in shopping centers, school complexes, industrial parks. Apart from purely industrial architecture, like the cotton mills of Manchester or the early skyscrapers of Chicago, no other environment has proved so encouraging to positive architectural expression as the suburb.

Though the original values of the suburb have been fast disappearing in the welter of the ever-spreading conurbation, the image that was left behind has had an influence upon urban planning. This is the image of a new kind of city, the "City in a Park"; more open in texture than the more crowded cities of the past, with permanent access to gardens and parks for all the inhabitants of the city, not just for the dominant minority. That influence has expressed itself in three different conceptions of the contemporary city, advanced by three distinguished architects and planners, Raymond Unwin, Frank Lloyd Wright, and Le Corbusier. Though radically different in their human background and purpose, all three conceptions have a common denominator: an unqualified demand for more space. In this article I shall confine myself to the work of Le Corbusier. If space and speed, mass production and bureaucratic regimentation were all that were necessary to form a new image of the modern metropolis, Le Corbusier would already have provided an adequate solution.

## LE CORBUSIER: DESTROYER AND INNOVATOR

Most architects, during the last thirty years, and certainly most architectural and planning schools, have been dominated by the powerful propaganda and experimental achievement of this singular man of genius, Le Corbusier. If anyone put forward what seemed a fresh and original conception of the City of Tomorrow, it was this redoubtable leader. Though that conception has gone through a series





Plan of the city for three million inhabitants, Le Corbusier

*"Le Corbusier 1910-1960," courtesy George Wittenborn, Inc.*

*"While Le Corbusier's image of the city is still often regarded as the last word in modern design, it combines, in fact, the three chief mistakes of the nineteenth century"*

of changes, corresponding to changes that have taken place likewise in his architecture, certain main features stand out, and will probably for a while continue to have influence, even if the master should abandon them. And though no one city, except Chandigarh, shows the full range of his influence, his thought has run so closely along the grain of our age that fragments of it are scattered everywhere.

The chief reason for Le Corbusier's immediate impact lies in the fact that he brought together the two architectural conceptions that separately have dominated the modern movement in architecture and city planning: the machine-made environment, standardized, bureaucratized, "processed," technically perfected to the last degree; and to offset this the natural environment, treated as so much visual open space, providing sunlight, pure air, green foliage, and views.

Not the least attraction of Le Corbusier's thought to his contemporaries was that in bringing these two together, he paid no more attention to the nature of the city and to the orderly arrangements of its constantly proliferating groups, societies, clubs, organizations, institutions, than did the real estate broker or the municipal engineer. In short, he embraced every feature of the contemporary city except its essential social and civic character. This failure to understand the function of the city as a focal meeting place extended to the C.I.A.M., which commissioned a book on the city in which the functions of the city that concerned the planner were reduced to Housing, Work, Recreation and Industry; and it was not until this group produced its symposium on the Heart of the City that the city's special social attributes, as a meeting place, were at last recognized.

In his first presentation of the City of the Future, Le Corbusier over-emphasized its new mechanical facilities, and equated urban progress with geometrical order, rectilinear planning, and mechanized bureaucratic organization. Enchanted by the possibilities of modern steel and concrete construction, Le Corbusier first presented a picture of a modern city like Paris, transformed into his new image: an image of free-standing, 60-story office buildings, set in open spaces, as the central feature, with multiple high speed transportation routes at many levels, feeding into this center, and long series of apartment houses, uniform in height, forming an undifferentiated residential district outside the bureaucratic core. This new unit would hold three million inhabitants, the equivalent of Paris. Le Corbusier's "Voisin" plan (1922-1925) was superimposed on the center of Paris: he proposed to tear down the historic core of Paris, as confused, unsanitary, pestilent, preserving only a few ancient monuments, and packing all its multifarious activities into uniform structures.

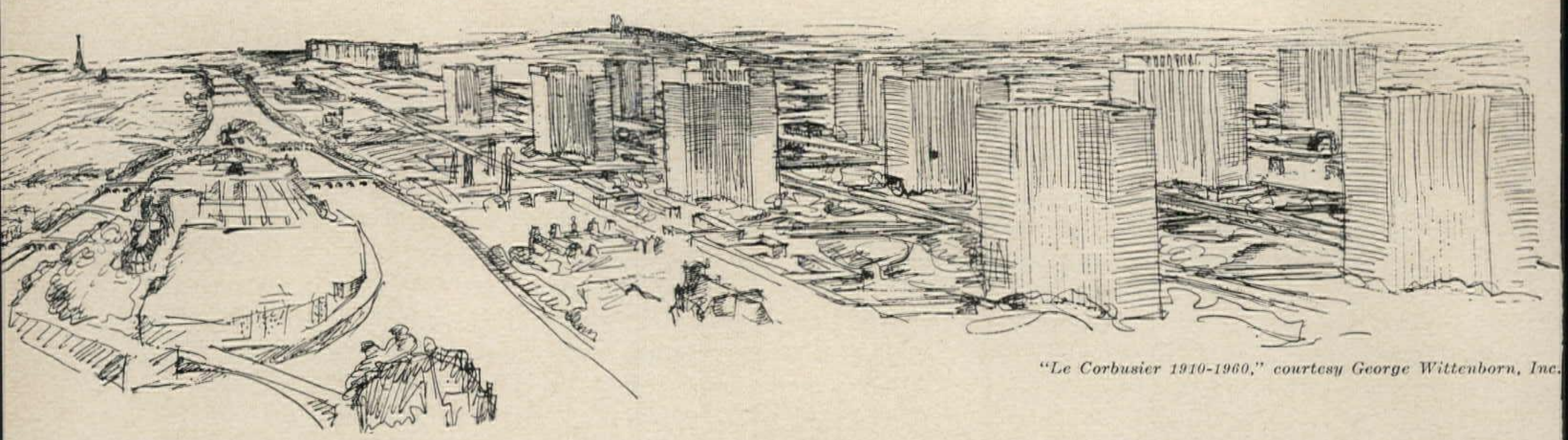
In his readiness to demolish the historic quarter of Paris and replace it with these towering isolated buildings, Le Corbusier's imagination worked like a bulldozer on an urban renewal project. In the name of efficiency, he paid no attention to the actual functions and purposes of the structures he proposed to re-house, or to historic buildings that by their individual character give form and continuity to the life that goes on within them. In short, he ignored the main office of the city, which is to enrich the future by maintaining in the midst of change visible structural links with the past in all its cultural richness and variety. In proposing prudently to preserve a handful of historic buildings as isolated monuments, Le Corbusier overlooked the fact that no small part of their value and meaning would disappear, once they were cut off from the multitudinous activities and associations that surrounded them; that in fact it was people, not space, that they needed if they were even properly to be seen.

In placing his emphasis on the vertical, rather than the horizontal elements of city design, Le Corbusier was fascinated, not only by the general possibilities of technology, but by the desire to give a more rigorous Cartesian expression to the American skyscraper. He had returned, most probably without any consciousness of it, to the form of the early Chicago skyscrapers, and had removed, not merely the romantic pinnacles and setback towers that had followed, but the visual jumble and congestion. His novel proposal was to combine the new order of height with something that had never been seriously suggested before, a palatial increase of open space, in the form of a park, between the buildings.

In that simple act, Le Corbusier wiped out the complex tissue of a thousand little and not so little urban activities that cannot be economically placed in tall structures or function efficiently except at points where they are encountered at street level and utilized by a multitude of people going about their business at all times of the day.

The extravagant heights of Le Corbusier's skyscraper had no reason for existence apart from the fact that they had become technological possibilities; the open spaces in his central areas had no reason for existence either, since on the scale he imagined there was no motive during the business day for pedestrian circulation in the office quarter. By mating the utilitarian and financial image of the skyscraper city to the romantic image of the organic environment, Le Corbusier had in fact produced a sterile hybrid.

But perhaps the very sterility of Le Corbusier's conception was what has made it so attractive to our age. In American cities tall buildings came into existence not simply as a convenience for business enterprise, but as a mode of increasing land values and the opportunities for highly profitable large-scale building and speculation; and even when the business towers provided too little floor space in proportion to elevator space to be profitable, they



"Le Corbusier 1910-1960," courtesy George Wittenborn, Inc.

Voisin Plan for Paris, Le Corbusier, 1925

*"Most architects, during the last thirty years, certainly most architectural and planning schools, have been dominated by the powerful propaganda and experimental achievement of this singular man of genius, Le Corbusier."*

served by their very extravagance as a form of commercially valuable advertisement. The tall building was accepted in America as a standardized substitute, with convertible units of space, for more functional plans and elevations that might require a more generous—that is expensive—allotment of land along with a more exacting design.

By stressing the visual openness between tall buildings, offsetting the low coverage with ever higher structures, Le Corbusier seemed to have satisfied two hitherto irreconcilable conditions: higher densities with higher rents on one hand, and greater exposure to light and air, along with a greater sense of open space, however unusable except to the eye. This pattern could be reduced to a mechanical formula and repeated anywhere precisely because it paid so little attention to the variety of human needs and the complexities of human association. That failing largely accounts for the present success of Le Corbusier's formula. But applied to urban renewal projects it has proved a disastrous success, on which Jane Jacobs has said almost the last word, though her own counter proposals, to increase densities and encourage haphazardness, are equally unsound, and quite as willfully negligent of urban realities.

## MISPLACED OPENNESS

Le Corbusier's early images of the city were supplemented by later designs that could be carried out on a more modest scale: his plan in the Nineteen Thirties for the little town of Nemuors in North Africa, with its geometric grouping of domino structures, set the fashion for high-rise slabs. Both images in turn have had a massive impact upon the minds of today's architect-city planners. The post-war housing estates of the London County Council record that influence at its best, sometimes in more ingratiating forms than he had pictured,—as in the Alton estate at Roehampton, on land already richly landscaped by the original suburban owners—but also at its worst, as in their over-emphatic repetitions of his Unity House slab in another area.

In the United States the standard urban renewal projects fostered by the Federal government have been designed in a similar socially heedless fashion. Le Corbusier meanwhile has kept on modifying his original proposals, which were exclusively metropolitan and bureaucratic. In more recent statements since 1945 he has envisaged small, better balanced, more self-contained communities, as complementary members of the metropolis; and in Chandigarh he even took over from Albert Mayer and Matthew Nowicki, the first planners, the outlines of the Radburn plan, with its series of neighborhood superblocks and its inner green walkways.

But the gigantic scale of that city demands a completely motorized population: that is the mischief of excessive openness. Though Le Corbusier's buildings are low, his walks are long, and the central public buildings swim in space under a torrid summer sun whose heat further penalizes pedestrian circulation. The misplaced openness of Le Corbusier's new capital turns the great buildings and monuments into isolated works of sculpture, exhibited as in a high outdoor museum. They are meant to be visited piously or admired occasionally at a distance: not to serve as intimate architectural companions in the daily traffic of the city, visible at all times, with sufficient detail to hold the eye and refresh the spirit even under intimate inspection. In its excessive, official openness this plan vies with Walter Burley Griffin's purely suburban conception of the Australian capital of Canberra.

Le Corbusier was of course right in thinking that the functions of business and transportation could be better handled in structures especially designed to fit modern needs; he was right, too, in thinking that a basic pattern of order is essential to the full enjoyment of the city, particularly in our own age, in which a multitude of sensual and symbolic stimuli—print, sound, images—at every hour of the day, would produce overwhelming confusion if the general background were equally confused. So, too, he was correct in thinking that the skyscrapers of New York or Chicago should be thinned out, if they were to be visible from street level, or the traffic avenues were to remain usable; and further, that sunlight, pure air, vegetation, along with order and measure, were essential components of any sound environment, whether urban or rural.

But in his contempt for historic and traditional forms, Le Corbusier not merely lost continuity with the past but likewise any sense of how much of the present he was also losing. His new conception of the City in a Park misconceived the nature and functions of both city and park.

The monotony of Le Corbusier's favored forms has expressed the dominant forces of our ages, the facts of bureaucratic control and mechanical organization, equally visible in business, in industry, in government, in education. That fact itself constituted one of its attractions. But until Le Corbusier theoretically destroyed the historic tissue of the city, with its great complexity of form and its innumerable variations even within the fixed geometry of the gridiron plan, the prevailing bureaucratic pattern had been modified by many human, sometimes all-too-human, departures. The old skyscrapers of Wall Street or the Loop may have been anarchic in their efforts to pre-empt space or claim attention, but they did not present the faceless conformist image of present-day Park Avenue. As for urban compositions that have been more directly influenced by Le Corbusier's idea of the City in a Park —the collection of office buildings in the Pittsburgh Triangle, for example—they might as well be in a suburb as in the city itself. Even the open space around these buildings has become meaningless in terms of light and air, for all-day fluorescent lighting and air conditioning flout the one benefit that would justify this type of plan.

## THE SUB-URBAN METROPOLIS

Unmodified by any realistic conception of urban functions and urban purposes, apart from the bureaucratic process itself, Le Corbusier's City in a Park turns out in fact to be a sub-urban conception. By its very isolation of functions that should be closely connected to every other aspect of city life, and by its magnification of the forces that govern metropolitan life today, it can be detached from the organic structure of the city and planted anywhere. Even the space around Le Corbusier's skyscrapers has an ambivalent function, for the City in a Park has now taken a more acceptable, commercially attractive form, and has become a City in a Parking Lot.

When we follow this whole process through, we discover that the freedom of movement, the change of pace, the choice of alternative destinations, the spontaneous encounters, the range of social choices and the proliferation of marketing opportunities, in fact, the multifarious life of a city has been traded away for expressways, parking space, and vertical circulation. It is not for nothing that so many of the new urban housing projects, filled with 20-story skyscrapers, are called villages: the conformities they demand, the social opportunities they offer, are as limited as those of a village. These islands of habitation in the midst of a sea of parking lots may have densities of 500 inhabitants a residential acre, and be part of a megalopolitan complex holding tens of millions of inhabitants, but the total mass still lacks the complex character of a city.

In short, the City in a Park does nothing to foster the constant give and take, the interchange of goods and ideas, the expression of life as a constant dialogue with other men in the midst of a collective setting that itself contributes to the animation and intensity of that dialogue. The architectural blankness of such a city mirrors the only kind of life possible under it: over-all control at the top, docile conformity at the bottom.

## BASIC URBAN FALLACIES

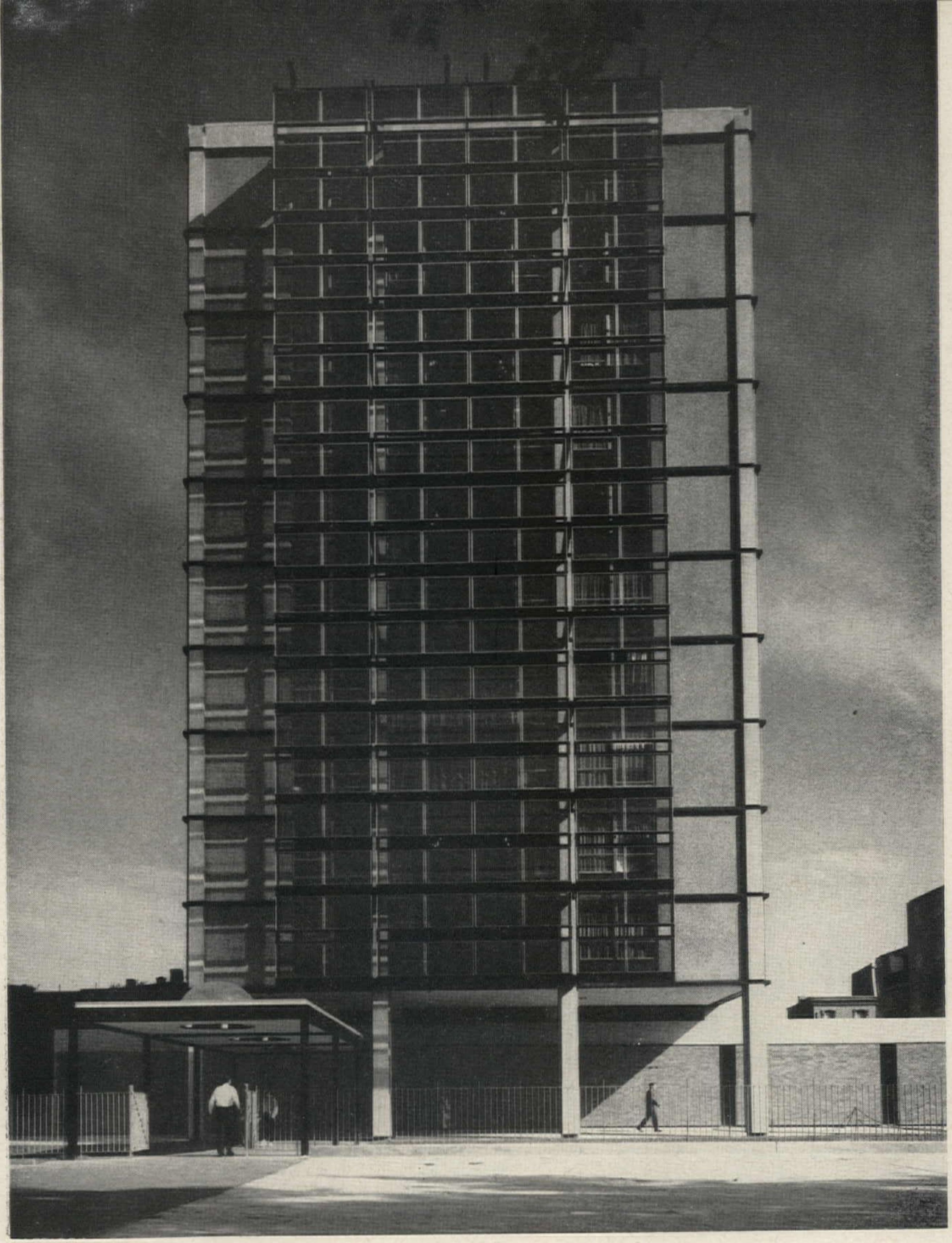
While Le Corbusier's image of the city is still often regarded as the last word in modern design, it combines, in fact, the three chief mistakes of the nineteenth century. These misconceptions destroyed the classic form of the city, as it had existed almost from the beginning, and replaced it with a succession of urban and suburban wastelands: anti-cities.

The first mistake was the over-valuation of mechanization and standardization as ends in themselves, without respect to the human purpose to be served. The second was the theoretic destruction of every vestige of the past, without preserving any links in form or visible structure between past and future, thereby over-magnifying the importance of the present and at the same time threatening with destruction whatever permanent values the present might in turn create, and nullifying any lessons that might be learned from its errors. This is the error of the "disposable urban container." Finally, Le Corbusier's concept carried to its extreme the necessary reaction against urban overcrowding: the mistake of separating and extravagantly over-spacing facilities whose topographic concentration is essential for their daily use.

Now that a sufficient number of adaptations of Le Corbusier's leading concepts are in existence, we begin to have an insight into both their social and their esthetic limitations; for the two are in fact closely connected. The visual open space that this planning produces has no relation to the functional open space, space as used for non-visual purposes, for meeting and conversation, for the play of children, for gardening, for games, for promenades, for the courting of lovers, for outdoor relaxation. At the high density of 250-500 people per acre, what seems by the trick of low coverage an ample provision of open space turns out to be miserly.

The esthetic monotony of these high-rise dominoes is in fact a reflection of their social regimentation: they do not represent, in architectural form, the variety that actually exists in a mixed human community; uniformity and conformity is written all over them. Such freedom, such family intimacy, such spontaneous utilization of the natural environment, and such architectural identity as even the old-fashioned railroad suburb offered has been forfeited without any equivalent return.

The City in a Park, as so far conceived by Le Corbusier and his followers, is a blind alley. Yet its basic ingredients, the more adroit use of present-day mechanical facilities and the constant respect for the natural conditions for health and child nurture, must play a part in any better image of the future city. Neither high-rise structures, vertical transportation, spatial separation, multiple expressways and subways, or wholesale parking space will serve to produce a community that can take advantage of all the facilities modern civilization offers and work them into an integrated urban form. Even when assembled together in orderly fashion they still do not constitute a city. Before the architect can make his contribution to this new form, his private services to his client must be combined with a better understanding of the nature and functions of the city as a device for achieving the maximum amount of human cooperation and crystallizing in more durable and visible form the whole creative process.



# HIGH-RISE DORMITORY

Philadelphia architects Nolen and Swinburne design a men's residence hall at Temple University featuring a steel and glass sunshade and precast, exposed-aggregate curtain-wall panels

*Johnson Hall, Temple University*
*Philadelphia, Pennsylvania*

ARCHITECTS:
*Nolen and Swinburne and Associates*

LANDSCAPE ARCHITECT:
*George Patton*

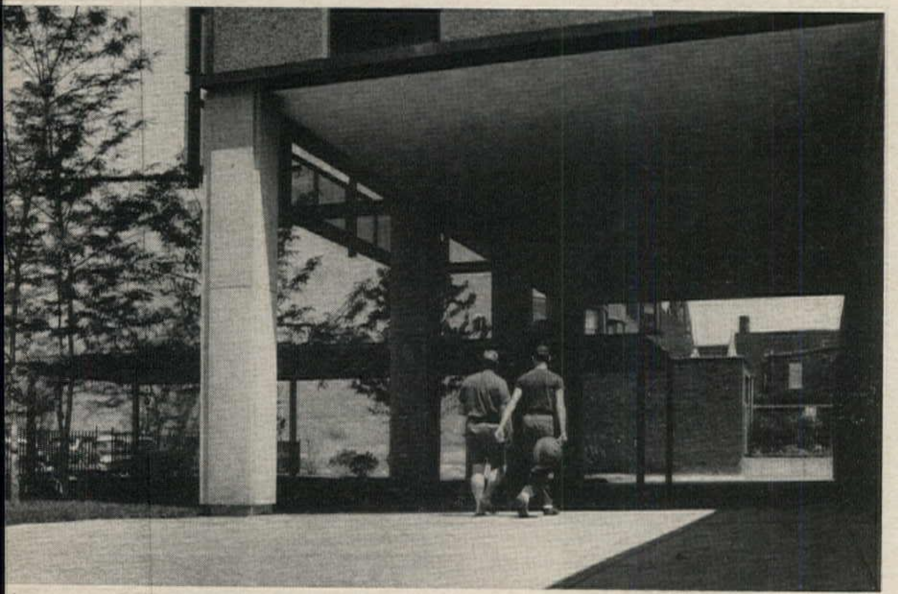
INTERIOR DESIGNERS:
*Chandler Cudlipp Associates*

STRUCTURAL ENGINEERS:
*Severud-Elstad-Krueger*

MECHANICAL ENGINEERS:
*Caldwell Engineering Company*

KITCHEN CONSULTANTS:
*Slater Food Service Management*

GENERAL CONTRACTOR:
*B. Bornstein and Son*

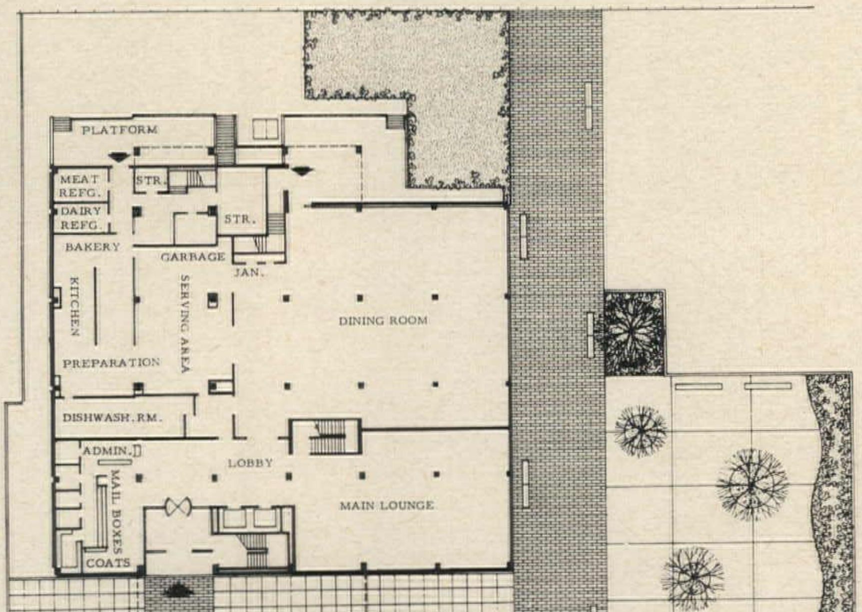


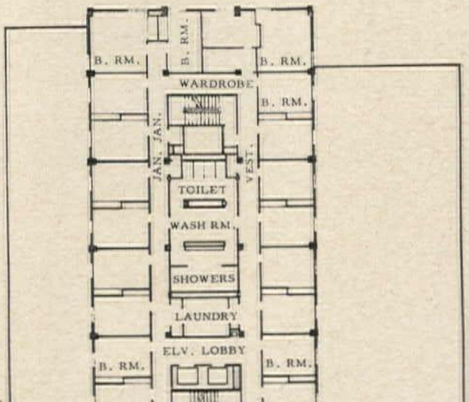
Located in an urban area characterized by heavy traffic and dense population, this new, 11-story men's dormitory at Temple University—which features a curtain wall of precast panels and a 10-story-high steel and glass sunscreen—is set in an informal garden arrangement to provide for outdoor recreation and ameliorate, as much as possible, the busy character of the setting.

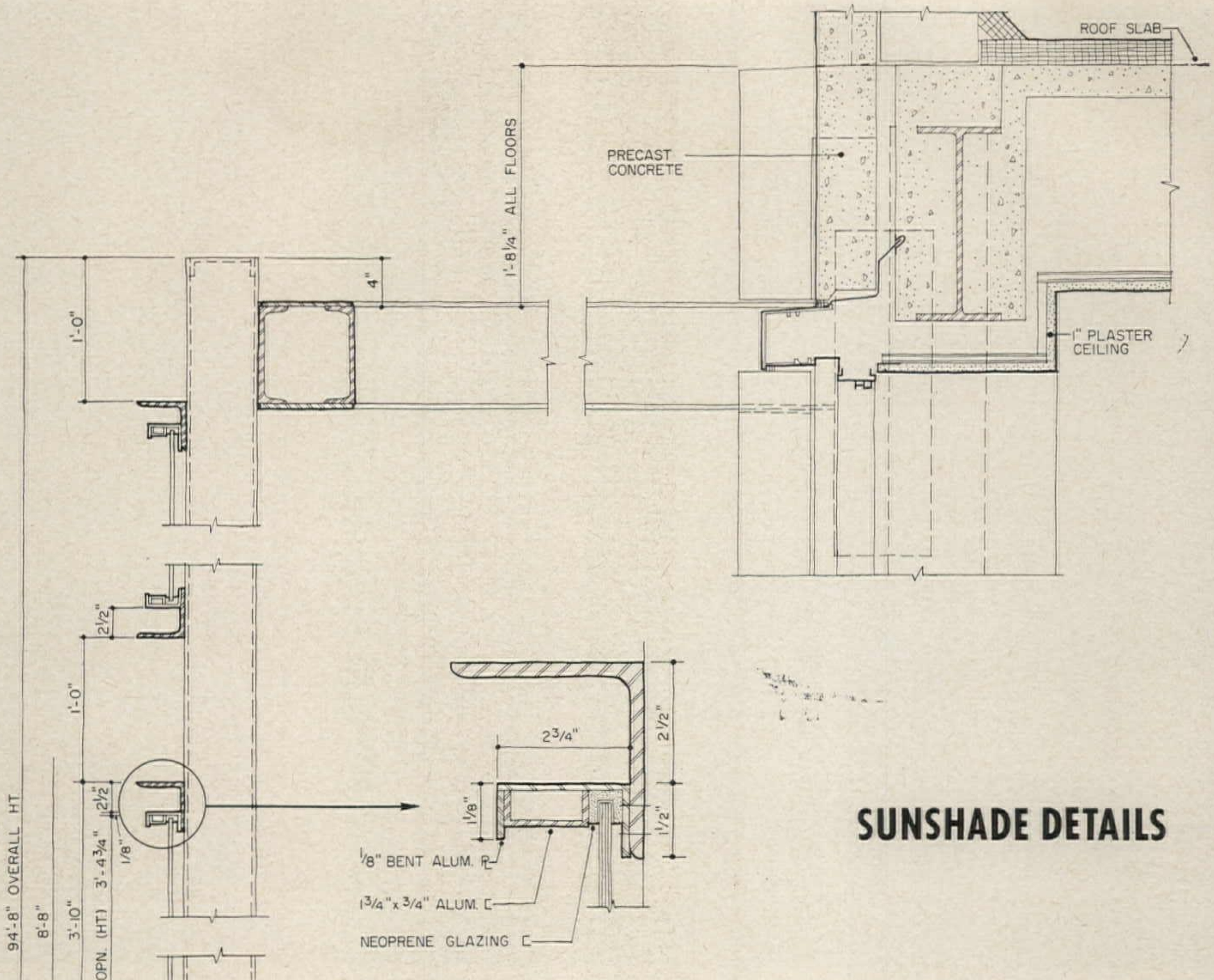
The colors of the building range from the beige exposed aggregate of the precast panels and tan brick to the darker brown of the interior finished wood to the gray and black of the sunscreen; this dark tonal range calculated to create a masculine character.

The building will house 450 men and 10 proctors, arranged in five two-floor units. Each unit accommodates 90 students and includes its own lounge, study and typing area, as well as complete laundry facilities. A large lounge and a dining room for 300 occupy a large part of the ground floor, the remainder of which is given over to kitchen and services. This building is the first of two which will eventually occupy the block; a common kitchen will link the two. The architects were awarded a "Citation for Excellence" by the Philadelphia Chapter of the A.I.A. for the design of the dormitory.

Cortland V. D. Hubbard photos

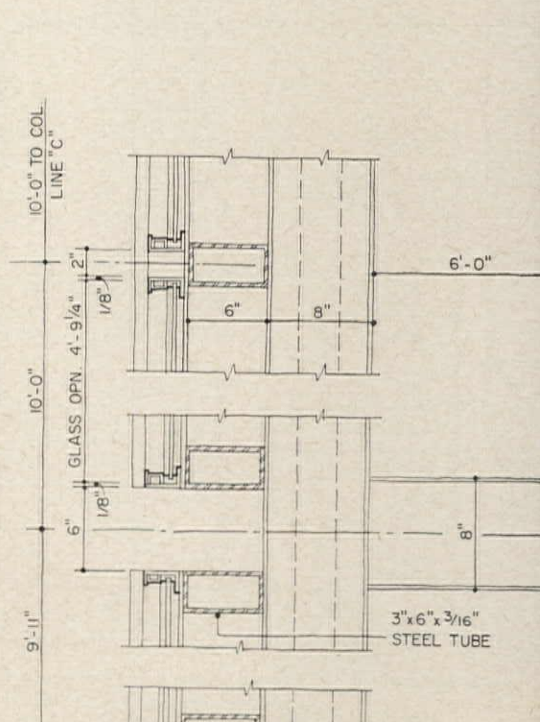





## SECTIONS

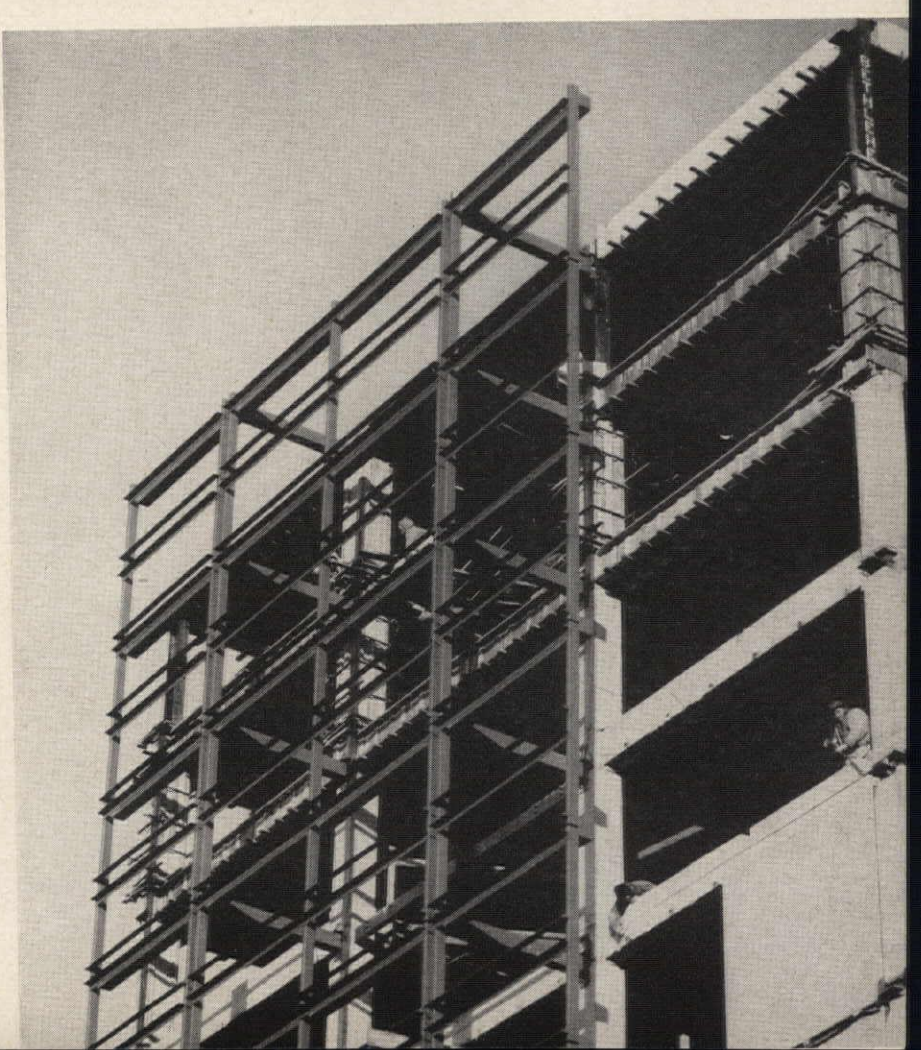
## SUNSHADE DETAILS

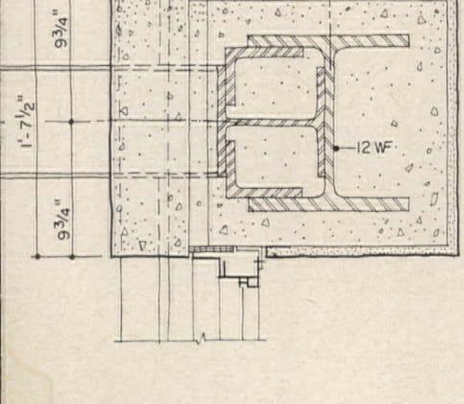


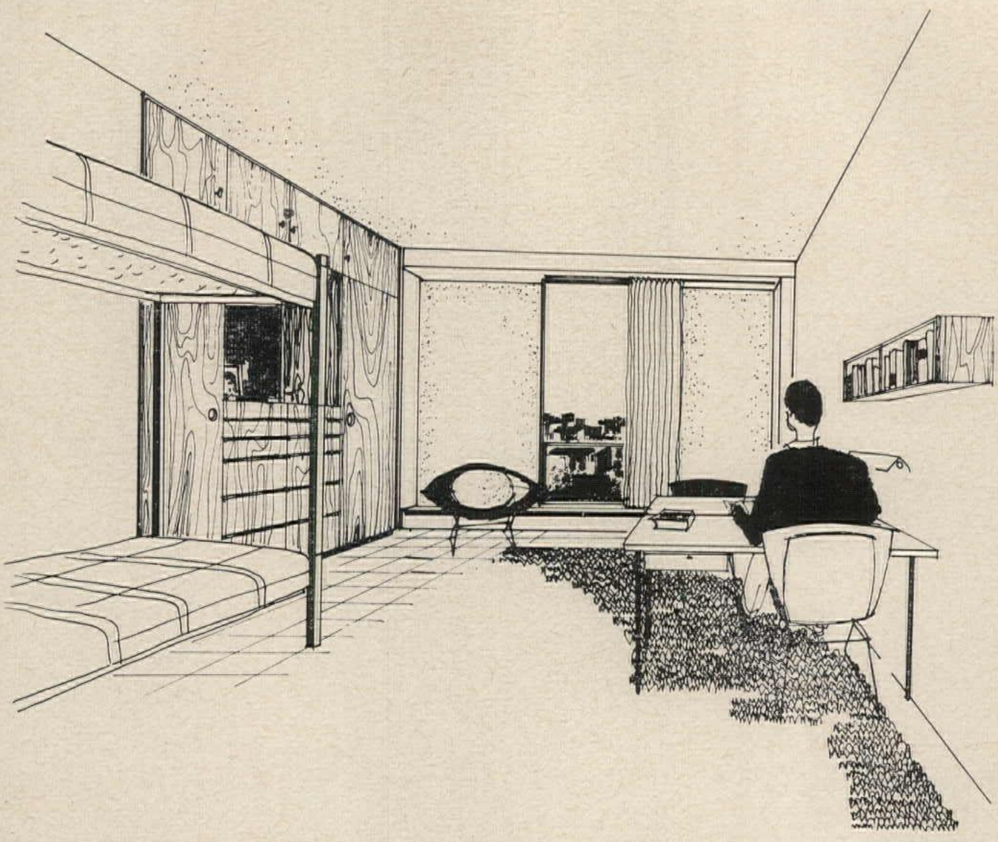

## PLANS

The 10-story-high sunscreen of gray glass and metal stands free of the building mass so its absorbed heat may be dissipated into the air before reaching the façade. The glass panels do not form a single large, unbroken expanse, but are articulated with the floor heights by means of gaps at each level, giving the whole a better scale and lowering wind resistance. In keeping with the masculine character of the building, the metal work is painted black—except for the small glass beads, which are of natural aluminum and create a pleasantly contrasting pattern of fine lines. The screen was designed to withstand 120 mph winds, since the building may conceivably be exposed to hurricanes.

The sunscreen is designed to protect the two-story-high, glass-walled lounges that occupy alternate upper floors. The lounges are oriented to the west and serve 90 students each.







A typical room—shown above in a sketch by the architect—is designed for two students, and includes a prefabricated, built-in double wardrobe and dressing unit with mirrors and drawers. These units are of natural oak, stained dark. Floors are vinyl-asbestos tile in a color to correspond with the color scheme of the room. Rooms are painted in a variety of colors ranging from warm to cool in tone as one moves around the plan in order. The hangings at the windows—furnished by the university—are of a natural colored fabric throughout the building.

The ground floor lounge is shown below at left, and a typical upper floor, two-story lounge at right. All finished woodwork is of oak, stained dark

Joseph W. Molitor

# Good Church Design on a Big Budget

Since most congregations can no longer afford to spend $1,500,000 for a church and school, St. Mark's Episcopal Church in New Canaan, Connecticut is in a class by itself. The architects, Sherwood, Mills and Smith, have taken brilliant advantage of the opportunity to design within a generous allowance

Joseph W. Molitor

Entrance façade as seen from sidewalk

*St. Mark's Church, New Canaan, Connecticut*

ARCHITECTS: *Sherwood, Mills and Smith*

STRUCTURAL ENGINEERS: *Werner-Jensen and Korst*

MECHANICAL ENGINEERS: *B. F. Greene*

LANDSCAPE ARCHITECT: *V. Cerasi*

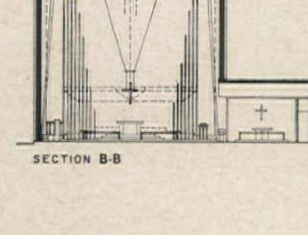
GENERAL CONTRACTOR: *Frank Mercede and Sons*

CABINET MAKER: *Joseph E. Rhodes*

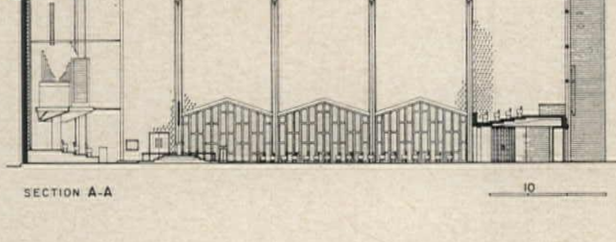
SCULPTOR: *Clark B. Fitzgerald*

STAINED GLASS WINDOWS: *The Willet Stained Glass Studio*

CARILLON CONSULTANT: *Arthur L. Bigelow*



SECTION B-B



SECTION A-A

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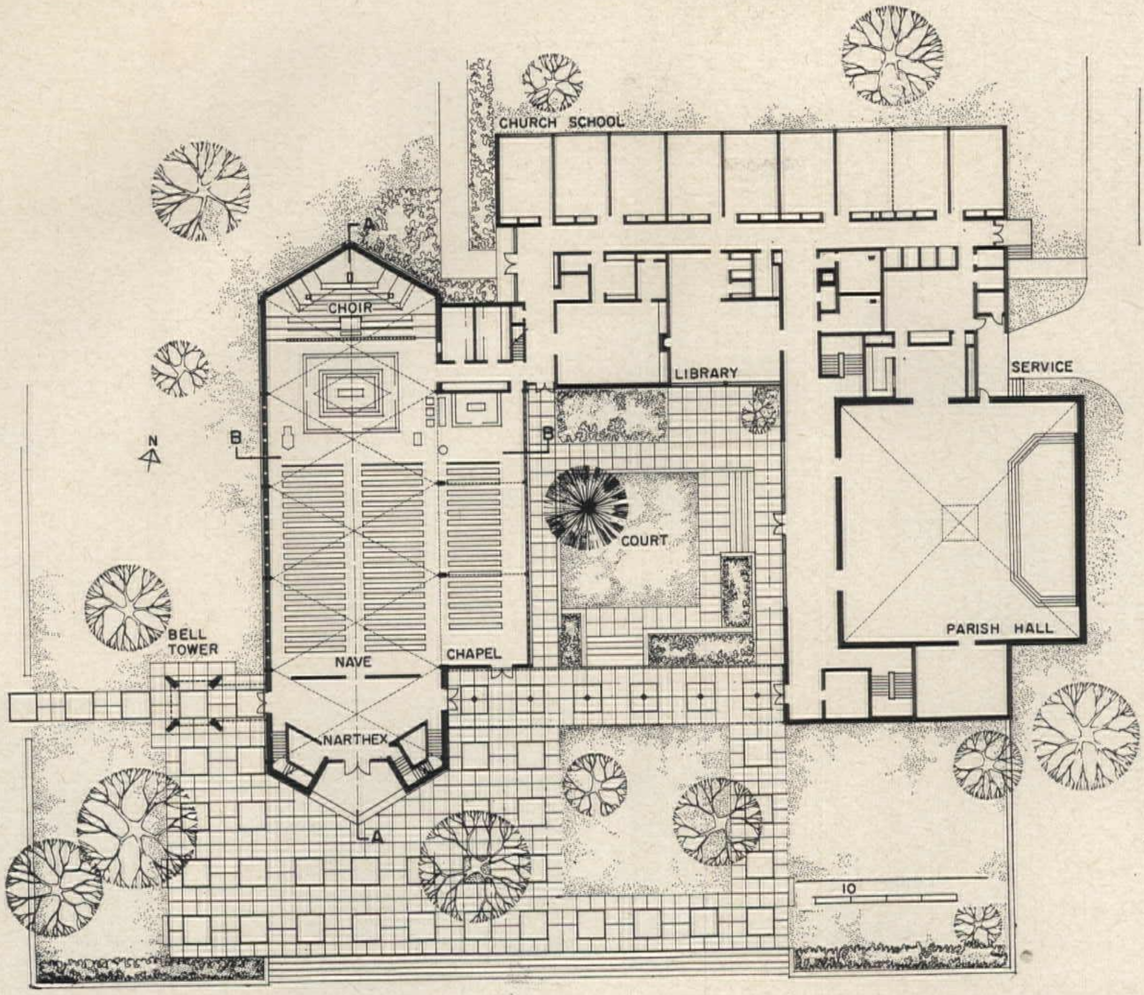
St. Mark's may become a place of pilgrimage, where cost paring architects are briefly consoled in the contemplation of the sources of architectural enrichment available to a prosperous congregation.

The church is placed toward the north of the site, well back from the sidewalk to the south in a nicely landscaped park of its own. It is a big building by present day standards, properly scaled for its size. It seats 700 people. The church proper is 169 ft long and 52 ft wide, with a side chapel 80 ft long and 24 ft wide. The nave is 56 ft high and is formed by triangular vaults supported by 13 precast reinforced concrete columns. The columns are tapered to be wide at the top where they join the vaults and where the stress is greatest. The columns are 40 ft high and weigh 16 tons each. Between each pair of columns are infill walls of patterned buff colored brick 18 in. thick. A negative joint where column and wall connect expresses the fact that the column, not the wall, is the supporting member.

To the west of the narthex is a bell tower, topped by a bronze cross. It houses a carillon made in France. The tower is constructed of four tapered reinforced concrete columns, each 117 ft high, which form a double-crossed arch at the pinnacle. The carillon consists of 20 bronze bells varying in weight from 110 pounds to 3,100 pounds, which are operated manually by a bell master from a keyboard in the tower. Two bells hung to swing in a peal as well as to be played by the keyboard can be rung by hand by means of rope pulls, extending to the base of the tower.

The parish hall lies to the east of the church and chapel, and is connected to them by the church school which consists of a bank of nine classrooms, each measuring 15½ ft by 25 ft. These elements are grouped around a central landscaped court.



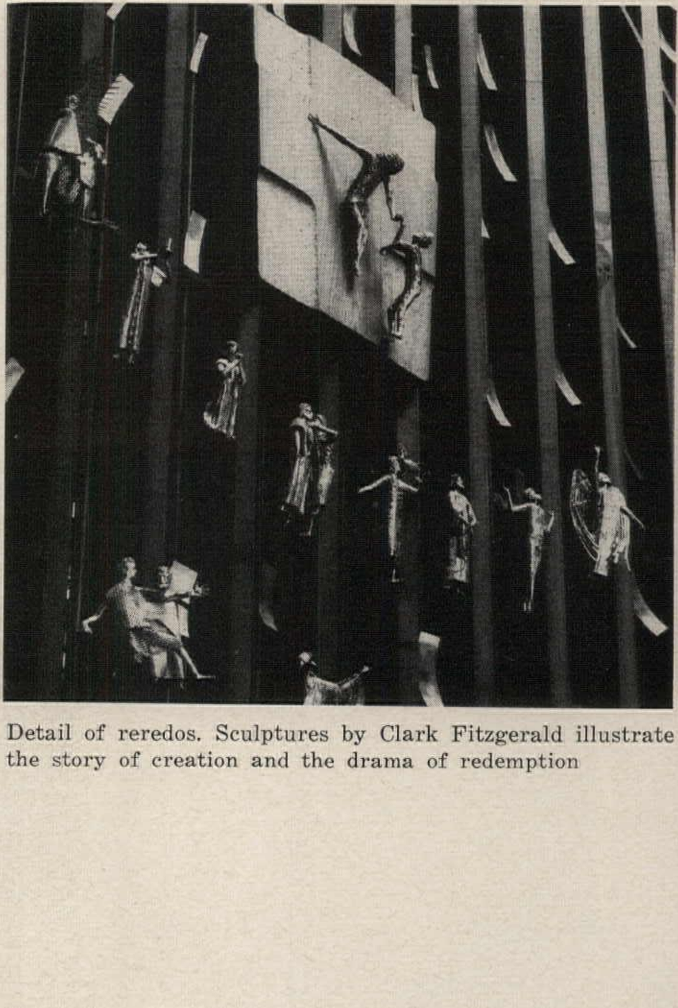

Church and chapel as seen from landscaped court

*Malcolm Smith/ Architectural Graphics Associates*

Joseph W. Molitor

*Above*: behind the altar is a free standing reredos made of dark-stained Philippine mahogany, ornamented with copper and brass sculpture. It separates the 50-seat choir from the sanctuary and nave, permitting the singers to see but not to be seen, and concealing the organ and pipes from the congregation. Screen and altar are illuminated by skylight above

Malcolm Smith/ Architectural Graphics Associates



Detail of reredos. Sculptures by Clark Fitzgerald illustrate the story of creation and the drama of redemption

Joseph W. Molitor

*Left*: view toward narthex. Chapel is to left of picture. Window over the entrance is known to the congregation as the "Resurrection Window." In its design, a mixture of somber blues and greens at the bottom of the window are transformed gradually to brilliant yellows and gold at the top

Joseph W. Molitor

Side chapel as seen from center aisle of nave. Three floor-to-ceiling panels of stained glass illustrate five episodes in the life of Christ. The stained glass for St. Mark's was designed by Odell Prather

Joseph W. Molitor

Parish hall has a pyramidal roof of reinforced concrete with central skylight. The structure is 72-ft square and seats 400

*Gunma Music Center, Takasaki, Japan*

ARCHITECTS: *Antonin Raymond, F.A.I.A. and L. L. Rado*

ARCHITECT IN CHARGE OF PROJECT: *Shinsaku Godai*

STRUCTURAL ENGINEER: *Takeshi Okamoto*

MECHANICAL ENGINEER: *Masahiro Oku*

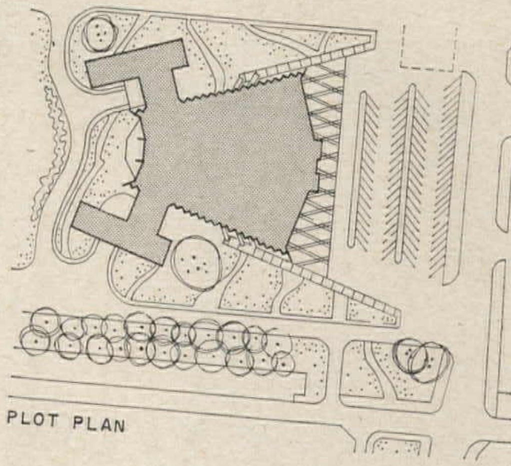
ELECTRICAL ENGINEER: *Seiichiro Gohma*

ACOUSTICAL CONSULTANT: *Akira Miki*

STAGE CONSULTANT: *Mansuke Amano*

INTERIOR DESIGN CONSULTANT: *Noemi P. Raymond*

CONTRACTOR: *Inoue Kogyo K. K.*



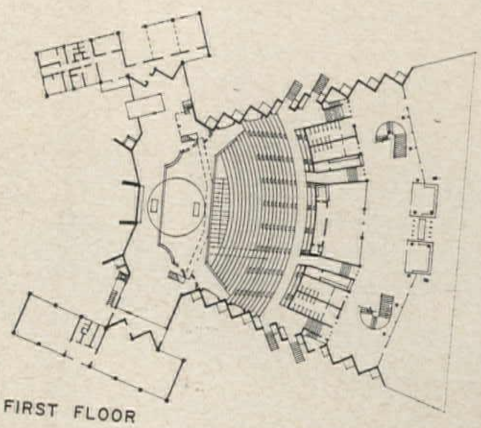
PLOT PLAN

Japan's traditional Kabuki theater requires a close relationship between the audience and the actors, while at the same time the sheer number of its performers calls for a huge stage. In a full Kabuki performance, action and sets are designed for proscenium openings of 100 ft. A shallow and wide seating arrangement is customary, as is the use of the *hanamichi* or runway which brings the actor from the front of the stage directly into the audience. The requirements for a Kabuki stage dominate the plan for the Gunma Music Center, and the essentials for the symphony orchestra are fitted within this framework.

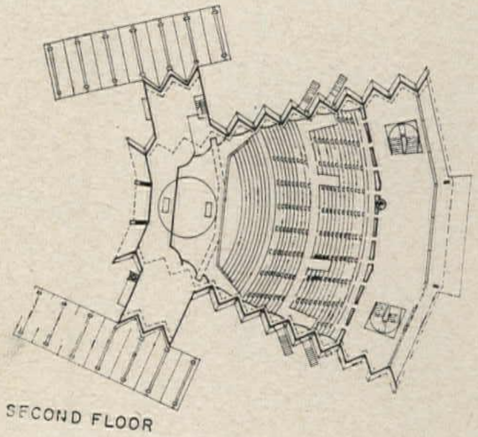
A strict budget called for a simple structure. Raymond decided to eliminate the standard fly gallery into which flats are hoisted, and to provide horizontal space in the wings instead. It was possible, therefore, to make the ceiling of the stage the same height as the auditorium and lobby and to enclose the total space (455,000 cu ft) in one structure.

To span the wide spaces required by the Kabuki plan, Raymond devised a continuously shaped folded slab. Walls and roof are one. They are built as a thin folded sheet of concrete which acts as a single shell covering the lobby, auditorium and stage. Similar to the structural form used by Nervi to enclose the UNESCO Conference Hall in Paris, and to Breuer's design for the church at St. John's Abbey in Minnesota, this building can also be compared with Raymond's design for St. Anselm's Church in Tokyo built in 1955. (See ARCHITECTURAL RECORD, November 1956.)

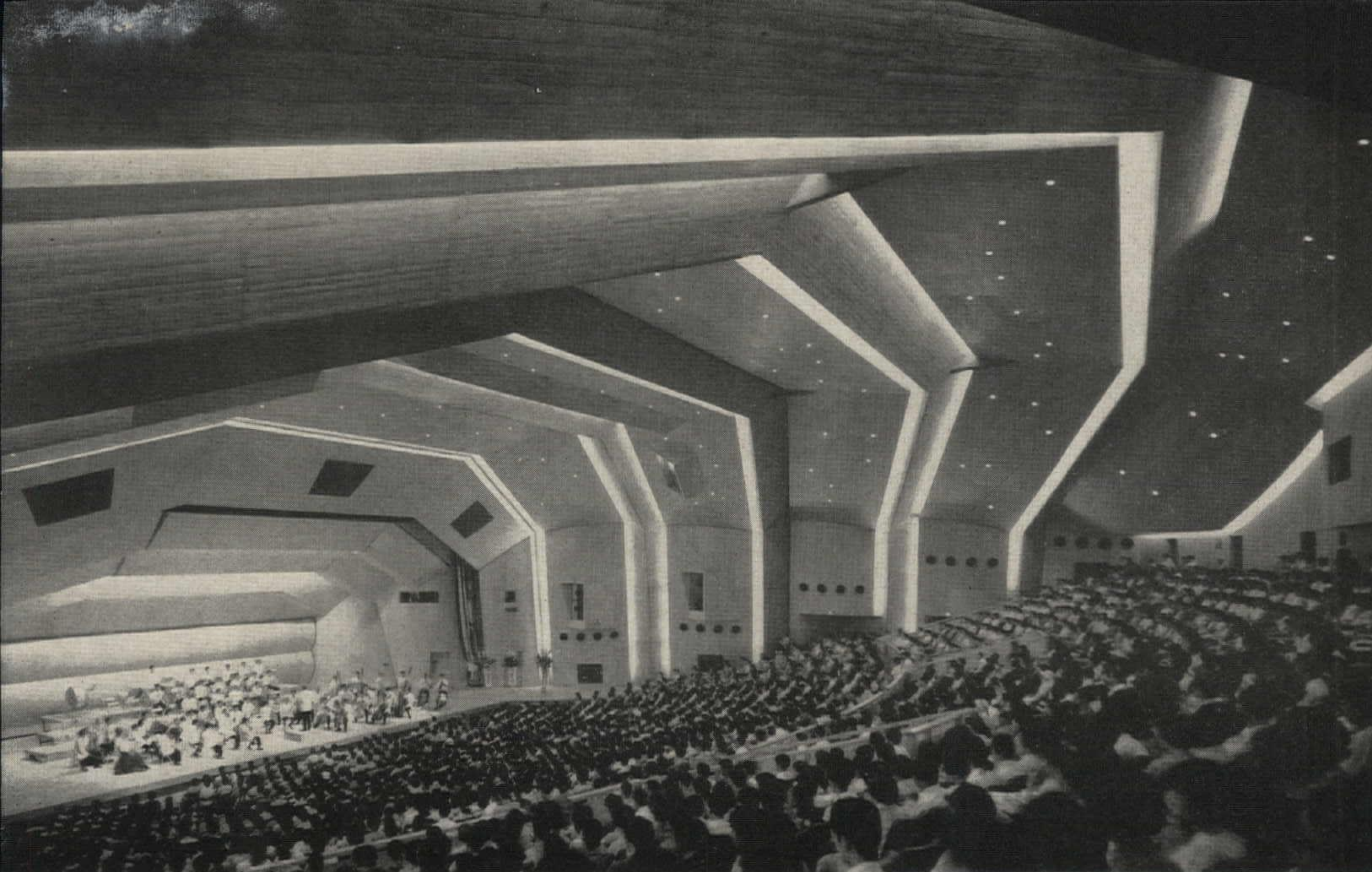
The fan shaped auditorium was carefully designed to seat 2,000 people all on one floor. Eliminating a balcony not only decreased construction costs but it had another salutory effect in the view of the architect. Said Raymond: "There are no balconies, and I believe the vision and the hearing are equally good and equally comfortable from every one of the 2,000 seats, which makes this theater democratic in the real sense of the word."



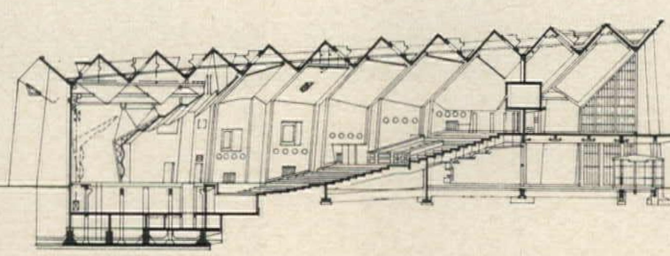
FIRST FLOOR



SECOND FLOOR

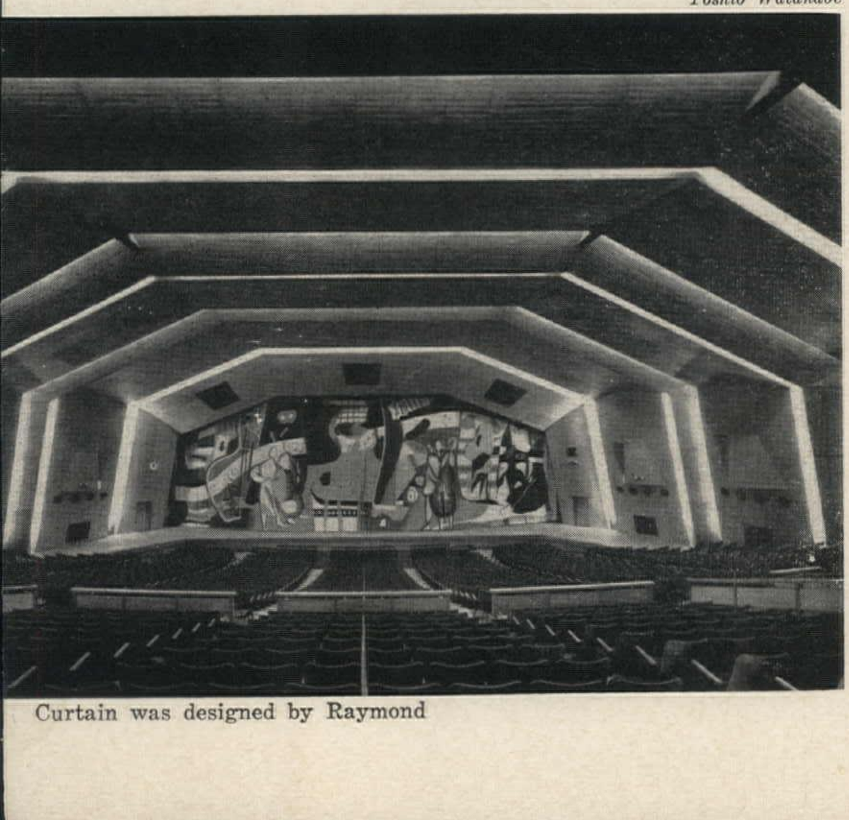


Yoshio Watanabe



SECTION

Yoshio Watanabe



Curtain was designed by Raymond

The designer specified perforated plywood panels on the walls and ceiling. At the wall they conceal air handling equipment, note portholes in photographs above and at left; and on the ceiling they conceal catwalks, spot lights and indirect fixtures as well. Akira Miki, the acoustical engineer, describes his devices as follows: "The folded plate sidewalls are covered with curved wood panels to obtain even sound distribution. The ceiling is similarly treated and each panel is hung at a different angle to direct the sound properly. The concrete surfaces behind these perforated walls and ceiling panels are treated with sound absorbent material for the purpose of absorbing noises originating in the audience. To solve the problem of the different acoustic requirements of Kabuki and a symphony orchestra, a special retractable proscenium mask was designed and this can be arranged to provide four different proscenium widths for various types of performance. The symphony orchestra acoustics were improved by designing a sound projection board which, when put in place, completes the auditorium space and encloses the orchestra and audience in one space. This sound panel is retractable." See section at left

Tensile beams connect all unit arches together, pulling them toward the rear of the building *Yoshio Yatanabe*

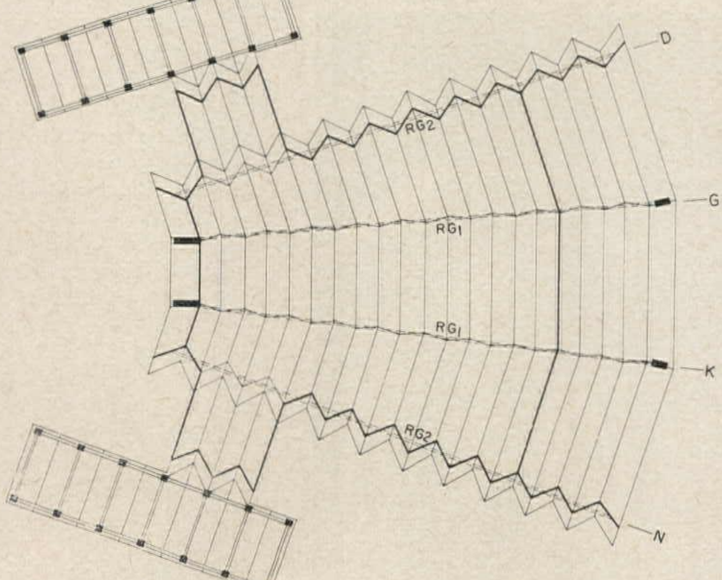



FIG. 1(A) ROOF FRAMING PLAN

Takeshi Okamoto, structural engineer for the Gunma Music Center, here describes the structural system: "The main portion of this building has a fan-shaped plan, 197 ft wide along the façade. The structure of this portion consists of walls of folded plates on both sides and a roof of folded plates jointed thereto. The walls are inclined 12 deg and 16 sec toward the inside.

"Loads are carried by each two-hinged arch, shown in Fig. 1(C) as D, D′, G, K, N′ and N, which is formed by continuous folded plates having a V-shaped section and comprising a unit combination of roof and walls. Each arch does not stand along a vertical plane, but inclines toward the front of the building along an arch formed by the rows of audience seats. See Fig. 1(A). This subjects each unit arch of folded plates to the forces that work to capsize it in the direction of the front of the building. To resist these forces and keep the arches in position, tensile beams $RG_1$ and $RG_2$ in Fig. 1(C) are provided connecting all unit arches together at the corners shown as D′, G, K and N′ in Fig. 1(C) and pulling them toward the rear of the building. These tensile beams are anchored at the end in the large buttresses which are rigidly connected to the basement wall. Refer to Fig. 1(B). The tensile beams serve also as stiffeners for each folded plate."

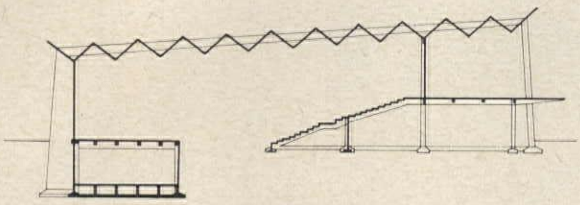


FIG. 1(B) LONGITUDINAL SECTION

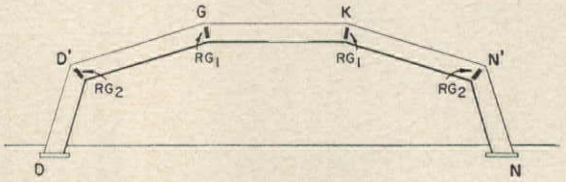
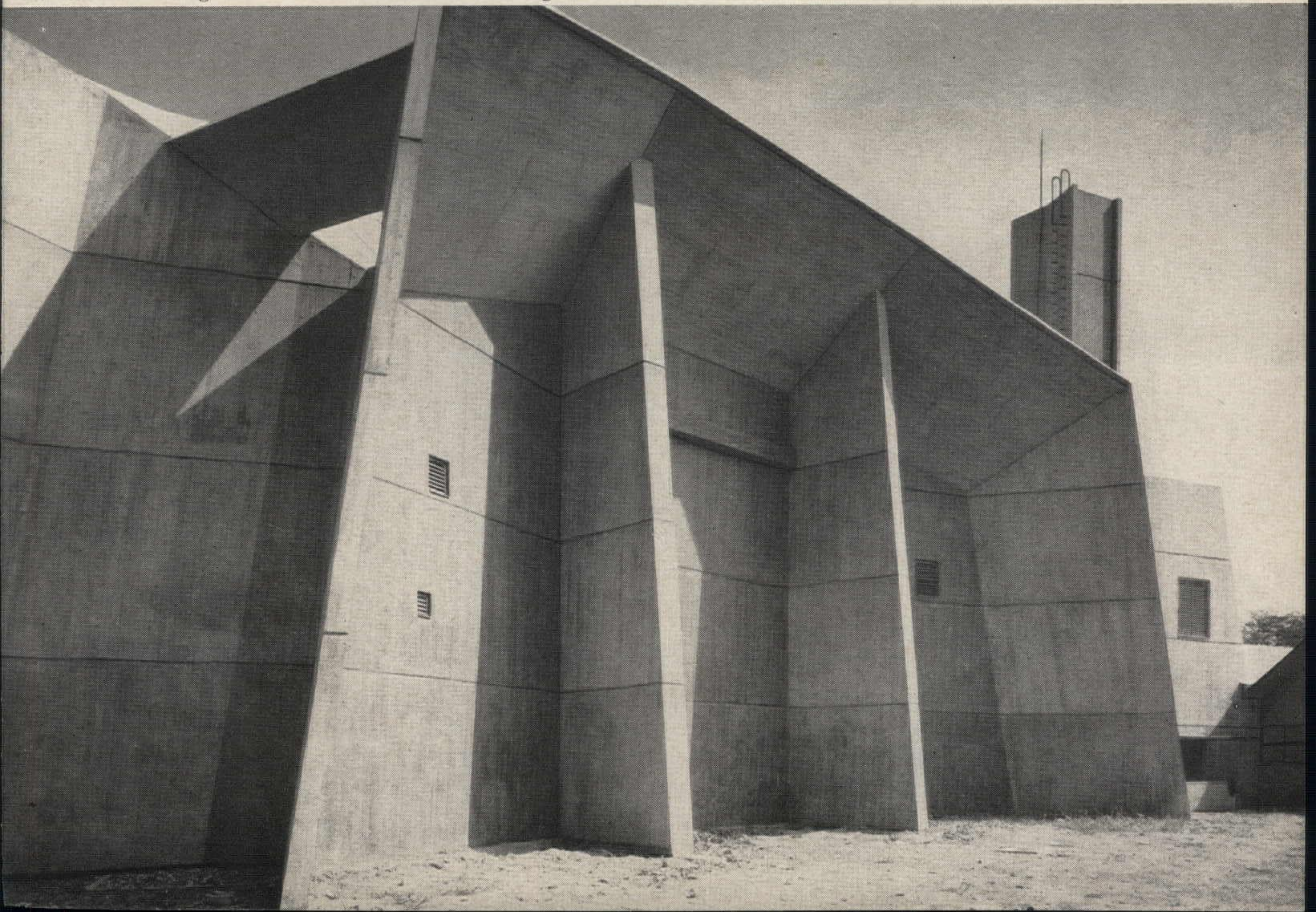



FIG. 1(C) TRANSVERSE SECTION

At rear of building tensile beams are anchored in large buttresses



Yoshio Watanabe

Upper lobby fresco designed by Raymond and executed by local artists

Lower lobby

# INDUSTRIAL BUILDINGS

## PLANNING INDUSTRIAL RESEARCH FACILITIES

Correlating the major factors that influence planning, location, design and construction of industrial research facilities with industry's new concern for the researcher's working climate and the vital need for flexibility

*By Frank L. Whitney,*
*President, Walter Kidde Constructors, Inc.*

Today's research facilities are gravitating to suburbs that have high educational standards. This is a direct attempt to attract and stimulate researchers, who are hard to find and even harder to hold.

Obtaining the best site involves much more than finding a large plot somewhere in the suburbs. Evaluation of both living area and building site must be made in detail, item by item. For example, researchers consider the caliber of local education the most important factor in picking a laboratory site; not only for education of their children, but as an index of the community's cultural level.

Another important community factor is access to a university to permit researchers to take graduate courses and rub elbows with fellow scientists. Other factors of community evaluation are the obvious ones: available housing, taxes, recreational and cultural activities, churches, medical facilities, distance to a metropolitan center and the quality of local government. (With experience, architects can assign weighting values to the various factors and develop a kind of scoring system for comparing sites.)

In building site evaluation, the most weighty factor is the combined cost of land and construction. Others are site acquisition costs, utilities, taxes and proximity to corporate headquarters. Advancements in soil technology and land reclamation make possible the salvaging of sites that might have been abandoned only a few years ago.

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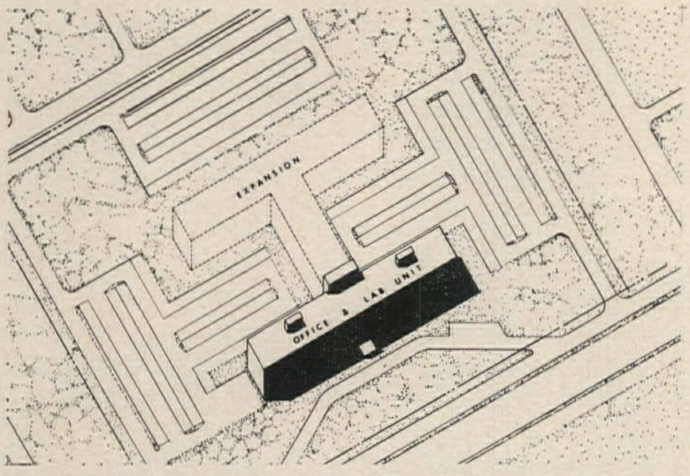
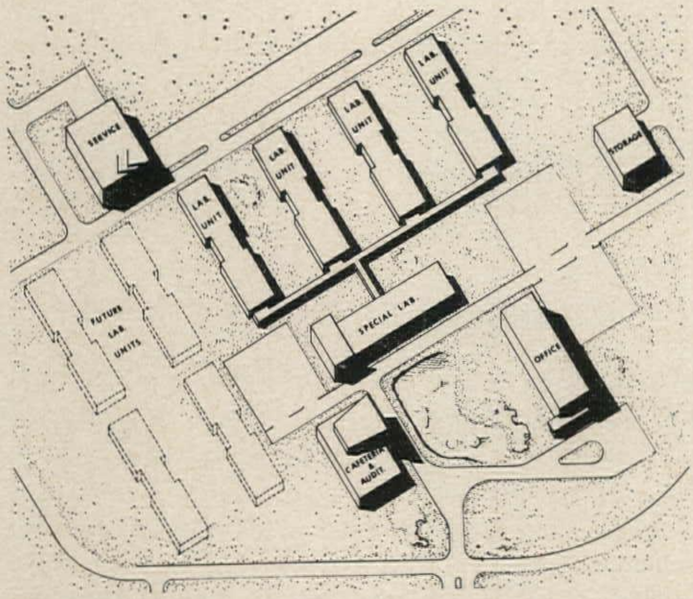
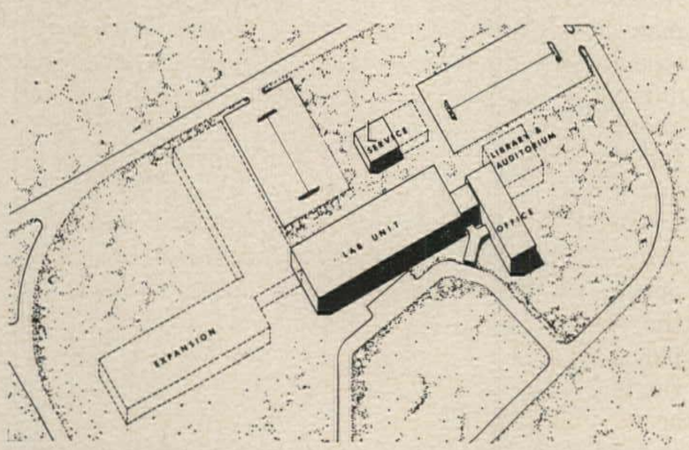
Text is condensed from a report based on a nationwide survey of laboratory design practice




The single structure laboratory and office unit is well adapted to research programs of definite or limited objective and to a restricted site. It provides internal flexibility, but expansion may be costly or disruptive




The campus plan permits separation of projects in a varied research program and easy expansion on a generous site, but it is costly to build and poses some problems in service distribution and inter-unit communications




The articulated plan is a reasonable compromise between the single building and campus plans, permits isolation of hazardous operation, but may develop problems in service distribution and communication between add-on related units

## MASTER PLAN

The master plan begins with a prediction of the ultimate research program, the number and size of laboratories and offices in terms of the number of researchers per unit. Although the facility's overall area can be related directly to its population, the shape and dimensions of the research complex depend more on the pattern of expansion. For example, a highly diversified company might consider it necessary to segregate projects in separate structures, whereas a more specialized company might prefer to handle research as a tightly knit operation under one roof.

In any case, the master plan should accommodate independent expansion of all facilities—laboratories, administrative offices, amenities and service structures—and without sacrificing a high degree of insulation from site surroundings. Ideally a site should be at least four times the area covered by the buildings. Some zoning regulations permit only five per cent maximum coverage. Once the basic objectives of the research program are defined, it is better to design to a specific site rather than to an ideal site and later attempt to adapt to actuality. Regulatory bodies, state and local, vary greatly from area to area in their building and site restrictions and code requirements.

Obvious influences of site on design are topography, utilities, views, and appearance to the public. Less obvious ones are underground conditions, solar heat loads, and approaches. Then too, there may be special requirements of the operation, such as hazards, security, unobstructed ranges for testing, equipment, etc.

Regardless of the size of the facility—whether it's a single building or a complex—the following four distinct building areas are usually necessary:

1. Laboratory (experimental areas, researchers' offices, conference rooms, mechanical and storage rooms)
2. Administrative (executive, administrative staff and clerical office space)
3. Amenities (library, auditorium, cafeteria)
4. Services (boiler plant, cooling equipment, substation, water supply and storage, sewage disposal, warehouse, shops, pilot plants or any other support services, parking lots and roads)

The arrangement of these four basic building areas depends largely on two factors: (1) the ability of all areas to expand independently, and (2) the need for maintaining good circulation between laboratory and all other services.

Too often, to save a few dollars on piping, a boiler plant, for example, is located where it not only gets in its own way, but strangles expansion of other areas. For ease of personnel circulation, centralized lab facilities such as computer or distillation rooms (technical staff services) should be near administrative areas, but a definite amount of isolation is often desired to maintain security and to prevent excessive traffic. Thus, it is wise to provide cafeteria, meeting rooms and auditorium with convenient access from the main lobby. This permits free access without disturbing lab personnel. Separating service areas from the lab also has the same advantage of reducing noise and disturbance. Placing administrative and reception areas on the front of the building complex is also desirable because they lend favorable "corporate face."

## BUILDING ARRANGEMENTS

Research facilities generally fall into one of three basic physical arrangements of structures:

1. Single building
2. Campus plan
3. Articulated building

Single structure, while most economical, has minimum flexibility and is best suited for a restricted research program. Advantages are building economy and easy internal rearrangement. Disadvantages lie in problems of isolating operations, limited expansion, disruption of work when expansion is required and difficulty in adapting to an irregular site. The single building may be practical only when a company can predict positively the exact nature and size of its research program.

When a single research building requires a floor area of about 50,000 sq ft or more, it probably should be constructed as a multi-story facility. Beyond this point, communications and circulation in the one-story plant become difficult and inefficient. Personnel prefer to climb a flight of stairs rather than walk what may often be the length of a football field on one level.

The campus plan is well suited to an organization of essentially non-related functions. Advantages are the ability to separate operations, easy expansion of units and pleasant atmosphere. Disadvantages lie in increased cost of both structure and service distribution and difficulties of communication.

The articulated plan, an effort to combine most of the advantages of the first two, is a series of interconnected smaller building units. These units may be single or multi-story or a mixture of both. This concept retains most of the expansion potential of the campus plan, but has better supervision and communications. Disadvantages are in the moderately high cost of service distribution and communications between interrelated subjects. More expensive site development plus extended services gives the articulated facility a higher price tag than the single structure, but if a company can reasonably predict growth in substantial increments, the articulated plan is ideal.

## LABORATORY LAYOUT

The laboratory building consists of four basic elements: experimental rooms, office areas, pipe chases and corridors. A variety of floor plans incorporating these elements is possible, depending upon the nature of research and the degree of privacy desired. Development of the most suitable design demands careful integration of architectural layout with mechanical and electrical installations. It is poor policy to adopt a layout first and then try to make mechanicals conform to it.

Broadly speaking, there are two classes of laboratories—the dry type for physical research; the wet type for chemical and biochemical work.

Regardless of the type, the optimum number of researchers per experimental area ranges from one to four, with two the most common. A larger number usually has an adverse effect on privacy and working conditions.

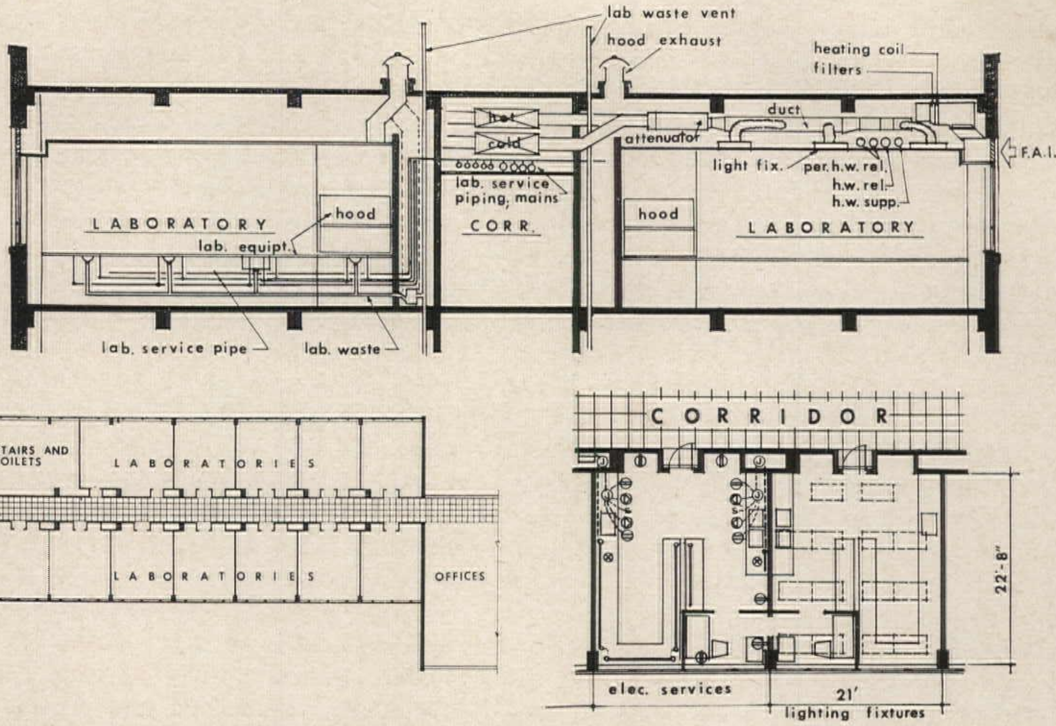
Other design criteria depend largely on the nature of research. In dry labs, for example, flexibility in terms of movable partitions is most important to permit changes, expansions or introduction of new research projects. Also, the nature of physical research is such that constant attention to apparatus is not usually essential, but the researcher should have a separate private office where he can carry on theoretical work. In wet labs, scientists prefer to stay close to their experiments, so there is a trend in wet labs to incorporate the office into the experimental area.

Physical research usually involves a larger number of theoretical scientists than does chemical research. Hence, dry laboratories generally have a higher ratio of office to laboratory space than do chemical labs. At times offices for physical scientists may be separated from the laboratory wing, as in the case of mathematicians using computers.

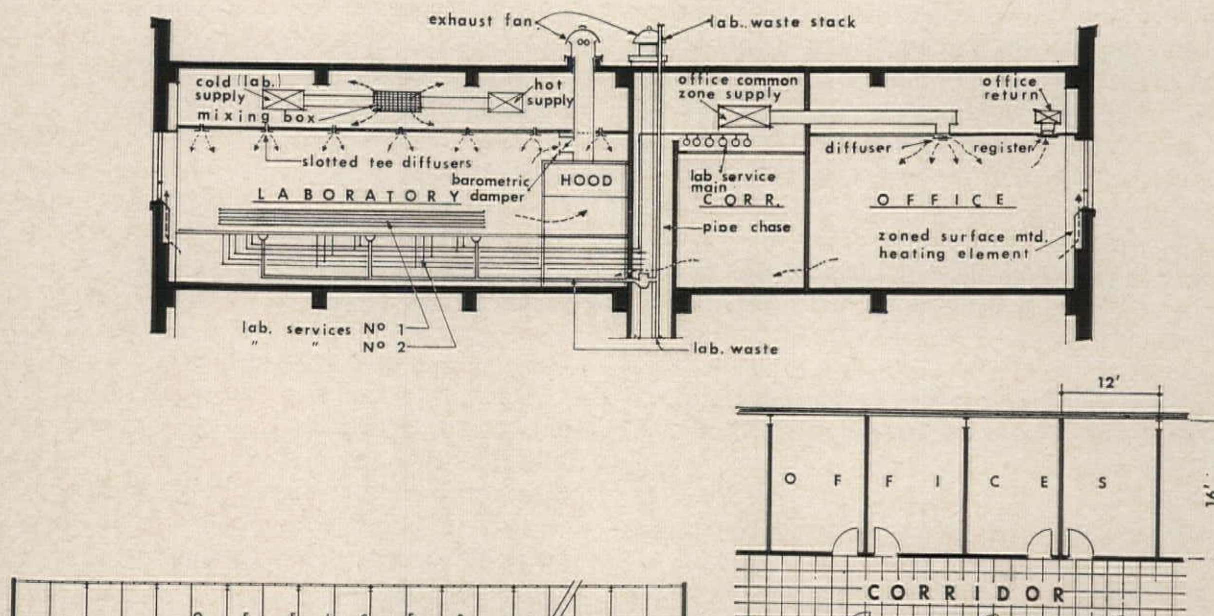
## MODULAR DESIGN

A laboratory designed on a modular plan permits maximum flexibility. Once the module is created, a variety of floor layouts can be worked out or altered during the design stage. The modules can be shifted about somewhat like building blocks until a satisfactory arrangement is obtained. Designing without a module makes changes costly and difficult.

Surveys of various organizations have failed to provide any hard and fast rules for determining optimum size or population of modules. The depth of the module depends upon the linear feet of bench per researcher. The width is governed by whether the lab is wet or dry, the number of people who will occupy the unit, portable equipment, size of pipe chases, fume hoods and the need for internal partitioning. Experience indicates that the optimum width in dry laboratories is 5 to 6 ft and in wet labs, 10 to 11 ft.




**1** Typical layout for center corridor with labs on each side can provide office cubicle or desk space in laboratory area or adjacent wing depending on whether proximity to work or isolation for study is predominant factor. Mechanical services shown in section at top are similar on each side of corridor. Details suggested may vary




**2** Off-center corridor with offices on one side and labs on the other provides extra office space for theoretical physical research. Hood exhaust for contaminated work would be vented far from any intake. Narrow doors between labs might be provided at outside wall. Electrical requirements may be extensive and cooling loads may be high

In planning the module, mechanical and electrical considerations are far more critical than architectural elements—such as window mullions or ceiling panels—which are available in virtually any measure. But mechanical and electrical services are far less flexible. They are costly to redesign or alter.

In addition human considerations must be taken into account. Foremost among these are safety factors: multiple exits from all laboratory units, elimination of dead-end aisles, properly located safety showers and eye wash fountains. Also, the psychological value of proper window treatment should not be overlooked. Outside orientation—an occasional glimpse of blue sky from either the office or the laboratory—can contribute to a pleasant and creative working environment.

The examples which follow show the general arrangement of four typical laboratory units and associated services. The drawings do not apply to specific laboratories, although with some modifications they may serve as a guide to designs for special requirements.

1. CENTER CORRIDOR WITH OFFICE CUBICLE IN LABORATORY AREA. *Assumed occupancy: pharmaceutical or chemical research*

This layout, with an office enclosure in each lab, is popular where the scientist prefers to be as close as possible to his experiments. Chief disadvantage is the elimination of every other pipe chase to make room for office enclosures.

It is possible, of course, to remove the office space from the labs to a separate wing, thus concentrating service distribution, but this is usually unpopular because of distance and lack of privacy.

*Heating, ventilation and air conditioning.* This project requires extensive fume hoods. To minimize conditioning loads for make-up air, outside air is supplied to the ceiling plenum, heated in winter, and directed by fans to the top of the fume hoods. This system reduces by two-thirds the amount of conditioned room air required to make up for fume-hood exhaust.

Where heat gains are large and variable, a high velocity, dual duct system can provide means for automatic individual room control. Air distribution shown is through combination air-light troffers. Other diffusers or perforated ceiling would also be feasible. Typical design air conditioning load per 1,000 sq ft would be about 6.8 tons, with make-up air (0.6 cfm per sq ft) and lights comprising about half the load.

Laboratory services are distributed vertically through chases with access from the corridor.

Electrical service at fume hoods consists of duplex plug receptacles for single phase, 120-volt, 60-cycle, AC power. Power stats for variable voltage at 60 cycles AC are mounted on the apron of the hood. Laboratory benches are provided with plug-mold having 120-volt AC receptacles, spaced 18 in. on centers and 208-volt receptacles limited to two to each 21-ft laboratory module.

2. OFF-CENTER CORRIDOR, OFFICES ONE SIDE, LABORATORIES OPPOSITE. *Assumed occupancy: electrical and physical research, including radioactive and contaminated materials*

Because offices are narrower than labs, this layout produces more offices than labs—a desirable condition for handling the high ratio of theoretical work in physical and electronic research. It is particularly economical in a multi-story structure, because runs of utilities are not lengthened by introduction of office space between or within labs. Because of the tendency of this layout to develop along fingers of circulation, it is most practical in a fairly small plan.

*Heating, ventilating and air conditioning.* Outside air loads are high because of exhaust through hoods by constantly operating fans. Thus laboratories are maintained under negative pressure and are provided with 100 per cent fresh air. Internal heat gain is relatively high and variable. The dual duct system provides excellent automatic individual room temperature control for laboratories under variable load conditions. The use of the ceiling as a supply plenum effects uniform air distribution at low velocities. The office areas are separately zoned for smaller quantities of outside air with substantial recirculation.

Design air conditioning load averages about 8.5 tons per 1,000 sq ft, of which about 4.7 tons is imposed by outside air supplied at 1.8 cfm per sq ft.

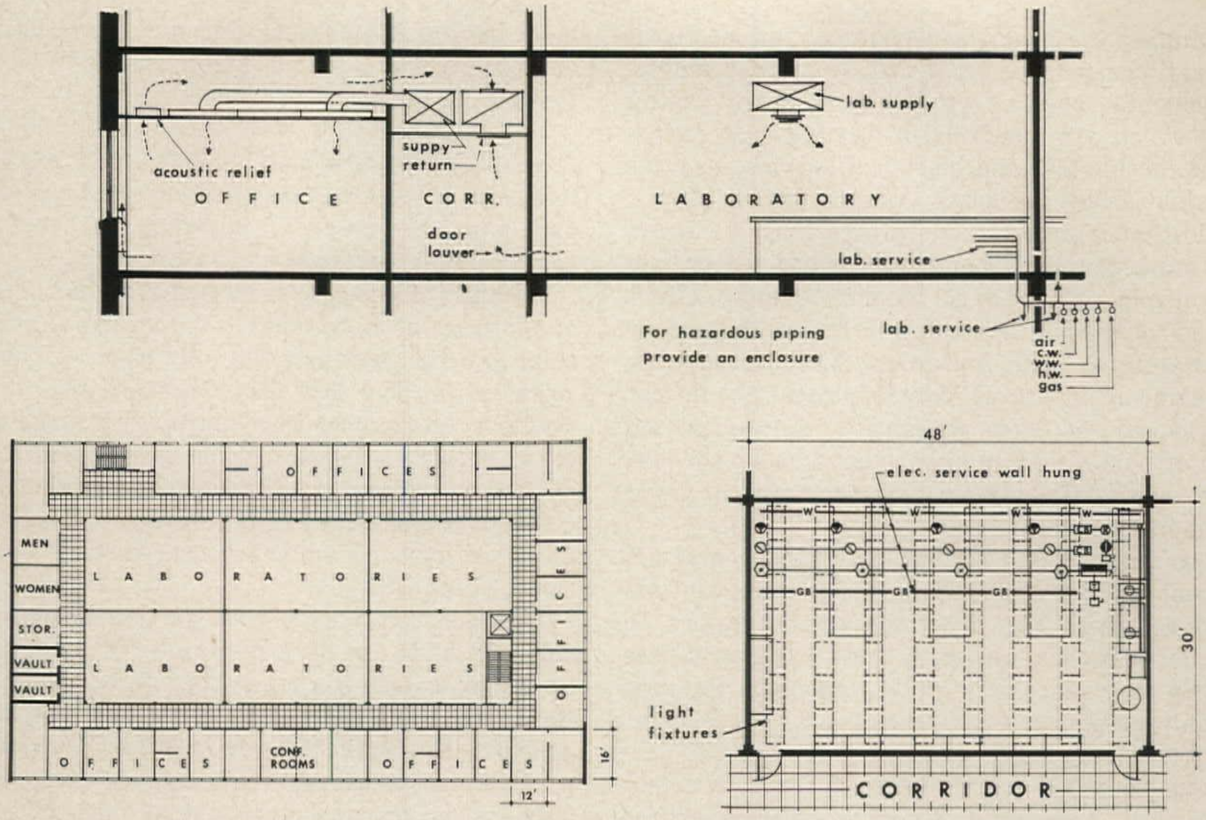
Services are extensive and subject to frequent change. They are therefore distributed vertically through pipe chases with access from corridors. Special waste lines, often stainless steel, are used for contaminated materials.

Electrical requirements for both AC and DC power vary considerably and cannot readily be determined except by understanding the operations of the specific application. Electrical ratings and load factors should be thoroughly evaluated to arrive at the maximum system demand.

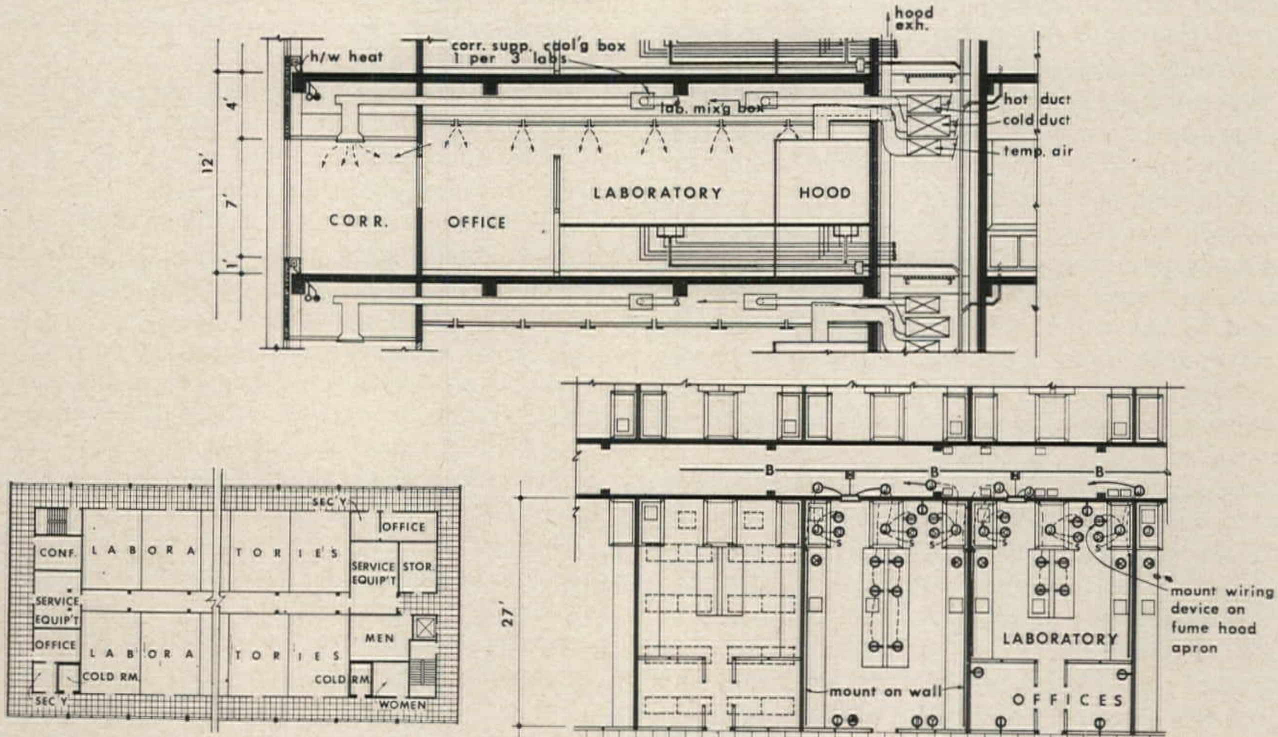
The cost of mechanical and electrical work for this type of floor plan is relatively high because of the length of service distribution lines, extensive plumbing services, and the amount of air conditioning capacity required.

3. CORE LABORATORIES AND PERIMETER OFFICES WITH DOUBLE CORRIDORS. *Assumed occupancy: electrical and electronic research*

A layout of this type is practical only with a fairly large facility—at least 30,000 sq ft. It is well suited for dry research, because it has flexibility in the core labs and a large number of offices. Concentration of labs simplifies service distribution, and




3 Core laboratories with perimeter offices make a layout suitable for large establishments, especially in "dry" research, where flexibility in lab areas is required. Service distribution to labs is relatively simple near center wall. Zoning of air handling systems is also fairly simple. Details are optional




4 Perimeter corridor with interior laboratories separated by mechanical service passageway provides easy access and flexibility for changing service requirements. Traffic and communications may be cumbersome, and workers' views of outside are limited unless privacy is sacrificed by interior window wall

this may be varied by running a service gallery either along or between the rear walls of back-to-back labs as well as under floor or over ceiling.

*Heating, ventilation and air conditioning.* Use of fume hoods is limited in electrical labs, and internal heat sources are a principal cooling load component. The example laboratory uses a simple, low velocity, zoned system, with return air discharged to corridors. The office area is similar, but is given modular flexibility and acoustical control in this example by use of air-light troffer diffusers and acoustically treated relief ducts which make the ceiling a return plenum.

Design air conditioning load averages about 4.6 tons per 1,000 sq ft of which about 1.25 tons is for outside air supplied at about 0.5 cfm per sq ft.

Electrical services are provided by power receptacles mounted on walls adjacent to laboratory benches. The benches are equipped with flexible power receptacles. Each laboratory module is equipped similarly and with rectifiers to furnish direct current. A central high frequency plug board provides variable frequency power for any location when required.

Cost of the simple mechanical systems for this plan is very low. Plan can be improved by construction of an enclosure for the horizontal run of service mains on the lower floor so that alterations can be made without disruption of laboratory work.

4. PERIMETER CORRIDOR, INTERIOR LABORATORIES WITH CENTRAL SERVICE CORRIDOR AND PLENUM. *Assumed occupancy: pharmaceutical or chemical research*

This layout is best suited to wet laboratories where offices are within the lab space. But the plan is adaptable and has served where both wet and dry experiments occur in the same building. The gallery provides good service distribution. The perimeter corridor permits striking window treatment, but it is inefficient because there is simply too much hall.

*Heating, ventilation and air conditioning.* Mechanical distribution is solved here with a central service core. Tempered fresh air is supplied to aero-balanced fume hoods by a duct system. A high velocity, dual duct system is used for air conditioning, with distribution to the room through the ceiling as a supply plenum.

Design air conditioning load averages about 6.0 tons per 1,000 sq ft, 1.2 tons of which is for outside air supplied at about 0.45 cfm per sq ft.

Service problems are similar to those in example 1, but the number of risers and maintenance problems is reduced by use of the service core.

The drawing shows an electrical layout for a pharmaceutical as well as a chemical laboratory. Location of the panelboard may be inside the laboratory along the corridor wall instead of the location shown. The center laboratory bench is equipped with pedestal type power receptacles.

## COST CONSIDERATIONS

Although each facility must be master planned to fit the needs of each research program, the following yardsticks are recommended to check planning efficiency:

1. Ratio of assignable area to gross area
2. Ratio of support personnel to researchers
3. Assignable area per worker

*Ratio of assignable area to gross.* Assignable space is that portion of the structure in which people work; gross space is the total area of all buildings. Assignable space excludes all service areas such as corridors, washrooms, stair wells, storerooms, lobby, cafeteria and auditorium.

Although there are exceptions for special conditions, about half of a facility's gross area is assignable, at least in labs of 100 or more researchers. If the percentage of assignable area is 60 or more, it's likely there is inadequate provision for services, inefficient corridors and unsuitable amenities. The reverse is true if the percentage falls much under 50. Here, it's probable that the utility of unassignable space is questionable. The facility may simply be too luxurious.

*Ratio of support personnel to researchers.* Researchers are defined here as professional scientists; support personnel consists of clerks, technicians, secretaries, maintenance workers, cafeteria attendants, etc.

Although this ratio varies considerably according to the nature of the program, common ratios of support personnel to researchers range from 1:1 to 3:1. Lower ratios are more common in basic research, where work is highly theoretical, requiring less need for technicians and other support. Applied research and development, on the other hand, depends to a much greater extent on technicians, administrators and others. Highest ratios are found in laboratories engaged in government work where, in addition to research activities, a large amount of contract administration is required.

An unusually low ratio may not indicate inefficiency if there is heavy use of outside services. Otherwise it might be a sign that scientists are overloaded with non-research work. A high ratio might mean the research program is top-heavy with administration and services.

*Assignable area per worker.* The amount of space required per person runs from 200 sq ft to 400 sq ft, including all personnel and all space. Much more than the maximum is usually inefficient; much less makes for cramped conditions.

Often overlooked is the dramatic effect that people

**TABLE 1—COST RANGES FOR LABORATORIES**

| | Dollars per sq ft |
|---|---|
| **Architectural and Structural** | |
| Foundations and first floor slab | 1.00 to 3.00 |
| Second floor slab and its structural frame | 2.50 to 3.50 |
| Roof decks, roofing and roof framing | 1.40 to 3.00 |
| Exterior walls | .25 to 2.50 |
| Interior partitions | .40 to 3.00 |
| Finishes | .25 to 3.00 |
| **Mechanical and Electrical** | |
| Fire protection | .50 to .75 |
| Building plumbing and piping | .50 to 2.50 |
| Heating plant | 1.00 to 2.00 |
| Refrigeration plant | 1.00 to 1.50 |
| Air conditioning, ventilation, etc. | 2.50 to 4.00 |
| Incoming power | .80 to 2.50 |
| Power distribution | 1.50 to 3.00 |
| Lighting system | 1.50 to 3.00 |
| Telephone and signal system | .20 to 1.00 |

**TABLE 2—PERCENTAGE BREAKDOWN OF COSTS FOR THREE SPECIFIC LABORATORY BUILDINGS**

| | Pharmaceutical | Industrial Chemical | Electronics | Average |
|---|---|---|---|---|
| Architectural | 31.0 | 39.6 | 28.2 | 32.9 |
| Structural | 14.5 | 12.0 | 23.8 | 16.8 |
| Mechanical | 44.0 | 36.7 | 26.4 | 35.7 |
| Electrical | 10.5 | 11.7 | 21.6 | 16.6 |
| | 100.0 | 100.0 | 100.0 | 100.0 |

Figures do not include laboratory furniture or yard work

have on industrial building costs. The higher the personnel density—that is, the more people per square foot of building—the greater the requirements for increased mechanical and electrical facilities to maintain worker efficiency and productivity.

## SINGLE VS. MULTI-STORY BUILDINGS

Another facet of cost determination relates to the height and number of stories. One-story structures require maximum ground area, but are most economical for building construction. Mechanical and electrical service distribution, however, is extended and expensive. Circulation and communication become difficult somewhere between 30,000 and 50,0000 sq ft—depending on the organization of the laboratories and need for physical interchange.

Two-story structures increase the cost of building construction. In addition to heavier footings and framing to carry floor loads, they require elevators to move supplies and stairs to move people. But there comes a point where a two-story building may be more economical. This depends upon savings in the distribution of mechanical and electrical services, land costs, and site configurations.

Multi-story buildings are most satisfactory for extremely large installations. However, expansion of multi-story buildings is difficult except in large increments.

## COST ANALYSIS

The cost of constructing a laboratory, including engineering, ordinarily ranges from $20 to $40 per sq ft, including land, site development, equipment and furnishings. This wide variation illustrates the difficulty of discussing laboratory costs except in very specific terms. For instance, the cost of foundations and first floor slabs usually ranges from $1 to $1.25 per sq ft. But if subsoil conditions require the driving of piles, these costs can soar to $3 per sq ft.

Much the same thing holds true for the cost of the second floor slab and its structural frame. Here, the cost can vary from $2.50 to $3.50 per sq ft. The difference lies in whether the slab requires underfloor ductwork. If it does, the floor must be poured in two lifts rather than one.

Roofing, exterior walls, interior partitions and finishes are all subject to wide variations. The difference, for instance, between a painted cement block and a window wall exterior can be quite considerable in cost as well as appearance.

An equally wide range of options pertains to the mechanical and electrical aspects of the laboratory. Partly because of this, air conditioning and ventilating costs can vary $2.50 to $4.00 per sq ft. Or the type of fire protection system and number of piped services will affect plumbing and piping costs which range from $.50 to $2.50 per sq ft. Table 1 translates the possible cost ranges for a two-story, 50,000 sq ft building.

## PERCENTAGE BREAKDOWNS

Frequently, and unfortunately, corporate managers have a tendency to wield the cost-cutting axe in the wrong direction. Ask any ten owners of industrial facilities how to cut building costs five per cent, and nine of them will undoubtedly suggest the removal of the fancy front entrance, plush lobby and the substitution of cheaper wall materials. Not enough managers would believe, for example, that a re-examination of air conditioning or heating or ventilating requirements might save twice as much as deglamorizing the walls. In considering building costs, it is an almost universal failing to overemphasize the architectural aspects and underemphasize mechanical and electrical installations. Table 2, which gives percentage breakdowns of costs for a pharmaceutical laboratory, an industrial chemical laboratory, and an electronics laboratory, underscores this very important point.

These figures illustrate a typical pattern in construction costs. They show that mechanical and electrical costs combined represent one-half of the total costs of the building—a frequently overlooked fact that should affect early planning.

This discussion has been oriented toward initial building costs. At least two other factors that bear on costs—site improvement and maintenance—should be taken into consideration. Careful design can minimize these problems.

Lawrence S. Williams photos

# LABORATORY FOR SPACE SCIENCES

## Vincent Kling brings discipline, repose and order to an articulated plan for the fantastic diversity of a space technology center

The Valley Forge Space Technology Center tops a partially wooded knoll on an irregularly shaped, 131-acre site in the rolling suburbs of Philadelphia. To serve the diverse functions of a rapidly changing technology, design emphasis was on expansibility and potential requirements in terms of bay sizes, ceiling heights and internal flexibility rather than on specific initial functions. Primary, too, was disciplined organization of inherent diversity into a unified architectural statement befitting both the company headquarters for its Missile and Space Vehicle Department and the individuality of highly skilled employes.

These design objectives are accomplished by separating the various functions into identifiable units of a single main structure and subdividing each unit into working segments. Varied and unusual facilities demonstrate scope of the design: a controlled environment "clean room" of 10,000 sq ft where super-critical assemblies are made in super-clean air; shock tunnels—one almost 140 ft long—where models are tested in air streams up to 34 times the speed of sound; an inertial guidance lab with a fully isolated slab for testing systems completely free from outside vibration; three separate data processing centers; a 25,000-sq-ft high-bay area with 46-ft clear height and 48-ft column spacing; a convertible one- or two-story lab area with removable median floor for creating high-clearance space when required. And in a separate building is a giant space simulator, a vacuum vessel 54 ft high for testing full sized space vehicles.

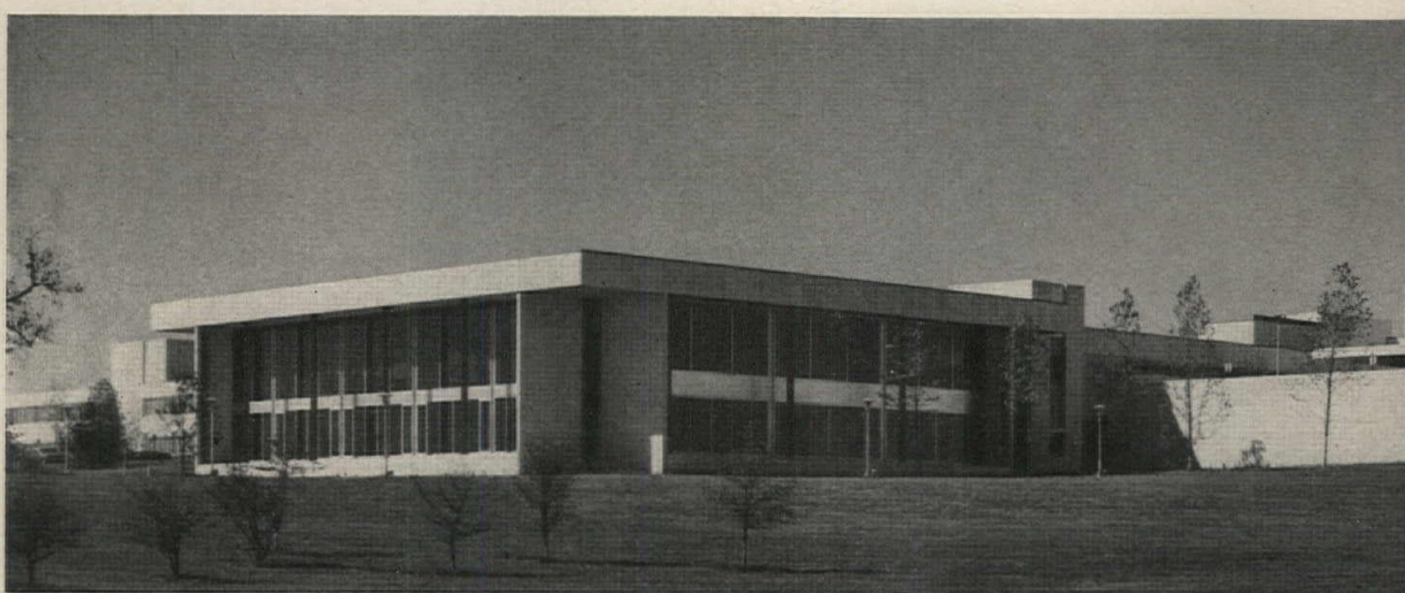
*Valley Forge Space Technology Center*
*King of Prussia, Pennsylvania*

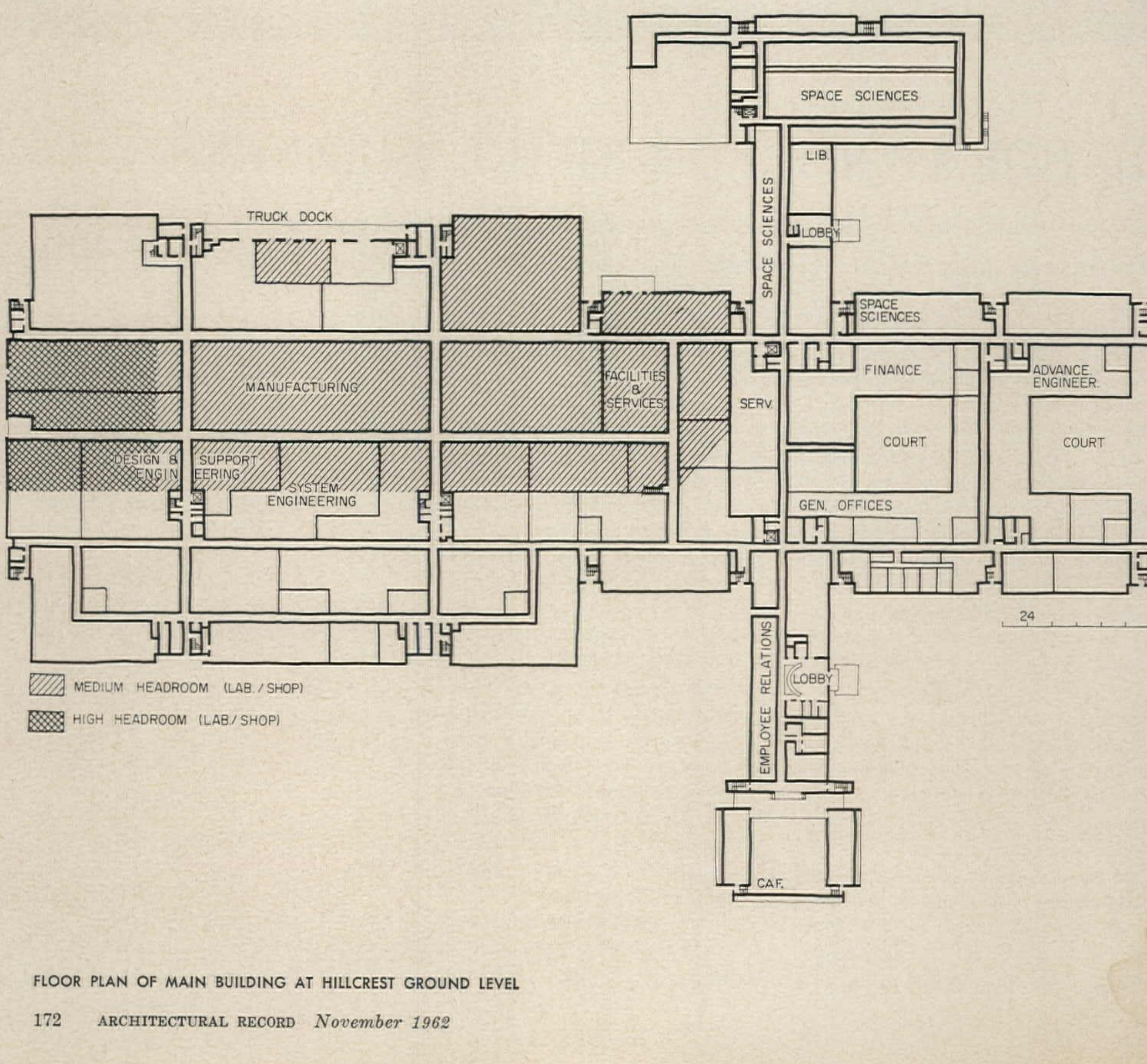
OWNER: *General Electric Company*

ARCHITECT: *Vincent G. Kling, F.A.I.A.*

ARCHITECT-ENGINEERS: *Jackson & Moreland, Inc.*
*United Engineers and Constructors, Inc.*

GENERAL CONTRACTORS:
*Space Technology Center—Huber, Hunt & Nichols, Inc.*
*Space Simulation Laboratory—R. M. Shoemaker, Inc.*






**FLOOR PLAN OF MAIN BUILDING AT HILLCREST GROUND LEVEL**

## MAIN BUILDING

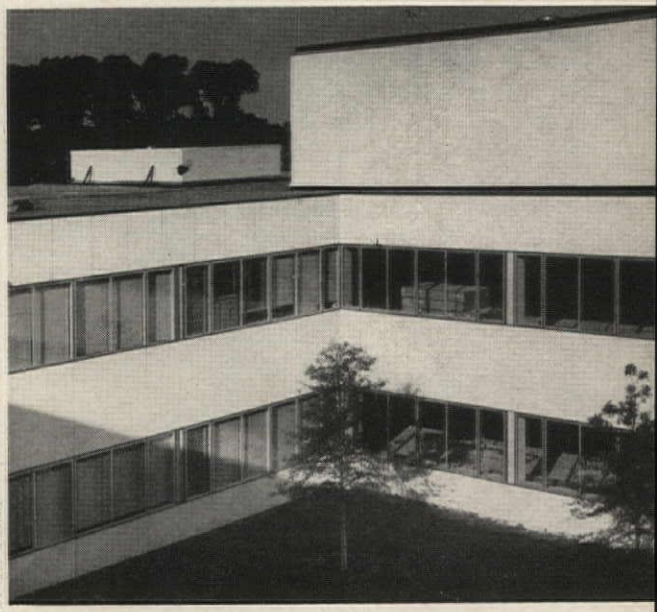
Four major elements are tied together in the main building in an articulated, cross-shaped plan which permits independent growth of those units which will require most space in the ultimate development. Largest elements lie along the east-west ridge of the knoll so that additions will not require level changes. Elements include: (1) offices at eastern end with open landscaped courts; (2) laboratory and development element at the western end, a sequence of enclosed rectangles of one- or two-story high spaces for labs and manufacturing; (3) space science lab to the north, a two-story unit for applied research not in the main flow of activity; (4) general services to the south including main lobby, personnel and public relations, and a two-level, gray glass-walled cafeteria.

Natural landfall is used to keep the roofs of various bay heights at a uniform, low profile against the sky. A consistent color scheme of off-white materials presents a uniform façade accented by shadow and by light blue venetian blinds in all the windows. Low profile is emphasized by continuous horizontal bands of clear glass and precast concrete spandrel facings. Rooftop mechanical equipment is carefully disciplined in long narrow penthouses which run at right angles to the main axis. Stair cores are expressed at junctions of rectangular elements by vertical glass panels.

Structure is steel frame with spread footings on solid rock. Bays are 24 by 24 ft except in medium and high areas where 48-ft spans are provided. Lab-development area can be converted for either high-bay or two-story use by a removable intermediate floor. In two-story office areas, floors are concrete slabs on cellular steel deck. Utilities are provided on a 4-ft partitioning module for maximum flexibility.

Main building spandrel panels have a combed finish. Vertical ribbed aluminum sandwich panels painted off-white enclose penthouses and the western expansion end of the lab-development area. Stair cores, retaining walls and other vertical masses are faced with an off-white split brick with the rough granite-aggregate face exposed. Permanent interior walls are painted concrete block in stacked bond. More than 8 miles of movable partitions are used for office and lab subdivisions.

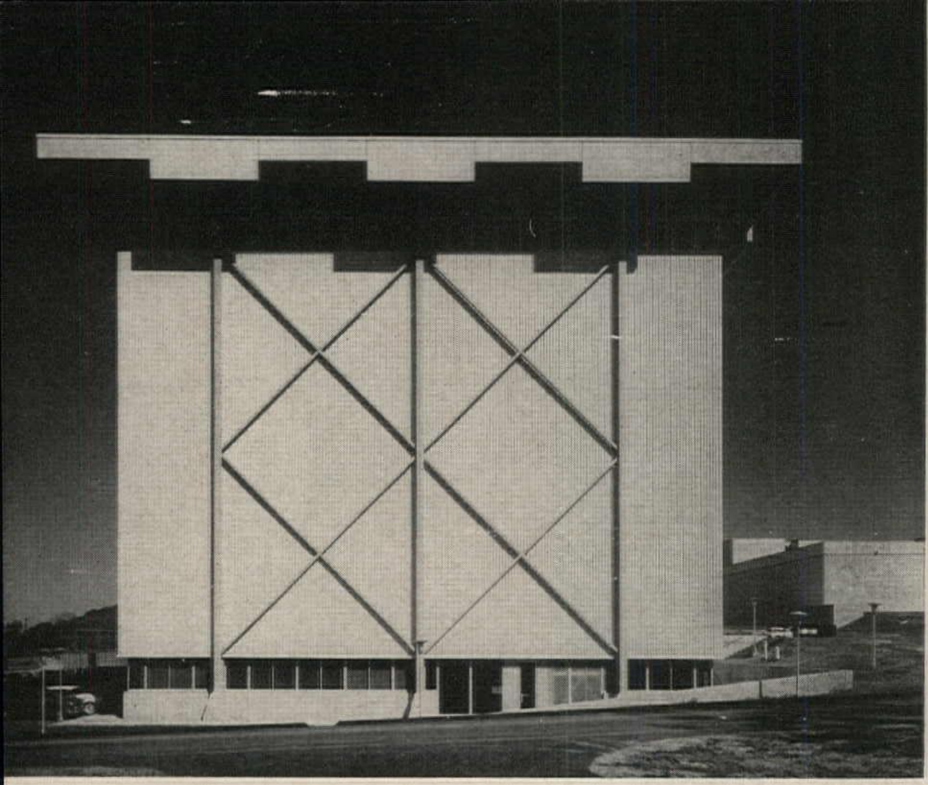
More than 50 separate air conditioning systems are used in the entire center because of the many controlled environment areas. Three 1,000-ton centrifugal refrigeration machines can supply 432,000 gph of chilled water which is piped to each air conditioning system and to 1,250 induction units throughout the buildings. Three steam generators provide heat and hot water

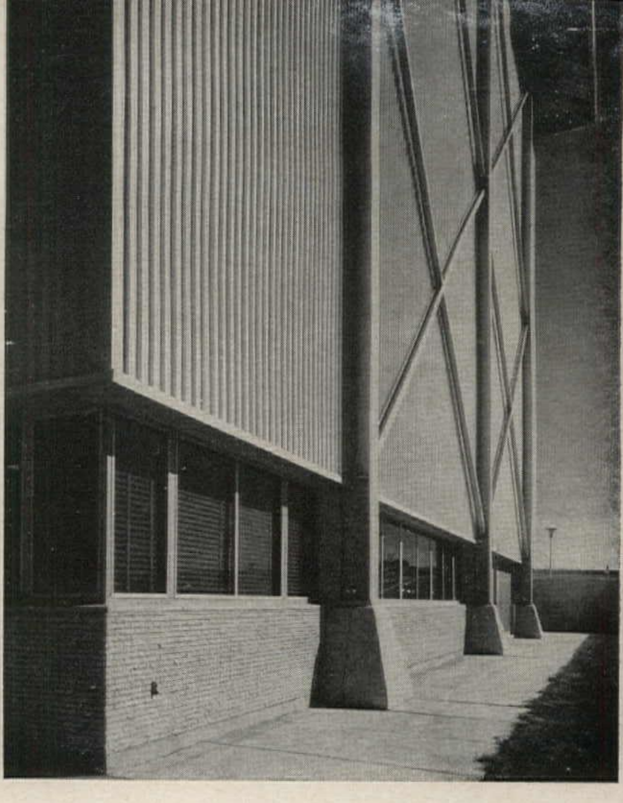


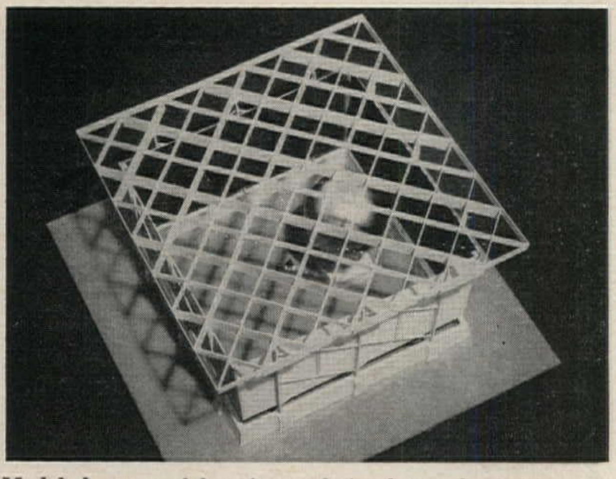
*J. A. Jones*

Planted courtyards brighten offices

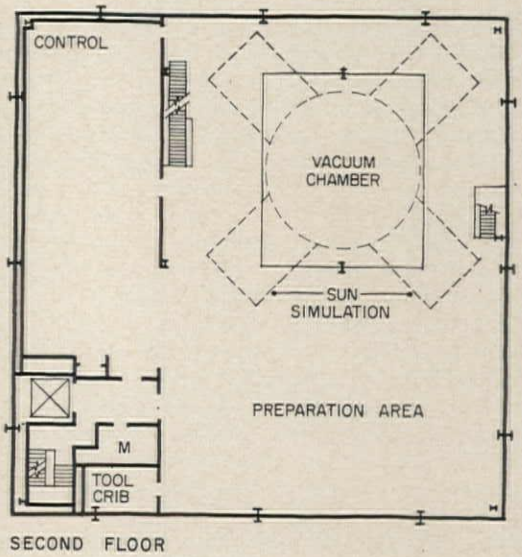
Main lobby, on a human scale, has research exhibits



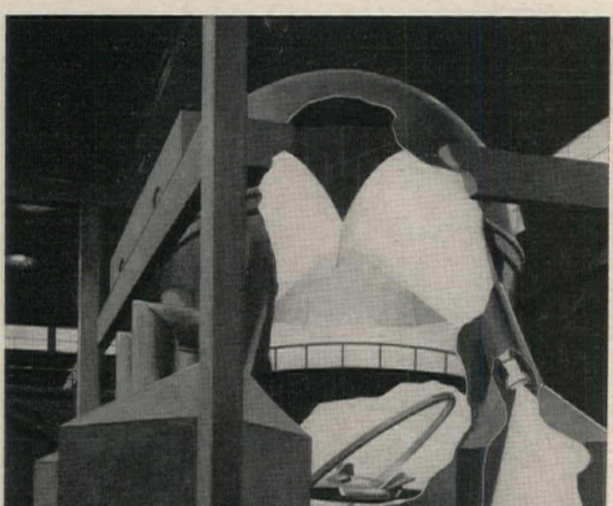




Model shows roof framing and simulator placement

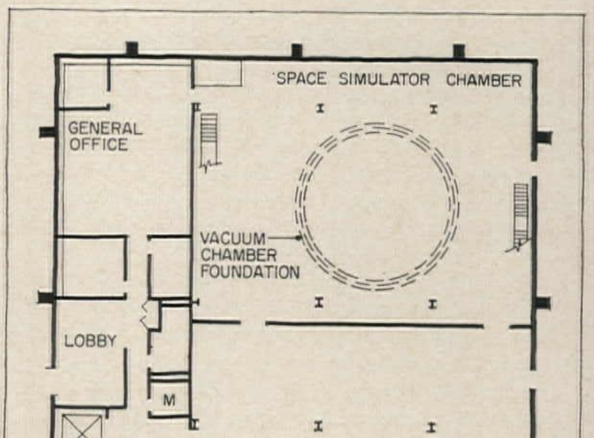



SECOND FLOOR

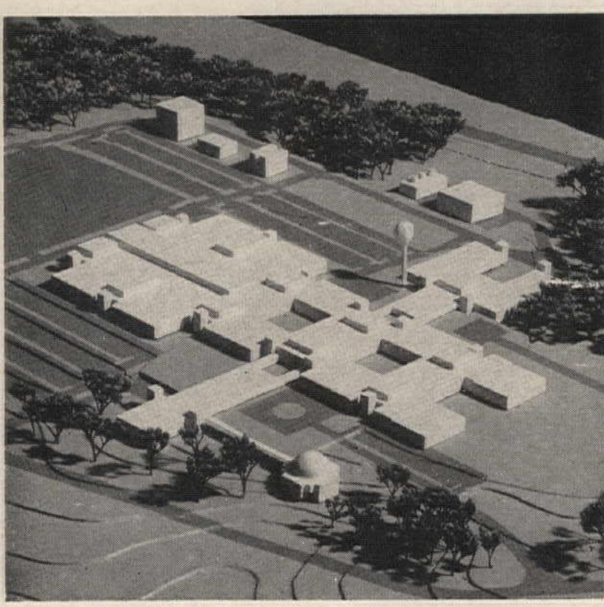


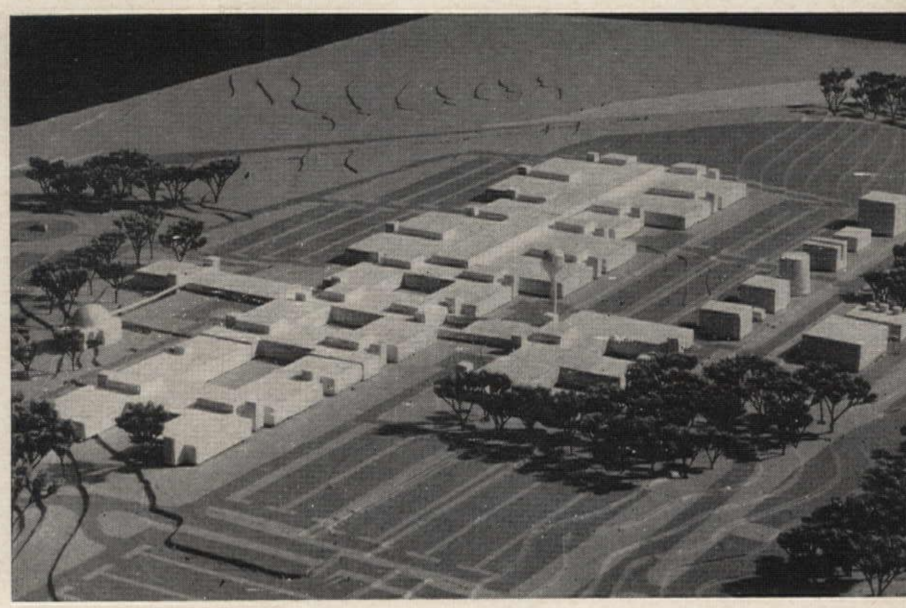
Simplified concept of simulator chamber

*Courtesy General Electric*




FIRST FLOOR





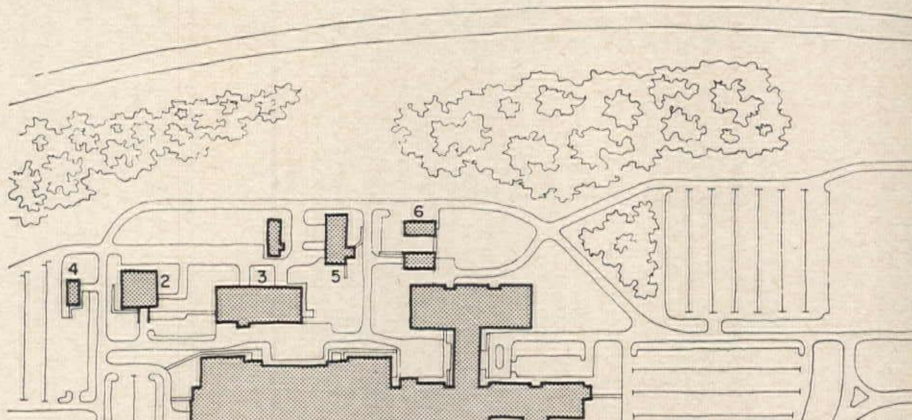
## EXPANSION PROGRAM

Initial plan was for first phase construction of 360,000 sq ft with smaller additions at two-year intervals, but while construction of the first phase was still underway the owner ordered it expanded to 900,000 sq ft. Continuity of the master plan and extensive use of standard materials permitted these additions without interruption of the initial construction schedule. The Space Sciences Laboratory was occupied 12 months after excavations began, and the whole current phase was occupied within 18 months. Massing models above show second and ultimate phases

## SIMULATOR BUILDINGS (*opposite*)

The Space Environment Simulation Laboratory is housed in a separate structure at the west end of the main building complex. The simulator itself is a stainless steel pressure vessel 32 ft in diameter and 54 ft high in which full size space vehicles can be subjected to the vacuum, intense cold and solar radiation of outer space. The building is 104 ft square and 88 ft high with a modified space frame roof spanning an unobstructed, column-free interior with intersecting diagonal trusses which cantilever beyond the walls to form a canopy overhang. Steel framing is expressed on the outside of vertically ribbed aluminum panel walls which have 5-ft-high bands of windows top and bottom. The building is located below the crest of the knoll so that its roof line appears in scale with top profile of the main building.

Full clear height of the building is retained over the simulator vessel, and a traveling crane at the top lifts off the cover and emplaces units for testing. About a third of the structure is given to a three-story arrangement of office and control room space. At the second floor level, a preparation floor area surrounds the protruding top segment of the simulator. Four smaller test vessels are housed in a nearby building of similar expression




1. Main Facility
2. Space Simulator
3. Space Environmental Test Facility
4. Structures Laboratory
5. Utility Building
6. Garage
7. Helicopter Landing Area

# HEADQUARTERS FOR A SPACE INDUSTRY

Albert C. Martin and Associates design a sun-shaded campus for space-age research and manufacture

Campus plan for the new headquarters of Space Technology Laboratories on a 110-acre site in Redondo Beach, California, was an accelerating factor in the concurrent planning, design and construction of the facility. First phase of a planned 10-building complex consists of five buildings now completed: a five-story engineering building, three two-story research buildings, and a one-story manufacturing plant. Occupancy of the first research building began 11 months after ground was broken, and the entire complex was dedicated seven months later. Total usable area is 638,700 sq ft, all devoted to the design and manufacture of spacecraft and space systems.

Long, rectangular engineering and research structures have been oriented at right angles to each other around a central mall and reflecting pool. Architectural theme of this group is stated by shadow-tint glass spandrels suspended from 10-ft overhangs embracing each floor at ceiling height. Behind the smoke-shaded spandrels are full length window walls of solar glass for peripheral offices and work areas in which louver drapes offer additional glare control. Each building has a distinctive thematic color painted on cantilevered marquees and on accent walls in open stairways.

Framing is reinforced concrete on caisson foundations. Interior partitions are removable dry wall. Each building is self-contained with respect to mechanical equipment, and each is capped with an instrumentation penthouse.

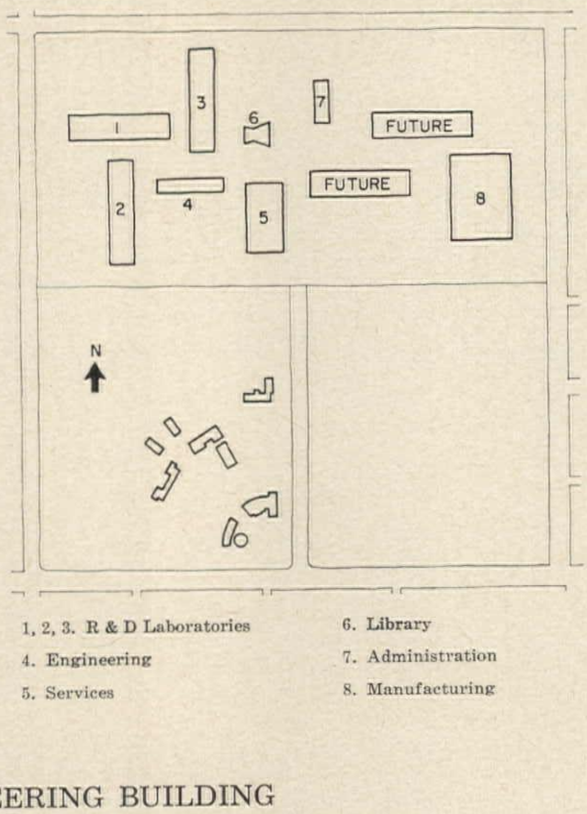
*S.T.L.'s Space Technology Center*
*Redondo Beach, California*

OWNER: *Space Technology Laboratories, Inc., a subsidiary of Thompson Ramo Wooldridge Inc.*

ARCHITECTS AND ENGINEERS: *Albert C. Martin and Associates*
*Craig R. Sturm, project architect*
*Arthur Barton, landscape architect*

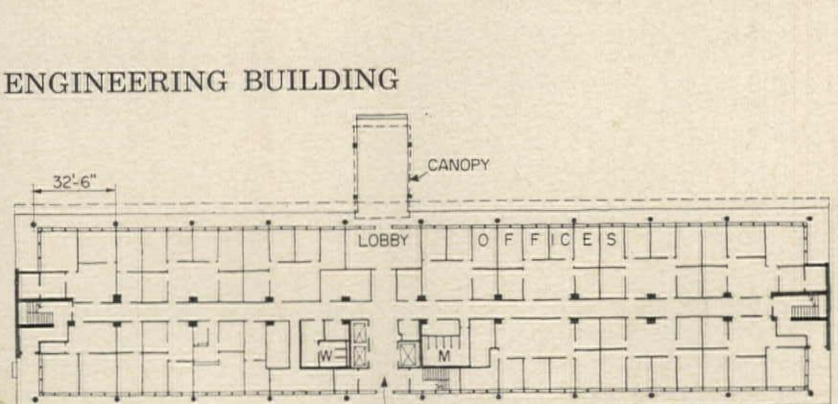
GENERAL CONTRACTOR:
*Twaits-Wittenberg Company*

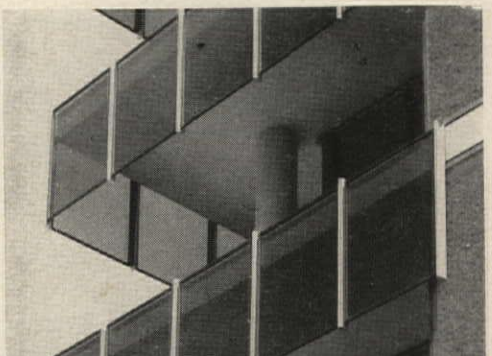
*Space Technology Laboratories photos*



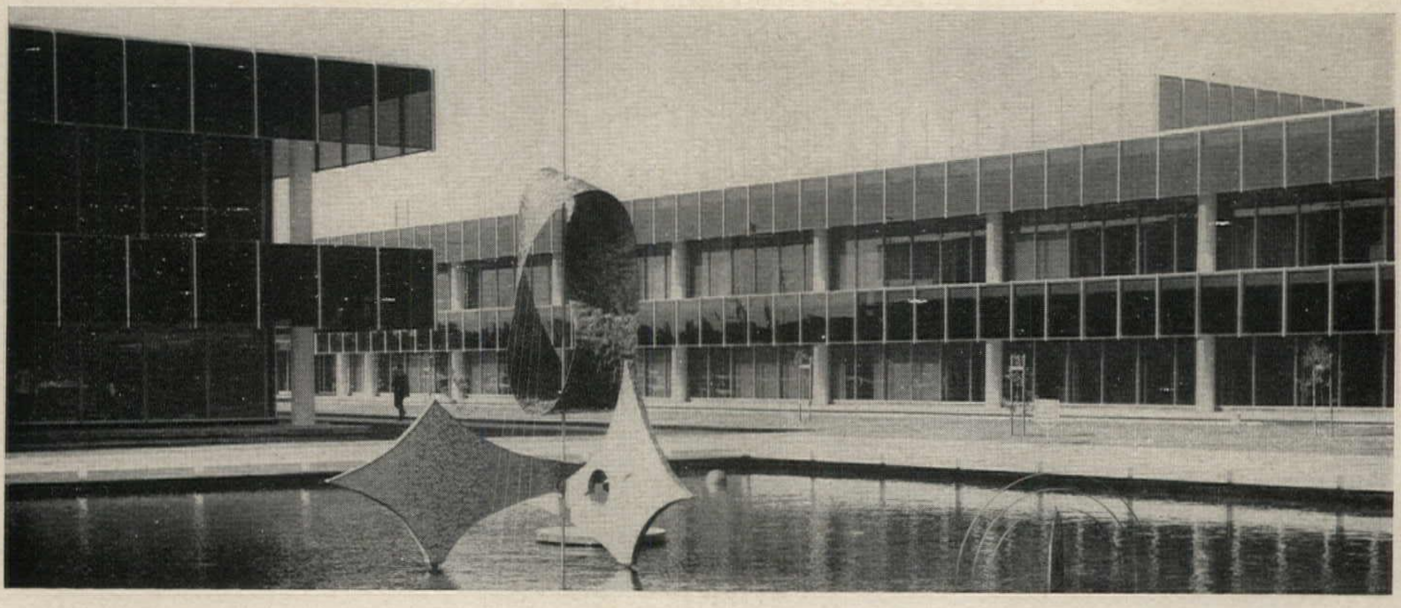

1, 2, 3. R & D Laboratories
4. Engineering
5. Services
6. Library
7. Administration
8. Manufacturing

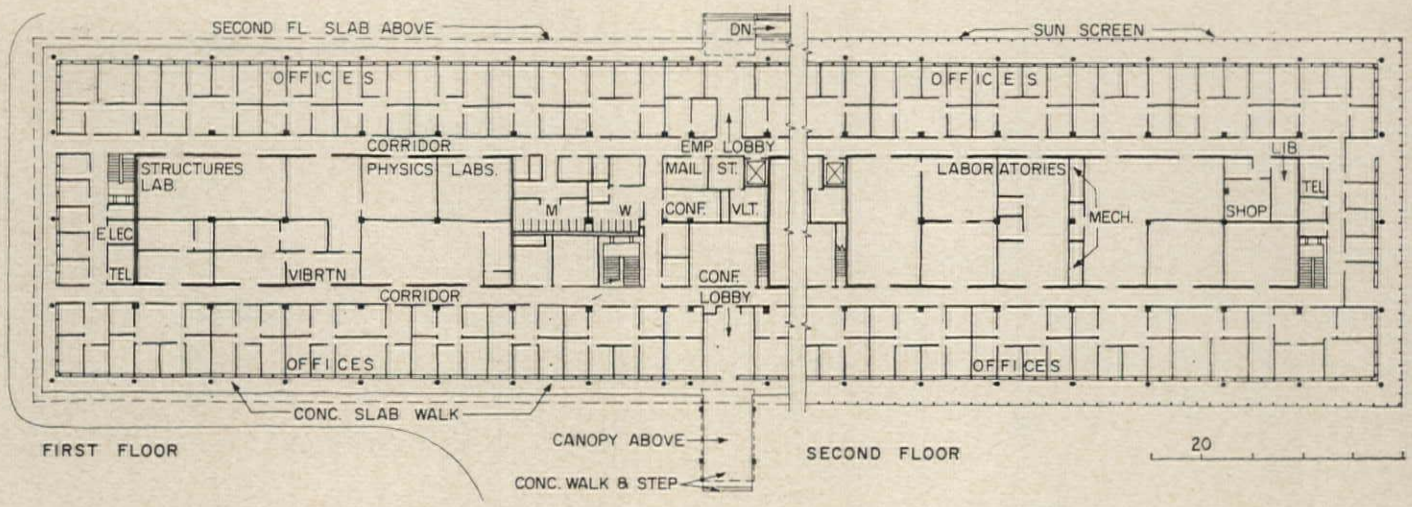
## ENGINEERING BUILDING



The five-story engineering building takes up the shadow glass motif and carries it to the roof. Offices are laid out in peripheral groups around secretarial bays off a central corridor. Top floor is temporary quarters for administration pending phase 2 construction of its own building. First floor plan is typical.



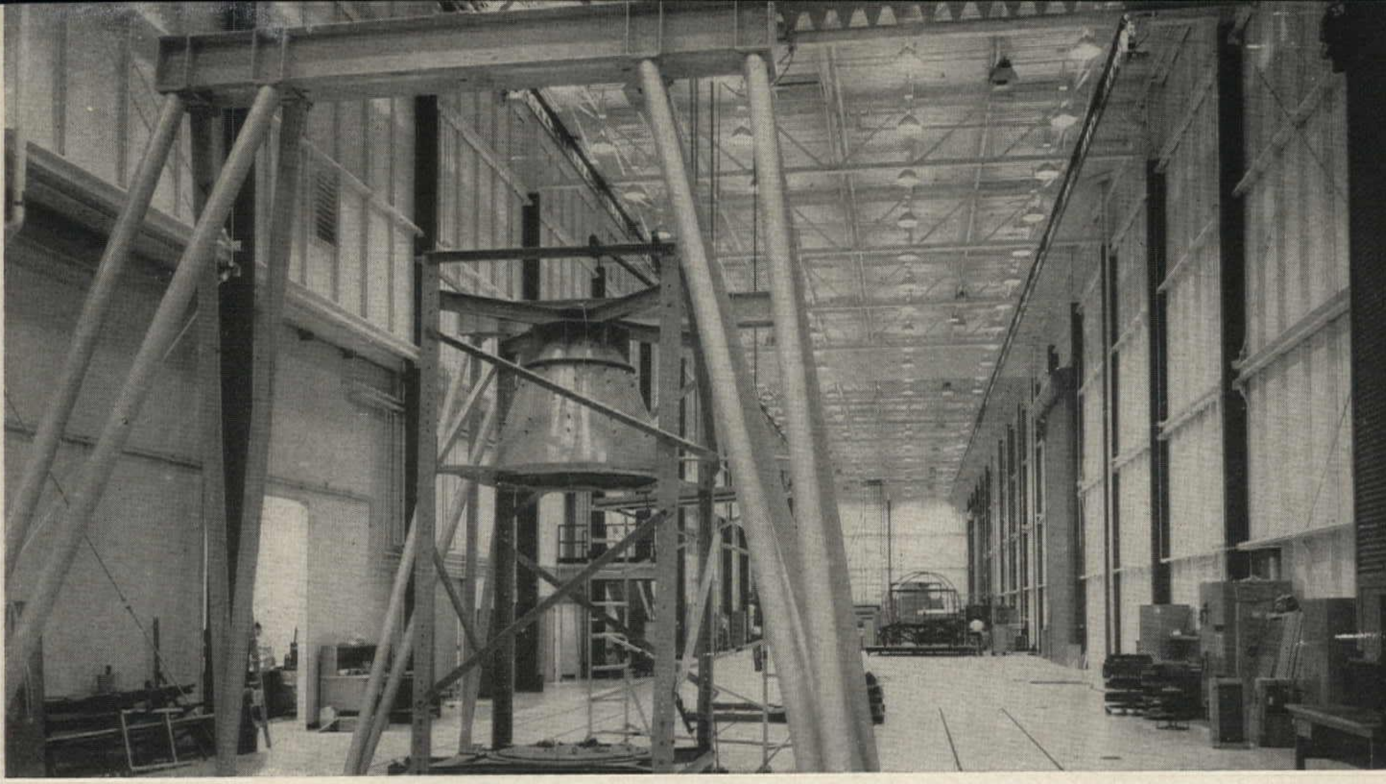


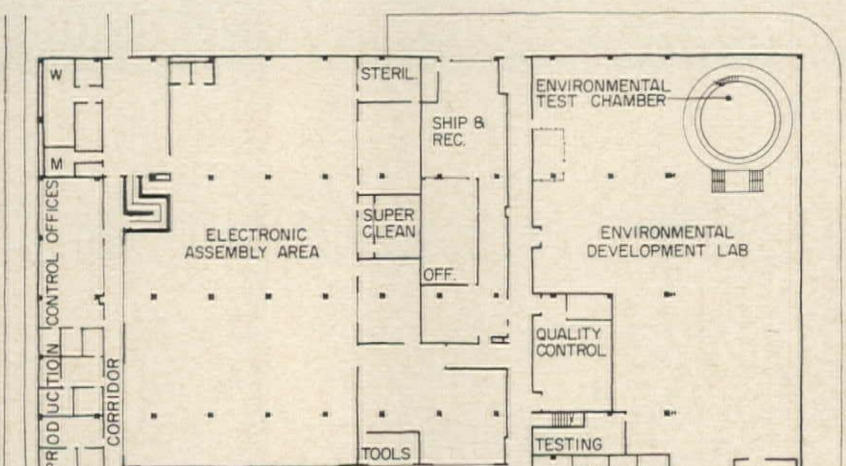

## RESEARCH BUILDINGS

Typical floor plan of two-story research buildings, above, shows peripheral office modules designed for working groups surrounding a core of laboratory and service spaces. Sculpture in reflecting pool at top is by Ben Mayer. Computer area, left, in the lab section of one of the research buildings, has a double floor to protect complex wiring and permit flexibility in location of machines. Floor surface is constructed of removable 1 by 2-ft panels. Between floors a constant flow of 54-deg air circulates. When a computer is installed, the floor section beneath it is removed to supply cooling air to the machine

## MANUFACTURING BUILDING *(opposite page)*

Sculptured patterns in tilt-up concrete walls characterize the 136,800 sq ft manufacturing building. The master plan calls for several other structures in this style to be built in the second phase of construction. Housed in this unit is a 12,000 sq ft dust-free clean room for delicate sub-assemblies protected by air locks and rigidly controlled environment. High bay area, top right, contains 30-ft environmental test chamber, bottom right, and gantry cranes for handling assembled vehicles. Machine shops for fabricating and testing systems and assemblies are provided in the low area

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MODEL SHOP
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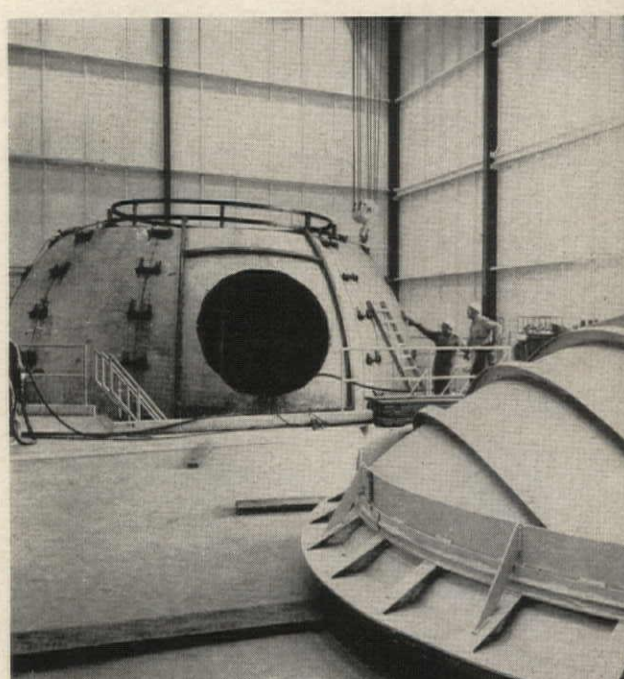


# ELECTRONICS RESEARCH LABORATORY

William L. Pereira and Associates unify under one roof a three-building center for electronics research

On a magnificent, 10-acre site atop one of the highest hills in Santa Barbara, the Hoffman Science Center unites indoors and out in an efficient working space of almost oriental serenity. Its 15,000 sq ft of floor space are divided among three buildings forming a U covered by a single gently pitched roof and joined by landscaped courts. Offices for the staff of fifty electronics scientists and engineers are all on the outer sides of the two parallel buildings, giving each a splendid view of the city below or the mountains to the northeast. Laboratory space that adjoins each office opens onto a central landscaped patio. Circulation is by means of covered walkways. There are no corridors. The building that forms the base of the U contains the entrance lobby, research library and visiting directors' suite. A dining room in the office building to the south overlooks a swimming pool.

Laminated wood, meticulously detailed, provides the principle decorative interest inside and out, framing panels of glass and painted plaster that form the exterior of the buildings, and forming the exposed beams that extend beyond the eaves. Entrance to the lobby is by a flight of stairs suspended over a reflection pool. The entire complex is slightly elevated from the ground on reinforced caisson foundation to provide an additional measure of privacy from surrounding parking areas and approaches.

*Hoffman Science Center*
*Santa Barbara, California*

OWNER: *Hoffman Electronics Corporation*

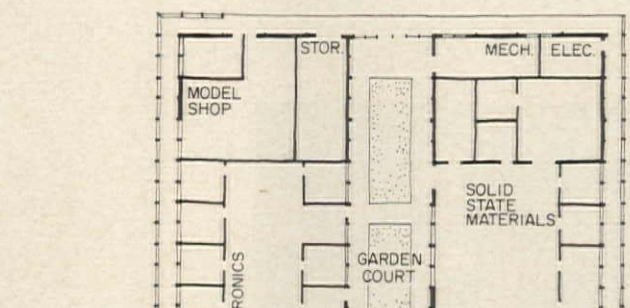
ARCHITECTS:
*William L. Pereira & Associates*
*Gin Wong, partner in charge*

ENGINEERS:
*Woodward & Tom, structural*
*Levine & McCann, mechanical and electrical*
*Penfield & Smith, civil*

LANDSCAPE ARCHITECT: *Richard B. Talor*

CONTRACTOR: *Kenneth C. Urton, Inc.*

*Julius Shulman photos*




Integration and definition of inside and outside spaces at the Hoffman Science Center is by the subtle interplay of exposed wood beams and columns with glass and plaster and wood panel walls embracing garden courts and walkways, free from the limiting lines of corridors. Space at the entrance lobby, below, is impressive; space for study or reflection, above, is inviting. Space for work is efficient. Sliding panel divider in library creates a conference room or opens for informal seminars

# *Architectural Engineering*

## British Scientists Report Study on Lighting, Structure

Research at the Building Research Station in England falls into two main categories: (1) subjects such as the chemistry of materials, structural engineering or the physics of environment, (2) particular building types such as housing and hospitals. The report of last year's research activities is especially interesting in the areas of lighting and structure.

Concerning hospital lighting the report suggests, "By day the corridor should be lighted to a level comparable with that of the wards and any other daylighted areas, and this level will not be far removed from that used in internal rooms. By night, however, after normal evening lighting is extinguished, the wards will only be dimly lighted, and the corridor will have to act as an adaptation step between these and internal rooms, the lighting of which must necessarily be of a higher level by reason of the more difficult visual tasks . . ."

In a different area of lighting, the first stage of work on glare from large sources has been completed at Cornell University (U.S.), in collaboration with the Building Research Station. This work has demonstrated that, "A large window can be made larger with little disadvantage, but a small increase in sky brightness seen through a large window will be immediately uncomfortable; equally, a light curtain drawn across will produce immediate relief from glare."

In structure, the British researchers are using electronic computers for evaluating the working loads and collapse loads of skyscraper frames. Also on structure, the report suggests that, "Owing to the interaction between beams and slabs, between beams and walls, and many other kinds of 'composite action,' the distribution of loads on beams is not known with any degree of precision." Several research projects are underway to develop design methods which account for the stiffening effect of exterior walls.

This research report, "Building Research 1961," Department of Scientific and Industrial Research, is available from British Information Services, 45 Rockefeller Plaza, New York 20, N.Y. for $1.70.

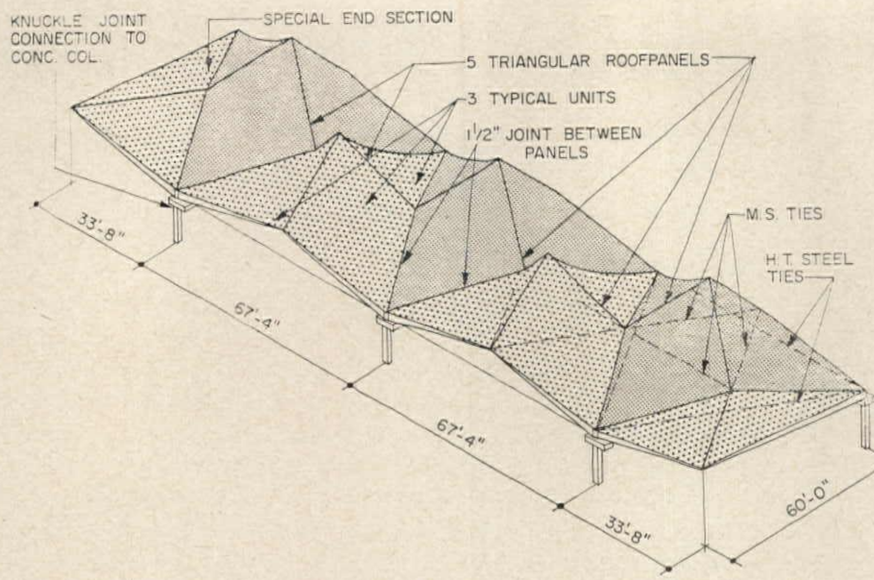
## It's Negative on Negative Ions

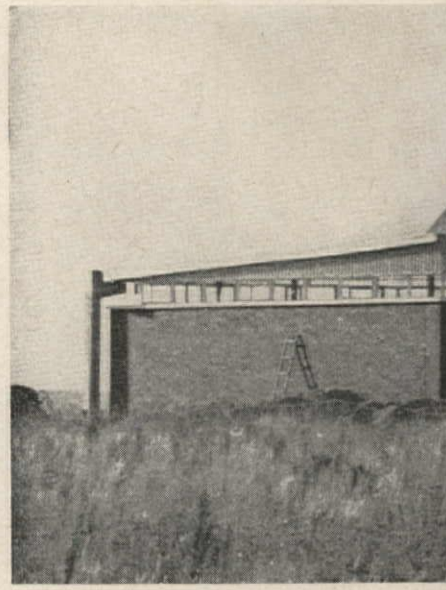
The latest evidence appears to be negative on negative air ions or positive ions producing either an exhilarating or a depressing effect on healthy human beings, according to a recent research study presented at the ASHRAE annual meeting in June. In a four-month study at the former ASHRAE laboratory in Cleveland, atmospheres containing negative ions, positive ions, or a predominance of neither were tried out on 16 individuals first at 78 F and 50 per cent relative humidity and then at 87 F and 50 per cent relative humidity. The test subjects rated the atmospheres on the basis of thermal sensation, humidity sensation, pleasantness, moods and fatigue. The subjects' ratings of mood stayed fairly constant throughout most of the tests, being characterized as "normal." Pleasantness varied from "pleasant" toward "unpleasant" when temperature tests were jumped from the 78 F level to 87 F, regardless of the nature of the ionization. The tests were reported in the September issue of the *ASHRAE Journal* (American Society of Heating, Refrigerating and Air Conditioning Engineers) in a technical paper by C. M. Humphreys and B. H. Jennings.

## Not a Centennial

Time flies, but not as fast as we made it last month on this page. Commercial electric lighting was only 80 years old in September, not 100 as we reported. *The New York Times,* from which we took our cue, had the story right. On September 4, 1882, the Edison Electric Company turned on 400 incandescent lamps for 59 of its customers.

## This Month's AE Section



# STRUCTURE CAN MOVE IF SOIL SWELLS

Roof panels are independent of one another, and are supported by knuckle joints atop the columns. The walls are built in 33-ft lengths, set back from columns. Idea is to prevent roof from ripping, walls from cracking, when heaving of clay soil is caused by moisture

*Warehouse: Sasolburg, Orange Free State, South Africa*

CONSULTING STRUCTURAL ENGINEER: *Louis H. van Loon*

This warehouse sits on a clay soil which heaves when the soil absorbs moisture. The engineer's problem was to design a structure that could adjust itself to the soil movement without the roof tearing apart, or the walls cracking. The engineer's unique solution was to make independent components of the roof panels, the columns and the walls. Each of five triangular roof panels is structurally independent of the one next to it. The load of a panel is transmitted to the columns by means of knuckle joints, so if a column is pushed up, stresses are not induced in the panels. The brick walls are divided into 33-ft sections and rest on strip footings.

The engineer, who is from Durban, South Africa, is now designing a project in timber and concrete shells of a similar triangulated construction, but for a building of 140- and 190-ft spans and some 800 ft long.

The swelling of the dessicated clay can amount to 8 in. and is caused by migration of moisture from the warm soil outside the building toward the colder soil situated below the building, resulting in a dome-shaped heaving pattern of the ground level, which invariably cracks the building founded upon it.

The new construction method employs a system of prefabricated timber shell roof units which are fitted together to form main triangular roof panels with concrete column supports in the corners.

Five such panels are combined with two special end sections to make up a rectangular building, approximately 60 by 202 ft.

Each panel consists of three typical shell roof units which are prefabricated on an underjig of timber scaffolding.

A typical shell roof consists of two layers of ¾- by 4-in. tongue-and-groove South African pine boarding, running in the principal convex and concave curvatures of the warped surface. The two layers of boarding are helix-nailed together, laterally connected with corrugated fasteners, and glued for a width of 3 ft along the perimeter of the shell.

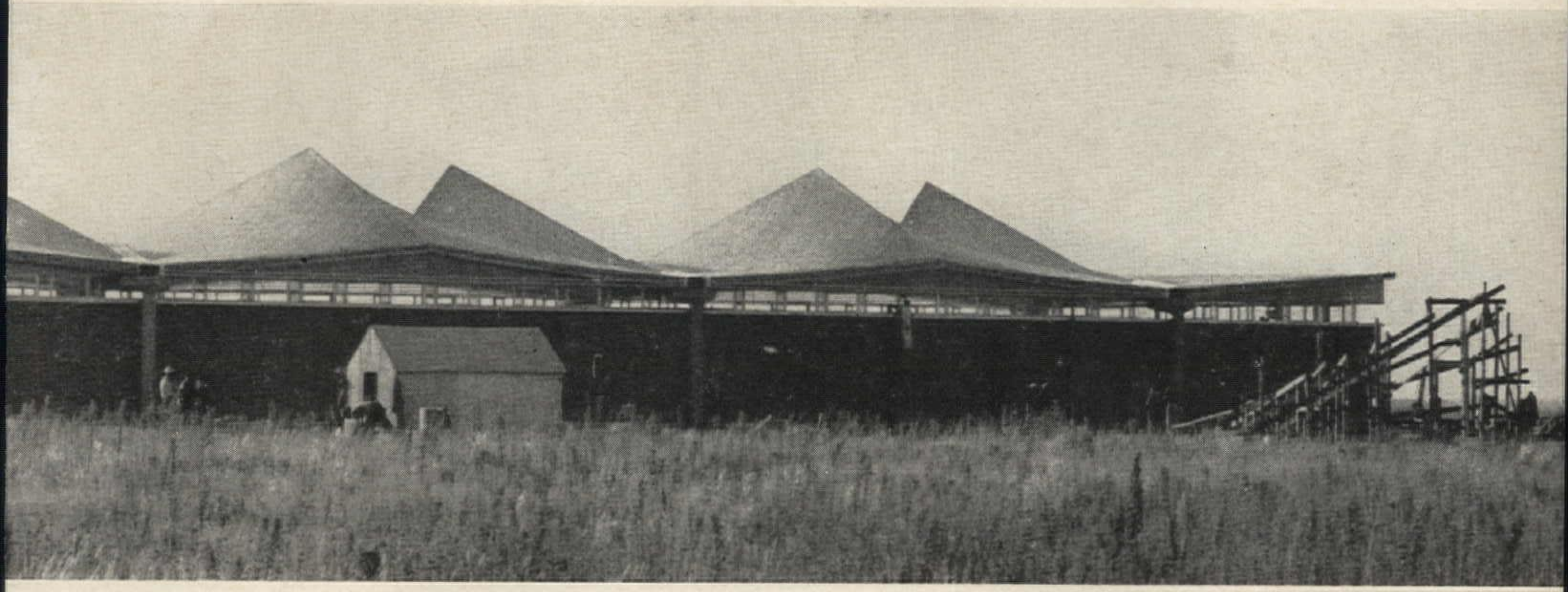
The edge beams are of laminated timber, and ¾-in. diameter mild-steel ties connect the lower corners to restrain the horizontal thrust of the shell.

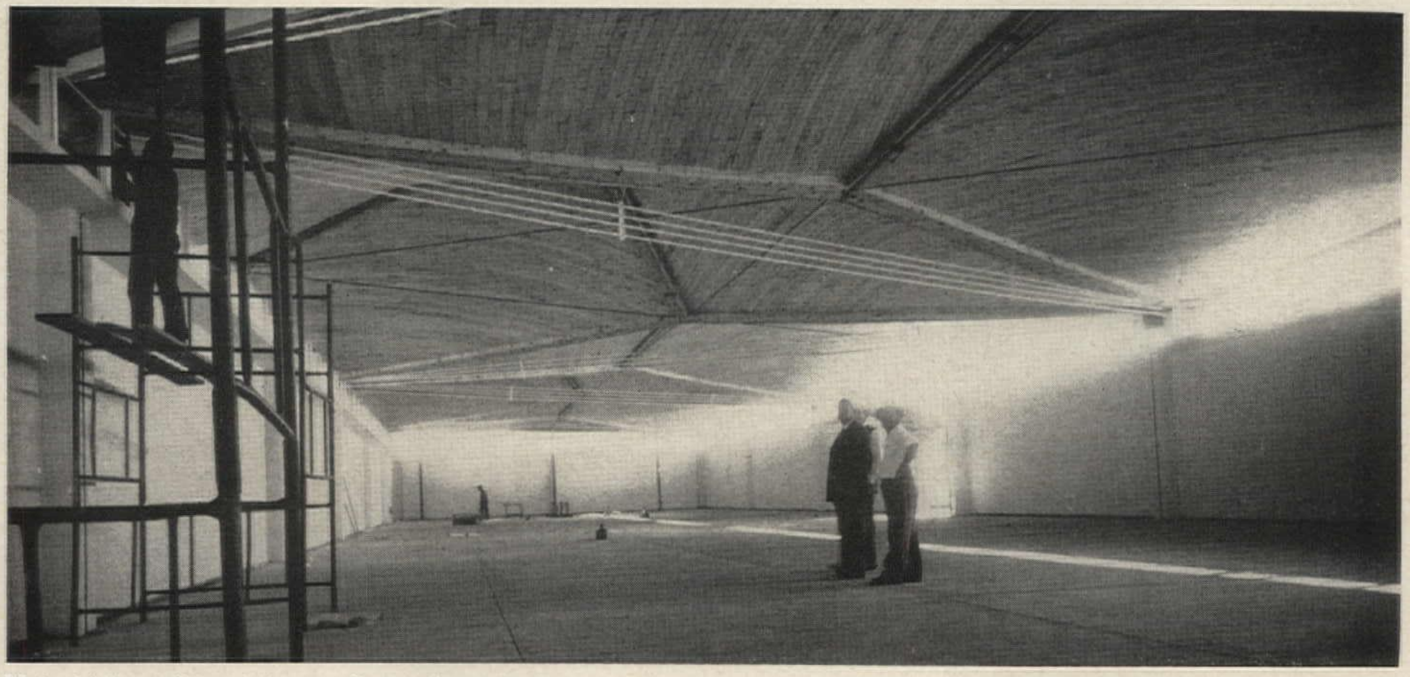
One typical roof unit took one day to complete and was then "slipped" off the underjig and transported some 30 ft along a slipway toward the building, where an erection mast lifted and positioned the shell. A typical shell weighs two tons and the whole process of slipping the shell off the underjig, erecting and positioning took no longer than 15 minutes.

Three typical shell roof units are combined to make up one main triangular roof panel by interconnecting the units along the ridges.

The individual panels are connected by screw fastening ¼- by 2-in. steel straps at 5 ft. o.c. to the soffit of the ridge beams, and by coach screwing the beams together from the top.

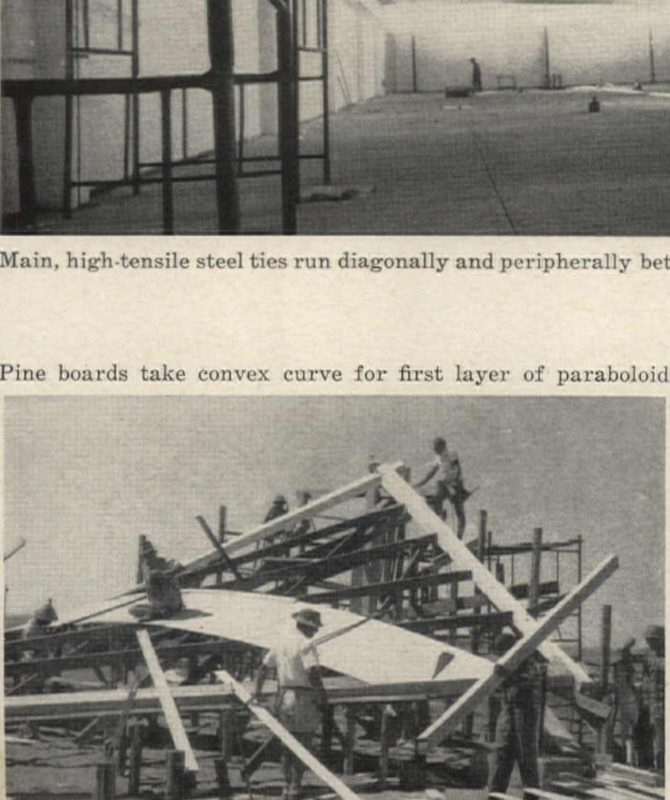
Each main triangular panel is in-



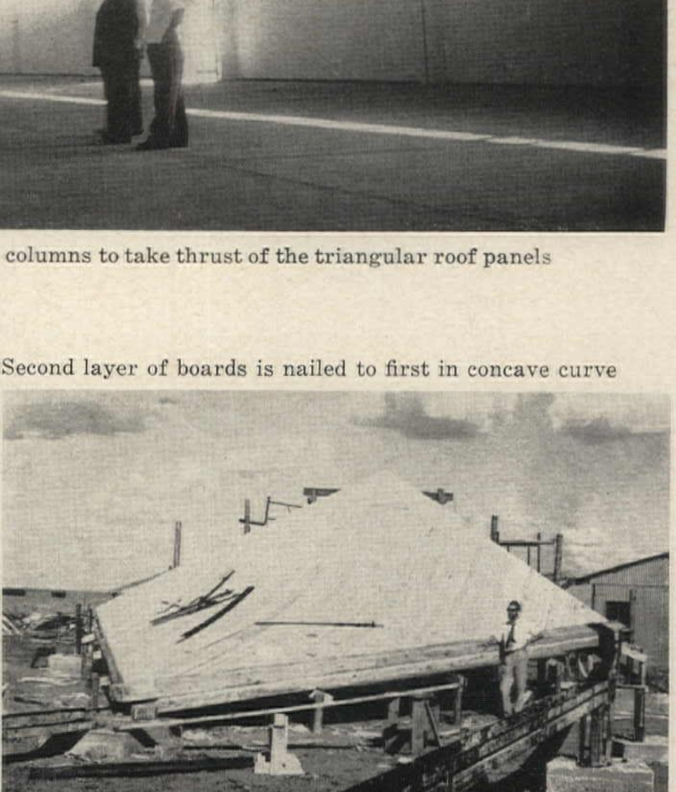


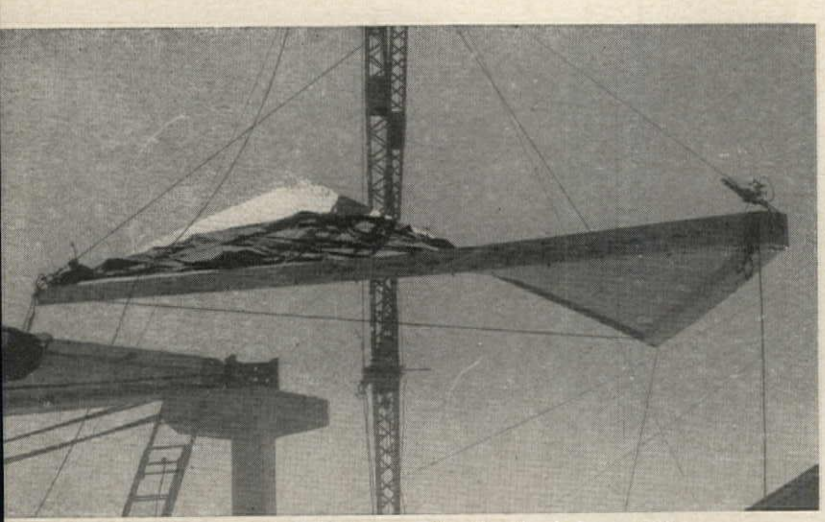
Main, high-tensile steel ties run diagonally and peripherally between columns to take thrust of the triangular roof panels

Pine boards take convex curve for first layer of paraboloid

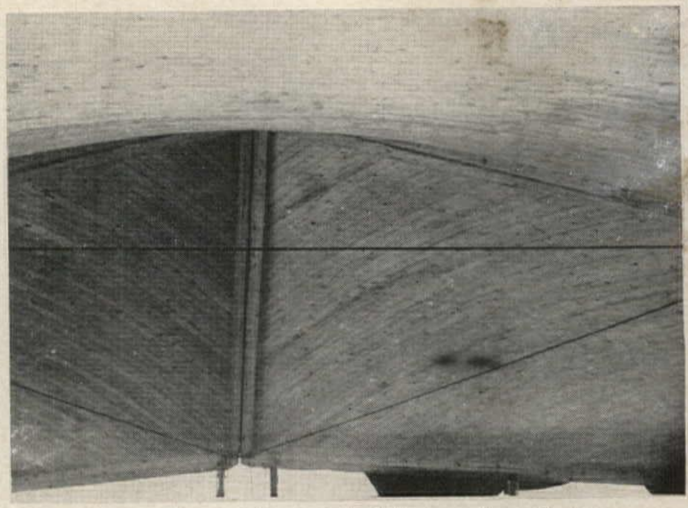


Second layer of boards is nailed to first in concave curve



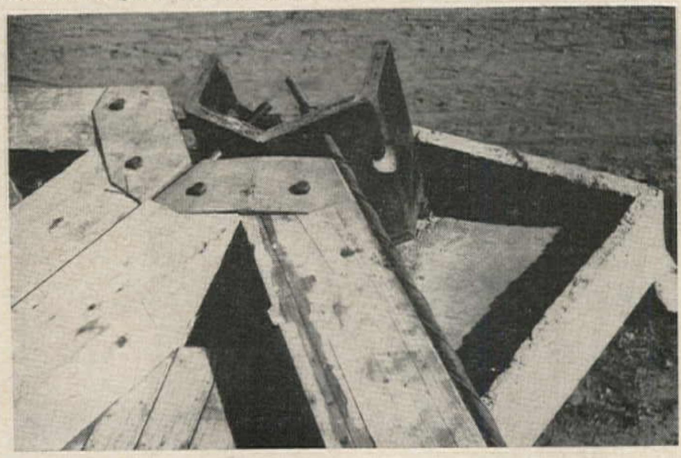


Single mild-steel tie restrains the single h. p. unit

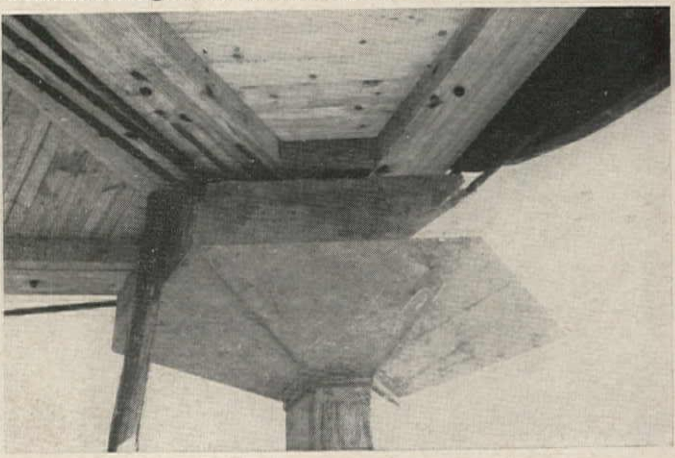


Joints between h. p. units and steel ties are shown here

Steel ball goes in hole in anchor block to make knuckle joint



Column head gathers rainwater; discharges it into drain pipe



dependent, and is supported on the concrete columns by means of a knuckle joint connection which allows free rotation in all directions.

Thus no secondary stresses are introduced in the shell construction because of heaving foundation soil.

There is a 1½-in. joint between the panels, capped with an aluminum coping piece which fits over the timber edge beams.

The thrust of the completed triangular roof panels is taken by high-tensile steel main ties.

The lower left photo shows the steel anchor block, which is bolted to the column head. Two roof panels are shown in position. The steel shoe which is bolted to the ends of the timber edge beams has a 2½-in. diameter chromium steel ball welded to it, which fits into a shaped hole in the anchor block. The shaped hole which will receive the knuckle of the third roof panel can be seen here as well.

Roofing material on top of the 1½-in. timber shell consists of two layers of five-ply bituminous felt painted in a light blue metallic color.

Rainwater is carried off through triangular openings in the lowest portion of the shell roof units, where it is collected in the mushroom column head from where it is discharged into a downpipe cast into the concrete column.

The brick walls and windows have been designed to be completely independent from the roof construction and the columns. They are built in 33-ft-long sections with joints in between to form panels which can individually adapt themselves to the heaving soil; lateral movements are prevented by means of special dowels cast in the concrete sills which allow for movements in the plane of the walls only.

The wall panels have been designed as follows:

1. As a beam 12 ft high, spanning 30 ft, and reinforced in the concrete strip footing; the footing being connected to the beam by means of dowels. The compression flange consists of a 2-ft 6-in.-wide concrete sill, which is also connected to the wall with dowels.

2. As being cantilevered a maximum of 15 ft, with reinforcing in the sill, and the concrete strip footing as the compression flange.

The new building is esthetically pleasing, requires virtually no maintenance (as timber resists the corrosive action of the fertilizers which will be stored in the warehouse), is completely "heave-proof" without the necessity of piling and is comparatively cheap.

The completed building, with concrete floor, brick walls etc., cost $3.50 per sq ft and was erected in 8 weeks. General Contractor was Roberts Construction Co. Ltd.

# COMPOSITE CONSTRUCTION IN A NEW LIGHT

*By Robert E. Rapp, P. E.*

More liberal engineering requirements for composite connectors combined with rigid-frame design make possible application of the method to lightly-loaded buildings such as apartment houses

Elimination of interior columns is a desirable objective when they interfere with the functional layout of space for people and for mechanical equipment. But long-span construction in steel in the past posed two problems: (1) with ordinary beams heavy tonnage of steel was required. Thus the designer was obliged to resort to costly built-up members such as plate girders or to expensive truss framing, (2) relatively deep, heavy members were required to prevent excessive deflection, increasing floor-to-floor height.

Now, however, research into composite construction (steel beams and concrete floor slab working together as a structural unit) has made possible economical long-span construction for many ordinary types of buildings. (It will be shown later how a 60-ft span can be achieved in an apartment structure with a floor-ceiling depth of only 25 in.) At one time composite construction was restricted primarily to bridges and to heavily loaded building structures.

Composite design was established in a more realistic light when the Joint A.C.I.-A.S.C.E.* Committee on Composite Construction in 1960 issued their report, "Tentative Recommendations for Design and Construction of Composite Beams and Girders for Buildings."

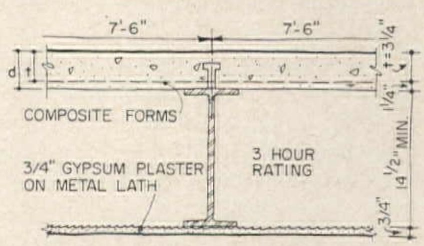
Extensive tests conducted about this time for A.I.S.C.* at Lehigh University showed how shear connectors could be reduced by as much as 50 per cent of that given in the Joint Committee report, while still maintaining a safety factor of 2.5 based on ultimate strength. These findings led to the incorporation of the composite design provisions which appear in the new A.I.S.C. "Specification for the Design, Fabrication & Erection of Structural Steel for Buildings."

Composite design is an ideal method to reduce deflection and, consequently, floor depth. Deflection is inversely proportional to the moment of inertia of the structural section. And since a composite section has a greatly increased moment of inertia over the steel section alone, excessive deflection in long-span construction is greatly reduced. Also, since shear connectors fasten the concrete slab to the steel beam, lateral stability is increased.

To date, composite design in buildings has generally utilized simple beam-type connections under gravity loadings only. This restricted its economic application to low-rise buildings that were not influenced by wind loading.

But by utilizing the new A.I.S.C. Specification, the Buffalo firm of Backus, Crane and Love, Architects and Engineers, were able to design an 11-story apartment house with a 35-ft clear span and 7-ft cantilever

**TYPICAL COMPOSITE SECTION**



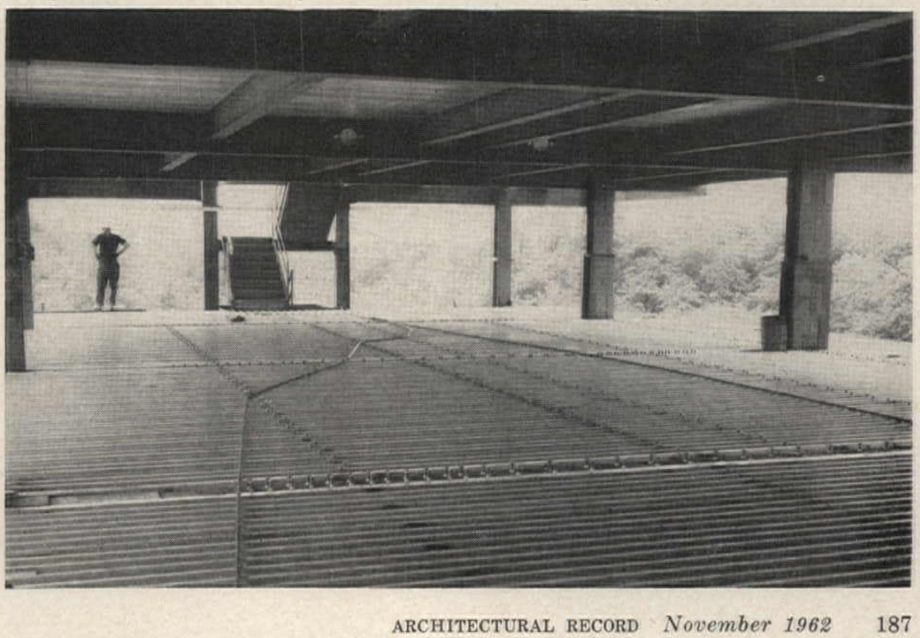

SECTION A-A *See Figure 4*

**Figure 1:** Actual beam depth depends on load. Minimum depth of 14½ in. is required for fire-resistance rating

*A.C.I.—American Concrete Institute. A.S.C.E.—American Society of Civil Engineers. A.I.S.C.—American Institute of Steel Construction.

Welding of beam composite connectors

In apartment structure they are used on beams and girders, but not on cantilevers



on each side. Shear studs were attached to the girders—with the exception of cantilever ends—and to most of the beams. Formed steel decking was used as a permanent form for the concrete floor.

As a result of all these factors, the designers were able to reduce the weight of steel, and to save 2 to 3 in. in total depth per floor. It took just 17 working days to erect the 775-ton frame, shown in the photos below.

The principles of structural design of this building are the same as will be outlined below: composite design combined with rigid frame analysis.

**A Design Example**

Design of framing for a hypothetical apartment building which is shown in plan in Figure 2 will be used to exemplify the functional economic and design advantages of composite design. We will examine the framing of a 60- by 60-ft section.

If metal deck forms are used at spans no greater than 7½ ft, all temporary floor shoring and mill-type formwork can be eliminated. This type of construction is illustrated in Figure 1.

If a conventional steel grid pattern had been used, the economical framing plan would be as shown in Figure 3 with girders on 20-ft centers and intermediate beams at 6 ft 8 in. An economical design in concrete flat plate construction, using staggered columns so that they would merge with partitioning, would require even more columns than the steel design.

Figure 4 shows the 60- by 60-ft module in steel designed with no interior columns; exterior columns are 15 ft on center. This design can be economical when composite construction is employed. The advantages are quickly apparent: (1) the total number of columns per unit area is reduced by one-third, (2) interior columns are completely eliminated, (3) the number of connections has been reduced by 79 per cent, (4) the number of individual pieces of steel to be handled has been reduced by 59 per cent.

By utilizing up-to-date composite design methods, the 60-ft long-span floor system would be approximately 20 per cent heavier in steel weight than the conventional framing shown in Figure 3. However, the functional advantages as well as savings in fabrication and erection costs offset this weight disadvantage. The former A.I.S.C. Specification would have required greater weight for the conventional framing, and if the design had been based on it, the increase in steel tonnage for the long-span frame would have been only 10 per cent.

The economy in long-span construction is achieved by composite design combined with semi-rigid connection theory. Presentation of this technique will take up the balance of this article.

**Engineering Calculations**

The 60-ft girders are spaced 7 ft 6 in. on center which eliminates shoring of the metal deck floor system. Fire resistance is provided by a vermiculite aggregate, gypsum plaster ceiling on plaster lath which serves as the finished ceiling. A 3-hr rating is obtained if the plaster is ¾ in. thick; 4-hr rating if it is 1 in. thick, providing that a distance of not less than 14½ in. is maintained between the metal lath and the underside of the composite steel form.

The total gravity bending moment for this design amounts to 480 ft-kips. Construction loads were conservatively estimated to be 20 lb per sq ft which were added to the dead load requirements. If the designer does not apply construction loads, then he must be sure to add form loads where applicable. By neglecting construction loads, it would be possible to select a lighter steel member. The engineer, however, must be sure to add loads for partitions if they are required, when calculating live load moments applied to the composite section.

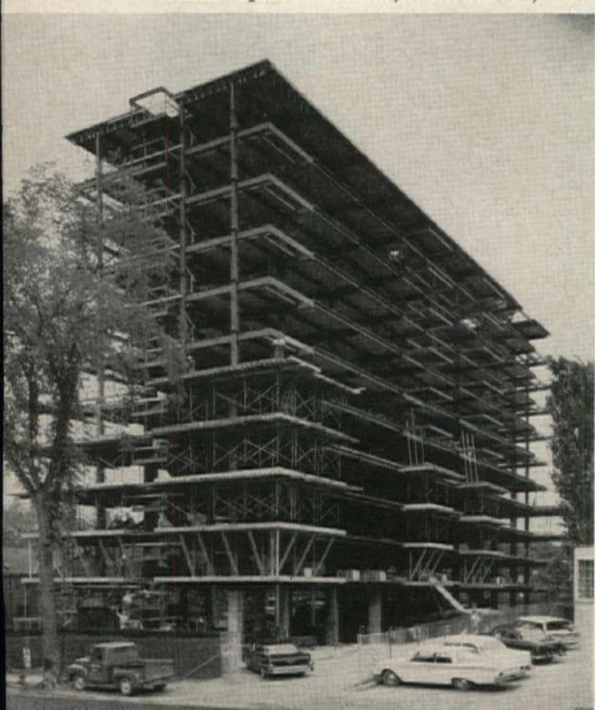
The 480 ft-kip gravity load is divided as follows: dead load moment $(M_D) = 285$ ft-kips; live load moment $(M_L) = 195$ ft-kips. If the engineer designs a fully rigid connection, the dead load moment is distributed as shown in Figure 5a. Deflection of a fully-rigid member is five times less than that for simple beam action; thus this fixed-connection design virtually eliminates deflection problems under dead load conditions. Also, if the end connection is made rigid, cambering of the beam is held to a minimum.

Figure 5b shows the distribution of bending moment under total load (live load plus dead load). This shows that the composite section is called upon to satisfy a positive moment of 290 ft-kips. The greater capacity of the composite member to absorb additional positive moment leads to the economical application of composite design by combining the composite action with semi-rigid connections to take care of the dead load moment only.

This criteria would classify the composite member for Type 3 (semi-rigid) construction under Section 1.2 of the new A.I.S.C. Specification. Connections of beams and girders are assumed to possess a dependable and known moment capacity intermediate in degree between complete rigidity and complete flexibility.

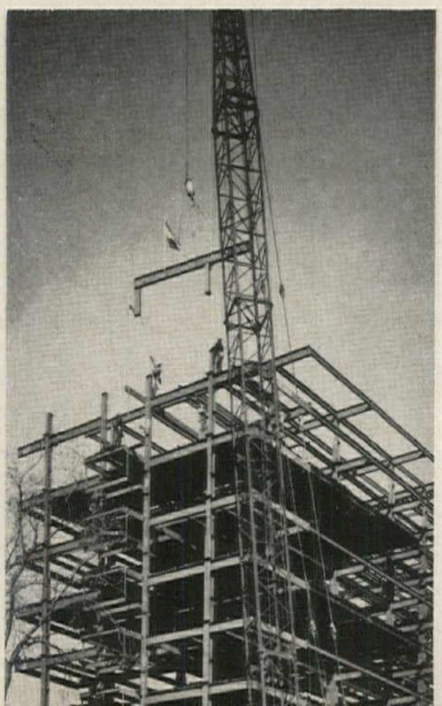
There is no point in extending the shear connectors to the ends of the beam. The Specification (1.11.4)

Clear span is 35 ft; cantilevers, 7 ft



*Backus, Crane and Love, Architects and Engineers*

Frame sections are bolted in the field



## COMPOSITE VS. CONVENTIONAL FRAMING

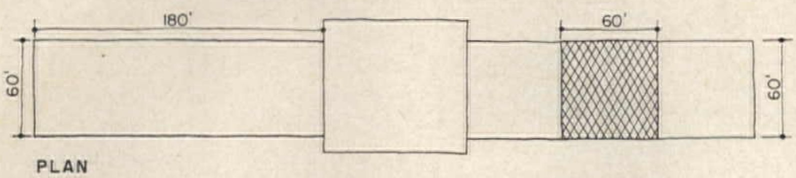



**Figure 2: Apartment plan of this shape will illustrate the advantages of composite**

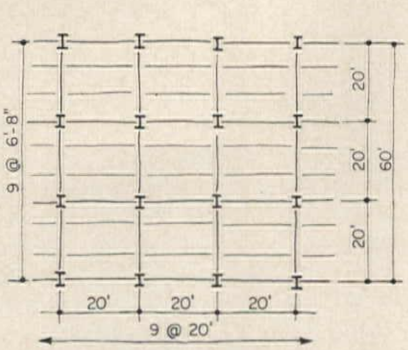



**Figure 3:** In conventional framing for a 60-ft module, columns are on 20-ft centers; beams are 6 ft 8 in. apart

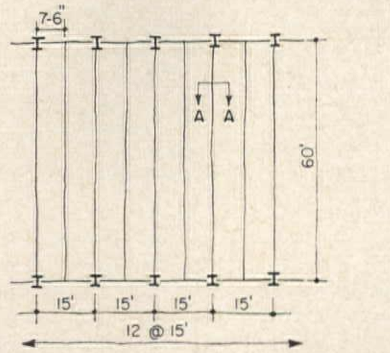



**Figure 4:** In composite, girders span 60 ft. Column eccentricity can be eliminated by cantilevering girders

states that shear connectors are to be evenly spaced between the point of maximum moment and a point of contraflexure in continuous beams. The black area in Figure 5b shows the limits of composite action; thus shear connectors should be spaced as required within these limits.

Figure 6 shows the dimensional properties of the composite section to satisfy the gravity loading conditions.

If the steel member is a "compact section" the maximum allowable stress for both the steel alone for dead load moment, and the composite section for total load moment cannot exceed 0.66 $F_y$ ($F_y$ is yield strength of steel). For A36 steel this allowable stress would be 24,000 psi.

The section modulus of the transformed section is 154 in.$^3$ The required section modulus to satisfy the 290 ft-kip positive moment is 145 in.$^3$ Therefore the gravity loading conditions for the 60-ft span can be satisfied by a 21 WF 55 girder made into a composite beam by means of connecting the girder to the concrete flange with 32 ⅞-in. diameter by 3½-in. studs. Other types of shear connectors are allowed. Their respective values are given in Table 1.11.4 of the new specification for various 28-day compressive strengths of concrete. In the example here the strength is taken as 3,000 psi.

Figure 7 shows a comparison of available moments for a 21 WF 55 girder in A36 steel using composite and non-composite criteria.

Figure 7a shows the available gravity moment for a steel girder alone with fully-fixed-end conditions conforming to Type 1 (rigid frame) construction. The maximum allowable moment that can be absorbed is equal to 329.1 ft-kips.

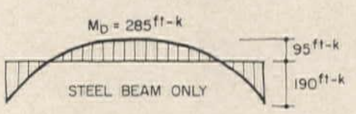
Figure 7b shows the maximum available gravity moment for the composite section if the steel connection is designed to its fullest negative moment capacity. The theoretical moment indicated is 527.4 ft-kips. This is an increase of 39 per cent in load carrying capacity of composite over non-composite design.

Figure 7c shows the composite section designed as a semi-rigid connected member. Only a 172 ft-kip negative moment connection would have to be developed. The steel member alone has a capacity of 219.4 ft-kips at 0.66 $F_y$; therefore, if the capacity of the semi-rigid joint connection were increased to between 172 and 219 ft-kips, there would be no chance of the member becoming overstressed under static gravity loads. It should be noted that the composite beam has been designed without a cover plate which would raise the cost.

In order to accomplish a satisfactory design using composite design methods with simple beam connections, a 24 WF 84 section would be required.

Application of composite semi-rigid design yields a weight saving of 34.5 per cent over non-composite design and 27.6 per cent over composite design with simple beam connections. This saving was accomplished even

### BENDING LOADS



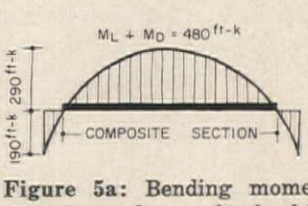




**Figure 5a: Bending moment for 60-ft beam due to the dead load**

**Figure 5b: Bending moment for composite section; live and dead load**

### COMPOSITE SECTION DESIGN

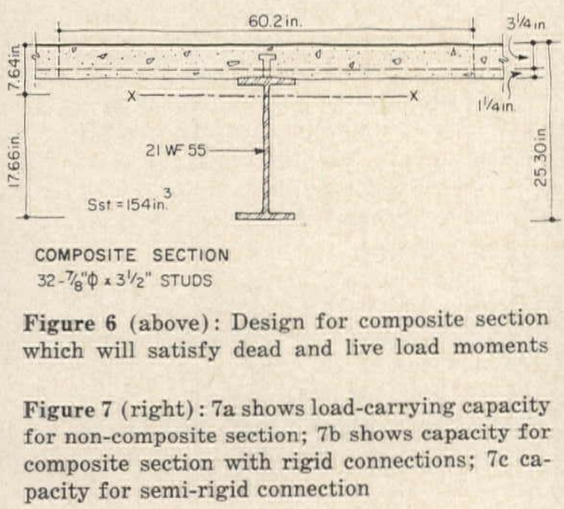
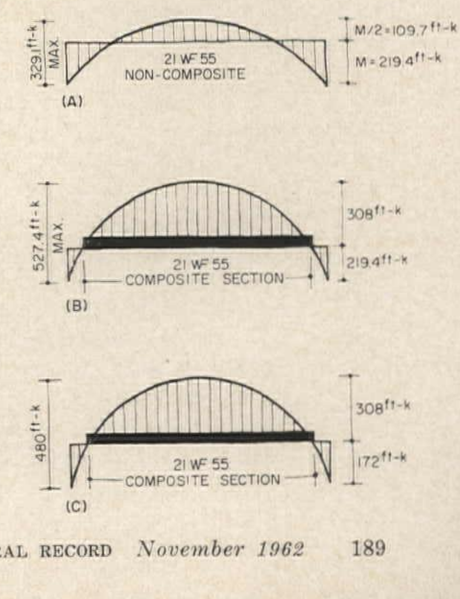



**Figure 6** (above): Design for composite section which will satisfy dead and live load moments

**Figure 7** (right): 7a shows load-carrying capacity for non-composite section; 7b shows capacity for composite section with rigid connections; 7c capacity for semi-rigid connection

### LOAD-CARRYING CAPACITIES



**EFFECT OF WIND PLUS GRAVITY LOADS**

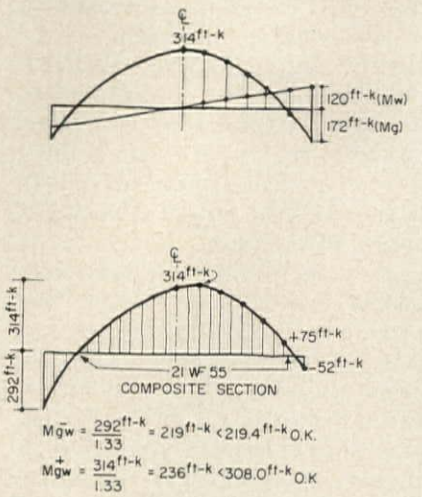



**Figure 8a** (top): permissible wind load moment. **Figure 8b** (bottom): bending moments due to wind and gravity loads

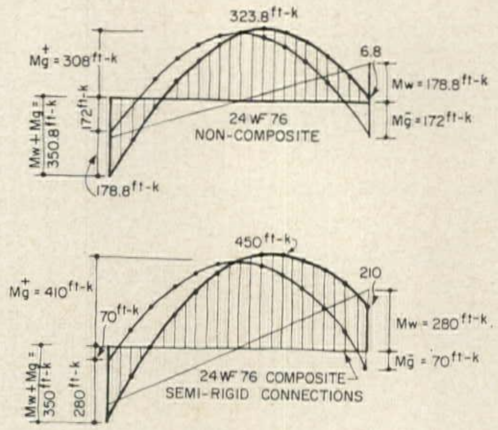



**Figure 9a** (top): wind and gravity load moments for a non-composite section. **Figure 9b** (bottom): semi-rigid design

with a relatively light live load to dead load ratio. There also is a 12.5 per cent saving in depth.

*Deflections.* At this point let us make a comparison in the deflections of each of the designs cited.

A. *21 WF 55 composite semi-rigid girder*:

deflection, dead load=1.08 in.; deflection, live load=0.31 in.; total deflection=1.39 in.

B. *24 WF 84 composite girder with simple beam connection*:

deflection, dead load=2.60 in.; deflection, live load=0.87 in.; total deflection=3.47 in.

C. *24 WF 76 non-composite rigid connection*:

total deflection=0.99 in.

Total deflection of the 21 WF 55 semi-rigid composite section was figured at a maximum end restraint of 219 ft-kips as shown in Figure 7b. With dead-load deflection of 1.08 in. and live-load deflection of only 0.31 in., it would not be necessary to camber the girder.

Likewise, it would not be necessary to camber the 24 WF 76 girder; however, the 24 WF 84 composite member with no end restraint would require cambering to compensate for dead load deflection.

If the engineer investigates deflection in the semi-rigid composite 21 WF 55 girder with dead load moment equal to 195 ft-kips and live load moment equal to 285 ft-kips, he would find that total deflection would equal 1.17 in., distributed as follows: deflection due to dead load=0.74 in. for steel girder only, rigidly connected; deflection due to live load=0.43 in. for the transformed section.

The moment distribution, as indicated above, is more in keeping with loading conditions in which composite design has heretofore been utilized. The designer can visualize that deflection is of no consequence regardless how the moment is distributed when semi-rigid design is employed.

In addition to these advantages, the engineer will be able to use the new high-strength steels in this type of design without being limited by deflection.

## Composite Design and Wind

Little thought has been given in the past to composite action under wind loading conditions. The reader will note that the available moment capacity for the section covered by figure 7b equals 527.4 ft-kips. This was accomplished, as outlined, by fully fixing the end connection to develop the full negative moment capacity of the 21 WF 55 steel member. If it is assumed that only a 172 ft-kip moment is required to satisfy gravity loads, then the difference between 172 and 219.4 (47.4 ft-kips) is the reserve moment capacity of the composite girder.

According to the A.I.S.C. Specification, the designer can increase the allowable stress for combined loading conditions by 33⅓ per cent; therefore, the induced moment due to wind that would be allowed under combined gravity and wind loads would be:

$$\frac{M_w + 172}{1.33} = 219.4 \text{ ft-kips; therefore,}$$

$$M_w = 120 \text{ ft-kips.}$$

These moments are distributed as shown in Figure 8. Under combined wind and gravity loads, the maximum positive moment equals 314 ft-kips; the maximum negative moment equals 292 ft-kips. However, if these respective induced moments were reduced by 33⅓ per cent, or the allowable working stress were increased by this amount, the composite section with an end restraint equal to the capacity of the steel member alone would accommodate a gravity load moment of 480 ft-kips, plus an induced wind moment of 120 ft-kips.

As previously stated, a fully-rigid 24 WF 76 girder would be required to satisfy the gravity loads if composite design were not utilized.

Figure 9 shows a comparison between a fully-rigid, composite and a semi-rigid, composite 24 WF 76 girder subjected to combined gravity and wind loading conditions. By applying the same methods of analysis as in Figure 8 (i.e. equation top of this column) it was found that the non-composite steel member was capable of handling a wind moment of 296 ft-kips (Figure 9a).

Figure 9b shows the same size section designed as a semi-rigid composite member. The allowable wind moment has been increased to 396 ft-kips. This is an increase in moment capacity of 25 per cent. By utilizing composite action, the same size member can be used to satisfy wind-induced moments ranging from 296 ft-kips to 406 ft-kips when combined with a gravity moment of 480.

*It should be pointed out that the columns must be made stiff enough, or adjacent bays or cantilevers must be provided to insure that the semi-rigid connection will act between the limits of the design assumptions.*

## Conclusion

Engineer and architect are seldom faced with the ideal situation when designing a structure. The author selected a problem employing apartment house loading conditions that heretofore had not been considered practical for composite design. This selection was made to emphasize new avenues that have been opened to the designer by utilizing the design techniques presented in this paper. Even greater economies could be achieved under heavier live loading conditions.

# DUAL-PURPOSE GLAZING ROOFS CONSERVATORY

Unique system prevents leaking of rain from without, dripping due to condensation from within, in three parabolic domes of Milwaukee's Mitchell Park Horticultural Conservatory

How would you glaze a 90-ft-high, parabolic-shaped greenhouse to keep out rain and to prevent condensation from dripping anywhere inside?

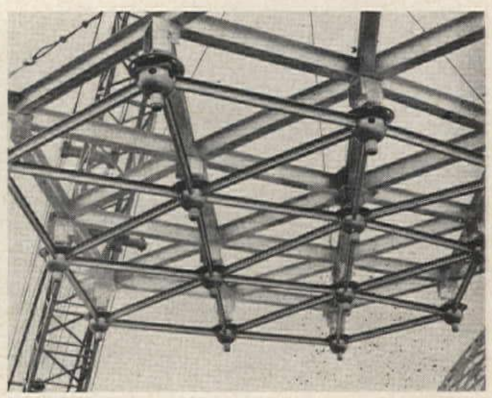
Skylight specialists working on the Mitchell Park Horticultural Conservatory solved this double-edged problem through a unique glazing and condensate drainage assembly of glass, aluminum framing and neoprene gasketing. The glazing system sits atop and follows the curvature of the precast concrete structural frame.

The glazing system consists of aluminum tubes interconnected by hollow aluminum hubs, and neoprene gaskets which seal the glass and serve as gutters for the condensate.

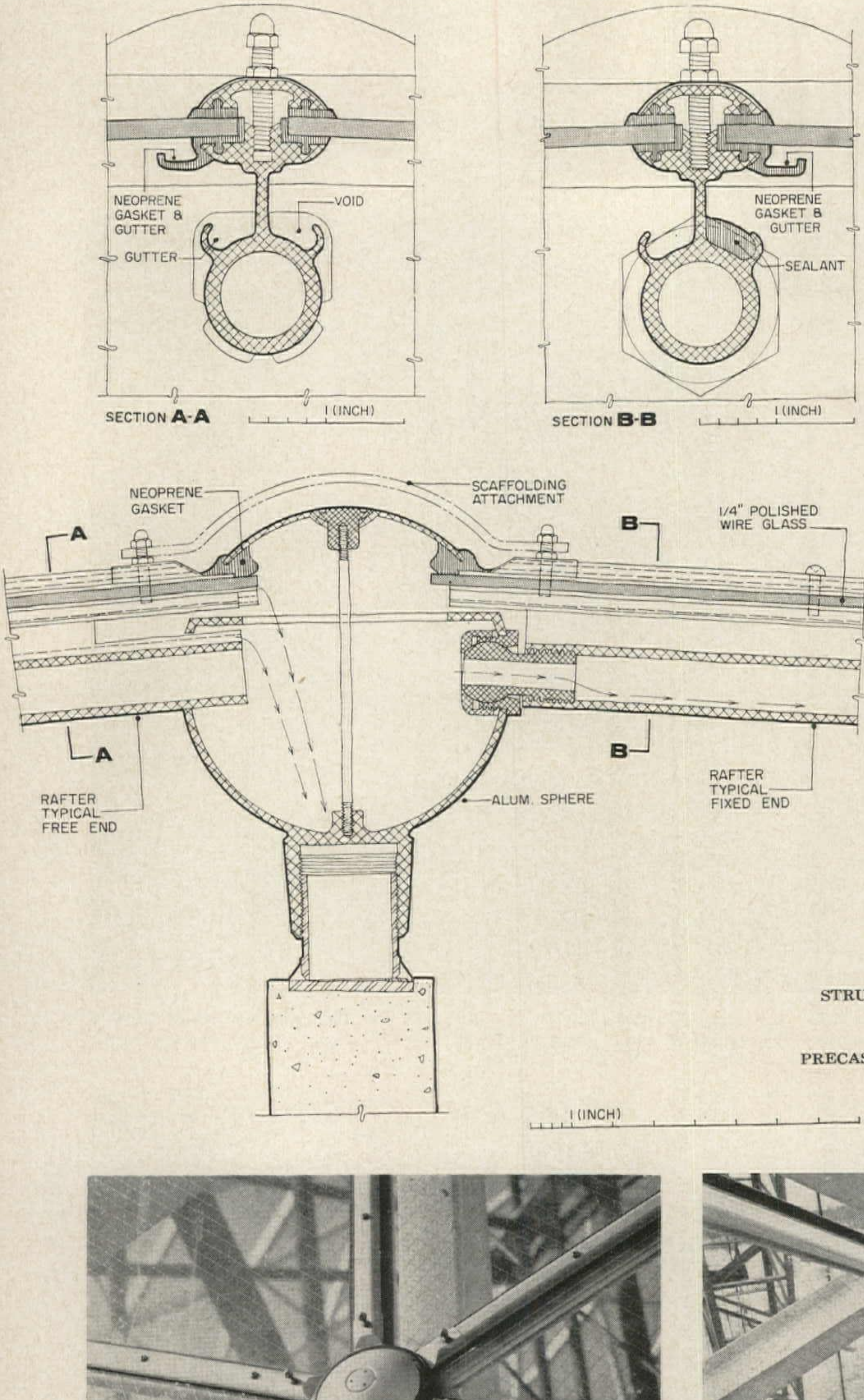
Condensed moisture on the glass runs into the neoprene gutters, which channel the water into the hollow aluminum hub. The water cascades from hub to hub through the aluminum tubes until it reaches the bottom of the dome, where it is collected in a continuous gutter.

Expansion and contraction movements of the glazing system due to thermal change are taken up at each hub. The ends of the aluminum tubes coming into top of a hub are free to

Lifting rig has just placed segment of aluminum and glass glazing on the precast dome. There are five basic glazing elements—three hexagons and two diamonds



*Left:* a special revolving scaffold, which covers one-fifth of the dome, is used by welders to fasten glazing unit solidly to the dome. *Center:* men outside on platform of boom guide glazing assembly into place. *Right:* lifting rig is used by crane to hoist glazing unit. A separate assembly rig in the shop properly locates the spherical joints so that the glazing unit will have the correct curvature for a particular segment of dome




move. Tubes at the bottom of the hub are fastened and sealed to prevent leakage.

The aluminum sphere is pierced to provide a void where the free end of the tubular rafter enters it so that moisture condensing on the aluminum rafter will drain into the sphere, and so that the tube can move.

Moisture collecting at the corners of the glass enters the sphere through the open space between the inner surface of the glass and the top flange of the sphere.

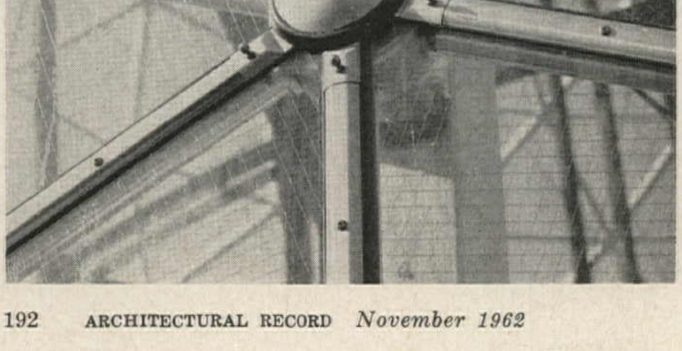
The aluminum sphere is attached to the precast concrete framing by means of a stainless steel coupling. The stainless steel coupling in turn is welded to an insert set in the precast concrete.

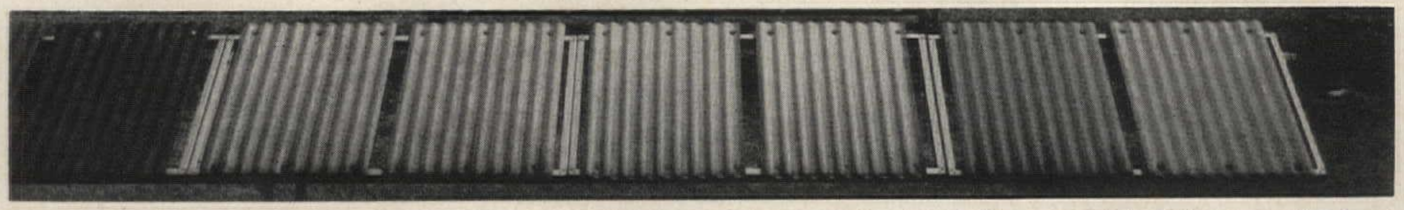
There are 39 different types of spheres for different angular arrangements of the rafters.

Here are interesting statistics on the three domes: *size*—90 ft high, 140 ft in diam.; *materials*—115,000 sq ft of glass, 16,000 rafters, 5,500 spherical joints, 240,000 ft of neoprene gasketing. Total cost of the three domes is $3,600,000. Cost of the glazing is $1,096,000.

The glazing system was invented by Ronald G. Hawkins, vice president of Super Sky Products Co., Thiensville, Wisconsin.

ARCHITECT: *Donald L. Grieb*
STRUCTURAL ENGINEERS: *Ammann & Whitney*
GLAZING: *Super Sky Products Co.*
PRECAST CONCRETE: *Hufschmidt Engineering Co.*





Ten-year old samples in industrial atmosphere. Two bright panels, left, are aluminized. Two at right of them are aluminum

# CHARACTERISTICS OF ALUMINIZED STEEL

*By W. H. Withey and H. H. Lawson*

Twenty-three years after its initial development, aluminum-coated or aluminized steel is emerging from virtual seclusion as a major architectural material with a largely untapped design potential.

Since 1952, when the architectural grade of aluminized steel was made commercially available, an increasing but still relatively small number of architects and engineers have evaluated and selected the material. It has been used for a variety of industrial and commercial buildings as roofing, siding, curtain walls, interior panels and related architectural applications.

Performance records indicate that aluminized steel has earned a place in the building materials market in competition with galvanized steel on one hand and aluminum alloys on the other. Properties of aluminized steel are a hybrid combination of the key characteristics of both steel and aluminum.

W. H. WITHEY is Supervisor, Construction Markets and H. H. LAWSON is Research Engineer, Research and Technology, Armco Steel Corporation, Middletown, Ohio

**Comparative Advantages**

A combination of corrosion resistance and strength unique among building materials is the major asset for aluminized steel. In addition, it is not as expensive as most aluminum building alloys. Aluminum-coated steel is approximately 30 per cent more expensive than zinc-coated steel. But aluminized steel exhibits a coating life four times that of zinc-coated steel in mild industrial atmospheres.

The appearance and corrosion resistance of aluminized steel are similar to that of aluminum. The material resists fire damage in the manner of steel. At 800 degrees F, aluminized steel has ten times the strength of aluminum. And aluminized steel shows high heat reflectivity, reflecting unwanted external summer heat and retaining internal generated heat.

**Types**

There are two grades of aluminum-coated steel. Type 1 has aluminum-silicon coating which provides excellent resistance to a combination of corrosion and high temperatures to 1,250 degrees F. The material is currently the major 1962 automobile muffler material and is used in a variety of other high temperature applications.

Type 2, the architectural grade, has a commercially pure aluminum coating which exhibits excellent resistance to atmospheric corrosion. Type 2 is not recommended for use above 900 degrees F.

The aluminum used for coating Type 2 is commercially pure alumi-

Truck terminal uses aluminized steel for vertical panels

Roofs are durable, attractive and reflect solar heat

num with a uniformly deposited coating thickness of approximately .002 in. per side—twice the thickness of a commercial hot dipped zinc-coated steel. General surface corrosion resistance of the coating in normal atmospheric exposure is similar to 1,100 aluminum.

### Corrosion Resistance

We have been field testing Type 2 aluminum-coated steel in a mild industrial atmosphere since 1939. After 23 years exposure in the Middletown, Ohio corrosion yard, the material is still in excellent condition. Corrosion engineers predict that the material will continue to withstand the environment for many more years.

As a general rule, aluminized steel is considered to have the same weathering characteristics as aluminum sheet. A 10-year corrosion comparison test in a mild industrial atmosphere is shown in the first photo. Aluminized steel and aluminum, weathering side by side, exhibit a markedly similar appearance.

Corrosion where solid aluminum meets the steel base metal is not a problem with aluminized steel. Because of the nature of the aluminum-steel bond, moisture cannot enter between the layers of the material to initiate corrosion.

Some mild discoloration can be expected at sheared edges. But samples exposed for 23 years show no undercutting of the coating and no bleeding.

In general, the corrosion resistance of aluminized steel is such that painting is not required. If painting is specified for extra protection or decorative reasons, no surface preparation of the material is necessary or recommended. Wash primers and similar preparations should be avoided. Where aluminized has been painted, paint life has been excellent, exceeding that of galvanized steel. In effect, paint life increases as the corrosion resistance of the painted surface increases.

### In-Service Corrosion

Data on how aluminized Type 2 reacts in specific environments have recently been gathered by a group of corrosion specialists from Armco's Research Center. The researchers inspected 55 "in-service" installations exposed from 1 to 10 years. Involved were roofing and siding installations in a variety of industrial, commercial and farm buildings. Related building products such as canopies, air conditioner housings, rolling doors, water tank covers, gutters and insulation lagging were also inspected.

In rural, mild industrial and severe industrial atmospheres, researchers found Type 2 performing well.

In severe marine installations subject to direct contact with salt spray, Type 2 etched sufficiently to produce an unsatisfactory appearance. The attack was characterized by rough white deposits which form on aluminum surfaces exposed to similar conditions. It was noted that all zinc-coated components in this atmosphere were painted regularly. Painting Type 2 in this case would have improved performance.

In marine-industrial environments only slightly removed from direct contact with salt water spray, Type 2 was found to be bright after 9 years' service. Researchers concluded that when considering materials for marine environments, an inspection should be made of other structures in the immediate area. If salt deposits are not present, unpainted Type 2 should be suitable for building components.

### Interior Environments

It is apparent from the research study that far more difficulty is encountered from interior building conditions than from exterior environments. Gases and fumes from various plant operations, as well as condensation from humidity, should be carefully considered during the selection of materials. Inspection of installations reporting signs of corrosion revealed that most problems could have been eliminated by proper design.

Field inspections indicated unprotected aluminized Type 2 should not be used in areas contaminated with sulfurous and sulfuric acid. Two installations were inspected where these vapors were vented to the roof and the fumes permitted to impinge on the aluminized surface. Extension of the vent stack or use of special paints in this area would have alleviated this condition.

**Costs* of a Metallic-Coated Steel**

| Thickness in. | Gage no. | Standard galvanized (1.25 class coating) | Standard galvanized treated for painting | Aluminized steel Type 2 |
|---|---|---|---|---|
| .080 | 14 | 25.5 | 26.0 | 31.1 |
| .065 | 16 | 21.4 | 21.8 | 25.9 |
| .050 | 18 | 17.0 | 17.3 | 20.5 |
| .040 | 20 | 13.9 | 14.2 | 16.8 |
| .025 | 25 | 9.3 | 9.5 | 11.6 |

*Cost data are approximate, since some variable and minor factors are necessarily omitted. Data are based on cut sheets 24 to 36 in. wide by 96 to 144 in. long and base quantities

### Economic Factors

On a price basis alone, aluminized steel is economically competitive with most building grades of aluminum. Since the density of aluminum is about one-third that of steel, it is necessary to consider the price per square foot as a basis for comparison. Cost estimates also must be based on decimal thickness because the gage system for aluminum alloys (Brown and Sharpe) is not the same as the gage system for aluminized steel.

Aluminized steel often will show a price advantage on the basis of equal thickness, the advantage being somewhat greater as thickness increases. Due to the greater strength and modulus of elasticity of aluminized steel, metal thickness can usually be reduced from that necessary with aluminum to provide an even greater economic advantage.

An approximate first-cost comparison of aluminized, cold-rolled steel treated for painting, standard zinc-coated steel and zinc-coated steel treated for painting is shown in the table.

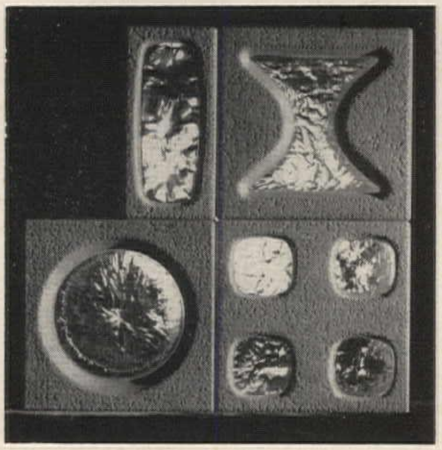
### Design Considerations

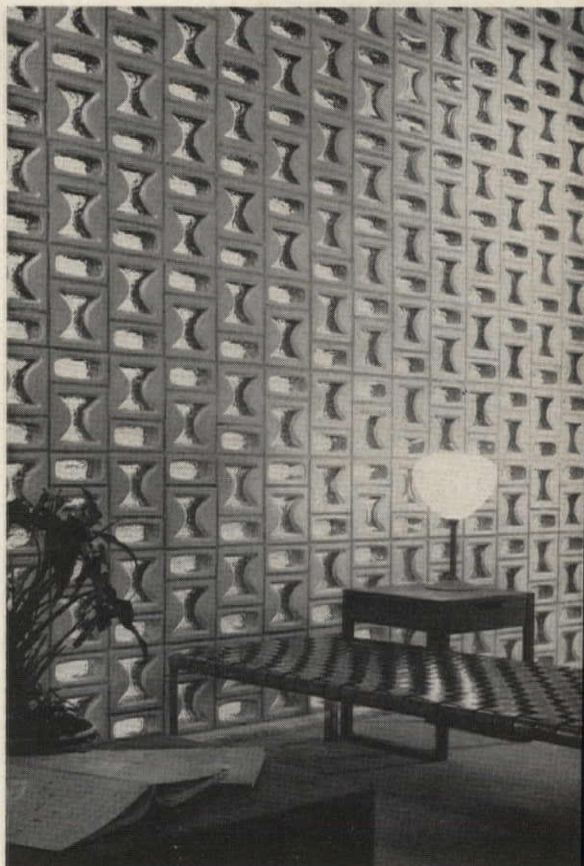
The strength of aluminized steel gives the material an added design dimension. In general, standard data for the design of light-gage cold-formed steel products apply to aluminum-coated steel. Mechanical properties of aluminized steel and zinc-coated steel are essentially the same, but aluminized is not quite as versatile when it comes to fabrication.

*Continued on page 208*

For more information circle selected item numbers on Reader Service Inquiry Card, pages 225–226

## GLASS BLOCKS WITH RECESSED DESIGNS FOR WALLS





New wall design possibilities are offered with *Intaglio Glass Wall Units* —all-glass blocks in square and rectangular shapes with recessed design areas of patterned clear glass. The raised portion of each unit has a textured finish with an opaque gray ceramic finish on both faces. The finish is fired at high temperatures to assure permanence, and the gray color blends with the mortar used to join the units, tending to eliminate any sharp delineation between the separate units.

The contrasts in both surface and color and the light and shadow effect caused by recessing the design areas provide, in fact, glass and grill in one building material. The clear glass areas have a light transmission rating of 20 to 40 per cent. The inside of the clear areas is patterned to permit even diffusion of light without glare, and the texture is designed so that there can be no focusing.

The *Intaglio* units give a "one operation" wall with interior and exterior decorative effects provided by the same material. Since the interiors of the hollow units are at a partial vacuum, the wall has an insulation value equal to about 12 in. of concrete. There is an average sound reduction of 38 decibels.

Pictured above are the four patterns currently available: 4- by 8-in. oval, and hourglass, circle and nuggett—all in 8- by 8-in. blocks. *Pittsburgh Corning Corp., One Gateway Center, Pittsburgh 22, Pa.*

CIRCLE 300 ON INQUIRY CARD

## CHAIN LINK FENCES WITH COLORFUL VINYL COATINGS


*Colorbond* chain link fences have the strength of steel combined with the colors possible with vinyl. Ten colors and any two-color combination are available. High strength, hot-dip zinc coated steel wire is used with a weather-resistant vinyl developed especially for the fencing by Union Carbide. The vinyl retains its flexibility and is self-extinguishing. Chemical resistance is high and maintenance costs are reduced to a minimum. Costs are reported to be slightly higher than those for bare galvanized steel and lower than for aluminum fencing.

With the long-term protection of its vinyl coating the fencing is warranted for 10 years and should last up to 20 years. It is available in standard 6, 9, 11 and 12 gage wire, in heights from 2 to 12 ft. Matching vinyl-base paint is supplied for posts and hardware.

In addition to the regular uses of chain link fencing for protective enclosures of various kinds, the colors suggest further uses, such as color-coded designation for fence-side parking and warning colors for restricted or dangerous areas. When used around power distribution stations, *Colorbond* boosts safety because the vinyl insulates against 12,000 volts. *Colorguard Corp., 107 E. 38th St., New York 16, N.Y.*

CIRCLE 301 ON INQUIRY CARD

*more products on page 213*

# Office Literature

For more information circle selected item numbers on Reader Service Inquiry Card, pages 225-226

### GLASS WALLS

(A.I.A. 26-A) "Creative Ideas in Glass" has 8 pages of full color photographs showing the varied uses of glass in curtain wall construction in existing buildings. Several building types are included. *American-Saint Gobain Corp., Kingsport, Tenn.*

CIRCLE 400 ON INQUIRY CARD

### AUTOMATIC DOOR OPENERS

(A.I.A. 16-D) Specifications and detail drawings for hydraulic, electric and pneumatic automatic door operating equipment, for all doors that swing, slide or fold. *The Stanley Works, New Britain, Conn.**

CIRCLE 401 ON INQUIRY CARD

### CONCRETE BLOCK

The advantages of using 8-in. concrete masonry block for residential and commercial use are illustrated in a 16-page booklet showing both exterior and interior applications. *National Concrete Masonry Assoc., 1015 Wisconsin Ave., N.W., Washington 7, D.C.*

CIRCLE 402 ON INQUIRY CARD

### CERAMIC FACING

(A.I.A. 9-A) *Contours CV*, a lightweight ceramic architectural facing for exterior and interior use, is illustrated in a brochure with photographs of 12 standard designs. *Gladding, McBean & Co., 2901 Los Feliz Blvd., Los Angeles 39, Calif.*

CIRCLE 403 ON INQUIRY CARD

### WOOD GRILL WORK

A 40-page, 3-color catalog contains 175 stock patterns of hardboard grill panels and 21 suggestions of areas for use. *Sculpt-A-Grille, Inc., 7105 S. McKinley Ave., Los Angeles 1, Calif.*

CIRCLE 404 ON INQUIRY CARD

### SLATE

Photographs of Pennsylvania slate finishes are shown in folder with suggestions for use, specifications and details on properties. *The Structural Slate Co., Pen Argyl, Pa.**

CIRCLE 405 ON INQUIRY CARD

### VINYL PANELS

Existing buildings and suggested designs using Barrett's building panels of polyvinyl chloride are shown in a large-size brochure which includes specifications, installation data. *Allied Chemical Co., Barrett Div., 40 Rector St., New York 6, N.Y.**

CIRCLE 406 ON INQUIRY CARD

### ROOF, WALL EXHAUSTERS

(A.I.A. 30-D-1) Engineering bulletin 2CE has data to enable one to specify both air moving capacity and exhauster sound level for power roof and wall exhausters. *Jenn-Air Products Co., Inc., 1102 Stadium Drive, Indianapolis 7, Ind.*

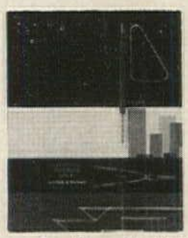
CIRCLE 407 ON INQUIRY CARD

### STEEL FLOOR SYSTEM

*WacoPlate* steel free-access floor system has panels made with a flat top sheet spotwelded to a die-form stiffener sheet. *Panel Products Div., Washington Aluminum Co., Inc., Baltimore 29, Md.**

CIRCLE 408 ON INQUIRY CARD

### WOOD BUILDINGS



Use of West Coast lumber for commercial buildings is illustrated in a full color, 40-page booklet showing banks, shopping centers, motels, country clubs and other building types. *West Coast Lumbermen's Assoc., 1410 S. W. Morrison St., Portland 5, Ore.*

CIRCLE 409 ON INQUIRY CARD

### LIGHTWEIGHT CONCRETE

The varied uses of *Elasticrete* lightweight concrete are described in a series of booklets, giving specifications and design details. *Elastizell Corp. of America, P.O. Box 321, Alpena, Mich.*

CIRCLE 410 ON INQUIRY CARD

### SLIDING DOOR HARDWARE

A new line of sliding, folding and accordion door hardware for medium and heavy doors is illustrated in a 26-page catalog. *House & Co., 219 E. 44th St., New York 17, N.Y.*

CIRCLE 411 ON INQUIRY CARD

### SANDSTONE

(A.I.A. 8-B-6) Color illustrations of *Amherst* sandstone installations are included in brochure with technical data and samples of patterns and finishes available. *Cleveland Quarries Co., Amherst, Ohio*

CIRCLE 412 ON INQUIRY CARD

### FIR PLYWOOD COMPONENTS

(A.I.A. 19F) Structural details for folded plate roofs and stressed skin panels using fir plywood components are given in two pamphlets which have illustrations and descriptive text. *Plywood Fabricator Service, Inc., P. O. Box 7, Riverdale Station, Chicago 27, Ill.**

CIRCLE 413 ON INQUIRY CARD

### HEAT REQUIREMENTS

(A.I.A. 30-C-44) Technical bulletin TR-103 has charts and data for quickly determining radiant heating unit requirements, both for entire buildings and specific areas. *General Products Co., Inc., P. O. Box 887, Fredericksburg, Va.*

CIRCLE 414 ON INQUIRY CARD

### COPPER PIPING

(A.I.A. 29-B-4) Technical information on copper tubing and fittings is given in a 16-page copper piping manual. *NIBCO Inc., 500 Simpson St., Elkhart, Ind.*

CIRCLE 415 ON INQUIRY CARD

### AREA LIGHTING

Facts and figures on lighting various outdoor areas are given in a 48-page, illustrated booklet, GEA 7223A. *General Electric, Schenectady 5, N.Y.**

CIRCLE 416 ON INQUIRY CARD

### ACID-PROOF FLOORS

Technical data and construction fundamentals for industrial floors subject to acids and alkalies. *Atlas Mineral Products Co., Mertztown, Pa.*

CIRCLE 417 ON INQUIRY CARD

**Additional product information in Sweet's Architectural File*

*more literature on page 242*

# Why Del Webb's luxurious new OceanHouse features NEVAMAR® surfaces in every room

Each of 200 gracious guest rooms at OceanHouse in San Diego, California contains trouble-free surfaces of Nevamar decorative laminate. You'll find Nevamar in all the public rooms, too—throughout the Jolly Roger cocktail lounge, in the dining room, and on all dressers, chests, night stands and hi-fi sets.

Interior designers for Del E. Webb Corporation created the OceanHouse decor to combine nautical feeling with Oriental-Tahitian influence. Furniture surfaced with Oriental Walnut Nevamar fitted the plan perfectly. For the public rooms and registration desk, the selection was Nevamar Imperial Flat-Cut Mahogany. Draperies of flameproof Saranspun by National also play an important part in the overall scheme.

Top designers are using Nevamar laminates to solve many decorating problems—in wall paneling, doors, furniture and countertops. We'll be happy to help you do the same if you tell us your requirements.

NATIONAL PLASTIC PRODUCTS COMPANY, INC., ODENTON, MD.

NEVAMAR

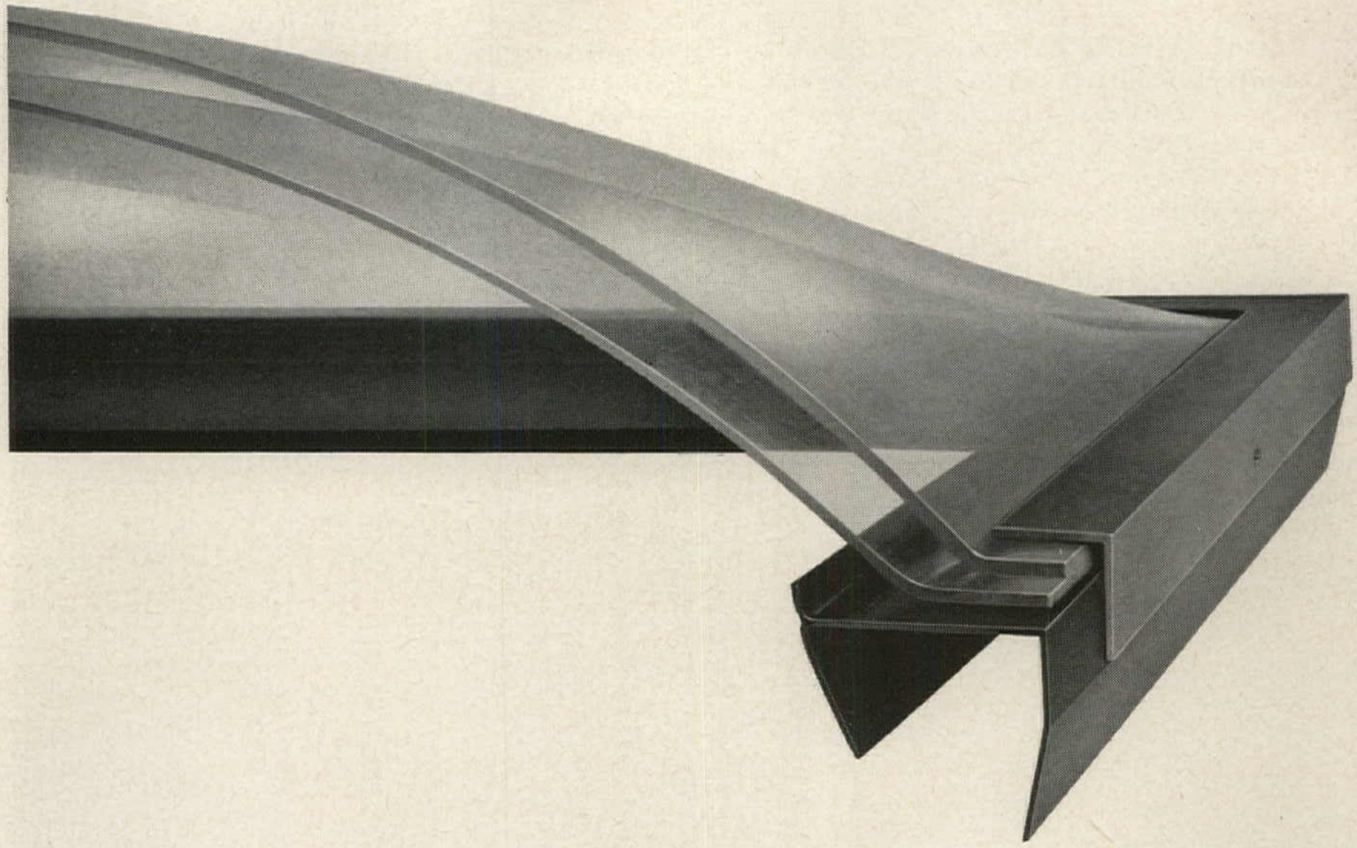
ARCHITECTS FOR OCEANHOUSE: MARTIN STERN JR., AIA, ARCHITECT & ASSOCIATES; LEON GLUCKSMAN, AIA, ASSOCIATE; BENTON CHARLES GEVERSON, ASSOCIATE.

Typical guest room at OceanHouse. Furniture by Whitecraft of Miami features mar-resistant surfaces of NEVAMAR laminate.

Jolly Roger Cocktail Lounge at OceanHouse. Tables fabricated with NEVAMAR tops by West Coast Industries, San Francisco. Bar top fabricated and installed by Art Top of San Diego.

**For more data, circle 76 on Inquiry Card**

*NEW FROM JOHNS-MANVILLE*



# Corrulux® Double-Domes for better daylighting

**ALL-ACRYLIC DOMES ARE PREFABRICATED AND FACTORY-SEALED . . . SPECIAL FRAME DESIGN ALLOWS UP TO 12% MORE DAYLIGHTING AREA**

Now—a new unit with a special frame design that affords as much as 10-12% more daylighting area! J-M Corrulux Double-Domes are available in clear acrylic or in 3 shades of white for various light transmission values and insulation requirements. They are particularly suited to the low-pitched roofs favored for modern school, supermarket and factory buildings . . . and also have special residential applications.

On-site assembly is no longer a problem. The new PVC (polyvinyl chloride) frame is rigid and durable, yet flexible enough to adjust to curb openings that frequently deviate from specified dimensions. Therefore, each unit can be installed factory-sealed.

In service, weathering and age leave PVC functionally intact. The domes proper are of time-tested acrylic plastic that has proved itself in every climate zone for many years.

For more information about these adaptable new daylighting units, write for Brochure CXI-9A. Address Johns-Manville, Box 158, Dept. AR11 New York 16, N. Y. In Canada: Port Credit, Ont. Cable: Johnmanvil.

*Easy, trouble-free installation*

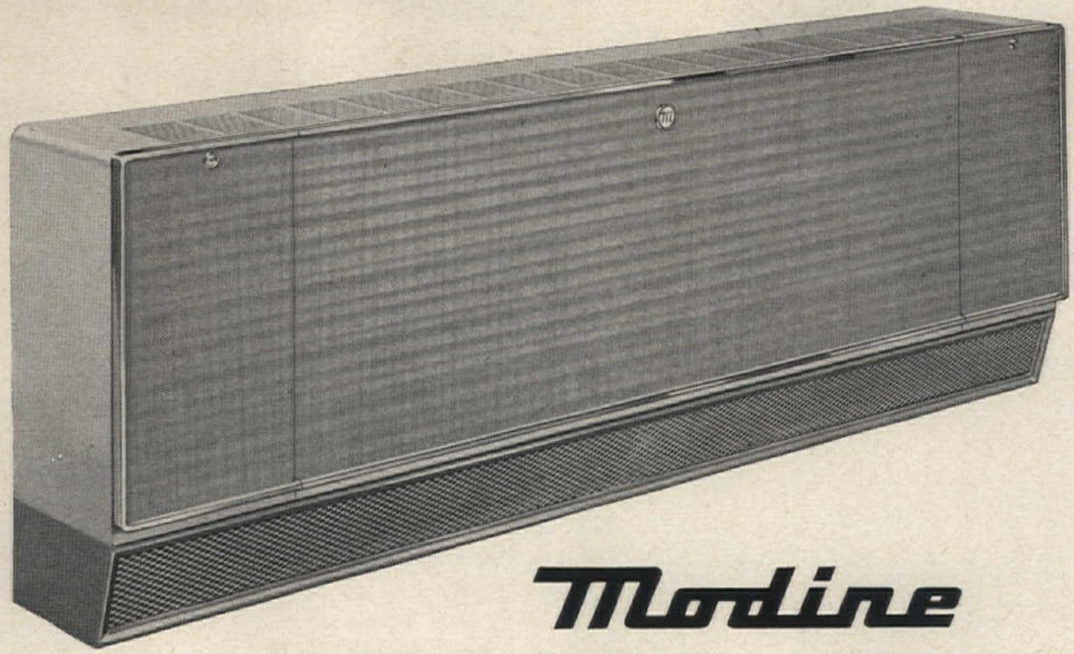
*Available in a curb type, as shown above, or in a flush type*

JOHNS-MANVILLE

For more data, circle 77 on Inquiry Card

For more data, circle 78 on Inquiry Card →

# toward better classroom climate



## Modine School-Vent® UNIT VENTILATOR

***for heating, cooling and ventilating***

## ALL-SEASON COMFORT! FUNCTIONAL GOOD LOOKS! LOW, SLIM SILHOUETTE! IN SEVEN ATTRACTIVE COLORS!

Introduced just one year ago . . . and already the Modine SCHOOL-VENT has won favor in modern schools coast-to-coast!

Teachers and pupils like the ideal "educational climate" it maintains. Engineers like its unique concept of *air control* . . . employing a simple, *full-damper* system that automatically adjusts to temperature and fresh-air requirements. School officials like its maintenance and operating economies.

And *you'll* like its fresh, attractive styling . . . its design simplicity and flexibility. The SCHOOL-VENT is thinner and lower than most other equipment of this type . . . 13″ x 28″ compared to the normal 18″ x 32″.

Choice of seven handsome colors: light gray, tan beige, light green, coral red, light blue, dark gray and cream yellow. And SCHOOL-VENT beauty is virtually "student-proof." Heavily reinforced, welded steel cabinets defy abuse. Front panels have attractive, scuff-resistant vinyl inserts.

Modine SCHOOL-VENT unit ventilators heat with steam or hot water . . . cool with central-source chilled water. Five sizes: 500 to 1500 cfm. For complete information, write for SCHOOL-VENT Bulletin 1261.

V-1463

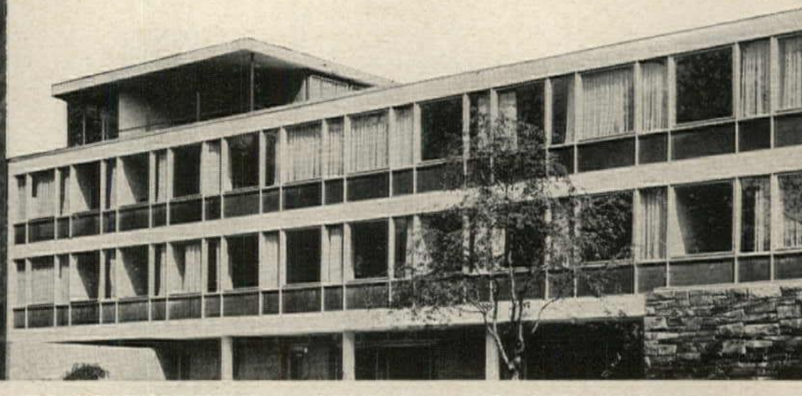
ML® HEAT TRANSFER CREATIVE CENTER

**Modine MANUFACTURING CO.**

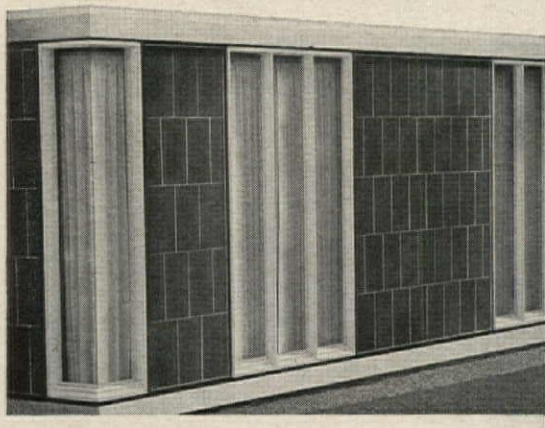
1510 DeKoven Ave., Racine, Wis. • In Canada: Sarco Canada, Ltd., Toronto 8, Ont.

• Steam, Hot Water, Gas-Fired and Electric Unit Heaters • Fan-Coil Units and Self-Contained Airditioners • Classroom Heating and Ventilating Units • Cabinet Unit Heaters, Steam and Gas Blower Unit Heaters • Steam Specialties • Radiation Products — Convectors, Finned Tube, Baseboard

For more data, circle 82 on Inquiry Card



**DANISH EMBASSY** *Natural Cleft slate panels add dignified zest to the modern lines of the new Danish Embassy, in Washington, D.C. Architect—Vilhelm Lauritzen; Consulting Architects—The Architects Collaborative.*



**NEAL** *Cleft Slate tiling accents le motif moderne at the new W. E. Neal office building in Minneapolis. Architect—Donald Hustad.*

**SLATE IS MICA GRANULAR CRYSTALLINE STONE,** *derived from argillaceous sediments, solidified by metamorphism and characterized by perfect cleavage. It possesses both a horizontal and vertical grain. In aspect it can be as bold as Gibraltar or as delicate as a maiden's whim. It presents the pure essence of Nature, and is unequivocal . . . it enhances every architectural feeling!*

**SLATE** *has more uses than any other natural rock.*

- INTERIOR AND EXTERIOR PANELING
- BASEBOARDS, THRESHOLDS, LINTELS
- SILLS, TRIMMING, PATIOS, WALKS
- LAVATORY EQUIPMENT ENCLOSURES
- STAIR TREADS, RISERS, PLATFORMS
- CAPS, BASES, WAINSCOTS, SPANDRELS
- HEARTHS, MANTELS, FACINGS
- ACID AND ALKALI RESISTANT HOODS, SHELVING, TANKS AND TOPS

# PENNSYLVANIA SLATE

## enhances EVERY architectural feeling

*Write for new brochure outlining the uses and characteristics of slate. Specific inquiries invited.*

**THE STRUCTURAL SLATE COMPANY**
**PEN ARGYL, PA.**

Boston • Cleveland • Philadelphia • Chicago • Minneapolis • Washington, D. C.

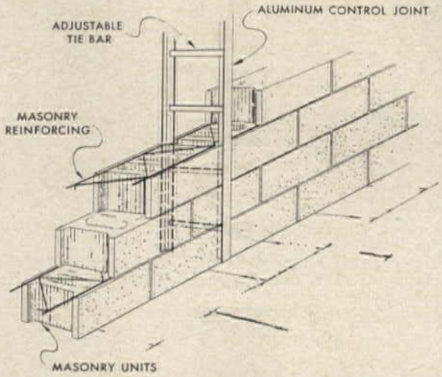
For more data, circle 83 on Inquiry Card

## *Product Reports*

*continued from page 199*

### MASONRY JOINT

Aluminum *Con-trol-joint* for masonry construction controls shrinkage cracks, adds strength and permits




use of different size and type masonry units without keying. The joints are adjustable for any wall thickness and can be used for both interior and exterior applications. *United Areo Products Corp., Burlington, N.J.*

CIRCLE 302 ON INQUIRY CARD

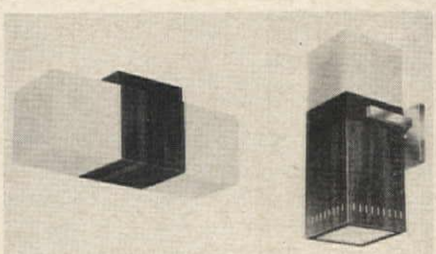
### COOLING TOWER SCREENS

Extruded aluminum cooling tower screens are designed to conceal cooling towers, water tanks and other equipment where high air efficiency must be maintained. Vertical and horizontal line screens are offered with a number of finishes. Variations possible in spacing blades and structural supports provide a wide range of styles to harmonize with the rest of the building. *Construction Specialties, Inc., 55 Winans Ave., Cranford, N.J.*

CIRCLE 303 ON INQUIRY CARD

### LIGHTING FIXTURES

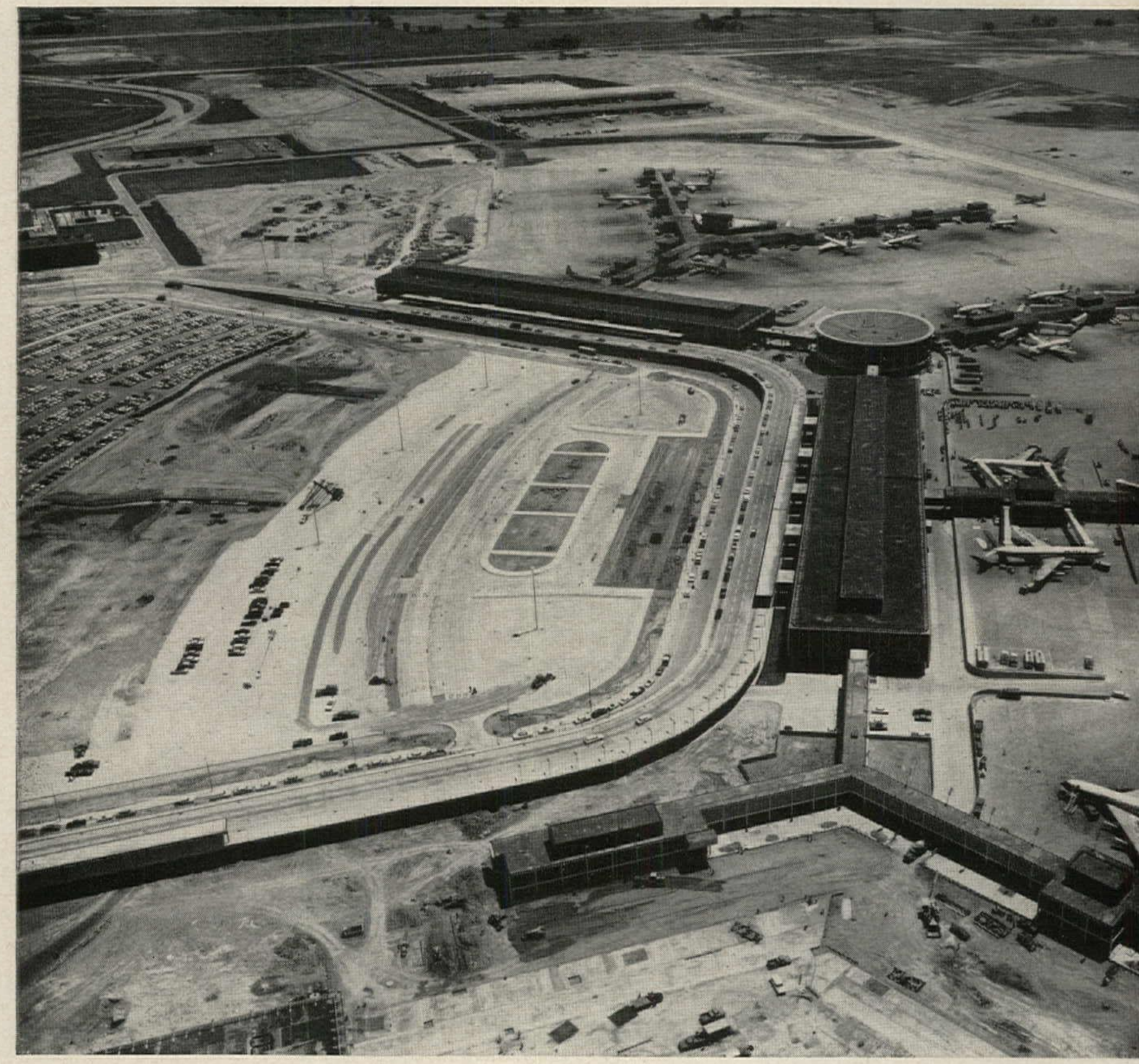
Coordinated fixtures for fluorescent and incandescent lights are available in walnut, birch, white, polished brass



and brushed chrome finishes. *Globe Lighting Products, Inc., 801 Second Ave., New York 17, N.Y.*

CIRCLE 304 ON INQUIRY CARD

*more products on page 216*



## At Chicago O'Hare International Airport, B&G *Hydro-Flo*®

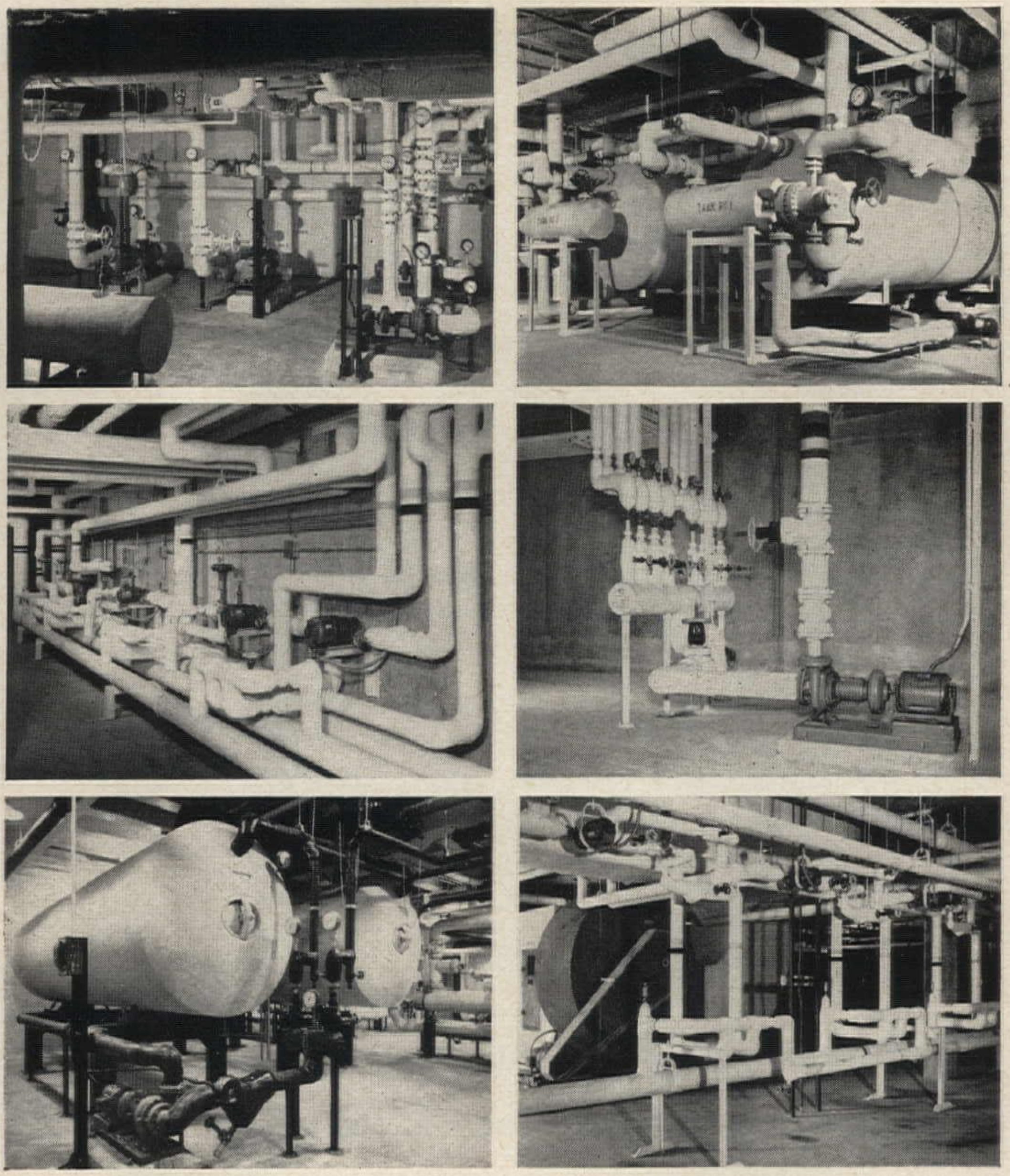
**320**
**B&G BOOSTER PUMPS**

**127**
**B&G UNIVERSAL PUMPS**

The number of B&G *Hydro-Flo* System Units installed at O'Hare Field reflects the vast size of the airport. 462 B&G pumps and 46 B&G heat exchangers are required to furnish hot water and circulate it through the heating system. This installation aptly demonstrates the superior qualities of circulated water as a means of heating or cooling a structure.

The B&G *Hydro-Flo* System is extremely flexible in application...performing equally well in a low cost home, modern high rise or a building complex covering acres.

For large installations, B&G engineers have developed a method of Primary-Secondary pumping which offers designers unlimited versatility in meeting zone problems in the most efficient and economical way. Required *pump horsepower is sharply reduced*, heat control improved and fuel saved.



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

## *Product Reports*

*continued from page 213*

### FLOODLIGHTS

A calibrated dial mechanism permits on-the-job focusing for more precise beam coverage in a new series of quartz iodine floodlights. Moving the

lamp forward or back inside a double parabolic reflector can achieve a wide range of vertical beam spreads, as well as asymmetrical beams. *Stonco Electric Products Co., Kenilworth, N.J.*

CIRCLE 305 ON INQUIRY CARD

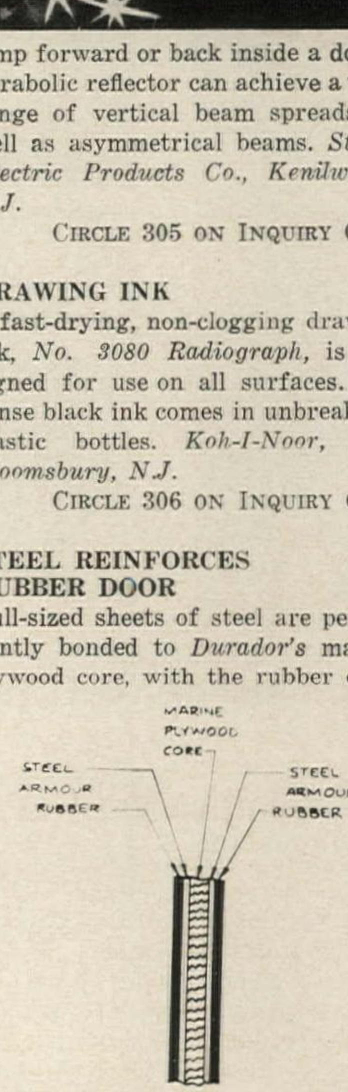
### DRAWING INK

A fast-drying, non-clogging drawing ink, *No. 3080 Radiograph,* is designed for use on all surfaces. The dense black ink comes in unbreakable plastic bottles. *Koh-I-Noor, Inc., Bloomsbury, N.J.*

CIRCLE 306 ON INQUIRY CARD

### STEEL REINFORCES RUBBER DOOR

Full-sized sheets of steel are permanently bonded to *Durador's* marine plywood core, with the rubber exte-




riors of the door bonded to the steel. A full-length rubber hinge permits full openings in either direction and eliminates need for lubrication. *Clark Door Co., Inc., Rose St., Newark 8, N.J.*

CIRCLE 307 ON INQUIRY CARD

*more products on page 220*

# Amtico TRAVERTINE* Vinyl Flooring

Fairmont Tower, San Francisco, Calif. Designed by Mario Gaidano, Architect, A.I.A., with Barbara Dorn Associates as Interior Design Consultant. Fairmont management: J. D. Weiler & B. H. Swig, Owners; R. L. Swig, Pres. & Managing Dir.

## Amtico Vinyl captures the practical beauty of natural travertine...

See Amtico Travertine* Vinyl and natural travertine side by side. Your very own eyes proclaim it . . . Amtico has completely captured the heart and soul of natural travertine's look, its texture, its soft beige color! Advantages over natural travertine: Drastically lower price. Much lighter in weight . . . floor requires no reinforcement. Far greater durability. Resilient comfort underfoot. Much easier to install . . . will not chip or break. Mops clean . . . effortless to maintain . . . should never be waxed.

Ideal for smart commercial and residential installations. Adds true classic beauty to floors and walls. Standard and special tile sizes up to 36″ x 36″, ⅛″ and .080″ gauges. Four colors, others on special order. Write for free samples.

**Produced by an exclusive patented process #3,012,285*

Manufacturers of the finest in Vinyl, Rubber, Vinyl Asbestos and Asphalt Floorings

**AMERICAN BILTRITE RUBBER COMPANY**

TRENTON 2, NEW JERSEY

Showrooms: New York • Chicago • Los Angeles
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In Canada: American Biltrite Rubber Company Ltd., Sherbrooke, Que.

MEMBER OF RESOURCES COUNCIL

*Amtico* FLOORINGS

For more data, circle 87 on Inquiry Card

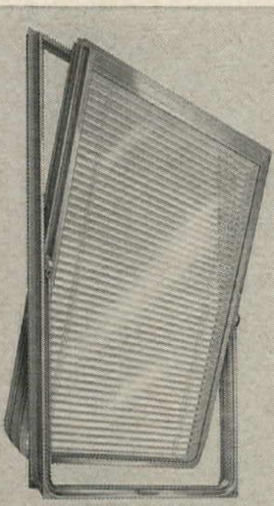
# AMELCO WINDOWS

## *specified for* JOHNS HOPKINS *University*

### *School of Advanced International Studies*

*1740 MASSACHUSETTS AVENUE, N. W., WASHINGTON, D. C.*

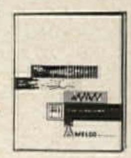
**Architect: Justement, Elam, Callmer and Kidd • Contractor: John McShain, Inc. • Amelco Distributor: James A. Cassidy Co., Inc. Wash.,**



***CONTROLS HEAT, LIGHT, SIGHT & SOUND***

- Dual Glazing
- Venetian Blind between panes of glass
- True Thermal break in vent and frame
- Pivots 180° Horizontally

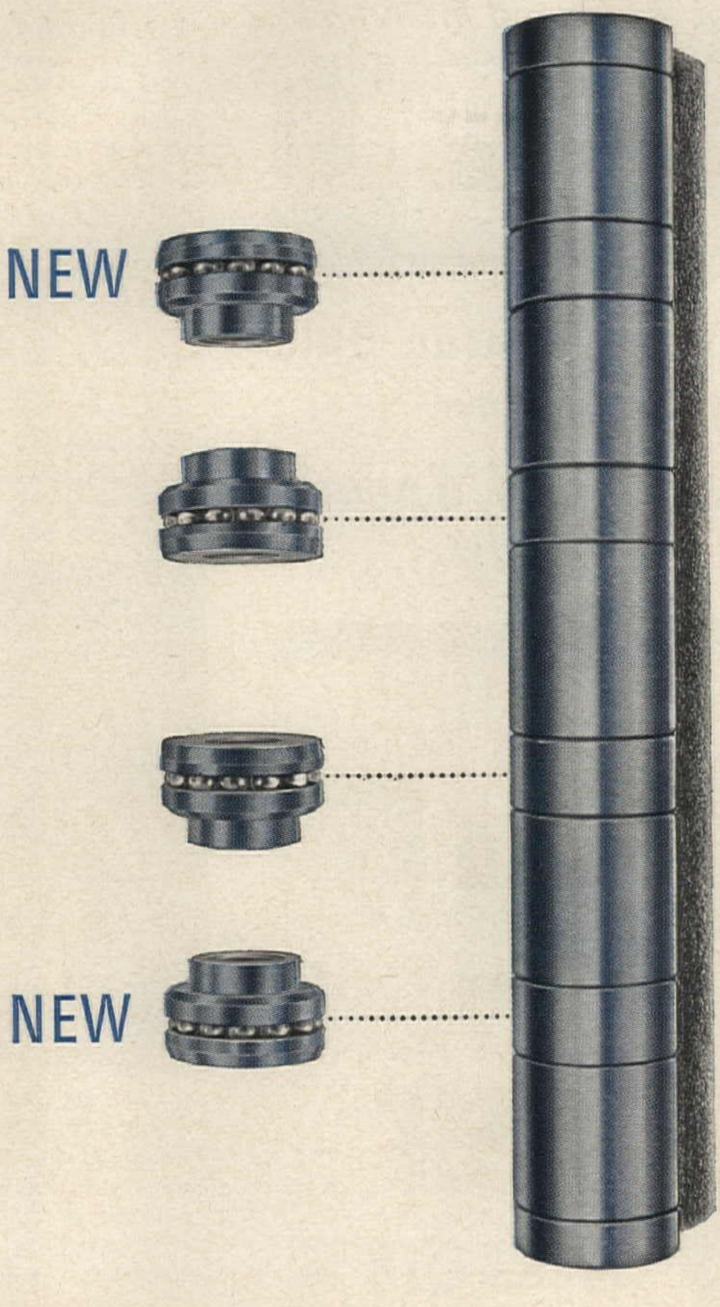
The Amelco Window offers many advantages . . . dual glazing with venetian blind *between* the panes of glass reduces solar heat gain by 65%. Just think of the savings in air conditioning equipment costs . . . and operating costs.
Two inch air space and true thermal break in vent and frame offer 55% less heat loss in winter.
Air space and efficient seals reduce noise transmission more than 50%.
Horizontal pivoting offers ventilation if you need it and cleaning of all glass surfaces from inside . . . more savings.
Many leading architects are specifying Amelco . . . the most versatile, most economical window in America. Write for full story.



AMELCO

**AMERICAN ELUMIN CO • 1676 COMMERCE DRIVE, STOW, OHIO**

For more data, circle 88 on Inquiry Card




## conversation piece...

# NEW SLIMLINE 5

## WITH 4 BALL BEARINGS

When talk turns to quality and design, architects and builders find this new hinge makes for good conversation. It's the *only* slimline with five knuckles, the *only* slimline with four ball bearings . . . and it's still the slimmest of them all. How the four intricate but rugged ball-bearing units integrate without increasing knuckle size is a tribute to hinge craftsmen at Hager.

The five knuckles mean 10% to 20% more strength on lateral pull and twice the bearing surface to support vertical weight. The pin, approximately one-third larger than other slimlines, naturally maintains a much greater protective margin in shear and tensile strength.

Medium and heavy doors move ever so quietly, ever so smoothly, ever so true, on the new four-ball-bearing Slimline 5. Write Hager, or contact your Hager representative for information. C. Hager & Sons Hinge Mfg. Co., St. Louis 4, Mo. Hager Hinge Canada, Limited, Kitchener, Ontario.

***Everything hinges on Hager®***

Hager

For more data, circle 89 on Inquiry Card

## *Product Reports*

*continued from page 216*

### COLORED EXTERIOR PLYWOOD PANELING

Exterior plywood paneling with factory-applied colors is said to save costs as compared to unfinished siding with on-site painting. The line has Douglas fir veneers and acrylic-vinyl paint. A variety of sizes and thicknesses is available. The panels meet F.H.A. specifications for 303 C specialty siding and can be nailed directly to studs. *Georgia-Pacific, Equitable Bldg., Portland, Ore.*

CIRCLE 308 ON INQUIRY CARD

### LIGHTWEIGHT ALUMINUM BEAM

The *Alcoa Hico 59er* adjustable beam weighs only 28 lbs and can be used

as a support for concrete slab forms for spans from 5 ft 9 in. to 9 ft 9 in. The beam has a built-in camber curve, and bending moment is 3,000 lbs, with an end reaction of 1,750 lbs. *Aluminum Co. of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa.*

CIRCLE 309 ON INQUIRY CARD

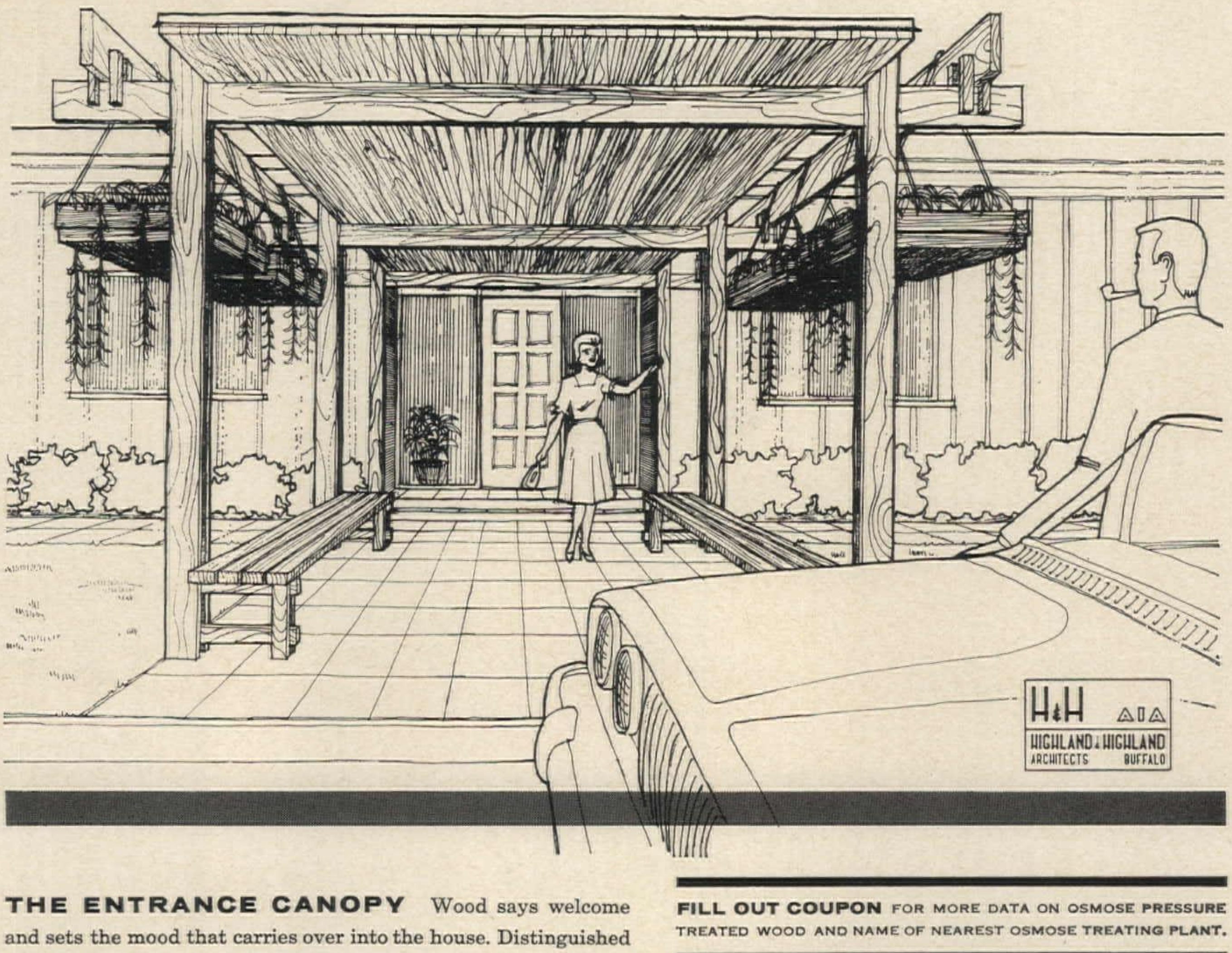
### SURFACE BRICK

*Vesta* brick surfacing can be used without concrete footings, to save costs while providing a decorative surface. The product can be attached to any surface, using tar paper and a patented socket wire mesh with loops which serve as guides for the brick. Mortar is applied over the wire to the depth of the loops. Applications are wainscoting, fireplace facings, planters, room dividers, and interior walls. *Vesta Mfg. Co., 275 Leo Ave., San Jose, Calif.*

CIRCLE 310 ON INQUIRY CARD

*more products on page 234*

## DESIGN INSPIRATIONS NO. 8 USING OSMOSE TREATED WOOD




**THE ENTRANCE CANOPY** Wood says welcome and sets the mood that carries over into the house. Distinguished by the warm-timbered tones of exposed beams and posts with hanging gardens to give added interest, this entrance design is easy to look at . . . easy to live with . . . and exceedingly practical. It suggests one of the many exciting ways you can transform a standard doorway into a showplace of excellent taste with Osmose pressure treated wood. Osmose treated wood is virtually immune to exposure and termites, requiring the very minimum in maintenance and repair. All considered, it is a *new* material whose only design limit is your imagination.

**FILL OUT COUPON** FOR MORE DATA ON OSMOSE PRESSURE TREATED WOOD AND NAME OF NEAREST OSMOSE TREATING PLANT.

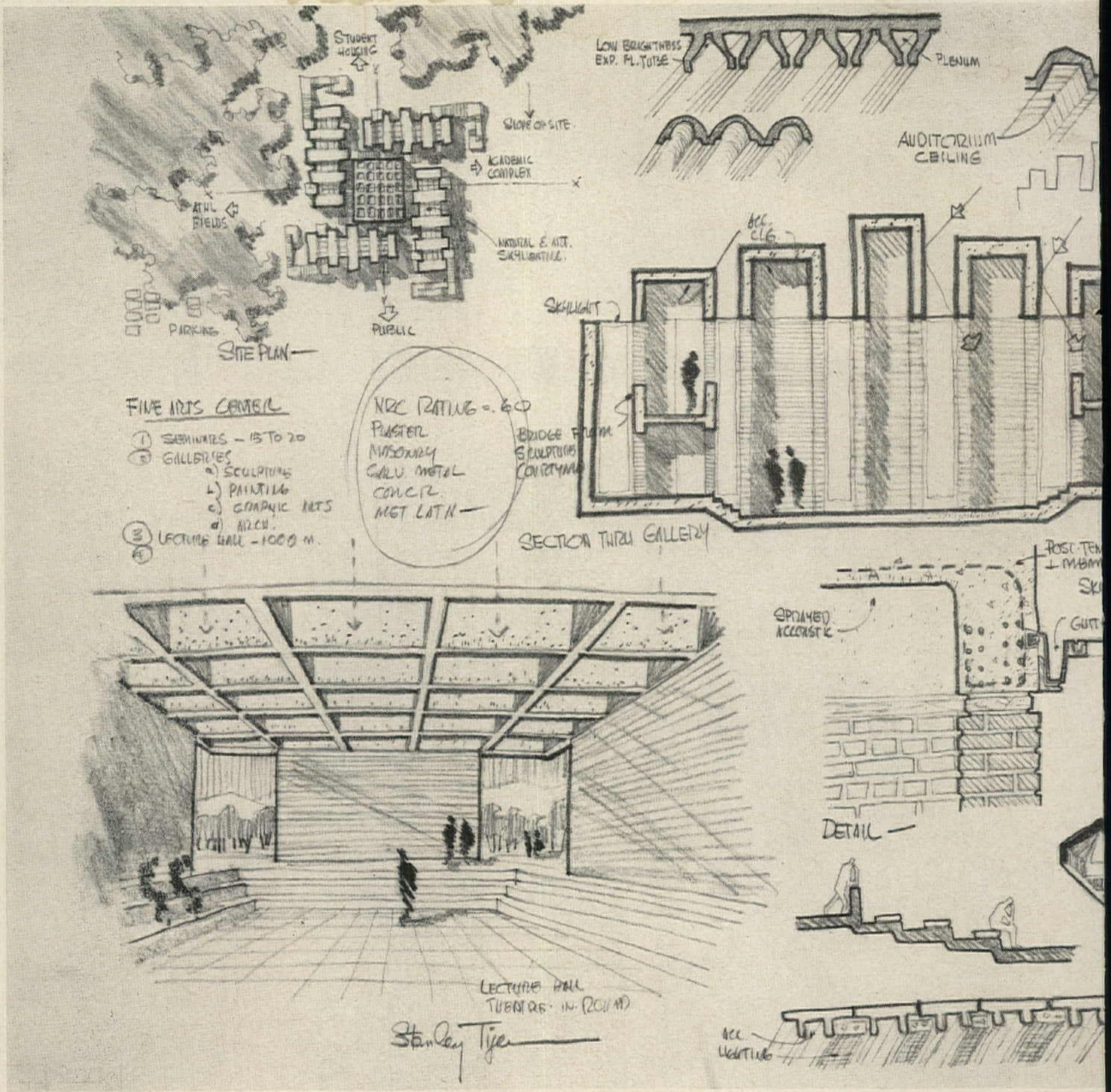
OSMOSE WOOD PRESERVING CO. OF AMERICA, INC.
980 ELLICOTT ST., BUFFALO 9, N. Y.

☐ Send more data on OSMOSE Pressure Treated Wood
☐ Name of nearest plant

Name__________
Firm__________
Street__________
City__________ Zone____ State____

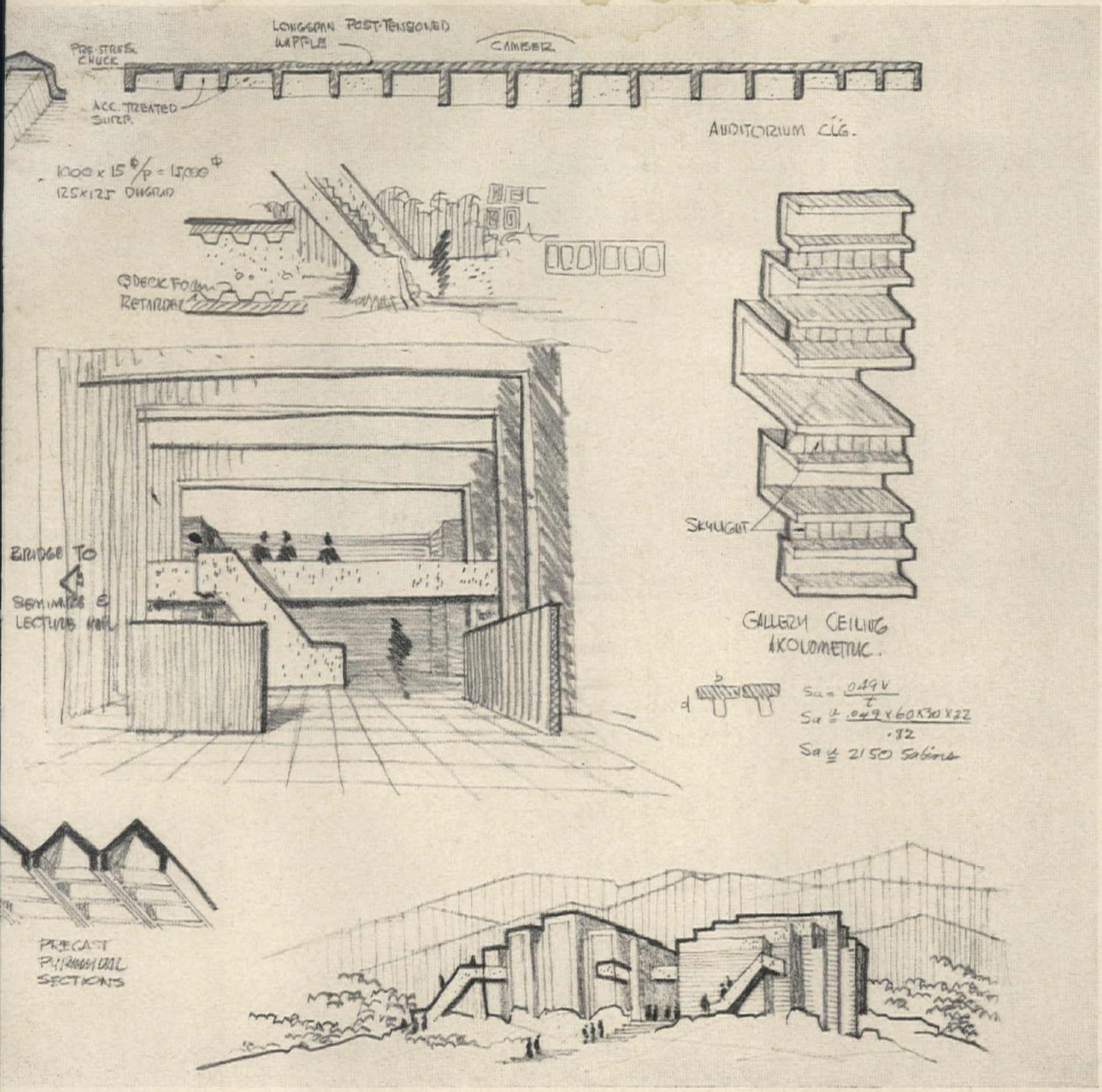
← For more data, circle 92 on Inquiry Card

For more data, circle 93 on Inquiry Card




# Acoustical ceilings are designable

*Architect Stanley Tigerman gives us a few of his ideas regarding three dimensional, acoustical ceilings. Mr. Tigerman is a principal of the firm of Tigerman and Koglin, 100 West Monroe St., Chicago.*




# now that Zono-Coustic is here

Enough is enough. The number of flat acoustical ceilings made out of itty-bitty squares has reached the saturation point.

Three dimensions and the play of light and shadow are the elements that make ceilings interesting.

Zono-Coustic Acoustical Plaster will stick to the shapes you design, add the texture you want, and give you an N.R.C. rating of .60.

It can be machine applied over any clean firm surface such as base coat plaster, masonry, galvanized metal, concrete or metal lath surfaces.

Help stamp out flat, dull, acoustical ceilings. For complete information about Zono-Coustic, write for Bulletin #PA-59, to: *Zonolite Company, 135 South LaSalle Street, Chicago 3, Illinois.*

**ZONOLITE**

For more data, circle 94 on Inquiry Card

## *Product Reports*

*continued from page 220*

### PLASTIC LAB FAUCET

A rigid gooseneck compression faucet for labs is made of polyvinyl chloride to maintain the purity of distilled water. The *Lab-Flo* unit has needle valve control and wheel handle. *T & S Brass & Bronze Works, Inc., 128 Magnolia Ave., Westbury, L.I., N.Y.*

CIRCLE 311 ON INQUIRY CARD

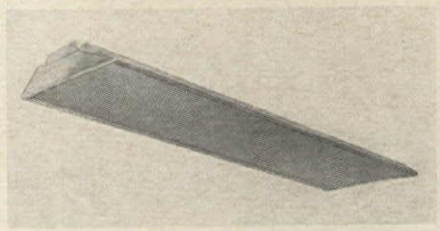
### HARDWOOD STRIP FLOORS

A cost-cutting method for installing hardwood strip floors over concrete without use of wood subfloors uses two-layer sleepers of 1- by 2-in. wood nailed together to suspend a moisture barrier of 4-mil polyethylene film between sleeper layers and across the air space. The bottom layer of each sleeper is secured to the slab by a latex mastic applied with a caulking gun and by concrete nails. The strip hardwood flooring is nailed at right angles to the sleepers. A 4-mil polyethylene film is placed directly over the base fill before pouring slab to prevent rise of ground moisture into the slab. *The National Oak Flooring Manufacturers' Assoc., 814 Sterick Bldg., Memphis 3, Tenn.*

CIRCLE 312 ON INQUIRY CARD

### FLUORESCENT FIXTURE

The *Jamaica, Series 500* lighting fixture has lens fitted into acrylic side panels to make a one-piece enclosure which hinges from either side. Two spring catches release enclosure for relamping and cleaning, yet hold it securely. The fixture is designed for



school and commercial installations. *Litecontrol Corp., 36 Pleasant St., Watertown, Mass.*

CIRCLE 313 ON INQUIRY CARD

### AIR CONDITIONER ENCLOSURE

Flexibility and fast installation are features of the *Modulaire* air conditioner enclosures. Sections are precut and pre-assembled, with no cutting or welding necessary. *Modulaire Components Corp., 1421 Second Ave., New Hyde Park, N.Y.*

CIRCLE 314 ON INQUIRY CARD

### "CLEAN ROOM" FLOOR

*Poly-Rock Smooth-Top* is a trowel-applied surfacing for use over concrete or wood in "clean rooms." The floor is highly resistant to acids, fuels, etc., and will withstand impact and heavy loads. Several solid colors are available. *Plant Maintenance, Inc., Cleveland 21, Ohio.*

CIRCLE 315 ON INQUIRY CARD

### ZONE CONTROL IN GAS HEAT

A gas baseboard heater for zone heating has the vented gas burner in a sealed combustion chamber, so no room air is used. The heater front is 10½ in. high and 4½ in. wide. *Samuel Stamping & Enameling Co., Manufacturers Road, Chattanooga 1, Tenn.*

CIRCLE 316 ON INQUIRY CARD

*more products on page 238*


MOUNT OLIVET HOME FOR SENIOR CITIZENS • ARCHITECT: H. W. FRIDLUND • BUILDER: KRAUS-ANDERSON

Pella®

# WOOD CASEMENT WINDOWS

PELLA ALSO MAKES QUALITY WOOD
TWINLITE® AND MP WINDOWS
WOOD FOLDING DOORS AND PARTITIONS
SLIDING GLASS DOORS AND ROLSCREENS

## Care-free windows for care-free living

Until someone invents a self-cleaning window, PELLA WOOD CASEMENT WINDOWS require the least maintenance, providing substantial savings for your client. Occupants can operate each ROLSCREEN®—the "instant screen" *that rolls down in spring, rolls up in fall.* Self-storing storm panels stay in place the year 'round, saving on seasonal labor and valuable storage space. Stainless steel, spring-type weatherstripping combines with wood frames to increase the efficiency of heating and air-conditioning systems. PELLA offers 18 ventilating sizes up to 24" x 68" and 48 fixed sizes for maximum planning flexibility. Full information and specifications in SWEET's or see the Yellow Pages for the name of nearest U.S. or Canadian distributor.

1 *of a series*

ROLSCREEN COMPANY • PELLA, IOWA

For more data, circle 96 on Inquiry Card

# *Close harmony i color planning for luxury living in Tulsa*

Conceived as a super-luxury address to attr people to the city from country estates, Tuls new 2300 Riverside Apartments combines all feel of the open with the ultimate in town livi

Coordination between the architect's office Dallas and the building site in Tulsa impose two-way problem in color planning. The solut was simple: a "Man from Devoe" in each covered the responsibilities at his end of the li Working in closest cooperation, these men help the architect and the painting contractor achi the exact rhapsody in hues projected on the boar

Their combined assistance began with help color selection . . . through the Devoe Library Colors® system, covering over 1,000 interior a exterior colors. It continued with the provision all technical data required on paint, the supply of Devoe Dispensers for mixing of special colors the building site, scheduling of paint shipme and complete follow through and cross-check of all details between Tulsa and Dallas.

Devoe Architectural Representatives are now av able in 66 cities from coast to coast. Why not how much time, trouble and cost your near Man from Devoe can save for you. There is charge or obligation for his assistance . . . eve two, three or more "Men from Devoe" work i team to cover projects hundreds of miles or m from your office. To contact a Man from Dev call or write the nearest Devoe office listed bel

Tulsa's new, high-rise luxury 2300 Riverside Apartments (left) overl the Arkansas River and downtown Tulsa. Architects: Harrell & Hami AIA; General Contractor: Centex Construction Company; Painting tractor: Eddie H. Shahan, Inc., all of Dallas, Texas.

Charles A. Barclay . . . Devoe Architectural Representative "on call" to architects in the Tulsa, Oklahoma area.

DEVOE PAINT

**DEVOE**

**DEVOE & RAYNOLDS COMPANY, IN**

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Atlanta • Boston • Charlotte, N.C. • Chicago • Cincinnati • Da Denver • Detroit • Houston • Los Angeles • Louisville • Moonac N.J. • New Orleans • New York • Philadelphia • Stamford, Co Warehouses in all principal cities, coast to coast.

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For more data, circle 97 on Inquiry Card

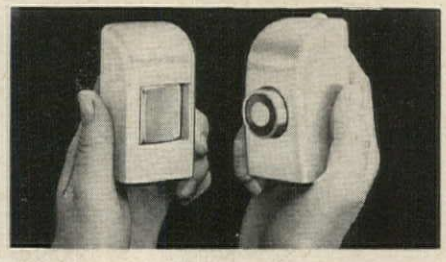
For more data, circle 98 on Inquiry Card

## Product Reports
*continued from page 234*

### FOAM PLASTIC TILE
*RV-Lite* foam polystyrene tile provides an attractive covering material that is moisture-resistant insulation. The 12-in.-sq tiles are ½ in. thick and are available in a range of patterns and colors and unpainted white. *Arvery Corp., 3500 N. Kimball Ave., Chicago 18, Ill.*

CIRCLE 317 ON INQUIRY CARD

### ELECTRO-MAGNET FOR FIRE DOORS
Fire doors can be kept open with an electro-magnet connected to an electric sensing system, located either remotely or at the door itself. Smoke, high temperature or other action that can be picked up on the sensor breaks the connection, allowing the door closer to close in advance of actual smoke or fire danger. *Challenger Lock Co., 2349 W. La Palma Ave., Anaheim, Calif.*



CIRCLE 318 ON INQUIRY CARD

### PRODUCT BRIEFS
**Sound-deadening fiberboard,** when used with dissimilar materials, makes floors, ceilings and walls highly absorbtive of air-borne and impact noises. *Kaiser Gypsum Co., Inc., Kaiser Center, Oakland 12, Calif.*

CIRCLE 319 ON INQUIRY CARD

**Plastic-impregnation of fabrics** in small quantities for window shades makes possible individuality at low cost. *Window Shade Manufacturers Assoc., 341 Madison Ave., New York 17, N.Y.*

CIRCLE 320 ON INQUIRY CARD

**Patina anodic finish** for architectural aluminum is available in 24 colors, all with good corrosion resistance and color stability. *Reynolds Metals Co., 19 E. 17th St., New York 17, N.Y.*

CIRCLE 321 ON INQUIRY CARD

**Panels, folding screens, doors and shutters** of Finnish plywood, poplar and birch are available in 11 patterns. *Attco Designs, 227 Eagle St., Brooklyn 22, N.Y.*

CIRCLE 322 ON INQUIRY CARD

**Playground and play equipment** design service for architects and planners has been opened in New York. *Frank LaPrelle, 300 E. 46th St., New York, N.Y.*

CIRCLE 323 ON INQUIRY CARD

**Precoated steel and aluminum** with a variety of finishes and paints is available for users in Midwest, South and West. *Precoat Metals, Inc., 4301 S. Spring Ave., St. Louis 16, Mo.*

CIRCLE 324 ON INQUIRY CARD

**A Finnish sauna room** is made of redwood bricks and has an electric heater. *Viking Sauna Co. of New York, 330 E. 49th St., New York 17, N.Y.*

CIRCLE 325 ON INQUIRY CARD

WARREN REYNOLDS RESIDENCE, MINNEAPOLIS, MINN. ARCHITECT: NEWTON E. GRIFFITH

Pella®

# WOOD SLIDING GLASS DOORS

PELLA ALSO MAKES QUALITY WOOD CASEMENT AND MULTI-PURPOSE WINDOWS, WOOD FOLDING DOORS AND PARTITIONS AND ROLSCREENS

## The big difference begins where the glass ends

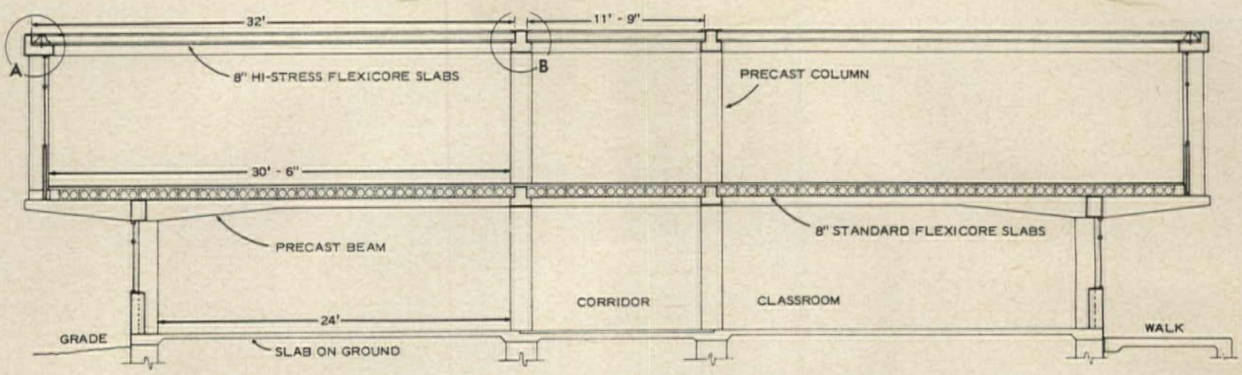
PELLA SLIDING GLASS DOORS with frames of real WOOD say *home* to your clients. And, wood frames can be finished or painted to go with any decorative schemes—inside and outside. Wood frames eliminate condensation, too. Stainless steel and wool pile weather stripping combine to provide exceptional weathertightness. *Screens close automatically*. Removable muntin bars are available in regular or diamond shapes to add the traditional touch. O, OX, XO, OXO and OXXO combinations in 33″, 45″ and 57″ glass widths. Custom sizes, too. Ask your PELLA representative to show you a sectional sample of wood frames with steel "T" reinforcement. He's listed in the Yellow Pages. Or, see details in SWEET's.

3

*of a series*

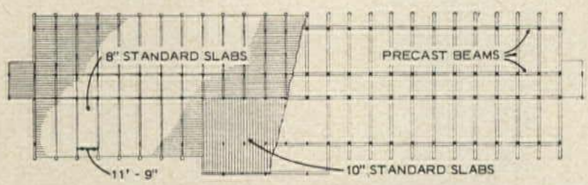
ROLSCREEN COMPANY • PELLA, IOWA

For more data, circle 100 on Inquiry Card

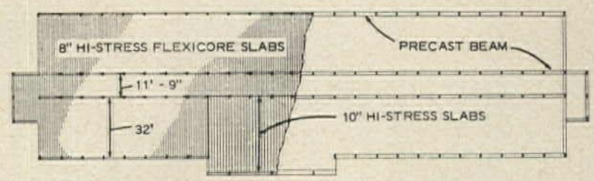



**LATERAL SECTION.** Hi-Stress Flexicore slabs, 32' in length, are used for long-span ceilings on second floor of classroom wing of Rutherford B. Hayes High School, Delaware, Ohio. The entire frame is precast concrete columns and beams.

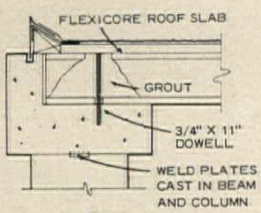
# New Hi-Stress Flexicore Slabs Give Improved Performance On 32-Foot Roof Span



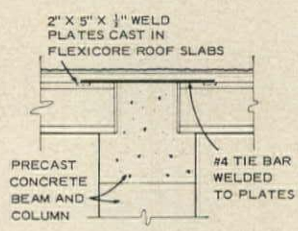

**SECOND FLOOR FRAMING, CLASSROOM WING.** Lateral precast beams serve as bearing for standard Flexicore slabs. Both 8" and 10" slabs used.




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




**DETAIL A**



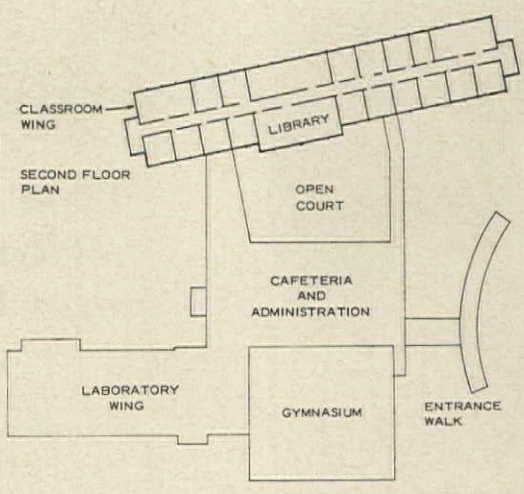

**DETAIL B**

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.

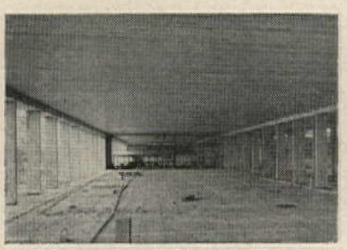
The steel strands are accurately pretensioned, before the slabs are cast, and introduce a controlled camber into the units.

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".

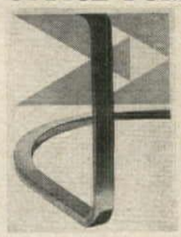
**flexicore**®
PRECAST CONCRETE DECKS

For more data, circle 101 on Inquiry Card

## *Office Literature*

*continued from page 200*

### OFFICE FURNITURE



A new "sled-base" group of chairs with chrome bases are illustrated in Catalog Supplement I. Tables, desks and chairs with stainless steel legs are also included. *Edgewood Furniture Co., Inc., 334 E. 75th St., New York 21, N.Y.**

CIRCLE 418 ON INQUIRY CARD

### GLARE-REDUCING GLASS

Tables of light and solar energy transmittance for *Solarbronze* plate glass are given in a booklet describing its solar heat control and warm gray hue. *Pittsburgh Plate Glass Co., 632 Fort Duquesne Blvd., Pittsburgh 22, Pa.**

CIRCLE 419 ON INQUIRY CARD

### DUCT HEATERS

(A.I.A. 31-K-3) Electric blast coil duct heaters are discussed in a 36-page bulletin. *Industrial Engineering & Equipment Co., 24 Hanley Industrial Center, St. Louis 17, Mo.**

CIRCLE 420 ON INQUIRY CARD

### HARDWOOD PANELING

(A.I.A. 23-L) Full-color photographs show all 14 varieties of *Evanite* hardwood paneling, as well as pictures of typical installations. *Evans Products Co., 1029 S. W. Alder St., Portland 5, Ore.**

CIRCLE 421 ON INQUIRY CARD

### FLOORING SPEC MANUAL

A revised "Specification Manual" for Northern hard maple, beech and birch flooring includes current grading rules and is described as a textbook on hardwood flooring and installation procedure. *Maple Flooring Manufacturers Assoc., 35 E. Wacker Dr., Chicago 1, Ill.**

CIRCLE 422 ON INQUIRY CARD

### SEALANTS

Case histories of the use of *Thiokol* polysulfide sealant in recent building projects are given in "Thiokol Facts." *Thiokol Chemical Corp., Trenton, N.J.**

CIRCLE 423 ON INQUIRY CARD

**Additional product information in Sweet's Architectural File*

*more literature on page 246*

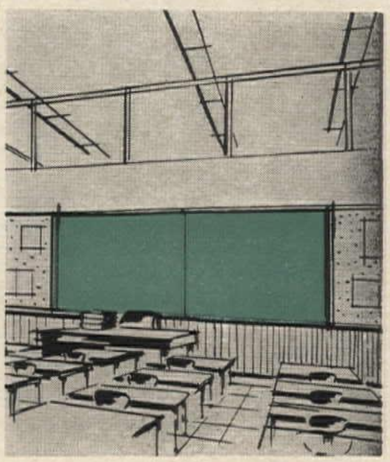

# J-M Colorlith won't slick or shine up . . . ever

Most chalkboard materials look good when they're new. But, after years of use and abuse, the colors may fade, the surfaces turn slick and shiny and impose a visibility-impairing glare. With Johns-Manville Colorlith®, this *can't* happen because the color is an integral part of the sheet and retains its soft shade indefinitely.

Available in three eye-pleasing, research-proved shades (Spruce Green, Cameo Brown and Charcoal Gray), Colorlith offers superior visibility. Made of asbestos and cement, it takes chalk easily providing excellent visual contrast. Further, it erases cleanly without "ghosting."

For full details on J-M Colorlith, write to J. B. Jobe, Vice President, Johns-Manville, Box 14, New York 16, N. Y. In Canada: Port Credit, Ontario. Cable: Johnmanvil.

**JOHNS-MANVILLE**

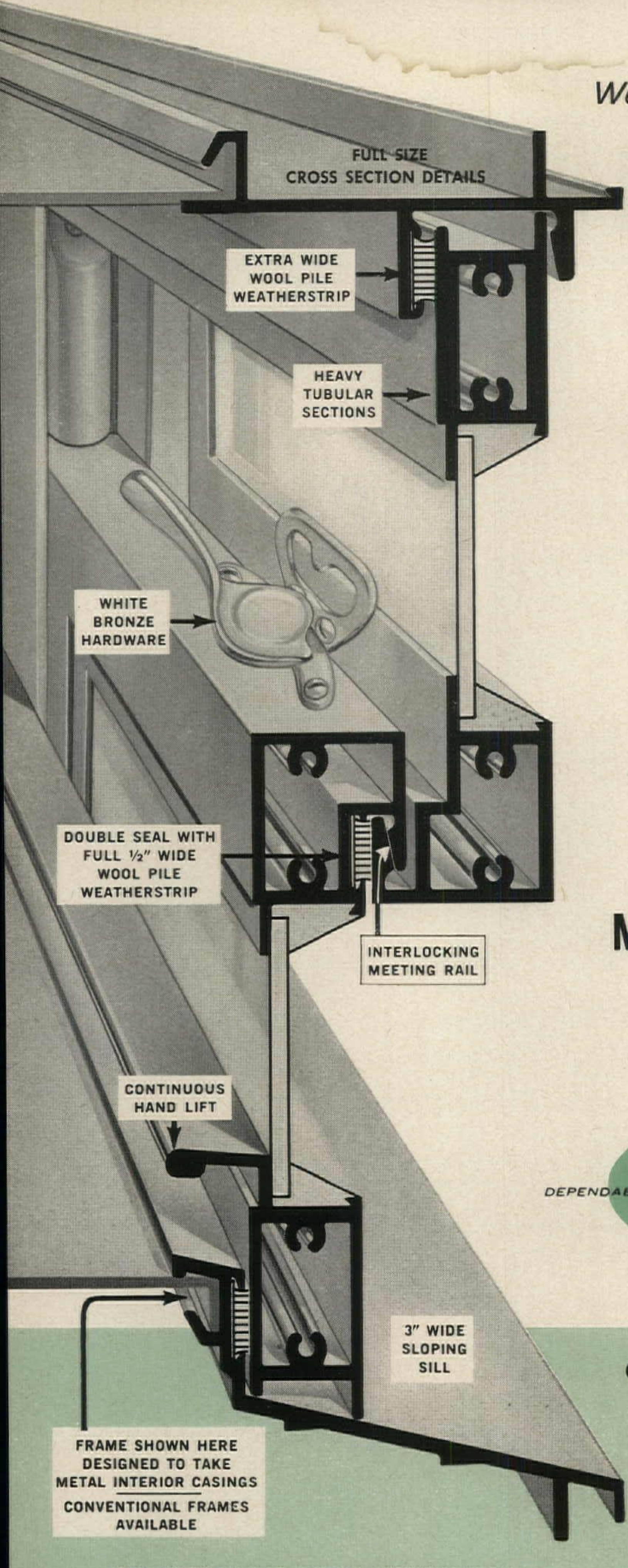


For more data, circle 104 on Inquiry Card

For more data, circle 105 on Inquiry Card →

*We designed this aluminum window to be*

# STURDIER



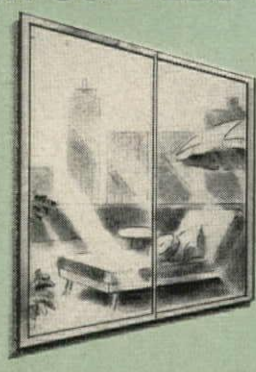

## Cupples new "Series 300" double-hung aluminum window was designed especially for architects and owners who want a better-operating, stronger, sturdier window for use in Apartments, Hotels, Motels and College Dormitories.

DEPENDABLE *Cupples*

**QUALIFIES UNDER DH-A2 SPECIFICATION**

Approved for Mitchell-Lama Housing under New York State Division of Housing and Community Renewal

**OTHER CUPPLES BUILDING PRODUCTS**



**CUPPLES SERIES 1100 SLIDING GLASS DOORS**

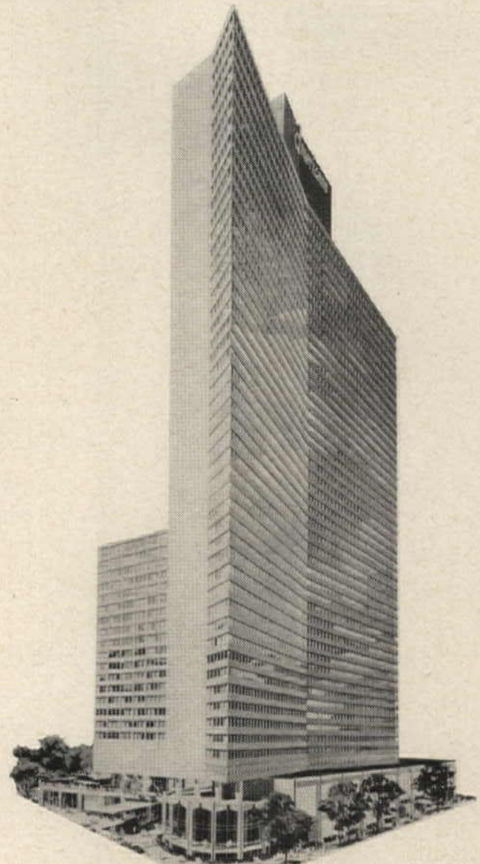
For rooms leading to balcony or terrace. Beautiful Alumilite finish. Extra strong, sturdy construction with tubular vertical rails. Adjustable ball bearing rollers. Interlocking meeting rails plus double wool pile and vinyl weatherstripping. In 2, 3 and 4 door units from 6 ft. to 20 ft. width. Sliding screens available.

# ...NOT CHEAPER!

INSTEAD OF TAKING METAL OUT, and designing the Cupples "300" window downward to a price, or to fool bargain hunters, we beefed up the sections to make it stronger and sturdier. We used double width wool pile weatherstrip all around the window and at the meeting rail to keep out dust and dirt as well as rain and cold drafts. We made the "300" a foolproof, easy-operating window that will give satisfactory, maintenance-free performance for many years to come. It's a window you should specify for any apartment house or for the hard, rough usage of hotels and college dormitories.

Sure the Cupples "Series 300" costs a few dollars more (approximately \$3 to \$4) than lightweight minimum standard residential windows, but its heavier sections, better weather-tightness and foolproof operating qualities make it a worthwhile investment that will pay handsome dividends in lower maintenance and tenant satisfaction.

Before you specify or order aluminum windows for your next job be sure you investigate the Cupples "300." Remember, too, that when you deal with Cupples you get DEPENDABILITY of product, quality, service, delivery and a well-established Company behind the product (Cupples is a division of ALCOA). Our representative in your area will be glad to consult with you at your convenience. Write for full size details and complete information. Address Dept. AR-211.



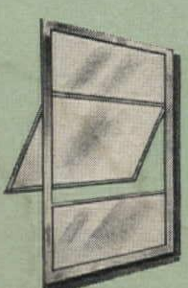
Americana Hotel, New York, N. Y.
*Architects:* Morris Lapidus, Harle & Liebman
*Contractor:* Diesel Construction Co.

**CUPPLES PRODUCTS CORPORATION**
*A Division of Aluminum Company of America*
**2650 SO. HANLEY ROAD, ST. LOUIS, MO.**
**815 W. SIXTH STREET, CORONA, CALIF.**

**ALCOA**
CUPPLES PRODUCTS DIVISION
ST. LOUIS, MO.

Bronx Park East Apartments, Bronx, N. Y.
*Architects:* Brown & Guenther
*Contractor:* Gotham Construction Corp.

## FOR USE IN APARTMENTS, HOTELS, MOTELS AND DORMITORIES

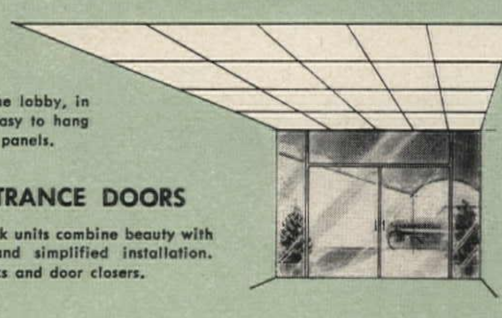


**CUPPLES SERIES 600 PROJECTED WINDOWS**

These strong, sturdy projected windows will take usage for many years. All horizontal rails in frame and sash are tubular for extra rigidity and strength. Adjustable, patented 4-bar operator mechanism. White bronze hardware. 5/8" glass rabbit. Interior or exterior metal snap-in bead glazing optional.

**CUPPLES ALUMI-COUSTIC CEILING GRID**

For luminous or acoustical ceilings in the lobby, in kitchens and bathrooms. Inexpensive. Easy to hang aluminum grid. Holds 2' x 2' or 2' x 4' panels.



**CUPPLES ENTRANCE DOORS**

New "40 LINE" of stock units combine beauty with flexibility of design and simplified installation. Choice of hardware locks and door closers.

## *Office Literature*

*continued from page 242*

### PARTITIONING

*Aetnawall Designer Series* partitions feature a single-unit, extruded aluminum post permitting four-way access without supplementary fastening devices. Brochure supplements current catalog. *Aetna Steel Products Corp., 730 Fifth Ave., New York 19, N.Y.**

CIRCLE 424 ON INQUIRY CARD

### ACOUSTICAL TILE

Folder gives details on *Styltone-Fire Rate 3* mineral acoustical tile. *Baldwin-Ehret-Hill, Inc., 500 Breunig Ave., Trenton 2, N.J.**

CIRCLE 425 ON INQUIRY CARD

### STEEL DOORS

Nomenclature for steel doors and frames is approved by the American Standards Association. *Steel Door Institute, 2130 Keith Bldg., Cleveland 15, Ohio*

CIRCLE 426 ON INQUIRY CARD

### DECORATIVE LIGHTING

(A.I.A. 31-F-23) Pendant lighting fixtures which mix and match for decorative lighting are presented in a 16-page booklet. *Lightolier, 11 E. 36th St., New York 16, N.Y.*

CIRCLE 427 ON INQUIRY CARD

### CURTAIN WALL SYSTEM

(A.I.A. 17-A) Specifications for a curtain wall system featuring sliding windows in a split mullion system are given in folder. *Peterson Window Corp., 704 Livernois Ave., Ferndale 20, Mich.**

CIRCLE 428 ON INQUIRY CARD

### GAS ENGINE CONDENSER

Details and specifications about the *Janitrol 58-060* gas engine condensing unit for residential and commercial air conditioning applications. *Midland-Ross Corp., 400 Dublin Ave., Columbus 16, Ohio.**

CIRCLE 429 ON INQUIRY CARD

### ROOFING

Changes in installation recommendations for *Roofmate FR* expanded polystyrene insulation board are given in an 8-page illustrated booklet. *Dow Chemical Co., Midland, Mich.*

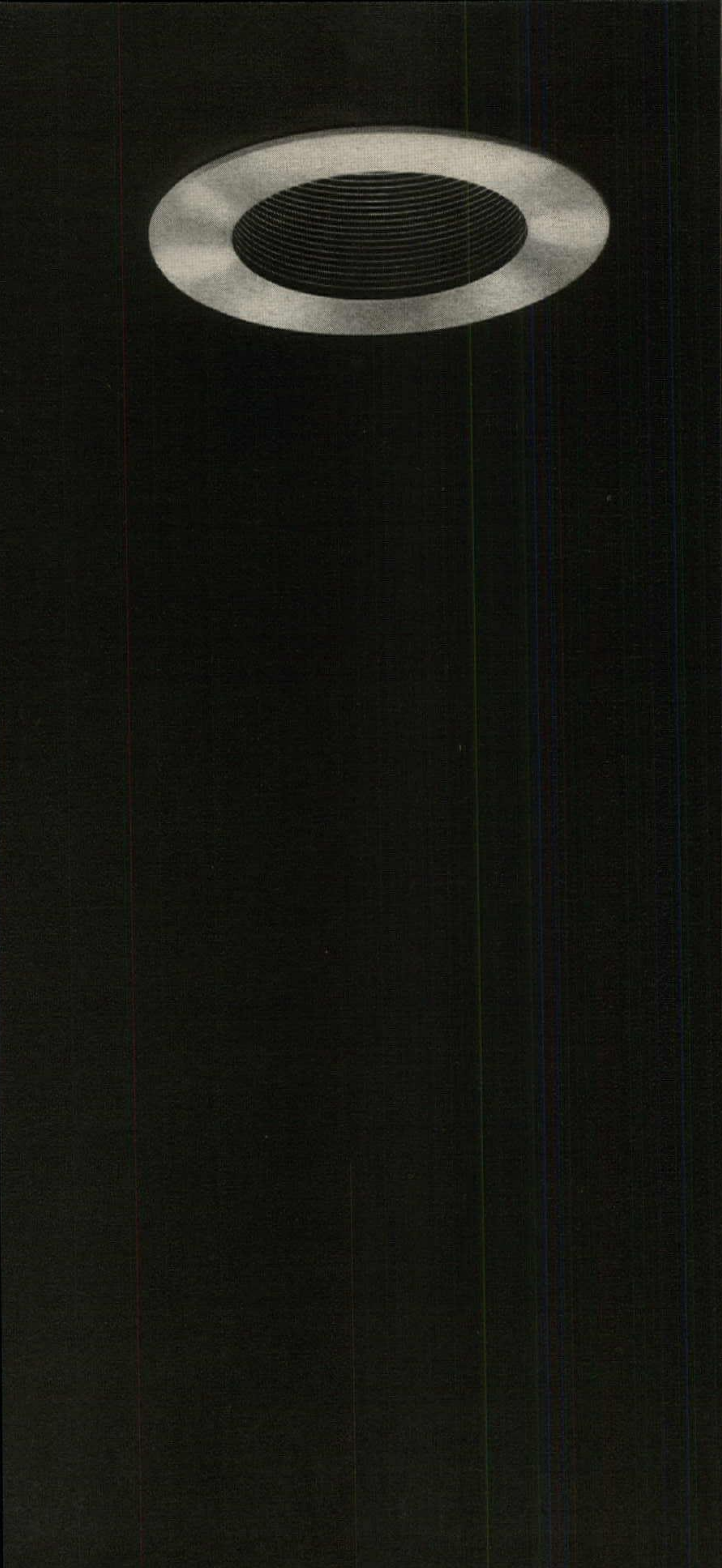
CIRCLE 430 ON INQUIRY CARD

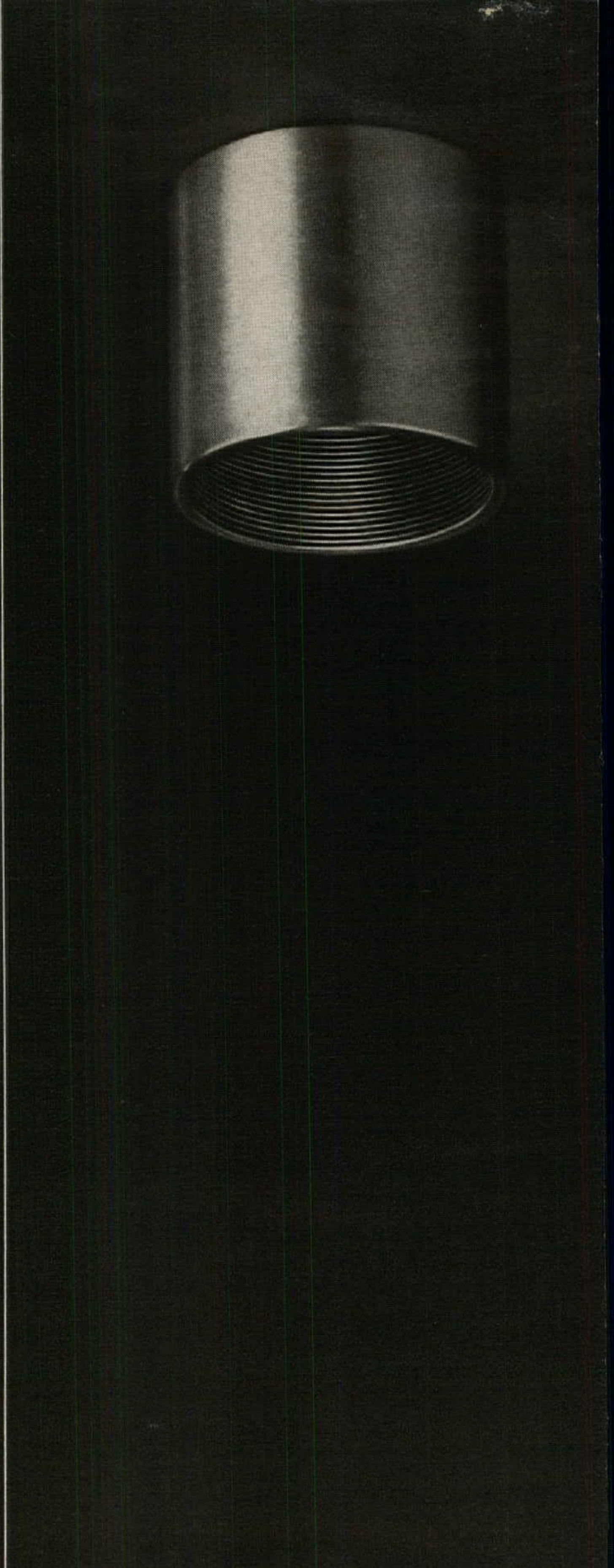
**Additional product information in Sweet's Architectural File*





For more data, circle 108 on Inquiry Card →





# We go to any lengths to solve your downlighting problems

From a completely recessed fixture all the way down to a ster
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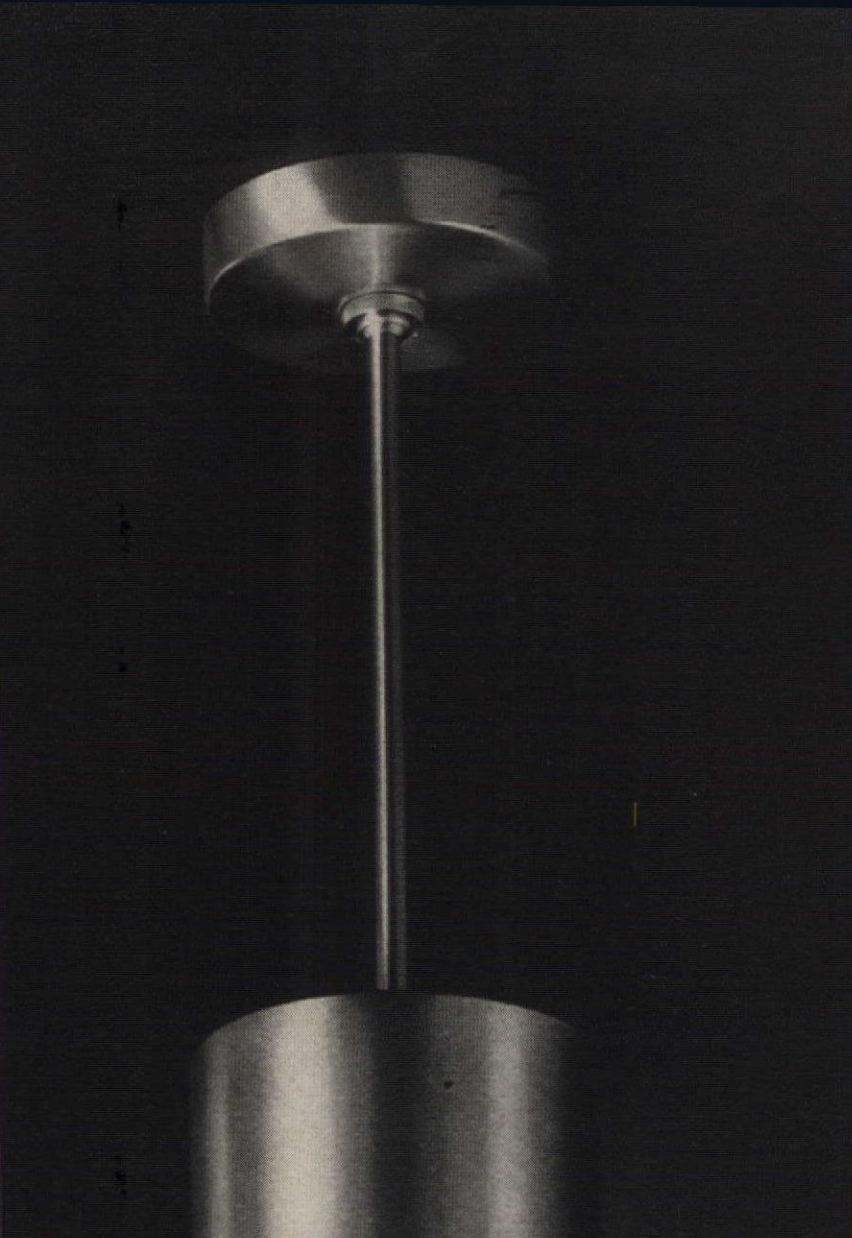
these simple, handsome Calculite® designs.

Lightolier engineering has a solution to your number one proble
in downlighting—surface brightness. In the type above, for exampl
Lightolier's answer is the exclusive Multi-Groove* downlight—
ring baffles, arranged ⅛" apart, one above the other, so that ea



affle puts the vertical surface just below it in total shadow. It pro-
ides a finer texture than the coarse pattern of the conventional unit.
This Multi-Groove Baffle Calculite is just one of 16 types of pre-
ision downlighting instruments in a total of 96 sizes and styles. All
hese Calculites have unique mechanical, installation and design
eatures. All provide the efficient lighting and clean, crisp design
hich have made Lightolier the preferred name in lighting. For
more information on Calculites, write for Brochure 31, Lightolier, Jersey City 5, New Jersey, Department AR-11,

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Showrooms in New York, 11 East 36th Street; Chicago, 1267 Merchandise Mart; Dallas, 1718 Hi-Line Drive; Los Angeles, 2515 South Broadway. Calculites are stocked by the Authorized Lightolier Distributors listed on page 250

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**NEW MEXICO**
**Albuquerque:** The Lighting & Maint. Co.

**NEW YORK**
**Binghamton:** Freije Elec. Sup. Co. **Buffalo:** Buffalo Incand. Light Co. Inc. **Nanuet (Rockland Co.):** Rockland Lighting. **Niagara Falls:** Hysen Supplies Inc. **Poughkeepsie:** Electra Sup. Co. **Rochester:** Rowe Electric Sup. Co. **Schenectady:** American Elec. Sup. Co. **Syracuse:** Superior Elec. Corp. **White Plains:** Wolar Lighting Corp.

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**TEXAS**
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**UTAH**
**Salt Lake City:** Artistic Lighting

**VIRGINIA**
**Arlington:** Dominion Elec. Sup. Co. Inc., Noland Co. **Lynchburg:** Mid-State Elec. Sup. Co., Inc. **Richmond:** Atlantic Elec. Sup. Co. **Roanoke:** Noland Co.

**WASHINGTON**
**Seattle:** Seattle Lighting Fix. Co.

**WEST VIRGINIA**
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**WISCONSIN**
**Appleton:** Moe Northern Co. **Eau Claire:** W. H. Hobbs Supply Co. **La Crosse:** W. A. Roosevelt Co. **Milwaukee:** Electri-Craft Lighting, Lappin Electric Co., Standard Elec. Sup. Co. **Racine:** Milch Elec. Sup. Co.

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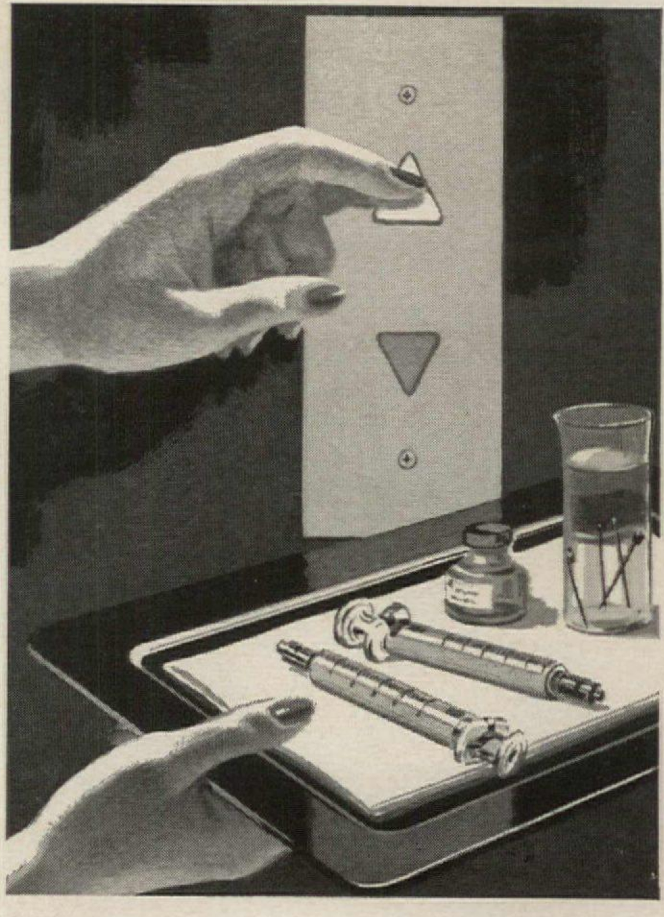

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## BY WATERLOO...
# IS
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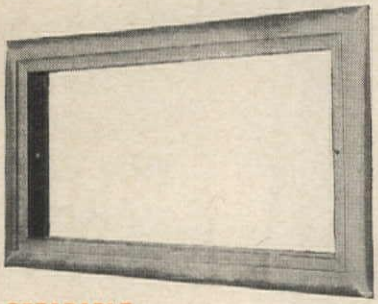
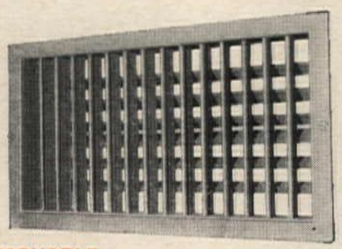
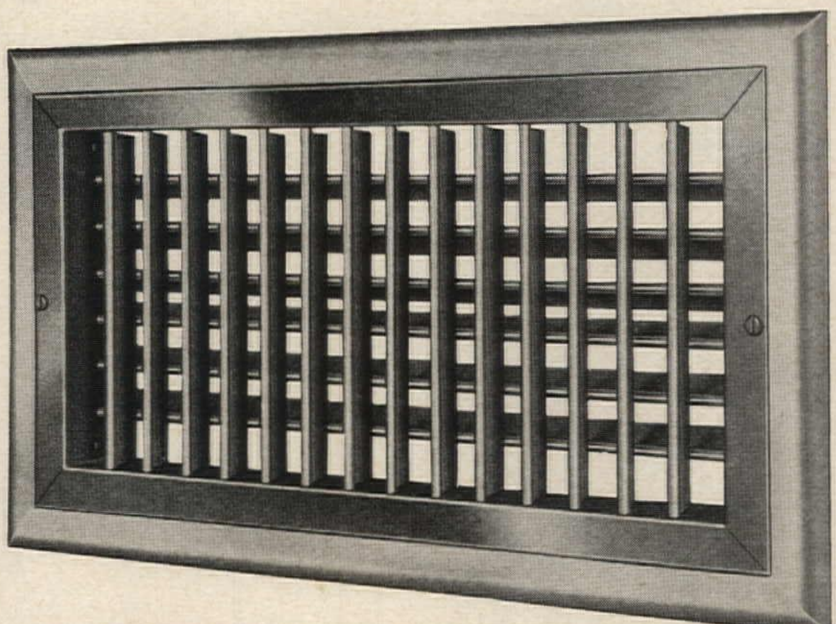


**SEPARABLE FRAME**



**REMOVABLE CORE**



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**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" over-all width.

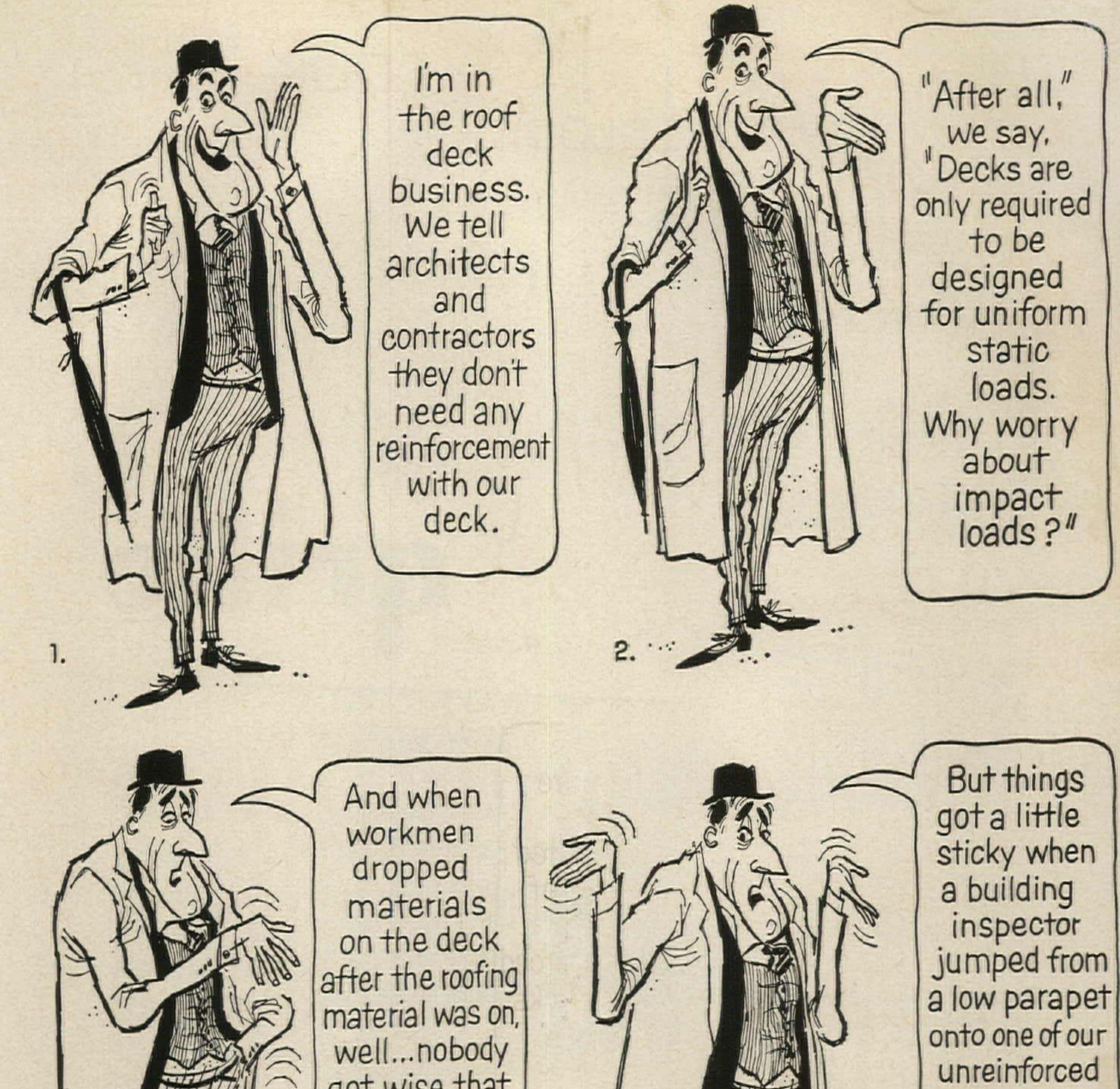
And Integrille can be finished in Satalum® — another Waterloo exclusive! Gives a smooth satin-like texture to natural aluminum, further protected by a hard, clear lacquer coating... for lasting beauty.

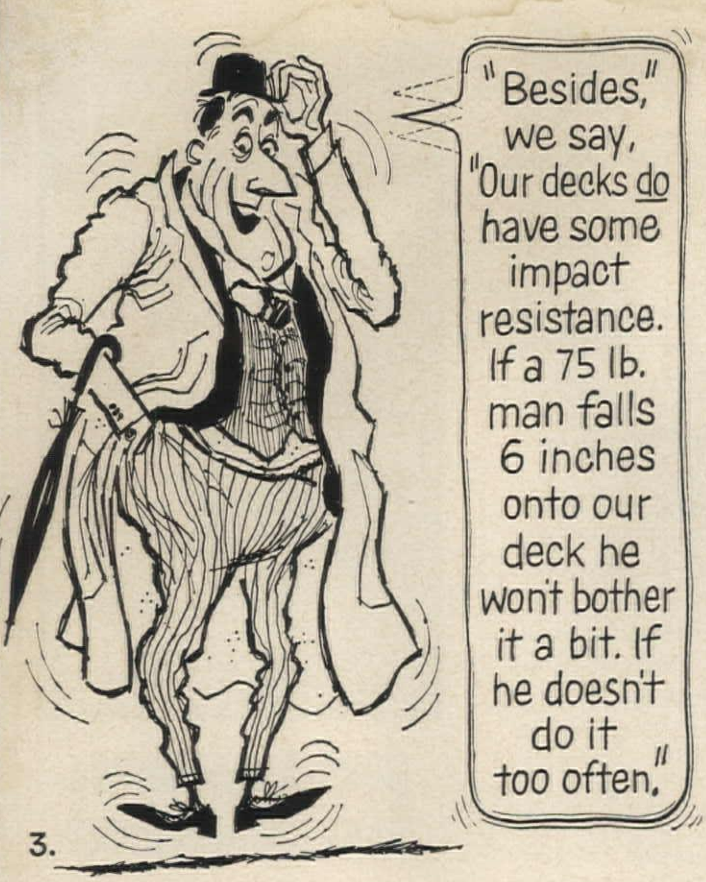
***This then... is Integrille. This handsome, bevelled frame is worthy of accommodating the finished art of the masters... yet it is designed solely to contain the decorative, functional Integrille core.***

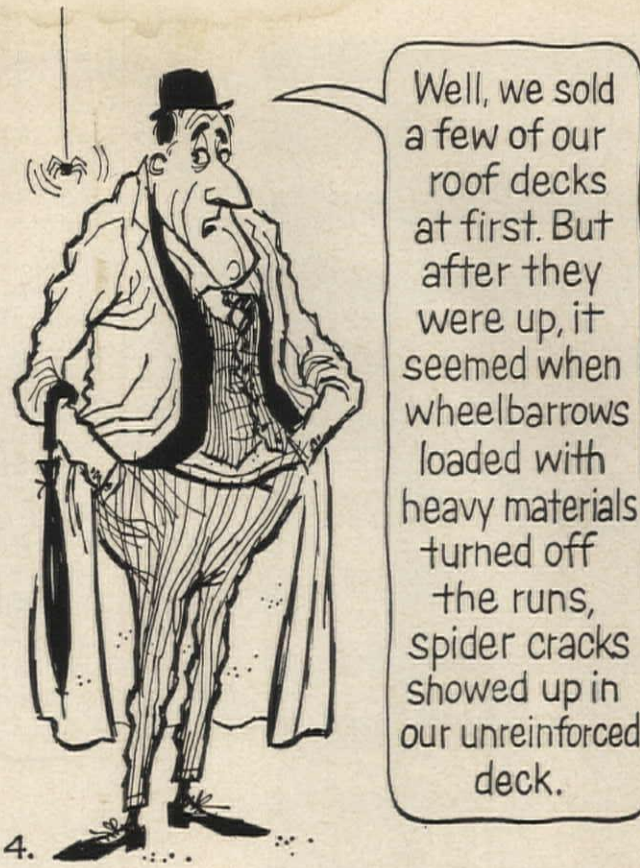
Write for the unique Integrille brochure.
Our representatives will gladly tell you more!

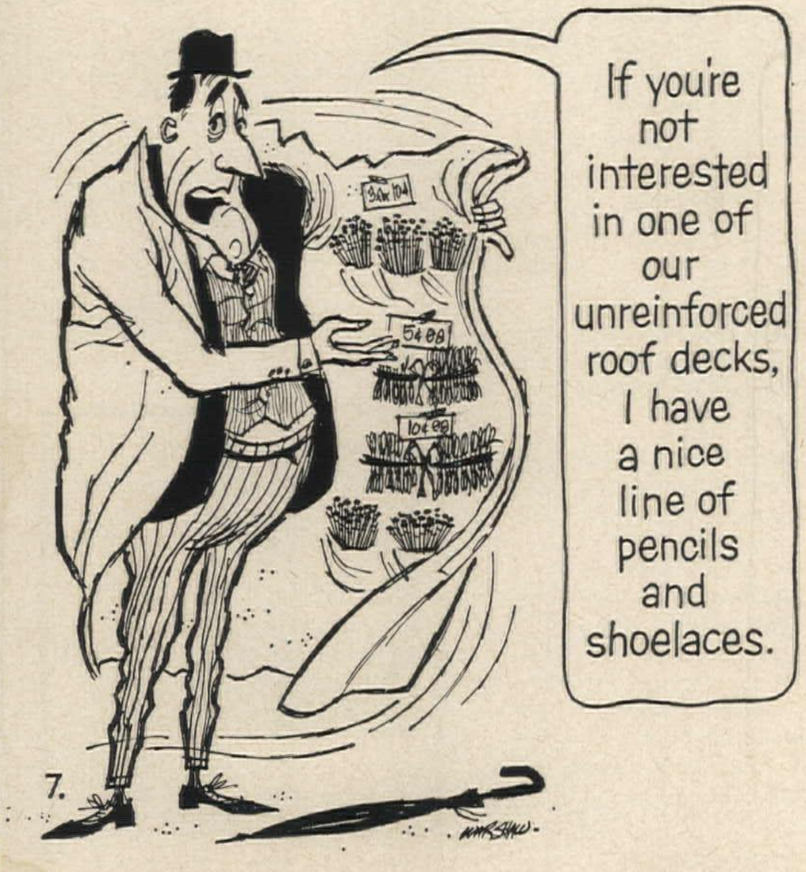
**WATERLOO REGISTER CO., INC., WATERLOO, IOWA**
A SUBSIDIARY OF
**DYNAMICS CORPORATION OF AMERICA**

For more data, circle 111 on Inquiry Card


1.
I'm in the roof deck business. We tell architects and contractors they don't need any reinforcement with our deck.
2.
"After all," we say, "Decks are only required to be designed for uniform static loads. Why worry about impact loads?"
5.
And when workmen dropped materials on the deck after the roofing material was on, well...nobody got wise that the material beneath was shattered. After all, the roofing material covered it up.
6.
But things got a little sticky when a building inspector jumped from a low parapet onto one of our unreinforced decks. His replacement was very unreasonable about okaying the deck.




*This advertisement published by the makers of* **KEYDECK** *that remarkably good roof deck reinforcement*


• MAKERS OF KEYCORNER • KEYSTRIP • KEYWALL • KEYMESH® AND KEYMESH PAPERBACKED LATH • WELDED WIRE FABRIC • NAILS.

For more data, circle 112 on Inquiry Card

## On the Calendar

**November**

1-3 1962 meeting, American Society of Designers; theme: "Relationship of Industrial Design to the Arts"—Waldorf-Astoria Hotel and the National Design Center, New York City

2-3 Sixth annual conference, the Organization of Cornell Planners; theme: "The Heart of the City"—Cornell University, Ithaca, N.Y.

5-9 National Metal Exposition—Chicago

7-9 1962 convention, National Warm Air Heating and Air Conditioning Association—Hotel Robert Meyer, Jacksonville, Fla.

8-10 Annual convention, Florida Association of Architects—Hotel Soreno, St. Petersburg, Fla.

9-15 55th convention, National Association of Real Estate Boards—Detroit

11-15 Annual meeting, Air-Conditioning and Refrigeration Institute—Hollywood Beach Hotel, Hollywood Beach, Fla.

12-14 Annual convention, Structural Clay Products Institute—Diplomat Hotel, Hollywood, Fla.

12-16 47th National Hotel Motor Hotel Exposition—the Coliseum, New York City

25-30 American Society of Mechanical Engineers winter annual meeting—Statler-Hilton Hotel, New York City

26-29 Atomic Industrial Forum conference and American Nuclear Society conference and Atom Fair—Washington, D.C.

27-29 Building Research Institute 1962 Fall Conferences—Mayflower Hotel, Washington, D.C.

**December**

10-16 NAHB convention and exposition—Chicago

**January**

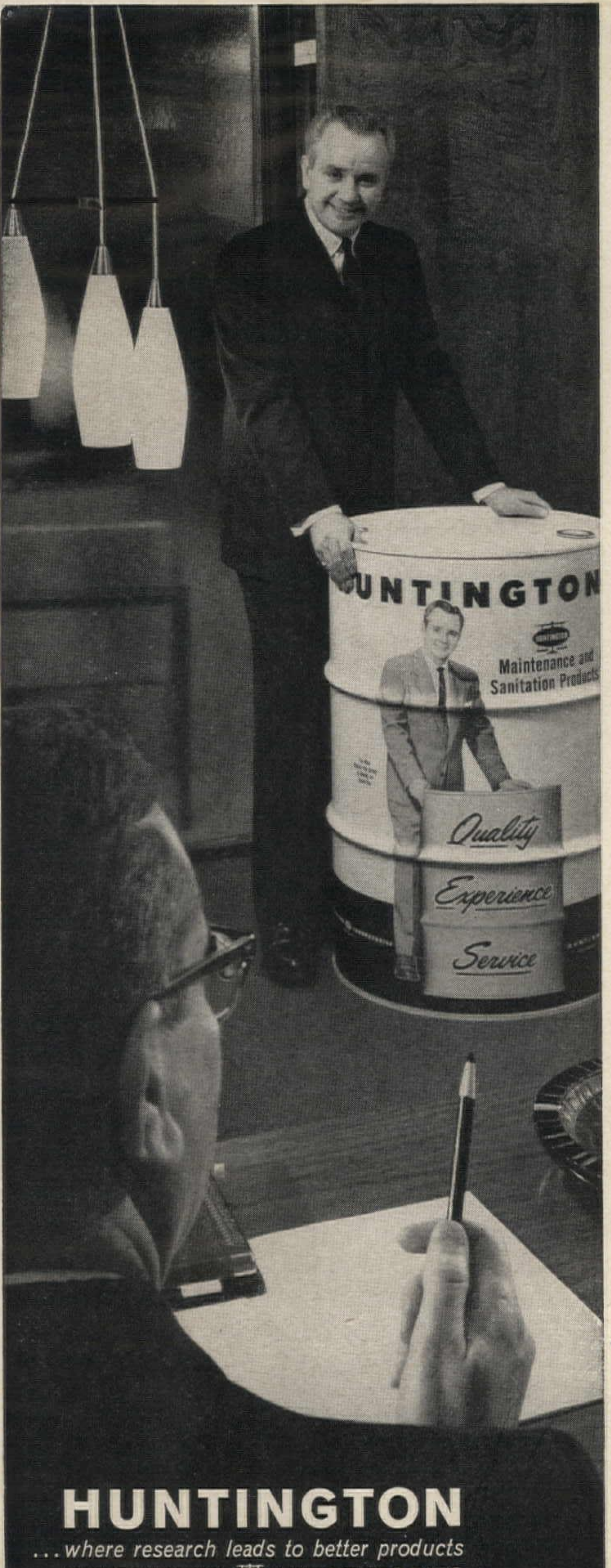
22-25 19th Annual Technical Conference, sponsored by the Society of Plastics Engineers—Ambassador Hotel, Los Angeles

## Office Notes

*New Firms, Firm Changes*

Charles F. Terry and Jack E. Rosenlund have associated in the practice of civil and structural en-

*continued on page 262*




### YOU SPECIFY THE FLOORING!

# Let him

### SOLVE THE MAINTENANCE PROBLEMS

Shoes are murder.

Stiletto-like high heeled slippers. Dress shoes. Work shoes. Day in and day out, they'll pound any flooring you specify . . . grinding in abrasive dust, dirt, even gravel . . . robbing it of its appearance and condition . . . leaving behind the scars of time and traffic.

How do you protect your building *and* your reputation against these floor-killers? Simple. Just hand over your floor maintenance worries and headaches to the gentleman behind the drum. He'll love it. Solving floor maintenance problems has been his way of life for an average of 19 years.

Your Man Behind the Huntington Drum has the ability and experience to create an *overall* maintenance program: for every area of your building . . . for every flooring material you specify. In his zeal, he'll even supervise the maintenance crews to make sure application is proper.

So why not call in our floor-oriented friend? Discuss with him the flooring you're about to specify, and dump the problem of its care into his lap. You'll lose a headache . . . and gain an ally.

SEE OUR CATALOG S IN SWEET'S

**FILL OUT AND MAIL THIS COUPON**

**Huntington Laboratories, Inc.**
Huntington, Indiana

**Gentlemen:** I would like a Man Behind the Huntington Drum to call on me to discuss floor maintenance.
(☐ Ask him to leave his drum outside.)

NAME ____________ TITLE ____________

FIRM ____________

ADDRESS ____________

CITY ____________ ZONE ______ STATE ____________

For more data, circle 115 on Inquiry Card


Designer and Architect, Norman Giller and Associates, Miami Beach, Florida

# PROBLEM

To give each guest "personalized climate" in Cleveland's SAHARA MOTOR HOTEL

# SOLUTION YORKAIRE THREE PIPE heat some rooms,

**Now! York makes it possible for you to provide custom comfort for any building—without costly zoning or extra ductwork!**

**Here's the modern way to air condition** a motel, hotel, apartment or office building . . . any multi-room building! It's the YORKAIRE Three Pipe Air Conditioning System that meets varying occupancy and solar factors, when some rooms require heating, others cooling—at the same time.

**Pioneered by York,** the YORKAIRE Three Pipe System uses one pipe for chilled water supply, one for hot water supply, one for return. A special valve admits just the right amount of chilled or hot water—from full flow to trickle to no flow—to each room terminal. There is no mixing of the hot and cold water supply, no bucking heating with cooling. The results are improved comfort conditions for occupants, lower heating and cooling costs for building owners.

**Completely flexible,** the YORKAIRE Three Pipe System may be applied in fan-coil or induction systems. For induction systems, less primary air fan

Each guest chooses the climate he wants!

Shaded rooms may be heated, while sunny rooms are being cooled!

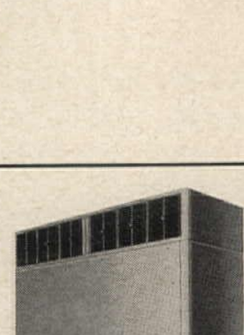
# AIR CONDITIONING...that can cool others, at the same time!

capacity is required and no return ducts are needed . . . so there is considerable space-saving as well as reduced installation and fan power costs.

**Plan ahead with York** when you plan air conditioning for any type of building. For over 75 years, York has pioneered major advances in conditioning air for comfort and process. For complete facts on the YORKAIRE Three Pipe System—and a list of the major buildings where it has been installed—see your York Representative; or write York Corporation, York, Pa.

**ANOTHER YORK SOLUTION!**

Cool a smaller building, or part of a multi-story building, with a YORK EMBASSY AIR CONDITIONER. May be installed with or without ductwork.



**YORK** CORPORATION
Subsidiary of Borg-Warner Corp.
YORK, PENNSYLVANIA

THE QUALITY NAME IN AIR CONDITIONING AND REFRIGERATION

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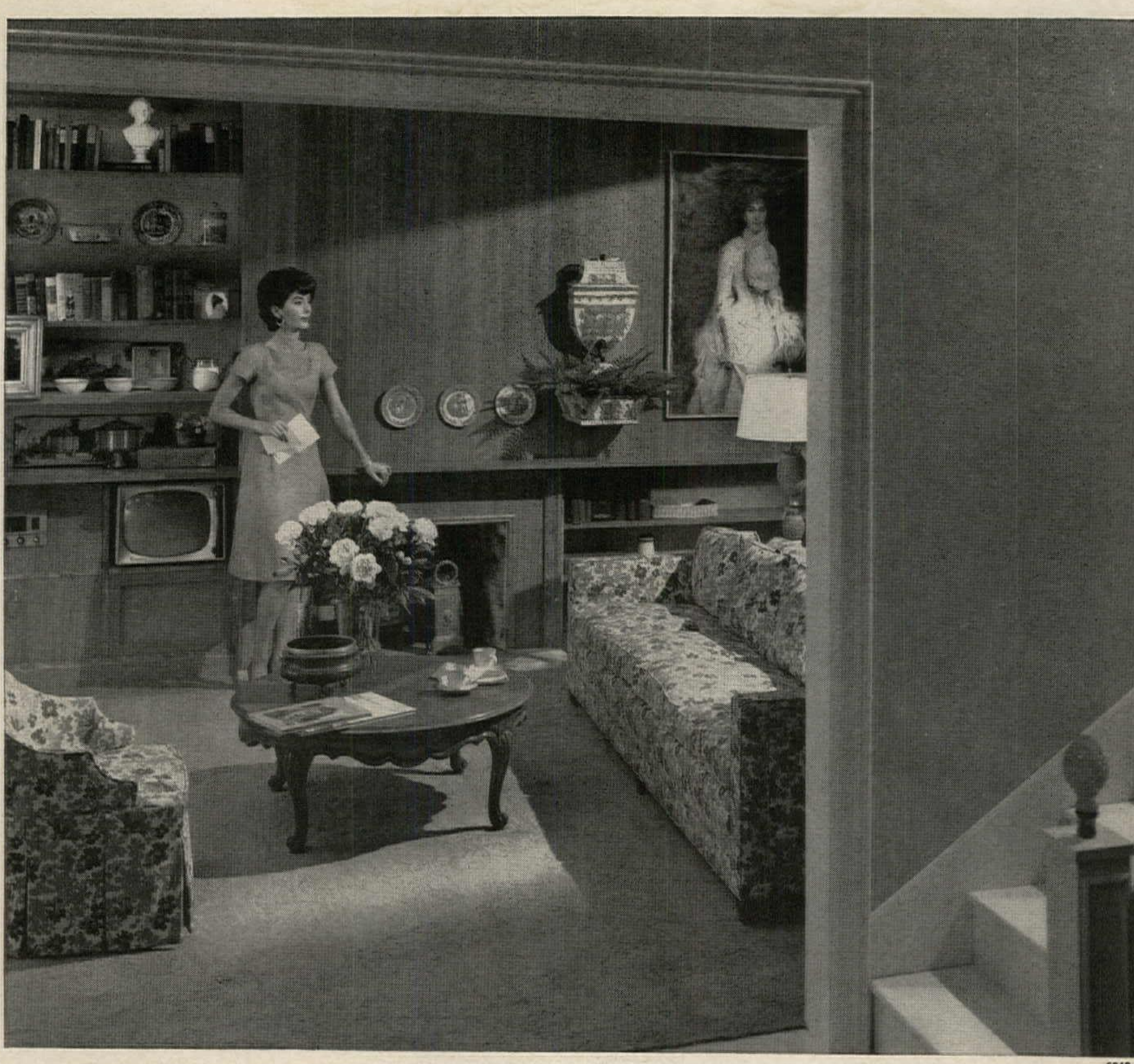

6240

# Create beautiful home interiors with wear-without-care Marlite paneling

There's no better material for building or remodeling any room than versatile Marlite plastic-finished paneling. The reason is simple. Marlite offers all the advantages of easy, fast dry wall construction with outstanding beauty, lifetime durability and easy maintenance that requires only an occasional damp cloth wiping.

Marlite's impervious surface resists heat, moisture, stains, and dents. It goes up fast over old walls or new framing. No messy plaster dust. No lingering paint odors. What's more, the Marlite line (styled by American Color Trends) includes an array of beautiful colors, decorator patterns, and authentic Trendwood finishes.

Get complete details before starting your next building or remodeling project from your building materials dealer, or consult Sweet's File or write Marlite Division of Masonite Corporation, Dept. 1105, Dover, Ohio.

**Marlite®** plastic-finished paneling

ANOTHER QUALITY PRODUCT OF MASONITE® RESEARCH

**MARLITE BRANCH OFFICES AND WAREHOUSES:** 204 Permalume Place N.W., Atlanta 18, Georgia • 18 Moulton Street, Cambridge 38, Mass. • 4545 James Place, Melrose Park, Illinois (Chicago) • 8908 Chancellor Row, Dallas 7, Texas • 1657 Powell Street, Emeryville, California (Oakland) • 3050 Leonis Blvd., Los Angeles 58, California • 39 Windsor Avenue, Mineola, L. I. (New York) • 2440 Sixth Avenue So., Seattle 4, Washington

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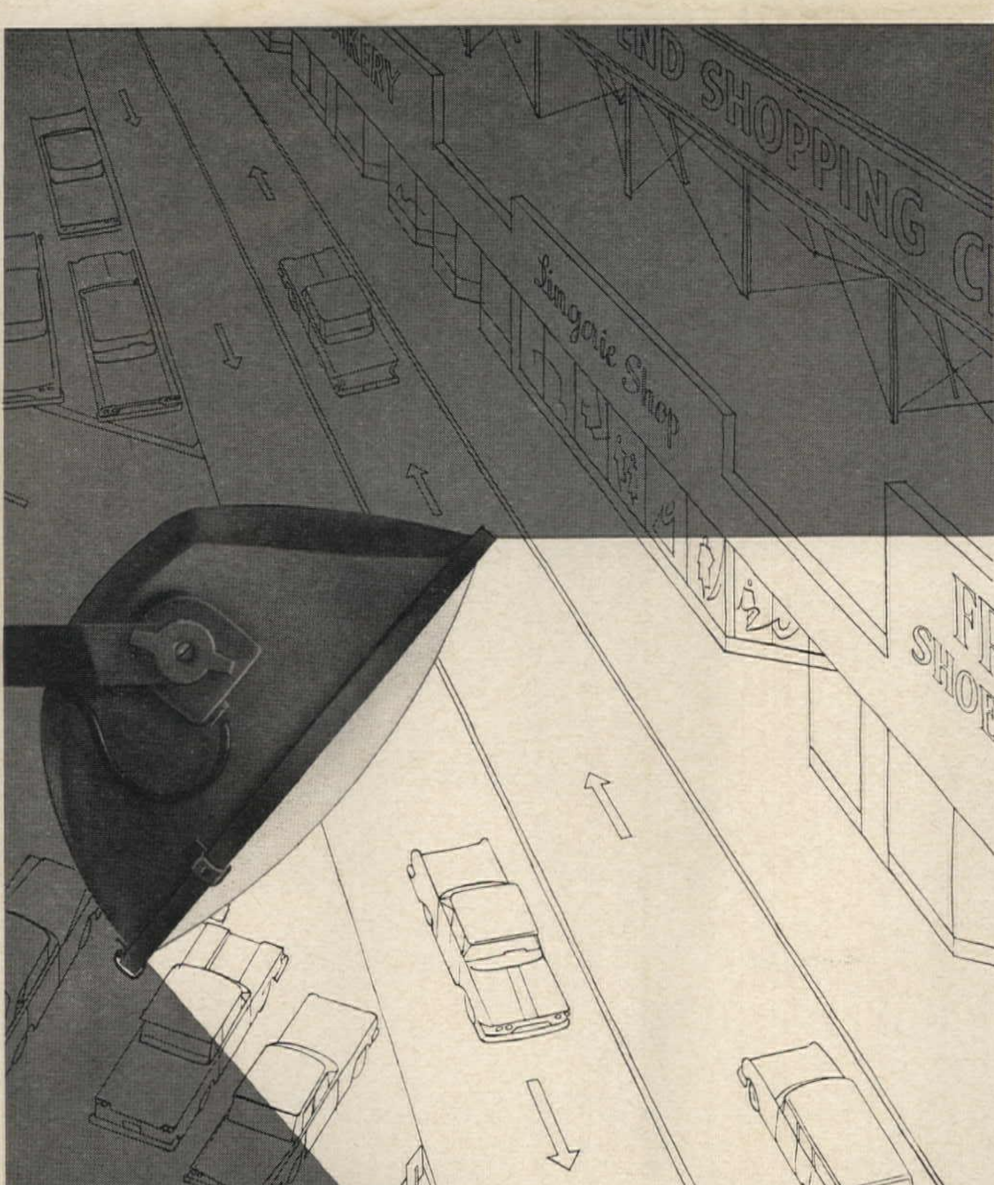


## NEW FROM WESTINGHOUSE

### MERCURY-MASTER

# FLOODLIGHT

**offers up to 60.2% more efficiency than other makes.**

The Mercury-Master Floodlight gives more usable light than any other mercury floodlight on the market. With a 54,000 lumen lamp, it has a beam efficiency of 69.2%. That's up to 60.2% more than other similar units. ■ Using a 57,000 lumen lamp, it has a 146° x 123° beam spread—widest in the industry. Saves money because you need fewer units, fewer poles, less wire, and less installation labor. ■ The Mercury-Master's ADUR-BIL® insulation system—a Westinghouse exclusive—assures long ballast life and unusually good electrical performance. It will withstand a nominal impulse of 15,000 volts and is tested at 4,000 volts to ground. It takes a 45% reduction in voltage before lamp dropout occurs. Lifeguard® mercury lamps will start at ambient temperatures as low as —20°F. ■ The MFB-10 Mercury-Master can be used with plain or control type lens, 700 or 1000 watt lamps. There's a complete selection of mounting accessories for any installation requirement—with integral or remote mounted ballasts. For details, see your Westinghouse representative, or write Westinghouse Electric Corporation, Lighting Division, Edgewater Park, Cleveland, Ohio. ■ You can be sure . . . if it's Westinghouse

**Westinghouse** (W)

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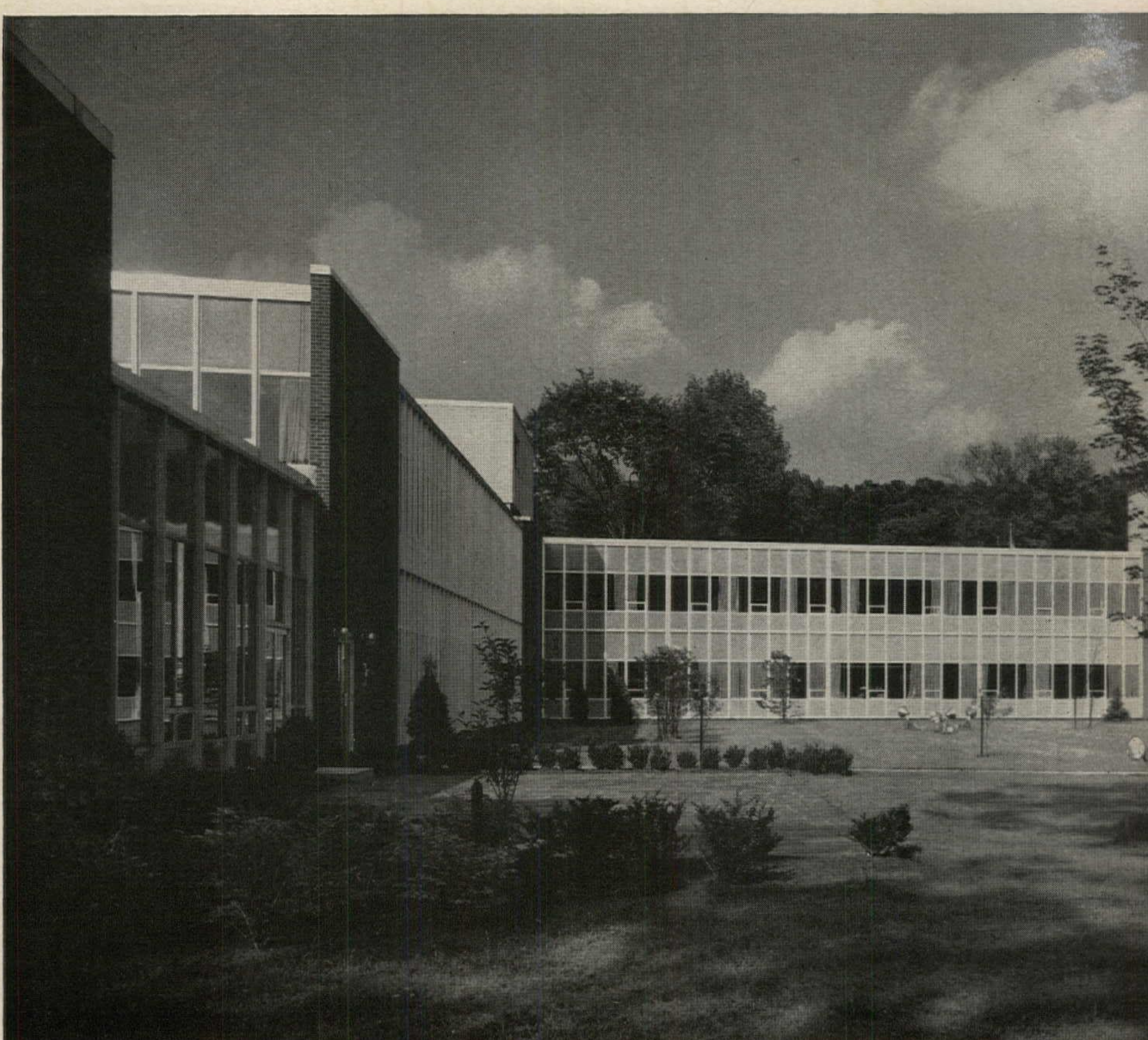
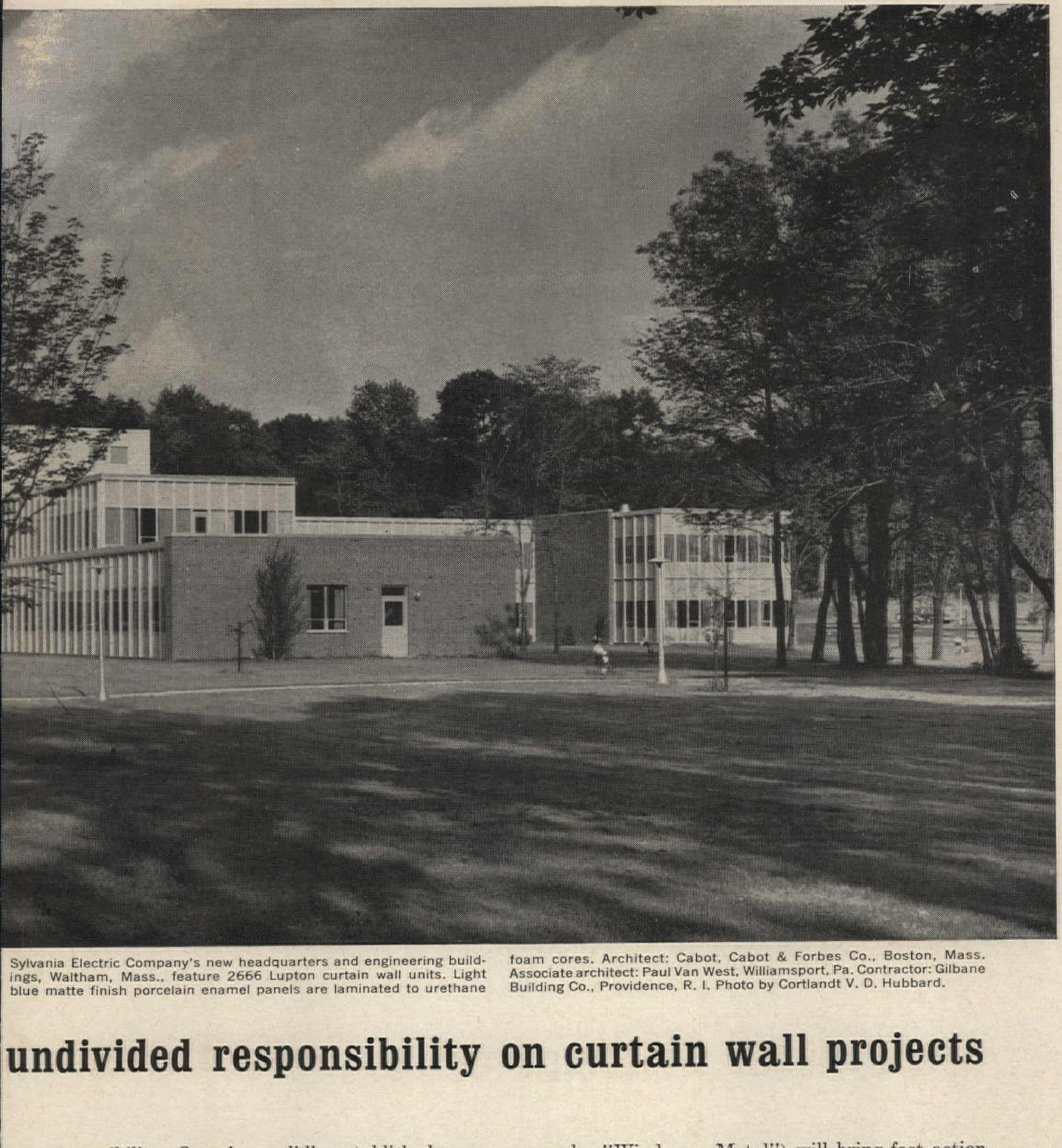


# New Sylvania buildings richly reflect Lupton's

**Sylvania's new headquarters provide another shining example of how LUPTON handles the complete job, from architect's design to final installation. Make your creative demands as exacting as you like . . . LUPTON single-source responsibility makes certain that your most imaginative uses of aluminum curtain wall systems are fully realized.**

Our units allow full scope for projects of any size . . . for unlimited versatility of function . . . for uninhibited architectural expression, planning, and form. Now you can specify—and get—virtually any combination of colors, finishes, and textures. And when it comes to skilled assistance from project engineers, LUPTON's staff can advise on or coordinate the manufacturing processes your design requires. After that, our curtain wall craftsmen see to it that your concepts are followed to a T. For final expert touches, LUPTON field supervisors assure speedy, efficient installation, always with an eye to maximum savings.

You have the assurance, too, of LUPTON financial



Sylvania Electric Company's new headquarters and engineering buildings, Waltham, Mass., feature 2666 Lupton curtain wall units. Light blue matte finish porcelain enamel panels are laminated to urethane foam cores. Architect: Cabot, Cabot & Forbes Co., Boston, Mass. Associate architect: Paul Van West, Williamsport, Pa. Contractor: Gilbane Building Co., Providence, R. I. Photo by Cortlandt V. D. Hubbard.

# undivided responsibility on curtain wall projects

responsibility. Ours is a solidly established company that backs up all jobs with a reputation for reliability of 25 years' standing.

In short, you can confidently rely on LUPTON total services and ability to turn your ideas into fully achieved realities. Why not investigate every advantage we can offer for your present or future projects? See Sweet's Architectural File (sections 3 and 17) for the Michael Flynn Aluminum Curtain Wall and Window catalogs. A call to the nearest LUPTON representative (see Yellow Pages under "Windows—Metal") will bring fast action without obligation.

**LUPTON®**

**MICHAEL FLYNN MANUFACTURING CO.**

Main Office and Plant: 700 East Godfrey Avenue, Philadelphia 24, Pa. West Coast Office and Plant: City of Industry (Los Angeles County), California. SALES OFFICES: San Leandro, California; Chicago, Illinois; New York City; Cleveland, Ohio; Dallas, Texas. Representatives in other principal cities.

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## *Office Notes*

*continued from page 254*

gineering under the firm name of **Terry-Rosenlund & Co., Consulting Engineers.** Offices are at 2525 McKinney Ave., Dallas.

**Arthur K. Hyde,** architect, has joined Eberle M. Smith Associates, Inc., Architects and Engineers, Detroit, as director of public and client relations.

Following the death of William Gladstone Merchant, William Gladstone Merchant & Associates, Architects, San Francisco, **Hans U. Gerson** has taken over the office. The firm name is now William G. Merchant and Associates; the address, the same.

**Robert L. Thorson** has been named an associate of Ulrich Franzen and Associates, Architects, 124 E. 40th St., New York.

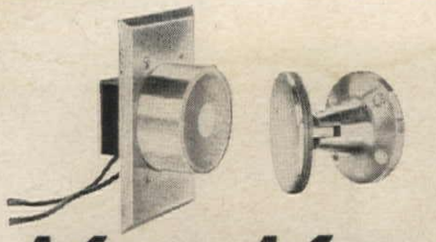
Oliver and Smith, A.I.A., Architects and Planners of Norfolk, Va., have announced three new senior associates and two associate promotions. Senior associates are: **Philip W. Hansen,** in charge of design; **Waverly C. Ormond,** in charge of production; and **Herbert A. Gygi,** in charge of supervision. New associates are **M. Ray Jordan** and **Frank C. Holton Jr.**

**Joseph W. Leinweber** has been named resident architect-engineer in Saigon, Vietnam by Smith, Hinchman and Grylls Associates Inc. of Detroit. There he will direct construction of a new medical complex for the International Cooperation Administration. Mr. Leinweber, who will spend two years in Saigon on the project, has recently returned from a two-year stay in Seoul, Korea, on a similar assignment for the Korea Joint Venture.

**Dr. Hannskarl Bandel** has become a general partner of the firm, Severud-Elstad-Krueger-Associates, 415 Lexington Ave., New York 17. **Jurgis Valaitis** and **William Gerber** are new associates.

**Richard G. Sawler** is now an associate of the firm, Clifford Douglas Stewart, Architect, 123 Newbury St., Boston 16.

Wm. N. Bonham, A.I.A., and Arthur C. Jones, civil engineer, have formed for the general practice of architecture and engineering the firm of **Bonham-Jones Associates.** Offices are at 600 North Sepulveda Blvd., Los Angeles 49, Calif.

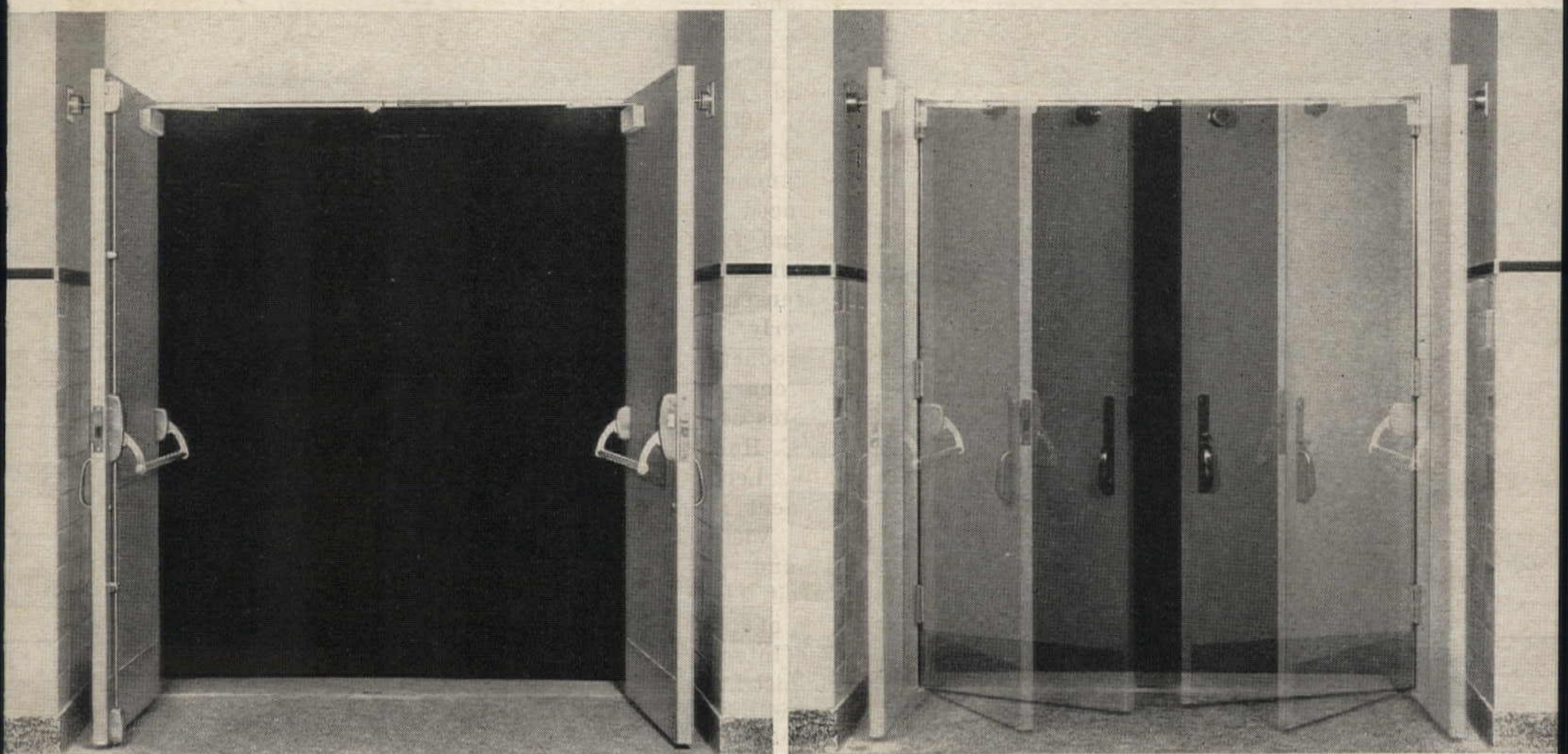


**MAGNAMATIC**

Patents applied for

# electromagnetic door holder

# A "fail-safe" holder for self-closing fire and smoke barrier doors. Self-contained and non-mechanical.



## Automatically releases on interruption of current. Used independently or with any fire or smoke detector system.

**The MagnaMatic Door Holder** represents an important breakthrough in the control of the spread of fire and smoke. It releases self-closing fire and smoke barrier doors from an open position, for simultaneous closing upon signal from any fire detector system or manual switch.

**The MagnaMatic Door Holder is "fool-proof" and "fail-safe."** That is, any interruption of the current, whether by detector, through power failure, or manual switch, deactivates the magnet and allows the doors to close. A signal from a fire or smoke detection device in any part of the building will release all doors simultaneously. Individual doors may be closed manually with ordinary effort, or released to close by an individual detector.

**Fire Marshals state that the MagnaMatic Door Holder represents a major breakthrough in the saving of lives and property,** by controlling the spread of fire and smoke. The National Fire Protection Association, The Fire Underwriters, Safety Officials and Code Officials have long wanted such a device. The MagnaMatic Door Holder complies with the description of the release device in the National Fire Codes, Volume 3, Section 101, paragraph 3209 (b), which requires an approved release device on barrier doors that are permitted to be held open.

The MagnaMatic Door Holder can completely remove the temptation to use "wedges" or other hazardous means to hold doors open.

The MagnaMatic Door Holder has no moving parts, is self-contained, requires no maintenance, is easily installed, and can be used with 120 or 24 volt AC current. Twenty of these devices can be operated for the kw cost of one 60 watt light.

Application for UL listing for Label Service has been made.

For more information contact your local Sargent Architectural Builders Hardware supplier, fire detection system supplier or write: Sargent & Company, New Haven 9, Connecticut.

**SARGENT**

THE NEWEST FASHION IN A COMPLETE LINE OF ARCHITECTURAL HARDWARE

For more data, circle 122 on Inquiry Card

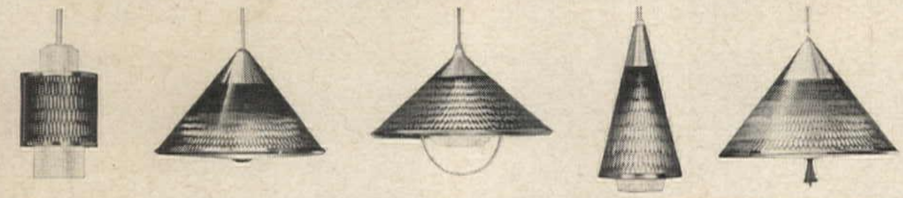
MOE LIGHT'S UNIQUE

# Honeycomb

## BRIGHT NEW IDEA IN DECORATIVE LIGHTING

There's nothing else quite like Honeycomb. Imaginatively, it creates unique visual effects from a blend of color and exciting new textures. Result: a family of 16 decorator-inspired styles, and distinct new beauty for your decorative commercial applications. See Honeycomb at Moe Light Distributors, or write for literature.


NEW FROM THOMAS INDUSTRIES



The shapes of Honeycomb . . . in emerald-blue, tangerine-gold and honey natural . . . pull-downs, pendants and close-to-ceiling.

**SEE THE HONEYCOMB FAMILY AT THESE SHOWROOMS. THEIR ADDRESSES ARE IN THE "YELLOW PAGES."**

**ALABAMA**
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Moore-Handley
Dothan: J. M. Sup.
Mack Elec. Sup.
Florence: S.B.S. Elec. Sup. Co.
Mobile: Clower Elec. Sup.
Montgomery: Teague Hardware
Noland Co. Inc.
Tuscaloosa: Cole Sup.

**ARIZONA**
Phoenix: Arizona Lighting Sup. Co.
Tucson: Billings Lighting Sup. Co.

**ARKANSAS**
Blytheville: Huffman Whlse. Sup.
Ft. Smith: Bruce Co.
Hot Springs: F. C. Stearns Hardware
Little Rock: Arkansas Elec. Co.
Fones Bros. Hardware

**CALIFORNIA**
Anaheim: Decore Lighting
Bakersfield: Kern Elec. Distributors
San Joaquin Whlse.
Stewart Elec. Sup. Co.
Burbank: Lighting Fixtures, Inc.
Costa Mesa: Allied Whlse. Elec. Co.
Covina: Lighting Dist.
Eureka: Campton Elec.
Long Beach: Fountain Lighting
Long Beach Elec. Co.
Los Angeles: Osipow Elec. Sup.
C. A. Ridgley Co.
Sam Rosen Lighting Co.
Modesto: Wille Elec. Sup.
Palm Springs: Tri-County Electrical Whlrs.
Pasadena: San Gabriel Valley Lighting Co.
Riverside: Soden Whlse. Elec. Co.
Tri-County Electrical Whlrs.
Sacramento: Valley Elec. Co.
San Bernardino: Tri-County Electrical Whlrs.
San Carlos: Savasta Elec. Sup. Co.
San Diego: Coast Elec. Co.
San Francisco: North State Elec. Sup. Co.
San Jose: Savasta Elec. Sup. Co.
San Luis Obispo: San Luis Obispo Whlse. Elec.
Santa Monca: Bay Lighting Co.
R. L. Doman Inc.
Santa Rosa: National Elec. Sup. Co.
Stockton: Valley Elec. Co.
Studio City: Liberty Lighting
Temple City: Temple City Lighting
Van Nuys: Van Nuys Lighting Co.
Whittier: Ranch House Lighting

**COLORADO**
Denver: Central Elec.
Poindexter Elec.
Grand Junction: Livran Elec.
Pueblo: Pueblo Elec.

**CONNECTICUT**
Bridgeport: Olschan Elec. Sup. Co.
Bristol: The Bristol Elec. Sup. Co.
Colchester: Nutmeg Lighting Fixture
& Elec. Sup. Co.
Danbury: Greene Elec. Sup.
Hartford: American Elec. Sup. Co.
The Sticklor Elec. Sup. Co.
Meriden: The Conn. Elec. Equip. Co.
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New Britain: Service Elec. Sup. Co.
Norwich: Higgins Elec. Sup. Co.
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Stamford: Elm Elec. Sup.
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Wilmington: Artcraft Elec. Sup. Co.

**FLORIDA**
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Hughes Sup.
Clearwater: Besco Elec. Sup.
Hughes Sup.
Morley Elec. Sup.
Daytona Beach: Hughes Sup.
Delray Beach: Atlas Elec. Sup.
Ft. Lauderdale: Atlas Elec. Sup.
Ft. Myers: Brockman Elec. Sup.
Ft. Pierce: Major Elec. Sup.
Gainesville: Hughes Sup.
Jacksonville: Ace Elec. Sup.
Jax Elec. Sup.
Lakeland: Polk Elec. Sup.
Leesburg: Besco Elec. Sup.
Miami: Farrey's Wholesale Hardware
Ocala: Besco Elec. Sup.
Orlando: Hughes Sup.
Panama City: Seaco Elec. Sup.
Punta Gorda: Brockman Elec. Sup.
St. Petersburg: Hughes Sup.
Sarasota: Brockman Elec. Sup.
Hughes Sup.
Tallahassee: Union Elec. Sup.
Tampa: Atlas Lighting, Inc.
Seminole Elec. Sup.
Venice: Hughes Sup.

**GEORGIA**
Albany: Albany Elec Sup.
Athens: DeVore and Johnson
Atlanta: Electrical Wholesalers
Noland Co. Inc.
Augusta: Georgia Elec. Sup.
Columbus: P & W Elec. Sup.
Macon: Lowe Elec. Co.
Marietta: Noland Co. Inc.
Rome: Wholesale Elec.
Valdosta: Union Elec. Sup.

**ILLINOIS**
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Chicago: Active Elec. Sup.
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Crystal Lake: Northern Illinois Elec.
Danville: Conron Inc.
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De Kalb: Crescent Elec.
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Forest Park: Bonny Elec.
Freeport: Koym Elec.
Herrin: Tri-State Elec.
Joliet: Joliet Elec.
Kewanee: May Elec.
La Salle: La Salle Elec.
Lyons: Scout Elec.
Mattoon: Central Wholesale
Mattoon Elec.
Mt. Vernon: Mt. Vernon Elec. Sup.
Peoria: Crescent Elec.
Kiefer Elec.
Quincy: Heintz Elec.
Rockford: Forest City Elec.
Henry Muntz & Sons
Springfield: Springfield Elec.
Sterling: Crescent Elec.
Urbana: Springfield Elec.

**INDIANA**
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Fort Wayne: Mossman-Yarnelle Co.
Gary: Aladdin Elec.
Indianapolis: Peerless Elec. Sup. Co.
Kokomo: Mid-States Elec. Sup.
Lafayette: Kirby-Risk Sup. Co., Inc.
Muncie: Universal Elec. Co., Inc.
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Carroll: Interstate Elec.
Cedar Rapids: Crescent Elec.
Van Meter Co.—
Council Bluff: Interstate Elec.
Davenport: Crescent Elec.
Des Moines: Collins & Co.
Dubuque: Crescent Elec.
Fort Dodge: Light Fixture Showroom
Marshalltown: Marshall Elec.
Mason City: Crescent Elec.
Ottumwa: Crescent Elec.
Rapid City: Crescent Elec.
Sioux City: Warren Elec.
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Kansas City: Foley Elec.
Leavenworth: Tholen Bros.
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Stratton-Baldwin Co.
Shreveport: Elec. Sup. Co., Inc.

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**MASSACHUSETTS**
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Gem Elec. Sup. Co.
Ralph Pill Elec. Sup. Co.
Henry L. Wolfer, Inc.
Brockton: Columbia Elec. Sup. Co., Inc.
Framingham: Inter-City Elec. Sup. Corp.
Gloucester: Gloucester Sup. Co.
Lawrence: Finberg Sup. Co.
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Noland Co. Inc.
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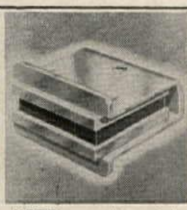
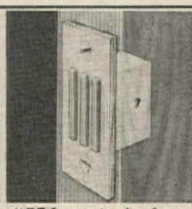
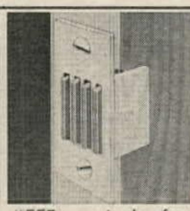


#555 snap-in catch for metal doors

#558 snap-in catch for metal doors

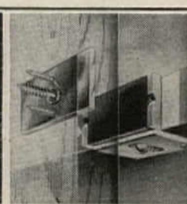


#556 catch for 1⅜" sliding doors



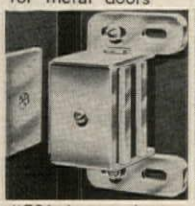
#557 catch for heavier sliding doors

#560 catch for cabinet doors



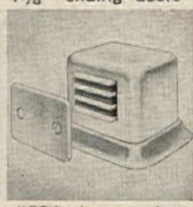
#570 catch for fine furniture

#590 catch for cabinet doors

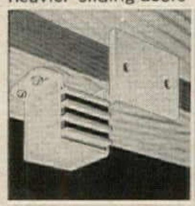


#591 heavy duty catch for cabinets

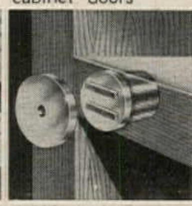
#592 extra heavy catch for doors



#594 heavy duty magnetic door stop



#595 magnetic door closer assist



#600 catch fits into ⅝" bore in shelf

#602 catch fits into ⅞" bore in door

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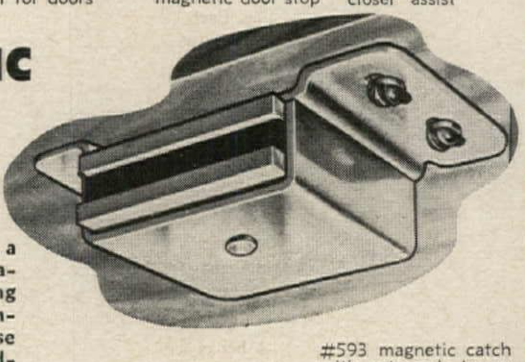

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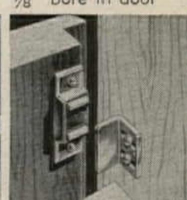

#1001 catch with plastic case

#1002 catch with plastic case

#1003 catch with plastic case

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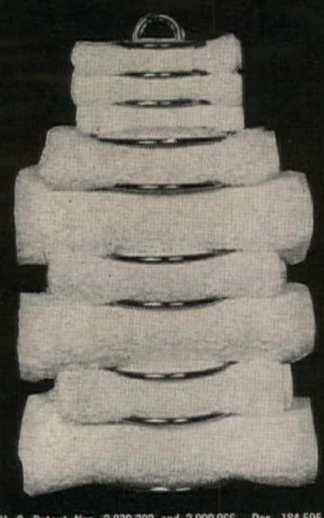

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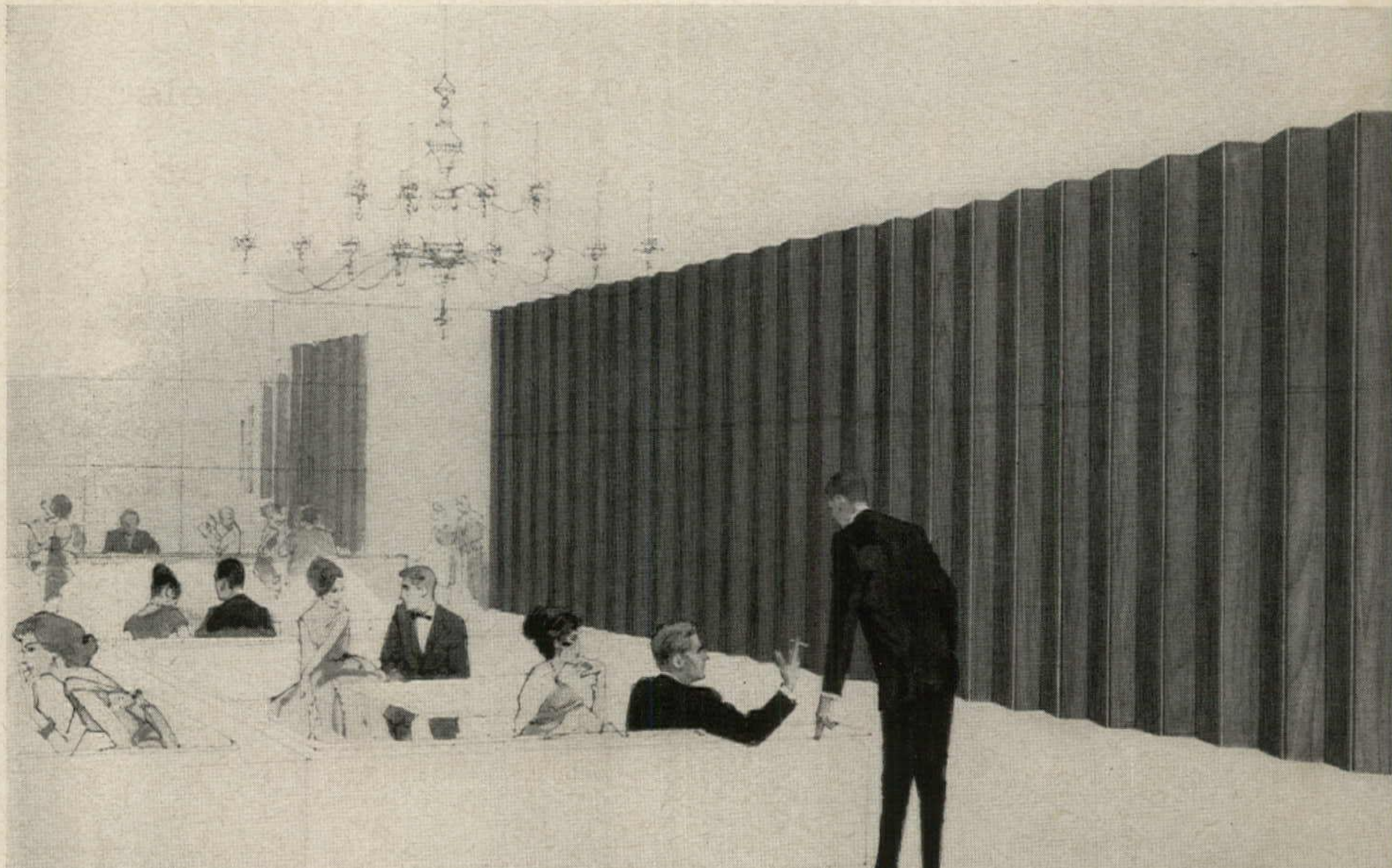

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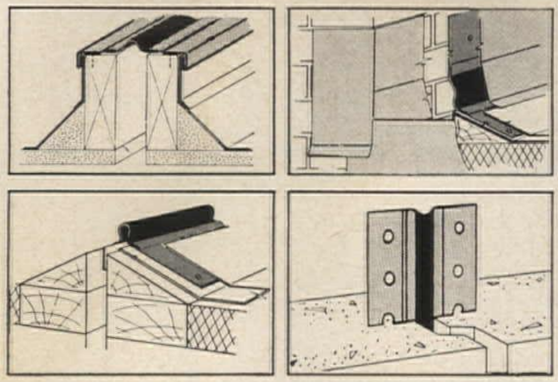

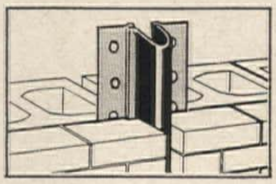

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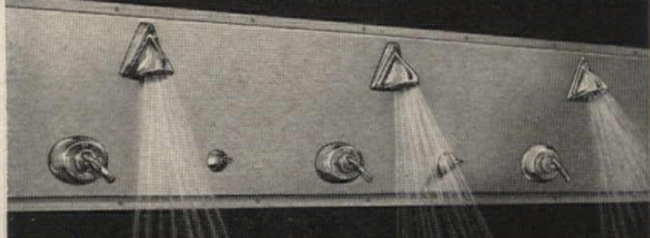

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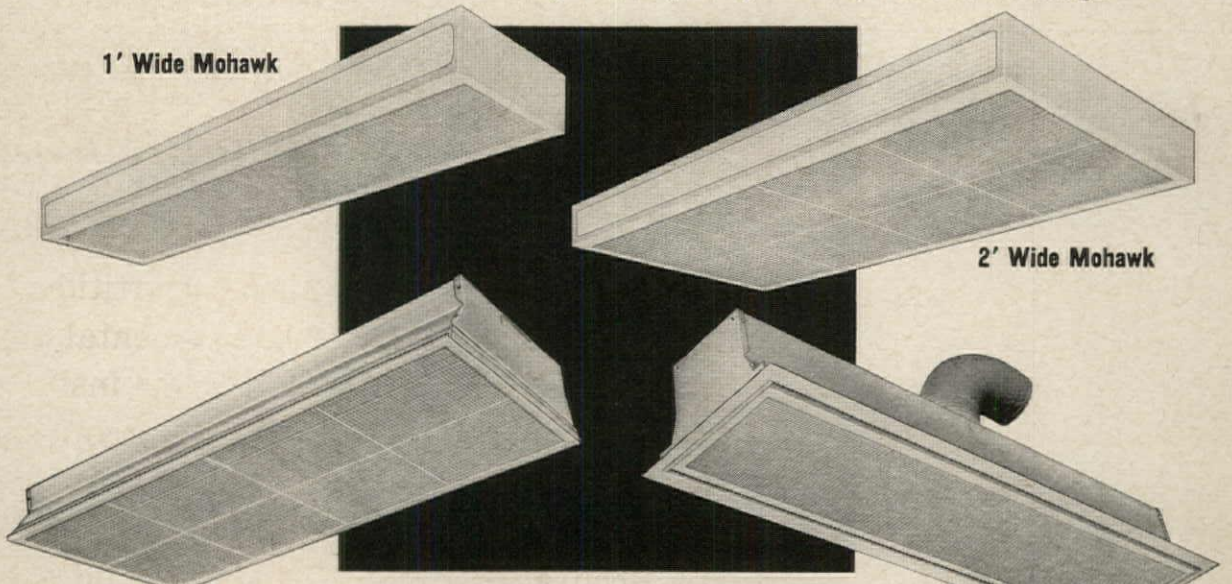


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Extremely versatile. Truly shallow. Suitable for most nationally-known ceiling systems. Wide choice of widths, lengths, lampages. Simple, fast installation. Concealed hinges and latches.

®Registered—Holophane Co., Inc.

**Sylvania's Sylva-flo Troffers**

Combines lighting and air-handling in one efficient unit. Offers outstanding lighting and mechanical qualities of Sylvania Troffers integrated with Multi-Vent system of low-velocity air diffusion.

Multi-Vent is a registered trademark of The Pyle-National Co.

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SYLVANIA LIGHTING PRODUCTS A Division of SYLVANIA ELECTRIC PRODUCTS INC. One 48th Street, Wheeling, West Virginia

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## Saves erection steps – provides anchorage and grounds

You reduce job time and costs on space-saving solid plaster partitions with this new track, because it: **1.** Eliminates ties or other supplemental fastening of channel studs or ⅜″ rib metal lath at the floor. **2.** Saves installation of separate plastering grounds by providing strong, straight grounds for both sides of the partition. **3.** Avoids lost time for repairs, since the strength of the inverted channel design protects the grounds against damage by on-site traffic. **4.** Provides quick, accurate 12″ or 16″ channel stud spacing — without premeasuring — through location of retaining slots 4″ o.c. Milcor Solid Partition Track is too new to be in Sweet's. Write for literature.

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*Milcor Metal Lath and Trim Products*

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**Inland Steel Products Company**

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BALTIMORE 5, BUFFALO 11, CHICAGO 9, CINCINNATI 25, CLEVELAND 14, DETROIT 2, KANSAS CITY 41, MO., LOS ANGELES 58, NEW YORK 17, ST. LOUIS 10, SAN FRANCISCO 3

ML-59

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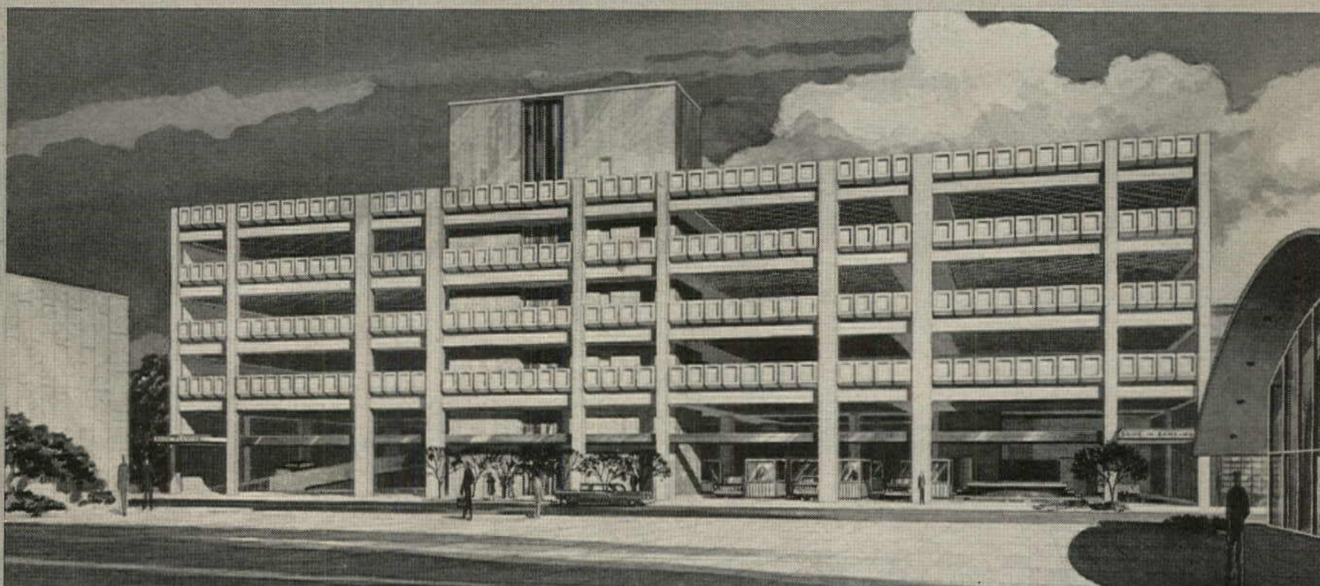
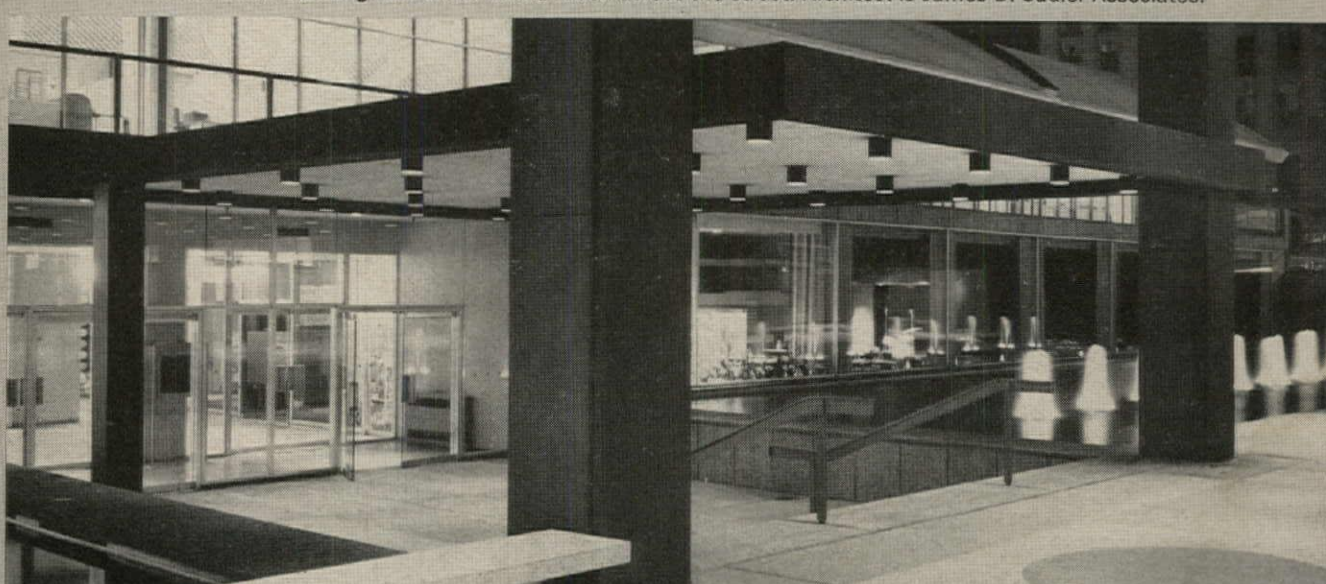
**Office building** and part of banking facilities at Denver U.S. National Center. Third building (not shown) at right rear.



**Motor Bank Building** now under construction across the street. Architect is James D. Sudler Associates.



**Courtyard** between buildings at top. One Honeywell control center will supervise heating-cooling equipment throughout complex.

# How much automation is practical for your buildings?

## Centralized automated control will save $17,000 per year at Denver U.S. National Center

**Installed as Center adds fourth building Honeywell automation will return 19% yearly on investment, pay for itself in 5¼ years, in savings on labor, power, depreciation**

Whether you are considering automation as an item in planning new construction, or as an improvement to an already existing structure, the experience of the Denver U.S. National Center could be helpful.

Three buildings have been in service for from three to seven years. A fourth is now under construction.

At an early stage in planning the newest building, Honeywell engineers and F. E. Stark, consulting mechanical engineer, made a cost comparison analysis of previous operating methods as against automated centralized control for all four buildings.

The study showed that under the old methods 3,874 manhours per year would be needed just to turn heating and air conditioning equipment on and off, to check temperatures and make adjustments.

But, with a Honeywell Selectographic* DataCenter installed this time would be cut to just 376 manhours per year—saving $10,320 in labor costs alone.

Further, the centralized control system would save $1,728 in electricity and steam each year, plus $5,000 in replacement and depreciation costs.

**Altogether, a saving of $17,048** per year—a 19% return on investment—or enough to pay for the control center and installation in just 5¼ years.

Using only present manpower, the Honeywell Selectographic* DataCenter will start and stop all air handling equipment in all four buildings; check and adjust temperatures; give instant reports of machinery operation (with an audible alarm for malfunction); and provide inter-com to every mechanical equipment room.

**So helpful in this instance,** central control is a basic step in automating *any* building's mechanical-electrical systems to wring maximum efficiency from equipment, cut a surprising waste in manhours, and plug needless leaks in fuel and power costs.

Today, however, central control is only the *beginning* of automation—ranging up to computer-guided systems that digest scores of variables, then instantly allocate the load to equipment for optimum results at minimum cost.

You'll want to keep abreast of the newest Honeywell developments, many of them offering your clients operational savings through concepts that were unavailable a few years ago.

**Honeywell automation specialists** will gladly discuss them with you, or work with you to make an automation analysis of any building.

Phone your nearest Honeywell office, check coupon, or write: W. N. Wray, Honeywell, Dept. AR6-92, Minneapolis 8, Minn. In Canada, write Honeywell Controls Ltd., Toronto 17, Ont.

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**Latest developments in automation.**
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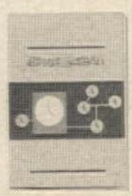

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Without obligation, please send Honeywell Planning Guides checked.

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TITLE, COMPANY________________

ADDRESS________________

CITY, ZONE, STATE________________

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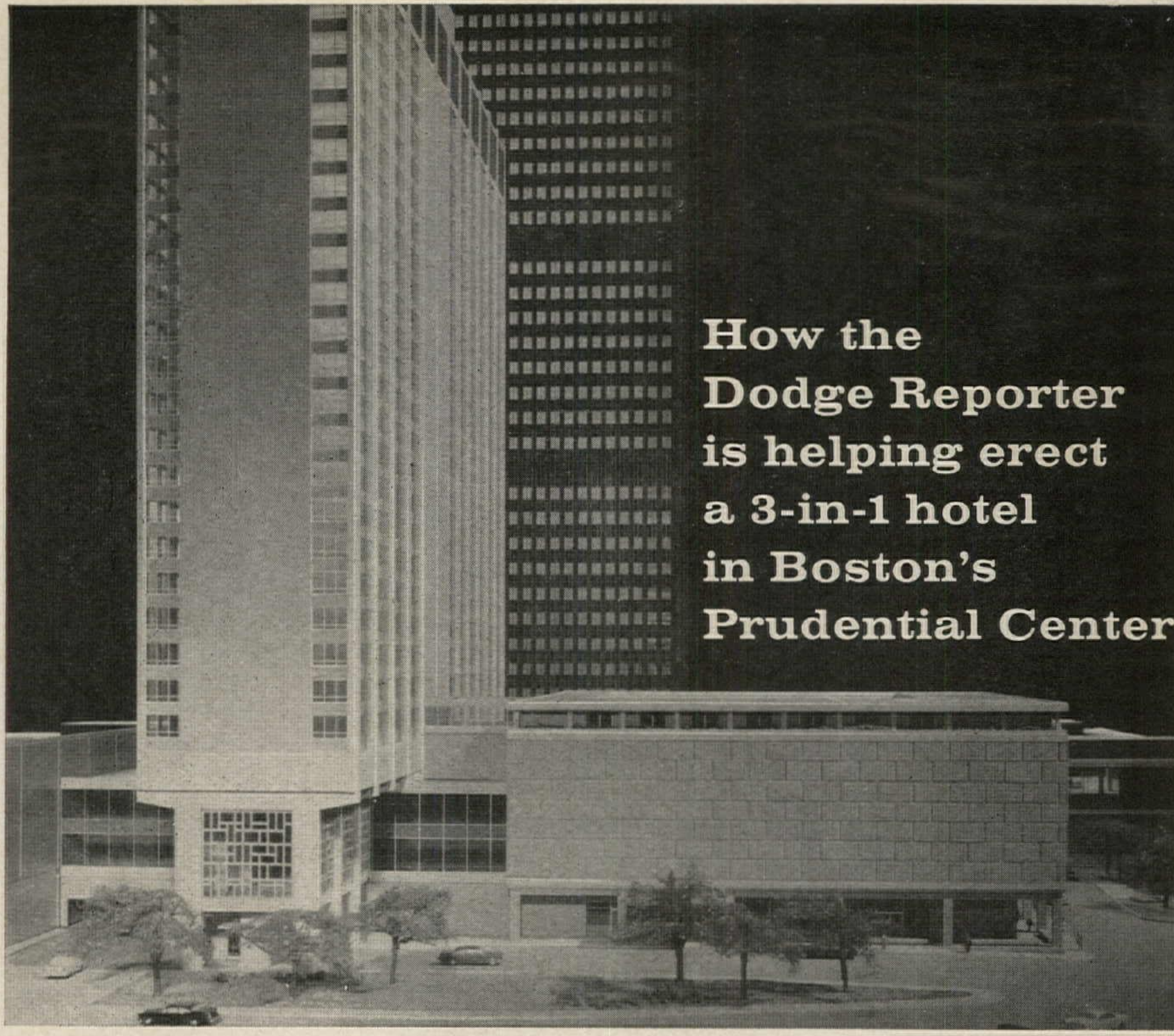


When Charles Luckman Associates took on the *Hotel America* project, it represented a planning problem as complex as that required by a 3-class passenger liner. Among the major considerations: the building had to be harmoniously integrated into the $100 million Prudential Center. It was planned to fulfill a multiplicity of private and civic needs. Three hotels in one, *Hotel America* combines the functions of a luxury residence tower, a commercial metropolitan hotel and a drive-in resort motor hotel. It will also serve the Boston area as a center for dining, convention facilities, shopping and entertainment, thus enabling the city to attract and accommodate large convention groups.

"When we were named as architects," said Mr. Luckman, "we informed the Dodge Reporter who visits us regularly. And as the project developed we kept him abreast of it. We also filed our plans in the Dodge Plan Room in Boston.

"Past experience has proved this to be the most efficient way to publicize our needs," he continued. "Dodge helps to create the kind of healthy bidding climate that we depend upon to achieve our job objectives inside the budget. From the start, Dodge Reports helped cut down excess office traffic by alerting suppliers who were conversant with our problems and knowledgeable enough to make accurate on-the-spot estimates."

Practical architects know that it is good practice to keep the Dodge Reporter constantly informed. Make him welcome in your office — as a service to yourself and to your clients.

Hotel America, Prudential Center, Boston, Mass.
*Architects:* Charles Luckman Associates
*Operator:* Hotel Corporation of America

*This imposing 1,000 room, 27-story edifice with separate entrances, individual staffs and complete facilities for each division will provide Boston with large convention facilities when completed in early 1965.*

*Its 5-story base will house dining and ballroom areas and several restaurants. Residence tower has private street entrance and separate bank of high speed elevators. The first three stories include drive-in motor hotel accommodations with many rooms overlooking swimming pool terrace. Direct access is provided by separate garage entrance and elevators.*

*To achieve identification by night without creating a garish facade, the hotel utilizes proper illumination, massing and color to make the unit attractive and inviting after dark.*

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# unlimited choice of louver sizes plus three shielding angles

*New* 45° SHIELDING
2½FT x 5FT SIZE

Louver size: 29-3/4" × 59-3/4"; +0", -1/16"
Cell opening: 9/16" × 9/16" × 9/16" high

**WITH UNEXCELLED LIGHTING PERFORMANCE FOR TODAY AND ALL FUTURE HIGH LIGHTING LEVEL REQUIREMENTS**

## LUXURY LIGHTING for FIXTURES, CEILINGS or MODULAR PATTERNS

**HIGH EFFICIENCY** As over 70% of the panel is open, and the ultra-violet resistent polystyrene has over a 50% transmission factor, the efficiency approximates an exposed lamp.

**HIGH MAINTAINED EFFICIENCY** As there is minimum area for dust collection, and dirt falls through, eliminating a dust film on the top side, high foot-candle, shadowless illumination is maintained.

**REDUCED GLARE** The height of the panel and the open cubes of the louver construction allow most light to come through instead of "brighting up" the panel. Accordingly, irritating and fatiguing glare is reduced without sacrificing light.

**AIR CIRCULATION** The open cubes allow free air circulation, enabling lamps and ballasts to operate cooler, increasing their efficiency and life.

**DIMENSIONALLY STABLE** The rigid, one piece construction provides a durable, impact resistant panel, impervious to scratching, tearing, washing or marring. American louvers' edges stay straight and are unaffected by temperature and humidity fluctuations. However, they can be cut to any specifications, offering unlimited design and installation flexibility.

**SIMPLE, LOW COST MAINTENANCE** American Plastic Louvers are destaticized to repel dust. Occasionally, if cleaning is required, simply dip in water and detergent—No wiping necessary.

55° SHIELDING
2FT x 4FT SIZE

Louver size: 23-11/16" × 47-11/16"; +0", -1/16"
Cell opening: 25/64" × 25/64" × 1/2" high

45° SHIELDING
2FT x 4FT SIZE
CHOICE OF TWO SIZES

Louver size: 23-7/16" × 47-1/2"; +0", -1/16"
Cell opening: 9/16" × 9/16" × 9/16" high

Louver size: 23-3/4" × 47-3/4"; +0, -1/16"
Cell opening: 1/2" × 1/2" × 1/2" high

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**FIRE HAZARD CLASSIFICATION**
(Based on 100 for Untreated Red Oak.)

| | |
|---|---|
| FLAME SPREAD | 130–160 |
| FUEL CONTRIBUTED | Over 100 |
| SMOKE DEVELOPED | Over 200 |

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*To meet more rigid specifications of the building codes, American Louver Co. now brings you a UNDERWRITERS' LABORATORIES, INC. label listing the use of American Louvers under conditions shown by their label.*

45° SHIELDING
3FT x 4FT SIZE

Louver size: 35-5/8" × 47-3/4" × 1/2" high
Cell opening: 1/2" × 1/2" high

Consulting or design assistance is available without obligation. Write for FREE sample kit.

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**LIGHTER WEIGHT** — 200-Series Stainless reduces weight by providing equivalent strength at thinner gages.

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# 200 SERIES Stainless Steel

THE 200-SERIES Stainless Steels have exceptional yield strength in the annealed condition — a yield strength that's 40% greater than that of corresponding 300-Series (18-8) stainless steels. Thus, in applications where the corrosion resistance is equally suitable, the 200-Series stainless steels can be used to create a lighter and more rugged product... at less cost.

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**GREATER STRENGTH**—200-Series Stainless increases load-carrying ability by offering greater strength at equivalent gages.

**LOWER COSTS**—200-Series Stainless cuts overall costs because its initial price is lower and less of it need be used.


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I am interested in technical data on 200-Series Stainless Steel. Please send me a copy of your new booklet: "200-Series Chromium-Nickel-Manganese Stainless Steels."

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TITLE____________________

COMPANY____________________

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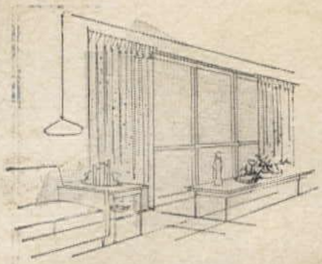
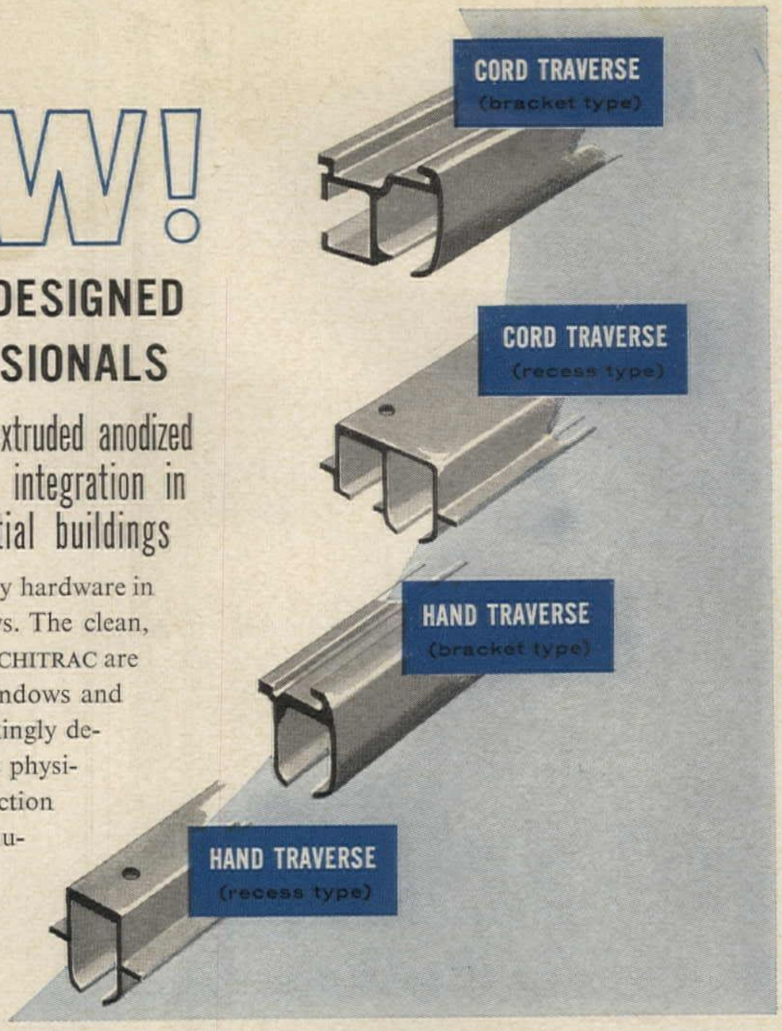


# NEW!

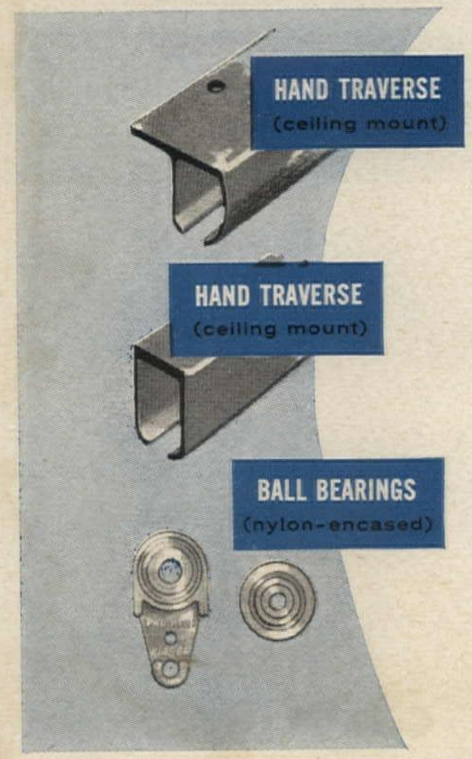
## DRAPERY HARDWARE . . . DESIGNED ESPECIALLY FOR PROFESSIONALS

### Kirsch ARCHITRAC provides six designs of extruded anodized aluminum traverse track and parts for integration in commercial, institutional and residential buildings

Now it is easy—and logical—to include drapery hardware in planning 'most any structure having windows. The clean, simple profile and satin-finished beauty of ARCHITRAC are highly compatible with modern aluminum windows and sliding glass doors. The product was painstakingly developed over a three-year period; it combines physical characteristics that ensure long-term satisfaction over a broad range of applications including humid and salt-air conditions. Scores of prestige installations attest its acceptance. Expert assistance in specifying is available.




# ARCHITRAC




- ✓ Developed for, and in collaboration with, registered architects, to ensure broad-range applicability, professional acceptance.
- ✓ Full range of types—for draw-cord or cordless operation—to be surface-mounted or recessed in ceiling.
- ✓ Nylon-encased ball bearing pulley and carrier elements ensure years of smooth operation, even in humid locations.
- ✓ Made in America—to highest standards—by Kirsch Company, the long-established world leader in the manufacture of high grade drapery hardware.

*Nationwide consultation service and product availability*

Special illustrated catalog in Sweet's; see it, or write for a copy. Ask for architects' price-estimating information, too.

**Kirsch**

**KIRSCH COMPANY, STURGIS, MICHIGAN**

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**This ceiling system**

**heats, too**

Heated or cooled air from the plenum passes through suspended ACOUSTONE Tile, via openings designed to assure proper penetration of air and optimum comfort level.

# AIRSON† Air Distribution System

YOU CAN HEAT as well as cool through an AIRSON System ceiling with amazing efficiency—for two good reasons. First, your heated (or cooled) air is pushed down into the room by means of pressure maintained in the plenum chamber. Second, the openings in each ACOUSTONE* Acoustical Ceiling Tile are sized, spaced, and *tapered* to penetrate air deep into the room. This overcomes the natural tendency of warm air to rise.

If a ceiling air distribution system doesn't offer *both* these features, it won't give the most desirable circulation and distribution of warm air.

Warm air or cool, an AIRSON System provides roomwide air distribution and comfortable air motion without stagnation—down where the people are . . . down where they can enjoy it. People enjoy the beauty and quiet supplied by the ACOUSTONE Ceiling Tile, too. Beauty, sound control, and comfort are part-and-parcel of an AIRSON System.

Consider all of AIRSON's advantages for any installation. Get more details from your U.S.G. Architect Service Representative; or write Dept. AR-28, 300 W. Adams St., Chicago 6, Ill.

**UNITED STATES GYPSUM**

the greatest name in building

*T.M. Reg. U.S. Pat. Off. †T.M. Reg. U.S. Pat. Off. by Airson Co., Inc.

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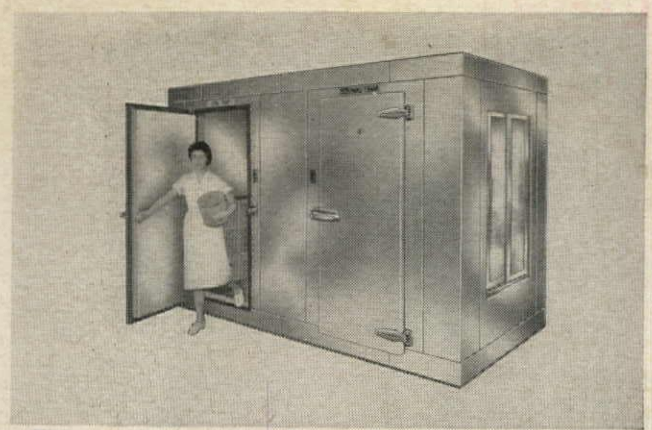
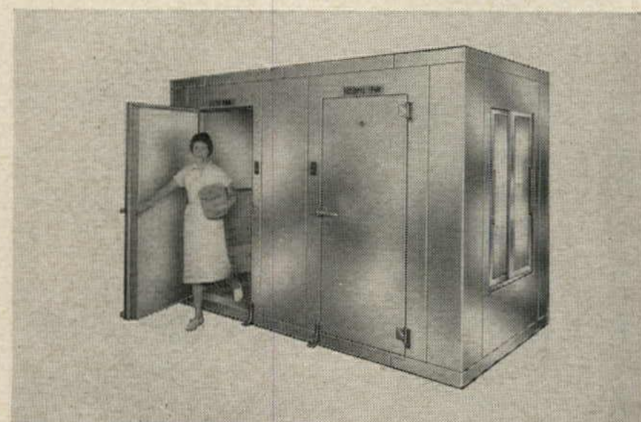


This was the world's most advanced design.



Until we made this one.

## Bally Walk-In Coolers and Freezers are now made with science's wonder insulation...Urethane "foamed-in-place"

The advantages of this new insulation represent a major design achievement that obsoletes all conventional insulated Walk-Ins ♦ With 97% closed cells it cannot absorb moisture . . . maintains peak efficiency, indoors or outdoors ♦ Insulating value is double . . . Bally 4" urethane equals 8½" of conventional insulation. Standard models ideal for use as minus 30° freezers ♦ Urethane, poured as a liquid, foams in place and binds tenaciously to the metal for great strength. Eliminates need for structural members. Replaces that space with insulation ♦ Lightweight urethane reduces weight to one-third for big freight savings . . . makes erection fast and easy ♦ Foamed door is extremely light in weight to open and close with little effort. Magnetic gasket provides positive seal ♦ Thinner walls increase usable space.

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.

**Write for free Architect's Fact File, complete with new Specification Guide, descriptive literature and technical booklet. Also see Sweet's Architect File 25a/Ba.**

Bally

Bally Case and Cooler, Inc.
Bally, Pennsylvania
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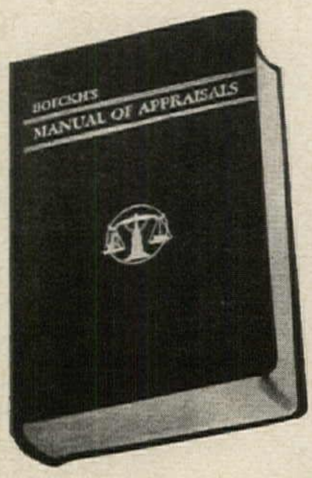


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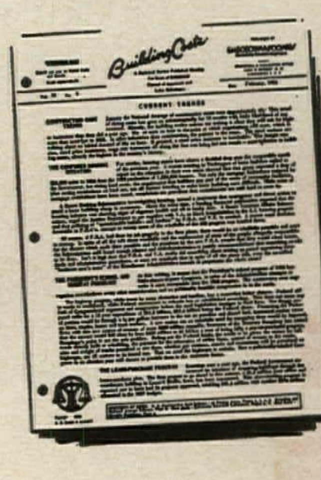


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# Remember the DIFFERENCE in Neoprene Structural Gaskets

All neoprene gaskets may *look* alike — but the differences in StanLock represent exclusive and important advantages to the architect, builder, glazier and owner. Here are the reasons:

## STANLOCK'S tempered locking strip

. . . is a separate, specially designed locking section made of harder, higher-density neoprene than the body of the gasket. While easily locked into the gasket upon installation, it applies *added pressure* at the sealing surfaces, providing a more positive seal where it is needed to prevent infiltration of water, air and dust.

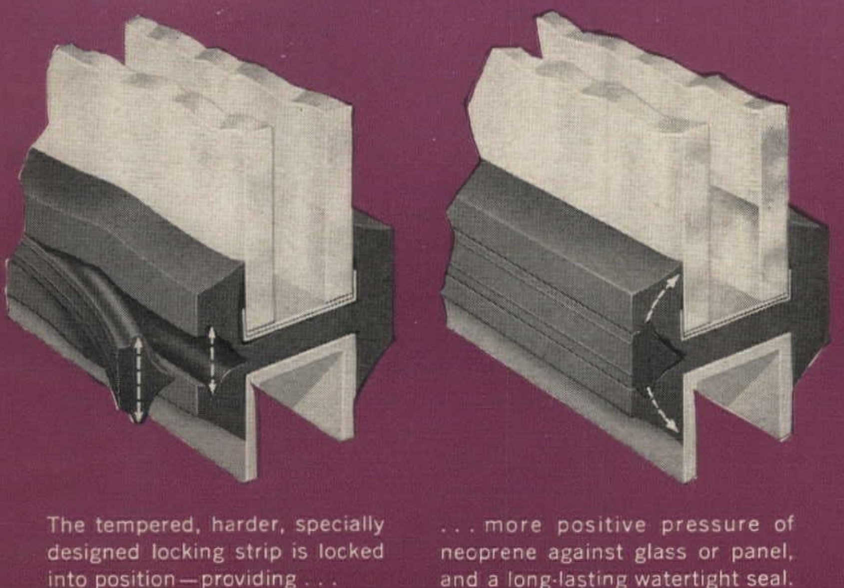
## STANLOCK'S time-proven neoprene compounds

. . . combine needed strength and relative resilience with maximum weathering properties. The right neoprene formulas, plus close control in compounding, give StanLock gaskets exceptionally long life. They meet the 25-year "actual" and the 50-year "desired" life requirements for structural seals. Hurricane wind tests have proved the resilience of StanLock to provide sufficient cushion, under severe wind loads or shock wave, to prevent glass breakage.

## STANLOCK'S versatility permits freedom in design

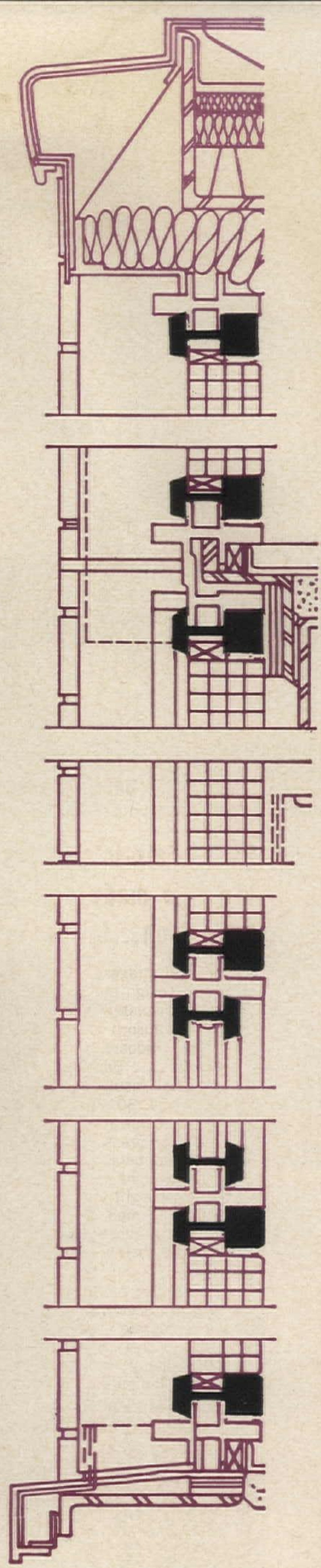
More than 24 different StanLock gasket sections are available from existing tooling. This great variety permits a wide range of curtainwall designs — in horizontal, vertical or grid applications — using glass or panel materials, in any combination with aluminum, steel, concrete or marble. Special sections are still being designed. The new StanLock catalog contains complete application data. Write for your copy.

## THE STANLOCK* LOCKING STRIP PRINCIPLE:



The tempered, harder, specially designed locking strip is locked into position—providing . . .

. . . more positive pressure of neoprene against glass or panel, and a long-lasting watertight seal.



*The Standard Products Co.*

**ARCHITECTURAL PRODUCTS DIVISION**
**316 Fisher Building · Detroit 2, Michigan**

See Sweet's 1962 Architectural File $\frac{3f}{St}$

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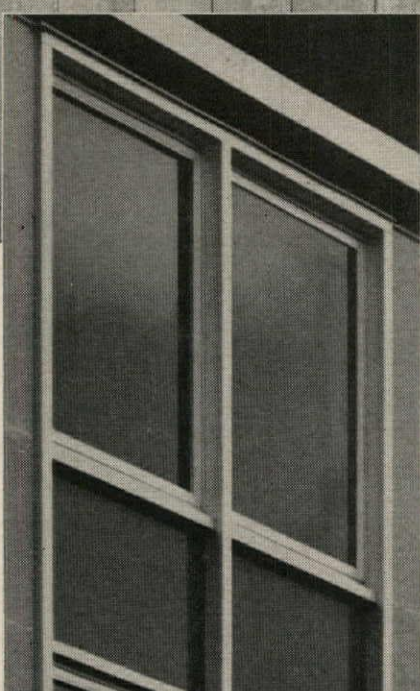
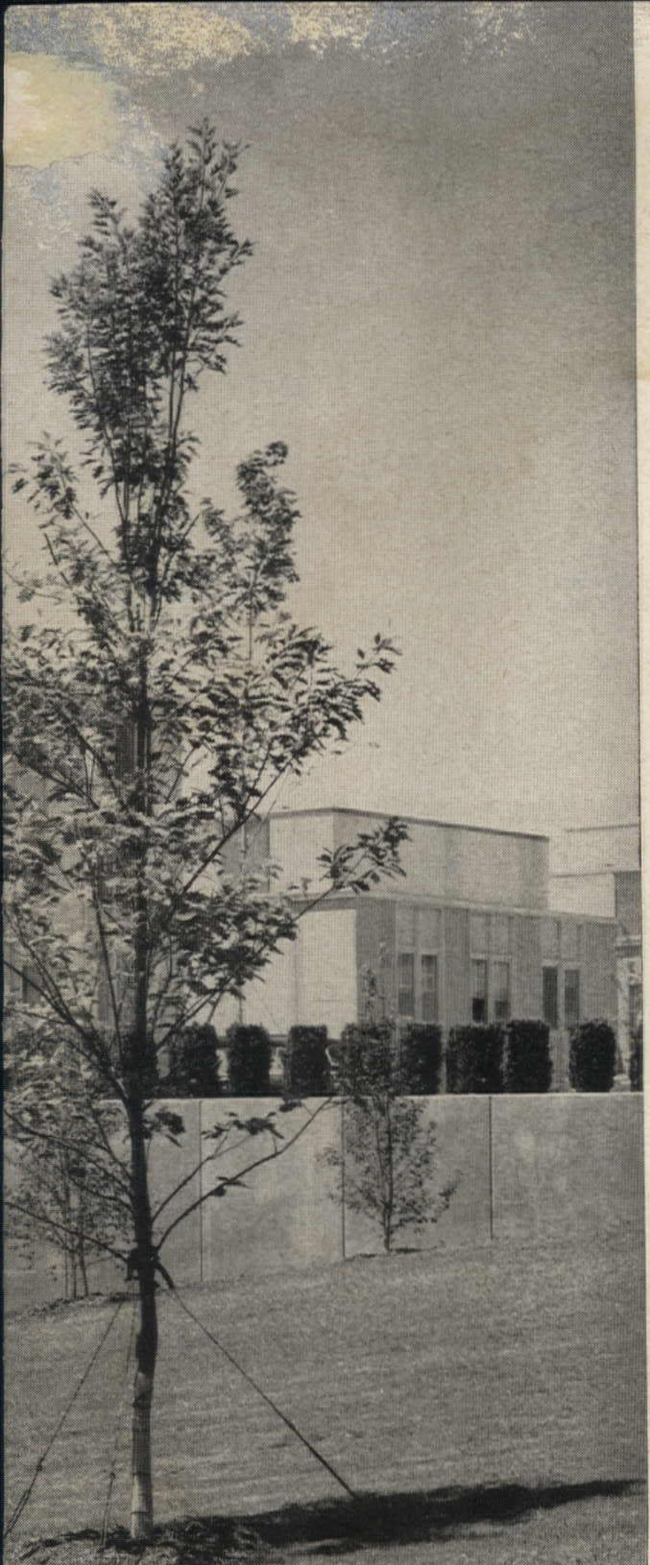


# NEW WINDOWS IN TRUSCON CURTAIN WALLS INCREASE DESIGN POSSIBILITIES

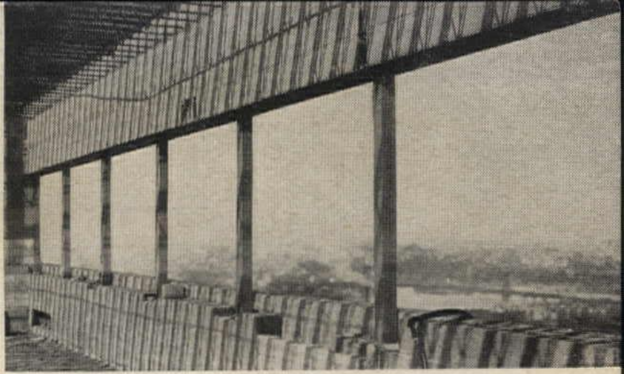
New Aluminum Vertically Pivoted Windows (illustrated) and Top-Hung Inswing Windows in Curtain Walls by Truscon, a division of Republic Steel Corporation, provide welcome new freedom in design and application.

Vision-Vent® and Grid-Vue are Truscon's Curtain Walls with the windows already in place. Their built-in, pre-engineered economies, combined with an ever wider choice of aluminum window types, make Truscon first choice for more and more outstanding new buildings.

Truscon Curtain Walls are available in many window sizes, with a choice of high-gloss panel colors, porcelain enamel, stainless steel, or aluminum. For all the advantages of modern curtain wall construction (fast erection, reduced weight on foundation, more usable interior space, excellent insulation and ventilation), investigate Truscon Vision-Vent and Grid-Vue. See your Truscon representative or send coupon.



**THE NEW KOPPERS RESEARCH CENTER,** east of Monroeville, Pa., is doubly striking with its tall Aluminum Vertically Pivoted Windows in Truscon's Vision-Vent Curtain Wall. Panel shapes complement perfectly the clean, crisp lines of other wall materials and decor.



**REPUBLIC'S NEW HIGH STRENGTH STRUCTURAL STEEL TUBING** provides needed strength in columns, posts, lintels, spandrels, and other structurals—for fewer dollars. Lightweight strength cuts cost of footings and foundation; simplifies handling, fabrication, and erection. Easily joined, highly adaptable. Send coupon for Republic's new specifications booklet about ELECTRUNITE® Structural Steel Tubing with 36% more strength.

**SAVE CONSTRUCTION TIME** with Republic's New Heavy Head High Strength Bolt Assemblies. Two-man team replaces costly erection crews. When wrenched up tight, Republic High Strength Bolts provide a vise-like clamping force which transfers loads by friction to the structural members. Fatigue life is improved. Joints are stronger than connections where loads are carried in shear. Send coupon for illustrated folder.

**THE NEW CANTON CITY HALL, CANTON, OHIO,** takes full advantage of Republic's ENDURO® Stainless Steel: in mullions, column sheathing, curtain wall panels, rooftop equipment, doors, windows, elevator interiors, soffits, fasciae, and curtain wall back-up members. Need for painting was eliminated, cleaning reduced, maintenance minimized. For further information contact your nearest Republic representative or check Sweet's.

# REPUBLIC STEEL

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**REPUBLIC STEEL CORPORATION**
**DEPT. AR-4194-A**
**1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO**

Please send more information on:
☐ Truscon Vision-Vent Curtain Walls
☐ Republic High Strength Structural Bolt Assemblies
☐ ENDURO Stainless Steel for architectural applications
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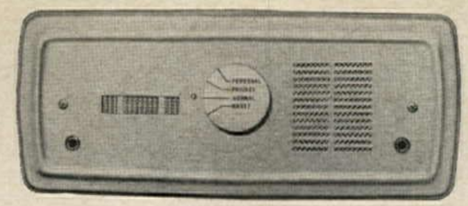
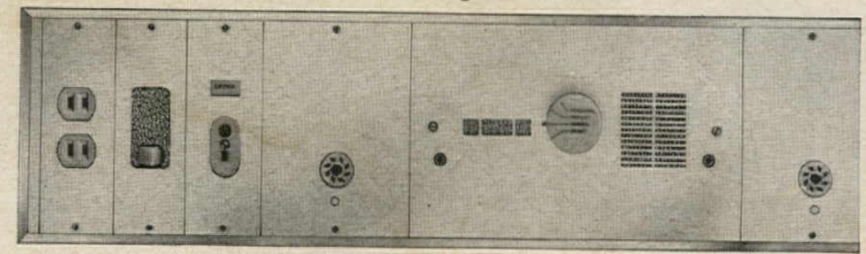
**FOR FORWARD-THINKING HOSPITALS—**

## *The New Auth Series 4000 Nurses' Call Systems*





## *The First Nurses' Call System to Offer All Three...*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**2. WIDEST SELECTION OF SERVICE FACILITIES FOR PATIENTS.** These range from nurses' call only to provision for connection of additional facilities, as selected, at each patient's bedside—in modular form and in one enclosure. These facilities are: 110 volt receptacle, TV, radio, oxygen, vacuum, telephone, etc.

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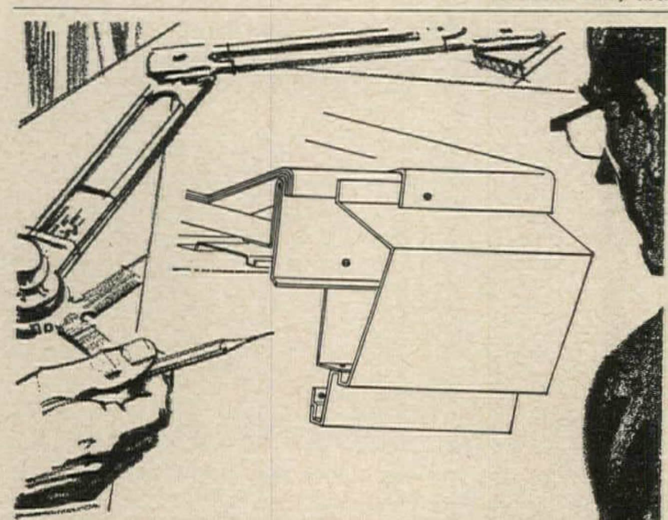

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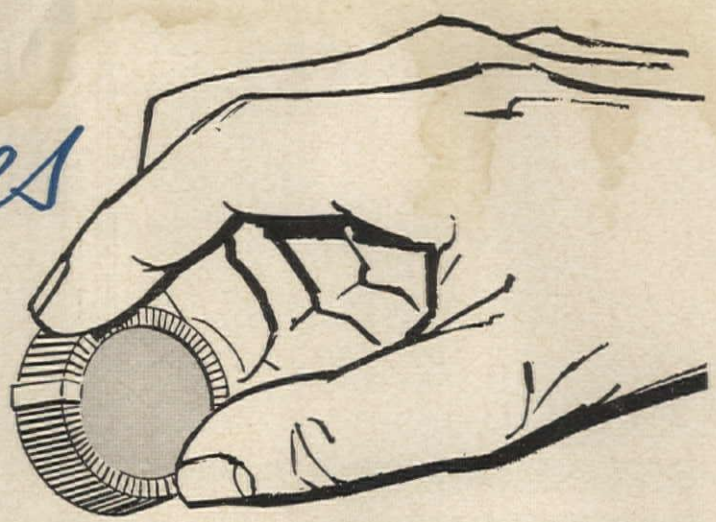

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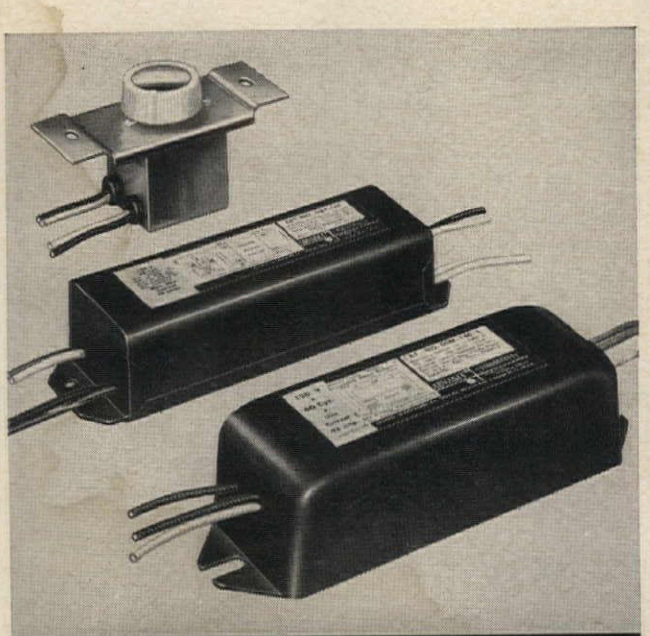

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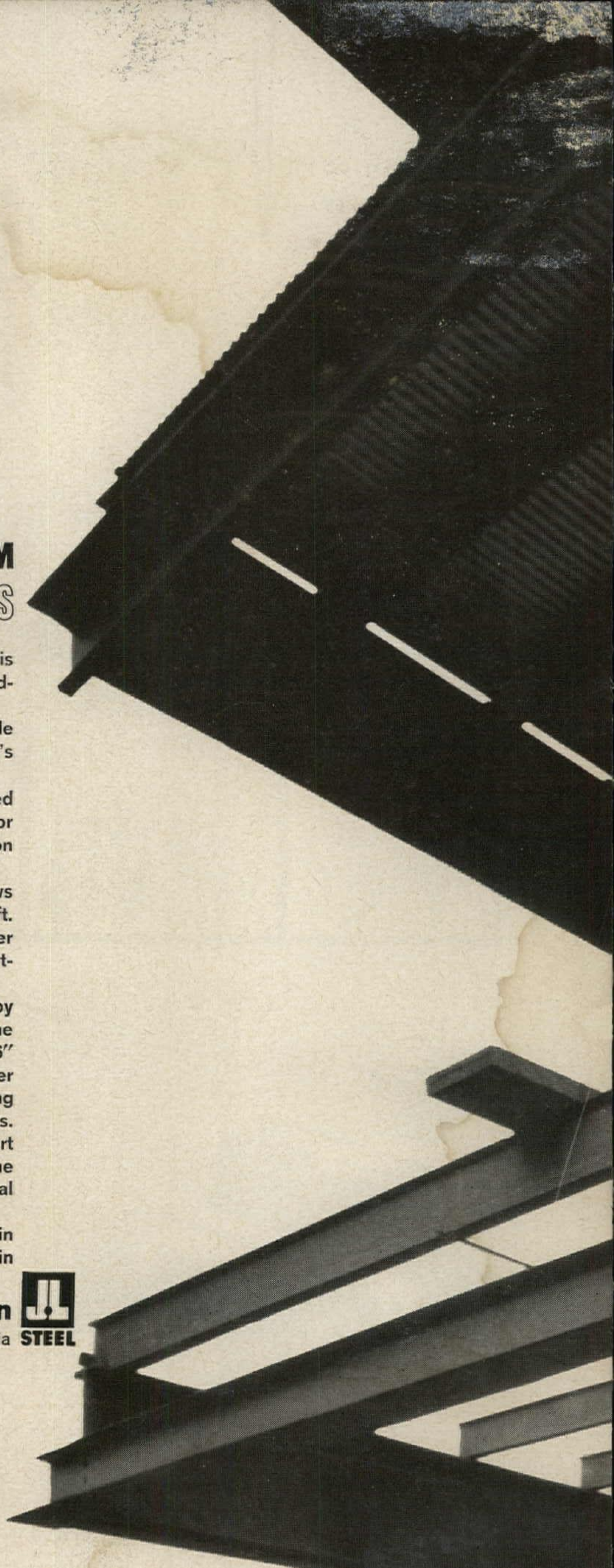

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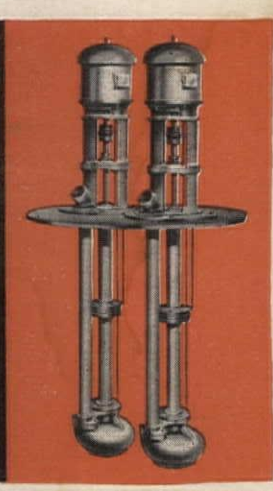

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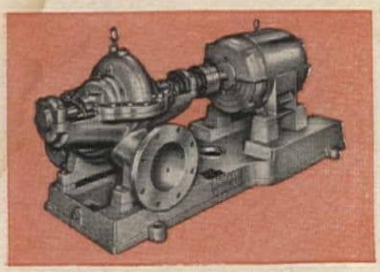

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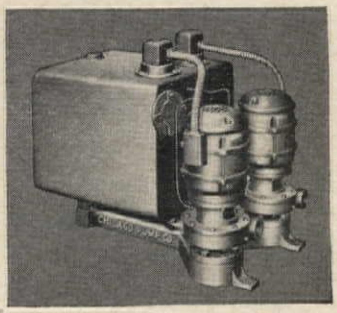

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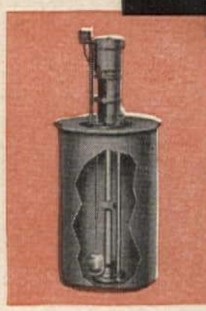

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